

FINAL SITE ASSESSMENT REPORT

DECEMBER 2023

# SHIRE OF WEST ARTHUR HILLMAN RESERVE WALK TRAILS PROJECT



Department of  
Local Government, Sport  
and Cultural Industries



**TREDWELL**

## Acknowledgements

The Shire of West Arthur are acknowledged and thanked for their contribution to the development of the Hillman Reserve Walk Trails Site Assessment Report.

The State Government through the Department of Local Government, Sport and Cultural Industries is a major supporter of the Hillman Reserve Walk Trails Project. Sport and recreation creates vibrant, inclusive and connected Western Australian communities.

Tredwell and the Shire of West Arthur acknowledge the Wilman Noongar people as the traditional custodians of this land. We pay our respects to elders past, present and emerging.

## Version Control

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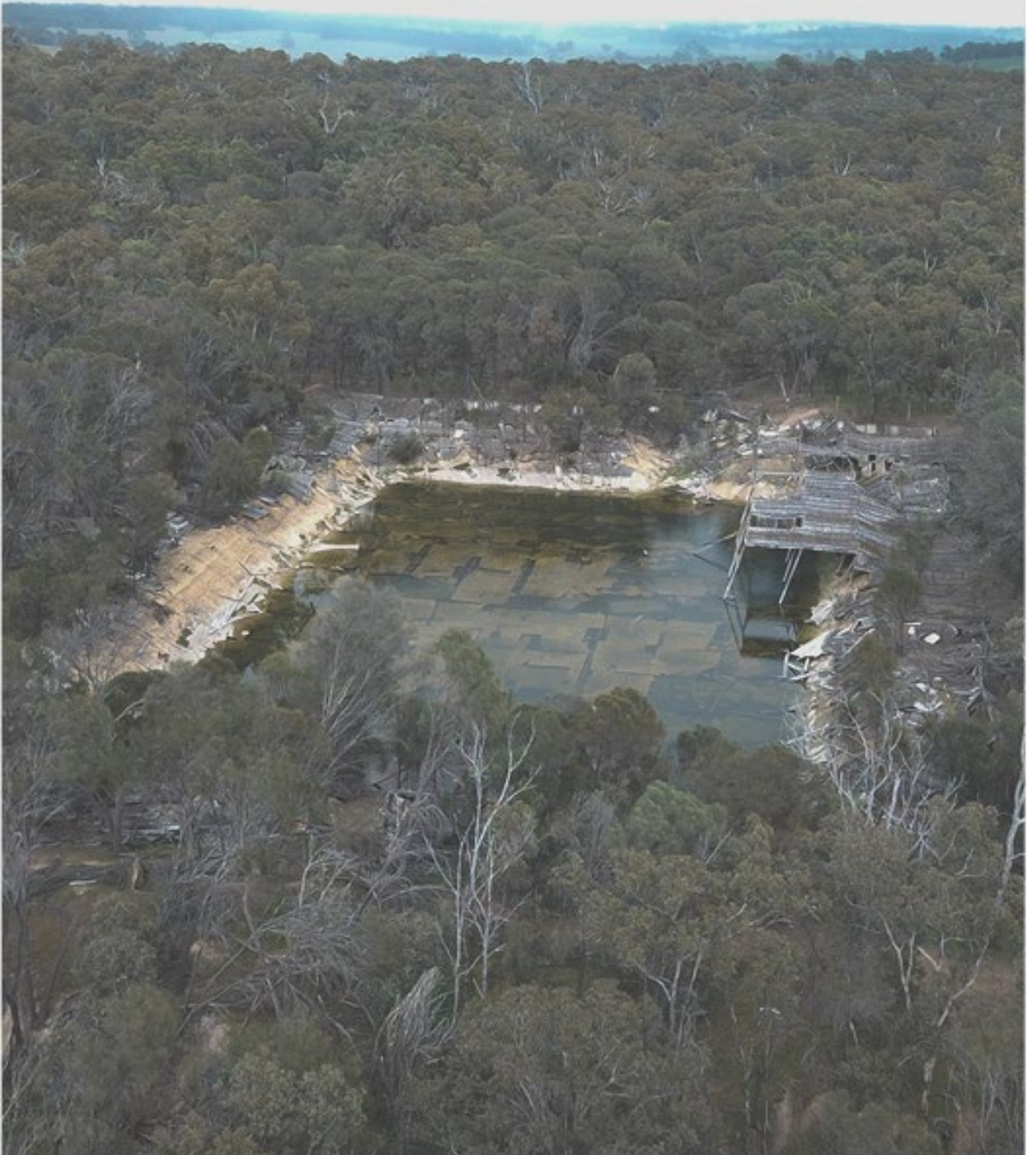
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# Executive Summary



# Executive Summary

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Hillman Reserve is a Class A Nature Reserve designated for water and conservation of flora and fauna. Currently, walk trails are not permitted in Hillman Reserve, however initial discussions with the Department of Biodiversity, Conservation and Attractions have indicated that there may be a future opportunity for walk trails.

The heritage structures within Hillman Reserve are listed in the Shire of West Arthur *Local Heritage Survey* (Heritage Intelligence WA, 2022) and are sites of considerable significance to the heritage of the locality. The Hillman Dam, concrete channels, stone quarry and rock catchment wall are all located within Hillman Reserve. The construction of the Hillman Dam, concrete channels and stone quarry were undertaken in the early 1930s.

Hillman Reserve was identified as a potential recreation site in the *Draft Management Plan for Wheatbelt Region Parks and Reserves* (2019) and is specifically listed as one of the top ranked sites for recreation development in the Wheatbelt Region. In 2020, community consultation undertaken by the Shire of West Arthur identified that local residents are eager to access Hillman Reserve.

The aim of the initial phase of the project is to undertake Stage 3 of the Trail Development Process, which includes a desktop assessment and on-ground audit of Hillman Reserve. The objective of the overall project is to plan and develop loop trails within Hillman Reserve and a spur trail which links from the existing Collie to Darkan Rail Trail to Hillman Reserve.

The on-ground audit of Hillman Reserve involved collection of the following features:

- Trail alignment and specifications (e.g. length, surface type)
- Environmental and heritage considerations
- Existing and potential access points
- Key linkages
- Support infrastructure (e.g. signage, parking)
- Points of interest (e.g. waterbodies, viewpoints)
- Hazards (e.g. erosion, fallen vegetation).

The desktop assessment of Hillman Reserve included an analysis of the following features.

- Land Tenure
- Cultural Heritage Sites
- Black Cockatoo Roost Sites
- Priority and Threatened Flora and Fauna
- Threatened Ecological Communities
- Fauna Types
- Vegetation Types
- Environmentally Sensitive Areas
- Dieback Risk
- Bushfire Prone Areas
- Public Drinking Water Source Areas
- Water Permit Requirements
- Hydro Zones
- Soil Types
- Topography.

The on-ground audit and desktop assessment identified several key strengths at Hillman Reserve, including the following.

- Ideally located within close proximity to the Collie to Darkan Rail Trail and the Darkan Town Centre as well as key population centres
- Hillman Reserve is a peaceful and quiet location with views of the surrounding farmland, townsites and hills
- Hillman Reserve features interesting and diverse vegetation types, wildflowers and native fauna
- Interesting cultural heritage features (e.g. Hillman Dam, concrete channels)
- Varying landscape (i.e. steeper terrain in the northern section and flatter terrain in the southern section of Hillman Reserve)
- There are currently no forest disease risk areas in Hillman Reserve
- Hillman Reserve is not located within a public drinking water source area or an environmentally sensitive area
- No threatened ecological communities recorded in Hillman Reserve.

# Executive Summary

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The on-ground audit and desktop assessment also identified several key issues at Hillman Reserve, including the following.

- River crossing (culvert or bridge) required for the spur trail
- Hillman Reserve is managed by the Department of Biodiversity, Conservation and Attractions, therefore permitted activities may include low impact recreation such as bushwalking and trail running
- Several invasive fauna species and non-native flora species are found within Hillman Reserve
- Several priority and threatened fauna species are located within Hillman Reserve which require protection
- Hillman Reserve is located within a bushfire prone area whereby additional planning requirements may apply
- Public access to Hillman Dam is not permitted due to the presence of asbestos.

Based on the on-ground audit, desktop assessment and discussions with the Shire, the following four trail alignments have been recommended within Hillman Reserve:

- Long Loop Walk Trail (4.4km)
- Short Loop Walk Trail (2.2km)
- Short Loop Walk Trail – Spur Trail Option to Julikin Rock (600m)
- Additional Short Loop Walk Trail Option (2km).

A dual-use vehicle and pedestrian spur trail (4.2km) has also been recommended which traverses from the Collie to Darkan Rail Trail, along gazetted road reserves which pass between properties, along the Reserve's perimeter access track and to the primary trailhead. This trail is the most suitable access point in/out of Hillman Reserve and will provide an important link to the Collie to Darkan Rail Trail

A road crossing point has been recommended across Hillman-Dardadine Road to ensure safe access for pedestrians. A river crossing is also required to ensure safe access for pedestrians and vehicles across the Hillman River.

The primary trailhead and associated parking area has been proposed at the existing clearing on the eastern boundary of Hillman Reserve.

Several interpretive opportunities are recommended throughout Hillman Reserve to highlight the unique heritage and environmental values. These include:

- Old Horse Yards
- Hillman Dam (set back by 200m due to the collapsed asbestos roofing)
- Concrete Channels
- Julikin Rock and Gnamma Holes
- Native Flora and Fauna.

Viewpoints/rest stops have been recommended at key locations across the trail network, particularly along the long loop walk trail due to the higher elevation and rocky terrain, providing views of the surrounding area.

An Implementation Plan has been developed which provides an overall action, priority level, indicative timeframe, indicative costing and identifies the relevant partner/s. The Implementation Plan identifies 21 actions which will help to guide the planning, implementation and management of the Hillman Reserve Walk Trails Project.



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# Introduction





## Project Overview

### Background

Hillman Reserve (the Reserve) is a Class A Nature Reserve designated for water and conservation of flora and fauna. Currently, walk trails are not permitted in the Reserve, however initial discussions with Department of Biodiversity, Conservation and Attractions (DBCA) have indicated that there may be a future opportunity for walk trails, noting that bicycle access is unlikely to be permitted. The Reserve is currently inaccessible to the general public as the road reserves which link from the Reserve to the Collie to Darkan Rail Trail are currently undeveloped.

The heritage structures within the Reserve are listed in the Shire of West Arthur (the Shire) *Local Heritage Survey* (Heritage Intelligence WA, 2022) and are sites of considerable significance to the heritage of the locality. The Hillman Dam, concrete channels, stone quarry and rock catchment wall are all located within the Reserve. The construction of the Hillman Dam, concrete channels and stone quarry were undertaken in the early 1930s.

The *Shire of West Arthur Trails Master Plan* (2009) identified two potential walk trails through the Reserve, which are considered to be a highlight of the local area. The first trail may include a trail alongside the concrete channels to Julikin Rock and the second trail may extend further over Julikin Rock and into surrounding bushland in a circular route. In addition, the development of a spur trail which links from the Reserve to the existing Collie to Darkan Rail Trail will potentially provide an opportunity for visitors to stay an additional night in Darkan. It is also likely to increase usage of the Darkan to Dardadine section of the Collie to Darkan Rail Trail, providing an additional attraction.

The Reserve was also identified as a potential recreation site in the *Draft Management Plan for Wheatbelt Region Parks and Reserves* (2019) and is specifically listed as one of the top ranked sites for recreation development in the Wheatbelt Region. In 2020, community consultation undertaken by the Shire identified that local residents are eager to access the Reserve.

### Objectives

The Shire was recently successful in obtaining WA Trail Planning Grants Program funding for the initial phase of the Hillman Reserve Walk Trails Project. The aim of the initial phase of the project is to undertake Stage 3 of the Trail Development Process (refer Appendix 3: Eight Stage Trail Development Process), which includes a desktop assessment and on-ground audit of the Reserve. The objective of the overall project is to plan and develop loop trails within the Reserve and a spur trail which links from the existing Collie to Darkan Rail Trail to the Reserve.

### Project Approach

The initial phase of the Hillman Reserve Walk Trails Project has been developed in line with the following two stage methodology. This has been developed to ensure that the project incorporates the relevant research and planning processes while meeting the project brief requirements.

Stage 1: Project Start-Up & Site Assessment

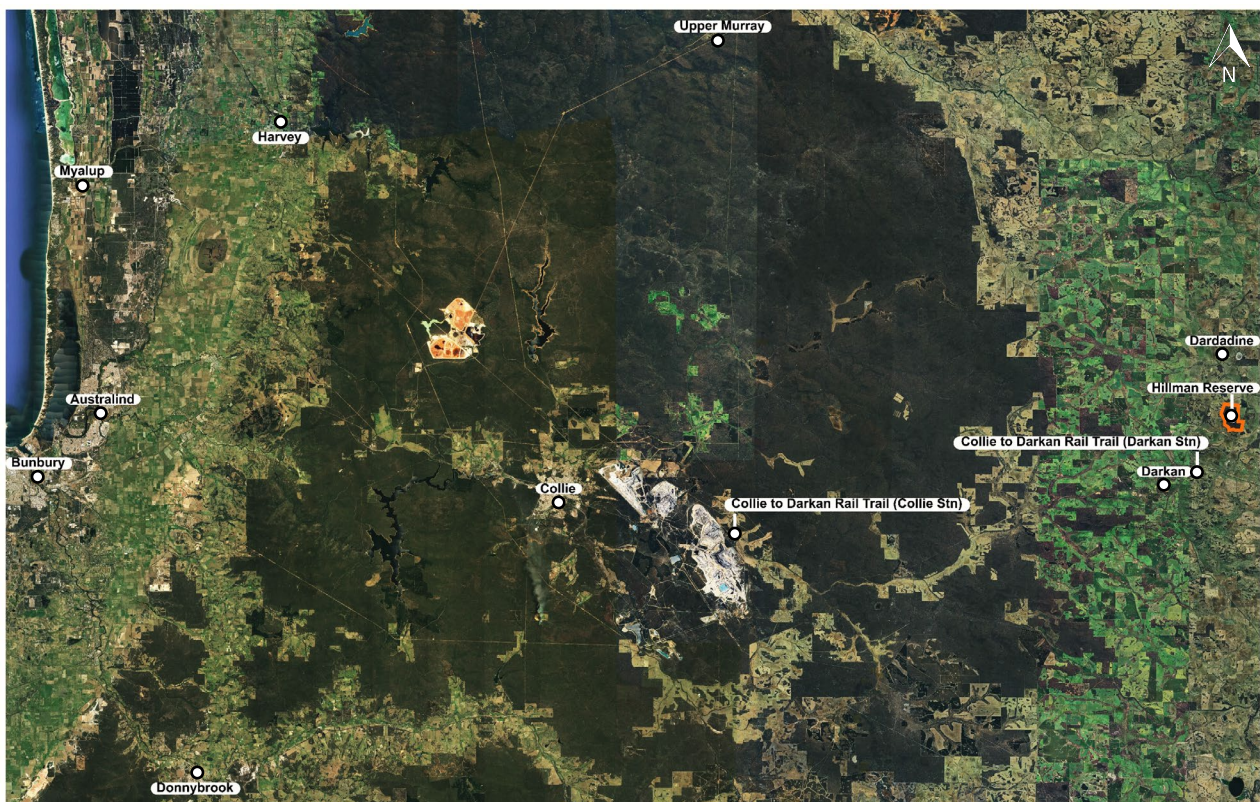
Stage 2: Site Assessment Report



## Focus Area

The Focus Area for this project is Hillman Reserve (and the associated spur trail), which is located 5km north of Darkan and situated adjacent to the Darkan to Dardadine section of the Collie to Darkan Rail Trail. Darkan is located 62km from Collie, 119km from Bunbury, 165km from Busselton, 196km from Rockingham, 211km from Perth and 236 km from Albany. The proximity of Darkan to the above key population centres makes it a convenient and ideal attraction for people who are seeking a short day trip or overnight stay.

A recent 2023 Concentric Circles Workshop conducted by the Department of Local Government, Sport and Cultural Industries (DLGSC) found that trail experiences located approximately two hours travel time from Perth are important for attracting visitors. Figure 1 below shows the location of the Reserve in relation to nearby localities and points of interest. The boundary of the Reserve is indicated in orange.

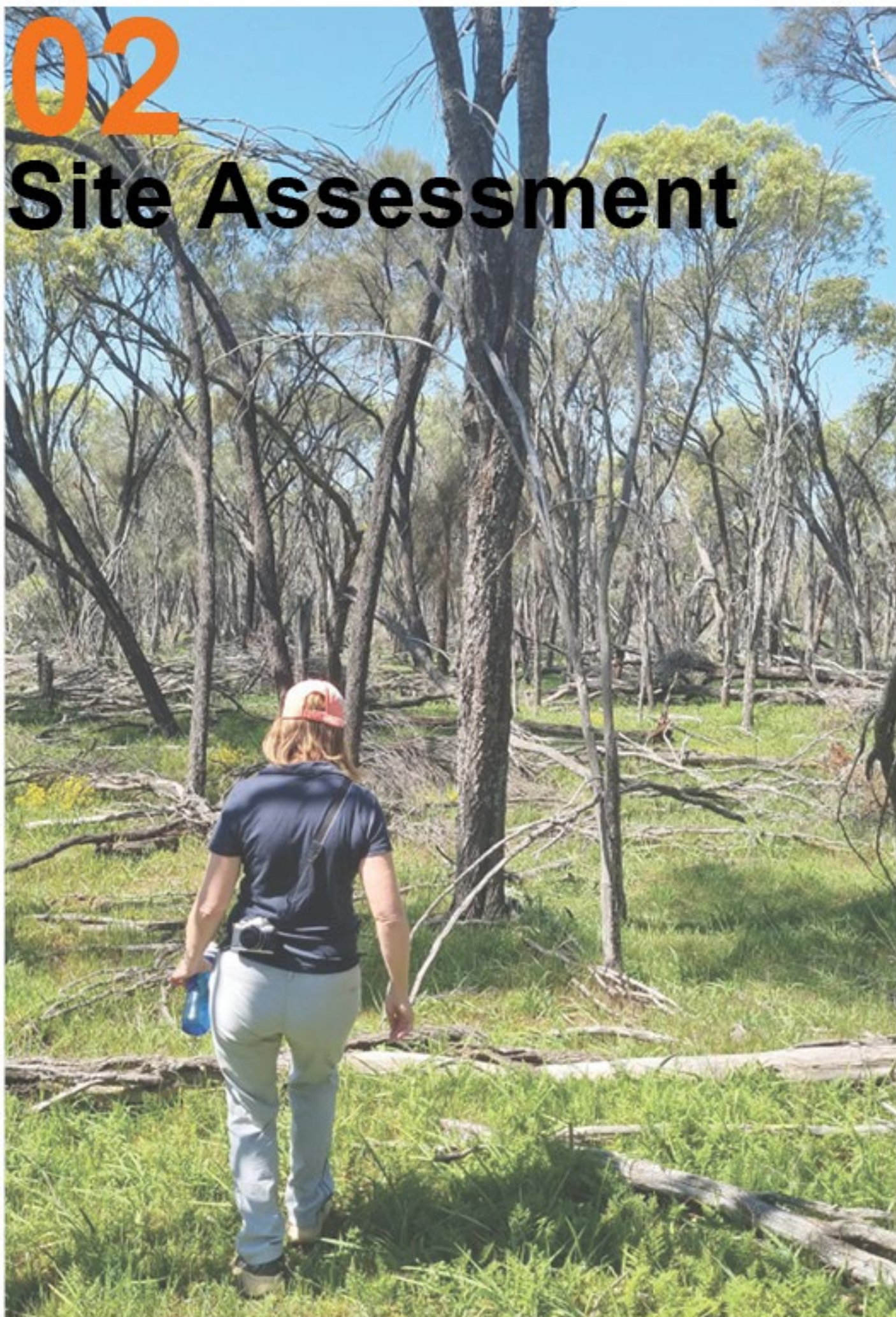


**Figure 1: Context Map**



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# Site Assessment





### Process

An on-ground audit of the Reserve was undertaken on the 27<sup>th</sup> of September 2023 to produce ground truthed, geo-referenced data and photographs. This included the use of the ESRI ArcGIS Collector mobile application to collect the following features:

- Trail alignment and specifications (e.g. length, surface type)
- Environmental and heritage considerations
- Existing and potential access points
- Key linkages
- Support infrastructure (e.g. signage, parking)
- Points of interest (e.g. waterbodies, viewpoints)
- Hazards (e.g. erosion, fallen vegetation).

The on-ground audit process was also supported by a desktop assessment of the Reserve. The desktop assessment was undertaken using ArcGIS Online and Nearmaps and included the analysis of various GIS layers and features including:

- Land Tenure
- Cultural Heritage Sites
- Black Cockatoo Roost Sites
- Priority and Threatened Flora and Fauna
- Threatened Ecological Communities
- Fauna Types
- Vegetation Types
- Environmentally Sensitive Areas
- Dieback Risk
- Bushfire Prone Areas
- Public Drinking Water Source Areas (PDWSAs)
- Water Permit Requirements
- Hydro Zones
- Soil Types
- Topography.

The desktop assessment also involved undertaking an analysis of site specific information and documentation relating to the Reserve, including:

- *Black Cockatoo Survey Report* (Blackwood Basin Group (BBG), 2022)
- *Local Heritage Survey* (Heritage Intelligence WA, 2022)
- *Camera Monitoring Report* (BBG, 2023)
- *Weeds and Flora of Hillman Reserve* (BBG, 2023).

An Impact Evaluation Checklist is included as part of the DBCA *Trails Development Series* (2019) and is used to document the trail assessment and approvals process. This checklist has been completed for the Reserve and is included as Appendix 4: Impact Evaluation Checklist.

An overview of the key findings from the on-ground audit and desktop assessment of the Reserve is provided over the following pages.

### On-Ground Audit Findings

#### Short Loop Walk Trail

There is potential to develop a short loop walk trail at the Reserve. This trail is expected to traverse from the primary trailhead, past Hillman Dam, alongside the concrete channels and returning to the trailhead. There may also be an option to access the viewpoint at Julikin Rock as an additional spur trail. The key features of this trail would include diverse species of wildflowers, historical concrete channels as well as interpretation opportunities for the historical old horse yard and Hillman Dam (at a safe distance of 200m due to the collapsed asbestos roofing).

Due to the relatively flat nature of this section of the Reserve, there is potential for this trail be rated as Class 2, as per the Australian Standards for Walking Tracks Classification and Signage (refer Appendix 2: Walking Trails Classification for further information). A high-level map of this trail is included in Chapter 4: Trail Mapping.



**Figure 2: Concrete Channels**



**Figure 3: Spider Orchids**



**Figure 4: Historical Old Horse Yard**



**Figure 5: Collapsed Asbestos Roofing**



**Figure 6: Short Loop Typical Terrain**



### Long Loop Walk Trail

There is also potential to develop a long loop walk trail at the Reserve which explores the many varying rock formations (including granite outcrops) and gnamma holes and provides opportunities for unobstructed views of the nearby farmland, hills and townsites. This trail is expected to traverse from the primary trailhead, past Hillman Dam, alongside the concrete channels and continue past Julikin Rock along the northern section of the Reserve and returning south to the trailhead.

Due to the relatively steep and undulating nature of this section of the Reserve, there is potential for this trail to be rated as Class 3, as per the Australian Standards for Walking Tracks Classification and Signage (refer Appendix 2: Walking Tracks Classification for further information). A high-level map of this trail is included in Chapter 4: Trail Mapping.



**Figure 7: Gnamma Holes**



**Figure 8: Julikin Rock**



**Figure 9: Rock Formations**



**Figure 10: Long Loop Typical Terrain**

### Additional Short Walk Loop Trail Option

Through discussions with the Shire, it was identified that an additional short walk loop trail option could be provided on the western side of the Reserve. This is expected to be an extension of the short walk loop trail and traverse from the south-west corner of this trail, past the concrete channels, along the western boundary of the Reserve and re-joining the short walk loop trail at the north-west corner.

The western side of the Reserve provides unique and intimate views of the nearby farmland and hills (refer Figure 11). This section of the Reserve features less understory vegetation (refer Figure 12), making it an ideal location for trail development.

The terrain on the western side of the Reserve varies from relatively flat in the southern section, becoming steeper further north towards Julikin Rock. There is potential for this trail to be rated as Class 2, as per the Australian Standards for Walking Tracks Classification and Signage (refer Appendix 2: Walking Tracks Classification for further information). A high-level map of this trail is included in Chapter 4: Trail Mapping.



**Figure 11: View from Hillman Reserve (Western Side)**



**Figure 12: Additional Short Walk Loop Option Typical Terrain**



### Potential Viewpoints

Several potential viewpoints exist throughout the Reserve. There are viewing opportunities at Julikin Rock (refer Figure 13) to the north-west of the Reserve as well as three other rock formations along the northern section of the Reserve. This will provide numerous rest points along the long loop walk trail. There is also a viewing opportunity along the western boundary of the Reserve. There is potential to install small lookouts with picnic settings (i.e. tables and seating) and interpretive signage at these locations.

It is important to note that Hillman Siding (refer Figure 17) was identified as a key potential viewing and interpretive opportunity, however this location is beyond the scope of this project as it is outside of the Focus Area and may be further investigated as a key linkage at the detailed design stage.



**Figure 13: Julikin Rock Viewpoint**



**Figure 14: North-East Viewpoint**



**Figure 15: Northern Viewpoint**



**Figure 16: North-West Viewpoint**



**Figure 17: Hillman Siding**



## 02 Site Assessment

### Primary Trailhead

It was identified that the most suitable location for a primary trailhead and associated parking area is along the eastern boundary of the Reserve (off the perimeter access track). This location is a large area which is relatively clear of any vegetation and would be suitable to park multiple vehicles at one time. The primary trailhead is expected to consist of informal gravel parking bays, seating, shelter, information bay and trailhead signage.



**Figure 18: Perimeter Access Track**



**Figure 19: Proposed Primary Trailhead**

### Access Point

It was identified that the most suitable access point to the Reserve is via the north-east corner of the Reserve. This access point requires the formalisation of a spur trail which traverses from the Collie to Darkan Rail Trail, along gazetted road reserves which pass between properties, along the Reserve's perimeter access track and to the primary trailhead.

The section of the gazetted road reserve from Hillman-Dardadine Road to South Road is already fenced and a track exists in this section. The section from South Road to the Reserve is not fenced and requires the development of a track. This road also crosses over Hillman River and would require the installation of a culvert or bridge.

The spur trail would be approximately 4km in length and is expected to be suitable for both vehicles looking to park at the primary trailhead, and pedestrians who are using the nearby Collie to Darkan Rail Trail. This option provides the least disturbance to the surrounding private land owners.



**Figure 20: Gazetted Road Reserve**



**Figure 21: Hillman River Crossing**



### Desktop Assessment Findings

#### Land Tenure

The Reserve is managed by the DBCA as a Class A Nature Reserve designated for water and conservation of flora and fauna (R16904). The gazetted road reserves which traverse from the Hillman-Dardadine Road, between properties and along the eastern boundary of the Reserve are under the management of the Shire. It is expected that any proposed walk trails within the Reserve would be owned by DBCA and managed by the Shire as part of the Darkan to Dardadine section of the Collie to Darkan Rail Trail.

The surrounding land ownership includes private land and Shire road reserves. The development of a spur trail along the gazetted road reserves may involve further consultation with adjacent landowners.

A pending exploration license (E 7006534) currently exists over the Reserve and has been granted to South Boddington Gold Pty Ltd. This presents a potential future threat to recreational trails on this land and authorises the licensee to enter and explore the land over which the license is granted. It also allows the licensee to extract or disturb up to 1,000 tonnes of material from the land. Licenses are granted for five years and may be extended by an additional five years and further period of two years thereafter.

#### Cultural Heritage Sites

A search of the Western Australian (WA) Heritage Council website titled 'InHerit' found that there is one cultural heritage site located within the Reserve: Hillman Dam (WA Heritage Council, 2017). 'InHerit' contains information about cultural heritage places and listings on the State Register of Heritage Places, Australian Government's Heritage List, local government inventories and non-government lists and surveys.

As per the Shire's *Local Heritage Survey* (Heritage Intelligence WA, 2022), Hillman Dam and the associated concrete channels are listed as a Category 2 Heritage Place, which is a place of considerable cultural heritage significance to the Shire that is worthy of recognition and protection through

provisions in the Shire's *Town Planning Scheme*. A planning application needs to be submitted to the Shire for any proposed development. It is recommended that Hillman Dam and concrete channels are retained and conserved.

Hillman Dam is important for its connection with the railways which assisted in the development of the district. When the Narrogin to Collie Railway was built in 1906, a concrete weir was constructed across the Hillman River. A steam engine was used to pump water to the overhead tank located at Hillman Siding for the steam trains. By the early 1930s, the water had become too saline, causing the engine boilers to rust, and a new dam was built, using the catchment from the Julikin Rock. Hillman Dam is also noted for its association with the Great Depression of the 1930s which had a catastrophic effect on the lives and financial affairs of those at the time.

The size of Hillman Dam is approximately 100m by 60m. The entire Dam was covered by an asbestos roof supported by timber uprights; however, the roof has collapsed in many places. Above Hillman Dam, a concrete channel runs approximately 1.5km to Julikin Rock, where a rock wall guides water into the channel. The rock wall contains some large flat granite rocks. About 40m east of the rock and 20m south of channel is a well which was likely used during construction of Hillman Dam. Horse yards remain near Hillman Dam which were also likely used during construction.

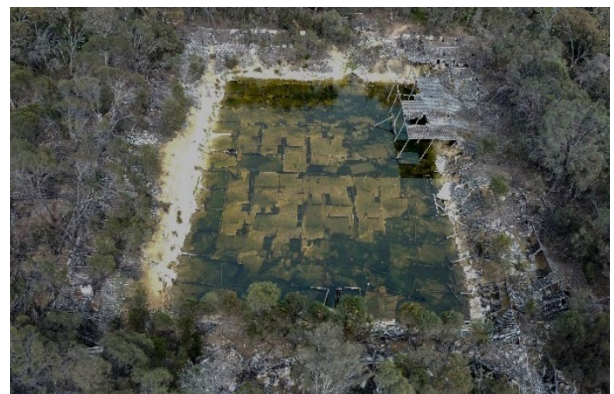


Figure 22: Hillman Dam

An analysis of the *Aboriginal Heritage Places Dataset* (Department of Planning, Lands and Heritage (DPLH), 2023) identified that there are no known registered Aboriginal Heritage Sites within the Reserve. This Dataset contains places within WA that have been reported to the Registrar of Aboriginal Sites as possible Aboriginal Sites within the meaning of Section 5 of the *Aboriginal Heritage Act 1972*.

### Black Cockatoo Roost Sites

An analysis of the *Black Cockatoo Roosting Sites Dataset* (DBCA, 2019) was conducted. This Dataset contains information from the Great Cocky Count event which takes place annually in early to mid-April. Three species of black cockatoos are recorded, including Carnaby's Black Cockatoo, Baudin's Black Cockatoo and Forest Red Tailed Black Cockatoo. These species are listed as threatened under State and Commonwealth legislation.

In WA, the Carnaby's Black Cockatoo and Baudin's Black Cockatoo are listed as endangered fauna, and the Forest Red Tailed Black Cockatoo is listed as vulnerable fauna under WA's *Biodiversity Conservation Act 2016*. It is an offence to take or disturb a threatened species or modify an occurrence of a threatened ecological community unless authorisation is granted under the *Biodiversity Conservation Act 2016*.

There are currently no known Black Cockatoo Roost Sites within the Reserve. As per the *Black Cockatoo Survey Report* (BBG, 2022), no obvious signs of Black Cockatoo activity were observed in the Reserve, although several potential suitable hollows were observed. The nearest Black Cockatoo Roost Site is situated approximately 5km south of the Reserve in Darkan. This has been identified as a Carnaby's Black Cockatoo Roost Site.

### Priority and Threatened Flora and Fauna

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction or otherwise in need of special protection and have been gazetted as such.

Priority species that are possibly threatened species and do not meet survey criteria, or are otherwise data deficient, are added to the priority fauna or priority flora lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species that are adequately known, rare but not threatened, meet criteria for near threatened, or have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Threatened species are listed by order of the Minister for Environment as threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016*. The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria.

The Minister for Environment may list a species as threatened under the *Biodiversity Conservation Act 2016*. This gives special protection to the threatened species. It is prohibited to take or disturb a threatened species unless authorisation is granted under the *Biodiversity Conservation Act 2016*. Substantial penalties apply for impacts to threatened species without an authorisation.

There are two priority and two threatened fauna species which have previously been recorded in the Reserve. These include:

- *Platycercus icterotis* (Inland Western Rosella, Priority 4)
- *Isoodon obesulus* (South Western Brown Bandicoot, Priority 4)
- *Bettongia penicillata* (Brush-Tailed Bettong, Critically Endangered)
- *Dasyurus geoffroii* (Western Quoll, Vulnerable).



## 02 Site Assessment

The following table provides a summary of the characteristics for the above priority and threatened fauna species, including their name, breeding information and preferred habitat.

**Table 1: Priority and Threatened Fauna**

Name	Breeding Info	Habitat
<i>Platycercus icterotis</i>	Seasonal breeder, nests on bed of wood dust/debris in tree hollows	Eucalypt woodlands and open forest
<i>Isoodon obesulus</i>	Breed throughout the year with a peak in spring	Forest, woodlands, heath and coastal scrub, usually on sandy combination soils
<i>Bettongia penicillata</i>	Breed throughout the year if conditions are favourable, nests in shallow scrape under bush	Dry sclerophyllous forest with a dense understory, including low arid scrub or desert spinifex grasslands
<i>Dasyurus geoffroii</i>	Seasonal breeders, mate between late April to July, with a peak in June	Wet and dry sclerophyll forests including contiguous jarrah and mallee. These areas consist of open forest, low open forest, woodland and open shrub

As per the *Weeds and Flora of Hillman Reserve* (BBG, 2023), there are three priority flora species which have previously been recorded in the Reserve. These include:

- *Stylidium rhipidium* (Priority 3)
- *Thysanotus cymosus* (Priority 3)
- *Xanthorrhoea brevistyla* (Priority 4).

The following table provides a summary of the characteristics for the above priority flora species, including their name, type, flowering months and preferred habitat.

**Table 2: Priority Flora**

Name	Type	Month	Habitat
<i>Stylidium rhipidium</i>	Slender annual herb, 0.05m high	Oct to Nov	Sandy soils, wet creek flats, swamps, granite outcrops
<i>Thysanotus cymosus</i>	Caespitose perennial herb (with fibrous roots and ellipsoidal tubers), 0.3m high	Sep to Oct	Clay, granitic or lateritic sand
<i>Xanthorrhoea brevistyla</i>	Perennial tree-like monocot (usually no trunk), up to 3.5m high	Oct to Dec	Sand, clay, laterite

### Threatened Ecological Communities

An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat. Its structure, composition and distribution are determined by environmental factors such as soil type, position in the landscape, altitude, climate and water availability. Types of ecological communities listed under national environmental law include woodlands, grasslands, shrublands, forests, wetlands, marine, ground springs and cave communities.

An ecological community becomes threatened when it's at risk of extinction (i.e. the natural composition and function of the ecological community has been significantly depleted across its full range). This can occur for a number of reasons including clearing of native vegetation, inappropriate fire regimes, non-native or invasive species, climate change, water diversion, pollution and urban development.

## 02 Site Assessment

An analysis of the *Threatened Ecological Communities Dataset* (DBCA, 2022) found that there are no threatened ecological communities within the Reserve.

### Fauna Types

In addition to the priority and threatened fauna species, according to the *Camera Monitoring Report* (BBG, 2023), the following fauna types (native and non-native) have been identified in the Reserve, based on camera monitoring results from the 11<sup>th</sup> of May 2023 until the 9<sup>th</sup> of June 2023.

- *Vulpes vulpes* (Fox, x5)
- *Felis catus* (Cat, x1)
- Species unknown (Rat, x4)
- *Phascogale calura* (Red-Tailed Phascogale, x4)
- *Trichosurus vulpecula* (Brush-tail Possum, x12)
- *Accipiter fasciatus* (Brown Goshawk, x1).

There were also numerous native reptile species identified during the on-ground site audit, including a dugite and shingleback lizard. It is important to note that this is not an exhaustive list and is based on available information and data. Further fauna surveys may be required at the detailed design stage.

### Vegetation Types

The *Black Cockatoo Survey Report* (BBG, 2022) found that the following types of tree species exist within the Reserve.

- Jarrah (south, west, north, east)
- Wandoo (south, south-west, west, north, east)
- Marri (south, west).

The *Camera Monitoring Report* (BBG, 2023) found that the Reserve, while still containing sizeable areas of significant degradation, contains much more substantial expanses of healthy, dense understory vegetation. This healthier ecosystem translates into a greater diversity of fauna observed. The dense Sheoak thickets in the Reserve play a crucial role in providing a suitable habitat for the Red-Tailed Phascogale.

A number of native wildflowers were also identified during the on-ground site audit, including spider orchids and cowslip orchids. Refer to Appendix 1: Weeds and Flora of Hillman Reserve for further information on the surveyed native and non-native vegetation types within the Reserve. It is important to note that this not an exhaustive list and is based on available information and data. Further vegetation surveys may be required at the detailed design stage.

### Environmentally Sensitive Areas

The *Environmentally Sensitive Areas Dataset* (Department of Water and Environmental Regulation (DWER), 2022) provides assistance to landowners and managers in determining the location of environmentally sensitive areas under the *Environmental Protection Act 1986*. Environmentally sensitive areas are classes or areas of native vegetation where the exemptions for clearing vegetation under the *Environmental Protection Regulations 2004* do not apply. An analysis of this Dataset identified that there are currently no environmentally sensitive areas within the Reserve.

### Dieback Risk

An analysis of *Forest Disease Risk Areas Dataset* (DBCA, 2019) was conducted. This includes areas of forest and vegetation which are subject to the risk of infection from dieback (a highly contagious fungal disease). Strict quarantine and access restrictions apply to these areas of forest and vegetation. There are currently no forest disease risk areas within the Reserve.

### Bushfire Prone Area

The *Bush Fire Prone Areas Dataset* (Department of Fire and Emergency Services (DFES), 2021) identifies current bushfire prone areas of WA. The entirety of the Reserve is designated as a bushfire prone area. Designated bushfire prone areas have been identified by the Fire and Emergency Services Commissioner as being subject, or likely to be subject, to bushfire attack. A bushfire prone area is identified by the presence of, and proximity to, bushfire prone vegetation and includes both the area containing the bushfire prone vegetation and



a 100m buffer zone immediately surrounding it.

Additional planning and building requirements may apply to the development of infrastructure within bushfire prone areas, in accordance with the *Planning and Development (Local Planning Schemes) Regulations 2015*, *State Planning Policy 3.7 Planning in Bushfire Prone Areas* and the Building Code of Australia. Further assessment of bushfire risk may also be required to ensure future developments in bushfire prone areas are safer. It will be important to consider these requirements in future trail planning and design.

### Public Drinking Water Source Areas

PDWSAs are surface water catchments and groundwater areas that provide drinking water to cities, towns and communities throughout WA. PDWSAs are proclaimed under the *Metropolitan Water Supply, Sewerage, and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*. The *Public Drinking Water Source Areas Dataset* (DWER, 2023) is used in policy decision making and to provide advice about protecting drinking water quality when land uses and activities (including recreation) are proposed in PDWSAs. An analysis of this Dataset found that the Reserve is not located within a PDWSA.

### Water Permit Requirements

It was identified that a water permit may be required for the proposed construction of the river crossing across Hillman River. There are several factors which determine whether proposed activities require approval from DWER (Refer Appendix 5: Water Permit Checklist). Given that Hillman River is not located within a proclaimed surface water area and the development does not involve taking, storing or diverting water, it is unlikely that a water permit application would be required.

### Hydro Zones

An analysis of the *Hydrological Zones of WA Dataset* (Department of Primary Industries and Regional Development (DPIRD), 2022) was conducted. Hydrological zones are a broad spatial framework grouping areas with similar hydrology. They are used to report on dryland salinity and acidification of inland waterways.

The Reserve is located within the hydrological zone of the Eastern Darling Range. This is categorised by a moderately to strongly dissected lateritic plateau on granite with eastward flowing streams in broad shallow valleys and some surficial Eocene sediments. Soils are formed in laterite colluvium or weathered in-situ granite.

The Eastern Darling Range hydrological zone consists of mainly low-yielding saprolite aquifers (brackish to saline). Palaeochannels and sandy Eocene aquifers occur in some valleys (fresh to brackish). Groundwater discharge may occur in drainage lines and on valley floors in cleared catchments within the hydrological zone. Discharge associated with dolerite dykes is the dominant discharge process in mid to upper slope landscape positions. Groundwater discharge is an important consideration when developing an alignment for the new trail network.

### Soil Types

DPIRD publishes the best available spatial information regarding soil landscape mapping across WA. Analysis of the *Soil Landscape Mapping Best Available Dataset* (DPIRD, 2022) identified that there are four different soil types located within the Reserve (refer Table 3).

**Table 3: Soil Types**

Location	Type	Description
Hillman Reserve Southern Boundary	Darkan 1 Subsystem	Gravelly hill crests and upper slopes with mainly yellowish brown sandy and loamy gravels
Hillman Reserve Southern Section	Darkan 2 Subsystem	Slopes of the Darkan System with mainly moderately deep sandy gravels and grey deep sandy duplex soils

## 02 Site Assessment

Location	Type	Description
Hillman Reserve North West and North East Sections	Darkan 1 Steep Phase	Steeper slopes of the gravelly uplands (Darkan 1) with mainly deep sandy gravels and large areas of shallow to moderately deep sandy gravels
Hillman Reserve Northern Section	Darkan 3 Subsystem	Slopes with red deep and shallow loamy and sandy duplex soils and grey deep sandy and loamy duplex soils associated with rock outcrops

Trails require a solid and sustainable tread. Soil type and texture have a major influence on drainage and durability. Clay and silt have the smallest particles. Small particles tend to be muddy when wet, dusty when dry and do not provide good drainage. Sand comprises of large particles that don't bind together and are very unstable. The best trail soil type is a mixture of clay, silt and sand.

### Topography

The northern portion of the Reserve (north of Julikin Rock) features the highest elevation range of between 270m and 350m above sea level. This provides sweeping views of the surrounding farmland and hills; however, it also presents difficulties regarding accessibility due to the undulating nature of the terrain. The southern portion of the Reserve (south of Julikin Rock) features more gradual undulations and is relatively flat, with elevations of between 260m and 280m above sea level. This presents opportunities for the development of an easier walk trail which is more accessible to a range of age groups.



03

# Challenges and Opportunities


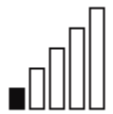




# 03 Challenges and Opportunities

## SWOT Analysis


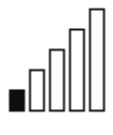


The strengths, weaknesses, opportunities and threats (SWOT) associated with the Reserve are identified and summarised in the following table. The information has been derived from the key findings of the preceding sections of the report, including the desktop assessment, on-ground audit and discussions with the Shire.

**Table 4: SWOT Analysis**

Strengths 	Weaknesses 	Opportunities 	Threats 
Ideally located within close proximity to the Collie to Darkan Rail Trail and the Darkan Town Centre as well as key population centres.	River crossing (culvert or bridge) required for the spur trail.	Potential to develop a small loop walk trail in the southern section and a long loop walk trail in the northern section of the Reserve.	Potential public health risks from the collapsed asbestos roofing at Hillman Dam. *
The Reserve is a peaceful and quiet location with views of the surrounding farmland, townsites and hills.	The Reserve is managed by DBCA, therefore permitted activities may include low impact recreation such as bushwalking and trail running (i.e. no mountain biking etc.).	Potential to develop a primary trailhead and associated parking area on the eastern boundary of the Reserve.	Potential impacts of trail development on environmental and cultural heritage values.
Strong community interest and support for trails at the Reserve (as per previous community consultation).	Several invasive fauna species and non-native flora species are found within the Reserve.	Interpretive opportunities highlighting the cultural heritage (e.g. Hillman Dam and concrete channels) and environmental significance of the Reserve.	Potential opposition to the trail development proposal by private landowners.
The Reserve features interesting and diverse vegetation types, wildflowers and native fauna.	Several priority and threatened fauna species are located within the Reserve which require protection (noting that this could also be viewed as a strength).	Opportunity to provide viewpoints at different locations throughout the trail network including Julikin Rock and other rock formations.	Lack of funding/competing funding priorities and limited capability of private landowners to financially contribute to trail development and management.
Interesting cultural heritage features at the Reserve (e.g. Hillman Dam, concrete channels).	The Reserve is located within a bushfire prone area whereby additional planning requirements may apply.	Potential to provide trail infrastructure (i.e. seating, shelter etc.) and signage (i.e. trailhead, interpretive, wayfinding, directional).	Inappropriate and unauthorised use of trails or damage to supporting infrastructure (e.g. rubbish dumping, vandalism, use by motorised vehicles).



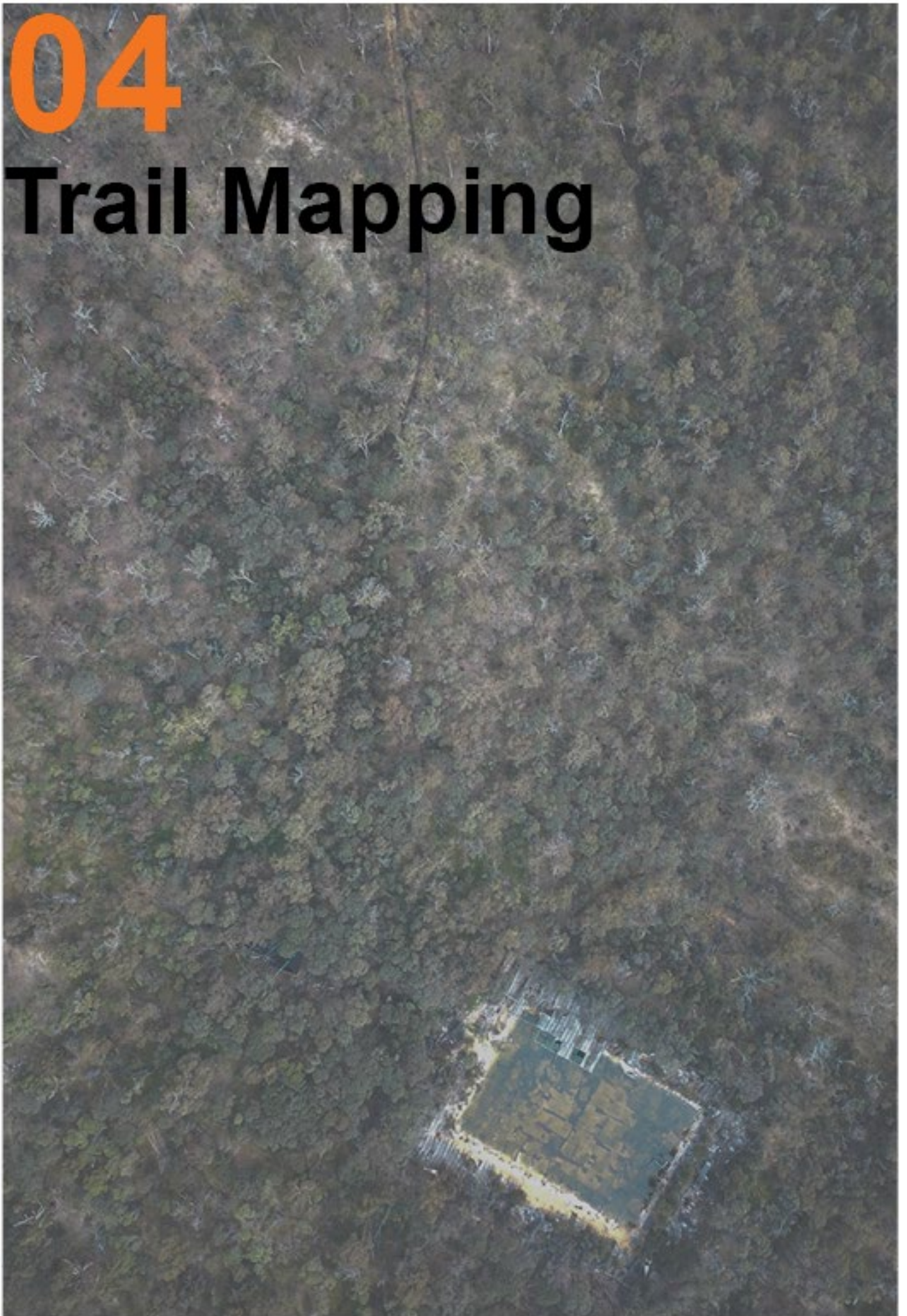
## 03 Challenges and Opportunities

Strengths 	Weaknesses 	Opportunities 	Threats 
Varying landscape (i.e. steeper terrain in the northern section and flatter terrain in the southern section of the Reserve).	Public access to Hillman Dam is not permitted due to the presence of asbestos.	Opportunity to develop a spur trail to promote access from the Collie to Darkan Rail Trail.	Increasing impacts of climate change on natural areas (i.e. bushfires, floods etc.).
There are currently no forest disease risk areas in the Reserve.		The flatter terrain in the southern section of the Reserve provides opportunities for less experienced bushwalkers and people from different age groups.	The resources required for ongoing management and maintenance of the trail network.
The Reserve is not located within a PDWSA or an environmentally sensitive area.		The steeper terrain in the northern section of the Reserve provides opportunities for more experienced bushwalkers.	
No threatened ecological communities recorded in the Reserve.		Economic benefits of attracting new visitors to the Shire and providing short stay accommodation on adjacent properties.	
High participation rates in bushwalking and recreational walking in WA and the Shire.		Enhanced access to natural areas and increased health and fitness benefits for visitors and the local community.	
		Potential for local Traditional Owner input into the trail network to grow cultural tourism and showcase Indigenous connections to country.	
		Potential to work with DBCA and volunteers to manage, maintain and promote (e.g. maps, brochures) the trail network (e.g. via a Memorandum of Understanding (MOU)).	

\* Contaminated is defined under the Contaminated Site Act 2003 as: In relation to land, water or a site, means having a substance present in or on that land, water or site at above background concentrations that presents, or has the potential to present, a risk of harm to human health, the environment or any environmental value.

04

# Trail Mapping





## Trail Concept Map

A high-level trail concept map has been developed for the Reserve (refer Figure 23 below). Based on the site assessment process and discussions with the Shire, the following four trail alignments have been recommended within the Reserve:

- Long Loop Walk Trail
- Short Loop Walk Trail
- Short Loop Walk Trail – Spur Trail Option (to Julikin Rock)
- Additional Short Loop Walk Trail Option.

A dual-use vehicle and pedestrian spur trail has also been recommended which traverses from the Collie to Darkan Rail Trail, along gazetted road reserves which pass between properties, along the Reserve's perimeter access track and to the primary trailhead. This trail is the most suitable access point in/out of the Reserve and will provide an important link to the Collie to Darkan Rail Trail.

A road crossing point has been recommended across Hillman-Dardadine Road to ensure safe access for pedestrians. A river crossing (i.e. culvert or bridge) is required to ensure safe access for pedestrians and vehicles across the Hillman River, particularly during the winter months.

The primary trailhead has been proposed at the existing clearing on the eastern boundary of the Reserve. It is recommended that the primary trailhead includes informal gravel parking bays, seating, shelter, information bay and trailhead signage with a map of the trail alignments, walking tracks classification, risk management and safety information.

Several interpretive opportunities are recommended throughout the Reserve to highlight the unique heritage and environmental values. These include:

- Old Horse Yards
- Hillman Dam (set back by 200m due to the collapsed asbestos roofing)
- Concrete Channels
- Julikin Rock and Gnamma Holes
- Native Flora and Fauna.

Viewpoints/rest stops have been recommended at key locations across the trail network, particularly along the long loop walk trail due to the higher elevation and rocky terrain, providing views of the surrounding area. These locations include Julikin Rock and the three other northern rock formations. Another viewpoint/rest stop has been recommended along the additional short loop walk trail option, providing unique views from the western side of the Reserve.

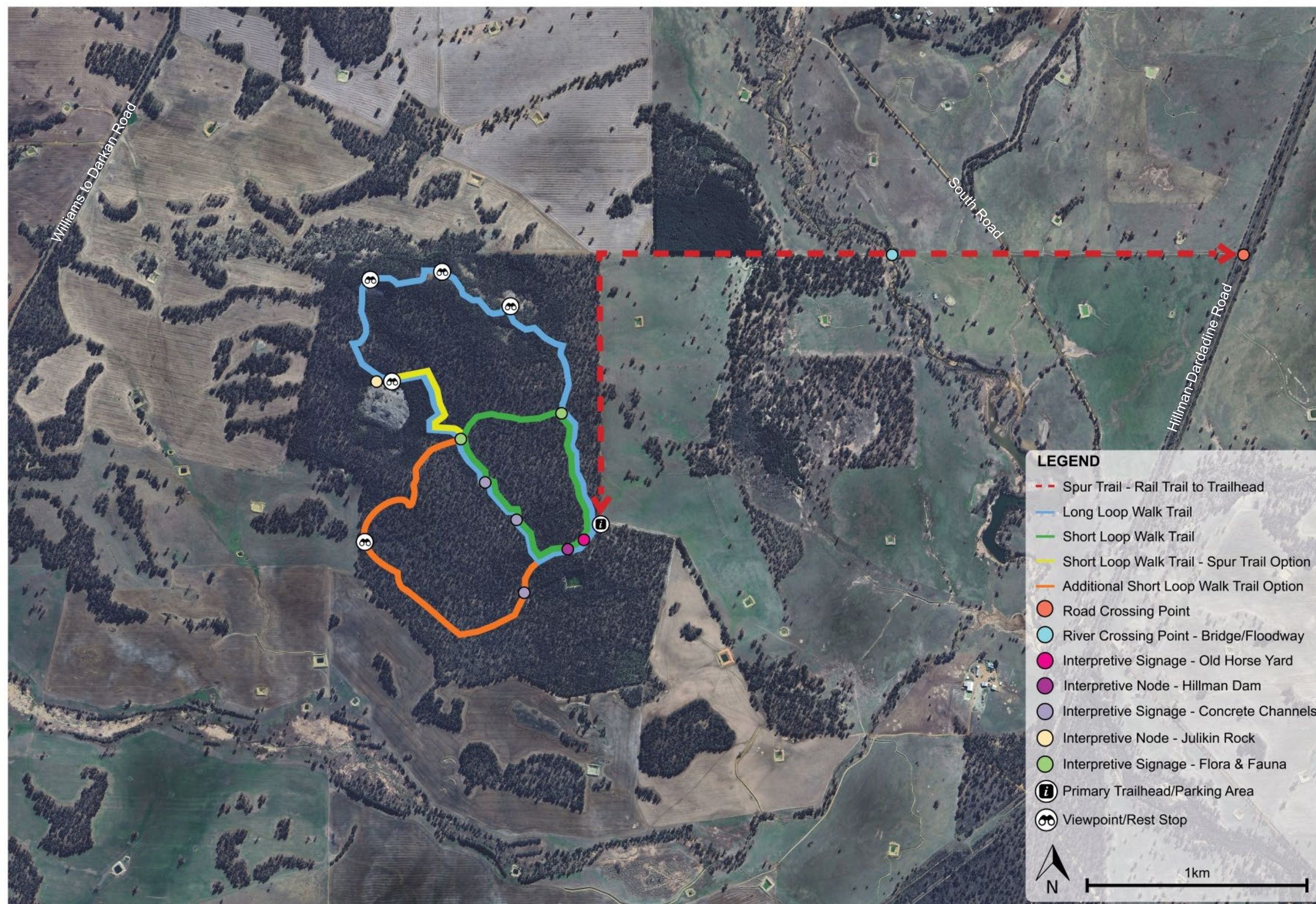
The following table provides a summary of the five proposed trails, including their suggested trail classification (refer Appendix 2: Walking Tracks Classification) and approximate length.

**Table 5: Hillman Reserve Proposed Trails**

Trail Name	Suggested Trail Class	Approximate Length
Long Loop Walk Trail	Class 3	4.4km
Short Loop Walk Trail	Class 2	2.2km
Short Loop Walk Trail – Spur Trail Option	Class 3	600m
Additional Short Loop Walk Trail Option	Class 2	2km
Spur Trail – Rail Trail to Trailhead	Class 2	4.2km

It is important to note that the locations of the trail alignments, signage and associated supporting infrastructure are indicative only and will be further assessed and refined during the detailed design stage.





**Figure 23: Hillman Reserve Trail Map**



# 05

## Implementation



## Implementation Plan

### Prioritisation

A prioritised Implementation Plan has been prepared to enable a staged approach for the walk trails within the Reserve. Strategies have been prioritised as High, Medium or Low based on the following.

- Benefit: overall benefit to the Shire and local community (social, environmental, economic)
- Need/Demand: field observations and requirements to mitigate existing levels of risk
- Feasibility: project size, resource requirements, social, economic or environmental constraints and likelihood of successful implementation.

It is anticipated that the implementation of some actions may include consultation with stakeholders and the wider community.

### Indicative Timeframes

Indicative timeframes have been identified for each action, acknowledging that it is not feasible to deliver all of the identified actions at the same time.

Timeframes are indicated as follows:

- Immediate: 2024
- Short: 2024/2025 – 2025/2026
- Medium: 2026/2027 – 2027/2028
- Long: 2028/2029 – 2029/2030
- Ongoing.

These timeframes should be reviewed periodically acknowledging that the schedule of implementation will be influenced by funding priorities/availability, resourcing capacity, Council priorities and level of stakeholder and community support.

### Indicative Costings

An estimate of the resources required to implement each action has been identified to assist Council with its budget processes. These are broad estimates and should be reviewed prior to implementation or as part of annual business and budget planning. The following indicative cost estimates have been used.

- Low: <\$50,000
- Medium: \$50,000-\$100,000
- High: >\$100,000.

### Partners

A range of partnerships will be required for the implementation. Key partners are likely to include the Shire, DBCA, DWER, Trails WA, South West Aboriginal Land and Sea Council (SWALSC), Traditional Owners, external consultants, private landowners and local residents. Each action's lead partner is listed in bold. The partners listed are indicative, rather than officially allocated, and may change over time.

### Implementation

The following Implementation Plan provides an overall action, priority level, indicative timeframe, indicative costing and identifies the relevant partner/s. The Implementation Plan is based on the findings from the preceding chapters of this report.



**Table 6: Implementation Plan**

Ref	Action	Priority	Timeframe	Cost	Partners
1	Seek external funding via the WA Trail Planning Grants Program for the planning and development of walk trails at the Reserve.	High	Immediate	Low	<b>Shire</b> DBCA
2	Undertake consultation with SWALSC and local Traditional Owners to identify potential Aboriginal Cultural Heritage Sites and interpretive opportunities for the trail development at the Reserve.	High	Immediate	Low	<b>Shire</b> External Consultant SWALSC Traditional Owners
3	Undertake consultation with the adjoining landowners to advise of the proposed spur trail and trail development at the Reserve.	High	Immediate	Low	<b>Shire</b> Private Landowners
4	Construct a fenced dual-use vehicle and pedestrian spur trail and river crossing (i.e. culvert or bridge) across Hillman River to ensure safe access for pedestrians and vehicles across the Hillman River.	High	Immediate	High	<b>Shire</b> External Consultant
5	Engage a suitably qualified trail planning firm to undertake Stage 4 of the Trail Development Process (i.e. development concept plans for the proposed walk trail network), including: <ul style="list-style-type: none"> <li>• Long Loop Walk Trail</li> <li>• Short Loop Walk Trail</li> <li>• Short Loop Walk Trail – Spur Trail Option (to Julikin Rock)</li> <li>• Additional Short Loop Walk Trail Option.</li> </ul> This is expected to include the identification of preferred trail alignments and the location of signage, viewpoints, parking and supporting infrastructure.	High	Immediate	Low	<b>Shire</b> External Consultant
6	Work with DBCA to review the existing relevant and up-to-date flora and fauna information, including priority and threatened species, potential impacts and mitigation measures for the Reserve.	Medium	Immediate/ Ongoing	Low	<b>Shire</b> DBCA
7	Work with DBCA to review the existing relevant and up-to-date weed information and consider resources for monitoring and management in the Reserve.	Low	Immediate/ Ongoing	Low	<b>Shire</b> DBCA
8	Engage a suitably qualified trail planning and construction firm to undertake Stages 5 to 7 of the Trail Development Process, including corridor evaluation, detailed design and construction of the trail network (refer to Ref 1 above).	Medium	Short	Medium	<b>Shire</b> DBCA External Consultant

## 05 Implementation

Ref	Action	Priority	Timeframe	Cost	Partners
9	Consider developing a MOU with DBCA for the management of the walk trails within the Reserve as well as a Bushfire Management Plan for the management of bushfire risk.	High	Short	Low	<b>Shire DBCA</b>
10	Develop and implement a Trail Signage and Infrastructure Plan for the walk trails, ensuring that trail signage clearly identifies permitted usage (i.e. no public vehicle use), risk management measures and trail user code of conduct. Types of signage may include wayfinding, interpretive, trailhead and management.	Medium	Short	Low	<b>Shire</b> External Consultant
11	Ensure protection of the cultural heritage sites within the Reserve (i.e. signage and fencing).	Medium	Short	Medium	<b>Shire DBCA</b>
12	Develop a primary trailhead which includes informal gravel parking bays, seating, shelter, information bay and trailhead signage.	High	Medium	Medium	<b>Shire DBCA</b>
13	Install primary trailhead sign at the parking area to provide trail information (i.e. grade, distance, time, map, safety) and meet AS2156.1.	High	Medium	Low	<b>Shire</b> DBCA External Consultant
14	Install wayfinding in consistent style at key locations to clearly define trail alignment (e.g. track markers should have the shape of a directional arrow on a square background of a minimum 90mm x 90mm).	High	Medium	Medium	<b>Shire</b> DBCA External Consultant
15	Consider installing interpretive signage for the following features: <ul style="list-style-type: none"> <li>• Old Horse Yards</li> <li>• Hillman Dam (set back by 200m due to the collapsed asbestos roofing)</li> <li>• Concrete Channels</li> <li>• Julikin Rock and Gnamma Holes</li> <li>• Native Flora and Fauna.</li> </ul>	High	Medium	Medium	<b>Shire</b> DBCA External Consultant
16	Install viewpoints at strategic locations throughout the walk trail network (e.g. Julikin Rock and the other northern rock formations).	Low	Medium	Medium	<b>Shire</b> DBCA External Consultant
17	Formalise a road crossing point across Hillman-Dardadine Road (e.g. safety signage) to ensure safe access to/from the Collie to Darkan Rail Trail.	Medium	Medium	Low	<b>Shire</b>
18	Consider establishing a local community group which contributes volunteer resources to trail maintenance efforts.	Low	Long/ Ongoing	Low	<b>Shire</b> Local Residents



## 05 Implementation

Ref	Action	Priority	Timeframe	Cost	Partners
19	Once the walk trails have been developed at the Reserve, upload trail information onto the Shire's website and consider promoting GIS enabled maps and file downloads of the trail alignment. Submit the walk trail alignments for inclusion on the Trails WA online database.	Low	Long	Low	Shire Trails WA
20	Once the walk trails have been developed at the Reserve, design a brochure which includes the necessary levels of information such as trail alignment, trail etiquette and risk management as well as images of the Reserve for promotion and marketing.	Low	Long	Low	Shire
21	Inspect and maintain the trail network in line with maintenance intervals recommended in AS2156.1.	Low	Long/ Ongoing	Low	Shire Local Residents

# 06

## Appendices





### **List of Appendices**

Appendix 1: Weeds and Flora of Hillman Reserve

Appendix 2: Walking Tracks Classification

Appendix 3: Eight Stage Trail Development Process

Appendix 4: DBCA Impact Evaluation Checklist

Appendix 5: Water Permit Checklist

## Appendix 1: Weeds and Flora of Hillman Reserve

Table 7: Weeds and Flora List

WEED LIST HILLMAN	OCT./NOV./DEC./ 2022, JAN./	FEB./MAR./ 2023
FAMILY	GENUS	SPECIES
POACEAE	Aira	sp.
ASTERACEAE	Arctotheca	calendula
POACEAE	Avena	sativa
POACEAE	Briza	maxima
POACEAE	Briza	minor
ASTERACEAE	Carduus	sp.
GENTIANACEAE	Centaurium	erythraea
ORCHIDACEAE	Disa	bracteata
ASTERACEAE	Hypochaeris	glabra
POACEAE	Lothium	rigida
PRIMULACEAE	Lysimachia	arvensis
OROBANCHACEAE	Orobanche	ramosa
ASTERACEAE	Osteospermum	fruticosum
OROBANCHACEAE	Parentucellia	latifolia
IRIDACEAE	Romulea	rosea
FABACEAE	Trifolium	dubium
ASTERACEAE	Ursinia	anthemoides
FLORA LIST HILLMAN	OCT./NOV./DEC./ 2022, JAN./	FEB./MAR./ 2023
FAMILY	GENUS	SPECIES
FABACEAE	Acacia	acuminata
FABACEAE	Acacia	celastrifolia
FABACEAE	Acacia	Lasiocarpa ? Var sedifolia
FABACEAE	Acacia	leptospermoides ssp leptospermoides
FABACEAE	Acacia	? microbotrya
FABACEAE	Acacia	nervosa
FABACEAE	Acacia	? rupicola
FABACEAE	Acacia	saligna
FABACEAE	Acacia	sp.
ROSACEAE	Acaena	echinata
CASUARINACEAE	Allocasuarina	huegeliana
HAEMODORACEAE	Anigozanthos	bicolor
HAEMODORACEAE	Anigozanthos	humilis
CENTROLEPIDACEAE	Aphelia	? drummondii (listed for DBCA quadrat)
POACEAE	Austrostipa	elegantissima
POACEAE	Austrostipa	variabilis
PROTEACEAE	Banksia	squarrosa
PITTOSPORACEAE	Billardiera	fusiformis
PITTOSPORACEAE	Billardiera	variifolia
ASTERACEAE	Blennospora	drummondii
BORYACEAE	Borya	scirpoidea
BORYACEAE	Borya	sphaerocephala
FABACEAE	Bossiaea	eriocarpa
COLCHIACEAE	Burchardia	monantha
HEMEROCALLIDACEAE	Caesia	sp. Wongan (was Caesia alfordii)
ORCHIDACEAE	Caladenia	barbarossa
ORCHIDACEAE	Caladenia	flava
ORCHIDACEAE	Caladenia	reptans ssp reptans
ORCHIDACEAE	Caladenia	sp.
MYRTACEAE	Calytrix	flavescens



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HAEMEROCALLIDACEAE	Chamaescilla	corymbosa
RANUNCULACEAE	Clematis	pubescens
CENTROLEPIDACEAE	Centrolepis	drummondiana
PTERIDACEAE	Cheilanthes	austrotenuifolia
POLYGALACEAE	Comesperma	? polygaloides
HAEMODORACEAE	Conostylis	pusilla
MYRTACEAE	Corymbia	calophylla
CRASSULACEAE	Crassula	extrorsa
GOODENIACEAE	Dampiera	pedunculata
FABACEAE	Daviesia	sp.
APIACEAE	Daucus	glochidiatus
RESTIONACEAE	Desmocladius	asper
RESTIONACEAE	Desmocladius	fascicularis
HAEMEROCALLIDACEAE	Dianella	revoluta
ASPARAGACEAE	Dichopogon	capillipes
ORCHIDACEAE	Diuris	sp.
SAPINDACEAE	Dodonaea	viscosa
DROSERACEAE	Drosera	barbigera
DROSERACEAE	Drosera	glanduligera
DROSERACEAE	Drosera	leucoblasta
DROSERACEAE	Drosera	pallida
DROSERACEAE	Drosera	stricticaulis
ORCHIDACEAE	Elythranthera	emarginata
MYRTACEAE	Eucalyptus	latens
MYRTACEAE	Eucalyptus	marginata
MYRTACEAE	Eucalyptus	wandoo
FABACEAE	Gastrolobium	bilobum
FABACEAE	Gastrolobium	praemorsum
FABACEAE	Gastrolobium	spinosum
HALORAGACEAE	Glischrocaryon	aureum
GOODENIACEAE	Goodenia	trinervis
FABACEAE	Gompholobium	marginatum
FABACEAE	Gompholobium	tomentosum
PROTEACEAE	Grevillea	bippinatifida
HAEMODORACEAE	Haemodorum	spicata
PROTEACEAE	Hakea	lissocarpa
PROTEACEAE	Hakea	undulata
BORAGINACEAE	Halgania	anagalloides
ASTERACEAE	Helichrysum	leucopsidium
DILLENIACEAE	Hibbertia	? commutata
DILLENIACEAE	Hibbertia	? glaucophylla (was rupicola)
ASTERACEAE	Hyalosperma	cotula
FABACEAE	Jacksonia	condensata
FABACEAE	Kennedia	prostrata
MYRTACEAE	Kunzea	micromera
MYRTACEAE	Kunzea	preissiana
ASTERACEAE	Lagenophora	huegelii
CYPERACEAE	Lepidosperma	leptostachyum
CYPERACEAE	Lepidosperma	resinosum
GOODENIACEAE	Leschenaultia	biloba
ERICACEAE	Leucopogon	? australis
STYLIDIACEAE	Levenhookia	pusilla
STYLIDIACEAE	Levenhookia	stipitata
CAMPANULACEAE	Lobelia	tenuior

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ASPARAGACEAE	Lomandra	caespitosa
PHYLLANTHACEAE	Lysiandra	calycina
ZAMIACEAE	Macrozamia	reidlei
PITTOSPORACEAE	Marianthus	erubescens
MYRTACEAE	Melaleuca	incana ssp incana
MYRTACEAE	Melaleuca	pungens
MYRTACEAE	Melaleuca	scalena
ASTERACEAE	Millotia	tenuifolia
POLYGALACEAE	Muehlenbeckia	adpressa
POACEAE	Neurachne	alopecuroidea
RUBIACEAE	Opercularia	vaginata
IRIDACEAE	Orthrosanthus	laxus
IRIDACEAE	Patersonia	junceae
GERANIACEAE	Pelargonium	littorale
PROTEACEAE	?Persoonia	quinquineris
PROTEACEAE	Persoonia	striata
PHILYDRACEAE	Philydrella	pygmaea
LOGANIACEAE	Phyllangium	sp
THYMELEACEAE	Pimelea	angustifolia
THYMELEACEAE	Pimelea	argentina
THYMELEACEAE	Pimelea	ciliata
ASTERACEAE	Podolepis	gracillis
ASTERACEAE	Podolepis	lessonii
PHYLLANTHACEAE	Poranthera	microphylla
ORCHIDACEAE	Pterostylis	vittata
AMARANTHACEAE	Ptilotus	davisii
AMARANTHACEAE	Ptilotus	declinatus
AMARANTHACEAE	Ptilotus	drummondii var drummondii
AMARANTHACEAE	Ptilotus	manglesii
ASTERACEAE	Rhodanthe	citrina
ASTERACEAE	Rhodanthe	manglesii
GOODENIACEAE	Scaevola	calliptera
ASTERACEAE	Senecio	pinnatifida var latilobus
ASTERACEAE	Siloxerus	filifolius
ASPARAGACEAE	Sowerbaea	laxiflora
CELASTRACEAE	Stackhousia	monogyna not listed for district on DBCA list
CELASTRACEAE	Stackhousia	pubescens
STYLIDIACEAE	Stylidium	androsaceum
STYLIDIACEAE	Stylidium	calcaratum
STYLIDIACEAE	Stylidium	caricifolium
STYLIDIACEAE	Stylidium	ciliatum
STYLIDIACEAE	Stylidium	crassifolium
STYLIDIACEAE	Stylidium	dichotomum
STYLIDIACEAE	Stylidium	leptophyllum
STYLIDIACEAE	Stylidium	petiolare
STYLIDIACEAE	Stylidium	pilliferum
STYLIDIACEAE	Stylidium	rhypidium P3
STYLIDIACEAE	Stylidium	uniflorum
HEMEROCALLIDACEAE	Stypandra	glauca
PROTEACEAE	Synaphea	? flabelliformis
ELAEocarpaceae	Tetratheca	virgata
ORCHIDACEAE	Thelymitra	benthamiana
ORCHIDACEAE	Thelymitra	crinita
ASPARAGACEAE	Thysanotus	cymosus P3



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ASPARAGACEAE	Thysanotus	patersonia
ASPARAGACEAE	Thysanotus	? multiflora
ARALIACEAE	Trachymene	pilosa
HAEMODORACEAE	Tribonanthes	longipetalum
HAEMODORACEAE	Tribonanthes	monantha
HAEMODORACEAE	Tribonanthes	purpurea
HAEMEROCALLIDACEAE	Trichoryne	humilis
RHAMNACEAE	Trymalium	ledifolium var rosmarinifolium
MYRTACEAE	Verticordia	acerosa
CAMPANULACEAE	Wahlenbergia	preissii
ASTERACEAE	Waitzia	nitida
ASTERACEAE	Waitzia	suavelolens
XANTHORRHOACEAE	Xanthorrhoea	brevistyla P4
XANTHORRHOACEAE	Xanthorrhoea	preissii
ASTERACEAE	Xerochrysum	macranthum

## Appendix 2: Walking Tracks Classification


### AS 2156.1-2001: Walking Tracks Part 1 - Classification and Signage

*AS 2156.1-2001: Walking Tracks Part 1 - Classification and Signage* provides a classification system for walking tracks, guidance for the design, fabrication and use of track markers, and information signs to be used for walking tracks. The Standard also sets out guidelines for the erection of markers and signs to ensure that, while they will be readily visible, clear, and easy to read, they will not detract from the landscape.

This Standard applies to outdoor areas where the environment is the focus of recreational activity. The objective of this Standard is to provide managing authorities with guidance for walking track classification and signage in order to provide consistency of information to users of walking tracks. This is intended to minimise risk, preserve natural features, and enhance recreation opportunities associated with the use of walking tracks.





Walking tracks are graded from one to six and these are outlined in Table 8. A track is to be classified according to the least developed element. In some cases (e.g. long-distance tracks), select portions of the track may be classified separately, however the overall classification will be according to the least developed/most challenging element.

**Table 8: Walking Tracks Classification**

Classification	Description	Track Conditions	Experience Level	Risk Management Recommendation
Class 1	 <p>No bushwalking experience required. Flat even surface with no steps or steep sections. Suitable for wheelchair users who have someone to assist them. Walks no greater than 5km.</p>	<p>Generally a broad, hardened surfaced track suitable for wheelchair use.</p> <p>Width: 1200mm or more. Well maintained with minimal intrusions.</p> <p>Grades in line with AS1428 series. Steps allowed only with alternate ramp access.</p>	<p>Users need no previous experience and are expected to exercise normal care regarding their personal safety.</p>	<p>Tracks and adjacent natural and built elements to be inspected and maintained regularly.</p> <p>Inspection interval: 30 days or less.</p>



## 06 Appendices

Classification		Description	Track Conditions	Experience Level	Risk Management Recommendation
Class 2		No bushwalking experience required. The track is a hardened or compacted surface, may have gentle hill section or sections and occasional steps. Walks no greater than 10km.	Generally a modified or hardened surface.  Width: 900mm or more.  Well maintained with minimal intrusions.  Generally, no steeper than 1:10. Minimal use of steps.	Users need no previous experience and are expected to exercise normal care regarding their personal safety.	Tracks and adjacent natural and built elements to be inspected and maintained regularly.  Inspection interval: 90 days or less.
Class 3		Suitable for most ages and fitness levels. Some bushwalking experience recommended. Tracks may have short steep hill sections a rough surface and many steps. Walks up to 20km.	Generally a modified surface, sections may be hardened.  Width: Variable and generally less than 1200mm. Kept mostly clear of intrusions/obstacles.  Gradient may exceed 1:10 but generally no steeper than 1:10. Steps may be common.	Users need no bushwalking experience and a minimal level of specialised skills. May encounter natural hazards such as steep slopes unstable surfaces and minor water crossings. Users responsible for their own safety.	Built elements to be inspected and maintained regularly. Any built facilities to be managed for public risk.  Inspection interval: 6 months or less.
Class 4		Bushwalking experience recommended. Tracks may be long, rough, and very steep. Directional signage may be limited.	Generally distinct without major modification to the ground. Encounters with fallen debris and other obstacles are likely.	Users require a moderate level of specialised skills such as navigation skills. May require maps and navigation equipment. Users need to be self-reliant, particularly for first aid/weather hazards.	Tracks to be inspected on a regular basis and after major natural events (e.g. fires, floods). Any built facilities to be managed for public risk.  Inspection interval: 6 to 12 months.
Class 5		Very experienced bushwalkers with specialised skills, including navigation and emergency first aid. Tracks are likely to be very rough, very steep and unmarked. Walks may be more than 20km.	Limited modification to natural surfaces and track alignment may be indistinct in places. Minimal cleaning. Debris along the track.	Users require a high degree of specialised skills, may require maps and navigation equipment. Users need to be self-reliant, particularly for first aid/weather hazards.	Tracks to be inspected on a regular basis and after major natural events (e.g. fires, floods). Any built facilities to be managed for public risk.  Inspection interval: 6 to 18 months.

## 06 Appendices

Classification		Description	Track Conditions	Experience Level	Risk Management Recommendation
Class 6		Very experienced bushwalkers with specialised skills, including navigation and emergency first aid. No defined track.	No modification of the natural environment.	Experience in the outdoors and a high level of specialised skills/equipment required. Need to be self-reliant, particularly for first aid/weather hazards.	Tracks will not be managed for public risk. Users will be responsible for personal safety and need to exercise appropriate care.



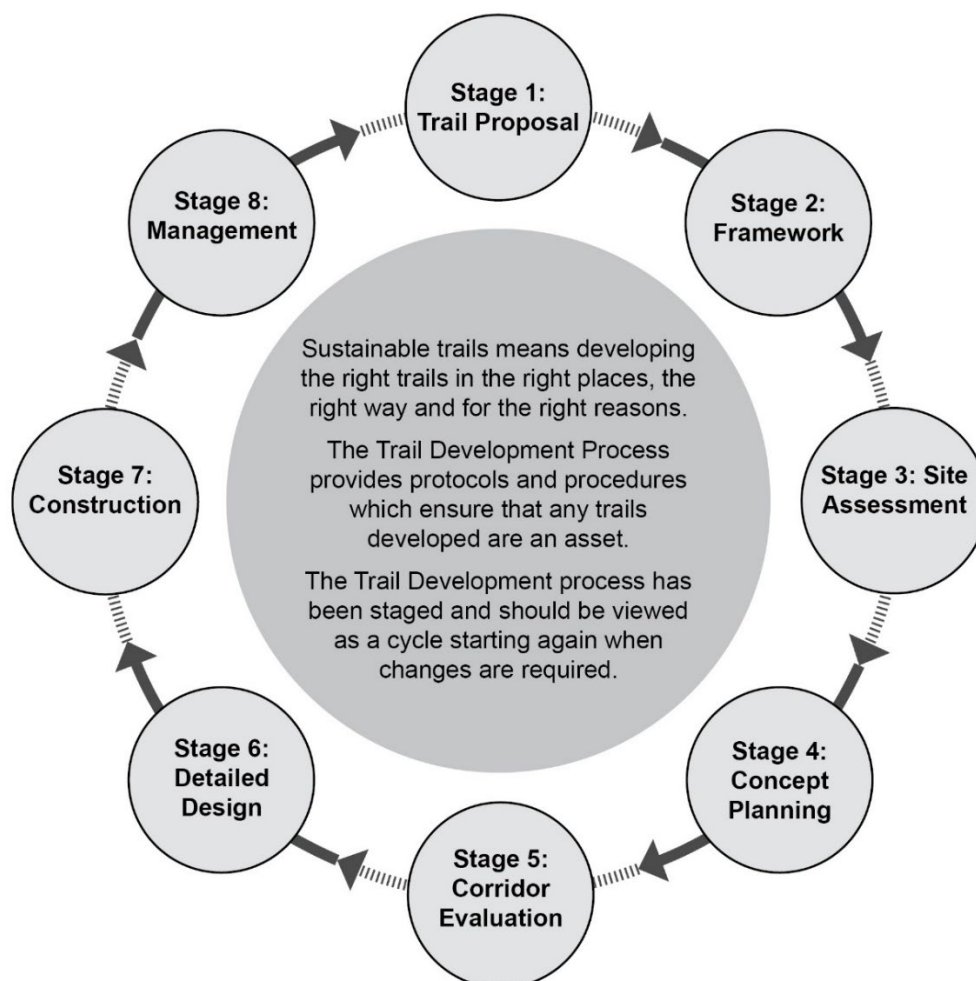
## Appendix 3: Eight Stage Trail Development Process

The Eight Stage Trail Development Process is widely recognised across Australia as best-practice in the development and ongoing renewal of recreational trails. This process is referenced in many contemporary trail planning guidelines and strategies across Australia, including *IPWEA's Practice Note 10.6 Paths, Trails and Tracks* (2021) and the *Australian Mountain Bike Trail Guidelines* (2019).

Trails are like any other asset or facility development and as such, are subject to a formal planning and approval process. A robust trail development process moves trail development away from a purely design and construction approach to a more considered and planned approach.

Working within a standardised methodology builds rigour into the development process and ensures that project proposals are transformed into professionally built and sustainable assets.

The Eight Trail Development Process encompasses a constant evaluation, review and improvement process as trails are being developed, maintained, extended, or renewed. The process is outlined in Figure 24. The WA Government has published the *DBCA Trails Development Series* (2019) which comprehensively details each stage of the process.



**Figure 24: Eight Stage Trail Development Process**

## Appendix 4: DBCA Impact Evaluation Checklist

Hillman Reserve Walk Trails Project  
Impact Evaluation Checklist

<b>A – Land Details</b>	
Land Manager	DBCA
Local Government Authority	Shire of West Arthur
Private property/Reserve Name and Location	
Hillman Nature Reserve, Darkan, WA (Reserve No. 16904)	
Tenure and Primary Management Objective of Lands	
DBCA – Water and Conservation	

<b>B – Proposed Project</b>
Purpose
<i>The objective of the project is to plan and develop loop trails within the Reserve and a spur trail which links from the existing Collie to Darkan Rail Trail to the Reserve.</i>
Type & Extent of Proposed Project
<p><i>Based on the site assessment process and discussions with the Shire, the following four trail alignments have been recommended for the Hillman Reserve Walk Trails Project:</i></p> <ul style="list-style-type: none"> <li>• Long Loop Walk Trail (4.4km)</li> <li>• Short Loop Walk Trail (2.2km)</li> <li>• Short Loop Walk Trail – Spur Trail Option to Julikin Rock (600m)</li> <li>• Additional Short Loop Walk Trail Option (2km)</li> </ul> <p><i>A 4.2km dual-use spur trail has also been recommended which traverses from the Collie to Darkan Rail Trail, along gazetted road reserves which pass between properties, along the Reserve's perimeter access track and to the primary trailhead.</i></p> <p><i>Support facilities for the trail network including a trailhead, parking, seating, shelter, viewpoints and signage may be provided.</i></p>



<b>Alternative Options Considered</b>				
<p><i>Access Route Option 2 is a gazetted road that runs from the Darkan-Williams Road to the Reserve. It does not join up with the Darkan to Dardadine section of the Collie to Darkan Rail Trail.</i></p> <p><i>Access Route Option 3 is currently how people access the Reserve; however, this requires access through a landowner's property along a laneway. A gazetted road exists in the area (to the south of Hillman Siding) which could be used but this would bisect the farmer's paddock. There has been consideration of a land swap arrangement to allow access along the laneway. However, the laneway passes close to the farmer's house and sheds and sheep work is carried out at the shed.</i></p>				
<b>Implications of Postponement or 'Do Nothing' Option</b>				
<p><i>Lack of access to suitable walk trail opportunities and associated facilities in the Shire.</i></p> <p><i>Limited opportunities for local economic growth through the visitor market.</i></p> <p><i>Potentially no increase in foot traffic for the Collie to Darkan Rail Trail.</i></p> <p><i>No interpretive opportunities highlighting the environmental features and cultural heritage.</i></p>				
<b>C – Impact Evaluation</b>				
<p>Indicate with Y/N in <b>Acceptable</b> column if proposed work is acceptable or not with respect to the environmental/management issue listed. If it's not acceptable, consider acceptability of modified proposal in <b>Modified</b> column or the <b>Do Nothing</b> column. The Comments column is for detailing action/s required to overcome/minimise adverse impact, or if no information is available to allow a decision.</p>				
<b>Issues</b>	<b>Acceptable</b>	<b>Modified</b>	<b>Do Nothing</b>	<b>Comments</b> Indicate action required to overcome/minimise adverse impact, or if no information is available to allow a decision.
<b>1. Management Considerations</b>				
1.1 Does the area have a management plan or strategy?	N	✓		No existing management plan in place, consider working with DBCA to develop one.
1.2 Does the proposal conflict with existing policy or management plan?	N	✓		The Reserve is currently designated for water and conservation, formal approval for a walk trail is required from DBCA.
1.3 How will the proposal affect neighbouring land holders and community interests	Y	✓		Further consultation will be undertaken with private landowners for the section of spur trail which passes between properties. Negligible impact on landowners, apart from enhanced accessibility across the Hillman River.
1.4 How will the proposal affect land management considerations e.g:				
• Fire management	Y		✓	Not managed by the Shire.
• Roads	Y	✓		Formalise the spur trail section which traverses along the gazetted road reserves and undertake further consultation with private landowners.
• Other recreation or tourism	Y		✓	No other recreation or tourism permitted in the Reserve.

1.5 How will the proposal affect or be affected by existing or planned land use e.g:				
<ul style="list-style-type: none"> <li>Mining and exploration</li> </ul>	N		✓	A pending exploration license (E 7006534) currently exists over the Reserve and has been granted to South Boddington Gold Pty Ltd.
<ul style="list-style-type: none"> <li>Basic Raw Material (gravel, rock and borrow pits)</li> </ul>	Y		✓	No known gravel/rock/borrow pits in the Reserve.
<ul style="list-style-type: none"> <li>Forestry</li> </ul>	Y		✓	Not applicable.
<ul style="list-style-type: none"> <li>Utility lines</li> </ul>	Y		✓	No known utility lines in the Reserve.
<ul style="list-style-type: none"> <li>Water catchment</li> </ul>	Y		✓	Not located within a PDWSA.
<ul style="list-style-type: none"> <li>Commercial activities (e.g. apiarist)</li> </ul>	Y		✓	Not applicable.
1.6 How will the proposal affect or be affected by neighbouring land use?	Y	✓		Further consultation will be undertaken with private landowners for the section of spur trail which passes between properties. Negligible impact on landowners, apart from enhanced accessibility across the Hillman River.
1.7 Are there any research plots, scientific study areas and reference sites in the proposed area?	Y	✓		Previous flora and fauna surveys have been conducted in the Reserve. The final trail alignment is to have no impact on threatened and priority flora and fauna.
<b>2. Plant Disease, Ferals, and Weeds</b>				
2.1 Diseases (e.g. dieback, armillaria, cankers etc)	Y		✓	No dieback areas located in the Reserve.
2.2 Will area require baiting buffers?	Y	✓		Feral fauna species have been identified in the Reserve, consider baiting as an option.
2.3 Declared weeds, or other environmental weeds	N	✓		Previous flora surveys have identified several species of weeds which may require management.
<b>3. Flora, Fauna and Ecosystems</b>				
3.1 Declared Rare Flora or Priority Species, Threatened Communities or restricted, unusual or poorly reserved vegetation associations	Y	✓		Three priority flora species have been identified in the Reserve. No threatened ecological communities have been identified in the Reserve. Consider a final trail alignment which has minimal impact on existing vegetation (i.e. utilises cleared areas).
3.2 Declared Rare or Endangered fauna, translocation programs, release sites or restricted habitats.	Y	✓		Priority and threatened fauna species have previously been recorded in the Reserve. Consider a final trail alignment which has minimal impact on existing habitat (i.e. utilises cleared areas).



3.3 Diverse Ecosystem Zones including rivers, streams, swamps, lakes, gorges, rock outcrops etc.	Y	✓		The nearby Hillman River requires a river crossing for pedestrian and vehicle access (e.g. bridge or culvert).
3.4 Fauna Habitat Zones	Y		✓	Not applicable.
3.5 Old-growth Forest	Y		✓	Not known to be old-growth forest.
<b>4. Cultural Heritage</b>				
4.1 Registered Aboriginal sites	Y		✓	No existing registered Aboriginal Cultural Heritage Sites.
4.2 Is the area subject to a Native Title claim? Has DAA or the Aboriginal Land and Sea Council been advised? Have Working Party members been consulted?	N	✓		The Shire recently completed a desktop survey which advised that it's highly likely Aboriginal Cultural Heritage Sites occur in the local area. Further consultation will take place with the SWALSC and local Traditional Owners.
4.3 Does the area adjoin or contain any places on the following lists:				
<ul style="list-style-type: none"> <li>Register of the National Estate</li> </ul>	Y		✓	The Reserve is not listed on the Register of the National Estate.
<ul style="list-style-type: none"> <li>Register of Heritage Places</li> </ul>	Y	✓		Hillman Dam and the associated concrete channels are listed on the Shire's <i>Local Heritage Survey</i> (Heritage Intelligence WA, 2022). It is recommended that these are protected with opportunities for interpretive signage.
<ul style="list-style-type: none"> <li>Municipal inventory for the local council</li> </ul>	Y		✓	As above. Identified as a Category 2 Heritage Place.
<ul style="list-style-type: none"> <li>Land manager heritage database</li> </ul>	Y		✓	N/A
<b>5. Recreation and Access</b>				
5.1 How will the area be accessed?	N	✓		From Hillman-Dardadine Road, along gazetted road reserves which pass between properties, along the Reserve's perimeter access track and to the primary trailhead. Further consultation with private landowners will be undertaken.
5.2 Is there a potential conflict with existing recreation use, events and/or commercial tour operators?	Y		✓	No conflicts with recreational use, events or commercial tour operators.
5.3 How will visitor safety be managed?	Y	✓		Provide sufficient waymarkers, safety and risk management signage at the trailhead, barriers at lookouts and potentially around Hillman Dam.
5.4 Landscapes, features, wilderness appreciation.	Y		✓	The site has high landscape amenity value (i.e. interesting terrain), cultural heritage and diverse fauna and flora.

5.5 Increased demand for facilities and service (rubbish disposal, toilets etc)	N	✓		Consider providing signage with the correct waste/recycling procedures at the trailhead and monitor for illegal dumping. Toilets won't be considered at this stage (public toilets provided in Darkan).
<b>6. Geology, Landform and Soils</b>				
6.1 Caves, fossils, or dunes	Y		✓	No known caves, fossils or dunes.
6.2 Soil erosion (water or wind)	Y		✓	No visible water or wind erosion sighted.
6.3 Soil mixing or soil compaction	Y	✓		Consider providing a soil mix where sandy sections of trail alignment exist.
6.4 Soil compatibility	Y	✓		Generally the existing soils appear to be suitable for trail development.
<b>7. Hydrology</b>				
7.1 Stream or impoundment sedimentation	Y		✓	No visible streams or impoundment sedimentation.
7.2 Altered run-off, impeded drainage or water logging	Y	✓		None sighted, however there is potential for groundwater discharge. Reassess as part of the detailed design process and monitor for changes, particularly in low lying areas.
<b>8. Monitoring</b>				
8.1 How and when will the effects of the proposed operation be monitored?	Y	✓		Dependant on the final classifications for the walk trails (refer Australian Walking Tracks Classification).
8.2 Who is responsible for completing the monitoring?	Y	✓		It is expected that any proposed walk trails would be managed by the Shire as part of the Darkan to Dardadine section of the Collie to Darkan Rail Trail. Further engagement and agreement with DBCA on a proposed monitoring model is required.
8.3 Have resources been made available for monitoring?	N	✓		Not applicable to this stage of the project. Potential for a management plan to be developed which identifies and allocates required resources.
8.4 Who will be provided with the monitoring results, and what is expected to happen with the results?	Y	✓		Not applicable to this stage of the project. It is expected that DBCA and the Shire will be provided with monitoring results.

## Appendix 5: Water Permit Checklist



Government of **Western Australia**  
Department of **Water and Environmental Regulation**

4/12/23

### Do I need a permit to undertake works on the bed or banks of a watercourse or wetland?

This tool will help you to determine if your proposed activities require approvals from the Department of Water and Environmental Regulation. It is intended as a guide only. If you are unsure about any of the questions please [contact us](#) for advice.

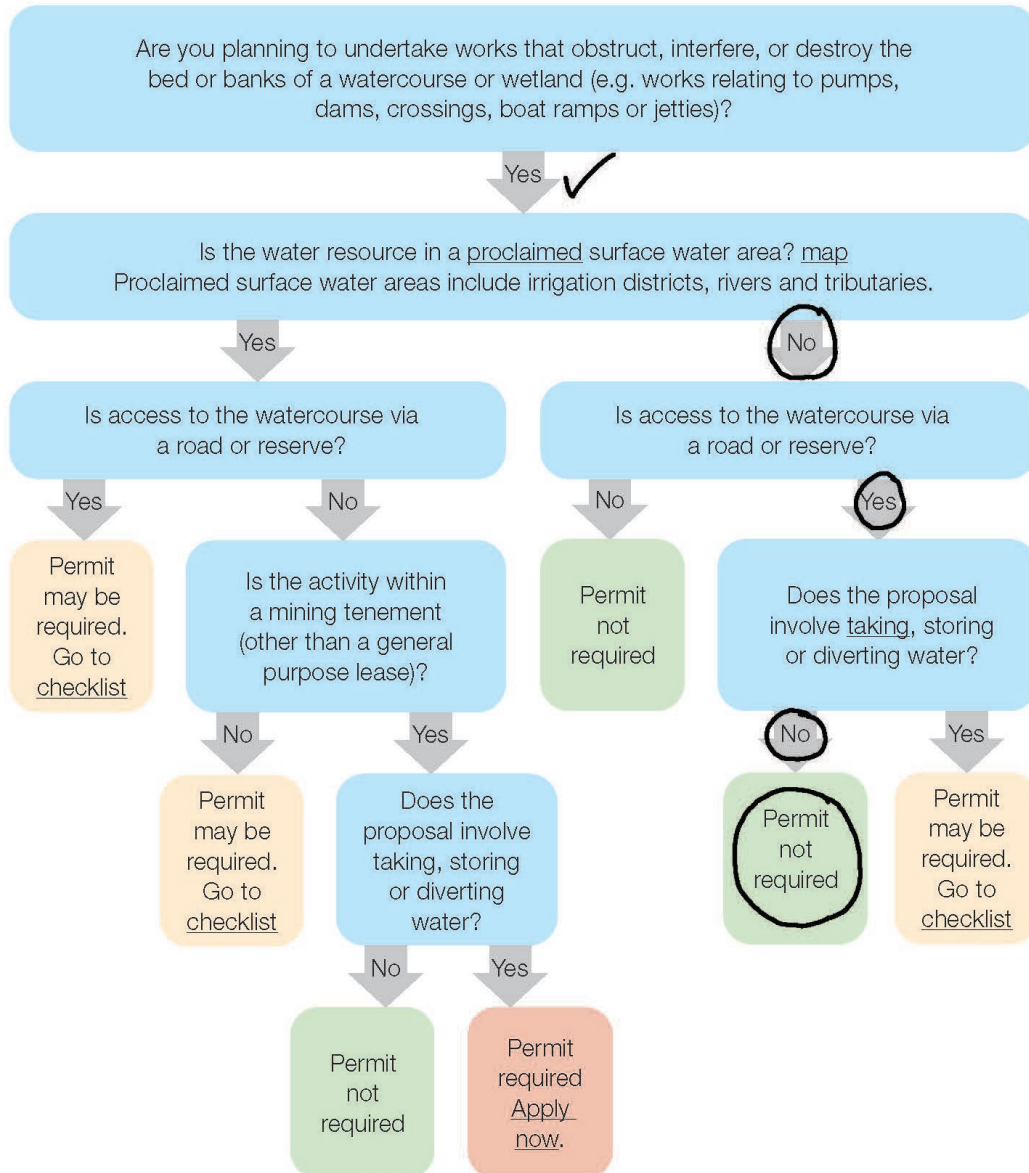


Figure 25: Water Permit Checklist (Completed)



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