ADDENDUM

11.2.2 AMENDMENT 67, WALLCLIFFE HOUSE, FOR INITIATION

LOCATION/ADDRESS   Lot 101 Wallcliffe Road Margaret River
APPLICANT/LANDOWNER Taylor Burrell Barnett Town Planning & Design
FILE REFERENCE     LND/1/67
REPORT AUTHOR      Matt Cuthbert, Strategic Project Officer
AUTHORISING OFFICER Dale Putland, Director Sustainable Development

This addendum provides a correction to the published report and additional appendices;

Correction to an administrative error in the report

Reference in the report (pages 27 and 30) to a future hotel catering for 40 guests is incorrect. The proponent has advised that the intention is to provide 40 rooms, across accommodation of all types.

Pg 27. ‘The proponents have also advised that the hotel will be designed to cater for 40 rooms guests, rather than 50 as previously put forward.’

Pg 30 ‘Changes to the concept plan to reduce the scale of development have also been made as previously discussed and the hotel is now intended to accommodate no more than 40 rooms guests.’

Appendices in support of the Scheme Amendment Request

Appendices are attached.
APPENDIX A
BUSHFIRE MANAGEMENT PLAN
Document Control

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Report issued for client comment.

Minor updates following client review.

Updated to address revised scheme amendment.

Minor text updates based on client review.

Disclaimer:

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This document has been prepared primarily to consider the layout of development and/or the appropriate building construction standards applicable to development, where relevant. The measures outlined are considered to be prudent minimum standards only based on the standards prescribed by the relevant authorities. The level of bushfire risk mitigation achieved will depend upon the actions of the landowner or occupiers of the land and is not the responsibility of the author. The relevant local government and fire authority (i.e. Department of Fire and Emergency Services or local bushfire brigade) should be approached for guidance on preparing for and responding to a bushfire.

Notwithstanding the precautions recommended in this document, it should always be remembered that bushfires burn under a wide range of conditions which can be unpredictable. An element of risk, no matter how small, will always remain. The objective of the Australian Standard AS 3959-2018 is to “prescribe particular construction details for buildings to reduce the risk of ignition from a bushfire while the front passes” (Standards Australia 2018). Building to the standards outlined in AS 3959 does not guarantee a building will survive a bushfire or that lives will not be lost.

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Executive Summary

Wallcliffe House Pty Ltd (the proponent) are progressing a scheme amendment to support the redevelopment of Lot 101 Wallcliffe Road, Prevelly (herein referred to as ‘the site’) which is located within the Shire of Augusta Margaret River. The site is approximately 5.2 ha in size and is located approximately 7 km south-west of the Margaret River townsite. The site is generally bounded by the Margaret River and associated fringing riparian vegetation to the north-west, a nature reserve to the south and existing residential and tourism (chalet and camping land uses) to the east (which includes the Margaret River rowing club).

The site is currently zoned ‘tourism’ under the Shire of Augusta Margaret River Local Planning Scheme (LPS) No.1. The scheme amendment is proposed in order to broaden the permitted land uses within the site to support the development of a luxury boutique hotel with up to 50 rooms through enabling other uses such hotel, chalet, guesthouse and ancillary and related uses consistent with the heritage values of the land. A development concept plan has been prepared by Spencer Fung Architects and MJA Studio to support the scheme amendment.

The site contains important heritage, vegetation and landscape values (including significant mature cultivated gardens and views to Margaret River and the surrounding land) that are intrinsic to the existing state and local heritage listing of the site and are important to the local community’s sense of place. This includes one of the original farms and homesteads built by the Bussell family (also known as ‘Wallcliffe House’), with construction of the original buildings commenced in 1858. While the majority of existing buildings within the site were irreparably damaged by a bushfire in 2011 and cannot be restored, these are proposed to be rebuilt and appreciated in a more contemporary manner based on the previous architectural styles. This, coupled with the retention of the landscape values within the site, will enable the cultural heritage values of the site to be maintained but also support the creation of a world-leading tourism and accommodation development.

The site is currently identified as a ‘bushfire prone area’ under the state-wide Map of Bush Fire Prone Areas prepared by the Office of Bushfire Risk Management (OBRM 2019). The identification of an area within a declared bushfire prone area necessitates further assessment of the bushfire risk and the suitability of the proposed development to be undertaken in accordance with State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7) (WAPC 2015) and the Guidelines for Planning in Bushfire Prone Areas Version 1.3 (the Guidelines) (WAPC and DFES 2017). Relevant to the proposed development within the site, the management of bushfire risk has also been considered in the context of Position Statement: Tourism land uses within bushfire prone areas (WAPC 2019a).

The overarching purpose of SPP 3.7 and its policy intent, is best summarised as preserving life and reducing the impact of bushfire on property and infrastructure through effective risk-based land use planning. Importantly SPP 3.7 requires the determining authority to apply its consideration to the satisfaction of the precautionary principle as provided at clause 6.11.
Pursuant to the considerations required by SPP 3.7, this Bushfire Management Plan (BMP) examines various responses to the likely long-term bushfire risk (following development) that will make the ultimate use of the land suitable for its intended purpose. As part of this, a bushfire attack level (BAL) assessment has been undertaken to determine the associated bushfire risk, the applicable BAL ratings (if any) across the site, and in turn the building siting and construction response that will achieve compliance with the bushfire protection criteria and satisfy the precautionary principle.

As part of assessing the long-term bushfire risk to the site, the vegetation within 150 m of the site has been classified in accordance with *Australian Standard AS 3959: 2018 Construction of buildings in bushfire prone areas* (Standards Australia 2018) (AS 3959). The following bushfire hazards were identified in the post-development scenario:

- Forest (Class A) vegetation, related to the riparian vegetation associated with the Margaret River, adjacent to the western and north-western boundary of the site, as well as forest vegetation to the south of the site, south of Wallcliffe Road reserve. A small area of forest vegetation was also identified adjacent to the driveway access into the site.
- Woodland (Class B) vegetation, located to the east and south-east of the site. These areas appear to be subject to some fuel load management, however had a higher load of leaf litter, so have been identified as woodland.
- Scrub (Class D) vegetation, located to the south of the site within Wallcliffe Reserve and associated with areas of coastal heath on outcropping limestone.

The BAL assessment completed for the site indicates that the majority of the site is subject to a BAL rating of BAL-29 or less, with a large portion of the site achieving a BAL rating of BAL-12.5. Areas around the periphery of the site, adjacent to the Margaret River to the west and Wallcliffe Road to the south are subject to a BAL rating of BAL-40 or BAL-FZ and may result in some of the proposed buildings being subject to a BAL rating of BAL-40 or BAL-FZ.

For the proposed buildings potentially impacted by a BAL rating of BAL-40 or BAL-FZ, it is likely that the extent of each BAL rating associated with the forest vegetation adjacent to the Margaret River could be reduced through the application of a Method 2 BAL assessment due to the fire run being less than 100 m in width (with the riparian vegetation adjacent to the site varying between 0 m and 25 m in width). This can be further explored as part of detailed design and prior to building licence. For the purpose of this BMP, and expediency facilitated by considering a worst case, the proposed buildings affected by a BAL rating of BAL-40 or BAL-FZ have been assessed as ‘unavoidable’ development and a further justification in accordance with clause 6.7.2 of SPP 3.7 has been made.
Overall, the outcomes of this BMP demonstrate that as development progresses, it will be possible for the intent of the bushfire protection criteria outlined in the Guidelines to be satisfied. This includes:

- **Location:** all proposed habitable buildings can be located in an area subject to a low or moderate bushfire hazard, given buildings are located in areas identified as low threat vegetation in accordance with Section 2.2.3.2 of AS 3959, some of which are within 100 m of ‘moderate’ or ‘extreme’ hazards and are therefore identified as ‘moderate’. However, in accordance with Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design November 2019 (WAPC 2019b) it is noted that there is the potential that not all buildings will achieve a BAL rating of BAL-29 or less. This is discussed further with regard to Element 2.

- **Sitting and Design:** Based on protecting the heritage, vegetation and landscape values of the site, bushfire impact to people, property and infrastructure is proposed to be minimised through:
  - Providing separation between habitable buildings and bushfire hazards to achieve a BAL rating of BAL-29 or less.
  - Where a BAL rating of BAL-29 or less cannot be achieved, constructing buildings to satisfy BAL-40 or BAL-FZ in accordance with AS 3959. This will improve the buildings resilience to bushfire attack. The previous buildings within the site did not have this benefit when subject to bushfire attack from the 2011 bushfire, with embers impacting on the wooden roof shingles causing the buildings to burn from the inside out.
  - Ensuring all habitable buildings have an exit located away from the main area of bushfire hazard, located to the south (Wallcliffe Reserve) and west/north-west (Margaret River) of the site.
  - Providing onsite fire-fighting capabilities, which will likely include a static water supply (supplemented by the irrigation system), and may also include building protection features such as automatic sprinkler systems.

- **Vehicular Access:** appropriate vehicle access can be provided, with the site able to access Wallcliffe Road, an existing public road that provides egress to Caves Road and Margaret River townsities to the east/north-east and Prevelly to the west/south-west. The internal private driveway is able to satisfy the requirements of the Guidelines, and in particular achieves the minimum horizontal clearance (4 m-wide) and provides suitable turn around areas for fire appliances.

- **Water:** Existing fire hydrants are currently located on Wallcliffe Road, directly east of the site and are located within 600 m of the proposed habitable buildings (and therefore are within 20 minutes turn-around). Additional static water supply is also proposed to be accommodated with the site (due to the potential for power outages to affect the reticulated water supply) and will be independent of mains power and water. The size of the tank will be determined in consultation with the Shire of Augusta Margaret River.
In addition to the above, policy measure 6.6 of SPP 3.7 requires any proposal relating to a vulnerable or high-risk land use subject to a BAL rating of BAL 12.5 or higher to address the applicable policy provisions, and at scheme amendment, this generally means ensuring that provision has been made for emergency evacuation. The proposed development is likely to be considered a ‘vulnerable’ land use and is able to address policy measure 6.6 based on the following:

- Bushfire impact will be minimised through the provision of suitable separation between bushfire hazards and and/or application of increased construction standards in accordance with the requirements of AS 3959.
- The proposed development will have appropriate direct access to Wallcliffe Road, providing for vehicle access that is available and safe during a bushfire with access to Caves Road/Margaret River townsite and Prevelly. In addition, given the proposed development will be permanently staffed, informed evacuation processes will be able to be implemented, and furthermore, there is sufficient space within the managed gardens that can provide a safer place if evacuation is not possible.
- Suitable vehicle access will be provided within the site allowing for vehicles to pass each other on the entrance road and to turn-around as required.
- The site will be subject to a high level of management based on the existing landscape values (which includes mature cultivated gardens that are irrigated and regularly subject to weed control and removal of dead material) and the proposed luxury boutique hotel.

The management/mitigation measures outlined in this BMP will mean that the intent of the bushfire protection criteria as outlined within the Guidelines, and in the context of Position Statement: Tourism land uses within bushfire prone areas (WAPC 2019a), can be addressed through either an alternate or acceptable solution, and having regard to clause 6.11 of SPP 3.7, the precautionary principle has been satisfied and bushfire risk can be appropriately managed.
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Appendix A

Wallcliffe House concept plan (MJA Studio 2019)

Appendix B

Additional photographs
List of Abbreviations

Table A1: Abbreviations – General terms

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<td>Australian Height Datum</td>
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<td>Australian Standard</td>
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<td>Asset Protection Zone</td>
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<td>BAL</td>
<td>Bushfire Attack Level</td>
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<td>Bushfire Management Plan</td>
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<td>BPAD</td>
<td>Bushfire Planning and Design</td>
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<td>EEP</td>
<td>Emergency Evacuation Plan</td>
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<td>ESL</td>
<td>Emergency Services Levy</td>
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<td>FDI</td>
<td>Fire Danger Index</td>
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<td>Flame Zone</td>
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Table A2: Abbreviations – Organisations

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<td>DBCA</td>
<td>Department of Biodiversity Conservation and Attractions</td>
</tr>
<tr>
<td>DoW</td>
<td>Department of Water (now known as Department of Water and Environment Regulation)</td>
</tr>
<tr>
<td>DFES</td>
<td>Department of Fire and Emergency Services</td>
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<td>Office of Bushfire Risk Management</td>
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### Table A4: Abbreviations – Planning and building terms

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1 Introduction

1.1 Background

Wallcliffe House Pty Ltd (the proponent) are proposing to redevelop Lot 101 Wallcliffe Road, Prevelly (herein referred to as ‘the site’) for tourism purposes. The site is located within the Shire of Augusta Margaret River and is approximately 5.2 ha in size and is found approximately 7 km south-west of the Margaret River townsite. The site is generally bounded by the Margaret River and associated riparian vegetation to the north-west, a nature reserve to the south and existing tourism land uses and residences to the east.

The site contains one of the original farms and homesteads built by the Bussell family (also known as ‘Wallcliffe House’), with construction of the original buildings commenced in 1858. The site was home to a number of large sandstone buildings and ancillary buildings, as well as a significant cultivated garden (and dairy), however the buildings were significantly damaged as a result of ember attack from a bushfire in 2011. The site has not been used for residential or tourism purposes since 2011 due to the damage from the bushfire although the cultivated gardens and grounds surrounding the buildings have continued to be maintained to a high standard.

Spencer Fung Architects and MJA Studio have prepared a concept plan to support the proposed redevelopment of the site (shown in Appendix A), which will include progressing an amendment to the Shire of Augusta Margaret River Local Planning Scheme No.1. The scheme amendment is proposed to broaden the permitted tourism land uses under the existing ‘tourism’ zoning to enable other uses such hotel, chalet, guesthouse and ancillary and related uses consistent with the heritage values of the land.

The entire site is currently identified as a ‘bushfire prone area’ under the state-wide Map of Bush Fire Prone Areas prepared by the Office of Bushfire Risk Management (OBRM 2019) and is shown in Plate 1 below. The identification of an area within a declared bushfire prone area necessitates further assessment of the bushfire risk and suitability of the proposed development to be undertaken in accordance with State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7) (WAPC 2015) and the Guidelines for Planning in Bushfire Prone Areas Version 1.3 (the Guidelines) (WAPC and DFES 2017).
1.2 Aim of this report

The aim of this BMP is to assess bushfire hazards within the site and nearby areas and ensure that the threat posed by any identified hazards can be appropriately mitigated and managed and demonstrate satisfaction of clause 6.11 of SPP 3.7, the precautionary principle. It has been prepared to support the proposed scheme amendment for the site and associated future development processes and addresses the requirements of SPP 3.7 (WAPC 2015), the Guidelines (WAPC and DFES 2017) and Australian Standard 3959-2018 Construction of buildings in bushfire prone areas (AS 3959) (Standards Australia 2018). The document provides an assessment of the bushfire management strategies to be considered as part of the proposed development buildings within the site and includes:

- An assessment of the existing classified vegetation in the vicinity of the site (within 150 m) and consideration of bushfire hazards that will exist in the post development scenario (Section 3).
- Commentary on how the future development can achieve the bushfire protection criteria outlined within the Guidelines (Section 5).
- An outline of the roles and responsibilities associated with implementing this BMP (see Section 6).

Given the site is proposed to be developed for tourism land uses, Emerge Associates have also considered the recently released Position Statement: Tourism land uses within bushfire prone areas (Position Statement) (WAPC 2019a). This document is intended as a risk-based guide to bushfire protection relevant to the characteristics of a tourism land use and its context whilst balancing the aims of opportunity, environmental protection, landscape amenity and cultural heritage. It recognises that the intrinsic link between tourism land uses and the natural environment may mean
that the acceptable solutions in SPP 3.7 and the supporting Guidelines for Planning in Bushfire Prone Areas Version 1.3 (WAPC and DFES 2017) cannot always be satisfied. Where this occurs, it instead provides a guidance to support the operation of tourism developments in bushfire prone areas that still meet the intent of SPP 3.7.

1.3 Statutory policy and framework

The following key legislation, policies and guidelines are relevant to the preparation of a bushfire management plan:

- Fire and Emergency Services Act 1998
- Bush Fires Act 1954
- Planning and Development Act 2005 and associated regulations
- Building Act 2011 and associated regulations
- State Planning Policy 3.7 Planning in Bushfire Prone Areas (WAPC 2015)
- Position Statement: Tourism land uses within bushfire prone areas (WAPC 2019a)
- Position Statement: Planning in bushfire prone areas – Demonstrating Element 1: Location and Element 2: Siting and design (WAPC 2019b)
- Guidelines for Planning in Bushfire Prone Areas version 1.3 (WAPC and DFES 2017)
- Australian Standard AS 3959: 2018 Construction of buildings in bushfire prone areas (Standards Australia 2018)

1.4 Description of the proposed development

The site is currently zoned ‘tourism’ under the Shire of Augusta Margaret River Local Planning Scheme (LPS) No. 1. The scheme amendment proposes to broaden the permitted land uses to include other uses such as hotel, chalet, guesthouse and ancillary and related uses that are consistent with the heritage values of the land.

The site is intended to be developed as a landmark luxury boutique hotel likely to accommodate up to 50 rooms (and associated staff), and is intended to respect and acknowledge the cultural heritage and history of the site, its location as well as the existing landscape values.

The proposed development is still highly conceptual and subject to a future detailed design process. However, the principles to be adopted will see that the proposed development is designed in a way to minimise the visual impact of the proposed development. New buildings will be located within the footprint of the existing fire damaged buildings (which cannot be restored), and additional new buildings are intended to be sensitively located in amongst the existing vegetation and would include uses such as guest cottages and suites, a workshop, guest and staff parking, a managers residence and other small structures such as gardeners shed and poolside decks.

The proposed new buildings will aim to retain the ‘essence’ of the former buildings as much as possible by utilising the natural local limestone blocks as well as masonry, timber framing and rammed earth (MJA Studio 2019). The existing mature cultivated gardens and areas of remnant vegetation within the site are proposed to be retained, although some modification to this vegetation may be required as part of development.
The development of the site may necessitate upgrades to the capacity of existing utilities. Such services’ upgrades may include some or all the wastewater collection and disposal, water supply, firefighting water supply, electricity, gas, and communication services. In particular, the management of wastewater will be upgraded from the current domestic-scale system to one that is suitable for the proposed development and that will minimise the potential for nutrients to enter the surrounding environment.

1.5 Description of land characteristics

The natural topographic contours for the area indicate the site has a north-westerly aspect, with elevation ranging from 2 m in relation to the Australian height datum (mAHBD) along the western boundary adjacent to Margaret River, to 12 mAHBD at its northern extent, 22 mAHBD in the south west near the Wallcliffe Cliffs and 64 mAHBD at the south eastern extent (i.e. closest to Wallcliffe Road) (DPIRD 1999). Topographic contours are shown in Figure 1.

As outlined previously, the site contains the historic Wallcliffe House, one of the original farms and homesteads developed by the Bussell family, and dates from around 1858. The entire site is a listed state and local heritage place and is described as containing areas of varying significance with regard to Aboriginal, European and natural values, where the original views and vista have changed little since European settlement and construction of the original Wallcliffe House and dairy in 1858. An example of the views to the Margaret River from within the site is shown in Plate 2. The landscape setting of the site is an important reason why the site is heritage listed, and even though the buildings within the site were irreparably damaged by the 2011 bushfire and cannot be restored, it is still an important heritage site, particularly with regard to community sense of place and the important landscape setting.

The site has not been used for residential or tourism purposes since the 2011 Margaret River bushfire, when the buildings were irreparably damaged. However, the gardens and grounds have continued to be maintained since the 2011 bushfire, and an example of the existing grounds is shown in Plate 3.
Plate 2: An example of the view of the Margaret River from within the site, with the original diary building in the foreground.

Plate 3: An example of the maintained gardens within the site, with planted exotic vegetation and looking towards the dairy and boatshed.
2 Environmental Considerations

In accordance with the Bushfire Management Plan – BAL Contour template prepared by the Department of Planning, Lands and Heritage (2018), this BMP has considered whether there are any environmental values within the site or nearby that may require specific consideration through either protection, retention or revegetation. To support this, a review of publicly available databases was undertaken, with particular reference to the Shared Location Information Platform (SLIP) databases. In addition to this, a number of site-specific environmental investigations and surveys have been undertaken to support the scheme amendment that have informed this BMP. These investigations include:

- **Environmental Assessment Report** (Emerge Associates 2019a)
- **Spring Flora and Vegetation Assessment** (Emerge Associates 2019b)
- **Fauna Assessment** (Harewood 2019)
- **Water Management Strategy** (Emerge Associates 2019c)
- **Aboriginal Heritage Review-Wallcliffe House, Margaret River** (Hocking Heritage 2019a)
- **Wallcliffe House and Landscape: European Heritage** (Hocking Heritage 2019b)

A review of the site-specific environmental investigations and publicly available datasets identified a number of environmental values within and surrounding the site. These are listed below with a summary of the outcomes provided in Table 1 and include:

- One individual of the priority four species *Banksia sessilis* var. *cordata* was recorded in the south-eastern corner of the site adjacent to the existing driveway. *Banksia sessilis* var. *cordata* is widespread in the region, despite a relatively restricted distribution close to the coastline from Cape Naturaliste in the north around to Albany in the south (DBCA 2019), and therefore the single individual identified in the site is not considered a significant population.

- Almost all vegetation within the site can be considered habitat of some type for the western ringtail possum (a state and federally protected species) and may be used for refuge, foraging and/or dispersal. Foraging evidence by the three black cockatoo species (also state and federally protected) was also identified within a couple of areas within the site, with three potential breeding habitat trees identified in the north-west portion of the site and surrounds. None of these potential breeding habitat trees contained hollows suitable for breeding, and only one tree was identified within the site itself.

- Margaret River, a major perennial watercourse, is located directly adjacent to the western boundary of the site. Between the waterbody and the site is an area of variable width (between 0 and 25 m) which was generally identified to contain riparian vegetation in ‘very good’ condition.

- Two Registered Aboriginal Heritage Site were identified within the site, namely:
  - Site 5848-Cliffs at Wallcliffe; and
  - Site 4495-Margaret River.

- The entire site was identified as a registered non-indigenous heritage site, Place No. 114 – Wallcliffe House and Landscape.
Related to the listing of the site as a state and local non-indigenous heritage site, the majority of site is identified in a ‘completely degraded’ vegetation condition as a result of the historic clearing of native vegetation to support the original agricultural land uses. The site contains well-maintained mature cultivated gardens (see Plate 2) with scattered remnant native trees, as well as planted endemic and non-endemic species.

More detail on the values listed above and in Table 1 is available within the Environmental Assessment Report (Emerge Associates 2019a).

**Table 1: Summary of potential environmental considerations that may be associated with the site (based on a search of the SLIP databases and site-specific information)**

<table>
<thead>
<tr>
<th>Key environmental feature (information in brackets refers to mapping data source)</th>
<th>Yes / no / potentially occurring within the site</th>
<th>If yes / potentially, describe value that may be impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAMSAR wetlands, wetlands of international significance, conservation category wetlands (DBCA-043)</td>
<td>No</td>
<td>Not applicable. No wetlands are located within or nearby to the site.</td>
</tr>
<tr>
<td>Threatened and priority flora (Emerge Associates 2019b)</td>
<td>Yes</td>
<td>One individual of the priority four species <em>Banksia sessilis</em> var. <em>cordata</em> was recorded in the south-eastern portion of the site adjacent to the existing driveway. No other threatened or priority species were identified within the site. <em>Banksia sessilis</em> var. <em>cordata</em> is widespread in the region, despite a relatively restricted distribution close to the coastline from Cape Naturaliste in the north around to Albany in the south (DBCA 2019), and therefore the single individual identified in the site is not considered a significant population.</td>
</tr>
</tbody>
</table>
| Threatened and priority fauna (Harewood 2019) | Yes | The fauna survey (Harewood 2019) identified the following conservation significant fauna species occurring within the site:  
• Western ringtail possum. Most of the vegetation within the site (including the cultivated gardens) is likely to be considered habitat and used for refuge, foraging and/or dispersal.  
• Three black cockatoo species (Carnaby’s, Baudin’s and forest red-tailed), with foraging evidence observed in association with marri and pine trees in the site. Three potential black cockatoo breeding trees were identified within the site and surrounds (with one tree in the site). No evidence of breeding or roosting was identified.  
• Osprey. A potential nest was located in the north-western portion of the site and an osprey observed resting on one of the buildings. The habitat values within the site were identified to contain low biodiversity value, with better quality habitat available in the reserves surrounding the site, namely Leeuwin Naturaliste National Park and Wallcliffe Reserve. |
| Threatened ecological communities (Emerge Associates 2019b) | No | No threatened ecological communities (TECs) or priority ecological communities (PECs) were identified within the site (Emerge Associates 2019b). |
| Clearing regulations – Environmentally Sensitive Areas (DWER-046) | No | No ESAs are identified within the site. A number of ESA are located within the vicinity of the site, including directly to the south of the site (associated with Wallcliffe Reserve) and on the northern bank of Margaret River (associated with Leeuwin Naturaliste National Park). |
Table 1: Summary of potential environmental considerations that may be associated with the site (based on a search of the SLIP databases and site-specific information) (continued)

<table>
<thead>
<tr>
<th>Key environmental feature (information in brackets refers to mapping data source)</th>
<th>Yes / no / potentially occurring within the site</th>
<th>If yes / potentially, describe value that may be impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBCA controlled lands or waters (DBCA-011)</td>
<td>No</td>
<td>Areas to the west, north-west and south-east of the site (including a portion of the Margaret River) are identified as part of Leeuwin-Naturaliste National Park (R8428). Leeuwin Naturaliste National Park does not directly abut the site.</td>
</tr>
<tr>
<td>Conservation Covenants Western Australia (DPIRD-023)</td>
<td>No</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Waterways or features (Emerge Associates 2019a; Nature Conservation 2018)</td>
<td>No</td>
<td>No surface water features have been identified within the site. The Margaret River, a major perennial waterway is located adjacent to the north-western boundary of the site. Between the waterbody and the site is an area of variable width (between 0 m to 25 m), which was generally identified to contain riparian vegetation in ‘very good’ condition.</td>
</tr>
<tr>
<td>Aboriginal heritage (DAA-001)</td>
<td>Yes</td>
<td>Two registered Aboriginal heritage sites are identified within the site and include: • Site 5848-Cliffs at Wallcliffe; and • Site 4495–Margaret River. Both are identified as mythological sites, and Site 5848 is also identified as an artefacts/scatter and rockshelter site.</td>
</tr>
<tr>
<td>Non-indigenous heritage (SHO-004)</td>
<td>Yes</td>
<td>The entire site is identified as registered non-indigenous heritage site, Place No. 114 – Wallcliffe House and Landscape. It relates to the historic Wallcliffe House and dairy and the associated cultivated gardens.</td>
</tr>
</tbody>
</table>

2.1 Native vegetation – modification and clearing

There are no conservation significant vegetation values within the site that would prevent the modification or clearing of vegetation. However, the cultural heritage values associated with the site and its landscape mean that clearing and modification of both the remnant native vegetation and cultivated gardens should be minimised. Where possible, it is the intent of the proposed development to retain existing vegetation and trees within the site as part of the landscaped areas and that will be maintained for guest enjoyment. No areas of native vegetation outside the site are proposed to be modified or cleared as part of the proposed development.

It is relevant to note that any clearing within the site is likely to be exempt from requiring a clearing permit in accordance with the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 through building approval.
2.2 Revegetation and landscape plans

No revegetation is proposed as part of the development of the site.

The existing landscaped areas are proposed to be retained, enhanced and maintained into the future, as part of protecting and enhancing the cultural heritage values of the site. This is likely to include additional planting of vegetation in different areas of the site. Currently these areas are maintained to achieve ‘low threat in accordance with AS 3959 and this is assumed to continue in the long-term. Management of these areas can be enforced through the Shire of Augusta Margaret River firebreak notice.

It is possible that the proponent may undertake weed control and/or additional native planting within the area of riparian vegetation associated with Margaret River where appropriate/required to assist in enhancing the native vegetation values. This will be considered as part of the bushfire attack level (BAL) assessment and the designation of the vegetation classification.
3 Bushfire Assessment Results

The bushfire risk for the site has been assessed in accordance with the Guidelines (WAPC and DFES 2017) and AS 3959.

The objective of AS 3959 is to improve the ability of buildings in a designated bushfire prone area to better withstand attack from bushfire. It provides a consistent method for determining a radiant heat level (radiant heat flux) as a primary consideration of bushfire attack on a building or object. It also prescribes simple construction responses to Class 1, 2, 3 and 10a buildings to reduce the likelihood of ignition corresponding to the determined radiant heat level. The radiant heat level is categorised based on six ascending Bushfire Attack Level (BAL): BAL-LOW, BAL-12.5, BAL-19, BAL-29, BAL-40 and BAL-FZ. The categories BAL-40 and BAL-FZ are within the flame length of a bushfire when the Fire Danger Index (FDI) exceeds FDI 80.

AS 3959 provides an assessment of radiant heat flux levels at various distances from classified vegetation (up to 100 m). It provides scientifically validated fuel loads for classified vegetation and the bushfire behaviour that may result from the effective slope beneath vegetation and the weather and climatic conditions described by a Fire Danger Index (FDI) (FDI 80 applies in WA). AS 3959 is used to determine appropriate setbacks of buildings to achieve different levels of radiant heat exposure (i.e. BAL-12.5 to BAL-FZ).

Not all vegetation is a classified bushfire risk. Vegetation and ground surfaces that are exempt from classification as a potential hazard is identified as a low threat under Section 2.2.3.2 of AS 3959. Low threat vegetation includes the following:

a) The vegetation of any type that is more than 100 m from the site.
b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified.
c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site or each other.
d) Strips of vegetation less than 20 m wide (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified.
e) Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.
f) Vegetation regarded as low threat vegetation 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 (i.e. playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, cultivated gardens, banana plantations, market gardens (and other non-curing crops), commercial nurseries, nature strips and windbreaks.
3.1 Bushfire attack level (BAL) assessment

In accordance with Clause 6.2 of SPP 3.7, a BAL assessment has been undertaken using the method 1 procedure in AS 3959 as a basis for determining the bushfire risk for the purpose of assessing the suitability of the proposed scheme amendment and future development. This provides a basis to identify the BAL ratings likely to be applicable to future habitable buildings.

It is noted that to support the future development approval process, the BAL ratings may be further refined through a Method 2 BAL assessment, particularly with regard to vegetation associated with Margaret River, where a short fire run methodology could be applied.

3.1.1 Assessment inputs

Assessing bushfire hazards takes into account the classes of vegetation within the site and surrounding area for a minimum of 100 m, in accordance with AS 3959. The assignment of vegetation classifications is based on an assessment of vegetation structure, which includes consideration of the various fuel layers of different vegetation types. For example, fuel layers in a typical forest environment can be broken-down into five segments as illustrated in Plate 4 below. These defined fuel layers are considered when determining the classification of vegetation and associated bushfire hazard levels.

Plate 4: The five fuel layers in a forest environment that could be associated with fire behaviour (Gould et al. 2007)

An assessment of existing vegetation within the site and surrounding 150 m as well as effective slope was undertaken on the 1st April 2019 in accordance with AS 3959 and the Guidelines to provide context for the siting of the classified vegetation and give a broader understanding of the likely intensity of the fire.
Table 2 outlines:

- The pre-development AS 3959 vegetation classifications (and associated photo locations), which also are shown in Figure 2. Additional photo locations that have not been included in Table 2 are provided in Appendix B.
- The post-development AS 3959 vegetation classifications, which are shown in Figure 3.
- The effective slope for each area of classified vegetation present in the post-development scenario, which is shown in Figure 4.
Table 2: Vegetation classification, effective slope and future management

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>AS 3959 classification</th>
<th>Site photo/s (location points shown in Figure 2)</th>
<th>AS 3959 classification, effective slope and assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 3, 4, 5, 6</td>
<td>Forest (Class A)</td>
<td>Photo location 3: forest vegetation outside of the site to the east, looking south-east. Photo location 21: forest vegetation to the north of the site, looking west.</td>
<td>The majority of forest vegetation surrounding the site (Plot 1, 3 and 6) has been assumed to remain in its existing condition and will remain a bushfire hazard for the foreseeable future. The forest vegetation found within the south-eastern portion of the site, adjacent to Wallcliffe Road reserve (Plot 5) is also assumed to remain largely in its existing condition (except where modified for the servicing infrastructure, which will be ‘non-vegetated’), to help screen the proposed development from the general public as well as maintain the existing views. No management of vegetation in these areas has been assumed. AS 3959 classification (Figure 3): Forest (Class A) Effective slope (Figure 4): Flat/upslope Continued below.</td>
</tr>
</tbody>
</table>

AS 3959 classification (Figure 2): Forest (Class A) 

Photo points: 3, 5, 12, 21, 22, 27, 28
### Table 2: Vegetation classification, effective slope and future management (continued)

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>AS 3959 classification</th>
<th>Site photo/s (location points shown in Figure 2)</th>
<th>AS 3959 classification, effective slope and assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 3, 4, 5, 6</td>
<td>Continued from above.</td>
<td>Continued from above.</td>
<td>14 The areas of forest vegetation within the site associated with Plot 4 (shown on Figure 2) will be modified as part of the proposed development of the site and converted to low threat managed garden/landscaped areas through the removal of understorey species. The existing marri trees in this area (identified as potential black cockatoo breeding habitat) will be retained. This area will be maintained to low threat in accordance with clause 2.2.3.2 (f) of AS 3959 by the proponent. AS 3959 classification Figure 3): Low threat vegetation (exclusion clause 2.2.3.2(f)) Effective slope (Figure 4): Not applicable</td>
</tr>
</tbody>
</table>
### Table 2: Vegetation classification, effective slope and future management (continued)

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>AS 3959 classification</th>
<th>Site photo/s (location points shown in Figure 2)</th>
<th>Post development (see Figure 3 and Figure 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Forest vegetation has been identified immediately adjacent to the western boundary of the site associated with the Margaret River. The vegetation is composed of a variety of plant species including overstorey species of Melaleuca sp. (paperbark) and peppermint trees over sedges and rushes.</td>
<td>Photo location 18: forest vegetation within the Margaret River, looking north.</td>
<td>The vegetation associated with the Margaret River that is identified as ‘forest’ is assumed to remain in the same condition and therefore has been assumed to remain as a bushfire hazard for the foreseeable future. No management of vegetation in these areas has been assumed. If weed control or revegetation activities are undertaken, this will not change the vegetation classification given forest is the highest fuel loads assumed in AS 3959.</td>
</tr>
<tr>
<td></td>
<td>AS 3959 classification (Figure 2): Forest (Class A)</td>
<td>Photo location 24: forest vegetation within the Margaret River, looking north-east.</td>
<td>AS 3959 classification (Figure 3): Forest (Class A)</td>
</tr>
<tr>
<td></td>
<td>Photo points: 18, 24, 26</td>
<td>Photo location 26: forest vegetation within the Margaret River, looking west.</td>
<td>Effective slope (Figure 4): Downslope 5-10°C</td>
</tr>
</tbody>
</table>

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*Project number: EP18-128(04) December 2019*
Woodland vegetation has been identified within the south-western portion of the site and is associated with an overstorey of peppermint trees with some smaller sporadic shrubs present in the understorey, which is mostly cleared and composed of built up leaf litter. This area was formerly a large water feature maintained by the previous landowner, evidenced by the limestone channels (see photo location 31), however is currently unmanaged.

**AS 3959 classification (Figure 2):**
Woodland (Class B)

**Photo points:**
29, 30, 31

Areas of woodland vegetation within the site (Plot 7, Figure 2) will be modified as part of the proposed development of the site and converted to low threat managed garden/landscaped areas and may include reinstating the previous water feature. These areas will be maintained to low threat in accordance with clause 2.2.3.2 (f) of AS 3959 by the proponent.

**AS 3959 classification Figure 3):**
Low threat vegetation (exclusion clause 2.2.3.2 (f))

**Effective slope (Figure 4):**
Not applicable
### Table 2: Vegetation classification, effective slope and future management (continued)

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>AS 3959 classification</th>
<th>Site photo/s (location points shown in Figure 2)</th>
<th>Post development (see Figure 3 and Figure 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Woodland vegetation has been identified within the central portion of the site and is associated with an area containing and overstorey of larger peppermint trees with limited understorey, although in locations some smaller shrubs are present. There has been some localised replanting of native species and there is also evidence of weed control regularly occurring.</td>
<td>Photo location 14: woodland vegetation in the central portion of the site, looking north. Photo location 15: woodland vegetation with some evidence of revegetation, looking south-west.</td>
<td>Plot no. 14: This particular area of woodland vegetation within the site (Plot 8, Figure 2) will be modified as part of the proposed development of the site, with the area proposed to contain a number of chalets/guest accommodation buildings. The remaining vegetation will be converted to low threat managed garden/landscaped areas and will be maintained in accordance with clause 2.2.3.2(f) of AS 3959 by the proponent. AS 3959 classification (Figure 3): Low threat vegetation (exclusion clause 2.2.3.2(f)). Effective slope (Figure 4): Not applicable.</td>
</tr>
<tr>
<td>AS 3959 classification (Figure 2): Woodland (Class B)</td>
<td>Photo points: 14, 15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Table 2: Vegetation classification, effective slope and future management (continued)**

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>AS 3959 classification</th>
<th>Site photo/s (location points shown in Figure 2)</th>
<th>Post development (see Figure 3 and Figure 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9, 10</td>
<td>Woodland vegetation has been identified within the landholding adjacent to the eastern boundary of the site (Plot 9) and near the entrance to the site associated with the Wallcliffe Road reserve (Plot 10). Both these areas contain an overstorey canopy of mostly peppermint trees with built up leaf litter and some sporadic grass/tussocks. Both Plot 9 and Plot 10 show evidence of fuel load management, with understorey species removed. However due to the built-up leaf litter, these areas have been identified as woodland.</td>
<td><img src="image1" alt="Photo location 1: woodland vegetation within the Wallcliffe Road reserve (Plot 10), looking south. There is some evidence of fuel reduction which the Shire of Augusta Margaret River confirmed." /> <img src="image2" alt="Photo location 8: woodland vegetation (due to built up leaf litter) within adjacent landholdings (Plot 9), looking east." /></td>
<td><img src="image3" alt="9, 10" /> It is assumed that these areas of woodland vegetation (Plot 9 and Plot 10) will remain in the same condition as the pre-development scenario and will therefore be a bushfire hazard for the foreseeable future. It is possible the classification of Plot 9 and Plot 10 as woodland vegetation is an overestimation of the fuel loads given there is evidence of fuel load management within each, with the Shire of Augusta Margaret River confirming management of fuels is occurring within the Wallcliffe Road reserve.</td>
</tr>
<tr>
<td>AS 3959 classification (Figure 2): Woodland (Class B)</td>
<td><img src="image4" alt="Photo location 38: woodland vegetation within the road reserve/entrance to the site (Plot 10), looking west." /></td>
<td><img src="image5" alt="AS 3959 classification (Figure 3): Woodland (Class B) Effective slope (Figure 4): Flat/upslope" /></td>
<td></td>
</tr>
</tbody>
</table>
### Table 2: Vegetation classification, effective slope and future management (continued)

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>AS 3959 classification</th>
<th>Site photo/s (location points shown in Figure 2)</th>
<th>Post development (see Figure 3 and Figure 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11, 12</td>
<td>Scrub vegetation has been identified to the north (Plot 11) and south (Plot 12) of the site and is associated with taller shrub species, generally over 2 m in height and growing within areas containing outcropping limestone. Some sporadic peppermint trees are present; however, these individuals are generally low in height (i.e. 5 m) and sprawling in form, behaving like scrub vegetation. These areas are associated with Leeuwin Naturaliste National Park to the north and Wallcliffe Reserve to the south.</td>
<td>Photo location 9: scrub vegetation along the southern boundary of the site with managed edge in foreground, looking south. Photo location 11: scrub vegetation associated with Wallcliffe Reserve, looking south. Photo location 32: scrub vegetation within the Wallcliffe Reserve, looking south. Photo location 33: scrub vegetation within Wallcliffe Reserve, looking south-west.</td>
<td>11, 12</td>
</tr>
<tr>
<td></td>
<td>AS 3959 classification (Figure 2): Scrub (Class D)</td>
<td>Photo points: 9, 11, 32, 33</td>
<td>AS 3959 classification (Figure 3): Scrub (Class D)</td>
</tr>
<tr>
<td></td>
<td>Effective slope (Figure 4): Flat/upslope</td>
<td></td>
<td>Effective slope (Figure 4): Flat/upslope</td>
</tr>
</tbody>
</table>
Table 2: Vegetation classification, effective slope and future management (continued)

<table>
<thead>
<tr>
<th>Plot no.</th>
<th>AS 3959 classification</th>
<th>Site photo/s (location points shown in Figure 2)</th>
<th>Post development (see Figure 3 and Figure 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Within and surrounding the site, non-vegetated areas such as existing roads, firebreaks, driveways, buildings and waterbodies (i.e. the river) have been excluded in accordance with Clause 2.2.3.2(e) of AS 3959.</td>
<td>Photo location 4: Wallcliffe Road to the north of the site, looking south-west. Photo location 10: the existing entry road to the site, looking east. Photo location 34: showing existing roads and infrastructure within the site, looking north-west. Photo location 35: showing the fire damaged ruins of Wallcliffe House, looking north-west.</td>
<td>The existing condition and/or maintenance regimes for all existing non-vegetated areas within and surrounding the site are assumed to continue in the long-term based on current land uses and management arrangements and/or will remain low threat as development within the site is progressed. AS 3959 classification (Figure 3): Non-vegetated (exclusion clause 2.2.3.2(e)). Effective slope (Figure 4): Not applicable</td>
</tr>
<tr>
<td></td>
<td>AS 3959 classification (Figure 2): Non-vegetated (exclusion clause 2.2.3.2(e))</td>
<td>Photo location 34: showing existing roads and infrastructure within the site, looking north-west.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Photo points: 2, 4, 10, 17, 34, 35, 39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Vegetation classification, effective slope and future management (continued)

<table>
<thead>
<tr>
<th>Pre-development (see Figure 2)</th>
<th>Post development (see Figure 3 and Figure 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot no.</td>
<td>AS 3959 classification</td>
</tr>
<tr>
<td>14</td>
<td>The majority of the site has been identified as low threat, based on the management of grass fuels and leaf litter to a low fuel level. The site contains large areas with mature cultivated gardens and turf areas, with regular maintenance evident. To the east and north-east of the site, low threat vegetation has been identified in association with open areas that are clearly well managed with regular mowing of grass and removal of built-up fuels evident. A portion of Wallcliffe Road reserve is also well managed, with evidence of built-up fuels being removed. <strong>AS 3959 classification (Figure 2):</strong> Low threat vegetation (exclusion clause 2.2.3.2(f)) <strong>Photo points:</strong> 6, 7, 13, 16, 17, 19, 20, 23, 25, 36, 37, 40, 41</td>
</tr>
</tbody>
</table>
This page has been left blank intentionally.
3.1.1.1 Post development assumptions

The BAL assessment, to determine the predicated BAL ratings applicable to the site, has assumed the following:

- **Designated FDI**: 80
- **Flame temperature**: 1090
- **Vegetation classification**: Forest (Class A), woodland (Class B) and scrub (Class D) vegetation identified within the post-development scenario, see Figure 3.
- **Effective slope beneath classified vegetation**: Flat/upslope and downslope 5-10°C (see Figure 4)
- **Setback distances**: as per Table 2.4.3 in AS 3959 with the relevant distances used to inform the BAL contour plan provided in Figure 5 and summarised in Table 3.

In addition to the above, the following key assumptions have informed this assessment:

- The areas of forest vegetation (Plot 4, Figure 2) and woodland vegetation (Plot 7 and Plot 8, Figure 2) within the site, will be modified to achieve low threat in accordance with Section 2.2.3.2 of AS 3959. This may include:
  - Clearing of vegetation; or
  - Modification of vegetation with it to be landscaped and managed to achieve low threat. This may include (but is not limited to):
    - Planting of and/or conversion to manicured garden beds;
    - Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.);
    - Low pruning of trees (branches below 2 m in height removed where appropriate);
    - Application of ground/surface covers such as mulch or non-flammable materials as required; and
    - Irrigation of turf and garden beds (where required);
    - Regular mowing/slashing of grass to less than 100 mm in height.
- Areas of low threat vegetation outside the site will continue to be managed and/or considered to achieve low threat in accordance with Section 2.2.3.2 of AS 3959 based on the existing maintenance regimes, and/or as per the Shire of Augusta Margaret River firebreak notice.
- All other areas of classified vegetation that has been identified outside of the proponent’s landholdings (i.e. the site) has been assumed to remain in its current state (unless stated otherwise), and will therefore remain a bushfire hazard to development within the site.
3.1.2 Assessment outputs

The BAL assessment completed for the site indicates that the majority of the site is subject to a BAL rating of BAL-29 or less, with a large portion of the site achieving a BAL rating of BAL-12.5. Areas around the periphery of the site, adjacent to the Margaret River to the west and Wallcliffe Road to the south are subject to a BAL rating of BAL-40 or BAL-FZ. As part of this, based on the current development concept plan, a number of the proposed buildings (which include buildings located based on the existing footprints) may be subject to a BAL rating higher than BAL-29. These buildings have been generally shown in Plate 5.

Table 3 below provides a summary of the setback distances necessary from the identified classified vegetation to achieve the indicated BAL ratings, with the BAL Contour Plan (Figure 5) being a visual representation of these distances. The setback distances are based on the post-development classified vegetation (Figure 3), effective slope (Figure 4) and are taken from Table 2.4.3 of AS 3959.

It is relevant to note that it is likely that the extent of each BAL rating related to the forest vegetation associated with the Margaret River (Plot 2, Figure 3) could be reduced through the application of a Method 2 BAL assessment due to the fire run being less than 100 m (with the vegetated area adjacent to the site varying between 0 m and 25 m in width). This will be further explored as part of detailed design and prior to building licence.

Plate 5: Based on the current development concept, indication of buildings potentially subject to a BAL rating greater than BAL-29.
Table 3: Setback distances based on vegetation classification and effective slope and Table 2.4.3 of AS 3959, as determined by the method 1 BAL assessment

<table>
<thead>
<tr>
<th>Post development plot number (see Figure 3)</th>
<th>Vegetation classification (see Figure 3)</th>
<th>Effective slope (see Figure 4)</th>
<th>Distance to vegetation</th>
<th>BAL rating (see Figure 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plot 1, 3, 5, 6</td>
<td>Forest (Class A)</td>
<td>Flat/upslope</td>
<td>&lt; 16 m</td>
<td>BAL-FZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16 - &lt; 21 m</td>
<td>BAL-40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21 - &lt; 31 m</td>
<td>BAL-29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>31 - &lt; 42 m</td>
<td>BAL-19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>42 - &lt; 100 m</td>
<td>BAL-12.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 100 m</td>
<td>BAL-LOW</td>
</tr>
<tr>
<td>Plot 2</td>
<td>Forest (Class A)</td>
<td>Downslope 5-10°C</td>
<td>&lt; 26 m</td>
<td>BAL-FZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>26 - &lt; 33 m</td>
<td>BAL-40</td>
</tr>
<tr>
<td></td>
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<td>33 - &lt; 46 m</td>
<td>BAL-29</td>
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<td>46 - &lt; 61 m</td>
<td>BAL-19</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>61 - &lt; 100 m</td>
<td>BAL-12.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 100 m</td>
<td>BAL-LOW</td>
</tr>
<tr>
<td>Plot 9, 10</td>
<td>Woodland (Class B)</td>
<td>Flat/upslope</td>
<td>&lt; 10 m</td>
<td>BAL-FZ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 - &lt; 14 m</td>
<td>BAL-40</td>
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<tr>
<td></td>
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<td>14 - &lt; 20 m</td>
<td>BAL-29</td>
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<td>20 - &lt; 29 m</td>
<td>BAL-19</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>29 - &lt; 100 m</td>
<td>BAL-12.5</td>
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<td></td>
<td></td>
<td></td>
<td>&gt; 100 m</td>
<td>BAL-LOW</td>
</tr>
<tr>
<td>Plot 11, 12</td>
<td>Scrub (Class D)</td>
<td>Flat/upslope</td>
<td>&lt; 10 m</td>
<td>BAL-FZ</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>10 - &lt; 13 m</td>
<td>BAL-40</td>
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<tr>
<td></td>
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<td></td>
<td>13 - &lt; 19 m</td>
<td>BAL-29</td>
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<tr>
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<td>19 - &lt; 27 m</td>
<td>BAL-19</td>
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<tr>
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<td></td>
<td></td>
<td>27 - &lt; 100 m</td>
<td>BAL-12.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt; 100 m</td>
<td>BAL-LOW</td>
</tr>
</tbody>
</table>
4 Identification of Bushfire Hazard Issues

The site is already zoned ‘tourism’ under the Shire of Augusta Margaret River Local Planning Scheme No. 1, and therefore the scheme amendment is not changing the zoning, only broadening the types of land uses that could be supported within the site. This is required in order to realise the potential of the site as a world leading luxury boutique hotel.

As previously discussed in **Section 1.5** and **Section 2**, the site contains important heritage, vegetation and landscape values that are intrinsic to the existing state and local heritage listing of the site and important to the local community’s sense of place. While the majority of existing building within the site were irreparably damaged by a bushfire in 2011 and cannot be restored, these are proposed to be rebuilt and appreciated in a more contemporary manner based on the previous architectural styles. This, coupled with the retention of the landscape values within the site, will enable the cultural heritage values of the site to be maintained but also support the creation of a world-leading tourism and accommodation development.

The proposed development aims to retain and enhance the existing characteristics of the site as well as minimise impacts on visual amenity through:

- Utilising the footprint and scale of the existing buildings to inform the location and size of the proposed buildings
- Locating buildings appropriately within the site based on the existing topographic contours and use of a variety of building techniques.
- Maximising the retention of existing vegetation (both native vegetation and mature cultivated gardens) through the sensitive location of buildings, including use of already cleared areas and the existing building footprints where possible.
- Avoiding impacts to vegetation surrounding the site, particularly associated with the Margaret River and Wallcliffe Reserve to the north-west and south respectively. This includes:
  - Excluding construction, clearing and general access from the vegetated portions of the Margaret River and Wallcliffe Reserve.
  - Managing bushfire risk to avoid modification of vegetation outside the site, which may include construction of the proposed buildings to a higher standard.
- Using the architectural style of the existing buildings to inform the style of the new built form, to enable these to blend with the existing (and historical) built form characters of the site.
- Using a colour and material palette that is based on the existing characteristics of the site (both built and natural) as well as the local area.

In order to achieve the above, it is possible that the requirements of SPP 3.7 and the Guidelines (WAPC & DFES 2017) cannot be strictly satisfied, particularly with regard to achieving a BAL rating of BAL-29 or less at habitable buildings (as shown within Figure 5), and in providing access to different destinations. On this basis, Emerge Associates, in consultation with the Shire of Augusta Margaret River, have considered the management of bushfire risk in the context of Position Statement: **Tourism land uses within bushfire prone areas** (WAPC 2019a) (also discussed in **Section 1.2**). As part of this, the Shire of Augusta Margaret River have indicated that higher building construction standards in accordance with AS 3959 may be supported where it is demonstrated this also will enable better landscape/environmental outcomes.
From a bushfire hazard management perspective, the key issues that are likely to require management and/or consideration as part of future development within the site include:

- Minimising the level of bushfire impact on the proposed habitable buildings within the site. This may include the provision of appropriate separation distances to achieve certain BAL ratings (i.e. BAL-29 or less), and/or by increasing the construction standards in accordance with AS 3959. It is acknowledged that while Wallcliffe House (and associated buildings) were largely destroyed by the 2011 Margaret River bushfire, this was largely as a result of embers entering the roof structures and burning the buildings from the inside out. AS 3959 did not exist at the time the previous buildings were constructed/refurbished (with the most recent building works occurring in the early 2000’s).

- Managing identified areas within the site to a low threat standard without detrimentally impacting the existing landscape and environmental values within the site. The majority of the site is already a highly managed landscape, with irrigation and ongoing maintenance visible however, a number of areas of classified vegetation within the site are identified for modification (Plot 4, Plot 7 and Plot 8, Figure 2). These areas were historically more managed than they are currently, therefore modification of the vegetation in these areas is unlikely to detrimentally impact the existing values, particularly given overstorey species are proposed to be largely retained.

- The provision of appropriate vehicular access to enable access to multiple destinations, as well as provision for emergency evacuation. Informed early evacuation processes will be possible due to the permanent staff that will be present within the site, plus due to the large area of managed gardens, a safer place could be accommodated if evacuation is not possible. As the proposed development will be considered a vulnerable land use (see Section 5.2.4), emergency evacuation will need to be planned for.

- Provision of appropriate water supply and associated infrastructure. While hydrants exist on Wallcliffe Road, it is possible that if power is lost, water would not be available and as a result independent static water supply is likely to be required.

These issues are considered further in Section 5.
5 Assessment Against the Bushfire Protection Criteria

This BMP provides an outline of the mitigation strategies that will ensure that as development progresses within the site, an acceptable solution and/or performance-based system of control can be adopted for each of the bushfire protection criteria detailed within Appendix Four of the Guidelines (WAPC and DFES 2017). The bushfire protection criteria identified in the Guidelines and addressed as part of this BMP are:

- Element 1: Location of the development
- Element 2: Siting and design of the development
- Element 3: Vehicular access
- Element 4: Water supply.

As part of the proposed development within the site, the intent of the bushfire protection criteria is proposed to be addressed through a mix of acceptable and performance solutions. A summary of how this can be achieved and an associated compliance statement for each has been provided in Table 4.
### Table 4: Summary of bushfire protection criteria and compliance statement

<table>
<thead>
<tr>
<th>Bushfire protection criteria</th>
<th>Intent</th>
<th>Method of compliance</th>
<th>Proposed bushfire management strategies</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Element 1: Location</td>
<td>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.</td>
<td>A1.1 Development location</td>
<td>The majority of all proposed habitable buildings¹ can be located in an area subject to a low or moderate bushfire hazard (and achieve BAL-29 or less), given buildings are located in areas identified as low threat vegetation in accordance with Section 2.2.3.2 of AS 3959. Appendix Two of the Guidelines (DPLH &amp; DFES 2017) states that low threat vegetation will be considered a ‘low’ hazard, except where within 100 m of a moderate or extreme hazard (associated with areas of classified vegetation), and in that case would be subject to a ‘moderate’ hazard. This is able to satisfy the acceptable solution. It is noted that based on the outcomes of the BAL assessment (Section 3.1.2) it is possible that not all buildings may be able to achieve a BAL rating of BAL-29 or less as portions of the site are likely to be subject to a BAL rating of BAL-40 or BAL-FZ due to the presence of classified vegetation in close proximity to the site boundary, largely related to riparian vegetation associated with the Margaret River to the west/north-west and the Wallcliffe Reserve to the south. This is further discussed with regard to Element 2 below.</td>
<td>The proposed development would be able to meet the intent of Element 1: Location based on providing appropriate separation to achieve a BAL rating of BAL-29 or less, or by increasing the buildings standards to improve building resilience.</td>
</tr>
</tbody>
</table>

¹ The Planning and Development (Local Planning Scheme) Amendment Regulations 2015 (the Regulations) (which enact the requirement for the consideration of bushfire risk) indicates that the requirement for a BAL assessment applies to a ‘development site’. Development site, as defined by the Regulations, “means that part of a lot on which a building that is the subject of development stands or is to be constructed”. Therefore, consideration of the habitable building rather than the ‘lot’ is in line with the Regulations when considering the location of the habitable building and the requirements of SPP 3.7 for the development site. Position Statement: Planning in bushfire prone areas - Demonstrating Elements 1: Location and Element 2: Siting and design (WAPC 2019b) has also clarified this position, in which the ‘developable land’ is noted as the “land that can accommodate a habitable dwelling”, and achieves a ‘moderate’ bushfire hazard level when it achieves a BAL rating of BAL-29 or less.
Table 4: Summary of bushfire protection criteria and compliance statement (continued)

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<td>Element 2: Siting and design</td>
<td>To ensure the siting and design of development minimises the level of bushfire impact.</td>
<td>A2.1 Asset Protection Zone</td>
<td>The outcomes of the BAL assessment (see Figure 5) indicate that the majority of the site and proposed habitable buildings will be subject to a BAL rating of BAL-29 or less, with the majority of the site subject to a BAL rating of BAL-12.5. This indicates that the majority of the site is subject to an acceptable level of risk, and is also able to provide a suitable defendable space around proposed habitable buildings, and a safe environment for people to evacuate to if required. However, as outlined in previous sections, in order to realise the potential of the proposed development (including reconstruction of a number of existing buildings) and to protect the existing heritage, vegetation and landscape values of the site, a number of the proposed habitable buildings within the current development concept (see Appendix A) may not be able to achieve a BAL rating of BAL-29 or less, as per the ‘acceptable solution’. These buildings are located around the periphery of the site (see Figure 5 and Plate 5) and are located adjacent to areas of classified vegetation, which includes the Margaret River (a strip of vegetation less than 25 m in width) and Wallcliffe Reserve, a nature reserve to the south of the site. The proposed buildings have been located in the indicated locations based on protecting the existing landscape, vegetation and amenity values through: • Utilising the footprint and scale of the existing buildings to inform the location and size of the proposed buildings • Locating buildings appropriately within the site based on the existing topographic contours and use of a variety of building techniques. • Maximising the retention of existing vegetation (both native vegetation and mature cultivated gardens) through the sensitive location of buildings, including use of already cleared areas and the existing building footprints where possible. Continued below.</td>
<td>The proposed development would be able to satisfy the intent of Element 2 ‘Siting and design based on the proposed management measures, including the application of higher construction standards in accordance with AS 3959 and providing appropriate defendable spaces.</td>
</tr>
</tbody>
</table>
### Table 4: Summary of bushfire protection criteria and compliance statement (continued)

<table>
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<tr>
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</table>
| Element 2: Siting and design (continued from above) | Continued from above. | N/A | Yes | Recently, the WAPC through the release of *Position Statement: Tourism land uses within bushfire prone areas* (2019a) have recognised that tourism development may have merit to be approved where it is not able to meet the acceptable solutions of SPP 3.7 provided human safety can be assured and if the buildings are not depended upon as a primary place of residence. In line with a risk-based approach (as per *Position Statement: Tourism land uses within bushfire prone areas* (WAPC 2019a), contingencies have been applied to reduce the risk to acceptable levels. In consultation with the Shire of Augusta Margaret River and given the iconic nature of the proposed development and important heritage, vegetation and landscape values, the level of bushfire impact affecting is proposed to be minimised through:  
- Providing separation between habitable buildings and bushfire hazards to achieve a BAL rating of BAL-29 or less.  
- Where a BAL rating of BAL-29 or less cannot be achieved, constructing buildings to BAL-40 or BAL-FZ in accordance with AS 3959. This will improve the buildings resilience to bushfire attack. The previous buildings within the site did not have this benefit when subject to bushfire attack from the 2011 bushfire, with embers impacting on the wooden roof shingles causing the buildings to burn from the inside out. A statement regarding buildings that are affected by a BAL rating of BAL-40 or BAL-FZ, that demonstrates their merit to be approved as ‘unavoidable’ development is outlined in Section 5.1.  
- Ensuring all habitable buildings have an exit located away from the main area of bushfire hazard, located to the south (Wallcliffe Reserve) and west/north-west (Margaret River) of the site.  
- Providing onsite fire-fighting capabilities, which will likely include a static water supply (supplemented by the irrigation system), and may also include building protection features such as automatic sprinkler systems.  
Continued below. |
| | | | | Continued from above. |
Table 4: Summary of bushfire protection criteria and compliance statement (continued)

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</tr>
</thead>
<tbody>
<tr>
<td>Element 2: Siting and design (continued from above)</td>
<td>Continued from above.</td>
<td>N/A</td>
<td>Yes</td>
<td>The majority of the site is or will be considered low threat due to the presence of well-maintained mature cultivated gardens which are subject to regular irrigation and maintenance to removed built up dead fuel material. This is not proposed to change given these landscaped areas are an important part of the existing cultural heritage values of the site, and will be an important part of realising the vision of the project being a world leading luxury boutique hotel. Overall, the intent of Element 2 can be satisfied on the basis that: • While, not all buildings may be able to achieve a BAL rating of BAL-29 or less, the resilience of buildings can be improved through the application of higher construction standards in accordance with AS 3959. Buildings constructed in accordance with AS 3959 have a greater ability to passively withstand the mechanisms of bushfire attack and survive a bushfire without the intervention of fire-fighting resources. This would minimise the level of bushfire impact and reduce the risk to property and infrastructure. • The majority of the site is subject to a BAL rating of BAL-12.5 providing a suitable environment to defend the proposed development. • All buildings will be accessible from an internal road network, enabling appropriate access and egress for emergency personnel and guests. • The proposed development will be supported by an emergency evacuation plan that will outline early evacuation procedures as well as use of a safer place, discussed further in Element 3. It is relevant to note that it is likely that the extent of each BAL rating related to the forest vegetation associated with the Margaret River (Plot 2, Figure 3) could be reduced through the application of a Method 2 BAL assessment due to the fire run being less than 100 m (with the vegetation adjacent to the site varying between 0 m and 25 m in width). This will be further explored as part of detailed design and prior to building licence. The specific BAL ratings applicable to proposed habitable buildings will be determined as part of the detailed design process and based on the proposed development layout. This will ensure construction requirements in accordance with AS 3959 are factored into the design and construction process.</td>
</tr>
<tr>
<td>Bushfire protection criteria</td>
<td>Intent</td>
<td>Method of compliance</td>
<td>Proposed bushfire management strategies</td>
<td>Compliance statement</td>
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<tr>
<td>Element 3: Vehicular access</td>
<td>To ensure vehicular access serving a subdivision/development is available and safe during a bushfire event.</td>
<td>A3.1 Two access routes</td>
<td>The proposed development will have appropriate direct access to Wallcliffe Road, which will provide egress in two directions, to Caves Road and the Margaret River townsite (in the north-east direction) and to Prevelly townsite (in a south-west direction). The public road network within the vicinity of the site is shown within Figure 6. It is acknowledged that the development only has one access point to the multiple destinations (typical of larger tourism/rural-residential lots), and further consideration to access has been undertaken in accordance with Position Statement: Tourism land uses within bushfire prone areas (WAPC 2019a). Given the proposed development will be permanently staffed, informed evacuation processes will be able to be implemented at all times as part of the proposed development, in consultation with relevant emergency agencies (i.e. DFES, DBCA or the Shire of Augusta Margaret River). Furthermore, there is sufficient space within the managed gardens that can provide a safer place (in accordance with the Design and Construction of community bushfire refuges handbook (ABCB and Fire Services Commissioner Victoria 2014)) in the case where evacuation is not possible. The specific building(s)/open space areas to form the safer place will be determined as part of detailed design once the final development layout is determined.</td>
<td>Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 3: Vehicular access.</td>
</tr>
<tr>
<td>A3.2 Public road</td>
<td>No public roads are proposed to be constructed as part of the tourism development within the site.</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>A3.3 Cul-de-sac (including dead-end-road)</td>
<td>Not applicable. No public roads (or cul-de-sacs/dead-end roads) are proposed within the site as part of the tourism development. Vehicle access within the site is considered in the context of private driveways longer than 50 m (see A 3.5 below).</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Element 3: Vehicle Access (continued from above)</td>
<td>Continued from above.</td>
<td>A3.4 Battle-axe</td>
<td>Not applicable. No battle-axe lots are proposed as part of the development of the site.</td>
<td>Continued from above.</td>
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<td>N/A</td>
<td>N/A</td>
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</table>
| | | A3.5 Private driveway longer than 50 m | The vehicle access within the site has been considered in the context of ‘a private driveway longer than 50 m’, although it will be accessible to the public who are visiting/accessing the site for accommodation/day uses and therefore is not strictly ‘private’. Within the site, the main entrance area and parking areas will be accessible by car, and are serviced by a loop road network that enable vehicles to turnaround. Elsewhere within the site, the main form of transport is proposed to be golf buggies or similar although all buildings will be accessible by vehicle. With regard to the requirements of the Guidelines:  
• The technical requirements outlined in Table 6 of Appendix Four in the Guidelines (WAPC & DFES 2017) can be satisfied, including minimum vertical (4.5 m) and horizontal (6 m) clearance. The existing pavement width of the main driveway is approximately 4 m-wide (although increases to 4.5 m in some locations), however with the cleared shoulders achieves 6 m-wide horizontal clearance. This will be maintained as part of development, or it is possible the pavement of the main driveway will be increased to 6 m-wide to satisfy the recommendation of the traffic assessment. This will be determined as part of detailed design.  
• Passing bays are unlikely to be required given the existing driveway provides 6 m-wide horizontal clearance through the constructed pavement and shoulders, enabling safe overtaking.  
• Suitable turn-around areas are accommodated by the main driveway and the proposed turnaround areas adjacent to the accommodation areas and vehicle parking areas. This enables fire appliances to turn around every 500 m and within 50 m of the proposed buildings.  
• The vehicle access within the site will be of an all-weather surface suitable for two-wheel drive vehicles and wide enough to support two-way traffic allowing overtaking if required. | Yes | N/A |
### Table 4: Summary of bushfire protection criteria and compliance statement (continued)

<table>
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</thead>
<tbody>
<tr>
<td>Element 3: Vehicle Access (continued from above)</td>
<td>Continued from above.</td>
<td>A3.6 Emergency access way</td>
<td>Not applicable. Given the proposed development has direct access to Wallcliffe Road, an existing public road that provides egress in two different directions. It is noted that an existing informal ‘fire exit’ is sign posted to the north-east of the site (shown in Figure 6) and connects to St Alouarn Place to the east and Wallcliffe Road to the south. It is unclear if this ‘fire exit’ is provided as a public easement, however it is understood that it is for use by all the landowners/land uses within the vicinity of this access way. It is currently composed of a mix of turf/grass and compacted gravel/mineral earth, and if it was proposed to be a formal emergency access way, upgrading of this fire exit may be required as well as application of an ‘easement in gross’ and/or ‘right-of-carriageway’ easement. This can be explored further as part of the development application process.</td>
<td>Continued from above.</td>
</tr>
</tbody>
</table>

![Plate 6: Existing ‘fire exit’ adjacent to the north-eastern boundary of the site, directing vehicle movement to Wallcliffe Road and St Alouarn Place through and alternate access point.](image-url)
### Table 4: Summary of bushfire protection criteria and compliance statement (continued)

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<tbody>
<tr>
<td>Element 3: Vehicle Access (continued from above)</td>
<td>Continued from above.</td>
<td>A3.7 Fire service access routes (perimeter roads)</td>
<td>Not applicable. Future development within the site will be provided with appropriate vehicular access, as outlined above, and therefore fire service access routes are not required.</td>
<td>Continued from above.</td>
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<td>N/A</td>
<td>N/A</td>
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<td>A3.8 Firebreak width</td>
<td>Fire breaks will be provided in accordance with the Shire of Augusta Margaret River firebreak notice, or as agreed based on maintaining the existing heritage, environment and landscape values. This may include ensuring appropriate vehicle access to/from proposed buildings in lieu of a firebreak. This would be confirmed through the development application process.</td>
<td></td>
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<tr>
<td></td>
<td>Yes.</td>
<td>N/A</td>
<td></td>
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<tr>
<td>Element 4: Water</td>
<td>To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.</td>
<td>A4.1 Reticulated areas</td>
<td>Development is located within an Emergency Services Levy (ESL) Category 5 area, which indicates that bushfire events are responded to by the state-wide emergency services (SES) network and usually a bush fire brigade. The site will connect with a reticulated water supply that runs along the eastern side of Wallcliffe Road reserve. Existing hydrants are currently located on Wallcliffe Road, directly east of the site and are located within 600 m from the proposed habitable buildings (and therefore are within 20 minutes turnaround of the site). In addition to the existing hydrants on Wallcliffe Road and given the potential for the reticulated water supply to be cut if there is a power outage, additional static water supply (available for community fire-fighting needs) will be provided within the site (provisionally shown in Appendix A, and associated with the existing tank location). The specific volume of static water supply will be determined in consultation with the Shire of Augusta Margaret River as part of development approval and is likely to be a minimum of 25,000L, but may vary depending upon the number of buildings constructed/operated. It will be the responsibility of the proponent to ensure the water tanks are continuously full of water. Water supply for fighting purposes will also be able to be supplemented by the irrigation supply system and structural fire-fighting water supply (which is separate to the requirements of addressing SPP 3.7).</td>
<td>Based on the outlined management measures, future development would be able to comply with and meet the intent of Element 4: Water.</td>
</tr>
<tr>
<td></td>
<td>Yes.</td>
<td>N/A</td>
<td></td>
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<td></td>
<td></td>
<td>A4.2 Non-reticulated areas</td>
<td>Not applicable</td>
<td></td>
</tr>
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<td></td>
<td>N/A</td>
<td>N/A</td>
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<tbody>
<tr>
<td>Element 4: Water (continued from above)</td>
<td>Continued from above</td>
<td>A4.3 Individual lots within non-reticulated areas (only for use if creating 1 additional lot and cannot be applied cumulatively)</td>
<td>Not applicable</td>
<td>Continued from above.</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This page has been left blank intentionally.
5.1 Unavoidable development

As outlined in Table 4, it is possible that a number of the buildings within the site may be subject to a BAL rating greater than BAL-29. These buildings have been previously identified in Plate 5.

Under Clause 6.7.2 of SPP 3.7, there is a presumption against approving development that will result in the introduction or intensification of land use where an area will be subject to an extreme bushfire hazard, and/or a BAL rating of BAL-40 or BAL-FZ unless it can be demonstrated the development is an ‘unavoidable development’.

A statement of reasons addressing Clause 6.7.2 of SPP 3.7 has been provided in Table 5.

Table 5: Summary of reasons why the proposed development is considered ‘unavoidable development’

<table>
<thead>
<tr>
<th>Unavoidable development, as per Clause 6.7.2 of SPP 3.7</th>
<th>Response of the proposed development</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Criteria</td>
</tr>
<tr>
<td>a)</td>
<td>The landowner/proponent has provided sufficient reason for why the proposal is considered to represent exceptional circumstances which adequately justifies a deviation from the policy measure.</td>
</tr>
</tbody>
</table>
Table 5: Summary of reasons why the proposed development is considered ‘unavoidable development’ (continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Response of the proposed development</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Continued from above</td>
<td>• Maximising the retention of existing vegetation (both native vegetation and mature cultivated gardens) through the sensitive location of buildings, including use of already cleared areas and the existing building footprints where possible.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Avoiding impacts to vegetation surrounding the site, particularly within the Margaret River and Wallcliffe Reserve to the north-west and south respectively. This is to both protect the environmental values of these areas, but to also maintain the existing views into/out of the site.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The above measures ensure that the visual impact of the proposed development is minimal, with the existing viewscapes (or those associated with the site prior to the 2011 bushfire) to be maintained and that the existing extensive gardens and grounds are retained and able to be incorporated as part of the proposed development. This is an important part of ensuring the heritage values of the site are maintained.</td>
</tr>
<tr>
<td>b)</td>
<td>It greatly improves the bushfire management of the site and surrounding area through the provision of a demonstrably significant reduction in the bushfire-related risk level to the community and property.</td>
<td>The proposed development improves bushfire management within the site and reduces bushfire risk to the property and community. This is through:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Constructing in accordance with AS 3959 will increase the proposed buildings resilience to mechanisms of bushfire attack passively (i.e. without the intervention of fire-fighting resources). The previous buildings did not meet AS 3959 requirements (being constructed prior to the release of the standard), which is one of the reasons the damage was so extensive.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The proponent has the capital to build using increased construction standards, and there are now a large volume of products on the market that mean satisfying BAL-40 and BAL-FZ construction is practically achievable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Even though hydrants are located within 600 m of the proposed buildings, the proponent proses to provide a separate static water supply within the site. This will provide an independent water supply (to be maintained by the proponent) that can be used for fire-fighting purposes, and could support community fire-fighting requirements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The proposed developed will be permanently staffed enabling informed evacuation processes to be implemented. Furthermore, there is sufficient space within the managed gardens that can provide a safer place if evacuation is not possible.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Continued below.</td>
</tr>
</tbody>
</table>
Table 5: Summary of reasons why the proposed development is considered ‘unavoidable development’ (continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Response of the proposed development</th>
</tr>
</thead>
<tbody>
<tr>
<td>c)</td>
<td>The benefits of the proposal going ahead in the area outweigh the costs to adjacent landowners, government and the general community</td>
<td>Currently the site is unusable given the state of the existing buildings. Significant capital investment is required to clean up the site, let alone rebuild and celebrate the heritage, vegetation and landscape values of the site so that the community can once again enjoy. To enable this capital investment, a tourism development of the scale/type proposed is required to enable this potential to be achieved, and to enable the community to again have access to the site. There would be no additional costs to adjacent landowners, government or the general community. The proponent would be fully responsible for all management measures within the site and have not assumed any management by landowners or government agencies to landholdings outside the site, or with regard to infrastructure within the site.</td>
</tr>
<tr>
<td>d)</td>
<td>It is accompanied by a Bushfire Management Plan jointly endorsed by the relevant local government and the State authority responsible for emergency services. The Bushfire Management Plan should demonstrate ongoing management measures that will improve the bushfire management of the site and/or surrounding area by minimising the level of bushfire impact.</td>
<td>A BMP (this document) has been prepared to support the proposed development of the site. The approach outlined within this BMP has been discussed in consultation with the Shire of Augusta Margaret River, the ultimate decision maker with regard to the proposed development and likely ongoing management considerations. Given the existing tourism zoning of the site, the proposed iconic nature of the tourism development and the important heritage, vegetation and landscape values that the proponent is seeking to protect and enhance, the Shire of Augusta Margaret River have indicated in principle support for the outlined approach. Going forward the proponent will need to demonstrate the outlined management measures have been addressed, as well as any other measures that are addressed as part of more detailed design (i.e. development application and building licence). This will include assessment in accordance with Position Statement: Tourism land uses within bushfire prone areas (WAPC 2019a).</td>
</tr>
</tbody>
</table>

5.2 Additional management strategies

5.2.1 Future approval considerations

The BAL assessment within this document is considered to be a conservative assessment of potential bushfire risk posed to future habitable buildings within the site based on the assumptions outlined in Section 3. It is noted that it is likely that the extent of each BAL rating related to the forest vegetation within the Margaret River (Plot 2, Figure 3) could be reduced through the application of a Method 2 BAL assessment due to the fire run being less than 100 m in width (with the vegetation adjacent to the site varying between 0 m and 25 m in width). This will be further explored as part of detailed design and prior to building licence.

Based on the outcomes of the BAL assessment and the proposed development layout, all habitable buildings will be subject to a BAL rating of BAL-12.5 or higher, and where Class 1, 2 and 3 buildings are proposed, buildings will need to be constructed in accordance with the determined BAL rating and the relevant sections of AS 3959. In particular, it is noted that a number of the buildings may be...
subject to BAL-40 or BAL-FZ construction standards based on protecting/maintaining existing heritage, vegetation and landscape values.

It is expected that this BMP will be able to support future planning processes, but a risk assessment statement and bushfire emergency evacuation plan (BEEP) in accordance with Position Statement: Tourism land uses within bushfire prone areas (WAPC 2019a) will likely be required. An updated BAL assessment should be prepared to support development approval/building licence once the building locations have been confirmed as part of detailed design, in order to confirm the BAL ratings applicable to buildings.

5.2.2 Landscape management

5.2.2.1 Within the site

As part of the proposed tourism development, and to satisfy the Shire of Augusta Margaret River’s requirement for an asset protection zone, the site is proposed to be formally landscaped and maintained to a low threat standard in accordance with Section 2.2.3.2 of AS 3959.

Ongoing management of the site is likely to include:

- Irrigation of grass and garden beds (where required)
- Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.)
- Low pruning of trees.
- Application of ground/surface covers such as mulch or non-flammable materials as required.
- Regular mowing/slashing of grass to less than 100mm in height (where required).

The proponent will be responsible for the maintenance of the site to a low threat standard in perpetuity.

5.2.2.2 Surrounding the site

Within existing private landholdings

Where indicated as low threat in Figure 3, it is assumed that the private landholdings surrounding the site will be managed by the applicable landowners in accordance with the Shire of Augusta Margaret River’s firebreak notice and/or in accordance with existing maintenance regimes. All other vegetation is assumed to remain in its existing condition for the foreseeable future with no formal management.

Existing road reserves

The maintenance of existing public road reserves is assumed to continue to achieve low threat in accordance with Section 2.2.3.2 of AS 3959, in line with the existing maintenance regimes and/or Shire of Augusta Margaret River requirements.
5.2.3 Shire of Augusta Margaret River fire control notice

As outlined previously, the Shire of Augusta Margaret River releases a firebreak notice annually (or as required) to provide a framework for bushfire management within the Shire. The Shire of Augusta Margaret River is able to enforce this order in accordance with Section 33 of the Bush Fires Act 1954 and landowners will need to ensure compliance with this notice as published or in accordance with directions provided by the Shire of Augusta Margaret River. This is likely to include (but is not limited to):

- Maintenance of appropriate asset protection zones around buildings and fixed assets within a landholding.
- Maintenance of hazard separation zones and fuel loads (i.e. grass less than 10 cm in height) within cleared and/or bush blocks.
- Particular standards for firebreaks and/or driveways, including location of the firebreak and horizontal and vertical clearances.
- Implementation of any requirements outlined within this or future BMPs for the site.

The Shire of Augusta Margaret River firebreak notice should be referred to for further detail.

5.2.4 Vulnerable or high-risk land uses

Policy measure 6.6 of SPP 3.7 requires any proposal relating to a vulnerable or high-risk land use subject to a BAL rating of BAL 12.5 or higher to address the applicable policy provisions, and at scheme amendment, this generally means ensuring that provision has been made for emergency evacuation. It is likely that the proposed tourism land uses within the site would be considered ‘vulnerable’ as defined by the Guidelines.

The proposed development is able to accommodate vulnerable land uses and the potential future evacuation requirements given:

- Suitable separation to minimise bushfire risk can be provided within the site, with a majority of habitable buildings likely to achieve a BAL rating of BAL-29 or less. Habitable buildings unable to achieve BAL-29 or less will be constructed to the relevant increased building standards (i.e. BAL-40 or BAL-FZ) in accordance with AS 3959.
- The proposed development will have appropriate direct access to Wallcliffe Road, providing for vehicle access that is available and safe during a bushfire with access to caves Road/Margaret River town site and Prevelly. In addition, given the proposed development will be permanently staffed, informed early evacuation processes will be able to be implemented, and furthermore, there is sufficient space within the managed gardens that can provide a safer place if evacuation is not possible.
- Suitable vehicle access, including turn-around areas, will be provided within the site allowing for vehicles to pass each other on the entrance road.
- The site will be subject to a high level of management based on the existing landscape values (which includes mature cultivated gardens that are irrigated and regularly subject to weed control and removal of dead material) and the proposed luxury boutique hotel.
All land uses classed as vulnerable and located in areas subject to a BAL rating greater than BAL-12.5 must address policy measure 6.6 at the development application stage, including an emergency evacuation plan.

5.2.5 Public education and preparedness

Community bushfire safety is a shared responsibility between individuals, the community, government and fire agencies. DFES has an extensive Community Bushfire Education Program including a range of publications, a website and Bushfire Ready Groups. The DFES publication ‘Prepare. Act. Survive.’ (DFES 2014) provides excellent advice on preparing for and surviving the bushfire season. Other downloadable brochures are available from http://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/pages/publications.aspx

The Shire of Augusta Margaret River provides bushfire safety advice to residents/visitors available from their website https://www.amrshire.wa.gov.au/services/community-safety/firebreak-notice-and-bushfire-information-20192020. Professional, qualified consultants also offer bushfire safety advice and relevant services to residents and businesses in high risk areas in addition that that provided in this BMP.

In the case of a bushfire in the area, advice would be provided to residents by the Shire of Augusta Margaret River, DFES and/or Department of Biodiversity Conservation and Attractions (DBCA) on any specific recommendations with regard to responding to the bushfire, including evacuation if required.
6 Responsibilities for Implementation and Management of Bushfire Measures

Table 6 outlines the future responsibilities of the proponent and the Shire of Augusta Margaret River associated with implementing this BMP with reference to ongoing bushfire risk mitigation measures for existing land uses (through compliance with the Shire of Augusta Margaret River fire control notice). These responsibilities will need to be considered as part of the subsequent development and implementation process.

Table 6: Responsibilities for the implementation of this BMP

<table>
<thead>
<tr>
<th>Management action</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Proponent</strong></td>
<td></td>
</tr>
<tr>
<td>Provide appropriate vehicle access to and from the site. Internal roads within the site should provide a minimum horizontal clearance of 6 m (which may include 4m-wide pavement with 1 m-wide cleared shoulders) and consider the requirements for private driveways in Table 6 within Appendix Four of the Guidelines in consultation with the Shire of Augusta Margaret River.</td>
<td>To support development approval</td>
</tr>
<tr>
<td>As part of detailed design, prepare a revised BAL assessment (or BMP) to determine the BAL ratings applicable to future habitable buildings within the site based on the final development concept. This BAL assessment can be used to support future building licences.</td>
<td>To support development approval and the building licence process.</td>
</tr>
<tr>
<td>Where Class 1, 2 or 3 buildings are proposed, ensure buildings comply with AS 3959, as per the applicable BAL rating, determined as part of this BMP (outlined within Section 4) or through the revised BAL assessment.</td>
<td>As part of building design and construction</td>
</tr>
</tbody>
</table>
| Design, implement and maintain the landscaped areas within the site to achieve a low threat standard (in accordance with Section 2.2.3.2 of AS 3959). Ongoing management should include (but is not limited to):  
  • Irrigation of grass and garden beds (where required),  
  • Regular removal of weeds and built up dead material (such as fallen branches, leaf litter etc.),  
  • Low pruning of trees (branches below 2 m in height removed where appropriate),  
  • Application of ground/surface covers such as mulch or non-flammable materials as required; and  
  • Where grass is present, this should be regularly cut so that the grass is maintained at or below 100 mm in height. | As part of development approval, and ongoing where applicable. |
| An additional static water supply to be provided within the site for fire-fighting purposes to supplement the existing reticulated supply. This should be designed as a potential alternative in the case the mains pressure fails, and should be independent of mains water and power supply. It should remain full and will be the responsibility of the proponent to maintain in the long-term. The specific size of the tank is to be determined in consultation within the Shire of Augusta Margaret River. | Prior to building occupancy and ongoing as required. |
| Prepare a bushfire emergency evacuation plan that includes consideration of bushfire risk and its associated management. Once approved, this plan should be implemented as required and subject to regular review (at least every five years). | To support development approval |
| Ensure that the site complies with the Shire of Augusta Margaret River fire control notice (as published) and/or directions given by the Shire of Augusta Margaret River in accordance with the Bush Fires Act 1954. | Ongoing, where applicable |
| Ensuring that where hydrants or water tanks for fire-fighting purposes are located, these are not obstructed and remain visible at all times. | Ongoing, where applicable. |
### Table 6: Responsibilities for the implementation of this BMP (continued)

<table>
<thead>
<tr>
<th>Management action</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shire of Augusta Margaret River</strong></td>
<td>Ongoing, as required</td>
</tr>
<tr>
<td>Providing fire prevention and preparedness advice upon request, including the Homeowners Bush Fire Survival Manual: Prepare, Act, Survive (or similar suitable documentation) and the latest Shire of Augusta Margaret River firebreak notice.</td>
<td>Ongoing, as required</td>
</tr>
<tr>
<td>Maintaining public road reserves under their management to appropriate standards, where required/applicable.</td>
<td>Ongoing, as required</td>
</tr>
<tr>
<td>Monitoring compliance with the Shire of Augusta Margaret River firebreak notice and enforcing requirements as required.</td>
<td>Ongoing, as required</td>
</tr>
</tbody>
</table>
7 Applicant Declaration

7.1 Accreditation

This BMP has been prepared by Emerge Associates who have been providing bushfire risk management advice for more than six years, undertaking detailed bushfire assessments (and associated approvals) to support the land use development industry.

Anthony Rowe is a Fire Protection Association of Australia (FPAA) Level 3 Bushfire Planning and Design (BPAD) accredited practitioner (BPAD no. 36690) with over nine years’ experience and is supported by a number of team members who have undertaken BPAD Level 1 and Level 2 training and are in the process of gaining formal accreditation.

7.2 Declaration

I declare that the information provided is true and correct to the best of my knowledge.

Signature: [Signature]
Signature: [Signature]

Name: Anthony Rowe
Company: Emerge Associates
Date: 29/11/19
BPAD Accreditation: Level 3 BPAD no. 36690

Name: Kirsten Knox
Company: Emerge Associates
Date: 29/11/19
8 References

8.1 General references


Emerge Associates 2019a, Environmental Assessment Report Lot 101 Wallcliffe Road Prevelly, EP18-128(05)—008

Emerge Associates 2019b, Spring Flora and Vegetation Assessment Lot 101 Wallcliffe Road Prevelly, EP18-128(01)—002


Harewood, G. 2019, Fauna Assessment-Lot 101 Wallcliffe Road Scheme Amendment

Hocking Heritage Studio, 2019a, Aboriginal Heritage Review-Wallcliffe House, Margaret River

Hocking Heritage Studio, 2019b, Wallcliffe House and Landscape: European Heritage

MJA Studios 2019, Wallcliffe House Design Principles Submission Scheme Amendment, unpublished report prepared for Wallcliffe House Pty Ltd

Office of Bushfire Risk Management (OBRM) 2017, Mapping Standard for Bush Fire Prone Areas, Department of Fire and Emergency Services, Cockburn Central


The Civil Group, 2019, Wallcliffe House - LPS Amendment - Engineering Aspects


Western Australian Planning Commission (WAPC) 2019a, Position Statement: Tourism land uses in bushfire prone areas October 2019, Western Australian Planning Commission, Perth.


Western Australian Planning Commission and Department of Fire and Emergency Services (WAPC and DFES) 2017, Guidelines for Planning in Bushfire Prone Areas Version 1.3, Western Australia.
8.2 Online references

Department of Water 2008, *LiDAR derived 1 m elevation contours* dataset, Government of Western Australia.


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Figures

Figure 1: Site Plan and Topographic Contours

Figure 2: Existing Site Conditions – AS 3959 Vegetation Classifications

Figure 3: Post Development Conditions – AS 3959 Vegetation Classifications

Figure 4: Post Development Conditions – Effective Slope

Figure 5: Bushfire Attack Level Contours

Figure 6 Vehicle Access
While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Figure 4: Post Development Conditions – Effective Slope

Project: Bushfire Management Plan
Client: Wallcliffe House Pty Ltd

Plan Number: EP18-12R(4)-F15a
Drawn: GAR
Date: 28/11/2019
Checked: HPB
Date: 29/11/2019
Approved: KK
Date: 29/11/2019

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.

Scale: 1:4,000@A4
GDA 1994 MGA Zone 50

Site boundary
150 m assessment boundary
Cadastral boundary
Concept plan

Effective slope
Flat / upslope
Downslope 0 - 5°
Downslope 5 - 10°
Downslope 10 - 15°
Downslope > 15°

Wallcliffe House Pty Ltd
Bushfire Management Plan
Lot 101 Wallcliffe Road, Prevelly

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Please Note: This BAL contour plan has been prepared to detail the bushfire risk posed by vegetation within 150 m of the site only, in accordance with AS 3959. Any landholdings outside of the site should be assessed separately to inform development.
Appendix A
Wallcliffe House concept plan (MJA Studio 2019)
### Table B1: Additional photo points organised by plot, as shown within Figure 2

<table>
<thead>
<tr>
<th>Plot 1, 3-6</th>
<th>AS 3959 classification (Figure 2): Forest (Class A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo location 12: forest vegetation along the entrance driveway to the site, looking north-east.</td>
<td>Photo location 22: forest vegetation associated with Margaret River, looking north.</td>
</tr>
<tr>
<td>Photo location 28: forest vegetation near the Wallcliffe Cliffs, looking south-west.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plot 13</th>
<th>AS 3959 classification (Figure 2): Non-vegetated (e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo location 2: showing Wallcliffe Road and footpaths to the north of the site, looking south-west.</td>
<td>Photo location 39: showing Margaret River, west towards the northern bank.</td>
</tr>
</tbody>
</table>
Table B1: Additional photo points organised by plot, as shown within Figure 2 (continued)

<table>
<thead>
<tr>
<th>Plot 14</th>
</tr>
</thead>
</table>

**AS 3959 classification (Figure 2): Low threat vegetation (f)**

- **Photo location 6:** showing areas of low threat vegetation with adjacent landholding driveway in background and minimal leaf litter, looking west.
- **Photo location 13:** showing areas of low threat vegetation and drainage within the site, looking south-west.
- **Photo location 19:** areas of low threat vegetation in the northern portion of the site, looking south-west.
- **Photo location 20:** areas of managed low threat vegetation within adjacent landholdings, looking south-east.
- **Photo location 25:** areas of manicured gardens and turf near the Margaret River, looking south-west.
- **Photo location 36:** existing managed rose gardens within the site, looking north.
Table B1: Additional photo points organised by plot, as shown within Figure 2 (continued)

<table>
<thead>
<tr>
<th>Plot 14</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 3959 classification (Figure 2): Low threat vegetation (f)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Photo location 37: managed turf (croquet court) and gardens within the central portion of the site, looking north-west.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photo location 40: areas of managed low threat vegetation within adjacent landholdings, looking east.</td>
</tr>
<tr>
<td>Photo location 41: managed low threat vegetation within adjacent landholdings with signed (but informal) ‘fire exit’ signed, looking north-east</td>
</tr>
</tbody>
</table>
Environmental Assessment Report
Lot 101 Wallcliffe Road, Prevelly
Project No: EP18-128(05)
# Document Control

<table>
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<th>Reviewer</th>
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<td>HPB</td>
<td>Kirsten Knox</td>
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<td>Issued for client review.</td>
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<td>Kirsten Knox</td>
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<td>Kirsten Knox</td>
<td>KK</td>
<td>Kirsten Knox</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Further minor text updates based on client review</td>
</tr>
</tbody>
</table>
Executive Summary

This Environmental Assessment Report (EAR) has been prepared on behalf of Wallcliffe House Pty Ltd (the proponent) to support the proposed development of Lot 101 Wallcliffe Road, Prevelly (herein referred to as ‘the site’) which is located within the Shire of Augusta Margaret River. The site is approximately 5.2 ha in size and is located approximately 7 km south-west of the Margaret River townsite. The site is generally bounded by the Margaret River and associated riparian vegetation to the north-west, a nature reserve to the south and existing residential and tourism land uses (including chalet and camping) to the east (which includes the Margaret River rowing club).

The site contains one of the original farms and homesteads built by the Bussell family (referred to as ‘Wallcliffe House’) with construction of the original buildings commenced in the 1850’s. The site was home to a number of large sandstone buildings and ancillary buildings, as well as a significant cultivated garden and dairy, however the buildings were significantly damaged by a bushfire in 2011. The site has not been used for residential or tourism purposes since 2011 due to the damage from the bushfire, although the cultivated gardens and grounds surrounding the buildings have continued to be maintained to a high standard over this period.

Spencer Fung Architects and MJA Studio have prepared a concept plan to support the redevelopment of the site, which will include progressing an amendment to the Shire of Augusta Margaret River Local Planning Scheme No.1. The scheme amendment is proposed to broaden the permitted land uses under the existing ‘Tourism’ zoning to enable other land uses such as hotel, chalet, guesthouse and ancillary and related uses consistent with the heritage values of the land.

This EAR has been prepared site to support the proposed scheme amendment and development of the site, and provides a synthesis of information relating to the environmental features, attributes and values. It outlines how these environmental values should be considered and managed as part of the proposed development. The environmental attributes and values relevant to the site are summarised below and include:

- **Topography** across the site ranges from approximately 2 m Australian Height Datum (AHD) along the western boundary (i.e. closest to Margaret River) to 12 mAHD at its northern extent, 22 mAHD in the south west near the Wallcliffe Cliffs and 64 mAHD at the south eastern extent (i.e. closest to Wallcliffe Road).
- **The south western portion** of the site contains the eastern most extent of the Wallcliffe Cliffs which contain significant local geological and landscape attributes.
- **A geotechnical investigation** undertaken for the site indicates:
  - The site is underlain by sand over calcarenite ( coarse grained limestone) with areas containing shallow pinnacle limestone.
  - Karst may be present in the central-western and central eastern portions of the site.
- **Available regional mapping** has not identified the site as having ASS risk within 3 m of the soil surface and this is supported by the outcomes of the geotechnical investigation. Margaret River, adjacent to the north-western boundary of the site, is identified as having a ‘low to moderate risk’ of acid sulfate soil (ASS) risk within 3 m of the natural soil surface.
- **Areas of the site** below the 5 m AHD contour may potentially be at risk from coastal processes such as inundation, storm surge or erosion.
The majority of vegetation within the site is highly disturbed and modified (‘completely degraded’), and was historically cleared to support the previous farming/residential land uses. Approximately 4 ha of the site is cleared and/or planted and is dominated by landscaped gardens that include native and exotic plant species. Small areas of the site contain more intact remnant vegetation in ‘degraded’ and ‘good’ condition and show evidence of weed control. In addition:

- One individual of the priority four species Banksia sessilis var. cordata was recorded in the south-eastern corner of the site adjacent to the existing driveway. No other threatened or priority flora species were identified within the site.
- No threatened or priority ecological communities were identified within the site.

A number of conservation significant fauna species were identified using habitat within the site including western ringtail possum, the three black cockatoo species (Carnaby’s, Baudin’s and forest red tailed) and osprey.

Limited regional groundwater level information is available and no site-specific groundwater monitoring has been undertaken to date. It is likely that groundwater is confined by the underlying weathered granite which would act as a low permeability aquitard.

Margaret River, a major perennial watercourse, is located directly adjacent to the western boundary of the site with the majority of intact riparian vegetation located outside the site. The riparian vegetation associated with Margaret River varies in width, with a small area containing no vegetation.

Aboriginal and non-indigenous heritage values have been identified within or nearby the site. This includes two Registered Aboriginal heritage sites (Site 5848 and Site 4495) and one Registered Heritage Place (Place 114-Wallcliffe House and Landscape).

Areas of bushfire hazard have been identified outside the site, associated with the existing nature and the Margaret River to the south and west/north-west respectively.

The site is intended to be developed as a landmark luxury boutique hotel and is likely to accommodate up to 50 rooms (and associated staff), and is intended to respect and acknowledge the cultural heritage and history of the site, its location as well as the existing landscape values. The site contains a number of buildings that relate to the original settlement of the area (including those constructed by the Bussell family in the 1850’s), as well as important landscape, vegetation and visual amenity values.

While the majority of existing building within the site were irreparably damaged by a bushfire in 2011 and cannot be restored, the proponent proposes to celebrate these historic values through rebuilding the previous buildings, as well as a number of additional buildings, to enable the building and broader site values to be appreciated in a more contemporary manner, and is in accordance with consultation undertaken with the Heritage Council of Western Australia and the Shire of Augusta Margaret River. In addition to the buildings, the existing mature cultivated gardens, remnant vegetation and visual amenity of the site are also an important part of the heritage values of the site. Accordingly, the development is proposed to be sensitively integrated with these features to minimise impact on the heritage and amenity values, while also providing the facilities required to provide a world-leading luxury boutique hotel, a type of tourism accommodation not currently located within the south-west of Western Australia. This type of accommodation would be a valuable addition to the local/regional community and economy.
Based on the environmental values or attributes identified within the site, this EAR provides an environmental management framework to be implemented across the site for future development, including:

- **Landform and karst formations**: the physical disturbance of Wallcliffe Cliffs should be avoided. Additional geotechnical investigation will be required post demolition and clearing of the existing buildings and foundations to determine actual karst risk and recommended building construction techniques. This can be managed as part of the development approval and construction process.

- **Flora and vegetation**: retention of existing remnant native vegetation and the mature cultivated gardens (including trees) is proposed to be maximised as part of detailed design and construction processes. Construction works will be excluded from the Margaret River and Wallcliffe Reserve, minimising impacts on vegetation values. The management of vegetation values as part of future development of the site can be appropriately managed through the development approval process.

- **Native fauna**: impacts to native fauna will be minimal given the limited habitat value within the site, short-term nature of potential impacts (i.e. during construction) and that the majority of existing vegetation is proposed to be retained, particularly the potential black cockatoo habitat tree in the north-western portion of the site. A fauna management plan can be prepared prior to construction commencing, to reduce any impact on fauna within the site and will include vegetation clearing protocols with a specific focus on western ringtail possums.

- **Hydrology – groundwater and surface water**: water management within the site will be based on maintaining the existing hydrological regime of the site which includes infiltrating at source and controlling erosion, and is further detailed within the WMS (Emerge Associates 2019c). This can be addressed as part of development approvals and may include the preparation of a water management plan or similar (i.e. detailed civil drawings).

- **Hydrology – wastewater**: the proponent is considering two options for the disposal of wastewater, which includes the use of an onsite package wastewater treatment plant or connecting to an existing Water Corporation system. The proposed approach will be confirmed as part of development approval, and all relevant DWER, Shire of Augusta Margaret River, Department of Health and/or Water Corporation approvals will be satisfied. This will include the appropriate management of nutrients to minimise impacts on the Margaret River.

- **Hydrology – Margaret River**: the riparian vegetation associated with Margaret River is proposed to be protected and enhanced, with no construction activities proposed within the area these values are located.

- **Visual amenity**: to prepare the development concept, a number of design principles have been applied which demonstrate that the proposed development can be implemented in such a way to retain and enhance the important, natural, rural and built landscape characters of the site. These design principles will be applied as part of detailed design and implementation.
• **Bushfire management**: bushfire hazards (classified vegetation) have been identified in the vicinity of the site. Appropriate separation will be provided between bushfire hazards and proposed habitable buildings to achieve BAL-29, or where this is not possible based on protecting the existing heritage, vegetation and landscape values, it is proposed that the construction standards of the buildings will be increased in accordance with AS 3959 (i.e. BAL-40 or BAL-F2). This can be managed through the development approval and building licence process, and will include the preparation of an updated BAL assessment (or BMP) to confirm the construction requirements and address and risk assessment relevant for tourism land uses. No modification of vegetation outside the site is proposed to manage bushfire risk.

Overall, there are no significant environmental issues or constraints within the site that would preclude the addition of the proposed tourism land uses within the existing ‘tourism’ zoning of the site, and any management considerations can be appropriately addressed as part of the development approval and building process in line with the scheme provisions.

The site has important heritage values that are inherently linked to the natural, landscaped and built environments present within the site which are proposed to be retained and enhanced by the proposed development. In particular, impacts on flora and vegetation values and conservation significant fauna will be minimal given existing vegetation is proposed to be largely retained, and vegetation outside the site will not be impacted particularly by the proposed bushfire mitigation measures. Ongoing consultation with the relevant approval authorities, in particular the Shire of Augusta Margaret River, the Heritage Council of Western Australia and Aboriginal stakeholders will continue to inform the detailed design and implementation of the proposed development.
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Appendix B

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<thead>
<tr>
<th>General terms</th>
<th>Description</th>
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<tbody>
<tr>
<td>ASS</td>
<td>Acid Sulfate Soils</td>
</tr>
<tr>
<td>BAL</td>
<td>Bushfire Attack Level</td>
</tr>
<tr>
<td>BGL</td>
<td>Below ground level</td>
</tr>
<tr>
<td>BMP</td>
<td>Bushfire Management Plan</td>
</tr>
<tr>
<td>EAR</td>
<td>Environmental Assessment Report</td>
</tr>
<tr>
<td>ESA</td>
<td>Environmentally sensitive area</td>
</tr>
<tr>
<td>FCT</td>
<td>Floristic community type</td>
</tr>
<tr>
<td>FZ</td>
<td>Flame zone</td>
</tr>
<tr>
<td>MGL</td>
<td>Maximum groundwater level</td>
</tr>
<tr>
<td>MNES</td>
<td>Matters of National Environmental Significance</td>
</tr>
<tr>
<td>P1</td>
<td>Priority 1</td>
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<tr>
<td>P2</td>
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<td>Priority 5</td>
</tr>
<tr>
<td>PEC</td>
<td>Priority ecological community</td>
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<tr>
<td>TEC</td>
<td>Threatened ecological community</td>
</tr>
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<td>WMS</td>
<td>Water Management Strategy</td>
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**Table A2: Abbreviations – units of measurement**

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<th>Units of measurement</th>
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<tr>
<td>cm</td>
<td>Centimetre</td>
</tr>
<tr>
<td>dB</td>
<td>Decibel</td>
</tr>
<tr>
<td>ha</td>
<td>Hectare</td>
</tr>
<tr>
<td>km</td>
<td>Kilometre</td>
</tr>
<tr>
<td>m</td>
<td>Metre</td>
</tr>
<tr>
<td>m²</td>
<td>Square metre</td>
</tr>
<tr>
<td>m AHD</td>
<td>Metres in relation to the Australian Height Datum</td>
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<tr>
<td>mm</td>
<td>Millimetre</td>
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### Table A3: Abbreviations – Organisations

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</tr>
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</tr>
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</tr>
<tr>
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<tr>
<td>DoL</td>
</tr>
<tr>
<td>DoW</td>
</tr>
<tr>
<td>DPaW</td>
</tr>
<tr>
<td>DPIRD</td>
</tr>
<tr>
<td>DPLH</td>
</tr>
<tr>
<td>DWER</td>
</tr>
<tr>
<td>EPA</td>
</tr>
<tr>
<td>OBRM</td>
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<tr>
<td>WALGA</td>
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<td>WAPC</td>
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### Table A4: Abbreviations – Legislation or standards

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<tr>
<td>AHA</td>
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<tr>
<td>AS 3959</td>
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<tr>
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<td>EP Act</td>
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<tr>
<td>EPBC Act</td>
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<td>PD Act</td>
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### Table A5: Abbreviations – Planning terms

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<td>LPS</td>
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<tr>
<td>SPP</td>
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<tr>
<td>Guidelines</td>
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1 Introduction

1.1 Background

Wallcliffe House Pty Ltd (the proponent) are proposing to redevelop Lot 101 Wallcliffe Road, Prevelly (herein referred to as ‘the site’) for tourism purposes. The site is located within the Shire of Augusta Margaret River and is approximately 5.2 ha in size and is found approximately 7 km south-west of the Margaret River townsit. It is generally bounded by the Margaret River and associated riparian vegetation to the north-west, a nature reserve to the south and existing residential and tourism land uses (including chalet and camping) to the east (which also includes the Margaret River rowing club), as shown in Figure 1.

The site contains one of the original farms and homesteads built by the Bussell family (referred to as ‘Wallcliffe House’) with construction of the original buildings commenced in 1858. The site was home to a number of large sandstone buildings and ancillary buildings, as well as a significant cultivated garden and dairy, however the buildings were significantly damaged by a bushfire in 2011. The site has not been used for residential or tourism purposes since 2011 due to the damage from the bushfire, although the cultivated gardens and grounds surrounding the buildings have continued to be maintained to a high standard over this period.

Spencer Fung Architects and MJA Studio have prepared a concept plan to support the redevelopment of the site, which will include progressing an amendment to the Shire of Augusta Margaret River Local Planning Scheme No.1. The scheme amendment is proposed to broaden the permitted land uses under the existing ‘Tourism’ zoning to enable other land uses such as hotel, chalet, guesthouse and ancillary and related uses consistent with the heritage values of the land. The concept plan is provided in Appendix A.

1.2 Purpose of this report

This Environmental Assessment Report (EAR) has been prepared by Emerge Associates to provide a synthesis of information regarding the environmental values and attributes of the site. Specifically, this report:

- Identifies the existing environmental values and attributes of the site (Section 2)
- Discusses the land use planning context and the proposed development of the site (Section 3)
- Discusses how the concept plan responds to the existing environment and outlines the future environmental management considerations (Section 4)
- Outlines how the environmental management approach will be implemented (Section 5)
- Outlines applicable environmental recommendations (Section 6).

The EAR is the key supporting environmental document for the scheme amendment process, to ultimately facilitate the consideration of the relevant environmental values by decision makers and the community, and ensure an appropriate management framework is applied.
2 Existing Environment

In order to understand the environmental values within or nearby to the site and consider appropriate management responses, Emerge Associates have reviewed a range of information sources, including local and regional reports, databases, mapping and site-specific investigations. Site specific investigations that have informed the preparation of this report include:

- *Bushfire Management Plan* (Emerge Associates 2019a)
- *Spring Flora and Vegetation Assessment* (Emerge Associates 2019b)
- *Water Management Strategy* (Emerge Associates 2019c)
- *Fauna Assessment* (Harewood 2019)
- *Aboriginal Heritage Review* (Hocking Heritage Studio 2019a)
- *European Heritage Report* (Hocking Heritage Studio 2019b)
- *Geotechnical Investigation Report* (CMW Geosciences 2018)
- *Engineering Aspects* (The Civil Group 2019)

2.1 Climate

The climate of the site is described as Mediterranean, with hot, dry summers and moderately wet, mild winters. The majority of rainfall within the region occurs between May and October each year, and on average is between 600 to 1000 millimetres annually. However, in the last 40 years there has been a marked decrease in rainfall, with a noticeable shift to a drier climate across the south-west of Western Australia (CSIRO 2009).

The closest weather station to the site which records rainfall and temperature data is located in Witchcliffe (Bureau of Meteorology (BoM) station number 9746), situated approximately 11.7 km south-east of the site. Based on weather data collected from 1999 to 2019 at the Witchcliffe station, the local area experiences an average of 974.7 mm of annual rainfall, as detailed in Table 1 below. Temperature data is also recorded at the Witchcliffe station, indicating the highest a mean maximum temperature of 27.1°C is in February, while the mean minimum temperature of 8.2°C is in July and August (BoM 2019).

*Table 1: Median (decile 5) annual rainfall from 1919 to 2019 at Witchcliffe (station number 9746) (BoM 2019)*

<table>
<thead>
<tr>
<th>Month</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
<th>Total</th>
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<tbody>
<tr>
<td>Median rainfall (mm)</td>
<td>5.8</td>
<td>6.8</td>
<td>25.5</td>
<td>48.6</td>
<td>123.3</td>
<td>159.1</td>
<td>200.7</td>
<td>164.9</td>
<td>113.4</td>
<td>55.4</td>
<td>32.0</td>
<td>13.6</td>
<td>974.7</td>
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</table>
2.2 Landform and soils

2.2.1 Topography

Overall the site has a north-westerly aspect, with elevation ranging from 2 m in relation to the Australian height datum (mAHD) along the western boundary adjacent to Margaret River, to 12 mAHD at its northern extent, 22 mAHD in the south west near the Wallcliffe Cliffs and 64 mAHD at the south eastern extent (i.e. closest to Wallcliffe Road) (DPIRD 1999). Topographic contours are shown in Figure 1.

2.2.2 Landform, soils and geology

The regional geological mapping (Western Australia 1:50 000 Regolith-Landform Resources Series, Cowaramup – Mentelle first edition 2000) indicates that the site is underlain by the Leeuwin Complex comprising fresh to weathered granite, while the area immediately to the west of the site (i.e. associated with the Wallcliffe Cliffs) comprise the Spearwood dunal system, described as sand over calcarenite (coarse grained limestone). Soil landscape mapping (compiled by the Department of Primary Industries and Regional Development (DPIRD)) indicates the site is within the ‘Gracetown low slopes phase’ soil landscape (shown in Figure 2) which is described as ‘deep yellow brown siliceous sands over limestone’ (i.e. Spearwood Sands).

A preliminary geotechnical investigation (CMW Geosciences 2018) was undertaken for the site and generally indicates that geology and soil within the site aligns with the published regional information, although sand over calcarenite (the Spearwood dunal system) appears to extend over the majority of the site (rather than granite), aligning with the soil landscape mapping, with some areas containing shallow pinnacle limestone with sand.

The south western portion of the site contains the eastern most extent of the Wallcliffe Cliffs. The Wallcliffe Cliffs comprise tall limestone cliffs which are located approximately 400 m from the coast and adjoin the site at its western-most boundary (with the total length of the cliffs approximately 250 m). There are a number of caverns, overhangs and caves within the cliffs that have been identified as having a diversity of significant local geological and landscape attributes (Shire of Augusta Margaret River 2018).

2.2.3 Karst formations

Karst is encountered all over Australia and the formation and size of karst features is reliant upon a variety of factors including water chemistry, strength of soluble rock and depth to groundwater from the surface. Karst landforms are produced as a result of the dissolution of soluble rock by weakly acidic surface water or groundwater. There are many distinctive landform features that define karst terrains including: sinkholes (dolines), caves, dry valleys, tube structures, vaults and solution flutes (Csaky 2003).

Due to the presence of limestone in the subsurface and presence of caves south-west of the site, the preliminary geotechnical investigation (CMW Geosciences 2018) has identified the central-western and central eastern portion of the site as a potential karst risk area. The karst risk areas within the site are shown in Figure 2.
2.2.4 Acid Sulfate Soils

Acid Sulfate Soils (ASS) is the name commonly given to naturally occurring soils and sediment containing iron sulphide materials. In their natural state ASS are generally present in waterlogged anoxic conditions and do not present any risk to the environment. When oxidised, ASS produce sulphuric acid, which can pose risks to the surrounding environment, infrastructure and human health.

The site is not identified as having any risk of ASS based on the available regional mapping prepared by the Department of Water and Environment Regulation (DWER 2017). This is supported by the outcomes of the preliminary geotechnical investigation (CMW Geosciences 2018). Margaret River, adjacent to the north-western boundary of the site, is identified as having a ‘low to moderate’ risk of ASS within 3 m of the natural soil surface.

Given no disturbance of Margaret River is proposed, and construction works within the site are unlikely to occur below the natural groundwater table, ASS is unlikely to be a risk for development within the site.

2.3 Coastal processes

The site is situated approximately 600 m east of the coastline, with the development located adjacent to Margaret River which meanders to the river mouth (for approximately 1.2 km) and is seasonally open to the ocean. The Shire of Augusta Margaret River commissioned the preparation of a Coastal Hazard Risk Management and Adaption Plan (CHRMAP) (Shore Coastal 2015) to provide strategic guidance on management and adaptation in key coastal settlements that may be exposed to coastal processes such as storm surge, inundation and erosion.

The CHRMAP (Shore Coastal 2015) considered Prevelly and the areas near the mouth of the Margaret River, and while estuarine flooding for Margaret River was not specifically identified as an issue, Shore Coastal (2015) indicated that assets located below the 5 m AHD contour or at a horizontal distance of 200 m from the coast may be exposed to coastal processes such as storm surge, inundation and erosion in the 100 year planning period. While portions of the site are located below the 5 m AHD contour, proposed habitable buildings can be located above this contour, indicating based on current predictions, that the proposed development is unlikely to be significantly impacted by coastal storm surge or inundation.

2.4 Biodiversity and natural area assets

2.4.1 Flora and vegetation

2.4.1.1 Site-specific investigations

A detailed flora and vegetation survey of the site and portions of the surrounding reserves was undertaken by Emerge Associates in November 2018. A copy of the Spring Flora and Vegetation Assessment (Emerge Associates 2019b) has been provided in Appendix B and the outcomes have been summarised in the following sections.
The purpose of the survey was to detail the flora and vegetation characteristics of the site, and in particular determine the presence of conservation significant values such as threatened and priority ecological communities (TECs and PECs), threatened and priority flora and regionally significant vegetation values.

At the federal level, certain listed TECs and threatened flora are protected through the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and are identified as Matters of National Environmental Significance (MNES). Any action likely to have a significant impact on a listed TEC or threatened flora species requires approval from the Commonwealth Minister for the Environment.

At the state level, threatened flora species are listed under sections 19(1) and 26(2) of the *Biodiversity Conservation Act 2016* (BC Act), while TECs are listed under sections 27(1) and 33 of the BC Act. Threatened flora species and TECs are also acknowledged through other state environmental approval processes such as environmental impact assessment pursuant to Part IV of the *Environmental Protection Act 1986* (EP Act) and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

In Western Australia, an ecological community under consideration for listing as a TEC, but which does not yet meet survey criteria or has not been adequately defined, or which is rare but not currently threatened, is referred to as a ‘PEC’. Similarly, species which are potentially rare or threatened, or meet the criteria for near threatened, or have recently been removed from the threatened species list are classed as ‘priority’ flora species. PECs and priority flora are not protected statutorily.

The presence of conservation significant values is discussed in the following sections.

### 2.4.1.2 Vegetation condition

Vegetation condition within the site was assessed using methods from Keighery (1994), with descriptions of the vegetation condition ratings provided in *Appendix B*.

The vegetation within the site ranged in condition, with the majority of the site identified in ‘completely degraded’ condition (associated with non-native species such as turf/grasses, and garden areas with planted trees and shrubs). A number of patches of vegetation were identified throughout the site ranging from ‘degraded’ condition (reflecting a lack of understorey structure and low species diversity) through to ‘very good’ condition (where moderate species diversity, $<20\%$ weed cover and relatively intact vegetation structure was identified). Adjacent to the site, within the Margaret River to the north-west and nature reserve to the south, vegetation was identified in ‘very good’ condition. Vegetation condition is shown in *Figure 3*.

### 2.4.1.3 Threatened and priority ecological communities

The flora and vegetation survey (Emerge Associates 2019b) found that the site is largely comprised of non-native vegetation (approximately 4 ha), and is associated with mature cultivated garden and lawn areas. The vegetation within the site has been described as five different ‘plant communities’ which have been summarised in *Table 2* and shown in *Figure 3*. ‘Cleared/planted’ is the dominant
plant community, while the other identified plant communities are relatively small and align with areas within the site where endemic species were identified in groups.

None of the plant communities described within the site (or surrounds) were identified as TECs or PECs.

The aquatic root mat community of the Leeuwin-Naturaliste Ridge Caves are a rare and complex TEC that live in a dark, warm and wet environment of limestone caves. In these communities, the tree roots from endemic species such as karri, marri or peppermints reach the water in shallow caves and create microscopic fungi. The fungi in return provide a food source for other organisms. None of the Leeuwin-Naturaliste Ridge Caves TECs have been located in the Wallcliffe Cliff (and caves) to the west of the site. While karst risk areas have been identified within the site (which may mean cave type features are present), it is highly unlikely that this TEC occurs within the site due to the historic clearing of vegetation (including the removal of tree roots) and the planting of non-native species.

Table 2: Summary of plant communities (including area (ha)) identified within the site and broader survey area (Emerge Associates 2019b).

<table>
<thead>
<tr>
<th>Plant community</th>
<th>Description</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AfW</td>
<td>Woodland of Agonis flexuosus over open shrubland of Rhagodia baccata subsp. baccata, Olearia axillaris and Hibbertia cuneiformis over open mixed forbland and open to closed grassland of weeds. See Plate 1.</td>
<td>Site 0.63, Additional survey area 0.21</td>
</tr>
<tr>
<td>AfSgHcW</td>
<td>Woodland of Agonis flexuosus over shrubland of Spyridium globulosum, Hibbertia cuneiformis, Templetonia retusa with vineland of Hardenbergia comptoniana and Muehlenbeckia adpressa over low shrubland of Phyllanthus calycinus over forbland of Tricoryne elatior and Thysanotus arenarius Austrostipa flavescens. See Plate 2.</td>
<td>Site 0.33, Additional survey area 2.45</td>
</tr>
<tr>
<td>CcAfW</td>
<td>Woodland of Corymbia calophylla and Agonis flexuosus over shrubland of Spyridium globulosum, Pteridium esculentum, Rhagodia baccata subsp. baccata and Exocarpos sparteus with vineland of Hardenbergia comptoniana and Muehlenbeckia adpressa over weeds</td>
<td>Site 0.05, Additional survey area 0.42</td>
</tr>
<tr>
<td>MhBvTrCS</td>
<td>Low open woodland of Agonis flexuosus (resprouting) with closed shrubland of Melaleuca huelligii, Beyeria viscosa, Acacia cyclops, Diplolaena dampieri, Dodonaea aptera and Spyridium globulosum with vineland of Hardenbergia comptoniana and Muehlenbeckia adpressa over open forbland of Tricoryne elatior, *Petrophaga dubia and Thysanotus arenarius, sparse sedgeland of Lepidosperma spp. and sparse grassland of Austrostipa flavescens and *Lagurus ovatus.</td>
<td>Site 0.16, Additional survey area 1.96</td>
</tr>
<tr>
<td>MrLOF</td>
<td>Low open forest of Melaleuca rhaphiophylla over open to closed rush/sedgeland of Juncus spp. and Baumea juncea over sparse forbland of Apium prostratum var. prostratum, Lobelia anceps, Samolus repens var. repens and *Atriplex prostrata.</td>
<td>Site 0.11, Additional survey area 0.79</td>
</tr>
<tr>
<td>Cleared/planted</td>
<td>Modified vegetation comprising weeds with occasional native trees and planted vegetation. See Plate 3.</td>
<td>Site 4.01, Additional survey area 0.08</td>
</tr>
</tbody>
</table>
Plate 1: Plant community $AfW$ in degraded condition

Plate 2: Plant community $AfSgHcW$ in good condition.
2.4.1.4 Threatened and priority flora

One individual of the priority four flora species *Banksia sessilis* var. *cordata* was recorded in the south-eastern corner of the site, adjacent to the existing driveway and is shown in Figure 3. No other threatened or priority species were identified within the site.

2.4.2 Terrestrial fauna

A Level 1 fauna survey was carried out by qualified zoologist Greg Harewood in April 2019 within the site and broader survey area and included a targeted western ringtail possum survey in addition to a targeted black cockatoo habitat assessment in accordance with the EPA Technical Guidance – *Terrestrial Fauna Surveys* (EPA 2016b). A copy of the fauna assessment is provided in Appendix C and the outcomes summarised in the section below.

2.4.2.1 Species of conservation significance

Fauna species that are considered to be rare or under threat warrant special protection under state and/or federal legislation. At a federal level, fauna species may be listed as ‘threatened’ pursuant to the EPBC Act and any action likely to have a significant impact on a listed threatened species requires approval from the Commonwealth Minister for the Environment.

At a state level, fauna species listed as ‘threatened’ under section sections 13, 19 and 26(2) of the BC Act. In addition to this, the Department of Biodiversity Conservation and Attractions (DBCA) maintains a list of priority fauna species which, while not considered threatened under the BC Act and therefore not protected directly, involve some concern over their long-term survival.

The outcomes of the fauna survey (Harewood 2019) indicate that the areas of remnant vegetation and cultivated gardens within the site are likely to provide habitat for conservation significant fauna species, with evidence of their presence observed for a number of species.
A summary of the conservation significant fauna species that were observed or may potentially occur within the site or surrounds have been summarised in Table 3.

Table 3: The presence of conservation significant fauna species within the site and surrounds (Harewood 2019).

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation status</th>
<th>Habitat present</th>
<th>Evidence of presence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baudin’s Black-Cockatoo <em>Calyptorhynchus baudinii</em></td>
<td>Schedule 3, Endangered</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ✔️</td>
</tr>
<tr>
<td>Carnaby’s Black-Cockatoo <em>Calyptorhynchus latirostris</em></td>
<td>Schedule 2, Endangered</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ✔️</td>
</tr>
<tr>
<td>Forest Red-tailed Black Cockatoo <em>Calyptorhynchus banksii naso</em></td>
<td>Schedule 3, Vulnerable</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ✔️</td>
</tr>
<tr>
<td>Eastern Osprey <em>Pandion haliaetus</em></td>
<td>Schedule 5, Migratory</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ✔️</td>
</tr>
<tr>
<td>Western Ringtail Possum <em>Pseudocheirus occidentalis</em></td>
<td>Schedule 1, Critically Endangered</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ✔️</td>
</tr>
<tr>
<td>Pouched Lamprey <em>Geotria australis</em></td>
<td>Priority 3</td>
<td>Site ×, Surrounds ✔️</td>
<td>Site ×, Surrounds ×</td>
</tr>
<tr>
<td>Peregrine Falcon <em>Falco peregrinus</em></td>
<td>Schedule 7</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ×</td>
</tr>
<tr>
<td>Masked Owl (SW population) <em>Tyto n. novaehollandiae</em></td>
<td>Priority 3</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ×</td>
</tr>
<tr>
<td>Black Bittern <em>Ixobrychus flavicollis</em></td>
<td>Priority 2</td>
<td>Site ×, Surrounds ✔️</td>
<td>Site ×, Surrounds ×</td>
</tr>
<tr>
<td>Australian Little Bittern <em>Ixobrychus</em></td>
<td>Priority 4</td>
<td>Site ×, Surrounds ✔️</td>
<td>Site ×, Surrounds ×</td>
</tr>
<tr>
<td>South-western Brush-tailed Phascogale <em>Phascogale tapoatafa wambenger</em></td>
<td>Schedule 6, -</td>
<td>Site ✔️, Surrounds ✔️</td>
<td>Site ✔️, Surrounds ×</td>
</tr>
<tr>
<td>Quenda <em>Isoodon fuscivent</em></td>
<td>Priority 4</td>
<td>Site ×, Surrounds ✔️</td>
<td>Site ×, Surrounds ×</td>
</tr>
<tr>
<td>Western False Pipistrelle <em>Falsistrellus mackenziei</em></td>
<td>Priority 4</td>
<td>Site ×, Surrounds ✔️</td>
<td>Site ×, Surrounds ×</td>
</tr>
<tr>
<td>Water Rat <em>Hydromys chrysogaster</em></td>
<td>Priority 4</td>
<td>Site ×, Surrounds ✔️</td>
<td>Site ×, Surrounds ×</td>
</tr>
</tbody>
</table>

Of the fauna species identified in Table 3:

- The presence of western ringtail possum throughout the site was identified through scats, dreys and identification of individuals during the nocturnal component of the survey, with the location of these observations shown in Figure 4. Almost all vegetation within the site can be considered habitat of some type for the western ringtail possum and may be used for refuge, foraging and/or dispersal.
• Foraging evidence of the three black cockatoo species (Carnaby’s, Baudin’s and forest red-tailed) was identified within site in the form of chewed marri nuts and pine cones in two areas, as shown in Figure 5, however overall the extent of quality foraging habitat within the site is limited. Three potential trees that could be used as breeding habitat (i.e. with a diameter at breast height ≥ 50cm) were identified in the survey area, with only one of the trees identified within the site. None of the trees were identified to contain hollows suitable for breeding and no evidence of breeding activity was observed. No roosting trees were identified either.

• A potential osprey nest was identified near the northern-most boundary of the site and an individual observed resting on one of the buildings during the survey. More recent site observations (separate to the survey) indicate the ospreys may also be nesting on top of one of the building ruins.

• No water rats were observed within the site or surrounds as part of the fauna survey (Harewood 2019), although it is noted that the dense swampy vegetation (i.e. riparian vegetation) associated with the Margaret River would be suitable habitat for the species. Anecdotal evidence provided by local Aboriginal people supports this, and indicates water rats are present and utilise the riparian vegetation.

• Similarly, while no quenda were observed, the fauna survey (Harewood 2019) noted that the dense swampy vegetation associated with the Margaret River (i.e. the riparian vegetation) would be considered suitable habitat for the species and may be used.

While fauna species of conservation significance were identified utilising the site, the site is considered to have overall low biodiversity value from a fauna perspective (when compared to surrounding nature reserves and the Margaret River), with impacts on species likely to be non-existent or negligible. The presence of fauna species within the site will need to be managed through the development process and is discussed further in Section 4.3.

2.4.3 Conservation reserves

2.4.3.1 DBCA managed lands

DBCA has tenure of or interests in numerous areas of land across the state for a range of purposes. Tenure categories include national parks, nature reserves, conservation parks, marine parks, marine nature reserves, marine management areas, section 5(1)(g) reserves, state forest and timber reserves. These areas are mapped within the Legislated Lands and Waters (DBCA 2017a) and Lands of Interest (DBCA 2017b) datasets. The Legislated Lands and Waters (DBCA 2017a) dataset includes lands subject to the following legislation; the Conservation and Land Management Act 1984 (CALM Act 1984), Swan and Canning Rivers Management Act 2006 (SCRM Act) and lands identified under the Land Administration Act 1997 (LA Act). The Lands of Interest (DBCA 2017b) dataset includes all other lands of which DBCA is recognised as the manager but is not vested under any act. These lands comprise of crown land and freehold land which DBCA has been acknowledged by the Department of Planning, Lands and Heritage (DPLH) as the responsible agency.

DBCA managed lands in the vicinity of the site include land to the west of the Margaret River (and including the portion of the river to the south west of the site) and south of Walcliffe Road to the south east of the site, and forms part of the Leeuwin-Naturaliste National Park (R8428) (DBCA 2017a), as shown in Figure 6.
2.4.3.2 Shire managed conservation reserves

The land directly to the south of the site is vested with the Shire of Augusta-Margaret River as an A-class nature reserve, R41545 (Wallcliffe Reserve) (Shire of Augusta-Margaret River 2018), as shown in Figure 6. Wallcliffe Reserve contains the majority of the Wallcliffe Cliffs which contain a number of caverns, overhangs and caves as discussed in Section 2.1.2. Due to increased degradation from recreational use and its Aboriginal significance, public access to the cliff caves was prohibited by the Shire of Augusta Margaret River in 2018 (Shire of Augusta-Margaret River 2018).

A separate cave is known to be present close to the south of the site within Wallcliffe Reserve, and approximately 150 m from the Wallcliffe Cliffs (Shire of Augusta-Margaret River 2018). However, the exact location of the cave is not identified in publicly available mapping. This cave was previously accessed for tourism purposes but this cave was gated to prevent access following the preparation of the Wallcliffe Cave Management Plan (2002-2012) (Shire of Augusta-Margaret River 2002).

2.4.4 Ecological linkages

Ecological or biodiversity linkages are described as areas of native vegetation which provide a corridor or linkage (typically linear) between patches of vegetation to allow movement of flora and fauna and their genetic material through the landscape, helping to maintain metapopulations. Ecological linkages are often continuous or near-continuous as the more fractured a linkage is, the less ease flora and fauna have in moving within the corridor (Alan Tingay and Associates 1998).

The Perth Biodiversity Project, supported by the Western Australia Local Government Association (WALGA), have identified and mapped regional ecological linkages (based on areas of vegetation being located in the vicinity of others) within the Perth Metropolitan Region (WALGA and PBP 2004). This study was extended beyond the Perth Metropolitan Region through the South West Biodiversity Project, resulting in the identification and mapping of the South West regional ecological linkages (Molloy et al. 2009).

There are no mapped ecological linkages within the site. Three regional ecological linkages (Nos 107, 108 and 109) meet to the west of the site, associated with the Margaret River, and generally extend to the north and south of the site aligned with Leeuwin-Naturaliste National Park. The general location of the ecological linkages are shown in Figure 6.

2.4.5 Environmentally Sensitive Areas

‘Environmentally sensitive areas’ (ESAs) are prescribed under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 and have been identified to protect native vegetation values of areas surrounding significant, threatened or scheduled flora, vegetation communities or ecosystems. Exemptions under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 do not apply within ESAs. However, exemptions under Schedule 6 of the Environmental Protection Act 1986 (EP Act) still apply, including any clearing in accordance with a subdivision approval under the Planning and Development Act 2005 (a recognised exemption under the Schedule 6 of the EP Act).
No ESAs are identified within the site. One ESA is located directly to the south of the site and adjacent to the northern bank of the Margaret River. This ESA is very large and extends to the north, south-west and south-east of the site over approximately 2518 square kilometers (km²) (and is shown in Figure 6).

2.5 Hydrology

2.5.1 Groundwater

A review of the Water Register (DWER 2019) indicates the site is found within the Busselton-Capel Groundwater Area and the Cape to Cape North subarea. This groundwater subarea is composed of two aquifers, the surficial and fractured rock, both of which rely on rainfall for recharge.

Limited regional groundwater level information is available and no site-specific groundwater monitoring has been undertaken to date. However, the preliminary geotechnical investigation (CMW Geosciences 2018) undertaken for the site observed that no groundwater was encountered within the various test pit locations (varying in depth from 0.5 m to 3 m), and based on the geology it is likely that groundwater is confined by the underlying weathered granite which would act as a low permeability aquitard. Perched groundwater is likely to fluctuate seasonally within the overlying sand/limestone formations, flowing north from the elevated southern portions of the site toward the river when present.

There is no groundwater quality data available for the site, however shallow groundwater has historically been utilised to irrigate landscaped portions of the site, and the condition of the irrigated vegetation is excellent (from a plant health perspective) indicating water quality is appropriate for use on plants.

2.5.2 Surface water

A review of the Water Register (DWER 2019) indicates that the site is located within the ‘Busselton Coast’ surface water area and ‘Lower Margaret’ subarea.

No surface water features have been identified within the site, however the Margaret River, a major perennial watercourse, is located directly adjacent to the western boundary of the site. While the topography of the site would direct runoff towards Margaret River (as indicated above), runoff from all rainfall events is expected to infiltrate at source within the sandy layer of soils in the site. The location of Margaret River is shown on Figure 6.

The portion of the Margaret River adjacent to the site forms part of the lower reaches or the river, with the river mouth (where it connects with the Indian Ocean) located approximately 1.2 km west of the site (based on the meandering river channel). Margaret River retains a diversity of habitats including pools, riffles, cascades, low flow channels, floodplains and backwaters as well as flora, fauna and aquatic (fish, invertebrates etc.) values.

Riparian vegetation values associated with the Margaret River are largely located outside the site boundary, but is located on an area of land located between the site and the waterbody. Remnant riparian vegetation is described as being dominated by *Melaleuca rhaphiophylla* and associated sedges and rushes (Nature Conservation Margaret River Region 2018). This description was
supported by the findings of the flora and vegetation survey completed by Emerge Associates (2018). The width of the riparian vegetation adjacent to the site varies between 0 m and 25 m, with a small portion of the site having direct access to Margaret River via an existing small cleared beach.

2.5.3 Wetlands

No wetlands of international importance (i.e. Ramsar wetlands) or geomorphic wetlands (as mapped within the federal Department of Environment and Energy Protected Matters Search Tool and the DBCA maintained Geomorphic Wetlands Leeuwin Naturaliste Ridge and Donnybrook to Nannup (DBCA-043) and Geomorphic Wetlands South West (DBCA-040) databases respectively) have been identified within the site or in close proximity.

2.6 Heritage

2.6.1 Aboriginal heritage

The Aboriginal Heritage Inquiry System (AHIS) is maintained pursuant to Section 38 of the Aboriginal Heritage Act 1972 by the Department of Planning, Lands and Heritage (DPLH), and contains information on Registered Aboriginal Heritages Sites and Other Heritage Places throughout Western Australia. In accordance with the Aboriginal Heritage Due Diligence Guidelines (DAA 2013), a search of the AHIS online database (DPLH 2018) was undertaken. Two Registered Aboriginal Heritage Sites were identified within the site, Site 5848-Cliffs at Wallcliffe and Site 4495-Margaret River. Both are mythological sites, and Site 5848 is also an artefacts/scatter and rockshelter site (DPLH 2018). The Registered Aboriginal Heritage Sites are shown in Figure 7.

An Aboriginal Heritage Assessment was conducted by Hocking Heritage Studio (2019a) to evaluate the potential impact of the proposed development on significant Aboriginal heritage sites and to assess the risk to any potentially significant archaeological deposits or burials within the site. This included a detailed review of the existing site files and previous ethnographic and archeological surveys (some specific to the site). Given the extensive investigations to date and level of disturbance in the site, the potential for sub-surface archeological materials or burials to be present within the site is considered low.

The assessment (Hocking Heritage Studio 2019a) found that the extent of Site 5848 Cliffs at Wallcliffe is significantly smaller than the polygon shown in Figure 7 and is likely to be an 800 m diameter area centered on the Wallcliffe Cliffs. In the past, no objections to ground disturbing activities within the site (as part of previous construction activities in the early 2000’s) were raised by Aboriginal stakeholders with regard to Site 5848 provided the cliffs were not impacted.

Site 4495-Margaret River includes the river system, its major tributaries and associated banks and was found to extend into the site, with the existing boathouse located within the boundaries of the Registered Site. There is the potential that in addition to the existing boathouse, future proposed development may extend into the mapped boundaries of the site. While some informal consultation between the proponent and Aboriginal stakeholders has occurred, the Aboriginal Heritage Assessment (Hocking Heritage Studio 2019a) recommends that further more formal consultation with Aboriginal stakeholders be undertaken, and if required (particularly with regard to Site 4495-Margaret River) Section 18 consent pursuant to the Aboriginal Heritage Act 1972 (AHA) be applied.
for. Further detail on the management of Aboriginal heritage values is provided in the Aboriginal Heritage Assessment (Hocking Heritage Studio (2019a), with impacts able to be managed in accordance with AHA and through ongoing consultation.

2.6.2 Non-Indigenous heritage

In order to determine the actual or potential presence of sites or features of non-indigenous heritage significance within the site, a review of readily available information at a federal, state and local government level was undertaken to determine if any of the following occur within the site:

- World Heritage Sites
- National Heritage Places
- Commonwealth Heritage Places
- Sites listed in the State Register of Heritage Places
- Sites listed in the Shire of Augusta Margaret River Heritage Register.

A desktop search of the State Heritage Office database, which includes state and local lists (Heritage Council 2018) and the Australian Heritage Database, which includes the National and Commonwealth Heritage Lists (Department of the Environment and Energy 2018) indicates that the entire site is identified as a state and local registered heritage place, namely Place No. 114 – Wallcliffe House and Landscape.

Wallcliffe House and Landscape is described as containing areas of varying significance with Aboriginal, European and natural values identified, and include visual amenity, associated with the original views and vista that have changed little since European settlement, and the construction of Wallcliffe House and dairy in the 1950’s by Alfred and Ellen Bussell.

Hocking Heritage Studio have been engaged by the proponent to assist with protecting the heritage values of the site. The European Heritage Assessment (Hocking Heritage Studio 2019b) notes that some of the heritage significance of the site, particularly associated with the buildings has decreased due to the irreparable damage to these buildings (including the original Wallcliffe House and associated dairy building) as a result of the 2011 Margaret River bushfire. Elements of the landscape suffered slight damage, but on the whole, the landscape quality of the site remains intact.

Independent engineering advice confirmed that the original house and dairy structures (as well as buildings from later eras) could not be restored but elements could be retained and incorporated into the redevelopment (where appropriate/able to). Overall many of the heritage values associated with the site relate to historic events and families, and Hocking Heritage Studio (2019b) noted that these can be appropriately commemorated through interpretation rather than the previous physical elements. The landscape characteristics of the site are still considered important values and it is recommended that modification/impacts on these values should be minimised (Hocking Heritage Studio 2019b).

Further detail on the non-indigenous heritage values of the site are detailed in the European Heritage Assessment (Hocking Heritage Studio 2019b). Impacts on these values will be fully considered by the Heritage Council of Western Australia pursuant to the Heritage of Western Australia Act 1990, with approval to impact/modify the heritage values of the site required. Preliminary consultation with the Heritage Council has already commenced and will be ongoing throughout the development process.
Environmental Assessment Report
Lot 101 Wallcliffe Road, Prevelly

The European Heritage Assessment (Hocking Heritage Studio 2019b) concluded that the application for the scheme amendment to enable the proposed redevelopment of the site would not harm the documented significance of the site given the proposed concept responds to the distinct natural and landscape features and will have minimal impact on the existing views.

2.7 Other land use considerations

2.7.1 Historic and existing land uses

A review of available historical aerial imagery indicates that a majority of the site was cleared of native vegetation prior to 2004 (Landgate 2018). As outlined previously, the site was historically used to support one of the original farms and homesteads built by the Bussell family with construction of the buildings commenced in the 1850’s. The site was home to a number of large sandstone buildings and ancillary buildings, as well as a significant exotic garden (and dairy) and has supported agricultural, residential and tourism land uses since the 1850’s.

The site has not been used for residential or tourism purposes since the 2011 Margaret River bushfire significantly damaged the original Wallcliffe House and the majority of its ancillary buildings. However, the gardens and grounds have continued to be maintained to a high standard since the 2011 bush fire.

2.7.2 Potential site contamination

A review of the DWER Contaminated Sites Database (DWER 2018) did not identify any registered contaminated sites within or in proximity to the site, and previous land uses are not likely to have resulted in contamination. A review of the Department of Defence Unexploded Ordinance (UXO) search tool did identify two potential UXO occurrences within the local area. These are detailed within Table 4 below.

<table>
<thead>
<tr>
<th>UXO Area</th>
<th>ID no.</th>
<th>Description</th>
<th>UXO Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Margaret River (WA)</td>
<td>908</td>
<td>A live fire mortar shoot was conducted in 1944. Cow Rock was used by RAAF for high explosive bombing practices during WWII.</td>
<td>Slight Occurrence</td>
</tr>
<tr>
<td>Cape Mentelle (WA)</td>
<td>858</td>
<td>RAAF aircraft used Cow Rock island (approximately 1.5 km west of Cape Mentelle) as a bombing target during WWII.</td>
<td>Other</td>
</tr>
</tbody>
</table>

The Department’s advice on UXO area ID no. 908 is that ‘all land usage and development, within these areas, may continue without further UXO investigation or remediation’, and the advice for UXO ID no. 858 is that ‘these sites have been included for general information purposes only. Defence makes no recommendations in regards to this category’ (DoD 2019). It is unlikely that UXOs are located within the site given the site was developed at the time of the identified testing periods (so is unlikely to have been subject to bombing) and the extent of ground-disturbing works that have occurred in the site since the 1940s.
2.7.3 Visual amenity

As previously outlined in Section 2.6.2, the site has important visual and landscape amenity values, particularly with regard to how the original buildings were located within the landscape and the views/vistas to/from the Margaret River and surrounds.

The *Visual Landscape Planning in Western Australia* manual (WAPC 2007) has been prepared to assist state agencies, local government, developers and the community to develop a tool kit to determine the character of the landscape that contributes to scenic quality and sense of place. This manual is intended to assist a development be sensitive to the landscape values within the site and to maximise the ability to appreciate the landscape.

A visual landscape assessment has been undertaken for the site by MJA Studio (2019) in accordance with the principles outlined within the *Visual Landscape Planning in Western Australia* manual (WAPC 2007). The assessment noted that the site has important, natural, rural and built landscape characters which form the basis of the proposed design approach. In particular the proposed buildings are intended to use the footprint and scale of the existing buildings to inform their location and size, as well inform the location of the new buildings through the use of the topographic contours and existing vegetation.

The visual impact assessment for the site includes the generation of a number of images demonstrating the views of the proposed development from different vantage points along the Margaret River and surrounding areas. Where possible, these images have been compared to current photos of the site to allow an evaluation of the existing (ruinous) buildings with the proposed development.

To create the images, the following was undertaken:

- An accurate three-dimensional terrain model of the site and surrounds was developed based on:
  - The completion of a Light Detection and Ranging (LiDAR) survey. LiDAR is a very accurate surveying technique that has the capacity to pick up the accurate location of each leaf on each tree in a survey area. As with sunlight filtering through a tree canopy LiDAR cannot see through vegetation, it is only able to penetrate through the gaps in the leaves.
  - Detailed topographic contours for the site and surrounds.
- A schematic three-dimensional model of the proposed built forms was developed and inserted into the three-dimensional terrain model.
  - The architectural style of the proposed reconstructed and new buildings has been informed by the historical built form.
  - The colours and materials represented in the model reflect the proposed material palette, which is informed by the natural context, existing matte finishes and blending of built form with the gardens and existing vegetation.

An example of the images generated through the visual impact assessment provided in Plate 4 and Plate 5, which show the views from the Wallcliffe Road lookout based on the existing and proposed development footprints respectively. Plate 6 and Plate 7 show the existing and the proposed views of the site from the northern banks of the Margaret River. An extract of the visual impact assessment showing the location of the images is provided in Appendix D.
It is important to note that the existing buildings are currently ruins and the rooflines would have been more visible prior to their destruction as a result of the 2011 bushfire. The reconstructed and new buildings are intended to be of similar scale to the historic buildings, with the cross sections in Appendix D showing how the proposed buildings will be located in the context of the landscape, topography and vegetation.

The visual impact assessment demonstrates that the proposed development is intended to be located sensitively within the landscape, minimising impacts on the existing aesthetic and amenity values, and is further discussed in Section 4.5.

Plate 4: The current view of the site from Wallcliffe Road lookout (MJA Studios 2019).

Plate 5: Image generated of the view of the proposed development from Wallcliffe Road lookout, looking north (MJA Studios 2019).
Plate 6: The current view of the site, looking south from Margaret River (MJA Studios 2019).

Plate 7: Image generated of the proposed development, looking south from Margaret River (MJA Studios 2019).
2.8 Bushfire hazard

The entire site is designated as a ‘bushfire prone area’ in the state *Map of Bush Fire Prone Areas* (Office of Bushfire Risk Management 2019) and is shown in Plate 8. A Bushfire Management Plan (BMP) (Emerge Associates 2019a) has been prepared to support the proposed scheme amendment and considers the potential mitigation and management of bushfire risks in accordance with SPP 3.7, *Position Statement: Tourism land uses within bushfire prone areas* (WAPC 2019), the *Guidelines for Planning in Bushfire Prone Areas Version 1.3* (WAPC and DFES 2017) as well as *Australia Standard 3959-2018 Construction of buildings in bushfire-prone areas* (AS 3959).

![Plate 8: Areas within and surrounding the site identified as “bushfire prone areas” (as indicated in purple) under the state-wide Map of Bush Fire Prone Areas (OBRM 2019)](image)

Tourism land uses are currently permitted within the site, with the proposed scheme amendment refining the types of land uses that will be allowed. Importantly for the site, the existing environmental, heritage and landscape values within and surrounding the site are imperative to the proposed tourism development and therefore the management of bushfire risk has been balanced with protecting and maintaining these values.
The bushfire hazards (associated with areas of ‘classified vegetation’) likely to affect the tourism development are shown in Figure 8, and are largely associated with areas of:

- Existing forest vegetation adjacent to the north-west boundary of the site, associated with the riparian vegetation values of the southern bank of the Margaret River;
- Forest and scrub vegetation associated with the Leeuwin-Naturaliste National Park to the south-east of the site (on the opposite side of Wallcliffe Road) and north-west of the site (adjacent to the northern bank of the Margaret River);
- Scrub and forest vegetation associated with Wallcliffe Reserve immediately south of the site; and
- Woodland and forest vegetation near the entrance to the site in neighbouring landholdings.

Overall, the proposed development within the site would be able to satisfy the intent of the bushfire protection criteria and the requirements of SPP 3.7, as well as the position statement for tourism land uses in bushfire prone areas by:

- Providing appropriate separation between bushfire hazards and proposed habitable buildings to achieve a bushfire attack level (BAL) rating of BAL-29, or where this is not possible based on protecting existing heritage, environment and landscape values, increasing the construction standard of the buildings (i.e. BAL-40 or BAL-FZ) in accordance with AS 3959. Given the high level of fuel load management within the site and surrounds, the majority of the site will be subject to a BAL rating of BAL-12.5.
- The proposed development will have appropriate direct access to Wallcliffe Road, providing for vehicle access that is available and safe during a bushfire. In addition, given the proposed developed will be permanently staffed, informed evacuation processes will be able to be implemented, and furthermore an appropriate onsite safer place can be provided as a last-resort alternative in the case evacuation is not possible and/or appropriate.
- Water supply for fire-fighting purposes can be addressed through the existing hydrants along Wallcliffe Road (which will be within 600 m of the proposed habitable buildings), and is also proposed to be supplemented through the provision of additional static water supply within the site.

Importantly for this site, the vegetation and landscape values are an intrinsic part of understanding and celebrating its heritage value and realising the tourism potential of the site, and are therefore proposed to be protected and where possible enhanced. Constructing to a higher building standard, such as BAL-40 or BAL-FZ, is considered an appropriate means to minimise impacts on these values (in particular clearing of existing remnant native vegetation) whilst improving the resilience of the proposed reconstructed and new buildings.

It is acknowledged that while Wallcliffe House (and associated buildings) were largely destroyed by the 2011 Margaret River bushfire, this was largely as a result of embers entering the roof structures and burning the buildings from the inside out. AS 3959 did not exist at the time the previous buildings were constructed, and therefore protection against the mechanisms of bushfire attack was not incorporated into the buildings as it can be now.

The management of bushfire risk is further considered in Section 4.6.
2.9 Summary of relevant environmental factors

Table 5 provides a summary of the environmental values/factors that have been investigated for the site and outlines those that will require further specific consideration as part of future development within the site, and if applicable these are discussed further in Section 4.

Table 5: Relevant environmental values/factors and considerations for the site.

<table>
<thead>
<tr>
<th>Environmental value/factor</th>
<th>Relevant considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform and soils</td>
<td>The presence of Walcliffe Cliffs and the potential karst risk areas in the central-western and central eastern portions of the site, mean this factor requires further consideration and is addressed in Section 4.1.</td>
</tr>
<tr>
<td>Coastal processes</td>
<td>Proposed habitable buildings within the site can be situated above the identified coastal risk contour meaning significant impacts from coastal processes such as storm surge, inundation and erosion is unlikely. This can be managed through the development process and is not considered further as part of this EAR.</td>
</tr>
<tr>
<td>Flora and vegetation</td>
<td>No conservation significant flora and vegetation values have been identified within the site. However, the native and non-native vegetation values within the site are considered important from a heritage and landscape perspective and management of vegetation is addressed further in Section 4.2.</td>
</tr>
<tr>
<td>Terrestrial fauna</td>
<td>The proposed development has the potential to impact conservation significant fauna species during construction activities. Protection and management of these species and associated habitat is addressed further in Section 4.3.</td>
</tr>
<tr>
<td>Conservation reserves</td>
<td>A number of conservation reserves have been identified within the vicinity of the site including Leeuwin-Naturaliste National Park (R8428) and Walcliffe Reserve (R41545) Development within the site is not proposed to impact these areas, with the management of vegetation values considered in Section 4.2. No further specific consideration of this factor is required.</td>
</tr>
<tr>
<td>Ecological linkages</td>
<td>No ecological linkages have been identified within the site. Maintaining vegetation values surrounding the site considered in Section 4.2, and no further specific consideration of this factor is provided as part of this EAR.</td>
</tr>
<tr>
<td>Environmentally sensitive areas (ESAs)</td>
<td>There are no ESAs mapped as being present within the site. Development within the site is not proposed to impact on any identified ESAs, and accordingly no further consideration of this factor is required as part of this EAR.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>Groundwater was not encountered during the geotechnical investigation, and based on the geology it is likely that groundwater is confined by the underlying weathered granite which would act as a low permeability aquitard. Groundwater is more of a consideration with regard to managing water quality and is discussed further in Section 4.4.</td>
</tr>
<tr>
<td>Surface water</td>
<td>Margaret River is located directly adjacent to the western boundary of the site. Given the natural topography of the site, any surface water generated within the site (i.e. as a result of rainfall) is expected to riparian vegetation is discussed further in Section 4.4.</td>
</tr>
<tr>
<td>Wetlands</td>
<td>No geomorphic wetlands or wetlands of international importance (i.e. Ramsar wetlands) have been identified within the site. No further consideration of this factor is required as part of this EAR.</td>
</tr>
<tr>
<td>Aboriginal heritage</td>
<td>While the proposed development has the potential to impact on Aboriginal heritage values, these will be managed in accordance with the Aboriginal Heritage Act 1972 and in consultation with Aboriginal stakeholders, and is further detailed in the Aboriginal Heritage Assessment (Hocking Heritage Studio 2019a), provided separately as part of the scheme amendment. No further consideration for Aboriginal heritage is detailed within this EAR.</td>
</tr>
</tbody>
</table>
### Table 5: Relevant environmental values/factors and considerations for the site.

<table>
<thead>
<tr>
<th>Environmental value/ factor</th>
<th>Relevant considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-indigenous heritage</td>
<td>The entire site is identified as a state and local listed heritage place, Place No. 114 – Wallcliffe House and Landscape. Impacts on these values will be fully considered by the Heritage Council pursuant to the <em>Heritage of Western Australia Act 1990</em>, with approval to impact/modify the heritage values of the site required, and is further detailed in the European Heritage Assessment (Hocking Heritage Studio 2019b), provided separately as part of the scheme amendment. No further consideration of this factor is provided in this EAR.</td>
</tr>
<tr>
<td>Historic and existing land uses</td>
<td>The site has historically supported agricultural, residential and tourism land uses but is currently not used for any specific purpose (except maintaining the gardens and grounds) due to damage from the 2011 bushfire. No further consideration of this factor is provided as part of this EAR.</td>
</tr>
<tr>
<td>Potential site contamination</td>
<td>No registered contaminated sites were identified within or in proximity to the site, and previous land uses are not likely to have resulted in contamination. Two potential UXO occurrences have been recorded within the local area (ID No. 908 and 858). The DoD makes no recommendations for further investigation or remediation of these areas, therefore no further consideration of this factor is required as part of this EAR.</td>
</tr>
<tr>
<td>Visual amenity</td>
<td>Given the sensitivity of the visual amenity associated with the site, this factor has been further considered in Section 4.5.</td>
</tr>
<tr>
<td>Bushfire hazard</td>
<td>Classified vegetation has been identified within the site and surrounds. Management of bushfire hazards is further considered in Section 4.6.</td>
</tr>
</tbody>
</table>
3 Planning Framework and Proposal

3.1 Local scheme amendment

The site is currently zoned ‘tourism’ under the Shire of Augusta Margaret River LPS No.1. An amendment to the Shire of Augusta Margaret River LPS No. 1 is proposed to be initiated to broaden the permitted land uses under the existing tourism zoning to enable other tourism land uses such as hotel, chalet, and ancillary and related uses consistent with the heritage and environmental values of the land (and surrounds) to occur within the site. This is required to support the proposed development of the site as a world-leading luxury boutique hotel.

As part of the scheme amendment process, the Western Australian Planning Commission (WAPC) will refer the amendment to the Environmental Protection Authority (EPA) to determine whether environmental assessment under Part IV of the EP Act will be required. The EPA will advise the WAPC if any environmental factors or potential significant impacts are identified as requiring assessment and advice or recommendations may be provided regarding future development within the site.

3.2 Proposed development

Spencer Fung Architects and MJA Studio have prepared a concept plan to support the proposed redevelopment of the site. The proposed concept plan for the development is provided in Appendix A.

The site is intended to be developed as a landmark luxury boutique hotel likely to accommodate up to 50 rooms (and associated staff), and is intended to respect and acknowledge the cultural heritage and history of the site, its location as well as the existing landscape values. The site contains a number of buildings that relate to the original settlement of the area (including those constructed by the Bussell family in the 1850’s), as well as important landscape, vegetation and visual amenity values.

While the majority of existing building within the site were irreparably damaged by a bushfire in 2011 and cannot be restored, the proponent proposes to celebrate these historic values through rebuilding the previous buildings, as well as a number of additional buildings, to enable the building and broader site values to be appreciated in a more contemporary manner, and is in accordance with consultation undertaken with the Heritage Council of Western Australia and the Shire of Augusta Margaret River. In addition to the buildings, the existing mature cultivated gardens, remnant vegetation and visual amenity of the site are also an important part of the heritage values of the site. Accordingly, the proposed development proposes to be sensitively integrated with these features to minimise impact on the heritage and amenity values, while also providing the facilities required to provide a world-leading luxury boutique hotel, a type of tourism accommodation not currently located within the south-west of Western Australia which will be a valuable addition to the local/regional community and economy.
The proposed new buildings will aim to retain the ‘essence’ of the former buildings as much as possible by utilising the natural local limestone blocks as well as masonry, timber framing and rammed earth (MJA Studio 2019). The existing mature cultivated gardens and areas of remnant vegetation within the site are proposed to be retained, although some modification to this vegetation may be required as part of development.

The development of the site may necessitate upgrades to the capacity of existing utilities. Such services’ upgrades may include some or all the wastewater collection and disposal, water supply, firefighting water supply, electricity, gas, and communication services. In particular, the management of wastewater will be upgraded from the current domestic-scale system to one that is suitable for the proposed development and that will minimise the potential for nutrients to enter the surrounding environment.

The water management infrastructure will be passive, and will be integrated into the design of the site. There will be no requirement for a large formalised drainage system as sheet flow and localised infiltration will be adopted, consistent with the historic function and design of the site.

3.3 Future planning approvals process

Subject to the initiation and finalisation of the scheme amendment, the development of the site will be progressed straight through to the development approval stage. A number of environmental values and attributes will require further consideration as part of the development approval, detailed design and construction process, as summarised in Table 5. The values considered further in this EAR (and Section 4) include:

- Landform and in particular karst formations
- Flora and vegetation
- Native fauna
- Hydrology, namely groundwater and stormwater, wastewater and potential impacts on Margaret River
- Visual amenity, and
- Management of bushfire hazards.
4 Environmental Assessment and Management Strategy

This section outlines how the proposed development has been designed to accommodate the environmental attributes and values associated with the site and details the environmental management considerations that will be required as part of future development. Only those environmental values and attributes identified in Table 5 for further consideration have been detailed below.

4.1 Landform and karst formations

4.1.1 Policy framework and management objective

In the context of environmental impact assessment, the EPA aims to ‘maintain the variety and integrity of significant physical landforms so that the environmental values are protected’ (EPA 2018). For the site, the appropriate management of landform values within the site will largely be considered as part of other environmental factors, namely through managing the heritage values of the site. The EPA notes that caves within the Leeuwin Naturaliste Ridge are recognised to contain scientific and social value, and have been identified to contain aquatic root mat TECs. No caves are identified within the site, however a number of karst risk areas have been identified in a number of locations within the site where buildings are currently located and/or proposed (see Figure 2) based on the presence of limestone caves at a similar elevation to the west of the site (CMW Geosciences 2018). Given the highly disturbed nature of the site and previous removal of native vegetation, the aquatic root mat TEC is not expected to be located within the site (even if karst features are present). In addition, the eastern-most extent of Wallcliffe Cliffs, a recognised feature of regional significance that contains tall limestone cliffs, caverns, overhangs and caves (Shire of Augusta Margaret River 2018), is located within the south-western portion of the site. Therefore, significant caves features are unlikely to be located within the site.

The proponent recognises the regional and heritage importance of the Wallcliffe Cliffs, and the principle management objective guiding development is to retain the Wallcliffe cliffs and avoid impacting on this feature. If karst is identified within the site, construction of buildings will be undertaken to minimise the risk to buildings, particularly with regard to the formation of potential sinkholes.

4.1.2 Spatial considerations for landform and karst

The development layout has considered the presence of the eastern-most extent of Wallcliffe Cliffs in the south-west portion of the site, with no buildings proposed to be constructed in this area.

For karst risk, at this stage of the process no specific layout considerations need to be accommodated as part of the design, with karst risk to be managed through detailed geotechnical investigations, discussed in Section 4.1.3. The area with a ‘higher’ karst risk includes a number of the existing buildings indicating risk can likely be managed.
4.1.3 Future landform and karst management requirements

4.1.3.1 Wallcliffe Cliffs

Buildings and infrastructure will be located to avoid direct physical disturbance of Wallcliffe Cliffs and construction activities will be undertaken in a manner that minimises potential disturbance of the cliffs and associated values.

A boardwalk is currently located at the base of the portion of Wallcliffe Cliffs that extends into the site. This boardwalk was damaged by the 2011 Margaret River bushfire and it is possible that the proponent may seek to repair the boardwalk for use by guests and to support education opportunities, or alternatively remove the boardwalk completely. The repair/removal of the boardwalk will be considered as part of the detailed design process and will be addressed as part of managing potential impacts on Aboriginal heritage values (see Aboriginal Heritage Assessment (Hocking Heritage Studio 2019a)). This can be managed to avoid detrimental impacts to the Wallcliffe Cliffs.

4.1.3.2 Karst

Given the historic use of the site and the limited presence of native vegetation, the potential presence for karst is considered a hazard mainly from a construction and development perspective, rather than environmental (i.e. TECs). The hazards associated with developing on karst cannot be eliminated, but geotechnical investigation and design strategies can be adopted to reduce and manage the risks within acceptable levels (CMW Geosciences 2018).

As part of detailed design for the development, further geotechnical investigations are proposed to determine the presence of karstic features and any related site geotechnical classification and construction considerations. CMW Geosciences (2018) recommends the investigation be undertaken post demolition and clearing of the existing buildings and foundations in two stages, namely:

- Stage 1: Undertake a Ground Penetrating Radar (GPR) survey of the proposed building footprints within the karst risk areas shown on Figure 2.
- Stage 2: Undertake aircore drilling to assess anomalies reported following the GPR survey. The drilling will also provide additional redundancy in the assessment.

The investigation and analysis will be undertaken by a suitably qualified professional and will inform location of buildings and foundation design. Given the construction of buildings in the identified karst risk areas previously, karst is considered to be manageable.
4.2 Flora and vegetation

4.2.1 Policy framework and management objective

In the context of environmental impact assessment, the EPA objective for flora and vegetation is ‘to protect flora and vegetation so that biological diversity and ecological integrity are maintained’.

Where a proposal may potentially impact upon flora and vegetation values, the following mitigation hierarchy should be applied to minimise potential impacts:

1. Avoid impacts
2. Minimise impacts
3. Offset impacts.

The site is largely dominated by areas of ‘Cleared/planted’ vegetation (associated with the mature cultivated gardens/grounds within the site) with scattered remnant native trees, as well as planted endemic and non-endemic species. One individual of the priority four species *Banksia sessilis* var. *cordata* was recorded in the south-eastern corner of the site adjacent to the existing driveway (shown in Figure 3). *Banksia sessilis* var. *cordata* is widespread in the region, despite a relatively restricted distribution close to the coastline from Cape Naturaliste in the north around to Albany in the south (DBCA 2019), and therefore the single individual identified in the site is not considered a significant population. No other conservation significant flora or vegetation was identified within the site or as potentially occurring. Overall, the site was identified to have a reduced level of biological diversity compared to surrounding areas where there are greater areas of remnant vegetation, including Leeuwin-Naturaliste National Park, Wallcliffe Reserve and the riparian vegetation associated with the Margaret River (Emerge Associates 2019b).

While the site is considered to contain limited conservation significant flora and vegetation values, the proponent recognises that the vegetation within the site is a valuable asset with cultural, heritage and aesthetic values. Therefore, the objective for future management of flora and vegetation values within the site will be to maximise retention of the existing vegetation values (including remnant vegetation, individual trees and mature cultivated gardens) and to avoid impacting on vegetation values within the reserve areas outside the site.

4.2.2 Spatial considerations for flora and vegetation

While there are limited conservation significant flora or vegetation values that require specific spatial consideration as part of the proposed development, given the objective for the development is to maximise the retention of the existing vegetation values, the following spatial considerations have informed the preparation of the development concept:

- Where possible, avoid the priority four species *Banksia sessilis* var. *cordata*, located adjacent to the existing driveway.
- Minimise the location of buildings in areas with vegetation in ‘very good’ condition.
- As much as possible, locate the proposed new buildings to avoid removal of existing mature trees, noting some pruning/modification of vegetation may be required.
- Utilise existing building footprints to maximise retention of the mature cultivated gardens.
- Locate buildings to maximise the existing view corridors.
The proposed concept plan demonstrates application of these considerations and is provided in Appendix A.

4.2.3 Future flora and vegetation management requirements

It is unlikely that the proposed development within the site will have a significant impact on vegetation values based on the proposed development, particularly given the majority of existing vegetation values are proposed to be retained. Some areas of vegetation or trees within the site will be modified or potentially removed in order to implement the development concept, however overall the proposed development intends to maintain and enhance the existing vegetation values.

Management of flora and vegetation values as part of detailed design and construction will be based on the following:

- Maximising the retention of existing vegetation through the sensitive location of buildings and through the use of existing building footprints where possible.
- Minimising the removal/modification of vegetation within the site that is in ‘very good’ condition.
- If possible, avoiding the removal of the priority four species *Banksia sessilis* var. *cordata*. If the driveway needs to be widened, it is possible that this individual may need to be removed.
- Clearly identifying the areas within the site where vegetation is to be retained as part of demolition and construction processes.
- Manage runoff from the minor and major rainfall events to control erosion.
- Avoiding impacts to vegetation surrounding the site, particularly those associated with the Margaret River and Wallcliffe Reserve. This includes:
  - Excluding construction, clearing and general access from the vegetated portions of the Margaret River and Wallcliffe Reserve.
  - Managing bushfire risk to avoid modification of vegetation outside the site, which may include construction of the proposed buildings to a higher standard. This is considered further in Section 4.6.
- Enhancing the existing vegetation values through additional planting of appropriate species within the site. As part of this, and in consultation with the Shire of Augusta Margaret River, this may include undertaking weed control within the vegetated portions of the Margaret River.

Overall, the protection and retention of vegetation can be managed through the standard development approval process.

4.3 Native fauna

4.3.1 Policy framework and management objective

The EPA’s objective for terrestrial fauna is ‘to protect fauna so that biological diversity and ecological integrity are maintained’. Similar to flora and vegetation values (Section 4.2), the application of the mitigation hierarchy should be applied to avoid or minimise impacts to terrestrial fauna where possible.
The EPBC Act also provides protection for listed ‘threatened’ species, including the western ringtail possum, the three black cockatoo species (Carnaby’s, Baudin’s and forest red-tailed) and osprey which were identified to utilise vegetation within the site. Any proposed action which is considered likely to result in a ‘significant’ impact upon these species, identified as Matters of National Environmental Significance (MNES) should be referred to the Commonwealth Department of Environment and Energy.

It is acknowledged that human changes to the natural environment can pose a challenge to native fauna, particularly those that are susceptible to the threat of habitat loss (i.e. removal/modification of native vegetation). As outlined in previous sections of this report, the native vegetation values within the site have been modified over a long period of time (since at least the mid-1800’s, when the Bussell family settled in the area), with the majority of the site composed of cultivated gardens/landscapes. A range of fauna species have been identified as using the site and surrounds, including the modified landscape within the site. Recent studies have shown that some species have been able to adapt to the increasing anthropogenic influences that are occurring on the natural environment, including some of the conservation significant species identified within the site. As an example, the western ringtail possum has benefited from some forms of development and adapted to the urban setting by taking advantage of gardens, buildings and other infrastructure for foraging, nest sites, movement and dispersal (Shedley, E. and Williams, K. 2014; Burbidge, A.A. and Zichy-Woinarski, J. 2017; and Nature Conservation Margaret River 2018a). High abundances of western ringtail possums in developed areas have been attributed to areas with connected canopy and vegetation being located within well-watered and fertilised parks and gardens resulting in vegetation with foliage of a higher nutritional value than those in a natural setting (Shedley, E. and Williams, K. 2014). While the proposed development within the site will be of a much lower density and a lighter footprint than typical urban development, the outcomes of studies conducted in urban areas have been used as guidance for the fauna management approach adopted as part of the proposed development.

Therefore, while conservation significant fauna species have been identified as utilising habitat within the site, the site is considered to have low biodiversity value from a fauna perspective and any impacts are likely to be non-existent or negligible (particularly given the short-term nature of potential impacts). Therefore, no significant impacts on fauna of conservation significance are likely. Regardless, the proponent is committed to retaining and enhancing the existing vegetation values (particularly vegetation connectivity throughout the site) and therefore the associated fauna habitat values. Accordingly, the management objective for fauna within the site will be principally focussed around maximising the retention of existing vegetation values and enhancing these as appropriate, as well as ensuring that development works are undertaken in a manner that minimises harm to native fauna.
4.3.2 Spatial considerations for fauna

Due to the cleared and degraded nature of vegetation within the site, limited fauna habitat values exist, and any habitat that is present is not considered high quality habitat for conservation significant species. Nevertheless, in preparing the development concept, the potential to impact on fauna and fauna habitat has been spatially considered through:

- Locating the proposed buildings in the north-western portion of the site to avoid:
  - The marri tree identified as potential a black cockatoo habitat breeding tree. The location of this tree (and the two outside the site) is shown in Figure 4.
  - The tree with the osprey nest, which is located in the vicinity of the three marri trees identified above.
- Maximising the retention of existing vegetation and locating the proposed new buildings in such a way to avoid removal of existing mature trees wherever possible.
- Utilising the existing building footprints to maximise retention of the existing vegetation, including the mature cultivated gardens.
- Minimising the location of buildings in areas with vegetation in ‘very good’ condition. Vegetation in ‘very good’ condition typical includes understorey vegetation, which is preferentially used by fauna species such as Quenda.

The proposed concept plan is provided in Appendix A.

4.3.3 Future fauna management considerations

Due to the low biodiversity values within the site from a fauna perspective, it is unlikely that the proposed development within the site will have a significant impact on fauna or fauna habitat values, particularly given existing vegetation within the site is largely proposed to be retained and enhanced.

It is possible that some areas of vegetation or trees will be modified or potentially removed as part of the proposed development or that fauna may be disturbed as part of the demolition of the existing buildings. Management of fauna as part of the detailed design, construction on ongoing operations for the proposed development will be based on the following:

- Retaining the marri tree identified as a potential black cockatoo habitat breeding tree within the north eastern portion of the site. The location of the tree (and the two in the reserve to the north) is shown in Figure 4.
- Confirming the location of the osprey nest, and if located within the site retaining the tree with the existing nest. If located on a building or similar, determine strategy for relocating and/or providing alternative nesting platform.
- Maximising the retention of existing vegetation through the sensitive location of buildings and through the use of existing building footprints where possible.
- Enhancing existing vegetation values, including connectivity between overstorey and understorey vegetation to allow for movement of species such as western ringtail possum and quenda.
- Applying best practice design lighting to minimise potential impacts on fauna utilising the site or surrounds. This may include features such as adaptive controls (i.e. dimmers/timers), type of light colour, low light (i.e. Lumens), shielding of lights and similar.
• Minimising harm to fauna (in particular western ringtail and common brushtail possums, given these are likely to be present in trees in the site) during demolition and construction through the preparation and implementation of a fauna management plan. Measures to be implemented include:
  o Bunting of black cockatoo potential habitat trees and the tree with the osprey nest, so that it is clear which trees are to be avoided.
  o Undertaking preclearing inspections of tree/vegetation proposed for removal/modification, and where safe, inspection of existing buildings prior to demolition. This may include a trapping and relocation program for western ringtail possums/brushtail possums, and/or delaying demolition activities if ospreys are nesting.
  o Identifying and pegging the extent of the riparian vegetation to avoid disturbance of associated fauna habitat.
  o Using of a fauna spotter during demolition and clearing works to avoid impacts to fauna wherever possible and to rescue trans-locatable fauna that are disturbed during clearing works to assist them to disperse safely or capture them for later translocation as appropriate.
  o Application of correct fauna handling procedures to reduce stress on any captured animals.
• Avoiding impacts to native vegetation surrounding the site, particularly within the Margaret River and Wallcliffe Reserve.

The management of the fauna and the associated fauna habitat values can be appropriately managed through the development approval process and through the preparation and implementation of a fauna management plan. As part of preparing the fauna management plan, additional investigations may be required to inform fauna management practices for species within the site and will be undertaken as required. Fauna habitat will be largely retained and impacts are likely to only be short-term, with the fauna species expected to remain, or re-establish after the development of the site is completed.

4.4 Hydrology

4.4.1 Policy framework and management objective

In the context of environmental impact assessment, the EPA’s objective for inland waters is ‘to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected’. The application of the mitigation hierarchy should be applied to avoid or minimise impacts to inland waters where possible.

The State Water Strategy for Western Australia (Government of WA 2003) and Better Urban Water Management (WAPC 2008) endorse the promotion of integrated water cycle management and application of water sensitive urban design (WSUD) principles to provide improvements in the management of stormwater, and to increase the efficient use of other existing water supplies.

Emerge Associates (2019c) have prepared a Water Management Strategy (WMS) to support the proposed development of the site and the overarching objective for the site is to maintain the pre-development hydrological regime and is based on an at source infiltration approach, and by minimising the potential for nutrient impacts on the Margaret River.
4.4.2 Spatial considerations for hydrological values

4.4.2.1 Groundwater

No specific spatial response is required for the management of groundwater within the site. This is due to the low-density nature of the proposed development and the existing characteristics of the site, with groundwater likely to be more than 3 m below the natural surface.

4.4.2.2 Stormwater

No specific spatial response is required for the management of stormwater given the low profile sheetflow from rainfall events is proposed to be infiltrated within the site using the existing permeable areas (as per the existing site conditions). The proposed development will lead to some additional impermeable surfaces, mainly associated with the rooftops on new buildings (i.e. the workshop and carparking areas). However, this is unlikely to change the peak runoff rates significantly, even in a major storm event.

Minor vegetated swales may need to be accommodated immediately adjacent to higher use pavement areas (i.e. the main access road into the site) to assist in treating the minor amounts of hydrocarbons and sediments that may occur on these areas, however the location of these swales can be addressed as part of detailed design.

4.4.2.3 Wastewater

The management approach for wastewater is still to be confirmed, and will be based on either connecting to the existing Water Corporation wastewater system, or through the operation of an onsite wastewater treatment system. At this stage in the process no specific spatial consideration has been provided in the development concept for wastewater. If an onsite wastewater treatment system is adopted, a designated irrigation area may need to be accommodated within the site but the requirement for this will be dependent on the type of system used and can be determined as part of detailed design.

4.4.2.4 Margaret River

Margaret River and its associated existing riparian vegetation is located directly adjacent to the north-western boundary of the site.

In accordance with Clause 4.31.2 and 4.31.3, under the Shire of Augusta Margaret River Local Planning Scheme No. 1, development between the Margaret River mouth and Darch Road (located east of the Margaret River townsites) is generally restricted within 40 m of the top of the river bank. However, it is noted that development on private land may be permitted closer to the river where there is an existing foreshore reserve and the development will not have an adverse environmental or landscape impact on the river or fringing riparian vegetation.

Based on the proposed development concept shown in Appendix A, none of the existing or proposed new buildings are located within the Margaret River or would disturb the fringing riparian vegetation. Some of these buildings (both existing and proposed) are and/or may be located within 40 m of the top of the bank of the Margaret River. These buildings are and/or are proposed to be located outside the areas where the riparian vegetation and waterway values are present, therefore,
while within 40 m of the river, would not directly impact on these values and could met the intent of the Shire of Augusta Margaret River Local Planning Scheme No. 1 and therefore it would not necessarily be a spatial constraint. Margaret River and its associated riparian values are a highly valued part of the project, and maintaining and improving these values in the long-term is a key driver for the proposed development.

In addition to the above, the development proposes to maintain the existing access to the Margaret River via a small cleared beach that contains no fringing riparian vegetation, as shown in Appendix A.

4.4.3 Future considerations for the hydrological values

4.4.3.1 Groundwater and surface water

The management of surface water and groundwater values within the site have been addressed through the preparation of the WMS (Emerge Associates 2019c). The WMS details a number of design criteria that will be used to guide management approaches associated with water supply and conservation, stormwater management and groundwater management as part of the proposed development and has considered the water quality objectives in the Draft Margaret River Management Strategy (Nature Conservation Margaret River Region 2018). These include:

- Use of appropriate non-potable water sources for irrigation.
- Minimising potable water use.
- Ensuring appropriate management of wastewater.
- Developing habitable buildings within the site so that these are located above predicted future coastal hazard risk elevation.
- Manage the small rainfall event runoff at source.
- Manage runoff from minor and major rainfall events to control erosion.
- Adopt a passive at-source approach to stormwater management infrastructure.
- Utilise appropriate non-structural measures to reduce nutrient loads.
- Stormwater infiltration infrastructure to be located at least 500 mm above highest known groundwater level.
- Buildings to be protected from groundwater inundation.

Some of the management measures that are proposed to be adopted within the site to ensure the objectives and design criteria detailed within the WMS are achieved include:

- Retention of existing landform/slopes within the site.
- Retention of existing vegetation and landscaped areas, which will minimise erosion and establishment phase irrigation needs.
- Soakwell and subsurface soaking which utilises the high infiltration capacity of underlying soils
- Surface based flow in preference to more traditional piped structures.
- Localised infiltration which uses the site’s existing and natural attributes/landform.
- Vegetated swales adjacent to road pavement to provide at-source infiltration and treatment.
- Erosion control at key locations, generally at the edge of pavements where slopes are steep. These will use local materials and will blend into the site and surrounds.
• Localised direction to infiltration areas. This will utilise the existing landform to direct runoff to portions the site that can infiltrate as close to source as possible, without the need for formalised infiltration basins.

Groundwater and surface water can be appropriately managed to ensure the pre-development hydrological regime is maintained. It is anticipated that management of groundwater and surface water will be addressed as a condition of development approval, through a water management plan or similar (which may include through detailed civil design drawings) in collaboration with the project civil engineers and landscape architect.

4.4.3.2 Non-potable water supply

The irrigation system utilised the site is currently supplied by groundwater from two low-yielding and shallow bores positioned into the shallow aquifer. This system has historically been operated three days per week in summer and anecdotally the tanks rarely, if ever, run dry.

Future irrigation water demand is likely to be similar to the historic/existing use given the majority of the turf and cultivated garden areas are proposed to be retained and no overall significant change to landscape areas is proposed. The existing irrigation system inclusive of the bores is proposed to be preserved and where required, modified to suit the future development of the site. The proponent is also considering the opportunity to harvest rainfall from the roof areas of the proposed buildings, to supplement the groundwater use within the site.

DWER have advised that the use of groundwater will need to be licensed as per the requirements of the Rights in Water and Irrigation Act 1914. This requirement can be satisfied as part of the development process.

4.4.3.3 Wastewater

The site was historically serviced by an onsite domestic-scale wastewater treatment unit. This system will be located then suitably and properly decommissioned (The Civil Group 2019). Development of the site will increase the demand for wastewater collection and disposal and, as outlined in Section 3.2 and the civil engineer for the project has indicated that there are two potential approaches that could be adopted (The Civil Group 2019). These include:

• Connection to the existing Water Corporation wastewater treatment system. This would require the construction of a private pressure main from the site to an existing pump station located at the intersection of Chuditch Place and Bandicoot Close. The pressure main could be located within already cleared road reserves.

• An onsite wastewater treatment system, which is likely to be an Activated Sludge Bioreactor Plus (ASBR+) package wastewater treatment plant (WWTP). These are capable of treating domestic strength wastewater to achieve high quality (i.e. Class A+) treated effluent suitable for reuse in non-potable applications. The treated water could therefore be reused by above-ground spray irrigation.
The preferred approach will be confirmed as part of the detailed design process. Regardless of the approach chosen, the following will need to be accommodated as part of proposed development:

- Appropriate management of nutrients and health considerations will need to be demonstrated to the satisfaction of the DWER, Shire of Augusta Margaret River and Department of Health, particularly for an onsite wastewater system.
- Provision of backup electricity and suitable buffer-storage tanks to avoid any risk of overflow spillage entering the environment (in particular Margaret River) in case of a breakdown in part of the system.
- Ongoing maintenance to ensure the system operates as intended.

Approval for the chosen system will be required from the relevant authorities as part of the development process, including one of the following: DWER, the Shire of Augusta Margaret River, the Department of Health and/or Water Corporation. Potential impacts and associated controls can be managed through this process.

4.4.3.4 Margaret River

The Margaret River is located directly adjacent to the north-western boundary of the site. The values typically associated with a foreshore, such as water body, fringing riparian vegetation etc., are located largely outside of the site, while a small portion of the site has direct access to the river via an existing small cleared beach. Riparian vegetation adjacent to the river body is identified as mostly in ‘very good’ condition and is composed of *Melaleuca rhaphiophylla* with sedges and rushes (Emerge Associates 2019b).

The Shire of Augusta Margaret River commissioned the preparation of the *Draft Margaret River Management Strategy* (Nature Conservation Margaret River Region 2018) and *Lower Margaret River Foreshore Action Plan* (Hanran-Smith & McKenzie 2018). These documents outline the management objectives for Margaret River, its tributaries and the associated areas of remnant native vegetation, and provides a broad framework to guide consideration of the proposed development within the site where it has the potential to impact on Margaret River. In particular, the document aims to support best practice management and coordination, the maintenance of a healthy ecosystem and recognition of Aboriginal heritage and community values (Hanran-Smith & McKenzie 2018; Nature Conservation Margaret River Region 2018).

As part of future development within the site, and in consideration of the the *Draft Margaret River Management Strategy* (Nature Conservation Margaret River Region 2018) and *Lower Margaret River Foreshore Action Plan* (Hanran-Smith & McKenzie 2018), potential impacts on the Margaret River are proposed to be managed in accordance with the following:

- Avoiding clearing of existing riparian vegetation adjacent to the Margaret River by:
  - Excluding construction, clearing and general access from the vegetated portions of the river.
  - Managing bushfire risk to avoid modification of vegetation outside the site, which may include construction of the proposed buildings to a higher standard. This is considered further in Section 4.6.
  - Maintaining the existing access to the river via a small cleared beach that contains no fringing riparian vegetation, as shown in Appendix A.
• Minimising potential encroachment of the river environs, particularly with regard to the amenity of other river users. This includes considering the potential visual impact of any proposed buildings through minimising building height and use of appropriate materials/colours (see Section 4.5), as well as minimising potential for noise and lighting.

• Maintaining and where possible enhancing existing native vegetation within or adjacent to the river. This would also include undertaking weed control and additional native planting within the river area where appropriate/required.

• Ensuring the banks of the river are not destabilised, with erosion minimised through use of appropriate construction techniques and stormwater management. This may include selecting different construction methodologies (i.e. using prefabricated components or buildings) to minimise potential construction impacts where in close proximity to the river.

• Maintaining and where possible improving quality of surface water and groundwater that may enter the river, outlined in Section 4.4.3.1.

As identified in Section 4.4.2.4, it is possible that a number of existing and/or new buildings will or may be located within 40 m of the top of bank for the Margaret River. These buildings would be located outside the area of the river containing riparian values (satisfying the intent of Clause 4.31.3 of the Shire of Augusta Margaret River Local Planning Scheme No. 1) and could be designed to ensure riparian vegetation (where this occurs within the site) is not removed, and that existing mature native trees are retained.

Overall, the Margaret River is considered an intrinsic and important part of the proposed tourism development within the site and will be considered as part of the detailed design process. Any potential impacts can be appropriately managed through the development approval process and in accordance with the Shire of Augusta Margaret River requirements.

4.5 Visual amenity

4.5.1 Policy framework and management objective

The EPA considers visual amenity as part of its ‘Social Surroundings’ factor, and aims ‘to protect social surroundings from significant harm’ (EPA 2016). Amenity is described as a broad term that relates to the qualities, attributes and characteristics of a place that make a positive contribution to the quality of life (EPA 2016b), and the ability for people to live and recreate within their surroundings without any unreasonable interference with their health, welfare, convenience and comfort (EPA 2016).

The ‘Social Surroundings’ factor also includes consideration of Aboriginal heritage and culture and natural and historical heritage values, however these values have been addressed separately by Hocking Heritage Studio (2019a and 2019b) and were summarised in Section 2.6 of this EAR.

The management of visual amenity is also considered in the context of the Visual Landscape Planning in Western Australia Manual (WAPC 2007), which provides a tool kit to determine the character of the landscape that contributes to scenic quality and sense of place and assist a development be sensitive to the landscape values within the site and to maximise the ability to appreciate the landscape.
The site has significant cultural values on a local and national level, as well as being situated within an area of environmental value. The objective for the management of visual amenity within/associated with the site is to retain and enhance the important natural, rural and built landscape characters of the site. The overarching objective is further informed by a number of design principles developed by MJA Studio (2019) and include:

- Preserve and enhance the existing gardens throughout the site
- Recreate all heritage buildings on their historical footprints
- Celebrate the traditional architecture of the heritage buildings using locally sourced materials and trades
- Locate new structures so as to preserve as many existing trees and landscape features as possible
- Work with the sloping terrain and step buildings into the landscape to minimise their visual impact.

4.5.2 Spatial considerations for visual amenity

A visual impact assessment was completed for the site by MJA Studio (2019) and was summarised in Section 2.7.3 of this report. The spatial layout of the development concept plan (see Appendix A) has responded to potential visual amenity impacts by locating buildings within site so that the existing views into and out of the site are largely maintained. This was achieved by:

- Using the scale and footprints of the existing buildings to inform the location and size of the proposed reconstructed and new buildings.
- Locating taller buildings appropriately based on the natural elevations within the site and through the use of benching where appropriate.
- Maintaining existing vegetation within the site to shield views of the proposed buildings.

The likely visual impact of the proposed development and the cross sections showing the elevation of the site and proposed buildings are shown in Appendix D.

4.5.3 Future visual amenity considerations

The outcomes of visual impact assessment (MJA Studio 2019) indicate that the proposed development can be located sensitively in the landscape, minimising the potential for impacts on existing aesthetics and amenity values of nearby residents and the broader community who utilise the surrounding environs.

The consideration and minimisation of potential impacts on visual amenity as part of detailed design and construction will be based on the following:

- The design principles summarised in Section 4.5.1 and in Design Principles and Visual Landscape Assessment (MJA 2019)
- Using the footprint and scale of the existing buildings to inform the location and size of the proposed buildings.
- Locating buildings appropriately within the site based on the existing topographic contours and use of a variety of building techniques.
• Maximising the retention of existing vegetation through the sensitive location of buildings, including use of already cleared areas and the existing building footprints where possible.
• Avoiding impacts to vegetation surrounding the site, particularly within the Margaret River and Wallcliffe Reserve to the north-west and south respectively. This includes:
  o Excluding construction, clearing and general access from the vegetated portions of the Margaret River and Wallcliffe Reserve.
  o Managing bushfire risk to avoid modification of vegetation outside the site, which may include construction of the proposed buildings to a higher standard. This is considered further in Section 4.6.
• Using the architectural style of the existing buildings to inform the style of the new built form, to enable these to blend with the existing (and historical) built form characters of the site.
• Using a colour and material palette that is based on the existing characteristics of the site (both built and natural) as well as the local area.

The visual amenity associated with the site is based on its existing vegetation, landscape and heritage values, which are proposed to be retained and/or reintroduced and will continue to inform the proposed development of the site. Visual amenity can be appropriately managed through the development approval process, and in accordance with the requirements of the Heritage Council of Western Australia and the Shire of Augusta Margaret River.

4.6 Bushfire management

4.6.1 Policy framework and management objective

State Planning Policy 3.7 Planning in Bushfire Prone Areas (WAPC 2015) (SPP 3.7) sets out the requirements for considering bushfire risk as part of the planning and development process, and its policy intent is best summarised as preserving life and reducing the impact of bushfire on property and infrastructure through effective risk-based land use planning. As part of this, any strategic planning proposal, subdivision or development application is required to demonstrate compliance with the bushfire protection criteria outlined within the Guidelines for Planning in Bushfire Prone Areas Version 1.3 (WAPC and DFES 2017) (the Guidelines). Typically, this means that habitable buildings should achieve a bushfire attack level (BAL) rating of BAL-29 or less.

Relevant to the proposed development within the site, the WAPC recently released the Position Statement: Tourism land uses within bushfire prone areas (Position Statement) (WAPC 2019). This document is intended as a risk-based guide to bushfire protection relevant to the characteristics of the tourism land use and its context whilst also balancing the aims of opportunity, environmental protection, landscape amenity and cultural heritage. It recognises that the intrinsic link between tourism land uses and the natural environment may mean that the current provisions in SPP 3.7 and the supporting Guidelines for Planning in Bushfire Prone Areas Version 1.3 (WAPC and DFES 2017) cannot always to satisfied simply and instead provides guidance to support the operation of tourism developments.
Tourism land uses are currently permitted within the site, with the proposed scheme amendment intending to refine the types of land uses that will be allowed. As outlined in this EAR, importantly for the site, the existing environmental, heritage and landscape values within and surrounding the site are imperative to the proposed tourism development and therefore the management of bushfire risk, in the context of the Position Statement, has been balanced with protecting and maintaining these values.

A *Bushfire Management Plan* (BMP) (Emerge Associates 2019a) has been prepared for the site to support the scheme amendment, and identified that bushfire risk can be appropriately managed in accordance with SPP 3.7, the Guidelines and the Position Statement. Based on the post development vegetation classification scenario and as part of protecting the heritage, vegetation and landscape values within the site, it is possible that a number of the proposed habitable buildings (including those associated with existing building footprints) are likely to be subject to a BAL rating greater than BAL-29, as shown within Plate 9. However rather than modifying vegetation, bushfire risk is proposed to be managed through the application of higher construction standards in accordance with *Australia Standard 3959-2018 Construction of buildings in bushfire-prone areas* (AS 3959) and provision of appropriate emergency evacuation responses.

The overall management objective for bushfire is to protect and maintain the existing vegetation, heritage and landscape values of the site whilst minimising bushfire risk through appropriate building construction and emergency evacuation planning.

*Plate 9: Proposed and existing buildings/footprints subject to a BAL rating greater than BAL-29.*
4.6.2 Spatial considerations for bushfire management

Typically, one of the measures for managing bushfire risk is to provide the minimum separation between habitable buildings and bushfire hazards to achieve a BAL rating of BAL-29 or less.

As outlined in Section 4.6.1, due to the important vegetation, heritage and landscape values within the site and surrounds, achieving a BAL rating of BAL-29 or less at habitable buildings may not be possible and/or appropriate when trying to maintain and improve the existing landscape values. Accordingly, spatial considerations associated with bushfire is based on:

- Where possible, achieving a BAL rating of BAL-29 or less at habitable buildings. However, this needs to be balanced with:
  - Using the scale and footprints of the existing buildings to inform the location and size of the proposed buildings. This is based on minimising visual amenity impacts and reducing the disturbance of existing vegetation.
  - Maximising the retention of existing vegetation, both remnant native vegetation and mature cultivated gardens. This is based on minimising visual amenity impacts as well as maintaining the existing landscape values, as required by the heritage listing of the site.
  - Minimising potential disturbance/clearing within the Margaret River and Walcliffe Reserve and/or vegetation within the site associated with these areas.
- Providing appropriate vehicle access and/or options for refuge. This includes ensuring roads are able to support overtaking/turn-arounds and that sufficient area is available within the site for an onsite safer place in accordance with the Design and Construction of community bushfire refuges handbook (ABCB and Fire Services Commissioner Victoria 2014).
- Providing appropriate water supply, which includes areas being available for additional stand-alone static water supply.

The Method 1 BAL assessment completed to support the scheme amendment (in accordance with the methods outlined in AS 3959) indicates that the majority of the site will be subject to a BAL rating of BAL-12.5. Specific detail on this is available within the BMP (Emerge Associates 2019a), provided separately as part of the scheme amendment. A number of buildings, both those located based on existing footprints and new buildings, may be subject to a BAL rating of BAL-40 or BAL-FZ and are shown in Plate 9. It is possible the BAL ratings will change, particularly near the vegetated portions of the Margaret River through the consideration of a Method 2 short fire run. The specific location of buildings will be determined as part of detailed design, which will inform the BAL ratings and the associated construction standards.

It is acknowledged that while Wallcliffe House (and associated buildings) were largely destroyed by the 2011 Margaret River bushfire, this was largely as a result of embers entering the roof structures and burning the buildings from the inside out. AS 3959 did not exist at the time the previous buildings were constructed, and therefore building protection against the mechanisms of bushfire attack was not incorporated in the previous buildings.
4.6.3 Future bushfire management considerations

The BMP (Emerge Associates 2019a) demonstrates that SPP 3.7 and the bushfire protection criteria (outlined within the Guidelines (WAPC and DFES 2017)) can be satisfied through a combination of ‘acceptable’ and ‘alternate’ solutions based on achieving the overall project objective of minimising bushfire risk whilst also protecting and maintaining the existing vegetation, heritage and landscape values of the site.

Going forward and based on satisfying the bushfire protection criteria, detailed design and construction will need to consider the following:

- **Element 1 Location:** future habitable buildings to be located in an area that will, on completion, be subject to a moderate/low bushfire hazard. This means proposed habitable buildings should not be located within areas containing classified vegetation. The development concept does not show any proposed buildings in areas of classified vegetation, however it is noted that some buildings may be subject to a BAL rating greater than BAL-29. This is proposed to be addressed through the measures outlined for Element 2.

- **Element 2 Siting and Design:** providing appropriate separation between bushfire hazards and proposed habitable buildings to achieve a BAL rating of BAL-29, or where this is not possible based on protecting existing heritage, vegetation and landscape values, increasing the construction standard of the buildings in accordance with AS 3959 (i.e. BAL-40 or BAL-FZ). As part of detailed design, the BAL ratings applicable to buildings will be determined based on final building locations and a revised BAL assessment, which may include undertaking a detailed Method 2 BAL assessment for areas subject to short fire runs (i.e. riparian vegetation associated within the Margaret River).

- **Element 3 Vehicular Access:** appropriate direct access to Wallcliffe Road to be provided via the private driveway, as well as turn-around and overtaking areas. In addition, emergency evacuation procedures will need to be developed (which is a typical requirement for tourism land uses) and may include the provision of an onsite safer place. Given the proposed development will be permanently staffed, informed evacuation processes will be able to be implemented, and an appropriate onsite safer place could be provided as a last-resort alternative in the case evacuation is not possible and/or appropriate (particularly given the majority of the site is subject to BAL-12.5).

- **Element 4 Water:** water supply for fire-fighting purposes which will include the provision of a static water supply within the site. The specific size of the water supply will need to be determined in consultation with the Shire of Augusta Margaret River but is likely to be at least 25,000L.

The proposed tourism development will be considered a vulnerable land use, and as such in accordance with Clause 6.6 of SPP 3.7 at development approval, the project will need to demonstrate that emergency evacuation can be appropriately addressed, in accordance with SPP 3.7 and the Position Statement: Tourism land uses in bushfire prone areas (WAPC 2019). This may include the preparation of a risk assessment and bushfire emergency evacuation plan, although given operational detail is typically not known at the time of application, it is generally recommended that the emergency evacuation plan be a condition of approval and instead the proponent demonstrate emergency evacuation could be satisfied. Ongoing consultation with the Shire of Augusta Margaret River will inform this process.
## Implementation Framework

A summary of how the proposed development responds to the environmental values and attributes discussed in Section 4 has been provided in Table 6. This table also outlines the proposed future management required as part of the subdivision and development process.

**Table 6: Environmental management framework implementation table**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Scheme amendment</th>
<th>Development phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform and karst</td>
<td>• Preparation of this EAR.</td>
<td>• As part detailed design and implementation, avoid physical disturbance to the portion of Wallcliffe Cliffs within the site.</td>
</tr>
<tr>
<td>formations</td>
<td>• Completion of a preliminary geotechnical assessment (CMW Geosciences 2019).</td>
<td>• Completion of additional karst investigations by suitably qualified professional.</td>
</tr>
<tr>
<td></td>
<td>• As part detailed design and implementation, avoid physical disturbance to the</td>
<td>• Adopt and implement required construction techniques to address karst risk.</td>
</tr>
<tr>
<td></td>
<td>portion of Wallcliffe Cliffs within the site.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Completion of additional karst investigations by suitably qualified professional.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Adoption and implement required construction techniques to address karst risk.</td>
<td></td>
</tr>
<tr>
<td>Flora and Vegetation</td>
<td>• Preparation of this EAR.</td>
<td>• As part of detailed design maximise the retention of vegetation within the site through the sensitive location of buildings and use of appropriate construction techniques.</td>
</tr>
<tr>
<td></td>
<td>• Completion of a flora and vegetation assessment (Emerge Associates 2019b).</td>
<td>• Preparation and implementation of a construction management plan, in particular excluding works from the Margaret River and associated riparian vegetation.</td>
</tr>
<tr>
<td></td>
<td>• As part of detailed design maximise the retention of vegetation within the site</td>
<td>• Where construction occurs in the vicinity of retained trees/vegetation, protect trees/vegetation in accordance with arborist (or other professional) advice.</td>
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<tr>
<td></td>
<td>through the sensitive location of buildings.</td>
<td></td>
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<tr>
<td></td>
<td>• Identification of vegetation to be retained (i.e. potential black cockatoo</td>
<td></td>
</tr>
<tr>
<td></td>
<td>breeding trees).</td>
<td></td>
</tr>
<tr>
<td>Native Fauna</td>
<td>• Preparation of this EAR.</td>
<td>• As part of detailed design maximise the retention of vegetation within the site through the sensitive location of buildings. This includes retaining the potential black cockatoo breeding tree and tree with the osprey nest.</td>
</tr>
<tr>
<td></td>
<td>• Completion of a fauna assessment (Harewood 2019).</td>
<td>• Prepare a fauna management plan prior to construction commencing.</td>
</tr>
<tr>
<td></td>
<td>• Identification of vegetation to be retained (i.e. potential black cockatoo</td>
<td>• Implement the fauna management plan to minimise impacts on native fauna.</td>
</tr>
<tr>
<td></td>
<td>breeding trees).</td>
<td></td>
</tr>
<tr>
<td>Hydrology</td>
<td>• Preparation of a WMS (Emerge Associates 2019c).</td>
<td>• Preparation and implementation of a construction management plan, in particular excluding works from the Margaret River and associated riparian vegetation.</td>
</tr>
<tr>
<td></td>
<td>• Identification of the Margaret River and associated riparian values.</td>
<td>• Preparation and implementation of detailed design addressing the requirements of the WMS (Emerge Associates 2019c).</td>
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<tr>
<td></td>
<td></td>
<td>• Confirmation on the treatment and disposal of wastewater.</td>
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<tr>
<td></td>
<td></td>
<td>• Implementation of wastewater treatment and disposal in accordance with relevant approvals.</td>
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<tr>
<td></td>
<td></td>
<td>• Confirmation of potable and non-potable water supply approaches.</td>
</tr>
</tbody>
</table>
Table 6: Environmental management framework implementation table (continued)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Scheme amendment</th>
<th>Development phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual amenity</td>
<td>• Preparation of a visual impact assessment (MJA Studios 2019).</td>
<td>• Preparation and implementation of detailed design based on the design principles outlined in Section 4.5, including: o Using the previous building scale and footprint to inform design. o Using a colour and material palette based on the existing natural and built characteristics of the site. o Maximising the retention of existing vegetation, both native vegetation and mature cultivated gardens.</td>
</tr>
<tr>
<td>Bushfire</td>
<td>• Preparation of BMP (Emerge Associates 2019a).</td>
<td>• Preparation of an updated/new BMP or BAL assessment.</td>
</tr>
<tr>
<td></td>
<td>• Completion of BAL assessment (in accordance with AS 3959) to identify buildings potentially subject to a BAL rating greater than BAL-29 (i.e. those buildings subject to BAL-40 or BAL-F2).</td>
<td>• Certification of the BAL assessment to support building licence/s (where vegetation modification is required).</td>
</tr>
<tr>
<td></td>
<td>• Consideration of vehicle access and appropriate water supply.</td>
<td>• Habitable buildings to be constructed to appropriate BAL ratings, in accordance with AS 3959.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Preparation and implementation of a bushfire emergency evacuation plan.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Landscaped areas to continue to be implemented and maintained as low threat in accordance with Clause 2.2.3.2(f) of AS 3959.</td>
</tr>
</tbody>
</table>
6 Conclusions

This EAR has been prepared on behalf of the proponent (Wallcliffe House Pty Ltd) for Lot 101 Wallcliffe Road, Prevelly (the site) to support the proposed development of the site for tourism land uses in accordance with the concept plan shown in Appendix A.

In addition to the preparation of this EAR, Emerge Associates have prepared or commissioned the following documents to support the proposed scheme amendment:

- **Bushfire Management Plan** (Emerge Associates 2019a)
- **Spring Flora and Vegetation Assessment** (Emerge Associates 2019b)
- **Fauna Assessment** (Harewood 2019)
- **Water Management Strategy** (Emerge Associates 2019c)

Based on the environmental values or attributes identified within the site, this EAR provides an environmental management framework for the values identified in Table 5 to be implemented within the site as part of future development. It is relevant to note that the proponent recognises that the ongoing management of Aboriginal and non-indigenous heritage values is important, and this has been addressed separately by Hocking Heritage Studio (2019a and 2019b). The proposed management of the identified environmental values/attributes include:

- **Landform and karst formations**: the physical disturbance of Wallcliffe Cliffs should be avoided. Additional geotechnical investigation will be required post demolition and clearing of the existing buildings and foundations to determine actual karst risk and recommended building construction techniques. This can be managed as part of the development approval and construction process.

- **Flora and vegetation**: retention of existing remnant native vegetation and the mature cultivated gardens (including trees) is proposed to be maximised as part of detailed design and construction processes. Construction works will be excluded from the Margaret River and the Wallcliffe Reserve, minimising impacts on vegetation values. The management of vegetation values as part of future development of the site can be appropriately managed through the development approval process.

- **Native fauna**: impacts to native fauna will be minimal given the limited habitat value within the site, short-term nature of potential impacts (i.e. during construction) and that the majority of existing vegetation is proposed to be retained, particularly the potential black cockatoo habitat tree in the north-western portion of the site. A fauna management plan can be prepared prior to construction commencing, to reduce any impact on fauna within the site and will include vegetation clearing protocols with a specific focus on western ringtail possums.

- **Hydrology – groundwater and surface water**: water management within the site will be based on maintaining the existing hydrological regime of the site which includes infiltrating at source and controlling erosion, and is further detailed within the WMS (Emerge Associates 2019c). This can be addressed as part of development approvals and may include the preparation of a water management plan or similar (i.e. detailed civil drawings).
Environmental Assessment Report
Lot 101 Waclcliffe Road, Prevelly

- **Hydrology–wastewater:** the proponent is considering two options for the disposal of wastewater, which includes the use of an onsite package wastewater treatment plant or connecting to an existing Water Corporation system. The proposed approach will be confirmed as part of development approval, and all relevant DWER, Shire of Augusta Margaret River, Department of Health and/or Water Corporation approvals will be satisfied. This will include the appropriate management of nutrients to minimise impacts on the Margaret River.

- **Hydrology – Margaret River:** the riparian vegetation associated with the Margaret River is proposed to be protected and enhanced, with no construction activities proposed within the vegetated areas.

- **Visual amenity:** to prepare the development concept, a number of design principles have been applied which demonstrate that the proposed development can be implemented in such a way to retain and enhance the important, natural, rural and built landscape characters of the site. These design principles will be applied as part of detailed design and implementation.

- **Bushfire management:** bushfire hazards (classified vegetation) have been identified in the vicinity of the site. Appropriate separation will be provided between bushfire hazards and proposed habitable buildings to achieve BAL-29, or where this is not possible based on protecting the existing heritage, vegetation and landscape values, it is proposed that the construction standards of the buildings will be increased in accordance with AS 3959 (i.e. BAL-40 or BAL-FZ). This can be managed through the development approval and building licence process, and will include the preparation of an updated BAL assessment (or BMP) to confirm the construction requirements and address and risk assessment relevant for tourism land uses. No modification of vegetation outside the site is proposed to manage bushfire risk.

Overall, there are no significant environmental issues or constraints within the site that would preclude the addition of the proposed tourism land uses within the existing ‘tourism’ zoning of the site, and any management considerations can be appropriately addressed as part of the development approval and building process in line with the scheme provisions.

The site has important heritage values that are inherently linked to the natural, landscaped and built environment present within the site which are proposed to be retained and enhanced by the proposed development. In particular, impacts on flora and vegetation values and conservation significant fauna will be minimal given existing vegetation is proposed to be largely retained, and vegetation outside the site will not be impacted particularly by the proposed bushfire mitigation measures. Ongoing consultation with the relevant approval authorities, in particular the Shire of Augusta Margaret River, the Heritage Council of Western Australia and Aboriginal stakeholders will continue to inform the detailed design and implementation of the proposed development.
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7 References

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Contaminated Sites Act 2003
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Environment Protection and Biodiversity Conservation Act 1999
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While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.

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Project: Environmental Assessment Report
Lot 101 Wallcliffe Road, Prevelly
Client: Wallcliffe House Pty Ltd

Plan Number: EP18-1280893---F05
Drawn: KNM
Date: 02/05/2019
Checked: HPB
Approved: KK
Date: 10/05/2019

Scale: 1:8,000@A4
GDA 1994 MGA Zone 50

Site boundary
Cadastral boundary
Elevation contour (m AHD)
While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Figure 3: Plant Communities and Vegetation Condition

Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Figure 4: Possum Observations

Project: Environmental Assessment Report
Lot 101 Wallcliffe Road, Prevelly
Client: Wallcliffe House Pty Ltd

Plan Number: EP18-128(05)-F08
Drawn: KNM
Date: 02/05/2019
Checked: HPB
Approved: KK
Date: 10/05/2019

Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

While Emerge Associates make every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Figure 5: Black Cockatoo Observations

Project: Environmental Assessment Report
Lot 101 Wallcliffe Road, Prevelly
Client: Wallcliffe House Pty Ltd

Plan Number: EP18-208(05)-F09
Drawn: KNM
Date: 02/05/2019
Checked: HPK
Approved: KK
Date: 10/05/2019

Scale: 1:3,500@A4
GDA 1994 MGA Zone 50

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Figure 6: Environmental Features

Project: Environmental Assessment Report
Lot 101 Wallcliffe Road, Prevelly
Client: Wallcliffe House Pty Ltd

Plan Number: EP16-928050-F50
Drawn: KNM
Date: 02/05/2019
Checked: HPS
Approved: KK
Date: 10/05/2019

Scale: 1:7,500 @ A4
GDA 1994 MGA Zone 50

emerge associates makes every attempt to ensure the accuracy and completeness of data, emerge accepts no responsibility for externally sourced data used.
Figure 7: Aboriginal Heritage Values

Project: Environmental Assessment Report
Lot 101 Wallcliffe Road, Prevelly
Client: Wallcliffe House Pty Ltd

Plan Number: EP18-12860(05)–F23
Drawn: KNM
Date: 10/05/2019
Checked: HPB
Approved: KK
Date: 10/05/2019

Plan Scale: 1:7,500@A4
GDA 1994 MGA Zone 50

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Figure 8: Existing Site Conditions – AS 3959 Vegetation Classifications

Plan Number: EP18-128(05)-F24
Drawn: KNM
Date: 10/05/2019
Checked: HPB
Approved: KK
Date: 10/05/2019

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Appendix A
Wallcliffe House concept plan (MJA Studio 2019)
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Spring Flora and Vegetation Assessment
Lot 101 Wallcliffe Road, Prevelly
Project No: EP18-128(01)
Document Control

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Issued for client review

Minor mapping update.

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Executive Summary

Wallcliffe House Pty Ltd engaged Emerge Associates to undertake a spring flora and vegetation survey within Lot 101 Wallcliffe Road in Prevelly (referred to herein as ‘the site’). The site, which is approximately 5.31 ha in size, is bound by Wallcliffe Road to the east, rural residential lots to the north-east, the Margaret River to the north and west and a nature reserve to the south.

A botanist and an environmental consultant from Emerge Associates visited the site on 19 November 2018 and undertook a detailed flora and vegetation survey. During the survey an assessment was made on the type, condition and values of vegetation across the site and the adjacent areas of remnant vegetation to the north west, west and south (the site including adjacent areas of remnant native vegetation are herein referred to as ‘the survey area’).

Outcomes of the survey include:

- Non-native vegetation is present across 4 ha of the site.
- Remnant native vegetation is present across 1.3 ha of the site in varying levels of condition.
- A total of 66 native and 51 non-native (weed) species were recorded in the survey area.
- One individual of the priority four species *Banksia sessilis* var. *cordata* was recorded in the south-eastern corner of the site adjacent to the driveway.
- No other threatened or priority flora species were recorded or are considered likely to occur within the site.
- The native vegetation within the survey area was classified into five plant communities: **AfW**, **CcAfW**, **MrLOF**, **AfSgHcW** and **MhBvTrS** that are present in ‘very good’, ‘good’, ‘degraded’, and ‘completely degraded’ condition.
- No threatened ecological communities (TECs) or priority ecological communities (PECs) were recorded within or are likely to occur within the site. There is a possibility that Wallcliffe Cave or any caves within the Wallcliffe Cliffs could potentially contain one of the aquatic root mat TECs.
- The site and surrounds are mapped as two Registered Aboriginal Sites, contain unique geological features and are adjacent to the Margaret River. As such the native vegetation within the site is likely to be locally and/or regionally significant.
- Large *Agonis flexuosa* (peppermint) and *Corymbia calophylla* (marri) trees within the site may be locally and/or regionally significant due to their habitat value for endangered western ring-tailed possum and black cockatoo species respectively.
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<tr>
<th>Organisations</th>
<th>Description</th>
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<td>EPA</td>
<td>Environmental Protection Authority</td>
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<tr>
<td>DBCA</td>
<td>Department of Biodiversity, Conservation and Attractions</td>
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<tr>
<td>DoW</td>
<td>Department of Water (now DWER)</td>
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<td>DWER</td>
<td>Department of Water and Environmental Regulation</td>
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<td>DPaW</td>
<td>Department of Parks and Wildlife (now DBCA)</td>
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<tr>
<td>The Shire</td>
<td>The Shire of Augusta-Margaret River</td>
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<td>WALGA</td>
<td>Western Australia Local Government Association</td>
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**Table A2: Abbreviations – General terms**

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<td>Environmentally sensitive area</td>
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<tr>
<td>IBRA</td>
<td>Interim Biogeographic Regionalisation of Australia</td>
</tr>
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<td>NVIS</td>
<td>National Vegetation Inventory System (ESCAVI 2003)</td>
</tr>
<tr>
<td>P1</td>
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<tr>
<td>PEC</td>
<td>Priority ecological community</td>
</tr>
<tr>
<td>T</td>
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**Table A3: Abbreviations – Legislation**

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<td>Local planning scheme</td>
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### Table A5: Abbreviations – units of measurement

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<td>m²</td>
<td>Square metre</td>
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<tr>
<td>m AHD</td>
<td>m in relation to the Australian height datum</td>
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<td>mm</td>
<td>Millimetre</td>
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1 Introduction

1.1 Project background

Wallcliffe House Pty Ltd (Wallcliffe House) intends to develop Wallcliffe House, located at Lot 101 Wallcliffe Road in Prevelly for tourism purposes. This lot (referred to herein as ‘the site’) is located approximately 8 kilometres (km) south-east of Margaret River township within the Shire of Augusta Margaret River (the Shire) and is zoned ‘tourism’ under the Shires Town Planning Scheme (TPS) No 1.

The site is approximately 5.31 hectares (ha) in size and is bound by Wallcliffe Road to the east, rural residential lots to the north-east, the Margaret River to the north-west and a nature reserve to the south. The location and extent of the site is shown in Figure 1. In order to provide contextual vegetation information for the wider area, the areas in the surrounding reserves were also assessed. The site and these surrounding areas are collectively referred to as the ‘survey area’, and occupy 11.26 ha, which is also shown on Figure 1.

1.2 Purpose and scope of work

Emerge Associates (Emerge) were engaged by Wallcliffe House to provide environmental consultancy services to support the development of the site. The purpose of this survey is to provide sufficient information on the flora and vegetation values within the site to inform this process.

The scope of work was specifically to undertake a spring flora and vegetation assessment to the standard required of a detailed survey in accordance with the Environmental Protection Authority’s (EPA’s) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016).

As part of this scope of work, the following tasks were undertaken:

- Desktop review of relevant background information pertaining to the site and surrounds, including database searches for threatened flora species and ecological communities.
- Compilation of a comprehensive list of flora species recorded as part of the field survey.
- Mapping of plant communities and vegetation condition.
- Identification of conservation significant flora and vegetation.
- Documentation of the desktop assessment, survey methodology and results into a report.
2 Background

2.1 Environmental context

2.1.1 Climate

Climate has a strong influence on the types of vegetation that grow in a region and the life cycles of the flora present. It is therefore critical for a flora and vegetation survey to respond appropriately to climatic conditions to ensure that surveys are conducted during times when flora species are easiest to detect and identify.

The south west of Western Australia experiences a Mediterranean climate of hot dry summers and cool wet winters. In Mediterranean type climates some flora species will typically spend part of their life-cycle as either underground storage organs or as seed. This is an adaptation to unfavourable environmental conditions such as excessive heat and drought that occur over the summer period. These species, known as ‘geophytes’ or ‘annuals’, tend to re-emerge during winter when favourable conditions return and are most visible during spring, which is the flowering period for a majority of plant species. Therefore, spring is the optimal time to complete flora and vegetation surveys in the south west of WA.

An average of 957.6 millimetres (mm) of rainfall is recorded annually from the Witchcliffe weather station, which is the closest weather station, located approximately 11.7 km from Prevelly. The majority of this rainfall is received between the months of May and August. Mean maximum temperatures range from 16.4°C in July to 27.1°C in February, while mean minimum temperatures range from 8.2°C in July and August to 14.4°C in February (BoM 2018).

A total of 874.6 mm of rain was recorded from May to October 2018 (BOM 2019) indicating sufficient seasonal rainfall occurred at the site to promote the growth of flora species prior to this survey.

2.1.2 Geomorphology and soils

Landform and soils influence vegetation types at regional and local scales. The site lies in the Jarrah Forest bioregion and within the Southern Jarrah Forest subregion, as defined by the Interim Biogeographic Regionalisation of Australia (IBRA) (Environment Australia 2000). The Southern Jarrah Forest subregion extends from Collie in the north to Yallingup in the west and Albany in the south east. This subregion comprises the southern part of the Darling Plateau, where it broadens and slopes gently to the southern coastline, being dissected by multiple rivers (Beard 1990). Broadly, the soils within the Southern Jarrah Forest subregion comprise laterite gravels but clay/loam soils occur in the eastern portion where the Plateau is flatter and drainage is poor (DEC 2002). The north-western portion of the Southern Jarrah Forest subregion comprises a combination of limestone and granites as it lies on the northern tip of the Leeuwin-Naturaliste Ridge.

The Department of Primary Industries and Regional Development (DPIRD) has compiled data from various surveys to produce a soil landscape mapping dataset for Western Australia (DPIRD 2018), which places the site within the ‘Gracetown low slopes Phase’ soil landscape. This is described as comprising ‘low slopes (gradients 5-10%) with deep yellow brown siliceous sands over limestone (i.e. Spearwood Sands)’. 
The south western portion of the site contains the eastern most portion (approximately 25 m) of the Wallcliffe Cliffs. The Wallcliffe Cliffs comprise tall limestone cliffs which continue west for 235 m into the nature reserve to the south and west (as discussed below in Section 2.3.2). There are a number of caverns, overhangs and caves within the cliffs. The cliffs have been identified as having a diversity of significant geological and landscape attributes (Shire of Augusta-Margaret River 2018). A separate cave is present close to the south of the site within the nature reserve, and approximately 150 m from the Wallcliffe Cliffs (Shire of Augusta-Margaret River 2018).

2.1.3 Topography

The elevation of the site ranges from 2m in relation to the Australian height datum (mAHNd) along the western boundary adjacent to Margaret River to 12 mAHNd at its northern extent, 22 mAHNd in the south west near the Wallcliffe Cliffs and 64 mAHNd at the south eastern extent (DPIRD 1999).

2.1.4 Hydrology and wetlands

Wetlands include “areas of seasonally, intermittently or permanently waterlogged soils or inundated land, whether natural or otherwise, fresh and saline, e.g. waterlogged soils, ponds, billabongs, lakes, swamps, tidal flats, estuaries, rivers and their tributaries” (Wetlands Advisory Committee 1977). Wetlands can further be recognised by the presence of vegetation associated with waterlogging or the presence of hydric soils such as peat, peaty sand or carbonate mud (Hill et al. 1996).

Wetlands of national or international significance may be afforded special protection under Commonwealth or international agreements. The following lists of important wetlands were checked as part of this assessment:

- Ramsar List of Wetlands of International Importance (DBCA 2017c)
- A Directory of Important Wetlands in Australia (DBCA 2018).

No Ramsar or listed ‘important wetlands’ are located near the site.

Examination of the Department of Water and Environmental Regulation (DWER) hydrography dataset (DWER 2018) shows no wetland or water related features in the site. However, the major, perennial watercourse (Margaret River) is present adjacent to the western boundary of the site.

2.1.5 Regional vegetation

Native vegetation is described and mapped at different scales in order to illustrate patterns in its distribution. The south-west of Western Australia is internationally recognised as a biodiversity hotspot and contains a wide variety of endemic flora and vegetation types. The Southern Jarrah Forest is characterised as mainly containing Eucalyptus marginata (jarrah) forest on lateritic soils of the Plateau and on the loam soils of the valleys, with Corymbia calophylla (marri) – Eucalyptus wandoo (wandoo) woodland on the drier laterite-free soils (Beard 1990).

Variations in native vegetation within the site can be further classified based on regional vegetation associations. Beard et al. (2013) mapping shows the majority of the site as comprising vegetation association ‘Boranup_1109’. This association is described as ‘Agonis shrubland / Boronia mixed shrubland’ (Beard et al. 2013). ‘Boranup_1109’ association has 96.02% of its pre-European extent remaining within the Southern Jarrah Forest with 52.08% protected for conservation purposes.
A small portion in the northern portion of the site is mapped as ‘Boranup_3’ which is described as ‘open forest or woodland of Eucalyptus marginata and Corymbia calophylla’.’ ‘Boranup_3’ association has 67.21% of its pre-European extent remaining on the within the Southern Jarrah Forest with 16.11% protected for conservation purposes (Government of Western Australia 2018). The areas of each mapped vegetation association are shown in Plate 1.

Plate 1: Regional vegetation association mapping (Beard et al. 2013) showing the small portion of the site mapped as presenting the ‘Boranup_3’ association.

Studies have indicated that the loss of biodiversity caused by habitat fragmentation is significantly greater once a habitat type falls below 30% of its original extent (Miles 2001). The national objectives and targets for biodiversity conservation established an objective of retaining 30% of the original extent of each vegetation complex (Environment Australia 2001). The percentage protected for conservation of the ‘Boranup_1109’ association is above the 30% retention objective but the ‘Boranup_3’ association falls below this retention objective.

2.1.6 Historic land management

The site is the location of Wallcliffe House, which was one of the original homesteads and farms built by the Bussell family with construction of the building commenced in 1858. The site was home to a number of large sandstone buildings and ancillary buildings, as well as, a significant exotic garden (and dairy). A review of publicly available historical images from 2004 onwards shows that the majority of the site was cleared of native vegetation prior to 2004 and the site was used for residential and tourism purposes (WALIA 2018).
Fire scars are visible from between 2007-2009 (affecting the south eastern portion of the site and adjacent land) and 2011 (with the majority of vegetation within the site and adjacent area affected during the Margaret River bushfire). Wallcliffe House and a number of its ancillary buildings were also destroyed during the 2011 bushfire.

2.2 Significant flora and vegetation

2.2.1 Threatened and priority flora

Certain flora taxa that are considered to be rare or under threat warrant special protection under Commonwealth and/or State legislation. At a Commonwealth level, flora taxa may be listed as ‘threatened’ pursuant to Schedule 1 of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Any action likely to have a significant impact on a taxon listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment and Energy.

In Western Australia flora species may also be classed as ‘threatened’ under the Biodiversity Conservation Act 2016 (BC Act). Threatened flora species are listed under sections 19(1) and 26(2) of the BC Act. It is an offence to ‘take’ or disturb threatened flora without Ministerial approval. Threatened flora species listed under the EPBC Act and/or BC Act are assigned a conservation status according to their national extent.

Flora species that do not currently meet the criteria for listing as threatened but are potentially rare or threatened may be added to the DBCA’s Priority Flora List. Whilst priority species are not afforded direct statutory protection, they are considered during State approval processes. Further information on threatened and priority species and their categories is provided in Appendix A.

A search was conducted for threatened and priority flora within a 10 km radius of the site using the Protected Matters Search Tool (DoEE 2019a), NatureMap (DPaW 2017b) and DBCA’s threatened and priority flora database (reference no. 10-1218FL). Eleven threatened and 12 priority flora species were identified as potentially occurring in the wider local area as listed in Table 1. None of these species were mapped as occurring within the site.

Of the flora species potentially occurring in the local area, only those with habitat preferences of sandy, limestone soils and low lying, wet soils were deemed likely to occur in the site.

On this basis three threatened flora species and eight priority flora species were identified as having potential to occur within the site (shaded green in Table 1).
Table 1: Significant flora species known or likely to occur within 10 km of the site

<table>
<thead>
<tr>
<th>Species</th>
<th>Level of significance</th>
<th>Life strategy</th>
<th>Habitat</th>
<th>Flowering period</th>
<th>Likelihood of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caladenia lodgeana</td>
<td>T CE</td>
<td>P</td>
<td>Black loam</td>
<td>Oct</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Calectasia cyanea</td>
<td>T CE</td>
<td>P</td>
<td>Heathland on white sand or laterite gravel over laterite.</td>
<td>Jun-Oct</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Banksia nivea subsp. Uliginosa</td>
<td>T E</td>
<td>P</td>
<td>Sandy clay, gravel.</td>
<td>Aug-Sep</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Caladenia excelsa</td>
<td>T E</td>
<td>P</td>
<td>White, grey or bown sand, sandy loam.</td>
<td>Sep-Oct</td>
<td>Possible</td>
</tr>
<tr>
<td>Caladenia hoffmanii</td>
<td>T E</td>
<td>P</td>
<td>Clay, loam, laterite, granite. Rocky outcrops and hillsides, ridges, swamps and gullies.</td>
<td>Aug-Oct</td>
<td>Possible</td>
</tr>
<tr>
<td>Caladenia huegelii</td>
<td>T E</td>
<td>P</td>
<td>Well-drained, deep sandy soils in lush undergrowth in a variety of moisture levels.</td>
<td>Sep-early Nov</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Gastrolobium papilio</td>
<td>T E</td>
<td>P</td>
<td>Sandy clay over ironstone and laterite. Flat plains.</td>
<td>Oct-Dec</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Lambertia echinata subsp. Occidentalis</td>
<td>T E</td>
<td>P</td>
<td>White sandy soils over laterite, orange/brown-red clay over ironstone. Flats to foothills, winter-wet sites.</td>
<td>Feb or Apr or Dec</td>
<td>Possible</td>
</tr>
<tr>
<td>Sphenotoma drummondii</td>
<td>T E</td>
<td>P</td>
<td>Stony or shallow soils over granite or quartzite.</td>
<td>Sep-Dec</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Banksia squarrosa subsp. Argillicae</td>
<td>T V</td>
<td>P</td>
<td>White/grey sand, gravelly clay or loam.</td>
<td>Jun-Nov</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Drakaea micrantha</td>
<td>T V</td>
<td>P</td>
<td>Open sandy patches often adjacent to winter-wet swamps.</td>
<td>September to early October</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Synaphea macrophylla</td>
<td>P1 -</td>
<td>P</td>
<td>Gravelly loam.</td>
<td>Oct</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Synaphea sp. Redgate Road (J. Scott 16)</td>
<td>P1 -</td>
<td>P</td>
<td>Grey clay, litter. Winter-wet areas, wet areas along road verges and ditches.</td>
<td>-</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Amperea micrantha</td>
<td>P2 -</td>
<td>P</td>
<td>Sandy soils.</td>
<td>Oct-Nov</td>
<td>Possible</td>
</tr>
<tr>
<td>Acacia inops</td>
<td>P3 -</td>
<td>P</td>
<td>Black peaty sand, clay. Swamps, creeks.</td>
<td>Sep-early Nov</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Gastrolobium formosum</td>
<td>P3 -</td>
<td>P</td>
<td>Clay loam. Along river banks or in swamps.</td>
<td>Nov</td>
<td>Possible</td>
</tr>
<tr>
<td>Pultenaea pinifolia</td>
<td>P3 -</td>
<td>P</td>
<td>Loam or clay. Floodplains, swampy areas.</td>
<td>Oct-Nov</td>
<td>Possible</td>
</tr>
</tbody>
</table>
Table 1: Significant flora species known or likely to occur within 10 km of the site (cont.)

<table>
<thead>
<tr>
<th>Species</th>
<th>Level of significance</th>
<th>Life strategy</th>
<th>Habitat</th>
<th>Flowering period</th>
<th>Likelihood of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stylidium lowrieanum</td>
<td>P3 EPBC Act</td>
<td>P</td>
<td>Sand or sandy loam over limestone. Eucalypt or Agonis woodland, forest, scrub.</td>
<td>Oct-Nov</td>
<td>Possible</td>
</tr>
<tr>
<td>Acacia tayloriana</td>
<td>P4 EPBC Act</td>
<td>P</td>
<td>Grey or yellow/orange sandy soils, lateritic gravel, clay loam. Winter-wet areas.</td>
<td>Jan</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Banksia sessilis var. cordata</td>
<td>P4 EPBC Act</td>
<td>P</td>
<td>White/grey sand. Coastal limestone.</td>
<td>Jul-Oct</td>
<td>Possible</td>
</tr>
<tr>
<td>Eucalyptus marginata x megacarpa</td>
<td>P4 EPBC Act</td>
<td>P</td>
<td>Sandy loam. Interdunal areas.</td>
<td>-</td>
<td>Possible</td>
</tr>
<tr>
<td>Franklandia triaristata</td>
<td>P4 EPBC Act</td>
<td>P</td>
<td>White or grey sand.</td>
<td>Aug-Oct</td>
<td>Possible</td>
</tr>
<tr>
<td>Gahnia sclerioides</td>
<td>P4 EPBC Act</td>
<td>P</td>
<td>Loam, sandy soils. Moist shaded situations.</td>
<td></td>
<td>Possible</td>
</tr>
</tbody>
</table>

Note: T=threatened, CE=critically endangered, E=endangered, V=vulnerable, P1=Priority 1, P2=Priority 2, P3=Priority 3, P4=Priority 4, P=perennial, PG=perennial geophyte, A=annual. Species considered to potentially occur within the site are shaded green.

2.2.2 Threatened and priority ecological communities

An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat. An ecological community’s structure, composition and distribution are influenced by environmental factors such as soil type, position in the landscape, altitude, climate and water availability (DoEE 2017b). ‘Threatened ecological communities’ (TECs) are ecological communities that are recognised as rare or under threat and therefore warrant special protection.

Selected TECs are afforded statutory protection at a Commonwealth level under section 181 of the EPBC Act. Any action likely to have a significant impact on a community listed under the EPBC Act requires approval from the Commonwealth Minister for the Environment and Energy.

TECs will be listed within Western Australia under Section 27(1) and 33 of the BC Act and under the Biodiversity Conservation Regulations (BC Regulations). Their significance is also acknowledged through other state environmental approval processes such as ‘environmental impact assessment’ pursuant to Part IV of the Environmental Protection Act 1986 (EP Act) and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004.

A plant community that is under consideration for listing as a TEC in Western Australia, but does not yet meet survey criteria or has not been adequately defined, may be listed as a ‘priority ecological community’ (PEC). Listing as a PEC is similarly considered during State approval processes. Further information on categories of TECs and PECs is provided in Appendix A.
Known locations of TECs and PECs within 10 km of the site were searched for using the Protected Matters Search Tool (DoEE 2019) and DBCA’s threatened and priority ecological communities’ database (reference no. 17-0122018). These search results indicate no TECs or PECs are known to occur within the site, but that two TECs and one PEC occur within 10 km of the site as listed in Table 2.

Table 2: TECs and PECs known to occur within 10 km of the site.

<table>
<thead>
<tr>
<th>Code</th>
<th>Community name</th>
<th>TEC/PEC</th>
<th>Level of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAVES</td>
<td>Aquatic Root Mat Community Number 2 of Caves of the Leeuwin Naturaliste Ridge</td>
<td>TEC</td>
<td>Critically Endangered</td>
</tr>
<tr>
<td>LEEUWIN02</td>
<td></td>
<td></td>
<td>Endangered</td>
</tr>
<tr>
<td>CAVES</td>
<td>Aquatic Root Mat Community Number 4 of Caves of the Leeuwin Naturaliste Ridge</td>
<td>TEC</td>
<td>Critically Endangered</td>
</tr>
<tr>
<td>LEEUWIN04</td>
<td></td>
<td></td>
<td>Endangered</td>
</tr>
<tr>
<td>Melaleuca</td>
<td>Melaleuca lanceolata forests, Leeuwin Naturaliste Ridge</td>
<td>PEC</td>
<td>Priority 2</td>
</tr>
<tr>
<td>lanceolata</td>
<td></td>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

*Communities considered to be potentially present within the site shaded green.

2.2.3 Local and regional significance

Flora species and ecological communities may be significant for a number of reasons irrespective of whether they have special protection under policy or legislation.

Six key reasons that vegetation within the site may be significant are listed below:

- The site and surrounds contribute to Registered Aboriginal Heritage Sites. These include Registered Aboriginal Site 5848 – Cliffs at Wallcliffe and Registered Aboriginal Site 4495 – Margaret River. Both are Mythological sites, and Site 5848 is also an Artefacts/Scatter and Rockshelter site (DPLH 2019).
- The site contains the eastern most portion of the Wallcliffe Cliffs. Within the Cliffs there is a diversity of geological, biological and landscape attributes that enhance its significance, interest and value as a natural feature worthy of protection (Shire of Augusta-Margaret River 2018).
- The site is listed on the State Heritage Register.
- The site is directly adjacent to the Margaret River waterway.
- The site is directly adjacent to Reserve 41545, which is an A-Class nature reserve to the south and west as shown in Figure 2.
- The vegetation within the site has potential value as habitat for threatened or priority fauna species including, in particular, western ring-tailed possum, Carnaby’s black cockatoo, Baudin’s black cockatoo and the forest red-tailed black cockatoo, which are listed under the EPBC Act and BC Act.
Weeds

The term ‘weed’ can refer to any plant that requires some form of action to reduce its effect on the economy, the environment, human health and amenity. Many non-native flora species and some native species are considered to be weeds.

A particularly invasive or detrimental weed species may be listed as a ‘declared pest’ pursuant to the Western Australia’s *Biosecurity and Agriculture Management Act 2007* (BAM Act), indicating that it warrants special management to limit its spread. At a national level, the Australian government has compiled a list of 32 Weeds of National Significance (WoNS) (DoEE 2019), of which many are also listed under the BAM Act. Further information on categories of declared pests is provided in Appendix A.

Due to historical disturbance weed species are expected to be present at the site.

2.3 Land use considerations

A range of legislation, regulations and polices are relevant to the evaluation of vegetation in Western Australia. Key considerations applicable to the site are described below and also shown in Figure 2.

2.3.1 DBCA managed or legislated lands

DBCA has tenure of or interests in numerous areas of land across the state for a range of purposes. Tenure categories include national parks, nature reserves, conservation parks, marine parks, marine nature reserves, marine management areas, section 5(1)(g) reserves, state forest and timber reserves. These areas are mapped within the *Legislated Lands and Waters* (DBCA 2017a) and *Lands of Interest* (DBCA 2017b) datasets. The *Legislated Lands and Waters* (DBCA 2017a) dataset includes lands subject to the following legislation; the *Conservation and Land Management Act 1984* (CALM Act 1984), *Swan and Canning Rivers Management Act 2006* (SCRM Act) and lands identified under the *Land Administration Act 1997* (LA Act). The *Lands of Interest* (DBCA 2017b) dataset includes all other lands of which DBCA is recognised as the manager but is not vested under any act. These lands comprise of crown land and freehold land which DBCA has been acknowledged by the Department of Planning, Lands and Heritage (DPLH) as the responsible agency.

The land to the west of the Margaret River (and including the portion of the river to the south west of the site) and south of Wallcliffe Road to the south east of the site comprises the *Leeuwin-Naturaliste National Park* (R8428) (DBCA 2017a). These are shown on Figure 2.

2.3.2 Shire managed conservation reserves

The land directly to the south of the site is vested with the Shire of Augusta-Margaret River as an A-class nature reserve R41545 (Wallcliffe Reserve) (Shire of Augusta-Margaret River 2018), as shown on Figure 2. Wallcliffe Reserve contains the majority of the Wallcliffe Cliffs, as discussed in Section 2.1.2. There are a number of caverns, overhangs and caves within the cliffs. Due to increased degradation from recreational use and its Aboriginal significance, public access to the cliff caves was prohibited in 2018 (Shire of Augusta-Margaret River 2018).
A separate cave is known to be present close to the south of the site within Wallcliffe Reserve, and approximately 150 m from the Wallcliffe Cliffs (Shire of Augusta-Margaret River 2018). However, the exact location of the cave is not known. This cave was previously accessed for tourism but this cave was gated to prevent access following the preparation of the Wallcliffe Cave Management Plan (2002-2012) (Shire of Augusta-Margaret River 2002).

2.3.3 Environmentally sensitive areas

‘Environmentally sensitive areas’ (ESAs) are prescribed under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 and have been identified to protect native vegetation values of areas surrounding significant, threatened or scheduled flora, vegetation communities or ecosystems. Within an ESA none of the exemptions under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 apply. However, exemptions under Schedule 6 of the EP Act still apply, including any clearing in accordance with a subdivision approval under the Planning and Development Act 2005 (a recognised exemption under the Schedule 6 of the EP Act).

One ESA is located directly to the south of the site and on the adjacent side of the Margaret River. This ESA is very large and extends to the north, south-west and south-east of the site over approximately 2518 square kilometers (km²) area and is shown in Figure 2.

2.3.4 Ecological linkages

Ecological linkages are linear landscape elements that allow the movement of fauna, flora and genetic material between areas of remnant habitat. The movement of fauna and the exchange of genetic material between vegetation remnants improve the viability of those remnants by allowing greater access to breeding partners and food sources, refuge from disturbances such as fire and maintenance of genetic diversity of plant communities and populations. Ecological linkages are ideally continuous or near-continuous as the more fractured a linkage is, the less ease flora and fauna have in moving within the corridor (Alan Tingay and Associates 1998).

The Perth Biodiversity Project, supported by the Western Australia Local Government Association (WALGA), have identified and mapped regional ecological linkages within the Perth Metropolitan Region (WALGA and PBP 2004). This study was extended beyond the Perth Metropolitan Region through the South West Biodiversity Project, resulting in the identification and mapping of the South West regional ecological linkages (Molloy et al. 2009).

There are no mapped ecological linkages within the site. Three regional ecological linkage (Nos 107, 108 and 109) meet to the west of the site within the Margaret River and extend to the north and south of the site along the coast, and to the north east of the site, along the path of the Margaret River heading inland. The locations of these linkages are shown in Figure 2.

2.4 Previous flora surveys

No previous flora and vegetation surveys are known to have been undertaken within the site.
3 Methods

3.1 Field survey

One botanist and an environmental consultant from Emerge visited the site on 19 November 2018 to conduct the flora and vegetation assessment.

3.1.1 Vegetation

The site and survey area were traversed on foot and the composition and condition of vegetation was recorded. Searches were conducted for threatened and priority flora species with potential to occur in the site, with a particularly focus on identifying areas of suitable habitat within the site.

Detailed sampling of the vegetation was undertaken using a combination of non-permanent 10 x 10 m quadrats, relevés and photo points. The quadrats were established using fence droppers bound by measuring tape. The relevés were completed over an equivalent 10 x 10 m area without the use of physical markers and were included to provide a more rapid sample of patches of vegetation outside of the site boundary. The photo points were included to show specific site features at a particular location.

A total of 11 locations were sampled, comprised of four quadrats, four relevés and three photo points. The position of each sample location was recorded with a hand-held GPS unit, as shown in Figure 3 and Figure 4.

The data recorded within the samples included:

- site details (site name, site number, observers, date, location)
- environmental information (slope, aspect, bare-ground, rock outcropping soil type and colour class, litter layer, topographical position, time since last fire event)
- biological information (vegetation structure and condition, foliage projective cover’ (FPC), degree of disturbance and species present).

Additional plant taxa not observed within samples were recorded opportunistically as the botanist traversed the survey area. Photographs were taken throughout the field visit to show particular site conditions.

All plant specimens collected during the field survey were dried, pressed and then named in accordance with requirements of the Western Australian Herbarium. Identification of specimens occurred through comparison with named material and through the use of taxonomic keys. Flora species not native to Western Australia are denoted by an asterisk (‘*’) in text and raw data.

Vegetation condition was assigned at each sample and changes in vegetation condition were also noted and mapped across the survey area. The condition of the vegetation was assessed using methods from Keighery (1994), with the condition scale outlined in Table 3.
### Table 3: Vegetation condition scale applied during the field assessment

<table>
<thead>
<tr>
<th>Condition category</th>
<th>Definition (Keighery 1994)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pristine</td>
<td>Pristine or nearly so, no obvious signs of disturbance.</td>
</tr>
<tr>
<td>Excellent</td>
<td>Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.</td>
</tr>
<tr>
<td>Very good</td>
<td>Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.</td>
</tr>
<tr>
<td>Good</td>
<td>Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.</td>
</tr>
<tr>
<td>Degraded</td>
<td>Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.</td>
</tr>
<tr>
<td>Completely degraded</td>
<td>The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as ‘parkland cleared’ with the flora comprising weed or crop species with isolated native trees or shrubs.</td>
</tr>
</tbody>
</table>

### 3.2 Mapping and data analysis

#### 3.2.1 Plant community identification and description

The local plant communities within the survey area were identified from the sample data collected during the field survey.

Once a group was defined from the cluster analysis, the vegetation was described according to the dominant species present using the structural formation descriptions of the National Vegetation Inventory System (NVIS) (ESCAVI 2003). The identified plant communities were then mapped on aerial photography (1:3,500) from the sample locations and boundaries were interpreted from aerial photography and notes taken in the field. Vegetation condition was mapped on aerial photography (1:3,500) based on the locations and notes recorded during the field survey to define areas with differing condition.

#### 3.2.2 Threatened and priority ecological communities

The plant communities were compared to the TEC and PECs located within 10 km of the site (as listed in Table 2).

Areas of native vegetation potentially representing a TEC were assessed against the characteristics provided in the following documents:

- **Commonwealth Listing Advice on Aquatic root mat communities 1, 2, 3 and 4 in caves of the Leeuwin Naturaliste Ridge** (Endangered Species Scientific Subcommittee 2000).
3.2.3 Species accumulation curve

A species accumulation curve was plotted from sample data by generating a trendline (log) in Microsoft Excel. The trendline was forecast to locate the asymptote of the curve (the point at which the curve flattens), which provides an indication of amount of sampling that would be required before it can be assumed few species remain undetected. PRIMER v6 also offers a range of estimators to predict minimum species richness (Clarke and Gorley 2006). Both the Jacknife1 and Chao2 non-parametric estimators are reported, as these are known to perform well in comparison to simulated and real data sets and are also recommended for small sample sizes (Gotelli and Colwell 2011). Comparison between actual and estimated species accumulation assists in evaluating the adequacy of sampling effort.

3.3 Survey limitations

It is important to note the specific constraints imposed on surveys and the degree to which these may have limited survey outcomes. An evaluation of the survey methodology against standard constraints outlined in the EPA document Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016) is provided in Table 4.

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Degree of limitation</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability of contextual info.</td>
<td>No limitation</td>
<td>The broad scale contextual information described in Section 2 is adequate to place the site and vegetation in context.</td>
</tr>
<tr>
<td></td>
<td>Minor limitation</td>
<td>There is no publicly available regional flora survey dataset available for the south-west region that would allow for statistical analysis to determine the presence or absence of conservation significant vegetation types. As such the plant communities identified were compared to the TECs and PECs within the wider local area based on the species presence, soils, landforms and location information available.</td>
</tr>
<tr>
<td>Experience level of personnel</td>
<td>No limitation</td>
<td>This flora and vegetation assessment was undertaken by a qualified botanist with eight years of botanical experience in Western Australia. Technical review was undertaken by a senior environmental consultant with 16 years’ experience in environmental science in Western Australia.</td>
</tr>
<tr>
<td>Suitability of timing</td>
<td>No limitation</td>
<td>The survey was conducted in November and thus within the main flowering season. High rainfall was recorded from May to October 2018 in the months preceding the site visit. Therefore it is likely that many plant species would have been in flower and/or visible at the time of survey. The degraded nature of most of the site limits the potential habitat for native geophytic plants such as orchids and the majority of threatened and priority flora species with potential to occur are perennial species. The survey timing was considered adequate to allow the detection of species for which seasonal timing is critical.</td>
</tr>
</tbody>
</table>
Table 4: Evaluation of survey methodology against standard constraints outlined in EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (cont.)

<table>
<thead>
<tr>
<th>Constraint</th>
<th>Degree of limitation</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal coverage</td>
<td>Minor limitation</td>
<td>Comprehensive flora and vegetation assessments can require multiple visits, at different times of year, and over a period of a number of years, to enable observation of all species present. The site was visited once in late November 2018. Although only sampled once, the site data was considered conclusive as it was collected in the spring main flowering period and much of the vegetation within the site is non-native. However, the survey does not meet the full requirements of a ‘detailed’ survey. In order for the survey to be considered a ‘detailed’ survey a second visit in a different season is required.</td>
</tr>
<tr>
<td>Spatial coverage and access</td>
<td>No limitation</td>
<td>Site coverage was comprehensive (track logged).</td>
</tr>
<tr>
<td></td>
<td>Minor limitation</td>
<td>All parts of the site could be accessed as required (with the exception of the areas in close proximity to the derelict buildings, which contained no remnant native vegetation). Wallcliffe Cave, which occurs close to the southern boundary of the site, is gated and thus was also not accessed. The survey area included adjacent vegetation providing contextual information for the native vegetation within the site.</td>
</tr>
<tr>
<td>Sampling intensity</td>
<td>No limitation</td>
<td>A total of 117 species were recorded, of which 104 were recorded from 11 sample locations and 13 were recorded opportunistically. Minimum species richness within survey area is estimated at between 149 (Jacknife1) and 158 (Chao2). (refer species accumulation curve and estimates shown in Plate 12). This indicates that between 74 and 79% of the estimated 149-158 species were recorded. Considering the completely degraded nature of the majority of the site and the time spent sampling and searching the remnant vegetation within the site itself, the presence of additional species is more likely to be within the portions of the survey area outside of the site. This is particularly likely for the vegetation to the south of the site within Wallcliffe Reserve. Thus the survey effort was considered to be adequate to prepare a representative species inventory for the site.</td>
</tr>
<tr>
<td>Influence of disturbance</td>
<td>Minor limitation</td>
<td>Time since fire is eight to ten years as interpreted form aerial imagery and therefore short-lived species more common after fire may not have been visible.</td>
</tr>
<tr>
<td></td>
<td>No limitation</td>
<td>Historical ground disturbance was evident over most of the site. The disturbance history of the site was considered when undertaking field sampling.</td>
</tr>
<tr>
<td>Adequacy of resources</td>
<td>No limitation</td>
<td>All resources required to perform the survey were available.</td>
</tr>
</tbody>
</table>
4 Results

4.1 General site conditions

The site is predominantly cleared of native vegetation or parkland cleared with remnant Agonis flexuosus (peppermint) trees over managed grasses (Plate 2). Planted non-native vegetation was present surrounding the building remains in the centre of the site (Plate 3).

Small sections of disturbed native vegetation subject to some plantings, ground disturbance and weed management are present within the site. A boardwalk is present along the south western boundary of the site adjacent to Margaret River and running underneath the limestone cliffs (Plate 4). Portions of the boardwalk were burnt in 2011. A landscaped, rocky stream was historically built in the south western portion of the site using limestone blocks (Plate 5), at the time of the survey there was no water present and no evidence that this water feature is still in use. The most intact vegetation exists along the west of the site adjacent to the Margaret River and to the south of the site.
4.2 Flora

A total of 66 native and 51 non-native (weed) species were recorded within the survey area during the field survey, representing 53 families and 101 genera. The dominant families containing native taxa were Fabaceae (eight native taxa and five weed taxa), Myrtaceae (eight native taxa and two weed taxa) and Cyperaceae (five native taxa). The most common genera were *Melaleuca* (with four taxa) and *Acacia* and *Lepidosperma* with three taxa each. The family containing the most taxa was Poaceae (two native and 11 non-native species) and Fabaceae. Of the species recorded 104 were recorded in sample locations and 13 were recorded opportunistically. A complete species list is provided in Appendix B and sampled data in Appendix C. This species list does not document all exotic planted species present within the site (given the extensive planted gardens), but does include those planted species recorded within areas of remnant native vegetation.

4.2.1 Threatened and priority flora

One priority 4 (P4) species, *Banksia sessilis* var. *cordata*, was recorded in the site. One individual of the species was recorded adjacent to the driveway in the eastern portion of the site, as shown on Figure 4. No other threatened or priority flora species were recorded within the site.

4.2.2 Locally and regionally significant flora

No significant flora species were recorded within the site.

4.2.3 Declared pests

Two species, *Zantedeschia aethiopica* (arum lily) and *Asparagus asparagoides* (bridal creeper) were recorded within the site that are listed as declared pests (C3) pursuant to the BAM Act.

Bridal creeper is also listed as a ‘weed of national significance’ (WoNS).

4.3 Vegetation

4.3.1 Plant communities

Four native plant communities were identified within the site. Plant community *AfW* exists in the south-western corner and a patch in the centre of the site and extends over 0.63 ha. Plant community *MrLOF* is located along the edges of the Margaret River to the west of the site and extends over 0.11 ha. Plant community *CcAfW* was located to the north of the site close to the Margaret River. This community extends over 0.05 ha of the site and extends to the north of the site. Plant community *MhBvTrS* is located to the south west of the site and extends over 0.16 ha. Plant community *AfSgHcW* is present to the south east of the site and extends over 0.33 ha. The remainder of the site (4 ha) contains modified vegetation with bare soil, scattered native trees over pasture grasses or planted vegetation.

A description and the area of each plant community (within the site and also within the adjacent survey area) is provided in Table 5 and representative photographs of each are provided in Plate 6 to Plate 11. The location of each plant community is shown in Figure 3.
### Table 5: Plant communities identified within the survey area

<table>
<thead>
<tr>
<th>Plant community</th>
<th>Description</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFW</td>
<td>Woodland of Agonis flexuosus over open shrubland of <em>Rhagodia baccata</em> subsp. <em>baccata</em>, <em>Olearia axillaris</em> and <em>Hibbertia cuneiformis</em> over open mixed forbland and open to closed grassland of weeds (<a href="#">Plate 6</a>).</td>
<td>0.63</td>
</tr>
<tr>
<td>AfSgHcW</td>
<td>Woodland of Agonis flexuosus over shrubland of <em>Spyridium globulosem</em>, <em>Hibbertia cuneiformis</em>, <em>Templetonia retusa</em> with vineland of <em>Hardenbergia comptoniana</em> and <em>Muehlenbeckia adpressa</em> over low shrubland of <em>Phyllanthus calycinus</em> over forbland of <em>Tricoryne elatior</em> and <em>Thysanotus arenarius</em> Austrostipa flavescens (<a href="#">Plate 7</a>).</td>
<td>0.33</td>
</tr>
<tr>
<td>CcAfW</td>
<td>Woodland of <em>Corymbia calophylla</em> and <em>Agonis flexuosus</em> over shrubland of <em>Spyridium globulosem</em>, <em>Pteridium esculentum</em>, <em>Rhagodia baccata</em> subsp. <em>baccata</em> and <em>Exocarpos sparteus</em> with vineland of <em>Hardenbergia comptoniana</em> and <em>Muehlenbeckia adpressa</em> over forbland of <em>Tricoryne elatior</em> and <em>Thysanotus arenarius</em> Austrostipa flavescens (<a href="#">Plate 8</a>).</td>
<td>0.05</td>
</tr>
<tr>
<td>MhBvTrCS</td>
<td>Low open woodland of <em>Agonis flexuosus</em> (resprouting) with closed shrubland of <em>Melaleuca huegelli</em>, <em>Beyeria viscosa</em>, <em>Acacia cyclops</em>, <em>Diplolaena dampierei</em>, <em>Dodonaea aptera</em> and <em>Spyridium globulosem</em> with vineland of <em>Hardenbergia comptoniana</em> and <em>Muehlenbeckia adpressa</em> over open forbland of <em>Tricoryne elatior</em>, <em>Petrorhagia dubia</em> and <em>Thysanotus arenarius</em>, sparse sedgeland of <em>Lepidosperma</em> spp. and sparse grassland of <em>Austrostipa flavescens</em> and <em>Lagurus ovatus</em> (<a href="#">Plate 9</a>).</td>
<td>0.16</td>
</tr>
<tr>
<td>MrLOF</td>
<td>Low open forest of <em>Melaleuca rhaphiophylla</em> over open to closed rush/sedgeland of <em>Juncus</em> spp. and <em>Baumea juncea</em> over sparse forbland of <em>Apium prostratum</em> var. <em>prostratum</em>, <em>Lobelia anceps</em>, <em>Samolus repens</em> var. <em>repens</em> and <em>Atriplex prostrata</em> (<a href="#">Plate 10</a>).</td>
<td>0.11</td>
</tr>
<tr>
<td>Cleared/planted</td>
<td>Modified vegetation comprising weeds with occasional native trees and planted vegetation (<a href="#">Plate 11</a>).</td>
<td>4.01</td>
</tr>
</tbody>
</table>
Plate 6: Plant community AfW in degraded condition

Plate 7: Plant community AfSgHcW in good condition.
Plate 8: Plant community **CcAfW** in very good condition.

Plate 9: Plant community **MhBvTrS** in very good condition. Note fire killed/resprouting shrubs.
Plate 10: Plant community MrLOF in very good condition.

Plate 11: Parkland cleared vegetation (left) and planted non-native landscaped gardens (right) in completely degraded condition.

4.3.2 Vegetation condition

The most intact native vegetation was located to the west along the edge of Margaret River (plant communities MrLOF and CCAfw) and in the south-western corner of the site (plant community MhBvTrCS). The MrLOF and CCAfw vegetation was mapped as being in very good condition as it retains the structure expected of a riparian wetland community and has moderate native species diversity. The MhBvTrCS vegetation in the south western portion of the site shows evidence of being significantly burnt in the 2011 fire. However as it comprises a dense shrubland of resprouting native coastal species with numerous understorey species and limited weed cover, it was also considered to be in very good condition. A portion of plant community AfSgHcW bordering the south eastern boundary of the site was also considered to be in very good condition. This area showed less severe evidence of fire.
Sections of plant communities **AfW** and **AfSgHcW** to the south and east of the site were mapped as being in good condition as they had higher weed cover.

A number of areas of the **AfW** vegetation consists of trees over scattered native shrubs and a high cover of pasture weeds (particularly to the south west of the site along Margaret River). This vegetation was mapped as being in degraded condition as it lacks understory structure and has low species diversity. Consequently the vegetation is effectively parkland cleared and rehabilitation would require intensive management.

Remaining areas in the site are in ‘completely degraded’ condition and consist of non-native species such as pasture grasses, and planted trees and shrubs. Tracks within the site were also mapped as being in ‘completely degraded’ condition.

The extent of vegetation by condition category within the site and also within the wider survey area is detailed in **Table 6** and shown in **Figure 4**.

**Table 6: Vegetation condition categories within the site and survey area**

<table>
<thead>
<tr>
<th>Condition category (Keighery (1994))</th>
<th>Site (ha)</th>
<th>Additional survey area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pristine</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Excellent</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Very Good</td>
<td>0.28</td>
<td>4.26</td>
</tr>
<tr>
<td>Good</td>
<td>0.62</td>
<td>1.37</td>
</tr>
<tr>
<td>Degraded</td>
<td>0.39</td>
<td>0.21</td>
</tr>
<tr>
<td>Completely Degraded</td>
<td>4.01</td>
<td>0.08</td>
</tr>
</tbody>
</table>

### 4.3.3 Threatened and priority ecological communities

No TECs or PECs occur within the site. Wallcliffe Cave and the cliff caves in the south western portion of the site and survey area are not known to contain any aquatic root mat TEC. However, it is possible that aquatic root mat TECs occur to the south of the site.

### 4.3.4 Locally and regionally significant vegetation

A number of mature native trees (diameter at breast height larger than 500 mm) including *Corymbia calophylla* (marri) and peppermint are present in the site. Due to their number and size these trees have the potential to provide habitat for black cockatoos (especially Carnaby’s black cockatoo) and western ring-tailed possum respectively, along with other ecological services.

### 4.4 Species richness and sampling adequacy

A total of 104 species were recorded from 11 samples. A species accumulation curve derived from sample data is presented in **Plate 12**. After eleven samples the curve is still increasing and has not reached its asymptote. This indicates that a proportion of species likely remain undetected by sampling.
Species richness was estimated in PRIMER v6 to be between 149 (Jacknife1) and 158 (Chao2). Based on the trend of the species accumulation curve approximately 30 to 40 samples would be required to capture that many species. Including the 13 additional species recorded opportunistically, a total of 117 species was recorded in the survey area. This indicates that between 74 and 79% of the estimated 149-158 species were recorded. Considering the completely degraded nature of the majority of the site and the time spent sampling and searching the remnant vegetation within the site itself, the presence of additional species is more likely to be within the portions of the survey area outside of the site. This is particularly likely for the vegetation to the south of the site within Wallcliffe Reserve. Thus the survey effort was considered to be adequate to prepare a representative species inventory for the site.

Plate 12: Species accumulation curve derived from sample data ($y = 35.522\ln(x) + 14.619$ $R^2 = 0.9816$).
5 Discussion

The vegetation within the site has been subject to significant past disturbance and is largely in completely degraded condition. The central portion of the site contain the fenced remains of the buildings that were damaged in the 2011 fire. These are surrounded by maintained cultivated gardens dominated by exotic species. Approximately four hectares of the site is cleared or comprises non-native vegetation. The 1.3 ha of native vegetation remaining within as well as areas adjacent to the site shows varying levels of disturbance, including fire damage, partial clearing and weed invasion.

The AfW vegetation was located in a number of pockets within the site. These areas have all been subject to some disturbance, both from historical clearing and the 2011 fire. The north-eastern patch is in degraded condition and has been subject to plantings of local native and exotic species. This area is also subject to weed control. The south western pockets of the AfW vegetation range from degraded to good condition. The area directly south west of the site was mapped as being in degraded condition due to high grass weed loads and limited native understorey species. The AfW vegetation within the south western portion of the site is mapped as being in good condition as they contained less weed cover and had a number of native understorey species present. A landscaped, rocky stream was historically built in this area using limestone blocks, at the time of the survey there was no water present and no evidence that this water feature is still in use. This area was still considered to be in good condition due to the native species present and low weed cover, but showed evidence of historic modification.

The most intact native vegetation exists along the south-western, western and south eastern periphery of the site and extending outside of the site boundary. The vegetation along Margaret River comprises plant community MrLOF (with CcAfW at higher elevation at the northern extent of the site). These communities are relatively intact, riparian communities in very good condition, despite localised incursions of weed species in higher densities. The vegetation was subject to some disturbance during the 2011 fire but due to its proximity to the river was not extensively burnt.

Plant communities AfSgHcW and MhBvTrS extend to the south of the site, with small areas of each occurring within the site boundary. Based on the historical aerials, the vegetation to the south east of the site (plant community AfSgHcW) was burnt between 2007 and 2009. The vegetation present in the south west corner of the site (plant community MhBvTrS) was then subsequently burnt in 2011. Both communities are in the process of regenerating and contained high coverage of native species. The vegetation at the junction of the communities was burnt by both fires and consequently was more degraded with high weed cover. The two communities share numerous common species but showed differences in species composition and structure. AfSgHcW vegetation had a more intact canopy of peppermint trees. Within the MhBvTrS vegetation peppermint trees were more scattered and at the time of the survey were of a similar height to the dominant shrub species present (approximately two metres high). The MhBvTrS vegetation is located on limestone cliffs above the river with higher densities of outcropping limestone. As a result, the suite of species was slightly different to the AfSgHcW vegetation on sandier soil further east.
5.1 Threatened and priority flora

In the south-west of Western Australia, September to November is considered the optimal period for undertaking flora and vegetation surveys, with this period also extending into December the further south the site is located. This is when the majority of flora species are flowering and therefore easiest to detect and identify. In 2018 many species in the south-west were still in flower later than usual due to the higher (albeit average) rainfall compared to previous years and the late start to the flowering period (anecdotally, some species were nearly a month behind their typical flowering times).

The portion of the Margaret River adjacent to the site is estuarine and low level interaction with the ocean and intrusion of salt water is evident (Hanran-Smith and McKenzie 2018). The presence of *Juncus kraussii* subsp. *australiensis* confirms this. This is likely to limit those conservation significant species that have a preference for lower lying, moist habitats.

One individual of the priority flora species *Banksia sessilis* var. *cordata* (P4) was recorded in the south-eastern corner of the site alongside the driveway.

No other threatened or priority flora species were recorded within the site or adjacent portions of the survey area. The absence of the larger perennial species such as *Lambertia echinata* subsp. *occidentalis* and *Pultenaea pinifolia* was relatively easy to confirm. As it was to confirm that *Banksia sessilis* var. *cordata* was only present at the one identified location. However, due to their size, smaller geophytic species such as *Caladenia excelsa* and *C. hoffmanii* can be more difficult to detect. Considerable search effort was applied to the areas of remnant native vegetation present within the site itself therefore it is considered that further threatened and priority flora species are unlikely to occur within the site. Conservation significant species could occur within Wallcliffe Reserve to the south of the site which was not assessed in the same level of detail.

5.2 Threatened ecological communities

No TECs or PECs are considered to occur within the site.

The only TECs or PECs considered to potentially occur close to the site are aquatic root mat communities 1, 2, 3 and 4 in caves of the Leeuwin Naturaliste Ridge TECs. These TECs comprise four separate communities of aquatic invertebrates living in mats of fine tree rootlets associated with extensive growths of microscopic fungi in caves on the Leeuwin Naturaliste Ridge (ESSS 2000). The caves that contain the root mat communities occur in limestone on gneiss granites (English et al. 2000; ESSS 2000). The soil above the caves contains little water and growth of tree roots into the caves is promoted by the availability of permanent water in the cave streams and pools. Root mats are produced by *Eucalyptus diversicolor* (karri) in Easter Cave and Stronges Cave, marri in Calgardup cave and karri and peppermint in Kudjal Yolgah cave (ESSS 2000). The resulting root mats provide the primary food source for the aquatic root mat (Jasinska et al. 1996). The four communities are also differentiated by the invertebrate species composition and abundance and most species present are endemic to the one cave (J. 1996; ESSS 2000). As such, each community is considered to represent a separate TEC and all four communities were assessed as critically endangered (ESSS 2000). Despite new information showing a much larger extent of root mat communities, the communities still fit
criteria for critically endangered as documented within the *Interim Recovery Plan 2008-2013* (DEC 2008).

The nearest known occurrence of one of the aquatic root mat TECs is *Aquatic Root Mat Community Number 2 of Caves of the Leeuwin Naturaliste Ridge*, 9 km south of the site. This TEC occurs at Strong’s Cave and the root mats are produced by karri. There are a number of caves present close to the site. These are present within the Wallcliffe Cliffs and also a separate cave 150 m south of the cliffs (referred to as Wallcliffe Cave). Due to increased degradation and Aboriginal cultural significance, public access to the cliff caves was prohibited in 2018 (Shire of Augusta-Margaret River 2018). Wallcliffe Cave was gated to prevent access in 2002. Whilst neither cave systems have been identified as containing aquatic root mat TECs previously, it is possible that these TECs occur within the area. Targeted surveys of the caves for root mats and the assemblages of invertebrate fauna would be required to determine the presence or absence of aquatic root mat TECs but are not likely to occur within the site itself.

5.3 Local and regional significance

The site and surrounds are mapped as two Registered Aboriginal Sites, contains unique geological features and abuts the Margaret River. As such the intact vegetation (that in good or better condition) within the area is likely to be locally and/or regionally significant and also contributes to regional ecological linkages.

Large peppermint and marri trees within the site may be locally and/or regionally significant due to their habitat value for endangered western ring-tailed possum and black cockatoo species respectively. However, further assessment by a fauna specialist is required to confirm these values.
6 Conclusions

The majority of vegetation within the site is highly disturbed and modified. Approximately four hectares of the site contains completely degraded, non-native vegetation. The remaining 1.3 ha of the site includes native vegetation that is largely present in degraded (0.39 ha) and good (0.62 ha) condition. However, the site contains approximately 0.28 ha of relatively intact native vegetation in very good condition.

One individual of the priority flora species *Banksia sessilis* var. *cordata* (P4) was recorded in the south-eastern corner of the site alongside the driveway. No other threatened or priority flora species were recorded or are considered likely to occur within the site.

No TECs or PECs were recorded within the site. There is a possibility that Wallcliffe Cave or caves within the Wallcliffe Cliffs to the west and south of the site could potentially contain one of the aquatic root mat TECs.

The intact vegetation in the southern portion of the site likely to be locally and/or regionally significant and contribute to the associated regional ecological linkages. The large peppermint and marri trees within the site may be locally and/or regionally significant due to their habitat potential for threatened western ring-tailed possum and black cockatoo species respectively.
7 References

7.1 General references


Beard, J. S. 1990, *Plant Life of Western Australia*, Kangaroo Press Pty Ltd., Kenthurst, N.S.W.


Department of Biodiversity, Conservation and Attractions (DBCA) 2017a, *DBCA - Legislated Lands and Waters (DBCA-011)*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2017b, *Lands of Interest (DBCA-012)*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2017c, *Ramsar Sites (DBCA-010)*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018, *Directory of Important Wetlands in Australia - Western Australia (DBCA-045)*.


Department of Primary Industries and Regional Development (DPIRD) 1999, *Contours 2m*, Perth.


Wetlands Advisory Committee (Report of the Wetlands Advisory Committee to the Environmental Protection Authority), 1977, The status of reserves in System Six, Environmental Protection Authority, Perth.

7.2 Online references


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Figures

Figure 1: Site Location
Figure 2: Environmental Features
Figure 3: Plant Communities
Figure 4: Vegetation Condition
Figure 2: Environmental Features

Project: Spring Flora and Vegetation Assessment
Lot 101 Wallcliffe Road Amendment Support
Client: Wallcliffe House Pty Ltd

Plan Number: EP16-129011- F02
Drawn: KNM
Date: 23/01/2019
Checked: SKP
Approved: TAA
Date: 11/02/2019

Scale: 1:7,500 @ A4
GDA 1994 MGA Zone 50

Emergence Associates makes every attempt to ensure the accuracy and completeness of data, Emergence accepts no responsibility for essentially sourced data used.

- Site boundary
- Cadastral boundary
- ESA
- DBCA managed lands
- Shire managed nature reserves
- Regional ecological linkages
- Elevation contour (m AHD)
Conservation significant flora

- Banksia sessilis var. cordata (P4)

Plant

- AfSgHcW
  - Woodland of Agonis flexuosus over shrubland of Syridium globulosum, Hibbertia cuneiformis, Templetonia retusa with vineland of Hardenbergia comptoniana and Muehlenbeckia adpressa over low shrubland of Phyllanthus calycinus over forbland of Tricoryne elatior and Thysanotus arenarius and sparse grassland of Austrostipa

- AfW
  - Woodland of Agonis flexuosus over open shrubland of Rhagodia baccata subsp. baccata, Olearia axillaris and Hibbertia cuneiformis over open mixed forbland and open to closed grassland of weeds.

- CcAfW
  - Woodland of Corymbia calophylla and Agonis flexuosus over shrubland of Syridium globulosum, Pteridium esculentum, Rhagodia baccata subsp. baccata and Conocarpus spartus with vineland of Hardenbergia comptoniana and Muehlenbeckia adpressa over weeds.

- MhBvTrCS
  - Low open woodland of Agonis flexuosus with closed shrubland of Metrosideros hexapetala, Templetonia retusa, Beyeria viscosa, Arctostaphylos calycinum, Diploloea damperi, Dodonaea viscosa, Lobelia anceps, Samolus repens var. repens and *Atriplex prostrata.

- MrLOF
  - Low open forest of Melaleuca niphophylla over open to closed rush/sedgeland of Juncus spp. and Baumea juncea over sparse forbland of Apium prostratum var. prostratum, Lobelia anceps, Samolus repens var. repens and *Atriplex prostrata.

- Cleared / planted
  - Modified vegetation comprising weeds with occasional native trees and planted vegetation.

While Emerge Associates makes every effort to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Figure 4: Vegetation Condition

Project: Spring Flora and Vegetation Assessment
Lot 101 Wallcliffe Road Amendment Support
Client: Wallcliffe House Pty Ltd

While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Conservation Significant Flora and Vegetation

Threatened and priority flora

Flora species considered rare or under threat warrant special protection under Commonwealth and/or State legislation. At the Commonwealth level, flora species can be listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Flora species considered ‘threatened’ pursuant to Schedule 1 of the EPBC Act are assigned categories according to their conservation status, as outlined in Table 1.

In Western Australia, plant taxa may be classed as ‘threatened’ under the Biodiversity Conservation Act 2016 (BC Act) which is enforced by Department of Biodiversity Conservation and Attractions (DBCA). Threatened flora species are listed under sections 19(1) and 26(2) of the BC Act. It is an offence to ‘take’ or disturb threatened flora without Ministerial approval. Section 5(1)1 of the Act defines to take as including “… to gather, pluck, cut, pull up, destroy, dig up, remove, harvest or damage flora by any means” or to cause or permit the same to be done. The definition of threatened flora under the BC Act is provided in Table 1.

Section 43 of the BC Act requires that an occurrence of a threatened species or threatened ecological community is reported to DBCA where the occurrence has been identified as part of field work completed:

- as part of an assessment under Part IV of the Environmental Protection Act 1986; or
- in relation to an application for a clearing permit under the Environmental Protection Act 1986 section 51E(1)(d).

Penalties apply to individuals and organisations that fail to provide accurate reports of threatened species or communities.

The Biodiversity Conservation Regulations 2018 (BC Regulations 2018) came into effect on January 1 2019. The BC Regulations include provisions for licencing, charges, penalties and other provisions associated with the BC Act.

Flora species that may be threatened or near threatened but lack sufficient information to be listed under the BC Act may be added to the DBCA’s Priority Flora List (DBCA 2018c). Priority flora species are considered during State approval processes. Priority flora categories and definitions are listed in Table 1.
Table 1: Definitions of conservation significant flora species pursuant to the EPBC Act and BC Act and on DBCA’s Priority Flora List (DBCA 2018c)

<table>
<thead>
<tr>
<th>Conservation code</th>
<th>Description</th>
</tr>
</thead>
</table>
| EX<sup>†</sup>     | Threatened Flora – Presumed Extinct  
Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such. |
| T<sup>‡</sup>       | Threatened Flora – Extant  
Taxa which are declared to be likely to become extinct or is rare, or otherwise in need of special protection. |
| CR<sup>‡</sup>      | Threatened Flora – Critically Endangered  
Taxa which are considered to be facing an extremely high risk of extinction in the wild. |
| EN<sup>‡</sup>      | Threatened Flora – Endangered  
Taxa which are considered to be facing a very high risk of extinction in the wild. |
| VU<sup>‡</sup>      | Threatened Flora – Vulnerable  
Taxa which are considered to be facing a high risk of extinction in the wild. |
| P1<sup>§</sup>      | Priority One – Poorly Known  
Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat e.g. road verges, urban areas, farmland, active mineral leases etc., or the plants are under threat, e.g. from disease, grazing by feral animals etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey. |
| P2<sup>§</sup>      | Priority Two – Poorly Known  
Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’, but urgently need further survey. |
| P3<sup>§</sup>      | Priority Three – Poorly Known  
Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as ‘rare flora’ but needs further survey. |
| P4<sup>§</sup>      | Priority Four – Rare  
Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years. |

<sup>‡</sup>pursuant to the EPBC Act, <sup>†</sup>pursuant to the BC Act, <sup>§</sup>on DBCA’s Priority Flora List

Threatened and priority ecological communities

‘Threatened ecological communities’ (TECs) are recognised as ecological communities that are rare or under threat and therefore warrant special protection. Selected TECs are afforded statutory protection at a Commonwealth level under section 181 of the EPBC Act. TECs nominated for listing under the EPBC Act are considered by the Threatened Species Scientific Committee and a final decision is made by the Commonwealth Minister for the Environment and Energy. Once listed under the EPBC Act, communities are categorised as either ‘critically endangered’, ‘endangered’ or ‘vulnerable’ as defined in Table 2. Any action likely to have a significant impact on a community listed under the EPBC Act requires approval from the Minister for the Environment and Energy.
Within Western Australia TECs are determined by the Western Australian Threatened Ecological Communities Scientific Advisory Committee (WATECSAC) and endorsed by the State Minister for the Environment. The WATECSAC is an independent group comprised of representatives from organisations including tertiary institutions, the Western Australian Museum and DBCA. The TECs endorsed by the State Minister are published by DBCA (DBCA 2018b).

TECs are assigned to one of the categories outlined in Table 2 according to their status (in relation to the level of threat). TECs are afforded direct statutory protection at a State level under the BC Act and BC Regulations. Ecological communities are listed under Section 27(1) and 33 of the BC Act. Their significance is also acknowledged through other state environmental approval processes such as ‘environmental impact assessment’ pursuant to Part IV of the Environmental Protection Act 1986 (EP Act) and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004.

Table 2: Categories of threatened ecological communities (English and Blyth 1997; DEC 2009).

<table>
<thead>
<tr>
<th>Conservation code</th>
<th>Description</th>
</tr>
</thead>
</table>
| PD                | Presumably Totally Destroyed  
An ecological community that has been adequately searched for but for which no representative occurrences have been located. |
| CE                | Critically Endangered  
An ecological community that has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. |
| E                 | Endangered  
An ecological community that has been adequately surveyed and is not critically endangered but is facing a very high risk of total destruction in the near future. |
| V                 | Vulnerable  
An ecological community that has been adequately surveyed and is not critically endangered or endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future. |

An ecological community that is under consideration for listing as a TEC, but does not yet meet survey criteria or has not been adequately defined may be listed as a ‘priority ecological community’ (PEC). PECs are categorised as priority category 1, 2 or 3 as described in Table 3. Ecological communities that are adequately known and are rare but not threatened, or meet criteria for ‘near threatened’, or that have been recently removed from the threatened list, are placed in ‘priority 4’. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in ‘priority 5’ (DEC 2009). Listed PECs are published by DBCA (DBCA 2017b).
### Additional Background Information

<table>
<thead>
<tr>
<th>Priority code</th>
<th>Description</th>
</tr>
</thead>
</table>
| **P1**        | Priority One  
Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range. |
| **P2**        | Priority Two  
Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes. |
| **P3**        | Priority Three  
Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:  
(i) communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;  
(ii) communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them. |
| **P4**        | Priority Four  
Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened or that have been recently removed from the threatened list. These communities require regular monitoring. |
| **P5**        | Priority Five  
Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years. |

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Table 3: *Categories of priority ecological communities (DEC 2009).*
Weeds

A number of legislative and policy documents exist in relation to weed management at state and national levels. The *Biosecurity and Agriculture Management Act 2007* (BAM Act) is the principle legislation guiding weed management in Western Australia and lists declared pest species. At a national level, the Australian government has compiled a list of 32 Weeds of National Significance (WoNS) (DoEE 2018), of which many are also listed under the BAM Act.

Declared Pests

Part 2.3.23 of the BAM Act requires a person must not; “a) keep, breed or cultivate the declared pest; b) keep, breed or cultivate an animal, plant or other thing that is infected or infested with the declared pest; c) release into the environment the declared pest, or an animal, plant or other thing that is infected or infested with the declared pest; or d) intentionally infect or infest, or expose to infection or infestation, a plant, animal or other thing with a declared pest”.

Under the BAM Act, all declared pests are assigned a legal status, as described in *Table 4*. Species assigned to the ‘declared pest, prohibited - s12’ category are placed in one of three control categories, as described in *Table 5*.

The *Biosecurity and Agriculture Management Regulations 2013* specify keeping categories for species assigned to the ‘declared pest - s22(2)’ category, which relate to the purposes of which species can be kept, as well as the entities that can keep them. The categories are described in *Table 6*.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act (DAFWA 2016).

*Table 4: Legal status of declared pest species listed under the BAM Act (DAFWA 2016).*

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declared Pest Prohibited - s12</td>
<td>May only be imported and kept subject to permits. Permit conditions applicable to some species may only be appropriate or available to research organisations or similarly secure institutions.</td>
</tr>
<tr>
<td>Declared Pest s22(2)</td>
<td>Must satisfy any applicable import requirements when imported, and may be subject to an import permit if they are potential carriers of high-risk organisms. They may also be subject to control and keeping requirements once within Western Australia</td>
</tr>
</tbody>
</table>
Table 5: Control categories of declared pest species listed under the BAM Act (DAFWA 2016).

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Exclusion</td>
</tr>
<tr>
<td></td>
<td>Not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.</td>
</tr>
<tr>
<td>C2</td>
<td>Eradication</td>
</tr>
<tr>
<td></td>
<td>Present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.</td>
</tr>
<tr>
<td>C3</td>
<td>Management</td>
</tr>
<tr>
<td></td>
<td>Established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.</td>
</tr>
</tbody>
</table>

Table 6: Keeping categories of declared pest species listed under the BAM Act (DAFWA 2016).

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prohibited</td>
<td>Can only be kept under a permit for public display and education purposes, and/or genuine scientific research, by entities approved by the state authority.</td>
</tr>
<tr>
<td>Exempt</td>
<td>No permit or conditions are required for keeping.</td>
</tr>
<tr>
<td>Restricted</td>
<td>Organisms which, relative to other species, have a low risk of becoming a problem for the environment, primary industry or public safety and can be kept under a permit by private individuals.</td>
</tr>
</tbody>
</table>
Wetland Habitat

Geomorphic wetland types

On the Swan Coastal Plain DBCA (2017a) have used the geomorphic wetland classification system developed by Semeniuk (1987) and Semeniuk and Semeniuk (1995) to classify wetlands based on the landform shape and water permanence (hydro-period) as outlined in Table 7.

Table 7: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017a)

<table>
<thead>
<tr>
<th>Level of inundation</th>
<th>Basin</th>
<th>Flat</th>
<th>Channel</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanently inundated</td>
<td>Lake</td>
<td>-</td>
<td>River</td>
<td>-</td>
</tr>
<tr>
<td>Seasonally inundated</td>
<td>Sumpland</td>
<td>Floodplain</td>
<td>Creek</td>
<td>-</td>
</tr>
<tr>
<td>Seasonally waterlogged</td>
<td>Dampland</td>
<td>Palusplain</td>
<td>-</td>
<td>Paluslope</td>
</tr>
</tbody>
</table>

Wetland management categories

DBCA maintains the Geomorphic Wetland of the Swan Coastal Plain dataset (DBCA 2018a), which also categorises individual wetlands into specific management categories as described in Table 8.

Table 8: Geomorphic Wetlands of the Swan Coastal Plain classification categories (DBCA 2017a)

<table>
<thead>
<tr>
<th>Management category</th>
<th>Description of wetland</th>
<th>Management objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation (CCW)</td>
<td>Support high levels of attributes</td>
<td>Preserve wetland attributes and functions through reservation in national parks, crown reserves and state owned land. Protection provided under environmental protection policies.</td>
</tr>
<tr>
<td>Resource enhancement (REW)</td>
<td>Partly modified but still supporting substantial functions and attributes</td>
<td>Restore wetland through maintenance and enhancement of wetland functions and attributes. Protection via crown reserves, state or local government owned land, environmental protection policies and sustainable management on private properties.</td>
</tr>
<tr>
<td>Multiple use (MUW)</td>
<td>Few wetland attributes but still provide important hydrological functions</td>
<td>Use, development and management considered in the context of water, town and environmental planning through land care.</td>
</tr>
</tbody>
</table>

The management categories of wetland features are determined based on hydrological, biological and human use features. The DBCA document A methodology for the evaluation of specific wetland types on the Swan Coastal Plain, Western Australia (DBCA 2017a) details the methodology by which wetlands on the Swan Coastal Plain are assigned management categories based on a two tiered evaluation system, with preliminary and secondary evaluation stages. The preliminary evaluation aims to identify any features of conservation significance that would immediately place the wetland within the CCW management category. Examples of these significant features include presence on significant wetland lists, presence of TECs or PECs (Priority 1 and 2), presence of threatened flora and
over 90% of vegetation in good or better condition based on the Keighery (1994) scale. If such environmental values are identified the wetland would be categorised as CCW without further evaluation.

Should the preliminary evaluation indicate that no such features occur, the secondary evaluation and site assessment are then applied. In the secondary evaluation, an appropriate management category is determined through the assessment of a range of environmental attributes, functions and values.

Wetland reclassification
DBCA have a protocol for proposing changes to the wetland boundaries and management categories of the existing geomorphic wetland dataset (DEC 2007). The procedure involves a wetland desktop evaluation and site assessment which culminates in a recommended management category. Relevant information should be obtained in the optimal season for vegetation condition and water levels, which is usually spring (DEC 2007). In the case of larger wetlands that have undergone a degree of disturbance, a separate management category may be assigned to parts of the wetland in order to reflect the current values.
References

General references

Department of Biodiversity, Conservation and Attractions (DBCA) 2017a, *A methodology for the evaluation of wetlands on the Swan Coastal Plain*, draft prepared by the Wetlands Section of the Department of Biodiversity, Conservation and Attractions and the Urban Water Branch of the Department of Water and Environmental Regulation, Perth.

Department of Biodiversity Conservation and Attractions (DBCA) 2017b, *Priority Ecological Communities for Western Australia Version 27*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018a, *Geomorphic Wetlands, Swan Coastal Plain (DBCA-019)*.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018b, *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment*, Perth.


Online references


Appendix B
Species List
<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apiaceae</td>
<td>* Apium prostratum var. prostratum</td>
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<td>Amaryllidaceae</td>
<td>* Agapanthus praecox</td>
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<tr>
<td>Araceae</td>
<td>D Zantedeschia aethiopica</td>
</tr>
<tr>
<td>Asparagaceae</td>
<td>Acanthocarpus preissii</td>
</tr>
<tr>
<td></td>
<td>D Asparagus asparagoides</td>
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<tr>
<td></td>
<td>* Liriope sp.</td>
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<tr>
<td></td>
<td>Lomandra ?micrantha subsp. micrantha</td>
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<tr>
<td></td>
<td>Thysanotus arenarius</td>
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<td>Asphodelaceae</td>
<td>* Trachyandra divaricata</td>
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<td>Asteraceae</td>
<td>* Arctotheca calendula</td>
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<td></td>
<td>* Cotula coronopifolia</td>
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<td>* Hypochaeris glabra</td>
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<td>Olearia axillaris</td>
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<td>* Senecio sp.</td>
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<td></td>
<td>* ?Sigesbeckia orientalis</td>
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<td>* Allocasuarina sp.</td>
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<td>* Ehrharta villosa</td>
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<td>* Poa porphyroclados</td>
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<td>* Poaceae sp.</td>
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<td>Polygalaceae</td>
<td>* Comesperma confertum</td>
</tr>
</tbody>
</table>
Flora Taxa List - Lot 101 Wallcliffe Road
Note: * denotes introduced (weed or planted) species, D denotes declared pest species, P4 denotes 'priority 4' status

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
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<tbody>
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<td>Salicaceae</td>
<td>* Salix babylonica</td>
</tr>
<tr>
<td>Santalaceae</td>
<td>Exocarpos sparteus</td>
</tr>
<tr>
<td>Sapindaceae</td>
<td>Dodonaea aptera</td>
</tr>
<tr>
<td>Solanaceae</td>
<td>* Solanum laciniatum</td>
</tr>
<tr>
<td></td>
<td>* Solanum nigrum</td>
</tr>
<tr>
<td>Thymelaeaceae</td>
<td>Pimelea rosea subsp. rosea</td>
</tr>
</tbody>
</table>
Flora Taxa List - Lot 101 Wallcliffe Road

Note: * denotes introduced (weed or planted) species, D denotes declared pest species, P4 denotes 'priority 4' status

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zamiaceae</td>
<td><em>Macrozamia riedlei</em></td>
</tr>
</tbody>
</table>
## Vegetation Sample Data

**Sample Name:** Q1

**Project no.:** EP18-128  
**Date:** 19/11/2018  
**Author:** SKP, other  
**Status:** Non-permanent

### Quadrat and landform details

<table>
<thead>
<tr>
<th>Sample type: quadrat</th>
<th>Size: 10 m x 10 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW corner easting: 314876</td>
<td>NW corner northing: 6239367</td>
</tr>
<tr>
<td>Altitude (m): 12.64344</td>
<td>Geographic datum/zone: GDA94/Zone 50</td>
</tr>
<tr>
<td>Soil water content: dry</td>
<td>Landform: mid-slope</td>
</tr>
<tr>
<td>Time since fire: &gt; 5 yrs</td>
<td>Disturbance: high - clearing, fire</td>
</tr>
<tr>
<td>Soil type/texture sand/loam</td>
<td>Bare ground (%): 10</td>
</tr>
<tr>
<td>Rocks (%) and type: No rocks</td>
<td>Soil colour: brown/</td>
</tr>
<tr>
<td>Litter: 50% (leaves, twigs,)</td>
<td>Vegetation condition: degraded</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strata</th>
<th>Cover (%)</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper:</td>
<td>70 to 100</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Mid:</td>
<td>10 to 30</td>
<td>1 to 2</td>
</tr>
<tr>
<td>Ground layer 1:</td>
<td>0%</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td>Ground layer 2:</td>
<td>0%</td>
<td>0</td>
</tr>
</tbody>
</table>

Planted native and exotic shrubs present within patch. Grass weeds recently sprayed and dying at the time of survey. Burnt 2011.

### Vegetation description

Low closed forest *Agonis flexuosa* over open shrubland *Rhagodia baccata* subsp. *baccata* and planted *Melaleuca huegelii* and *Hibbertia cuneifolia* over grassland of *Ehrharta longifolia* and *Lagurus ovatus* over forbland *Lysimachia arvensis*, *Zantedeschia aethiopica*, *Sonchus oleraceus* and *Galium murale*.

![Vegetation Sample Data](image)
### Sample Name: Q1

**Project no.:** EP18-128  
**Date:** 19/11/2018  
**Status** Non-permanent  
**Author:** SKP, other

---

<table>
<thead>
<tr>
<th>Status</th>
<th>Confirmed name</th>
<th>Cover (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>* Acacia littorea</td>
<td>opp</td>
</tr>
<tr>
<td></td>
<td>* Agonis flexuosa</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>* Apium prostratum var. prostratum</td>
<td>0.5</td>
</tr>
<tr>
<td>*</td>
<td>* Atriplex prostrata</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>* Billardiera heterophylla</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>* Boronia alata</td>
<td>opp</td>
</tr>
<tr>
<td></td>
<td>* Corymbia ficifolia</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Cotula coronopifolia</td>
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<tr>
<td>*</td>
<td>* Ehrharta longiflora</td>
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<td>*</td>
<td>* Fumaria muralis subsp. muralis</td>
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</tr>
<tr>
<td>*</td>
<td>* Galium murale</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>* Hibbertia cuneiformis</td>
<td>3</td>
</tr>
<tr>
<td>*</td>
<td>* Hypochaeris glabra</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>* Juncus pallidus</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Lagurus ovatus</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>* Liriope sp.</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Lupinus cosentinii</td>
<td>0.5</td>
</tr>
<tr>
<td>*</td>
<td>* Lysimachia arvensis</td>
<td>3</td>
</tr>
<tr>
<td>*</td>
<td>* Lythrum hyssopifolia</td>
<td>0.5</td>
</tr>
<tr>
<td>*</td>
<td>* Malva parviflora</td>
<td>opp</td>
</tr>
<tr>
<td></td>
<td>* Melaleuca huegelii</td>
<td>3</td>
</tr>
<tr>
<td>*</td>
<td>* Olea europaea</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Olearia axillaris</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Polycarpon tetraphyllum</td>
<td>0.5</td>
</tr>
<tr>
<td>*</td>
<td>* Rhagodia baccata subsp. baccata</td>
<td>4</td>
</tr>
<tr>
<td>*</td>
<td>* Senecio elegans</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Solanum laciniatum</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Solanum nigrum</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>* Sonchus oleraceus</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>* Spyridium globulosum</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Trifolium campestre</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>* Trifolium glomeratum</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>* Zantedeschia aethiopica</td>
<td>1</td>
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</tbody>
</table>
Sample Name: Q2

Project no.: EP18-128  
Date: 19/11/2018  
Author: SKP, other  
Status: Non-permanent

Quadrat and landform details

- Sample type: quadrat  
- NW corner easting: 314869  
- Altitude (m): 13.622393  
- Soil water content: dry  
- Soil type/texture: sand/
- Rocks (%): 10%, limestone
- Litter: 20% (leaves, twigs,)

Size: 10 m x 10 m  
NW corner northing: 6239299  
Geographic datum/zone: GDA94/Zone 50  
Landform: mid-slope  
Disturbance: high - clearing, weeds, plantings, fire  
Bare ground (%): 5  
Soil colour: brown/
Vegetation condition: degraded

Strata  

<table>
<thead>
<tr>
<th>Strata</th>
<th>Cover (%)</th>
<th>Height (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>30 to 70</td>
<td>&lt;10</td>
<td>Planted native and exotic shrubs present within patch. Grass weeds recently</td>
</tr>
<tr>
<td>Mid</td>
<td>10 to 30</td>
<td>1 to 2</td>
<td>sprayed and dying at the time of survey. Burnt 2011</td>
</tr>
<tr>
<td>Ground layer 1</td>
<td>&lt;10</td>
<td>&lt;0.5</td>
<td></td>
</tr>
<tr>
<td>Ground layer 2</td>
<td>10 to 30</td>
<td>&lt;0.5</td>
<td></td>
</tr>
</tbody>
</table>

Vegetation description

Low open forest *Agonis flexuosa* over shrubland *Olearia axillaris, Boronia alata, Rhagodia baccata* subsp. *baccata* and *Solanum nigrum* over open grassland *Ehrharta longifolia* over forbland *Galium murale*, *Trifolium campestre* and *Polycarpon tetraphyllum*. 
### Sample Data

<table>
<thead>
<tr>
<th>Status</th>
<th>Confirmed name</th>
<th>Cover (%)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Acacia saligna</td>
<td>opp</td>
</tr>
<tr>
<td></td>
<td>Agonis flexuosa</td>
<td>40</td>
</tr>
<tr>
<td>*</td>
<td>Allocasuarina sp.</td>
<td>opp</td>
</tr>
<tr>
<td></td>
<td>Billardiera heterophylla</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Boronia alata</td>
<td>2</td>
</tr>
<tr>
<td>*</td>
<td>Conyza sumatrensis</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Crassula colorata</td>
<td>opp</td>
</tr>
<tr>
<td></td>
<td>Dichondra repens</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>Ehrharta longiflora</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Exocarpos sparteus</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>Fumaria muralis subsp. muralis</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>Galium murale</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Hibbertia cuneiformis</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>Hypochaeris glabra</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Isolepis sp.</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>Juncus pallidus</td>
<td>2</td>
</tr>
<tr>
<td>*</td>
<td>Lagurus ovatus</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>Melaleuca quinquenervia</td>
<td>opp</td>
</tr>
<tr>
<td></td>
<td>Olearia axillaris</td>
<td>10</td>
</tr>
<tr>
<td>*</td>
<td>Poaceae sp.</td>
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</tr>
<tr>
<td>*</td>
<td>Polycarpon tetraphylhum</td>
<td>5</td>
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<tr>
<td></td>
<td>Rhagodia baccata subsp. baccata</td>
<td>4</td>
</tr>
<tr>
<td>*</td>
<td>Salix sp.</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>Senecio sp.</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>Solanum laciniatum</td>
<td>opp</td>
</tr>
<tr>
<td>*</td>
<td>Solanum nigrum</td>
<td>4</td>
</tr>
<tr>
<td>*</td>
<td>Sonchus oleraceus</td>
<td>2</td>
</tr>
<tr>
<td>*</td>
<td>Trifolium campestre</td>
<td>2</td>
</tr>
</tbody>
</table>

* denotes non-native species
Sample Name: Q3

Project no.: EP18-128
Date: 19/11/2018
Author: SKP, other

Status: Non-permanent

Quadrat and landform details
Sample type: quadrat
Size: 10 m x 10 m
NW corner easting: 314828.4955
NW corner northing: 6239414.684
Altitude (m): -3.298827
Geographic datum/zone: GDA94/Zone 50
Soil water content: damp
Landform: waterway
Time since fire: > 5 yrs
Disturbance: moderate - weeds
Soil type/texture: sand/ with organic layer
Bare ground (%): 1
Rocks (%): No rocks
Soil colour: grey/brown
Litter: 70% (bark, twigs, branches)
Vegetation condition: very good

Strata

<table>
<thead>
<tr>
<th>Strata</th>
<th>Cover (%)</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>70 to 100</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Mid</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ground layer 1:</td>
<td>&lt;10</td>
<td>&lt;0.5</td>
</tr>
<tr>
<td>Ground layer 2:</td>
<td>&lt;10</td>
<td>&gt;0.5</td>
</tr>
</tbody>
</table>

Vegetation description

Low closed forest *Melaleuca rhaphiophylla* over low sparse herland *Lobelia anceps* over sparse rushland *Juncus kraussii* subsp. *australis* and *Juncus pallidus.*
Sample Name: Q3

Project no.: EP18-128
Date: 19/11/2018
Status: Non-permanent
Author: SKP

<table>
<thead>
<tr>
<th>Status</th>
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<th>Cover (%)</th>
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<tbody>
<tr>
<td>*</td>
<td>?Sigesbeckia orientalis</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Agonis flexuosa</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Apium prostratum var. prostratum</td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td>Atriplex prostrata</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Juncus kraussii subsp. australiensis</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Juncus pallidus</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Lobelia anceps</td>
<td>3</td>
</tr>
<tr>
<td>*</td>
<td>Lysimachia arvensis</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Melaleuca rhaphiophylla</td>
<td>60</td>
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<td>*</td>
<td>Modiola caroliniana</td>
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</tr>
<tr>
<td></td>
<td>Samolus repens</td>
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</tr>
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<td>*</td>
<td>Zantedeschia aethiopica</td>
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</tbody>
</table>

* denotes non-native species
## Vegetation Sample Data

### Sample Name:

<table>
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</tr>
<tr>
<td><strong>Date</strong></td>
<td>19/11/2018</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>Non-permanent</td>
</tr>
<tr>
<td><strong>Author</strong></td>
<td>SKP, other</td>
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</table>

### Quadrat and landform details

<table>
<thead>
<tr>
<th>Sample type</th>
<th>quadrat</th>
</tr>
</thead>
<tbody>
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<td><strong>Size</strong></td>
<td>10 m x 10 m</td>
</tr>
<tr>
<td><strong>NW corner easting</strong></td>
<td>314874.5163</td>
</tr>
<tr>
<td><strong>NW corner northing</strong></td>
<td>6239438.993</td>
</tr>
<tr>
<td><strong>Altitude (m)</strong></td>
<td>0.693734</td>
</tr>
<tr>
<td><strong>Geographic datum/zone</strong></td>
<td>GDA94/Zone 50</td>
</tr>
<tr>
<td><strong>Soil water content</strong></td>
<td>dry</td>
</tr>
<tr>
<td><strong>Time since fire</strong></td>
<td>&gt; 5 yrs</td>
</tr>
<tr>
<td><strong>Soil type/texture</strong></td>
<td>sand/</td>
</tr>
<tr>
<td><strong>Rocks (%) and type</strong></td>
<td>No rocks</td>
</tr>
<tr>
<td><strong>Litter</strong></td>
<td>25% (leaves, branches,)</td>
</tr>
</tbody>
</table>

| **Landform** | mid-slope |
| **Disturbance** | low - low density weeds, adjacent clearing |
| **Bare ground (%)** | 5 |
| **Soil colour** | brown/ |
| **Vegetation condition** | very good |

### Strata

<table>
<thead>
<tr>
<th>Strata</th>
<th>Cover (%)</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
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<td>&lt;10</td>
</tr>
<tr>
<td>Mid</td>
<td>30 to 70</td>
<td>1 to 2</td>
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<tr>
<td>Ground layer 1</td>
<td>10 to 30</td>
<td>&gt;0.5</td>
</tr>
<tr>
<td>Ground layer 2</td>
<td>0%</td>
<td>0</td>
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</table>

### Vegetation description

Low woodland *Corymbia caalphylla* and *Agonis flexuosa* over shrubland *Rhagodia baccata* subsp. *baccata*, *Exocarpos spartes*, *Pteridium esculentum*, *Spyridium globulosum* with vineyard of *Muehlenbeckia adpressa* over tall open sedgeland of *Lepidosperma* spp. and sparse forbland of *Lysimachia arvensis* and *Kennedia prostrata*.
### Sample Name: Q4

**Project no.:** EP18-128  
**Date:** 19/11/2018  
**Author:** SKP  
**Status** Non-permanent

### Species Data

* denotes non-native species

<table>
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<td></td>
<td><em>Agonis flexuosa</em></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><em>Billardiera heterophylla</em></td>
<td>1</td>
</tr>
<tr>
<td>*</td>
<td><em>Bromus diandrus</em></td>
<td>10</td>
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<tr>
<td></td>
<td><em>Corymbia calophylla</em></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td><em>Exocarpos spartus</em></td>
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<td></td>
<td><em>Hardenbergia comptoniana</em></td>
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<td></td>
<td><em>Hibbertia cuneiformis</em></td>
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<tr>
<td></td>
<td><em>Kennedia prostrata</em></td>
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<tr>
<td></td>
<td><em>Lepidosperma longitudinale</em></td>
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<tr>
<td>*</td>
<td><em>Lysimachia arvensis</em></td>
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<tr>
<td></td>
<td><em>Muehlenbeckia adpressa</em></td>
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</tr>
<tr>
<td></td>
<td><em>Pteridium esculentum</em></td>
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</tr>
<tr>
<td></td>
<td><em>Rhagodia baccata subsp. baccata</em></td>
<td>5</td>
</tr>
<tr>
<td>*</td>
<td><em>Solanum laciniatum</em></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><em>Spyridium globulosum</em></td>
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<tr>
<td></td>
<td><em>Stenopetalum robustum</em></td>
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<td><em>Zantedeschia aethiopica</em></td>
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**Sample Name:**

**PP5**

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<td>19/11/2018</td>
</tr>
<tr>
<td>Status</td>
<td>Non-permanent</td>
</tr>
<tr>
<td>Author:</td>
<td>SKP, other</td>
</tr>
</tbody>
</table>

**Quadrat and landform details**

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<th>Sample type:</th>
<th>photopoint</th>
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<td>NW corner easting:</td>
<td>314876.6803</td>
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<td>Altitude (m):</td>
<td>0.354714</td>
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<tr>
<td>Soil water content:</td>
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</tr>
<tr>
<td>Time since fire:</td>
<td>&gt; 5 yrs</td>
</tr>
<tr>
<td>Soil type/texture / with organic layer:</td>
<td>No rocks</td>
</tr>
<tr>
<td>Rocks (%) and type:</td>
<td>No rocks</td>
</tr>
<tr>
<td>Litter:</td>
<td>10% (branches,)</td>
</tr>
</tbody>
</table>

| Size: | other |
| NW corner northing: | 6239451.24 |
| Geographic datum/zone: | GDA94/Zone 50 |
| Landform: | waterway |
| Disturbance: | Low - low density weeds, adjacent clearing |
| Bare ground (%): | 2 |
| Soil colour: | / |
| Vegetation condition: | very good |

**Vegetation description**

Low woodland *Melaleuca rhaphiophylla* and *Agonis flexuosa* over tall sedgeland *Baumea juncea* and *Lepidosperma gladiatum*

Vegetation change to Melaleuca and Baumea from the upslope veg
Sample Name: PP5

Project no.: EP18-128
Date: 19/11/2018
Author: SKP

Status Non-permanent

Species Data
* denotes non-native species

<table>
<thead>
<tr>
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<tr>
<td></td>
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<td>Dianella revoluta</td>
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<td>Lepidosperma gladiatum</td>
</tr>
<tr>
<td></td>
<td>Melaleuca rhaphiophylla</td>
</tr>
<tr>
<td></td>
<td>Muehlenbeckia adpressa</td>
</tr>
<tr>
<td></td>
<td>Rhagodia baccata subsp. baccata</td>
</tr>
</tbody>
</table>
Sample Name: PP6

Project no.: EP18-128
Date: 19/11/2018
Author: SKP, other

Status: Non-permanent

Quadrat and landform details

Sample type: photopoint
Size: other
NW corner easting: 314630.8288
Altitude (m): 0.375583
Soil water content: slightly damp
Time since fire: > 5 yrs
Soil type/texture sand/
Rocks (%) and type: No rocks
Litter: 0% (,)

NW corner northing: 6239147.321
Geographic datum/zone: GDA94/Zone 50
Landform: lower slope
Disturbance: high - aggressive weeds
Bare ground (%): 0
Soil colour: brown/
Vegetation condition: degraded

<table>
<thead>
<tr>
<th>Strata</th>
<th>Cover (%)</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper:</td>
<td>10 to 30</td>
<td>&lt;10</td>
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<tr>
<td>Mid:</td>
<td>10 to 30</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Ground layer 1:</td>
<td>30 to 70</td>
<td>&gt;0.5</td>
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<tr>
<td>Ground layer 2:</td>
<td>0%</td>
<td>0</td>
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Vegetation description

Low woodland Agonis flexuosa and Melaleuca rhaphiophylla over tall open shrubland Spyridium globulosum, Melaleuca huegelli and Rhagodia baccata subsp. baccata with vineland Muehlenbeckia adpressa, Clematis pubescens and Hardenbergia comptoniana over tall closed grassland *Ehrharta erecta and Poaceae spp.*

area to south of the site, with dense grass weeds. Burnt 2011.
Sample Name: PP6

Project no.: EP18-128
Date: 19/11/2018
Author: SKP

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<thead>
<tr>
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<th>Cover (%)</th>
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</tr>
<tr>
<td></td>
<td>Billardiera heterophylla</td>
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</tr>
<tr>
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<td>Clematis pubescens</td>
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<td>Ehrharta erecta</td>
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<td>Fumaria muralis subsp. muralis</td>
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<td>Hardenbergia comptoniana</td>
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<td></td>
<td>Melaleuca huegelii</td>
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</tr>
<tr>
<td></td>
<td>Melaleuca rhaphiophylla</td>
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<tr>
<td></td>
<td>Muehlenbeckia adpressa</td>
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</tr>
<tr>
<td></td>
<td>Rhagodia baccata subsp. baccata</td>
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<tr>
<td>*</td>
<td>Rumex crispus</td>
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</tr>
<tr>
<td></td>
<td>Scaevola nitida</td>
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<tr>
<td></td>
<td>Spyridium globulosum</td>
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<tr>
<td>*</td>
<td>Zantedeschia aethiopica</td>
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Sample Name: R7

Project no.: EP18-128
Date: 19/11/2018
Author: SKP, other
Status: Non-permanent

Quadrat and landform details

Sample type: releve
Size: other
NW corner easting: 314669.8685
NW corner northing: 6239192.907
Altitude (m): 0.138893
Geographic datum/zone: GDA94/Zone 50
Soil water content: damp
Landform: waterway
Time since fire: > 5 yrs
Disturbance: moderate - weeds, adj clearing
Soil type/texture sand/ with organic layer
Bare ground (%): 0
Rocks (%) and type: No rocks
Soil colour: brown/
Litter: 5% (branches,)
Vegetation condition: very good

Strata

Cover (%)
Upper: 30 to 70
Mid: 0%
Ground layer 1: 0%
Ground layer 2: 0%

Height (m)
<10
0

Vegetation description

Low open forest *Melaleuca rhaphiophylla* over sedge/rushland *Baumea juncea* and *Juncus* spp. over forbland *Apium prostratum* var. *prostratum*, *Pelargonium littorale*, *Rumex crispus* and *Cynogroton lineare* and open grassland of grass weeds.
<table>
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<tr>
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<tbody>
<tr>
<td></td>
<td>Apium prostratum var. prostratum</td>
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<tr>
<td>*</td>
<td>Atriplex prostrata</td>
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<tr>
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<td>Baumea juncea</td>
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<td></td>
<td>Conostylis aculeata subsp. gracilis</td>
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<td></td>
<td>Cycnogeton lineare</td>
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<tr>
<td>*</td>
<td>Cynodon dactylon</td>
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<td>Dodonaea aptera</td>
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<td>Juncus kraussii subsp. australiensis</td>
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<td>Lobelia anceps</td>
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<td>Melaleuca rhaphiophylla</td>
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<tr>
<td></td>
<td>Pelargonium littorale</td>
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<tr>
<td>*</td>
<td>Rumex crispus</td>
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<tr>
<td></td>
<td>Samolus repens</td>
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</table>
Sample Name: R8

Project no.: EP18-128
Date: 19/11/2018
Author: SKP, other
Status: Non-permanent

Quadrat and landform details
Sample type: releve
Size: other
NW corner easting: 314714.6094
NW corner northing: 6239183.354
Altitude (m): 10.093226
Geographic datum/zone: GDA94/Zone 50
Soil water content: dry
Landform: mid-slope
Time since fire: > 5 yrs
Disturbance: moderate - weeds, fire
Soil type/texture: sand/
Rocks (%): 20%, limestone
Soil colour: brown/
Litter: 5% (twigs, branches)
Vegetation condition: very good

Strata | Cover (%) | Height (m) |
--- | --- | --- |
Upper | 30 to 70 | <10 |
Mid | 30 to 70 | 1 to 2 |
Ground layer 1 | 10 to 30 | <0.5 |
Ground layer 2 | 0% | 0 |

Vegetation description
Regenerating well post fire (2011). Weed cover limited
Low open woodland of Agonis flexuosa over closed tall shrubland Melaleuca huegelii, Beyeria viscosa, Spyridium globulosum, Diplolaena dampieri and Templetonia retusa over low open forbland Dianella revoluta, Acanthocarpus preissii, Thysanotus arenarius and Tricoryne elatior, sparse sedgeland of Lepidosperma squamatum and L. gladiatum and sparse grassland of grass weeds.
### Sample Name: R8

**Project no.:** EP18-128  
**Date:** 19/11/2018  
**Status** Non-permanent  
**Author:** SKP

---

#### Species Data

* denotes non-native species

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<td>Acanthocarpus preissii</td>
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<td>Agonis flexuosa</td>
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<tr>
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<td>Asparagus asparagoides</td>
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<td>Austrostipa flavescens</td>
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<td>Beyeria viscosa</td>
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<td>Briza maxima</td>
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<td>Chorizema diversifolium</td>
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<td>Conostephium pendulum</td>
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<td>Dianella revoluta</td>
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<td>Diplolaena dampieri</td>
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<td>Exocarpos sparteus</td>
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<td>Hardenbergia comptoniana</td>
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<td>Hibbertia cuneiformis</td>
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<tr>
<td>*</td>
<td>Lagurus ovatus</td>
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<td>Lepidosperma gladiatum</td>
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<td>Lepidosperma squamatum</td>
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<td>Melaleuca huegelii</td>
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<td>Orobanche minor</td>
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<td>Patersonia occidentalis</td>
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<td>Pelargonium capitatum</td>
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<td>Petrorrhagia dubia</td>
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<td>Spyridium globulosum</td>
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<td>Templetonia retusa</td>
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<tr>
<td></td>
<td>Thysanotus arenarius</td>
</tr>
<tr>
<td></td>
<td>Tricoryne elatior</td>
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</table>
Sample Name: R9

Project no.: EP18-128
Date: 19/11/2018
Author: SKP, other
Status: Non-permanent

Quadrat and landform details
Sample type: releve
Size: other
NW corner easting: 315136.465
NW corner northing: 6239189.047
Altitude (m): 53.091671
Geographic datum/zone: GDA94/Zone 50
Soil water content: dry
Time since fire: > 5 yrs
Disturbance: moderate - weeds, fire
Soil type/texture: sand/
Rocks (%): No rocks
Bare ground (%): 15
Litter: 5% (branches, leaves,)
Vegetation condition: good

Soil colour: brown/
Landform: mid-slope

Strata
Upper: 0%
Mid: 0%
Ground layer 1: 0%
Ground layer 2: 0%

Cover (%)

Height (m)
0
0
0

Vegetation description
Low open woodland of Agonis flexuosa over tall shrubland of Hibbertia cuneiformis, Spyridium globulosum, Jacksonia horrida, Phyllanthus calycinus and Templetonia retusa with vineland Hardenbergia comptoniana and Muehlenbeckia adpressa over grassland *Avena fatua, *Briza maxima and Austrostipa flavescens and forbland Conostylis aculeata subsp. gracilis, *Euphorbia terracina, Tricoryne elatior and *Zantedeschia aethiopica.
Sample Name: R9

Project no.: EP18-128  
Date: 19/11/2018  
Author: SKP

Species Data
* denotes non-native species

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<td>Austrostipa flavescens</td>
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<td></td>
<td>* Avena fatua</td>
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<tr>
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<td>Beyeria viscosa</td>
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<td>* Briza maxima</td>
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<td>Conostylis aculeata subsp. gracilis</td>
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<td>* Euphorbia terracina</td>
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<td>* Gladiolus caryophyllaceus</td>
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<td>Hakea olefolia</td>
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<td>Hardenbergia comptoniana</td>
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<td>Jacksonia horrida</td>
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<td>Lepidosperma gladiatum</td>
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<td>Muehlenbeckia adpressa</td>
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<td>* Oxalis sp.</td>
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<td>* Pelargonium capitatum</td>
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<td>Phyllanthus calycinus</td>
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<td>Poranthera microphylla</td>
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<td>Templetonia retusa</td>
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<td>Thysanotus arenarius</td>
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<td>Tricoryne elatior</td>
</tr>
<tr>
<td></td>
<td>* Zantedeschia aethiopica</td>
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Sample Name:  

**PP10**

**Project no.:** EP18-128  
**Date:** 19/11/2018  
**Author:** SKP, other

**Status** Non-permanent

---

**Quadrat and landform details**

- **Sample type:** photopoint
- **Size:** other
- **NW corner easting:** 315059.0224  
  **Altitude (m):** 46.429489
- **Soil water content:** dry  
  **Time since fire:** > 5 yrs
- **Soil type/texture:** sand/  
  **Rocks (%):** No rocks
- **Litter:** 5% (branches, leaves,)

- **NW corner northing:** 6239164.458  
  **Geographic datum/zone:** GDA94/Zone 50
- **Landform:** mid-slope  
  **Disturbance:** moderate - weeds, fire
- **Bare ground (%):** 20  
  **Soil colour:** brown/
- **Vegetation condition:** very good

---

**Strata**

<table>
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<tr>
<th>Strata</th>
<th>Cover (%)</th>
<th>Height (m)</th>
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<tr>
<td>Mid</td>
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</tr>
<tr>
<td>Ground layer 1</td>
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</tr>
<tr>
<td>Ground layer 2</td>
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**Vegetation description**

Low open woodland of *Agonis flexuosa* over tall shrubland of *Acacia littorea, Melaleuca huegelii, Beyeria viscosa, Macrozamia riedlei, Olearia axillaris, Phyllanthus calycinus* and *Templetonia retusa* over grassland *Avena barbata, Lagurus ovatus, Briza maxima* and *Austrostipa flavescens* and open forbland *Conostylis aculeata subsp. gracilis, Patersonia occidentalis* and *Thysanotus arenarius*.
**Sample Name:** PP10

**Project no.:** EP18-128  
**Date:** 19/11/2018  
**Author:** SKP  
**Status** Non-permanent

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<td>Agonis flexuosa</td>
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<tr>
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<td>Austrostipa flavescens</td>
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<td>* Avena barbata</td>
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<td>P4 Banksia sessilis var. cordata</td>
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<td>Beyeria viscosa</td>
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<td>* Briza maxima</td>
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<td>Cassytha pomiformis</td>
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<td>* Hyparrhenia hirta</td>
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<td>* Lagurus ovatus</td>
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<td>Lepidosperma gladiatum</td>
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Sample Name: R11

Project no.: EP18-128
Date: 19/11/2018
Author: SKP, other
Status: Non-permanent

Quadrat and landform details
Sample type: releve
NW corner easting: 314918.412
Altitude (m): 31.452335
Soil water content: dry
Time since fire: > 5 yrs
Soil type/texture: Sand/
Rocks (%) and type: No rocks
Litter: 10% (twigs, leaves)
Size: other
NW corner northing: 6239146.4
Geographic datum/zone: GDA94/Zone 50
Landform: mid-slope
Disturbance: moderate - weeds, fire
Bare ground (%): 5
Soil colour: brown/
Vegetation condition: good

Strata
Upper: 0%
Mid: 0%
Ground layer 1: 0%
Ground layer 2: 0%

Height (m)
0
0
0
0

Vegetation description

Higher weed load (c. 30%) throughout area. Burnt 2009/2011
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<tr>
<th>Status</th>
<th>Confirmed name</th>
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<tbody>
<tr>
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<td>Agonis flexuosa</td>
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Fauna Assessment

Lot 101 Wallcliffe Road
Prevelly

May 2019
V2

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Acronyms/Abbreviations:

**ALA**: Atlas of Living Australia [www.ala.org.au]

**BA**: Birdlife Australia (Formerly RAOU, Birds Australia).


**°C**: Degrees Celsius.

**CALM**: Department of Conservation and Land Management (now DPaW), WA Government.

**CAMBA**: China Australia Migratory Bird Agreement 1998.

**CBD**: Central Business District.

**DBH**: Diametre at Breast Height – tree measurement.

**DEC**: Department of Environment and Conservation (now DPaW), WA Government.

**DEH**: Department of Environment and Heritage (now DotEE), Australian Government.

**DEP**: Department of Environment Protection (now DER), WA Government.

**DER**: Department of Environment Regulation (formerly DEC, DoE), WA Government.

**DEWHA**: Department of the Environment, Water, Heritage and the Arts (now DotEE), Australian Government.

**DMP**: Department of Mines and Petroleum (formerly DoIR), WA Government.

**DoE**: Department of Environment (now DER/DPaW), WA Government.

**DoP**: Department of Planning, WA Government.

**DotE**: Department of the Environment (now DotEE), Australian Government.

**DotEE**: Department of the Environment and Energy (formerly SEWPaC, DWEHA, DEH & DotE), Australian Government.

**DoIR**: Department of Industry and Resources (now DMP), WA Government.

**DPaW**: Department of Parks and Wildlife (formerly DEC, CALM, DoE), WA Government.


**EPA**: Environmental Protection Authority, WA Government.

ha: Hectare (10,000 square metres).

IBRA: Interim Biogeographic Regionalisation for Australia.

IUCN: International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.

JAMBA: Japan Australia Migratory Bird Agreement 1981.

km: Kilometre.

m: Metre.

mm: Millimetre.

P: Priority - DPaW fauna conservation ranking.

POS: Public Open Space.

RAOU: Royal Australia Ornithologist Union.


SEWPaC: Department of Sustainability, Environment, Water, Population and Communities (now DotEE), Australian Government.

SRE: Short Range Endemic.


WA: Western Australia.

WAM: Western Australian Museum, WA Government.

WAPC: Western Australian Planning Commission, WA Government.


WRP: Western Ringtail Possum
SUMMARY

This report details the results of a fauna assessment of Lot 101, Wallcliffe Road, Prevelly (referred to as “the site” or “Lot 101”). Lot 101 is approximately 5.31 ha in size. In order to provide contextual information for the wider area, areas in the surrounding reserves have also been included in the fauna assessment. The site and these surrounding areas are collectively referred to as the “survey area” and occupy about 11.26 ha (Figures 1 & 2).

Lot 101 is zoned ‘tourism’ under the Shires of Augusta Margaret River Local Planning Scheme (LPS) No 1 and it is understood that the landowners are proposing to redevelop the site for tourism purposes. The site contains Wallcliffe House, which was once one of the original farm and homesteads built by the Bussell family in the 1850s and contains large areas of cultivated gardens and turf. This redevelopment will require the removal/ modification of some of the existing vegetation within the site, an action that has the potential to impact on current fauna habitat values.

The fauna assessment reported on here represents one of several technical reports that will be used to provide an understanding of the suite of environmental values present within the survey area which will then be used during the ongoing planning and approval process.

The scope of works was to conduct a level 1 fauna survey as defined by the EPA (EPA 2016). Because some listed threatened species (i.e. three species of black cockatoo (Calyptorhynchus sp.) and the western ringtail possum (WRP) (Pseudocheirus occidentalis)) are known to occur in the general area, the scope of the survey work was expanded to include targeted assessment of the site’s significance to these particular species. To fulfil the required scope of works the assessment has therefore included a literature review (“desktop study”) and a day and night survey carried out in April 2019.

With respect to native vertebrate fauna, 21 mammals (including nine bat species), 124 bird, 34 reptile, 10 frog and six fish species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the survey area at times. Thirteen species of introduced animals could also frequent the area.

Descriptions and example images of the main fauna habitats/dominant vegetation present within the survey area are provided in Table 1, with the location and extent of each unit being depicted in Figure 3.

Lot 101 is predominantly cleared of native vegetation with some parkland cleared native trees (mainly peppermint - Agonis flexuosa), managed grasses and gardens with planted non-endemic and exotic plant species remaining. Small sections of disturbed native vegetation subject to some plantings, ground disturbance and weed management occur mainly in central section of the site. The most intact vegetation is present along the west of the site adjacent to the Margaret River (a major, perennial watercourse) and to the south of the site bordering the Wallcliffe Nature Reserve. A small section of a high limestone cliff enters the site near its south west corner.
Overall the fauna habitat quality of Lot 101 can be regarded as being very low given most areas are highly degraded/modified. The fauna assemblage likely to persist in these areas is likely to be highly depauperate and would only be represented by a small subset of the predicted fauna species (Appendix B). The balance of the survey area, which generally contains larger expanses of a variety of good quality habitats can be expected to harbour a higher percentage of the predicted species. While the site itself has relatively low overall fauna habitat values it still retains some value for a range of species including some of conservation significance and this fact will need to be taken into consideration during ongoing planning and subsequent development.

The locations of various possum observations made during the day and night surveys are shown in Figure 4. Nine WRP dreys were observed during the day survey. WRP scats were also observed at three locations during the same period. Seven WRPs and five common brushtail possums were observed during the nocturnal survey. Most WRPs were seen in remnant native vegetation with one individual recorded with the grove of pine trees near the centre of Lot 101.

The results of the WRP assessment suggest that almost all the vegetation present with the survey area can be considered habitat of some type and therefore maybe used either continuously or at various times for refuge, foraging and/or dispersal.

The black cockatoo habitat assessment identified only three trees within the survey area with a DBH of ≥50cm. None of the trees appeared to contain hollows of a size that would be suitable for black cockatoos to use for nesting purposes. Only one of the identified habitat trees is actually located within Lot 101.

Evidence of black cockatoos foraging was observed during the field survey in the form of chewed marri fruits and pine cones in two areas (Figure 5). This evidence was attributed to one or more of the three black cockatoo species depending on the plant species involved and the characteristics of the foraging activity (i.e. nature of remaining debris).

The overall extent of quality foraging habitat for black cockatoos within Lot 101 is very limited. Marri and red flowering gum, the most favoured native species present, are only represented by a few scattered specimens. A group of pine trees near the centre of the site appear to be a focal point of foraging activity with numerous chewed cones being observed under trees during the survey period. The total extent of quality foraging habitat within Lot 101 is difficult to estimate given that the favoured species (marri, red flowering gum and pine) are represented by only a small number of scattered trees or small groves of trees but would not amount to more than about 0.1 or 0.2 ha.

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey.

Besides the three black cockatoo species and the western ringtail possum, evidence of one additional fauna species of conservation significance was observed during the survey period, this being the eastern osprey (*Pandion cristatus*) (state and federally listed migratory species).
One individual of this species was observed roosting in a tree near Margaret River and on top of one of the buildings at a later time. What appears to be an osprey nest is also present in a tree near the north east boundary of Lot 101 (outside of the current development footprint).

Opportunistic fauna observations are listed in Appendix B. Including those species previously mentioned, a total of 11 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the survey area during the course of survey.

The assessment indicates that the best quality and widest range of fauna habitats within the survey area are located outside of Lot 101. As a consequence, these areas (including the reserve areas of which they from a part of) are most likely to be harbouring the greatest variety of fauna species. Any development undertaken in Lot 101 is therefore considered as unlikely to impact significantly on the current status of any fauna species presently utilising the area.

In summary five vertebrate fauna species of conservation significance were positively identified as utilising the survey area for some purpose, these being:

- Forest Red-tailed Black Cockatoo – Vulnerable;
- Baudin’s Black Cockatoo – Endangered;
- Carnaby’s Black Cockatoo – Endangered;
- Eastern Osprey – Migratory; and
- Western Ringtail Possum – Critically Endangered.

A number of additional vertebrate species of conservation significance may also utilise the survey area, though, as no evidence of these species’ presence was identified during the field survey, the status of some in the area remains uncertain. These species are:

- Pouched Lamprey – Priority 3;
- Black Bittern – Priority 2;
- Australian Little - Priority 2;
- Masked Owl – Priority 3;
- Peregrine Falcon – Schedule 7;
- South-western Brush-tailed Phascogale - Schedule 6;
- Quenda – Priority 4;
- Western False Pipistrelle – Priority 4;
As indicated, most of these species would not actually utilise Lot 101 due to a lack of suitable habitats, though they may frequent nearby areas.

One invertebrate species of conservation significance has also been assessed as possibly occurring based on available information. The Cape Leeuwin freshwater snail (Vulnerable) has been collected in national park areas north and south of the survey area (DBCA 2019b) so it must be regarded as a potential species though it is considered unlikely to occur within Lot 101 itself given the disturbed nature of the site.

Overall Lot 101 has low biodiversity values and therefore impacts on fauna in general will be non-existent or negligible. Constraints on development within the subject site will largely be centred on the presence of habitat used or potentially used by threatened fauna species in particular the western ringtail possum.

The presence of this species should be taken into account during ongoing planning and subsequent development. To this end it is recommended that a fauna management plan be formulated for implementation prior to and during development. In particular the plan should define procedures for ensuring the retention and protection of existing WRP habitat wherever possible including protocols for ensuring western ringtail possums (and other fauna) are not injured or killed during site works.

It is also recommended that the tree containing the potential eastern osprey nest be specifically marked and fenced off during site works to minimise activity occurring nearby which may disturb nesting birds.
1. **INTRODUCTION**

This report details the results of a fauna assessment of Lot 101, Wallcliffe Road, Prevelly (referred to as “the site” or “Lot 101”). The site is located approximately 8 km south-east of Margaret River township within the Shire of Augusta-Margaret River (the Shire) (Figure 1).

Lot 101 is approximately 5.31 ha in size and is bounded by Wallcliffe Road to the east, rural residential lots to the north-east, the Margaret River to the north-west and the Wallcliffe Nature Reserve to the south (Figure 2).

In order to provide contextual information for the wider area, some areas in surrounding reserves have also been included in the fauna assessment. The site and these surrounding areas are collectively referred to as the “survey area” and occupy about 11.26 ha (Figure 2).

2. **DEVELOPMENT PROPOSAL**

Lot 101 is zoned ‘tourism’ under the Shires Local Planning Scheme (LPS) No 1 and it is understood that the landowners are proposing to redevelop the site for tourism purposes. The site contains Wallcliffe House, which was once one of the original farm and homesteads built by the Bussell family in the 1850s and contains large areas of cultivated gardens and turf. The redevelopment will require the removal/modification of some of the existing vegetation within the site, an action that has the potential to impact on current fauna habitat values.

The fauna assessment reported on here represents one of several technical reports that will be used to provide an understanding of the suite of environmental values present within the survey area which will then be used during the ongoing planning and approval process.

3. **SCOPE OF WORKS**

The scope of the fauna survey was to carry out a “desktop study” and a site reconnaissance survey consistent with a level 1 fauna survey as defined in EPA Guidance (2016), in addition to targeted surveys for western ringtail possums (WRP) and black cockatoo habitat. To fulfil this requirement the following has been undertaken:

- A literature review of ecological information pertaining to the survey area and surrounds, including database searches for conservation significant fauna species and locations.

- A ‘level 1’ (basic) fauna assessment, with additional targeted (detailed) survey for specific conservation significant fauna values, namely black cockatoos
(Calyptorhynchus sp.) and the western ringtail possum (Pseudocheirus occidentalis). As part of the survey the following sub tasks were undertaken.

- A single day survey:
  - Opportunistically collect an inventory of fauna taxa present through visual observation and secondary evidence such as tracks, scats, skeletal remains, foraging evidence or calls if observed/heard.
  - Record the location and attributes of all potential black cockatoo habitat trees (large eucalypts with trunk diameter at breast height ≥50 cm, presence type and size of hollows, evidence of use, inspection to confirm use).
  - Record the location of any dreys, obvious tree hollows, scats, habitat characteristics and individual western ringtail possums. This will involve a series of close spaced traverses across vegetated sections of the survey area (concurrent with the black cockatoo habitat tree assessment).
  - Describe fauna habitat values with particular reference to black cockatoo habitat and habitat for other ‘threatened’ or ‘priority’ fauna species with potential to occur within the survey area.

- For western ringtail possums, a single nocturnal (night) survey was undertaken in order to understand whether the possums were present within the survey area. This involved a nocturnal count to provide an estimate of the distribution and abundance of western ringtail possums.

  - Documentation of fauna and fauna habitat information, field survey methods and results, into a report.

Note: For the purposes of this report the term black cockatoo is in reference to Baudin’s black cockatoo Calyptorhynchus baudinii, Carnaby’s black cockatoo Calyptorhynchus latirostris and the forest red-tailed black cockatoo Calyptorhynchus banksii naso.

4. METHODS

4.1 POTENTIAL FAUNA INVENTORY - LITERATURE REVIEW

4.1.1 Database Searches

Searches of the following databases were undertaken to aid in the compilation of a list of conservation significant fauna potentially occurring within the survey area:

- DBCA’s NatureMap Database Search (combined data from DBCA, ALA, WAM, BA and consultant’s reports) (DBCA 2019b); and
• Protected Matters Search Tool (DotEE 2019).

It should be noted that lists produced during the abovementioned database searches contain observations/inferred distributions from a broader area than the survey area and therefore may include species that would only ever occur as vagrants due to a lack of suitable habitat or the presence of only marginal habitat within the survey area itself. The databases also often include or are based on very old records and in some cases certain species have become locally or regionally extinct.

Information from these sources should therefore be taken as indicative only and local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

4.1.2 Previous Fauna Surveys in the Area

Fauna surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publicly available and could not be referenced. The most significant of those available have been used as the primary reference material for compiling the potential fauna assemblage for the general area.

Those reports referred to included, but were not limited to:


• Harewood, G. (2013). Western Ringtail Possum Survey of Lots 72 and 73 Kevill Road, Margaret River. Unpublished report for TME Town Planning Management Engineering Pty Ltd.


• Morgan, D. and Beatty, S. (2003). Fish fauna of Margaret River Western Australia. Report to the Margaret River Regional Environment Centre.


As with the database searches some reports refer to species that would not occur in the survey area due to a lack of suitable habitat (extent and/or quality) and this fact was taken into consideration when compiling the potential fauna species list. It should also be noted that the NatureMap database is likely to include some records from previous fauna surveys in the area, including some of those listed above.

4.1.3 Existing Publications

The following represent the main publications used to identify and refine the potential fauna species list for the survey area:


4.1.4 Fauna of Conservation Significance

The conservation significance of fauna species has been assessed using data from the following sources:

• *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).* Administered by the Australian Government DotEE;

• *Wildlife Conservation Act 1950 (WC Act).* Administered by the Western Australian DBCA (Govt. of WA 2018). Note: The Wildlife Conservation (Specially Protected Fauna) Notice 2018 has been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016 (BC Act)*;

• Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List - the acronym derived from its former name of the International Union for Conservation of Nature and Natural Resources). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and the

• DBCA Priority Fauna list. A non-statutory list maintained by the DBCA for management purposes (DBCA 2019a).

The *EPBC Act* also requires the compilation of a list of migratory species that are recognised under international treaties including the:

• Japan Australia Migratory Bird Agreement 1981 (JAMBA);

• China Australia Migratory Bird Agreement 1998 (CAMBA);

• Republic of Korea-Australia Migratory Bird Agreement 2007 (ROKAMBA); and


(Note – Some, but not all species listed under JAMBA are also protected under Schedule 5 of the BC/WC Act.)
Most, but not all migratory bird species listed in the annexes to these bilateral agreements are also protected in Australia as matters of national environmental significance (MNES) under the **EPBC Act**.

The conservation status of all vertebrate fauna species listed as occurring or possibly occurring in the vicinity of the survey area has been assessed using the most recent lists published in accordance with the above-mentioned instruments and is indicated as such in the fauna listings of this report. A full listing of conservation codes is provided in Appendix A.

A number of other species not listed in official lists can also be considered of local or regional conservation significance. These include species that have a restricted range, those that occur in breeding colonies and those at the limit of their range.

### 4.1.5 Invertebrate Fauna of Conservation Significance

For this assessment the review of potential conservation significant invertebrates has been limited to those listed by the DBCA and **EPBC Act** database searches (which rely on distribution records and known habitat preferences).

No assessment of the potential for short range endemic species (SREs) to be present has been made at this stage as it can be difficult to identify significant invertebrate species due to uncertainties in determining the range-restrictions of many species due to lack of surveys, lack of taxonomic resolutions within target taxa and problems in identifying certain life stages. Where invertebrates are collected during surveys, a high percentage are likely to be unknown, or for known species there can be limited knowledge or information on their distribution (Harvey 2002).

### 4.1.6 Likelihood of Occurrence – Fauna of Conservation Significance

Fauna of conservation significance identified during the literature review as previously being recorded in the general area were assessed and ranked for their likelihood of occurrence within the survey area itself. The rankings and criteria used were:

- Would Not Occur: There is no suitable habitat for the species in the survey area and/or there is no documented record of the species in the general area since records have been kept and/or the species is generally accepted as being locally/regionally extinct (supported by a lack of recent records).
  - Locally Extinct: Populations no longer occur within a small part of the species natural range, in this case within 10 or 20 km of the survey area. Populations do however persist outside of this area.
  - Regionally Extinct: Populations no longer occur in a large part of the species natural range, in this case within the southern forest region. Populations do however persist outside of this area.
• Unlikely to Occur: The survey area is outside of the currently documented distribution for the species in question, or no suitable habitat (type, quality and extent) was identified as being present during the field assessment. Individuals of some species may occur occasionally as vagrants/transients especially if suitable habitat is located nearby but the survey area itself would not support a population or part population of the species.

• Possibly Occurs: The survey area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field assessment, supported in some cases by recent records being documented in literature from within or near the survey area. In some cases, while a species may be classified as possibly being present at times, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

• Known to Occur: The species in question was positively identified as being present (for sedentary species) or as using the survey area as habitat for some other purpose (for non-sedentary/mobile species) during the field survey. This information may have been obtained by direct observation of individuals or by way of secondary evidence (e.g. foraging debris, tracks and scats). In some cases, while a species may be classified as known to occur, habitat may be marginal (e.g. poor quality, fragmented, limited in extent) and therefore the frequency of occurrence and/or population levels may be low.

4.1.7 Taxonomy and Nomenclature

Taxonomy and nomenclature for vertebrate fauna species used in this report is generally taken from the DBCA’s WA Fauna Census Database which is assumed to follow Aplin and Smith (2001) for amphibians and reptiles and Johnstone (2001) for birds. Jackson and Groves (2015) has been used for mammals.

Common names are taken from the Western Australia Museum (WAM) recognised primary common name listings when specified, though where common names are not provided, they have been acquired from other publications. Sources include Wilson and Swan (2017), Cogger (2014), Van Dyck & Strahan (2013), Christidis and Boles (2008), Bush et al. (2010), Bush et al. (2007) and Tyler & Doughty (2009). Not all common names are generally accepted.

4.2 SITE SURVEYS

Day and night field work within the survey area was carried out on the 1 April 2019. Survey work was done by Greg Harewood (consultant Zoologist), Kirsten Knox (Environmental Scientist – Emerge Associates) and Heidi Becker (Environmental Scientist – Emerge Associates).


4.2.1 Fauna Habitat Assessment

The vegetation communities mapped by Emerge Associates (Emerge Associates 2019) during the flora and vegetation survey have been used to classify the area into broad habitat types. This information has been supplemented by observations made during the field assessment undertaken during the fauna assessment.

As part of the literature review, available information on the habitat requirements of the species of conservation significance listed as possibly occurring in the area was researched. During the daytime reconnaissance survey, the habitats within the survey area were assessed and specific elements identified, if present, to determine the likelihood of listed species of conservation significance occurring and its likely overall value to them on a local and regional scale.

4.2.2 Western Ringtail Possum Assessment

To determine if western ringtail possums were utilising the survey area the following was carried out:

- One daytime survey of the survey area which involved searching for dreys, obvious tree hollows (and other potential daytime refuge habitat), scats and individual WRP s. The day time survey was carried out using a GPS equipped PDA for guidance and as a data recorder;

- One night time survey to locate and record the distribution and abundance of WRP s. The nocturnal count involved the systematic searching of potential WRP habitats within the survey area on foot using a head torch. The nocturnal count was carried out using a GPS equipped PDA for guidance and as a data recorder.

It should be noted that vegetation with the Wallcliffe Nature Reserve (located south of the site), which forms part of the survey area, is extremely dense and it was not possible to survey this area for WRPs to the same degree as other sections of the survey area.

4.2.3 Black Cockatoo Habitat Assessment

The following methods were employed to comply with the defined scope of works and are based on guidelines published by the federal DotEE (Commonwealth of Australia 2012) which states that surveys for Carnaby’s, Baudin’s and forest red-tailed black cockatoo habitat should:

- be done by a suitably qualified person with experience in vegetation or cockatoo surveys, depending on the type of survey being undertaken;

- maximise the chance of detecting the species’ habitat and/or signs of use;

- determine the context of the site within the broader landscape—for example, the amount and quality of habitat nearby and in the local region (for example, within 12 km);
account for uncertainty and error (false presence and absences); and

- include collation of existing data on known locations of breeding and feeding birds and night roost locations.

Habitat used by black cockatoos have been placed into three categories by the DotEE (Commonwealth of Australia 2012) these being:

- Breeding Habitat;
- Foraging Habitat; and
- Night Roosting Habitat.

So as to comply with the requested scope of works and in line with the published guidelines the following was carried out.

4.2.3.1 Black Cockatoo Breeding Habitat

The black cockatoo breeding habitat assessment has involved the identification of all suitable breeding trees species within the survey area that have a Diameter at Breast Height (DBH) of equal to or over 50cm. The DBH of each tree was estimated using a pre-made 50 cm “caliper”.

Target tree species included marri and jarrah and any other Corymbia/Eucalyptus species of a suitable size that were present. Peppermints, banksia, sheoak and melaleuca tree species (for example) were not assessed as they typically do not develop hollows that are used by black cockatoos.

The location of each tree identified as being over the threshold DBH was recorded with a GPS and details on tree species, number and size of hollows (if any) noted.

Potential hollows were placed into one of four categories, based on the size of the apparent hollow entrance, these being:

- Small = ~<5cm diameter (i.e. entrance too small for a black cockatoo);
- Medium = ~5cm-10cm diameter (i.e. entrance too small for a black cockatoo);
- Large = ~>10cm diameter (entrance large enough for a black cockatoo but possible hollow appears to be unsuitable for nesting i.e. wrong orientation, too small, too low or too shallow); or
- Large (cockatoo) = ~>10cm diameter (entrance appears big enough to provide access to a possible hollow that may be suitable for a black cockatoo to use for nesting).

Based on this assessment trees present within the survey area have then been placed into one of four categories:
• Tree < 50cm DBH or an unsuitable species (not assessed/recorded);
• Tree > 50cm DBH, no hollows seen;
• Tree > 50cm DBH, one or more hollows seen, none of which were considered suitable for black cockatoos to use for nesting; or
• Tree > 50cm DBH, one or more hollows seen, with at least one considered suitable or possibly for black cockatoos to use for nesting.

For the purposes of this study a tree containing a potential cockatoo nest hollow was defined as:

*Generally, any tree which is alive or dead that contains one or more hollows or possible hollows (cavities within the trunk or branches) which appear suitable for occupation by black cockatoos for the purpose of nesting/breeding. Hollows or apparent hollows that had an entrance greater than about 10cm in diameter and would allow the entry of a black cockatoo into a suitably orientated and sized branch/trunk, were recorded as a “potential nest hollow”.*

Identified hollows were examined using binoculars for evidence of actual use by black cockatoos (e.g. chewing around hollow entrance, scarring and scratch marks on trunks and branches).

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo breeding habitat areas in the vicinity of the survey area.

### 4.2.3.2 Black Cockatoo Foraging Habitat

The location and nature of black cockatoo foraging evidence (e.g. chewed fruits around the base of trees) observed during the field survey was recorded. The nature and extent of potential foraging habitat present was also documented irrespective of the presence of any actual foraging evidence.

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo foraging habitat areas in the vicinity of the survey area.

### 4.2.3.3 Black Cockatoo Roosting Habitat

Direct and indirect evidence of black cockatoos roosting within trees within the survey area was noted if observed (e.g. branch clippings, droppings or moulted feathers).

A review of available literature was carried out to determine the location/extent of any known/likely black cockatoo roosting habitat areas in the vicinity of the survey area.
4.2.4 Other Species of Conservation Significance

Evidence of the presence or likely presence of other species of conservation significance (including suitable habitat) was searched for and recorded concurrent with other field work. The aim was to obtain sufficient information to make a definitive comment on the likely significance of the survey area to other species of conservation significance which may be present.

4.2.5 Opportunistic Fauna Observations

Opportunistic observations of all fauna species were made during the field survey. Secondary evidence of a species presence such as tracks, scats, skeletal remains, foraging evidence or calls were also noted if observed/heard.

5. SURVEY CONSTRAINTS

No seasonal sampling has been carried out as part of this fauna assessment. The conclusions presented are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the survey area at the time of the field assessments. It should also be recognised that site conditions can change with time.

Some fauna species are reported as potentially occurring within the survey area based on there being suitable habitat (quality and extent) within the survey area or immediately adjacent. With respect to opportunistic observations, the possibility exists that certain species may not have been detected during field investigations due to:

- seasonal inactivity during the field survey;
- species present within micro habitats not surveyed;
- cryptic species able to avoid detection; and
- transient wide-ranging species not present during the survey period.

Lack of observational data on some species should therefore not necessarily be taken as an indication that a species is absent from the survey area.

The habitat requirements and ecology of many of the species known to occur in the wider area are often not well understood or documented. It can therefore be difficult to exclude species from the potential list based on a lack of a specific habitat or microhabitat within the survey area. As a consequence of this limitation the potential fauna list produced is most likely an overestimation of those species that actually utilise the survey area for some purpose. Some
species may be present in the general area but may only use the survey area itself on rare occasions or as vagrants/transients.

In recognition of survey limitations, a precautionary approach has been adopted for this assessment. Any fauna species that would possibly occur within the survey area (or immediately adjacent), as identified through ecological databases, publications, discussions with local experts/residents and the habitat knowledge of the Author, has been assumed to potentially occur in the survey area.

During the black cockatoo habitat survey a search for trees containing hollows was completed. It should be noted that identifying hollows suitable for fauna species from ground level has limitations. Generally, the full characteristics of any hollow seen are not fully evident (e.g. internal dimensions). It is also difficult to locate all hollows within all trees as some are not observable from ground level.

The location of observations was recorded using a handheld GPS. The accuracy of the GPS cannot be guaranteed above a level of about 5 to 10 metres, though it should be noted that in some circumstance the accuracy can increase or decrease beyond this range.

6. RESULTS

6.1 POTENTIAL FAUNA INVENTORY – LITERATURE REVIEW

A list of fauna species considered most likely to occur in the survey area has been compiled from information obtained during the literature review and is presented in Appendix B. This listing was refined after information gathered during the site reconnaissance and targeted survey was assessed.

The results of some previous fauna surveys carried out in the general area are summarised in this species listing as are the DBCA NatureMap database search results. Species considered unlikely to occur with the survey area but previously recorded in other surveys and/or which appear in the DBCA database search are not listed. The raw database search results from NatureMap (DBCA 2019b) and the Protected Matters Search Tool (DotEE 2019) are contained within Appendix C.

The list of potential fauna takes into consideration that firstly the species in question is not known to be locally/regionally extinct and secondly that suitable habitat for each species, as identified during the habitat assessment, is present within the survey area. Compiling an accurate fauna list has limitations (see Section 5 above) and therefore the listing is likely to be an overestimation of the fauna species actually present within the survey area at any one time.

With respect to native vertebrate fauna, 21 mammals (includes nine bat species), 124 bird, 34 reptile, 10 frog and six fish species have previously been recorded in the general area, some
of which have the potential to occur in or utilise sections of the survey area at times. Thirteen species of introduced animals could also frequent the area.

Of the 196 native animals that are listed as potentially occurring in the area, six are considered to be endangered/vulnerable or in need of special protection under State and/or Federal law. In addition, one migratory and seven DBCA priority species have also been listed as potentially present. One invertebrate species of conservation significance also has the potential to be present in the survey area.

These species are discussed in further detail in the following sections.

6.2 SITE SURVEYS

6.2.1 Fauna Habitat Assessment

Descriptions and example images of the main fauna habitats/dominant vegetation present within the survey area are provided in Table 1. The location and extent of each of the identified habitat/vegetation units is shown in Figure 3 (data courtesy Emerge Associates 2019).

A review of publicly available historical images from 2004 onwards shows that the majority of the site was cleared of native vegetation prior to 2004 while in use for residential purposes (WALIA 2018). Currently Lot 101 remains predominantly cleared of native vegetation with some parkland cleared native trees (mainly peppermint - *Agonis flexuosa*), managed grasses and gardens with planted non-endemic and exotic plant species remaining. Small sections of disturbed native vegetation subject to some plantings, ground disturbance and weed management occur mainly in central section of the site. The most intact vegetation is present along the west of the site adjacent to the Margaret River (a major, perennial watercourse) and to the south of the site bordering the Wallcliffe Nature Reserve. A small section of a high limestone cliff enters the site near its south west corner.

**Table 1: Main Fauna Habitats within the Survey area**

<table>
<thead>
<tr>
<th>Unit Code (see Figure 3)</th>
<th>Fauna Habitat Description</th>
<th>Example Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>AfW</td>
<td>Woodland of Peppermint over open shrubland over open mixed forbland and open to closed grassland of weeds. Lot 101 = ~0.63 ha Balance of Survey Area = ~0.21 ha</td>
<td><img src="image" alt="Example Image" /></td>
</tr>
<tr>
<td>Unit Code (see Figure 3)</td>
<td>Fauna Habitat Description</td>
<td>Example Image</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>AfSgHcW</td>
<td>Woodland of Peppermint over shrubland with vineland over low shrubland of over forland. Lot 101 = ~0.33 ha Balance of Survey Area = ~2.45 ha</td>
<td><img src="image" alt="Example Image" /></td>
</tr>
<tr>
<td>CcAfW</td>
<td>Woodland of Marri and Peppermint over shrubland with vineland over weeds. Lot 101 = ~0.05 ha Balance of Survey Area = ~0.42 ha</td>
<td><img src="image" alt="Example Image" /></td>
</tr>
<tr>
<td>MhBvTrCS</td>
<td>Low open woodland of Peppermint with closed shrubland with vineland over open forland and sparse sedgeland or grassland. Lot 101 = ~0.16 ha Balance of Survey Area = ~1.96 ha</td>
<td><img src="image" alt="Example Image" /></td>
</tr>
</tbody>
</table>
As indicated in Table 1 the majority of the site (3.98 ha ~75% of total area) contains modified vegetation with bare soil, scattered native trees over pasture grasses or planted vegetation (including buildings and roads). A sparse, generally degraded peppermint woodland makes up about 12% (0.63ha) of the site. The balance of Lot 101 contains small sections of remnant native vegetation that extends into the surrounding survey area and reserves (Figure 3).

Overall the fauna habitat quality of Lot 101 can be regarded as being very low given most areas are highly degraded/modified. The fauna assemblage likely to persist in these areas is likely to be highly depauperate and would only be represented by a small subset of the predicted fauna species (Appendix B). The balance of the survey area, which generally contains larger expanses of a variety of good quality habitats can be expected to harbour a higher percentage of the predicted species. While the site itself has relatively low overall fauna habit values it still retains some value for a range of species including some of conservation significance and this fact will need to be taken into consideration during ongoing planning and subsequent development of the site.

Based on available vegetation mapping it is estimated that there is approximately 14,200 ha of native vegetation within 12 km the survey area (with large proportions of this protected in
national park or nature reserves). Remnant native vegetation (excluding scattered trees) present within Lot 101 (total ~1.33 ha) makes up ~0.009% of this total.

6.2.2 Western Ringtail Possum Assessment

The locations of various possum observations made during the day and night surveys are shown in Figure 4.

Nine WRP dreys were observed during the day survey. WRP scats were also observed at three locations during the same period.

The majority of dreys were found in dense vegetation bordering Margaret River. It should be noted that human structures (e.g. houses/sheds), forks in trees, subtle cavities in tree trunks, fallen hollow logs, rabbit burrows and dense ground cover are also used by WRPs for daytime refuge (to varying degrees) and therefore observations of dreys only provide a guide to WRP habitat use/quality as other opportunities for daytime refuge may exist.

Seven WRPs and five common brushtail possums were observed during the nocturnal survey. It should be noted that these observations represent the minimum number of WRPs present, as it unlikely that all individuals were observed during the single nocturnal survey. Most WRPs were seen in remnant native vegetation with one individual recorded with the grove of pine trees near the centre of Lot 101.

The results of the WRP assessment suggest that almost all the vegetation present with the survey area can be considered habitat of some type and therefore may be used either continuously or at various times for refuge, foraging and/or dispersal. The quality is however highly variable depending on factors such as plant species, structure (e.g. midstorey component) and canopy connectivity. Much of the native vegetation within Lot 101 itself has been removed, with areas remaining being generally fragmented and with limited intact midstorey. Other areas have been planted as gardens with non-endemic and exotic species dominating.

6.2.3 Black Cockatoo Habitat Assessment

6.2.3.1 Black Cockatoo Breeding Habitat

Trees considered potentially suitable for black cockatoos to use as nesting habitat (using DotIEE criteria i.e. DBH >50cm (Commonwealth of Australia 2012) but ultimately subject to a suitable hollow being present or developing and a range of other factors) which were found within the survey area comprised the following species:

- Marri – *Corymbia calophylla*.

A summary of the potential black cockatoo habitat trees observed within the survey area is provided in Table 2 below and their location shown in Figure 5.
Table 2: Summary of Potential Black Cockatoo Habitat Trees (DBH ≥50cm) within the Survey Area

<table>
<thead>
<tr>
<th>Total Number of Habitat Trees Recorded</th>
<th>Number of Trees with No Hollows Observed</th>
<th>Number of Trees with Hollows Considered Unsuitable for Nesting Black Cockatoos</th>
<th>Number of Trees with Hollows Considered Possibly Suitable for Nesting Black Cockatoos</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

The assessment identified only three trees within the survey area with a DBH of ≥50cm. None of the trees appeared to contain hollows of a size that would be suitable for black cockatoos to use for nesting purposes. Only one of the identified habitat trees is actually located within Lot 101 (Figure 5).

Additional details on each habitat tree observed can be found in Appendix D.

While there appears to be a paucity of breeding data for the general area this could simply be a consequence of a lack of survey work or a lack of publicly available data. Based on available vegetation mapping it is however estimated that there is approximately 14,200 ha of native vegetation within 12 km the subject site. A significant portion of this vegetation is located within the Leeuwin-Naturaliste and Bramley National Parks. These areas (in addition to areas of private and crown land) and in particular that further inland, are likely to contain “potential” breeding habitat (i.e. suitable tree species with a DBH ≥50cm).

6.2.3.2 Black Cockatoo Foraging Habitat

The following represents a list of native (including non-endemics) plant species recorded within the survey area by Emerge Associates (2019) which are known (or highly likely) to be used by one or more of the black cockatoo species as a food source (i.e. foraging habitat).

- Marri – *Corymbia calophylla* - flowers, seeds, nectar.
- Red Flowering Gum - *Corymbia ficifolia* - flowers, seeds, nectar.
- Parrot Bush - *Banksia sessilis* - flowers, seeds.
- Peppermint - *Agonis flexuosa* – bark, grubs/invertebrates.
- Orange Wattle - *Acacia saligna* – fresh bark/grubs/invertebrates.
- Sheoak – *Allocasuarina* spp. – seeds.
It should be noted that the degree to which the various plant species are utilised varies considerably. For example, marri is documented as being the primary food source for all three species, though jarrah and banksia make up a high proportion of some black cockatoo species in other areas where they proliferate. Jarrah is absent from the survey area and banksia was only represented by one single parrot bush specimen. Other more common plants such as orange wattle and peppermint (for example) are only foraged upon rarely.

Evidence of black cockatoos foraging was observed during the field survey in the form of chewed marri fruits and pine cones in two areas (Figure 5). This evidence was attributed to one or more of the three black cockatoo species depending on the plant species involved and the characteristics of the foraging activity (i.e. nature of remaining debris). Representative examples of the foraging activity observed are shown in Table 3.

The overall extent of quality foraging habitat within Lot 101 is very limited. Marri and red flowering gum, the most favoured native species present, are only represented by a few scattered specimens. A group of pine trees near the centre of the site appear to be a focal point of foraging activity with numerous chewed cones being observed under trees during the survey period. However, the total extent of this resource is also quite small.

The total extent of quality foraging habitat within Lot 101 is difficult to estimate given that the favoured species (marri, red flowering gum and pine) are represented by only a small number of scattered trees or small groves of trees but would not amount to more than about 0.1 or 0.2 ha.

Table 3: Foraging Evidence Examples

<table>
<thead>
<tr>
<th>Foraging Evidence Description</th>
<th>Example Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marri Fruits – foraging activity attributed to the forest red-tailed black-cockatoo.</td>
<td><img src="image.jpg" alt="Example Image" /></td>
</tr>
<tr>
<td>Foraging Evidence Description</td>
<td>Example Image</td>
</tr>
<tr>
<td>------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Marri Fruits – foraging activity attributed to the Baudin’s black cockatoo.</td>
<td><img src="image1" alt="Marri Fruits Image" /></td>
</tr>
<tr>
<td>Marri Fruits – foraging activity attributed to Carnaby’s black cockatoo.</td>
<td><img src="image2" alt="Marri Fruits Image" /></td>
</tr>
<tr>
<td>Pine Cones – foraging activity attributed to Carnaby’s black-cockatoo or Baudin’s black cockatoo.</td>
<td><img src="image3" alt="Pine Cones Image" /></td>
</tr>
</tbody>
</table>

Based on available vegetation mapping it is estimated that there is approximately 14,200 ha of native vegetation within 12 km the subject site (~30% of the total area, though it should be noted that a high proportion of the 12 km buffer is ocean), much of which is very likely to represent potential black cockatoo foraging habitat of some type. There is also up to 480 ha of pine plantations within 12 km of the subject site, and these areas are likely to represent a significant foraging resource for Carnaby’s and Baudin’s black cockatoos in this area.
6.2.3.3 Black Cockatoo Roosting Habitat

No existing roosting trees (trees used at night by black cockatoos to rest) were positively identified during the survey.

A review of the 2018 Great Cocky Count database shows no documented roost sites within the survey area. There are 14 documented roost sites with 12 km of the survey area. Seven of these roost sites were monitored during the 2018 Great Cocky Count (April 2018) but none were found to be in use at the time (Peck et al. 2018). The results of the 2019 survey are pending.

6.2.4 Other Species of Conservation Significance

Besides the three black cockatoo species and the western ringtail possum, evidence of one additional fauna species of conservation significance was observed during the survey period, this being the eastern osprey (*Pandion cristatus*) (state and federally listed migratory species).

One individual of this species was observed roosting in a tree near Margaret River and on top of one of the buildings at a later time. What appears to be an osprey nest is also present in a tree near the north east boundary of Lot 101 (outside of the current development footprint). While listed under state and federal legislation as migratory the eastern osprey is not a threatened species, however the fact that it may breed in close proximity to the proposed development will need to be taken into consideration.

6.2.5 Opportunistic Fauna Observations

Opportunistic fauna observations are listed in Appendix B. Including those species previously mentioned, a total of 11 native fauna species were observed (or positively identified from foraging evidence, scats, tracks, skeletons or calls) within the survey area during the course of survey. The low number of observations can be attributed to the small size of the survey area, its largely degraded state and the limited time (~ five hours over one day/night) spent on site.

6.3 FAUNA INVENTORY – SUMMARY

6.3.1 Vertebrate Fauna

Table 3 summarises the number of vertebrate fauna species potentially occurring within or utilising at times the survey area, based on results from the literature review and observations made during the field assessment. A complete list of vertebrate fauna possibly inhabiting or frequenting the survey area is located in Appendix B.

As previously discussed, despite the omission of some species it should be noted that the list provided is still very likely an over estimation of the fauna species utilising the survey area (either on a regular or infrequent basis) as a result of the precautionary approach adopted for
the assessment. At any one time only a subset of the listed potential species are likely to be present within the bounds of the survey area.

Table 3: Summary of Potential Vertebrate Fauna Species (as listed in Appendix B)

<table>
<thead>
<tr>
<th>Group</th>
<th>Total number of Potential species</th>
<th>Potential number of Specially Protected species</th>
<th>Potential number of Migratory species</th>
<th>Potential number of Priority species</th>
<th>Number of species recorded during field survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Amphibians</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reptiles</td>
<td>34</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Birds</td>
<td>130</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Non-Volant Mammals</td>
<td>18</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Volant Mammals (Bats)</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>208</strong></td>
<td><strong>6</strong></td>
<td><strong>1</strong></td>
<td><strong>7</strong></td>
<td><strong>11</strong></td>
</tr>
</tbody>
</table>

Superscript = number of introduced species included in total.

### 6.3.2 Vertebrate Fauna of Conservation Significance

A review of the EPBC Act threatened fauna list, DBCA’s Threatened Fauna Database and Priority List, unpublished reports and scientific publications identified a number of specially protected, priority or migratory vertebrate fauna species as potentially occurring in the general vicinity of the survey area. Of these species, most that have no potential whatsoever to utilise the survey area for any purpose and have been omitted from the potential list (Appendix B), principally due to lack of suitable habitat (including extent and/or quality) or known local extinction.

In summary, five vertebrate fauna species of conservation significance were positively identified as utilising the survey area for some purpose during the survey period, these being:

- **Baudin’s Black-Cockatoo** *Calyptrorhynchus baudinii* – S3 (BC Act), Endangered (EPBC Act)
  Known to occur. Not seen during the survey period but some foraging evidence attributed to this species found within the survey area (chewed marri fruits and pine cones). Lot 101 contains a single potential breeding habitat tree (DBH ≥50cm) but no suitable hollows are present. Extent of quality foraging habitat with Lot 101 is very limited and no evidence of roosting observed.
• Carnaby’s Black-Cockatoo *Calyptrhynchus latirostris* – S2 (BC Act), Endangered (EPBC Act)
  Known to occur. Not seen during the survey period but some foraging evidence attributed to this species found within the survey area (chewed marri fruits and pine cones). Lot 101 contains a single potential breeding habitat tree (DBH >50cm) but no suitable hollows are present. Extent of quality foraging habitat with Lot 101 is very limited and no evidence of roosting observed.

• Forest Red-tailed Black Cockatoo *Calyptrhynchus banksii naso* – S3 (BC Act), Vulnerable (EPBC Act)
  Known to occur. Not seen during the survey period but some foraging evidence attributed to this species found within the survey area (chewed marri fruits and pine cones). Lot 101 contains a single potential breeding habitat tree (DBH >50cm) but no suitable hollows are present. Extent of quality foraging habitat with Lot 101 is very limited and no evidence of roosting observed.

• Eastern Osprey *Pandion haliaetus* – S5 (BC Act), Migratory (EPBC Act)
  Recorded during survey period and a potential nest site is located near the northern most boundary of Lot 101.

• Western Ringtail Possum *Pseudocheirus occidentalis* – S1 (BC Act), Critically Endangered (EPBC Act)
  Recorded during the survey period and potentially uses most vegetation in the survey area for some purpose at times.

Based on the habitats present and current documented distributions it is considered possible that several additional species may use the survey area for some purpose at times (but necessarily Lot 101). As no evidence of any was found their status within the survey area remains uncertain.

These species are:

• Pouched Lamprey *Geotria australis* – P3 (DBCA Priority Species)
  Known to migrate up Margaret River where it breeds but Lot 101 itself does not contain any habitat that this species would utilise.

• Peregrine Falcon *Falco peregrinus* – S7 (BC Act)
  Uncommon but this species potentially utilises the survey area as part of a much larger home range. Would not nest within Lot 101 and only likely to forage within this area very occasionally.

• Masked Owl (SW population) - *Tyto n. novaehollandiae* – P3 (DBCA Priority Species)
  Relatively uncommon but may occur, if only occasionally. Would not nest within Lot 101 and only likely to forage within this area very occasionally.
• Black Bittern *Ixobrychus flavicollis* – P2 (DBCA Priority Species)
  Riverside vegetation (mostly outside of Lot 101) appears suitable for this species. Not
  often recorded but must be considered a potential species.

• Australian Little Bittern *Ixobrychus dubius* – P4 (DBCA Priority Species)
  Riverside vegetation (mostly outside of Lot 101) appears suitable for this species. Not
  often recorded but must be considered a potential species.

• South-western Brush-tailed Phascogale *Phascogale tapoatafa wambenger* – S6 *(BC
  Act)*
  Possibly occurs though the majority of the habitats present appear marginal due to a
  lack of hollow bearing trees, especially within Lot 101 itself where it is least likely to
  occur.

• Quenda *Isoodon fusciventer* – P4 (DBCA Priority Species)
  Required dense groundcover to persist so most of the survey area (and almost all of
  Lot 101) is unsuitable. May be present in riparian vegetation along Margaret River.

• Western False Pipistrelle *Falsistrellus mackenziei* – P4 (DBCA Priority Species)
  Uncommon species but possibly forages along the Margaret River and in open areas
  on land. Unlikely to roost in the survey area due to a lack of suitable hollows especially
  within Lot 101 itself.

• Water Rat *Hydromys chrysogaster* – P4 (DBCA Priority Species)
  Likely to forage within Margaret River and riverside vegetation (mostly outside of Lot
  101) appears suitable for this species.

Note: Habitat for some of these species within the survey area, while considered possibly
suitable, may be marginal in extent/quality and the species listed may only visit the area for
short periods, or as rare/uncommon vagrants/transients.

A number of other species of conservation significance, while possibly present in the wider
area, are not listed as potential species due to known localised extinction (and no subsequent
recruitment from adjoining areas) and/or lack of suitable habitat and/or the presence of feral
predators.

6.3.3 Invertebrate Fauna of Conservation Significance

Several invertebrate species of conservation significance appeared in the DBCA database
search (DBCA 2019b) however most have been assessed as being unlikely to be present
especially within Lot 101 itself due to a lack of suitable habitat and/or likely local extinction.

The single species which may occur at least in the wider area is:

• Cape Leeuwin Freshwater Snail - *Austroassiminea letha*- S3 *(BC Act)*
  There are no records of this species from along the Margaret River but it has been
  recorded north and south of Prevelly in the recent past (DBCA 2019b). Considered
unlikely to occur within Lot 101 as possible habitat (base of limestone cliff) limited in extent and no seepages noted – more likely to occur in the Wallcliffe Nature Reserve though actual status is unknown.

7. POTENTIAL IMPACTS

In general the most significant potential impacts to fauna of any development include:

- Loss of vegetation/fauna habitat that may be used for foraging, breeding, roosting, or dispersal (includes loss of hollow bearing trees);

- Fragmentation of vegetation/fauna habitat which may restrict the movement of some fauna species;

- Modifications to surface hydrology, siltation of creek lines;

- Changes to fire regimes;

- Pollution (e.g. oil spills);

- Noise/Light/Dust;

- Spread of plant pathogens (e.g. dieback) and weeds;

- Potential increase in the number of predatory introduced species (e.g. cats);

- Death or injury of fauna during clearing and construction; and

- An increase in fauna road kills subsequent to development.

Based on the likely scale of habitat loss which the proposed development may result in (which is likely to be minimal based on the proposed retention of the majority of existing vegetation) and other factors such as the extent of similar vegetation in surrounding areas, its quality and degree of fragmentation, the possible impacts on species of conservation significance previously recorded in the general area has been assessed, a summary of which is provided in Table 4 below.

It should be noted that the best quality and widest range of fauna habitats within the survey area are located outside of Lot 101. As a consequence, these areas (including the reserve areas of which they form a part of) are most likely to harbour the greatest variety of fauna species. Any development undertaken in Lot 101 is therefore considered as unlikely to impact significantly on the current status of any fauna species presently utilising the area.
Table 4: Likelihood of Occurrence and Potential Impacts – Fauna Species of Conservation Significance (continues on following pages).

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation Status</th>
<th>BC Act/DBCA Priority</th>
<th>EPBC Act</th>
<th>Habitat Preferences</th>
<th>Habitat Present</th>
<th>Likelihood of Occurrence</th>
<th>Comments/Possible Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Pygmy Trapdoor Spider</td>
<td>P3</td>
<td>-</td>
<td></td>
<td>Poorly documented - Lives in shallow burrows on</td>
<td>Yes?</td>
<td>Unlikely to Occur</td>
<td>Previously recorded in nearby Kari forest (DBCA 2019b). Considered unlikely to occur as</td>
</tr>
<tr>
<td>Bertmainius opimus</td>
<td></td>
<td></td>
<td></td>
<td>eucalyptus bark or in topsoil.</td>
<td></td>
<td></td>
<td>habitat unlikely to be suitable. No impact on this species anticipated.</td>
</tr>
<tr>
<td>Cape Leeuwin Freshwater Snail</td>
<td>S3</td>
<td>-</td>
<td></td>
<td>Natural seepages from limestone or lime sands</td>
<td>Yes?</td>
<td>Possibly occurs?</td>
<td>No records from along the Margaret River (DBCA 2019b). Considered unlikely to occur</td>
</tr>
<tr>
<td>Austroassiminea letha</td>
<td></td>
<td></td>
<td></td>
<td>within Lot 101 as possible habitat (base of limestone</td>
<td></td>
<td>Wallcliffe Nature Reserve</td>
<td>cliff) limited in extent and no seepages noted – more likely in Wallcliffe Nature</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>only.</td>
<td></td>
<td>only.</td>
<td>Reserve though actual status unknown. No impact on this species anticipated.</td>
</tr>
<tr>
<td>Margaret River Hairy Marron</td>
<td>S1</td>
<td>CR</td>
<td></td>
<td>Upper reaches of Margaret River.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>Would not occur in lower reaches of Margaret River. No impact on this species will</td>
</tr>
<tr>
<td>Cherax tenuimanus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>occur.</td>
</tr>
<tr>
<td>Margaret River Burrowing Crayfish Engaewa</td>
<td>S1</td>
<td>CR</td>
<td></td>
<td>Narrow creek tributaries of the Margaret River which</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>Would not occur in lower reaches of Margaret River. No impact on this species will</td>
</tr>
<tr>
<td>pseudoreducta</td>
<td></td>
<td></td>
<td></td>
<td>are densely vegetated on heavy grey/yellow clay soils.</td>
<td></td>
<td></td>
<td>occur.</td>
</tr>
<tr>
<td>Grey Vernal Katydid Kawaniphila pachomai</td>
<td>P1</td>
<td>-</td>
<td></td>
<td>Not documented.</td>
<td>?</td>
<td>Would Not Occur.</td>
<td>Given the lack of published records and apparent knowledge on this species, its status</td>
</tr>
<tr>
<td>a ground beetle Trichosternus relictus</td>
<td>P3</td>
<td>-</td>
<td></td>
<td></td>
<td>?</td>
<td>Would Not Occur.</td>
<td>within the survey area is difficult to determine, however the probability of it being</td>
</tr>
<tr>
<td>Carter’s Freshwater Mussel Westralunio carteri</td>
<td>S3</td>
<td>VU</td>
<td></td>
<td>Occurs in greatest abundance in slower flowing</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>present can be regarded as being extremely low. No impact on this species will occur.</td>
</tr>
<tr>
<td>Pouched Lamprey Geotria australis</td>
<td>P3</td>
<td>-</td>
<td></td>
<td>This species lives in mud burrows in the upper</td>
<td>Yes</td>
<td>Possibly Occurs</td>
<td>The only records of this species in NatureMap (5) are from 1959 and 1931 (DBCA 2105b).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>reaches of coastal streams for the first 4 years of</td>
<td></td>
<td>(Margaret River only).</td>
<td>Considered very unlikely to occur. No impact on this species will occur.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>life until migrating to the sea. Adults migrate up to</td>
<td></td>
<td></td>
<td>Would not occur in lower reaches of Margaret River. No impact on this species will</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60km upstream during spawning.</td>
<td></td>
<td></td>
<td>occur.</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Known to migrate up Margaret River. No impact on this species anticipated.</td>
</tr>
<tr>
<td>Species</td>
<td>Conservation Status</td>
<td>Habitat Preferences</td>
<td>Habitat Present</td>
<td>Likelihood of Occurrence</td>
<td>Comments/Possible Impacts</td>
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</tr>
<tr>
<td>Mud Minnow&lt;br&gt;Galaxiella munda</td>
<td>S3</td>
<td>Typically found in small flowing streams near submerged vegetation, occasionally in still water of ponds, swamps and roadside drains. Water is usually darkly tannin stained and acidic (pH 3.0 – 6.0).</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>Would not occur in lower reaches of Margaret River. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balston's Pygmy Perch&lt;br&gt;Nannatherina balstoni</td>
<td>S3</td>
<td>Acidic, tannin stained freshwater pools, streams and lakes within 30km of the coast, typically situated amongst peat flats. Prefers shallow water and is commonly found in association with tall sedge thickets.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>Would not occur in lower reaches of Margaret River. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White-bellied Frog&lt;br&gt;Geocrinia alba</td>
<td>S1</td>
<td>Occurs only in the Karradale-Witchcliffe area where it persists along creeklines within agricultural landscapes, provided suitable riparian habitat remains intact.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>This species does not occur along Margaret River. With all records being in the Karradale-Witchcliffe area (DBCA 2019b). No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mallee Fowl&lt;br&gt;Leipoa ocellata</td>
<td>S3</td>
<td>Mainly scrubs and thickets of mallee Eucalyptus spp., boose Melaleuca lanceolata and bowgada Acacia linophylla, also dense litter forming shrublands.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>This species is regionally extinct. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migratory Shorebirds/Wetland Species/Marine Species&lt;br&gt;(various reptiles, birds and mammals)</td>
<td>S5, Various</td>
<td>Varies between species but includes open ocean, beaches and permanent/temporary wetlands varying from billabongs, swamps, lakes, floodplains, sewerage farms, saltwork ponds, estuaries, lagoons, mudflats sandbars, pastures, airfields, sports fields and lawns.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>There is no suitable habitat for any of these species within the survey area. No impact on any of these species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hooded Plover&lt;br&gt;Thinornis rubricollis</td>
<td>P4</td>
<td>Broad sandy ocean beaches and bays, coastal and inland salt lakes.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>There is no suitable habitat for this species in the survey area. No impact on any of these species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Osprey&lt;br&gt;Pandion haliaetus</td>
<td>S5</td>
<td>Coasts, estuaries, bays, inlets, islands, and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Ascends larger rivers.</td>
<td>Yes</td>
<td>Known to Occur</td>
<td>Recorded during survey period and a potential nest site is located near the northern most boundary of Lot 101. This area is not subject to any current development plans and therefore no impact on this species is anticipated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peregrine Falcon&lt;br&gt;Falco peregrinus</td>
<td>S7</td>
<td>Diverse from rainforest to arid shrublands, from coastal heath to alpine Mainly about cliffs along coasts, rivers and ranges and about wooded watercourses and lakes.</td>
<td>Yes</td>
<td>Possibly Occurs.</td>
<td>Uncommon but the survey area may represent part of a larger home range used by individuals of this species. Would not breed within Lot 101. No impact on this species anticipated.</td>
<td></td>
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</tr>
<tr>
<td>Species</td>
<td>Conservation Status</td>
<td>Habitat Preferences</td>
<td>Habitat Present</td>
<td>Likelihood of Occurrence</td>
<td>Comments/Possible Impacts</td>
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<tr>
<td><strong>Masked Owl (SW population)</strong> <em>Tyto n. novaehollandiae</em></td>
<td>P3</td>
<td>Roosts and nests in heavy forest, hunts over open woodlands and farmlands.</td>
<td>Yes</td>
<td>Possibly Occurs.</td>
<td>Relatively uncommon but may occur, if only occasionally. Any proposed development is however unlikely to impact on this species.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Barking Owl (SW population)</strong> <em>Ninox connivens connivens</em></td>
<td>P3</td>
<td>Dense vegetation, especially forest and thickets of waterside vegetation such as <em>meiaceus</em>. Roosts in tree hollows.</td>
<td>Yes</td>
<td>Unlikely to Occur</td>
<td>No suitable habitat within Lot 101 itself and only rarely recorded in the south west. Considered unlikely to occur. No impact on this species anticipated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Australasian Bittern</strong> <em>Botaurus poicoilopitus</em></td>
<td>S2</td>
<td>Freshwater wetlands, occasionally estuarine; prefers heavy vegetation such as beds of tall dense <em>Typha, Baumea</em> and sedges in freshwater swamps.</td>
<td>No/Marginal</td>
<td>Unlikely to Occur</td>
<td>Riverside vegetation (mostly outside of Lot 101) appears marginal for this species and therefore it is considered unlikely to occur. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Black Bittern</strong> <em>Ixobrychus flavicollis</em></td>
<td>P2</td>
<td>Freshwater pools, swamps and lagoons well screened with trees. Shelters in dense waterside vegetation.</td>
<td>Yes</td>
<td>Possibly Occurs</td>
<td>Riverside vegetation (mostly outside of Lot 101) appears suitable for this species. Not often recorded but must be considered a potential species. Areas of preferred habitat are however not subject to any current development plans and therefore no impact on this species is anticipated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Australian Little Bittern</strong> <em>Ixobrychus dubius</em></td>
<td>P4</td>
<td>Dense vegetation surrounding/within freshwater pools, swamps and lagoons, well screened with trees. Shelters in dense beds of <em>Typha, Baumea</em> and tall rushes in freshwater swamps around lakes and along rivers.</td>
<td>Yes</td>
<td>Possibly Occurs</td>
<td>Riverside vegetation (mostly outside of Lot 101) appears suitable for this species. Not often recorded but must be considered a potential species. Areas of preferred habitat are however not subject to any current development plans and therefore no impact on this species is anticipated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Noisy Scrub-bird</strong> <em>Atrochomis clamosus</em></td>
<td>S2</td>
<td>Areas of dense understorey or lower stratum of sedges and shrubs, a dense accumulation of leaf litter and an abundant population of litter-dwelling invertebrates.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>This species is regionally extinct. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Western Whipbird</strong> <em>Psophodes nigrogularis</em></td>
<td>S2</td>
<td>Dense shrubland with an open overstorey.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>This species is regionally extinct. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Carnaby’s Black Cockatoo</strong> <em>Calyptorhynchus latirostris</em></td>
<td>S2</td>
<td>Forests, woodlands, heathlands, farms; feeds on <em>Banksia, Hakea</em> and Marri.</td>
<td>Yes</td>
<td>Known to Occur</td>
<td>The survey area contains a small amount of foraging habitat, but no actual breeding hollows and no evidence of roosting found. The proposed small-scale development will not significantly impact on this species.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Baudin’s Black Cockatoo</strong> <em>Calyptorhynchus baudinii</em></td>
<td>S2</td>
<td>Mainly eucalypt forests where it feeds primarily on the marri seeds.</td>
<td>Yes</td>
<td>Known to Occur</td>
<td>The survey area contains a small amount of foraging habitat, but no actual breeding hollows and no evidence of roosting found. The proposed small-scale development will not significantly impact on this species.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>Conservation Status</td>
<td>BC Act/DBCA Priority</td>
<td>EPBC Act</td>
<td>Habitat Preferences</td>
<td>Habitat Present</td>
<td>Likelihood of Occurrence</td>
<td>Comments/Possible Impacts</td>
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</tr>
<tr>
<td>Forest Red-tailed Black Cockatoo</td>
<td></td>
<td>S3</td>
<td>VU</td>
<td>Eucalypt forests, feeds on marri, jarrah, blackbutt, karri, sheoak and snottygobble.</td>
<td>Yes</td>
<td>Known to Occur</td>
<td>The survey area contains a small amount of foraging habitat, but no actual breeding hollows and no evidence of roosting found. The proposed small-scale development will not significantly impact on this species.</td>
</tr>
<tr>
<td>Calyptorhynchus 29enicil naso</td>
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<td></td>
</tr>
<tr>
<td>Fork-tailed Swift</td>
<td></td>
<td>S5</td>
<td>Ma, Mig</td>
<td>Low to very high airspace over varied habitat from rainforest to semi desert.</td>
<td>Yes</td>
<td>Unlikely to Occur, Flyover only on very rare occasions.</td>
<td>May occur very occasionally for brief periods. Entirely aerial. No impact on this species will occur.</td>
</tr>
<tr>
<td>Apus pacificus</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chuditch Dasyurus geoffroii</td>
<td></td>
<td>S3</td>
<td>VU</td>
<td>Forest, mallee shrublands, woodland and desert. The densest populations have been found in riparian jarrah forest.</td>
<td>Yes</td>
<td>Unlikely to Occur</td>
<td>Not recorded in recent times in the general area (DBCA 2019b) so considered as unlikely to occur. No impact on this species is anticipated.</td>
</tr>
<tr>
<td>South-western Brush-tailed Phascogale</td>
<td></td>
<td>S6</td>
<td>-</td>
<td>Dry sclerophyll forests and open woodlands that contain hollow-bearing trees but a sparse ground cover.</td>
<td>Yes/Marginal</td>
<td>Possibly Occurs.</td>
<td>Possibly occurs though the majority of the habitats present appear marginal due to a lack of hollow bearing trees, especially within Lot 101 itself. The proposed small-scale development will not significantly impact on this species.</td>
</tr>
<tr>
<td>Phascogale tapoatafa wambenger</td>
<td></td>
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</tr>
<tr>
<td>Numbat Myrmecobius fasciatus</td>
<td></td>
<td>S2</td>
<td>EN</td>
<td>Open Woodlands generally dominated by eucalypts that provide hollow logs and branches for shelter and termites for food.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>This species is regionally extinct. No impact on this species will occur.</td>
</tr>
<tr>
<td>Quenda Isoodon fusciventer</td>
<td></td>
<td>P4</td>
<td>-</td>
<td>Dense scruffy, often swampy, vegetation with dense cover.</td>
<td>Yes</td>
<td>Possibly Occurs.</td>
<td>Requires dense groundcover to persist so most of the survey area (and almost all of Lot 101) is unsuitable. May be present in riparian vegetation along Margaret River. This area is not subject to any current development plans and therefore no impact on this species is anticipated.</td>
</tr>
<tr>
<td>Bilby Macrotis lagotis</td>
<td></td>
<td>S3</td>
<td>VU</td>
<td>Acacia shrublands, spinifex and hummock grassland. Mitchell grass and stony downs country if cracking clay, also desert sand plains and dune fields sometimes with spinifex hummock grassland and acacia shrubland.</td>
<td>No</td>
<td>Would Not Occur.</td>
<td>This species is regionally extinct. No impact on this species will occur.</td>
</tr>
<tr>
<td>Western Ringtail Possum</td>
<td></td>
<td>S1</td>
<td>CR</td>
<td>Coastal peppermint, coastal peppermint-tuart, jarrah-marri associations, sheoak woodland, and eucalypt woodland and mallee.</td>
<td>Yes</td>
<td>Known to Occur.</td>
<td>Recorded during the survey period and potentially uses most vegetation in the survey area for some purpose at times. The proposed small-scale development is considered as unlikely to significantly impact on the extent suitable habitat currently present. However, the potential for individuals to be injured or killed during any clearing operations will need to be managed.</td>
</tr>
<tr>
<td>Pseudocheirus occidentalis</td>
<td></td>
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<tr>
<td>Species</td>
<td>Conservation Status</td>
<td>Habitat Preferences</td>
<td>Habitat Present</td>
<td>Likelihood of Occurrence</td>
<td>Comments/Possible Impacts</td>
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<tr>
<td>Quokka Setonix brachyurus</td>
<td>S3</td>
<td>Currently restricted to densely vegetated coastal heaths, swamps, riverine habitats</td>
<td>No</td>
<td>Would Not Occur</td>
<td>This species appears to be locally extinct. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wooylie Bettongia penicillate</td>
<td>S1</td>
<td>Open forest and woodland with a low, dense, understorey of tussock grasses or woody</td>
<td>No</td>
<td>Would Not Occur</td>
<td>This species is locally extinct. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western Brush Wallaby</td>
<td>P4</td>
<td>Open forest or woodland, particularly favouring open, seasonally wet flats with low</td>
<td>Yes</td>
<td>Unlikely to Occur</td>
<td>Possibly occurs in larger remnants in nearby national park areas but not likely to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notamacropus irma</td>
<td></td>
<td>grasses and open scrubby thickets.</td>
<td></td>
<td></td>
<td>frequent the survey area. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tammar Wallaby Notamacropus</td>
<td>P4</td>
<td>Coastal scrub, heath, dry sclerophyll forest and thickets in mallee and woodland.</td>
<td>No</td>
<td>Would Not Occur</td>
<td>This species is locally extinct. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gilbert's Potoroo</td>
<td>S1</td>
<td>Long-unburnt, dense shrubland on the valley slopes.</td>
<td>No</td>
<td>Would Not Occur</td>
<td>This species is regionally extinct. No impact on this species will occur.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potorous gilbertii</td>
<td></td>
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</tr>
<tr>
<td>Western False Pipistrelle</td>
<td>P4</td>
<td>Wet sclerophyll forest dominated by karri and in high rainfall zones of the jarrah</td>
<td>Yes</td>
<td>Possibly Occurs</td>
<td>Uncommon species but possibly forages along the Margaret River and in open areas on land.</td>
<td></td>
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</tr>
<tr>
<td>Falsistrellus mackenziei</td>
<td></td>
<td>and marri forest.</td>
<td></td>
<td></td>
<td>Unlikely to roost in the survey area due to a lack of suitable hollows especially within</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Rat Hydromys chrysogaster</td>
<td>P4</td>
<td>Permanent water, fresh, brackish or marine.</td>
<td>Yes</td>
<td>Possibly Occurs</td>
<td>Likely to forage within Margaret River and riverside vegetation (mostly outside of Lot 101) appears suitable for this species. Areas of preferred habitat are however not subject to any current development plans and therefore no impact on this species is anticipated.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: see Appendix A for conservation codes
8. CONCLUSION

The fauna assessment within the survey area was undertaken for the purposes of delineating and characterising the fauna habitats and faunal assemblages present. Targeted searches for western ringtail possums and black cockatoo habitat was also carried out.

With respect to native vertebrate fauna, 21 mammals (including nine bat species), 124 bird, 35 reptile, 10 frog species and six fish species have previously been recorded in the general area, some of which have the potential to occur in or utilise sections of the survey area at times, a conclusion largely based on the presence of apparently suitable habitat. Fauna habitat quality within Lot 101 is however low as a consequence of historical clearing and development and only a subset of the fauna species predicted to occur in the wider area are considered likely to occur.

The assessment identified the presence the western ringtail possum and it is considered to potentially utilise most areas of Lot 101 where suitable vegetation persists. Within Lot 101 black cockatoo habitat was found to be limited in extent and/or of low quality. A single migratory species, the eastern osprey was recorded during the survey period and a possible nest site is present near the boundary of Lot 101.

A number of additional federal and/or state listed threatened and DBCA priority fauna species may also occur though in most cases their use of the survey area wasn’t detected during the survey period.

The best quality and widest range of fauna habitats within the survey area are located outside of Lot 101. As a consequence, these areas (including the reserve areas of which they form a part of) are most likely to harbour the greatest variety of fauna species. Any development undertaken in Lot 101 is therefore considered as unlikely to impact significantly on the current status of any fauna species presently utilising the area.

In summary five vertebrate fauna species of conservation significance were positively identified as utilising the survey area for some purpose, these being:

- Forest Red-tailed Black Cockatoo – Vulnerable;
- Baudin’s Black Cockatoo – Endangered;
- Carnaby’s Black Cockatoo – Endangered;
- Eastern Osprey – Migratory; and
- Western Ringtail Possum – Critically Endangered.

A number of additional vertebrate species of conservation significance may also utilise the survey area, though, as no evidence of these species’ presence was identified during the field survey, the status of some in the area remains uncertain. These species are:
• Pouched Lamprey – Priority 3;
• Black Bittern – Priority 2;
• Australian Little - Priority 2;
• Masked Owl – Priority 3;
• Peregrine Falcon – Schedule 7;
• South-western Brush-tailed Phascogale - Schedule 6;
• Quenda – Priority 4;
• Western False Pipistrelle – Priority 4;
• Water Rat – Priority 4.

As described previously, most of these species would not actually utilise Lot 101 due to a lack of suitable habitats, though they may frequent nearby areas.

One invertebrate species of conservation significance has also been assessed as possibly occurring based on available information. The Cape Leeuwin freshwater snail (Vulnerable) has been collected in national park areas north and south of the survey area (DBCA 2019b) so it must be regarded as a potential species though it is considered unlikely to occur within Lot 101 itself.

Overall Lot 101 has low biodiversity values and therefore impacts on fauna in general will be non-existent or negligible. Constraints on development within the subject site will largely be centred on the presence of habitat used or potentially used by threatened fauna species in particular the western ringtail possum.

The presence of this species should be taken into account during ongoing planning and subsequent development. To this end it is recommended that a fauna management plan be formulated for implementation prior to and during development. In particular the plan should define procedures for ensuring the retention and protection of existing WRP habitat wherever possible including protocols for ensuring western ringtail possums (and other fauna) are not injured or killed during site works.

It is also recommended that the tree containing the potential eastern osprey nest be specifically marked and fenced off during site works to minimise activity occurring nearby which may disturb nesting birds.
9. REFERENCES


FIGURES
Figure 3: Plant Communities

Conservation significant fora

- Banksia sessilis var. cordata (P4)

**Plant Communities**

- **AfW** Woodland of Agonis flexuosus over open shrubland of Rhagodia baccata subsp. baccata, Olearia axillaris and Hibbertia cuneiformis over open mixed forbland and open to closed grassland of weeds.

- **CcAfW** Woodland of Corymbia calophylla and Agonis flexuosus over shrubland of Spyridium globulosum, Pteridium esculentum, Rhagodia baccata subsp. baccata and Exocarpos sparteus with vineyard of Hardenbergia comptoniana and Muehlenbeckia adpressa over weeds.

- **MhBvTrCS** Low open woodland of Agonis flexuosus with closed shrubland of Melaleuca huergi, Templetonia retusa, Beyeria vicosa, Acazia cyclops, Diphylleia dumprini, Dodonaea opora and Spyridium globulosum with vineyard of Hardenbergia comptoniana and Muehlenbeckia adpressa over open forbland of Tricoryne elatior and Thysanotus arenarius, sparse sedgeland of Lepidosperma spp. and sparse grassland of Austrostipa flavescens and *Lagurus ovatus*.

- **MrLOF** Low open forest of <ITA>Melaleuca rhiaphylla</ITA> over open to closed rush/sedge/land of <ITA>Juncus</ITA> spp. and <ITA>Baumea juncea</ITA> over sparse forbland of <ITA>Atriplex prostrata</ITA> over open to closed rush/sedge/land of <ITA>Atriplex prostrata</ITA> ssp. and <ITA>Baumea juncea</ITA> over sparse forbland of <ITA>Atriplex prostrata</ITA> with occasional native trees and planted vegetation.

- **Cleared / planted** Modified vegetation comprising weeds with occasional native trees and planted vegetation.

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While Emerge Associates makes every attempt to ensure the accuracy and completeness of data, Emerge accepts no responsibility for externally sourced data used.
Lot 101 Wallcliffe Road
Prevelly

Black Cockatoo
Observations

Legend
- Survey Area
- National Park
- Habitat Tree (DBH >50cm)
- Foraging Evidence (Marri Fruits)
- Foraging Evidence (Pine Cones)

Lot 101 Wallcliffe Road
Margaret River
Prevelly
Black Cockatoo
Observations

Figure: 5

Projection/Coordinate System: UTM/MGA Zone 50

Scale: 1:3,500

Drawn: G. Harewood
Date: April 2019

Lot 101 Wallcliffe Road
Prevelly
Black Cockatoo
Observations

Legend
- Survey Area
- National Park
- Habitat Tree (DBH >50cm)
- Foraging Evidence (Marri Fruits)
- Foraging Evidence (Pine Cones)

Lot 101 Wallcliffe Road
Margaret River
Prevelly
Black Cockatoo
Observations

Figure: 5

Projection/Coordinate System: UTM/MGA Zone 50

Scale: 1:3,500

Drawn: G. Harewood
Date: April 2019