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# Tonkin Highway Extension (Thomas Road to Southwest Highway)

# Offset Strategy

*Environmental Protection Act 1986*

**August 2025**

# Document Control

| Revision | Date | Author | Reviewed |
|---|---|---|---|
| Final | August 2025 | Main Roads | Main Roads |

# Contents

# Figures

# Tables

# Executive Summary

Main Roads Western Australia (Main Roads) is proposing to construct the Tonkin Highway Extension (THE) project to extend the existing Tonkin Highway from Thomas Road in Oakford to South Western Highway in Mundijong, Western Australia.

The purpose of this Offset Strategy is to outline the offsets proposed for the THE project, in accordance with the Western Australia Environmental Offsets Guidelines (Government of Western Australia 2011), to mitigate the significant residual impacts of the THE project remaining after the application of the mitigation hierarchy and address the requirements of condition B5-3 of Ministerial Statement 595 (MS595).

The significant residual impacts resulting from the THE are:

- 0.10 ha *Corymbia calophylla – Kingia australis* woodlands and shrublands of the Swan Coastal Plain (SCP3a) Threatened Ecological Community (TEC) – Critically Endangered
- 3.37 ha *Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain (SCP3c) TEC – Endangered
- 2.83 ha of vegetated Conservation Category Wetlands (CCW)
- 1.91 ha of regionally significant bushland within Bush Forever Sites 351, 360 and 365.

Main Roads is proposing an offset package that includes three offset sites to offset the significant residual impact of the THE project. The table below summarises the proposed offset sites and their offset values.

| Offset | Distance to Offset | Offset Site (ha) | SCP3a TEC (0.1 ha x Quality 6) | | SCP3c (3.37 ha x Quality 3) | | CCW (2.83 ha x Quality 2) | | Bush Forever (1.91 ha @ 2:1) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ha | % | ha | % | ha | % | ha | % |
| **Cardup Nature Reserve** | 1 km E | 0.87 | 0.87 | 100.6 | | | | | 0.87 | 22.8 |
| **Mundijong Road** | Adjacent | 3.65 | | | 3.65 | 64.4 | 1.7 | 59.8 | 3.65 | 95.5 |
| **Waterloo Reserve** | 115 km SSW | 1.80 | | | 2.02 | 35.6 | 1.15 | 40.4 | | |
| **Total** | | | **0.87** | **100.6** | **5.67** | **100** | **2.85** | **100.2** | **4.52** | **118.3** |

The offset package proposed in this Offset Strategy has been developed in accordance with the Western Australian Offset Metric and the WA Offset Policy and will offset at least 100% of the significant residual impact of THE project.

# 1. Introduction

## 1.1 Proposal Background

Main Roads Western Australia (Main Roads) is proposing to construct the Tonkin Highway Extension (THE) project to extend the existing Tonkin Highway from Thomas Road in Oakford to South Western Highway in Mundijong, Western Australia. The extent of the THE project is shown in **Figure 1**.

The THE project is located within the Shire of Serpentine-Jarrahdale (SoSJ) Local Government Area (LGA) on the Swan Coastal Plain in Western Australia (**Figure 1**). The THE project lies 30 km south-east of the Perth Central Business District and approximately 3.5 km west of Byford.

The south-east corridor is an important and fast-growing area within the Perth Metropolitan Area. It is faced with increased congestion, higher travel times for freight vehicles and reduced safety outcomes on the existing road network. Population projections show that by 2031, sustained growth in the south-east sub-region will result in a population increase of approximately 35% from the 2008 base level. This additional population will put significant pressure on the existing road network with volumes exceeding the recommended road capacity.

The THE project will improve freight efficiency, connectivity and travel time within the existing road network by relieving congestion pressure and improving road safety for all users. The THE project includes:

- Approximately 14 km of four lane dual carriageway from Thomas Road to South Western Highway
- Construction/upgrades and grade separation to intersections at Thomas Road, Orton Road, Mundijong Road and South Western Highway
- A grade separated interchange at Bishop Road catering for the Perth to Bunbury rail line and the freight rail line.

## 1.2 Environmental Approvals

The THE project (Thomas Road to South West Highway) was referred to Department of Climate Change, Energy, the Environment and Water (DCCEEW) under the EPBC Act. DCCEEW approved the THE as a controlled action in 2021 (EPBC 2019/8608).

MS595 has been amended through a section 45C amendment under Part IV of the EP Act and a revised MS595 was published on 31 March 2025. This Offset Strategy has been prepared to meet the requirements of condition B5-3 of the amended MS595.

## 1.3 Purpose of this Strategy

The purpose of this Offset Strategy is to meet the requirements of condition B5-3 of the amended MS595, outline the offsets proposed for the THE project, in accordance with the Western Australia Environmental Offsets Guidelines (Government of Western Australia 2011) and to mitigate the significant residual impacts of the THE project remaining after the application of the mitigation hierarchy.

## 1.4 Consultation

A summary of Main Roads' consultation with the Department of Biodiversity, Conservation and Attractions (DBCA) regarding THE offsets is provided in **Table 1**.

**Table 1 Summary of Main Roads Consultation Regarding THE Offsets**

| Date | Organisation | Summary of consultation | Main Roads response to comments / concerns |
|---|---|---|---|
| **Cardup NR Offset Site** | | | |
| July 2024 | DBCA Swan Coastal Region | Initial discussions with DBCA held regarding potential use of Cardup Nature Reserve as an environmental offset | N/A |
| January 2025 | DBCA Swan Coastal Region | Correspondence with DBCA to further explore the use of Cardup Nature Reserve as an environmental offset, including discussion around the likely presence of vegetation representing occurrences of Swan Coastal Plain (SCP) 3a and SCP3c Threatened Ecological Communities (TECs) | N/A |
| January 2025 | DBCA Swan Coastal Region | DBCA endorsed Main Roads' use of the Cardup Nature Reserve as an environmental offset | Main Roads included a portion of Cardup NR representative of SCP3a vegetation (exact area to be confirmed after spring survey) in this offset strategy (MRWA 2024) |
| July 2025 | DBCA | In a meeting between DWER and DBCA it was agreed Mundijong Reserve is an appropriate alternative to Cardup Nature Reserve if SCP3a is not confirmed to be present. | Main Roads agreed to provide Mundijong Reserve as an alternative offset site for SCP3a in the event Spring Surveys determine SCP3a is not present at Cardup Nature Reserve. |
| **Waterloo Nature Reserve Offset Site** | | | |
| March 2024 | DBCA SW Region | Main Roads initiated discussion with DBCA regarding potential use of Waterloo Nature Reserve as an environmental offset | N/A |
| July 2024 | DBCA SW Region | DBCA South West Region botanist visited Waterloo Nature Reserve with a Main Roads botanist in July 2024, during which time vegetation representing SCP3c in differing condition classes was observed and discussed. Average vegetation condition across the occurrences was agreed | Main Roads prepared *Waterloo Nature Reserve Site Visit Field Notes – 11 July 2024* in collaboration with DBCA |
| August 2024 | DBCA SW Region | DBCA endorsed Main Roads' use of SCP3c vegetation within Waterloo Nature Reserve as an environmental offset | Main Roads included management of vegetation representative of SCP3c within Waterloo Nature Reserve in this offset strategy |


**Figure 1 - Tonkin Highway Extension Project**

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MRWA24008 16 September 2024

# 2. Significant Residual Impacts

**Table 2** provides a summary of the significant residual impacts for the THE project for which Main Roads is proposing to offset.

**Table 2 Summary of Residual Impacts**

| Environmental Value | Conservation Significance of Environmental Value | Significant Impact | Habitat Quality (weighted average score/10) |
|---|---|---|---|
| SCP3a – *Corymbia calophylla – Kingia australis* woodlands and shrublands of the Swan Coastal Plain | Threatened Ecological Community (TEC) – Critically Endangered | 0.10 ha | 6 |
| SCP3c - *Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain TEC | TEC – Endangered | 3.37 ha | 3 |
| Wetlands | Conservation Category Wetland (CCW) | 2.83 ha | 2 |
| Bush Forever Sites 351, 360 and 365 | Regionally Significant Bushland | Total of 1.91 ha regionally significant bushland | 'Very High' conservation significance' |

# 3. Offset Rationale

Main Roads has developed this offset package to counterbalance the significant residual impacts of the THE project. This section provides the rationale for the selection of offsets proposed in this document, noting the challenge of identifying offset sites in close proximity to the THE project in a peri-urban environment abutting the Darling Scarp.

The principles of the WA Offsets Policy (GoWA 2011) allow for a flexible approach to offsets. This includes allowing for a like-for-similar approach given the practical challenges in finding exact replacements for specific environmental values. It also considers that offsets should focus on achieving long-term strategic outcomes, e.g. best for species.

Under the conditions of the EPBC Act approval (EPBC 2019/8608), Main Roads is required to develop an offset strategy for the THE project within 12 months of commencing the action. The WA Offsets Policy states that there will be minimal duplication between State and Commonwealth requirements for offsets. Where a significant residual impact under the EP Act is also a Matter of National Environmental Significance under the EPBC Act, Main Roads intends to apply the same offset under both acts.

Below is a brief description of how input scores used in the offset calculator for both impact sites and offset sites have been developed. Offsets will be assessed using the WA Offsets Metric (DWER 2021) unless a different methodology is specified below.

## 3.1 Habitat Quality Scoring (TEC and CCW)

Habitat quality scoring for TECs and CCW will be linked to the Keighery (1994) vegetation condition scale. The Keighery (1994) vegetation condition scale is used in almost all flora and vegetation surveys in the south-west of Western Australia and provides a consistent methodology for assessing habitat quality across impact and offset sites. Each Keighery condition class is assigned a value (**Table 3**) out of ten for input into the offset calculator.

In order to obtain a single quality value per site, the condition value was averaged across the impact/offset site, using a weighted average. The area of each vegetation condition was multiplied by the quality score, then summed and divided by the total area of the offset site to obtain the weighted average.

**Table 3 Quality score using Keighery vegetation condition scale**

| Keighery Scale Vegetation Condition (1994) | Impact/Offset Quality Score |
|---|---|
| Pristine | 10 |
| Excellent-Pristine | 9 |
| Excellent | 8 |
| Very Good-Excellent | 7 |
| Very Good | 6 |
| Good-Very Good | 5 |
| Good | 4 |
| Degraded-Good | 3 |
| Degraded | 2 |
| Completely Degraded-Degraded | 1 |
| Completely Degraded | 0 |

## 3.2 Bush Forever

State Planning Policy 2.8 – *Bushland policy for the Perth Metropolitan Region* (SPP 2.8) (State of Western Australia 2010) provides a policy and implementation framework to ensure bushland protection and management is properly addressed in the Perth Metropolitan Area. SPP 2.8 prioritises the protection and management of regionally significant bushland whilst not preventing development where the development is in line with SPP 2.8 and other planning considerations. Bush Forever is a part of the conservation system that aims to establish and maintain a comprehensive, adequate and representative system.

SPP 2.8 provides an offset criteria where impacts on Bush Forever and regionally significant bushland are permitted. The offset criteria are dependent on the conservation significance of the vegetation. Main Roads has assessed the impacts on 1.91 ha of regionally significant bushland within Bush Forever sites impacted by the THE project as 'Very High' conservation significance, with a 2:1 offset ratio applicable in accordance with the provisions of SPP 2.8 and the requirement of MS595.

## 3.3 Management Actions

Main Roads has a role to plan, build, maintain and operate Western Australia's State Road Network. Under the *Main Roads Act 1930*, Main Roads is responsible for investing its resources and budget into the State's Road infrastructure and is not structured to ensure appropriate land management practices on areas of land that are not associated with road infrastructure.

As the State's agency responsible for ensuring effective management of our conservation estate, DBCA is by far the best placed to have governance of an offset site. In order to facilitate the appropriate management of offset properties beyond acquisition, Main Roads has a long-standing partnership with DBCA with regard to the identification and selection of offset properties.

Main Roads has developed this package of offsets to counterbalance the significant residual impacts of THE. This strategy includes a range of offset types, all direct like-for-like, but encompassing land management within existing DBCA reserves, re-creation of TEC on freehold land for future inclusion in the conservation estate and incorporation of land currently vested within transport corridors as offsets. The offset package comprises a mix of land acquisition and funding of land management.

The land acquisition of like-for-like bushland is increasingly challenging in Western Australia, and it is not always possible to find available remnant vegetation on privately owned property within the Perth metropolitan area and surrounds that will meet the like-for-like requirements of the WA Offset Policy.

It is well known that management of a site for the purpose of conservation is likely to result in tangible improvements to the environmental values of the site. Actions such as access control through fencing; revegetation of degraded areas; weed management; fire management and disease control will result in an overall improvement of habitat quality by maintaining and improving biodiversity and will reduce the chance of further degradation or loss.

Main Road is proposing a series of management actions within each offset site that may include, but are not limited to:

- Fencing: Access control is an effective tool for preventing a range of detrimental impacts to environmental offset sites. Controlling access prevents people, unauthorised vehicles and animals from causing land degradation, trampling vegetation, interfering with revegetation works and spreading of weeds and diseases. Fencing of remnant vegetation or revegetation to exclude grazing may assist in natural regeneration (BCT 2019).
- Pest control: the control of pest animals is as important as weed control (Greening Australia 2003). Reduction of grazing impacts by animals, on revegetation and naturally regenerating vegetation will enable vegetation to successfully establish and mature to flowering and seed formation, ensuring long term viability of the vegetation.
- Fire management: appropriate and active fire management of an offset site will promote a more natural fire regime to support the life cycles of the species present.
- Weed control: effective weed control is crucial for successful revegetation (Rokich and Newton 2016, Arborgreen 2025). Reduction of weed impacts on revegetation and naturally regenerating vegetation will reduce competition for light, water, nutrients and space, thereby promoting vegetation recovery and improvement of ecosystem function.
- Rubbish removal: reduction in rubbish within the offset site will improve the general integrity of the vegetation and reduce the likelihood that vermin will be attracted to the site, and in turn detrimentally impact the vegetation.

The benefits of undertaking active management of a site for the purpose of an offset or conservation include:

- Enhancement of habitat quality
- Protection of biodiversity
- Improving ecosystem function
- Increase climate resilience
- Reduce land degradation
- Provide enhanced ecological connectivity.

Not all of these benefits are necessarily quantifiable, but active management is generally more effective than passive management, as it will address existing threats and accelerate ecological recovery.

Where management of existing reserves is proposed, the actions that will be implemented as part of this offset strategy will be in addition to those actions already being implemented by the current land manager. Even within the conservation estate, there is often little funding available for the active management of a reserve beyond the legal responsibilities of basic maintenance (maintaining access and firebreaks).

More details on the specific management actions proposed within each offset site are provided in the following sections.

# 4. Summary of Offset Package

Three offset sites are proposed for the offset package, and these are summarised below in **Table 4**. This Offset Strategy has determined the starting and predicted future quality score for each of these offsets for each environmental value. This has been done by referencing surveys to quantify the residual impacts and offset gains, and ongoing measurable management.

The location of each offset site in relation to the THE project is shown in **Figure 2**.

Each offset site is described in more detail in the sections that follow.

**Table 4 Summary of Offset Package Tonkin Highway Extension**

| Offset | Distance to Offset | Offset Site (ha) | SCP3a TEC (0.1 ha x Quality 6) | | SCP3c (3.37 ha x Quality 3) | | CCW (2.83 ha x Quality 2) | | Bush Forever (1.91 ha @ 2:1) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ha | % | ha | % | ha | % | ha | % |
| **Cardup Nature Reserve** | 1 km E | 0.87 | 0.87 | 100.6 | | | | | 0.87 | 22.8 |
| **Mundijong Road** | Adjacent | 3.65 | | | 3.65 | 64.4 | 1.7 | 59.8 | 3.65 | 95.5 |
| **Waterloo Reserve** | 115 km SSW | 1.80 | | | 2.02 | 35.6 | 1.15 | 40.4 | | |
| **Total** | | | **0.87** | **100.6** | **5.67** | **100** | **2.85** | **100.2** | **4.52** | **118.3** |


**Figure 2 - Location of Offset Properties in Relation to the Proposal**

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MRWA24008 13 March 2025

# 5. Cardup Nature Reserve

## 5.1 Site Description

Cardup Nature Reserve is currently managed by the DBCA and encompasses as area of 74.81 ha. It is located on the southern side of Cardup Siding Road, within the Shire of Serpentine-Jarrahdale. Cardup Nature Reserve also forms part of Bush Forever Site 352 (Cardup Nature Reserve and adjacent Bushland, Cardup), which has documented the presence of two TECs including the Endangered SCP3b (*Corymbia calophylla — Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain) and Critically Endangered SCP20b (*Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain) (Government of Western Australia 2000).

Surveys conducted by DBCA in 1994, did not identify the presence of SCP3a (*Corymbia calophylla-Kingia australis* woodlands on heavy soils) TEC, however DBCA have confirmed that there is a high likelihood of SCP3a to be present within the nature reserve (DBCA, pers. comms. 6 January 2025).

A total of 0.87 ha of Cardup Nature Reserve is proposed as a direct offset for the THE project (**Figure 3**), pending confirmation of the presence of SCP3a, following spring botanical surveys in 2025. In the unlikely event SCP3a is determined not to be present within Cardup Nature Reserve Main Roads proposes to increase the area to be offset at Mundijong Reserve as an alternative to Cardup Nature Reserve. The presence of SCP3a was confirmed at Mundijong Reserve to the west of the projects Development Envelope (Woodman 2021).

The offset site lies within the Swan Coastal Plain IBRA Region which is a low-lying coastal plain, mainly covered with Banksia and Tuart woodlands on sandy soils. Swampy areas are dominated by paperbark, and outwash plains by *Casuarina obesa*. *Melaleuca* shrublands and *C. obesa*-Marri woodlands are located extensively in the south, while Jarrah woodland dominates duri-crusted Mesozoic sediments to the east (Mitchell *et al.* 2002).

One pre-European Beard (1990) vegetation association, being association 968, is mapped within the Cardup Nature Reserve. Vegetation association 968 has 32.02% of its pre-European extent remaining (Government of Western Australia 2019a) and is described as a medium woodland of Jarrah-Marri-Wandoo.

One Heddle *et al.* (1980) vegetation complex occurs within the offset site, the Guildford Complex. This complex is described as a mixture of open forest to tall open forest of Marri-Wandoo-Jarrah and woodland of Wandoo (with rare occurrences of *Eucalyptus lane-poolei* (Salmon White Gum)). Minor components include *Eucalyptus rudis* (Flooded Gum) - *Melaleuca rhaphiophylla* (Swamp Paperbark). Only 5.09% of the pre-European extent of the Guildford Complex remains on the Swan Coastal Plain and it is therefore considered poorly represented and under threat (Government of Western Australia 2019b).

A brief site inspection conducted by a Main Roads senior botanist, confirmed that the central portion of the nature reserve is of 'Very Good' condition, with poorer quality vegetation along the margins of the reserve. Surveys will be undertaken in spring 2025 to confirm the presence of SCP3a and to confirm offset start condition, with the condition assumed to be 'Very Good' for the purposes of the offset metric used in this strategy.

Cardup Nature Reserve occurs within close proximity of the THE project and contains similar vegetation associations and complexes making it a suitable offset site for the project. By managing

threatening processes and pressures at the offset site, tangible conservation benefits will be realised thereby achieving a conservation gain, such as improvement in the vegetation condition score, for the environmental values being impacted and offset.

## 5.2 Offset Security

Cardup Nature Reserve is a Class A reserve (R2457) for the conservation of flora and fauna vested in the Conservation and Parks Commission. DBCA has endorsed Main Roads' use of Cardup Nature Reserve as an environmental offset.

The Cardup Nature Reserve Offset Site will be added to the Department of Water and Environmental Regulation (DWER) offsets register once it is approved to formalise its status as an offset site.

## 5.3 Environmental Values

The existing environmental values within the Cardup Nature Reserve Offset Site pertaining to this Offset Strategy:

- 0.87 ha of SCP3a TEC (exact area to be confirmed following a spring survey)
- 0.87 ha of regionally significant bushland within a Bush Forever site.

Cardup Nature Reserve also contains SCP20b TEC, SCP3b TEC, Black Cockatoo foraging habitat and Priority flora.

## 5.4 Offset Values

The offset value from the implementation of this offset will be:

- Managing ongoing threatening processes to prevent of 0.87 ha of existing SCP3a TEC from declining from 'Very Good' condition (6) to 'Good-Very Good' condition (5).
- Active enhancement and revegetation to improve of 0.87 ha of existing SCP3a TEC from 'Very Good' condition (6) to 'Very Good-Excellent' condition (7).
- Management of 0.87 ha of regionally significant bushland within a Bush Forever site.

## 5.5 Management Actions

Main Roads proposes to undertake the following activities in conjunction with DBCA within the Cardup Nature Reserve Offset Site.

### 5.5.1 Existing Management

The current management works being undertaken by DBCA within the Cardup Nature Reserve are:

- Basic maintenance tasks including maintaining management access and firebreaks (where feasible)
- Liaison with utilities and neighbouring properties
- Monitoring for illegal activities.

The proposed management actions by Main Roads are considered additional to work already being undertaken by DBCA (Senior Planning Officer, DBCA, pers. comm. 19 May 2025).

Whilst DBCA is the responsible authority for initiating and guiding actions within state recovery plans, the plans are often unfunded. Implementation of identified actions within state recovery plans requires funding – part of DBCA's role is liaising with interested parties to fund the implementation of these recovery actions.

### 5.5.2 Management Plan

- Main Roads, in consultation with the DBCA, will develop a management plan
- Main Roads will fund the implementation of the management plan within the offset site in consultation with the DBCA.

### 5.5.3 Fencing

- Install and/or maintain fencing where possible (including temporary fencing options) to restrict and control unauthorised vehicle access and pedestrian movements
- Specification of fences will be determined in consultation with DBCA prior to installation and will depend on the size, location and topography of the offset within the reserve
- Fencing repairs and/or modifications may be required.

### 5.5.4 Pest Animal Control

- Carry out feral and pest animal control (e.g. rabbits) as required based on site observations. Control will be carried out where feral and pest animals are impacting vegetation condition recovery within the offset site
- Pest management will be carried out using best practices in accordance with Department of Primary Industry and Resource Development (DPIRD) advice and governed by the *Biosecurity and Agricultural Management Act 2007* (BAM Act).

### 5.5.5 Weed Control

- Undertake weed mapping to identify locations of Weed of National Environmental Significance (WoNS), Declared Pest (DP) plants under the BAM Act and aggressive environmental weeds
- Develop and implement a weed control and bushland restoration program for the offset site, including monitoring
- Selective weed control targeting aggressive environmental weeds present, where these are impacting recovery of vegetation condition
- Weed control will continue annually throughout the first five years of implementation of the Offset Strategy, after which, the frequency will be reduced to that required based on observations during monitoring inspections of impacts on vegetation condition recovery within the offset site.

### 5.5.6 Fire Management

- Develop a fire management plan within the Cardup Nature Reserve management plan and implement within the offset site
- The fire management plan will include:
    - location of firebreaks and vehicle access
    - firebreak maintenance
    - monitoring of fuel loads and timing of controlled burns (burns are unlikely to be implemented at this site).

### 5.5.7 *Phytophthora* Dieback Management

- Dieback surveys will be undertaken within the offset site and immediately adjacent areas to inform a dieback management plan.
- Develop and implement a dieback management plan for the duration of this strategy
- The dieback management plan may include measures such as: ongoing dieback monitoring, hygiene stations, signage, Phosphite treatment or limestone sheeting of particular tracks.

### 5.5.8 Rubbish Removal

- Conduct annual rubbish removal and discourage illegal dumping (restricting access, signage).

### 5.5.9 Other

- A detailed spring flora and vegetation survey will be conducted during 2025, in accordance with EPA (2016) to establish current baseline and determine the boundaries of SCP3a within the offset site. DBCA Swan Region botanist, who is familiar with Cardup NR, advised there is a high likelihood that areas of vegetation within the reserve represent SCP3a.
- Floristic Community Type (FCT) analysis will be conducted in accordance with DBCA methodology for the assessment of FCTs
- Conduct ongoing vegetation monitoring every five years to assess vegetation condition.
- In the unlikely event SCP3a is determined not to be present within Cardup Nature Reserve Main Roads proposes to increase the area to be offset at Mundijong Reserve as an alternative to Cardup Nature Reserve. The presence of SCP3a was confirmed at Mundijong Reserve to the west of the projects Development Envelope (Woodman 2021). An additional survey will be undertaken during spring to confirm the extent and condition of the SCP3a within the Mundijong Rail Reserve.

## 5.6 Targets

Main Roads has developed a set of monitoring and management activities and targets for the Cardup Nature Reserve Offset Site and these are outlined in **Table 5**.

**Table 5 Schedule of Monitoring, Management Activities and Targets for Cardup Nature Reserve**

| Action/Aspect | Description of Methodology | Timing | Target |
|---|---|---|---|
| Develop Cardup Nature Reserve Management Plan | In consultation with DBCA, develop a management plan to protect and enhance the site. | Complete by end of 2026 | Complete by end of 2026 |
| Implement Cardup Nature Reserve Management Plan | Fund the implementation of the management plan | Ongoing for duration of offset | Implement management plan for the duration of the offset |
| SCP3a | Implement Cardup Nature Reserve Management Plan within the offset site<br>Undertake monitoring of SCP3a condition | In accordance with the management plan | Improve SCP3a overall vegetation condition to 'Very Good-Excellent' (7) or better |
| Regionally Significant Bushland | Implement Cardup Nature Reserve Management Plan within the offset site | In accordance with the management plan | Improve vegetation condition to 'Very Good – Excellent' (7) or better |

## 5.7 Offset Calculator Values

Offset calculators for Cardup Nature Reserve are provided in **Appendix A** and the values summarised in **Table 6**.

**Table 6 Offset Calculator Values Cardup Nature Reserve**

| Environmental Value | Offset Size (ha) | Start Quality | Future Quality without Offset | Future Quality with Offset | Offset Value (%) |
|---|---|---|---|---|---|
| SCP3a TEC | 0.87 | 6 | 5 | 7 | 100.6 |
| Bush Forever (@2:1) | 0.87 | NA | NA | NA | 22.8 |


0 100 200 300 400 m

GDA2020 MGA Zone 50

**Legend**

- Cardup Nature Reserve Offset Site
- Bush Forever Site

**Figure 3 - Cardup Nature Reserve Offset Site**

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# 6. Mundijong Road Offset Site

## 6.1 Site Description

The Mundijong Road Offset Site is located along the southern side of Mundijong Road, within the Shire of Serpentine-Jarrahdale. The remnant vegetation along Mundijong Road, from Duckpond Road to Watkins Road Nature Reserve is part of Bush Forever Site 360 (Mundijong and Watkins Road Bushland, Mundijong/Peel Estate). Bush Forever Site 360 contains numerous TECs, including the BC Act listed Critically Endangered SCP3a and SCP3c (Government of Western Australia 2000).

Biological surveys conducted by Woodman (2021), Woodman (2021a) and Umwelt (2023) identified the presence of SCP3c (*Corymbia calophylla-Xanthorrhoea preissii* woodlands and shrublands) within the Mundijong Road Offset Site.

A total of 3.65 ha of remnant vegetation within the Mundijong Road Offset Site is proposed as a direct offset for the THE project (**Figure 4**). A total of 0.56ha of SCP3a in degraded condition within the Mundijong Road Reserve (area defined in **Figure 4a)** is proposed as an alternate offset site to Cardup Nature Reserve in the unlikely event the Spring survey confirm SCP3a is not present.

The offset site lies within the Swan Coastal Plain IBRA Region which is a low-lying coastal plain, mainly covered with *Banksia* and Tuart woodlands on sandy soils. Swampy areas are dominated by paperbark, and outwash plains by *Casuarina obesa*. *Melaleuca* shrublands and *C. obesa*-Marri woodlands are located extensively in the south, while Jarrah woodland dominates duri-crusted Mesozoic sediments to the east (Mitchell *et al.* 2002).

One pre-European Beard (1990) vegetation association, being association 968 is mapped within the Mundijong Road Offset Site. Vegetation association 968 has 32.02% of its pre-European extent remaining (Government of Western Australia 2019a) and is described as a medium woodland of Jarrah-Marri–Wandoo.

One Heddle *et al.* (1980) vegetation complex occurs within the offset site, the Guildford Complex. This complex is described as a mixture of open forest to tall open forest of Marri-Wandoo-Jarrah and woodland of Wandoo (with rare occurrences of Salmon White Gum). Minor components include *Eucalyptus rudis - Melaleuca rhaphiophylla*. Only 5.09% of the pre-European extent of the Guildford Complex remains on the Swan Coastal Plain and it is therefore considered poorly represented and under threat (Government of Western Australia 2019b).

The Mundijong Road Offset Site occurs directly adjacent to the THE project and contains the same vegetation associations and complexes, making it a suitable offset site for the project. By managing threatening processes and pressures at the offset site, tangible conservation benefits will be realised, thereby achieving a conservation gain, such as improvement in the vegetation condition score, for the environmental values being impacted and offset.

Implementation of the Mundijong Road Offset Site is a requirement under condition B5-2(2) of MS595 (as amended 31 March 2025) which states:

**B5-2(2)** - *Ensure on-ground management enhances or improves the vegetation condition of Corymbia calophylla communities along Mundijong Road east to Paterson Road*.

## 6.2 Offset Security

The land is currently a reserve vested with the Public Transport Authority (PTA). PTA has agreed to hand the management of the Mundijong Road Offset Site to Main Roads for the purpose of an environmental offset. The Mundijong Road Offset Site will be added to the DWER offsets register once it is approved to formalise its status as an offset site.

## 6.3 Environmental Values

The existing environmental values within the Mundijong Road Offset Site pertaining to this Offset Strategy are:

- 3.65 ha of SCP3c TEC
- 1.7 ha of CCW
- 3.65 ha of regionally significant vegetation within a Bush Forever site.

In addition to the values above the Mundijong Road Offset Site has also been provided as an alternative offset site in the unlikely event Spring Flora Surveys do not confirm the presence of SCP3a at Cardup Nature Reserve (**Figure 4a**). Mundijong Road also provides foraging habitat for all three species of Threatened Black Cockatoo.

## 6.4 Offset Values

The offset values from the implementation of this offset will be:

- SCP3c TEC:
    - Managing ongoing threatening processes to prevent 3.65 ha of existing SCP3c TEC from declining from an average of 'Good' condition (4) to 'Degraded-Good' condition (3)
    - Active enhancement and revegetation to improve of 3.65 ha of existing SCP3a TEC from 'Good' condition (4) to 'Very Good' condition (6).
- CCW:
    - Managing ongoing threatening processes to prevent of 1.7 ha of CCW from declining from an average of 'Good' condition (4) to 'Degraded-Good' condition (3)
    - Active enhancement and revegetation to improve of 1.7 ha of existing CCW from 'Good' condition (4) to 'Very Good' condition (6).
- Bush Forever:
    - Active management of 3.65 ha of regionally significant bushland within a Bush Forever site.

If required to be utilised to offset the residual impacts on SCP3a the offset values from the implementation will be:

- SCP3a TEC:
    - Managing ongoing threatening processes to prevent 0.56 ha of existing SCP3a TEC from declining from an average of 'degraded' condition (2)
    - Active enhancement and revegetation to improve of 0.56 ha of existing SCP3a TEC from 'Degraded' condition (2) to 'Very Good' condition (6).

## 6.5 Management Actions

As per condition B5-2(2) of the MS595, Main Roads must *ensure on-ground management enhances or improves the vegetation condition of Corymbia calophylla communities along Mundijong Road*. Main Roads proposes to undertake the following activities within the offset site:

### 6.5.1 Management Plan

- Main Roads will develop a management plan
- Main Roads will fund the implementation of the management plan within the offset site.

### 6.5.2 Fencing

- Install fencing where possible (including temporary fencing options) to restrict and control unauthorised vehicle access, pedestrian movements and restrict grazing by rabbits and kangaroos, assisting in the natural regeneration of vegetation associated with SCP3c and the CCW.
- Specification of fences will be determined prior to installation and will depend on the size, location and topography of the offset within the reserve
- Fencing repairs and/or modifications may be required.

### 6.5.3 Pest Animal Control

- Carry out feral and pest animal control (e.g. rabbits) as required based on site observations. Control will be carried out where feral and pest animals are impacting vegetation condition recovery within the offset site
- Pest management will be carried out using best practices in accordance with DPIRD advice and in accordance with the BAM Act
- Recalcitrant species typically associated with SCP3c TEC primarily comprise monocotyledons (i.e. grasses, rushes and sedges). Limiting and minimising grazing by pest animals will assist in natural regeneration and establishment of vegetation.

### 6.5.4 Weed Control

- Undertake weed mapping to identify locations of WoNS, DP plants under the BAM Act and aggressive environmental weeds
- Develop and implement a weed control and bushland restoration program for the offset site, including monitoring
- Selective weed control targeting aggressive environmental weeds present, where these are impacting recovery of vegetation condition
- Weed control will continue annually throughout the first five years of implementation of the Offset Strategy, after which, the frequency will be reduced to that required based on observations during monitoring inspections of impacts on vegetation condition recovery within the offset site
- Reduction of weed impacts naturally regenerating vegetation will reduce competition for light, water, nutrients and space, thereby enabling the successful establishment and maturity of flowering and seed formations, ensuring long term viability of the vegetation.

### 6.5.5 *Phytophthora* Dieback Management

- Dieback surveys will be undertaken within the offset site to inform a dieback management plan

- Develop and implement a dieback management plan for the duration of this strategy
- The dieback management plan may include measures such as: ongoing dieback monitoring, hygiene stations, signage, Phosphite treatment or limestone sheeting of particular tracks.

### 6.5.6 Rubbish Removal

- Conduct annual rubbish removal and discourage illegal dumping (restricting access, signage).

### 6.5.7 Other

- A detailed spring flora and vegetation survey will be conducted during 2025, in accordance with the EPA (2016) to establish a current baseline and determine the boundaries of SCP3c within the offset site
- Conduct ongoing vegetation monitoring every five years to assess vegetation condition.

## 6.6 Targets

Main Roads has developed a set of monitoring and management activities and targets for the Mundijong Road Offset Site and these are outlined in **Table 7**.

**Table 7 Schedule of Monitoring, Management Activities and Targets for Mundijong Road Offset Site**

| Action/Aspect | Description of Methodology | Timing | Target |
|---|---|---|---|
| Develop Mundijong Road Offset Site Management Plan | Develop a management plan to protect and enhance the site | Complete by end of 2026 | Complete by end of 2026 |
| Implement Mundijong Road Offset Site Management Plan | Fund the implementation of the management plan | Ongoing for duration of offset | Implement management plan for the duration of the offset |
| SCP3c | Implement management plan within the offset site<br>Undertake monitoring of SCP3c condition | In accordance with management plan | Improve SCP3c overall vegetation condition to 'Very Good' (6) or better |
| CCW | Implement management plan within the offset site<br>Undertake monitoring of CCW condition | In accordance with management plan | CCW overall habitat quality 'Very Good' (6) or better |
| Regionally Significant Bushland | Implement management plan within the offset site<br>Undertake monitoring of Regionally Significant Bushland condition | In accordance with management plan | Improve vegetation condition to 'Very Good' or better |

## 6.7 Offset Calculator Values

Offset calculators for Mundijong Road Offset Site are provided in **Appendix B** and **Appendix C** and the values summarised in **Table 8**.

**Table 8 Offset Calculator Values Mundijong Road Offset Site**

| Environmental Value | Offset Size (ha) | Start Quality | Future Quality without Offset | Future Quality with Offset | Offset Value (%) |
|---|---|---|---|---|---|
| SCP3c TEC | 3.65 | 4 | 3 | 6 | 64.4 |
| CCW | 1.7 | 4 | 3 | 6 | 59.8 |
| Bush Forever (@2:1) | 3.65 | NA | NA | NA | 95.5 |
| SCP3a TEC (Alternate Offset Site if required) | 0.56 | 2 | 2 | 6 | 100 |


**Figure 4 - Mundijong Road Offset Site**

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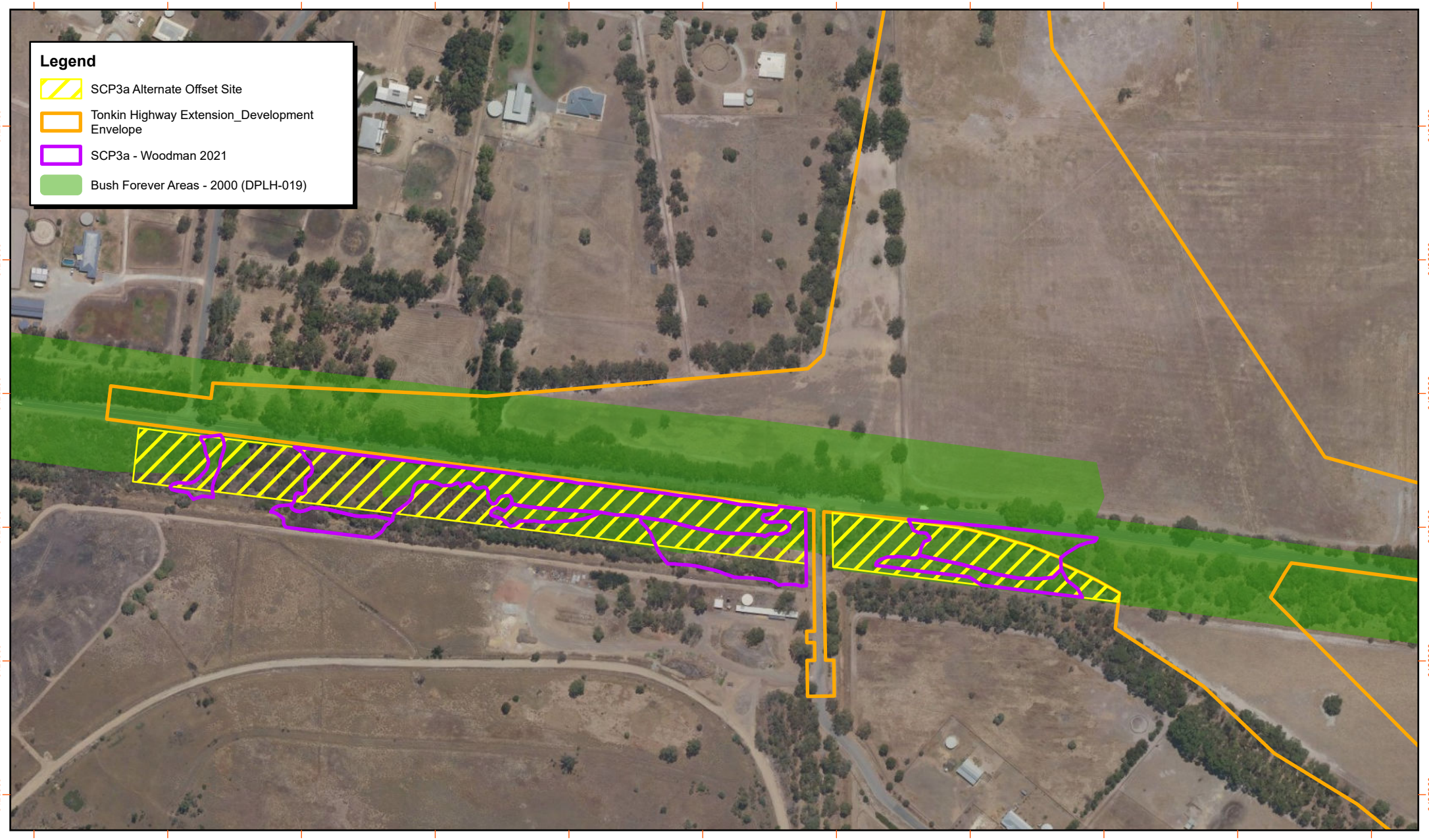


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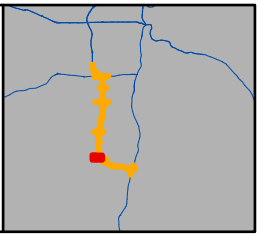
Coordinate System: GDA2020 MGA Zone 50
Scale: 1:3,720 @ A4
Created Date: 11/08/2025
Author: c9749

0 25 50 100 150 200 250
Meters

FIGURE 4a

# Mundijong Road Alternate Offset Site - SCP3a

mainroads WESTERN AUSTRALIA



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# 7. Waterloo Nature Reserve, Waterloo

## 7.1 Site Description

The Waterloo Nature Reserve encompasses an area of 18.43 ha and is located adjacent to South Western Highway approximately 10 km east of Bunbury. The Reserve contains patches of Commonwealth and State-listed SCP3c TEC and SCP08 TEC (Herb rich shrublands in claypans, part of EPBC Clay Pans TEC). A large proportion of Waterloo Nature Reserve has been identified by DBCA to contain SCP3c. Within the Waterloo Nature Reserve an area of 1.8 ha known to contain SCP3c (MRWA 2024) will be used as a direct offset by Main Roads for the THE project (**Figure 5**).

This offset site is approximately 115 km south of the impact site. Whilst it is a greater distance from the impact site than several other proposed offsets, it contains similar environmental values as the THE project area and is one of the few known remaining occurrences of SCP3c. Further, it is in secure tenure and managed by DBCA. Waterloo Nature Reserve contains vegetation with the same Heddle *et* al. (1980) vegetation complex and wetlands from the same consanguineous suite as those being impacted by THE. Only 29 occurrences of SCP3c have been identified, making any known occurrence highly significant (DEE 2017).

One pre-European Beard (1990) vegetation association is mapped within the Waterloo Nature Reserve, Vegetation association 968, which is described as: medium woodland of Jarrah-Marri-Wandoo and has 32.02% of its pre-European extent remaining (Government of Western Australia 2019a).

One Heddle *et al.* (1980) vegetation complex is mapped as occurring within the offset site, the Guildford Complex. This complex is described as a mixture of open forest to tall open forest of Jarrah-Marri-Wandoo and woodland of Wandoo. Minor components of the complex include Flooded Gum-Swamp Paperbark.

Only 5.09% of the pre-European extent of the Guildford Complex remains on the Swan Coastal Plain and this complex is therefore considered poorly represented and under threat.

On average, the vegetation within the Waterloo Nature Reserve Offset Site is considered to be in 'Good' condition (**Appendix D** – site assessment notes).

The entire Waterloo Nature Reserve is mapped as Geomorphic Wetlands of the Swan Coastal Plain (DBCA 2022). Three Geomorphic Wetlands occur and form part of the palusplain wetlands of the Keysbrook consanguineous suite (DBCA 2021), and include the following unique feature identifier number (UFI) and categories:

- UFI 1708 – Resource Enhancement Wetland
- UFI 1728 – CCW
- UFI 15223 – Multiple Use Wetland.

Threats within the Waterloo Nature Reserve include edge effects due to the long, narrow shape of the existing vegetation, damage from infrastructure (drainage, adjacent roads and rail), herbivore grazing and the presence of aggressive environmental weeds. Weed present include: Watsonia, Sparaxis, Babiana, African Lovegrass and Veldt Grass. It is considered likely that the quality of the vegetation will continue to decline without active management.

The Waterloo Nature Reserve contains the same Heddle *et al.* (1980) and Beard (1990) vegetation associations/complexes and also lies within the same consanguineous wetland suite as the THE project, making it a suitable offset site for the project as a 'like-for-like' offset. By managing threatening processes and pressures at the offset site, tangible conservation benefits, such as an improvement in vegetation condition will be realised, thereby achieving a conservation gain for the environmental values being impacted and offset.

## 7.2 Offset Security

Waterloo Nature Reserve (R46108, R2806) is an existing reserve vested with the Conservation and Parks Commission and managed by DBCA for the purpose of conservation of native flora and fauna.

Main Roads and DBCA will develop a MOU for the ongoing management and funding the Waterloo Nature Reserve Offset Site. The Waterloo Nature Reserve Offset Site will be added to the DWER offsets register once it is approved to formalise its status as an offset site.

## 7.3 Environmental Values

The existing environmental values within the Waterloo Nature Reserve Offset Site pertaining to this Offset Strategy include:

- 2.02 ha of SCP3c TEC
- 1.15 ha of CCW (UFI 1728).

The Waterloo Nature Reserve contains a number of significant environmental values that can be protected and enhanced with active on-ground management actions. Land management will include fencing and access control, revegetation, weed control, *Phytophthora* dieback management and fire management as outlined in **Section 7.5**. This will reduce the impact of weeds, dieback and other diseases, invasive species, feral and native animal grazing, and uncontrolled vehicle access, leading to a conservation gain for the protected matters. These management actions will have a positive impact on the site by improving the quality of SCP3c and improving vegetation quality within CCW.

## 7.4 Offset Values

The offset values from the implementation of this offset will be:

- SCP3c TEC:
    - Managing ongoing threatening processes to prevent 2.02 ha of existing SCP3c TEC from declining from 'Good' condition (4) to 'Degraded – Good' condition (3)
    - Active enhancement and revegetation to improve of 2.02 ha of existing SCP3c TEC from 'Good' condition (4) to 'Very Good' condition (6).
- CCW:
    - Managing ongoing threatening processes to prevent of 1.15 ha of CCW from declining from 'Good' condition (4) to 'Degraded – Good' condition (3)
    - Active enhancement and revegetation to improve of 1.15 ha of CCW from 'Good' condition (4) to 'Very Good' condition (6).

## 7.5 Management Actions

Main Roads proposes to undertake the activities described below in conjunction with DBCA in order to achieve the offset values stated in **Section 7.4**.

### 7.5.1 Existing Management

The current management works being undertaken by DBCA within the Waterloo Nature Reserve are:

- Basic maintenance tasks including maintaining management access and firebreaks (where feasible)
- Liaison with utilities and neighbouring properties
- Monitoring for illegal activities.

The proposed management actions by Main Roads are additional to work already being undertaken by DBCA and is above and beyond what DBCA will achieve at the site over the next ten years (DBCA Regional Leader Nature Conservation, South West Region *pers. comm.* 9 May 2025).

Whilst DBCA is the responsible authority for initiating and guiding actions within state recovery plans, the plans are often unfunded. Implementation of identified actions within state recovery plans requires funding – part of DBCA's role is liaising with interested parties to fund the implementation of these recovery actions.

### 7.5.2 Management Plan

- Main Roads, in consultation with DBCA, will develop a management plan for Waterloo Nature Reserve
- Main Roads will fund the implementation of the Waterloo Nature Reserve management plan within the offset site.

### 7.5.3 Fencing

- Install fencing to restrict and control unauthorised access (human and vehicle), herbivore gazing and grazing by livestock, in order to assist in the natural regeneration of vegetation associated with SCP3c.
- Fencing will be erected within 24 months of commencement of the Offset Strategy
- Specification of fences will be determined prior to installation and will depend on agreement with DBCA and other stakeholders and the size, location and topography of the reserve.

### 7.5.4 Pest Animal Control

- Pest management will be carried out using best practices in accordance with DPIRD advice and governed by the BAM Act
- Pest animal control (e.g. kangaroos) will be undertaken as required based on site observations. Control will be carried out where pest animals are impacting vegetation condition recovery.
- Limiting and minimising grazing by pest animals will assist in natural regeneration and establishment of vegetation
- Main Roads will liaise with DBCA, DPIRD and the local government to coordinate feral animal control within the site with controls being implemented in adjacent areas

### 7.5.5 Weed Control

- Weed mapping will be undertaken in 2025/26 to identify locations of WoNS, DP plants and aggressive environmental weeds
- A weed control program will be developed based on the weed mapping results to control significant outbreaks of these weeds within the site where these are impacting vegetation recovery
- Weed control will continue annually throughout the first five years of implementation of the Offset Strategy, after which, the frequency will be reduced to that required based on observations during monitoring inspections of impacts on vegetation condition recovery within the offset site
- Reduction of weed impacts on revegetation and naturally regenerating vegetation will reduce competition for light, water, nutrients and space, thereby enabling the successful establishment and maturity of flowering and seed formations, ensuring long term viability of the vegetation.

### 7.5.6 Fire Management

Main Roads will develop and implement a fire management plan for the site in consultation with DBCA. The fire management plan will include:

  - location of firebreaks and vehicle access
  - firebreak maintenance
  - Monitoring of fuel loads and timing of controlled burns (burns are unlikely to be implemented at this site).

### 7.5.7 *Phytophthora* Dieback Management

- Dieback surveys will be undertaken to inform a dieback management plan
- Develop and implement dieback management plan within the offset site for the duration of this strategy
- The dieback management plan may include measures such as: ongoing dieback monitoring, hygiene stations, signage, Phosphite treatment or limestone sheeting of particular tracks.

### 7.5.8 Rubbish Removal

- On establishment of the site as an offset, any significant piles of rubbish will be removed.
- Monitoring of rubbish dumping and removal as required will continue as part of routine management of the offset site.

### 7.5.9 Other

- A detailed spring flora and vegetation assessment will be conducted during 2025, to confirm and revise the extent of SCP3c which is documented by DBCA to occur
- FCT analysis will be conducted in accordance with DBCA methodology for the assessment of FCTs
- Conduct vegetation monitoring for the duration of the offset to determine and assess vegetation and habitat condition
- Develop a detailed revegetation plan in consultation with DBCA
- Conduct field assessment to determine the impact of grazing, particularly by kangaroos, to determine whether fauna fencing and/or kangaroo control is required.

## 7.6 Targets

Main Roads has developed a set of monitoring and management activities and targets for Waterloo Nature Reserve and these are outlined in **Table 9**.

**Table 9 Schedule of Monitoring, Management Activities and Targets for Waterloo Nature Reserve Offset Site**

| Action/Aspect | Description of Methodology | Timing | Target |
|---|---|---|---|
| Finalise land management agreement with DBCA | Develop MoU with DBCA that describes actions to be implemented and funding by Main Roads | Complete by end of 2025 | Complete by end of 2025 |
| Develop and implement Waterloo Nature Reserve Offset Management Plan | A management plan for Waterloo Nature Reserve Offset Site will be developed, and implemented within the offset site | Complete by the end of 2025 | Complete by the end of 2025 |
| SCP3c | Implement management plan within the offset site<br>Vegetation condition monitoring by installation and assessment of 10 x 10 m quadrats in accordance with EPA (2016) survey requirements | In accordance with management plan | SCP3c overall habitat quality 'Very Good' (6) or better |
| CCW | Implement management plan within the offset site<br>Vegetation condition monitoring by installation and assessment of 10 x 10 m quadrats in accordance with EPA (2016) survey requirements | In accordance with management plan | CCW overall habitat quality 'Very Good' (6) or better |

## 7.7 Offset Calculator Values

Offset calculators for Waterloo Nature Reserve are provided in **Appendix E** and the values are summarised in **Table 10** below.

**Table 10 Offset Calculator Values for Waterloo Nature Reserve**

| Environmental Value | Offset Size (ha) | Start Quality | Future Quality without Offset | Future Quality with Offset | Offset Value (%) |
|---|---|---|---|---|---|
| SCP3c TEC | 2.02 | 4 | 3 | 6 | 35.6 |
| CCW | 1.15 | 4 | 3 | 6 | 40.4 |

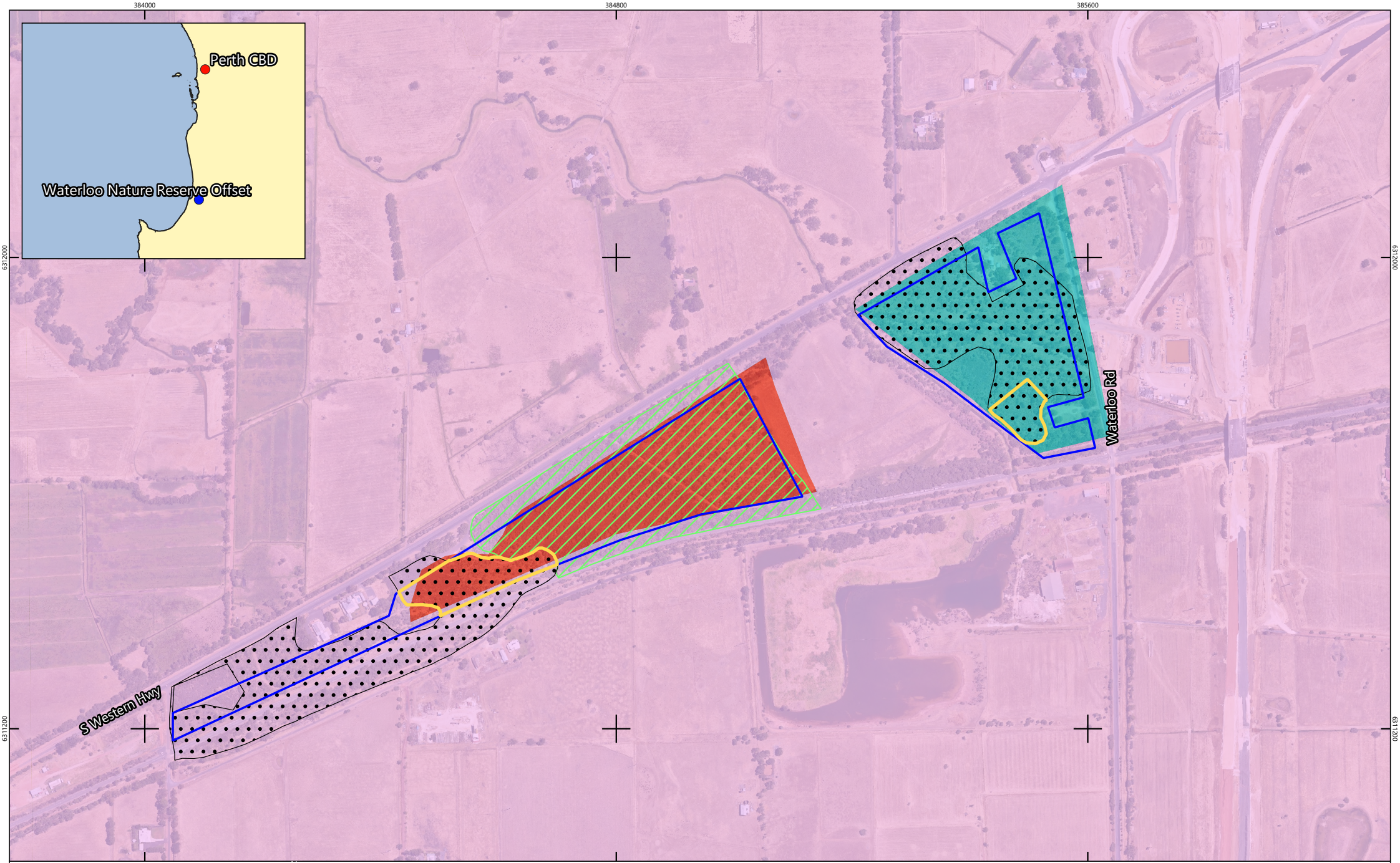


**Figure 5 - Waterloo Nature Reserve Offset Site**

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# 8. Adaptive Management and Contingency Actions

This Offset Strategy has adopted an 'adaptive management' approach to ensure that the proposed outcomes of the strategy are met. Adaptive management allows for the implementation of management whilst monitoring what is most effective in achieving conservation outcomes. The implementation of adaptive management acknowledges the inherent risks associated with complex ecological systems, the implementation of this Offset Strategy and their interactions with the wider world. Where the management actions and/or targets at a particular offset site are not being met, adaptive management and contingency actions will be implemented to ensure the success of the offset.

Measures to detect the need to implement corrective actions will include monitoring as described for each offset. Where monitoring results detect decline in vegetation/habitat condition, revegetation failure or other issues, the following will be carried out:

- Evaluate the cause of the decline, failures or issues
- Determine the appropriate contingency and adaptive management actions.

Corrective actions may include:

- Additional monitoring
- Supplementary planting and/or seeding
- Changes to species lists for planting and/or seeding
- Altered weed control scheduling
- Altered herbicides or weed management techniques
- Pest management
- Active dieback management, including Phosphite treatment
- Additional or alternative access control, including fencing
- Engaging additional resources to ensure works are undertaken as scheduled.

# 9. Consideration of WA Offsets Policy

This Offset Strategy has been developed to be consistent with the WA Offsets Policy. **Table 11** shows how each of the offset policy principles has been addressed in this Offset Strategy.

**Table 11 Consideration of the WA Environmental Offset Policy Principles**

| Offset Principle | Consideration |
|---|---|
| Environmental offsets will only be considered after avoidance and mitigation options have been pursued. | The potential impacts from the THE project have been significantly reduced as a result of the efforts applied during the detailed design phase and during environmental assessment. This reduction has been largely achieved through the additional avoidance and mitigation measures that have been developed for the THE project, particularly around Mundijong Road. |
| Environmental offsets are not appropriate for all projects. | Main Roads operates on a hierarchy of avoid, minimise, reduce, rehabilitate and (if necessary, where significant residual impacts will result) offset environmental impacts. This hierarchy is achieved primarily through changes in scope and design, development, and implementation of management measures and finally, an offset proposal. Application of the management hierarchy has been summarised in this Offset Strategy.<br>Environmental offsets are considered appropriate for the THE project. |
| Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted. | Main Roads has pursued a number of options in developing a package of offsets to counterbalance residual impacts that are relevant and appropriate for the locality and quantum of impact for each environmental value impacted. The options investigated have comprised land acquisition, on-ground management and rehabilitation of land representative of TECs, Bush Forever and CCW vegetation.<br>The direct offsets proposed will protect and enhance the same (or similar) environmental values being impacted by the THE project. The area and condition of offsets within the proposed offset sites is proportionate to that being impacted. |
| Environmental offsets will be based on sound environmental information and knowledge. | All offset sites have either been surveyed or will be surveyed as part of the implementation of the offset. The quantum of impact has been calculated using data from field surveys or the most current publicly available information in the absence of field survey data. |
| Environmental offsets will be applied within a framework of adaptive management. | Each offset will have a management plan to ensure offset objectives are met. Each of these plans will address monitoring and contingencies and allow for adaptive management measures. |
| Environmental offsets will be focussed on longer term strategic outcomes. | All offsets will be implemented for at least 20 years by Main Roads prior to being handed over to the ultimate land manager of the site. On-ground management actions for each site will be formalised through a site-specific management plan, where applicable. |

# 10. Reporting and Accountability

## 10.1 Roles and Responsibilities

This Offset Strategy outlines the environmental management activities to be undertaken by Main Roads or its delegate, in association with the offset sites for the THE project. Main Roads acknowledges that the environmental management actions contained in this Offset Strategy are legal requirements to be met by Main Roads.

The Director Environment and Heritage at Main Roads will maintain responsibility for implementation of the management actions specified in this Offset Strategy on behalf of the Main Roads Managing Director.

## 10.2 Reporting

Main Roads will report to DWER on the implementation of this Offset Strategy as part of annual compliance reporting required under MS595. The annual monitoring report for each offset site will be prepared in the format presented in **Table 12**. The annual compliance report will be made publicly available on Main Roads' website.

**Table 12 Format of Annual Monitoring Report for each Offset Site**

| Section | Potential Inclusions |
|---|---|
| Introduction | • Background<br>• Objective<br>• Scope of works<br>• Summary of management activities for the period<br>• Assumptions/limitations |
| Environmental Setting | • Climatic/weather conditions over the reporting period (rainfall, storms, dry periods)<br>• Changes to topography, drainage or hydrology (surface water runoff, flow direction)<br>• Environmental events such as flooding or fires<br>• Wetlands (if applicable) |
| Management Activities | • Details of on-ground management works or other works undertaken as per the agreed management actions<br>• Identification and justification for deviations from on-ground management works or other works specified in the operational works plan for the period<br>• Identification and justification of any corrective actions (if required) implemented during the period<br>• Result of any surveys, including monitoring surveys, undertaken (e.g. dieback mapping, weed mapping, flora and vegetation surveys)<br>• Any observed or anecdotal results noted from the implementation of on-ground management works (i.e. observable reduction in feral animals or reduction in weeds) |
| Financial Arrangements | • Details of expenditure incurred during the management period<br>• Identification of and justification for deviations in anticipated expenditure during the management period<br>• Any proposed re-allocation of funds from one management activity to another<br>• Any proposed re-allocation of funds from one management period to another<br>• Risk assessment for proposed funding changes for the upcoming management period |
| Stakeholder Consultation | • Details of any stakeholder consultation conducted |
| Figures | • Site layout<br>• Locations of on-ground management activities (e.g. fencing, signage, weed control, track maintenance)<br>• Locations of work areas (e.g. weed control, track maintenance)<br>• Locations of observations (e.g. areas showing reduced feral animal activity)<br>• Indications of proposed works areas for the upcoming management period<br>• Provision of spatial data |
| Photographs | • Evidence of works implemented (e.g. fencing, signage, rubbish removal)<br>• Evidence justifying deviations from operational works plan<br>• Visible changes to the site and/or surrounds<br>• Visible changes (improvement or degradation) to environmental values (e.g. vegetation condition, flora, fauna habitat, wetlands) |
| Conclusions | • Management activities completed to date<br>• Comment on the effectiveness of management activities that have been implemented this far |
| Recommendations | • Recommendations for management activities for the upcoming management period<br>• Recommendations for deviations to any management activities for the upcoming management period<br>• Recommendations for funding allocation for management activities for the upcoming management period<br>• Any other recommendations |

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# 12. Appendices

# Appendix A – Cardup Nature Reserve Offset Calculators

# WA Environmental Offsets calculator

**PLEASE ENABLE MACROS FOR THIS SPREADSHEET**

**Produced by:**

The Department of Water and Environmental Regulation (DWER) in consultation with stakeholder working groups

**Purpose:**

Use the WA Envirionmental Offsets calculator in conjunction with the *Environmental offsets metric: Quantifying environmental offsets in Western Australia* guideline. Together, they form a supplement to section 4 of the *WA Environmental Offsets Guidelines* and provide information to help decision-makers, government officers, industry and the community to quantify environmental offsets.

**Data currency:**

The correct application of the WA Environmental Offsets Calculator relies on access to current datasets (such as vegetation extent and land tenure).

**Process for using the WA Environmental Offsets Calculator**

| Step | Worksheet | Component |
|---|---|---|
| **Step 1: Determining conservation significance** | **Step1_ConservationSignificance** | **Conservation significance determination** |
| | | Combined *area* / *feature* |
| **Step 2: Calculating significant residual impact** | **Step2_SignificantResidualImpact** | **Part A: Significant impact calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part B: Rehabilitation credit calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part C: Significant residual impact calculation** |
| | | Separate *area* or *feature* calculations |
| **Step 3: Calculating offsets** | **Step3_Offsets** | **Offsets calculation** |
| | | Separate *area* or *feature* calculations |
| **Rationale for scores used in the Offsets Calculator** | **Rationale** | **All** |

# Step 1: Determining conservation significance

**Key:**

| | |
|---|---|
| | **Data to be entered** |
| | **Drop-down selection** |
| | **Automatically-generated scores** |

**(Or, if appropriate, manual data entry permitted)**

***Area / feature*** **(Impact site)**

| **Conservation significance determination for the environmental value impacted** | | |
|---|---|---|
| **Conservation significance** | **Description** | SCP 3a - Corymbia calophylla – Kingia australis woodlands on heavy soils |
| | **Type of environmental value** | Ecological community |
| | **Conservation significance of environmental value** | Threatened ecological community - critically endangered |
| | **Conservation significance score** | **6.8%** |

| | |
|---|---|
| **Please select *area* or *feature* for the calculations** | **Area** |

# Step 2: Calculating significant residual impact

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| | |
|---|---|
| Environmental value (step 1) | SCP 3a - Corymbia calophylla – Kingia australis woodlands on heavy soils |

***Area* (impact site)**

**Part A: Significant impact calculation *Area***

| | Description | Quantum of impact | |
|---|---|---|---|
| Significant impact | Clearing of 0.1 ha of Critically Endangered SCP 3a (Corymbia calophylla – Kingia australis woodlands on heavy soils) | Significant impact (hectares) | 0.10 |
| | | Quality (scale) | 6.00 |
| | | Total quantum of impact | 0.06 |

**Part B: Rehabilitation credit calculation *Area* (onsite)**

| | Description | | | | |
|---|---|---|---|---|---|
| Rehabilitation Credit | | Proposed rehabilitation (area in hectares) | | Time until ecological benefit (years) | |
| | | Current quality of rehabilitation site (scale) | | Confidence in rehabilitation result (%) | |
| | | Future quality WITHOUT rehabilitation (scale) | | Rehabilitation credit | 0.00 |
| | | Future quality WITH rehabilitation (scale) | | | |

**Part C: Significant residual impact calculation *Area***

| | | |
|---|---|---|
| Significant residual impact | Total quantum of impact | 0.06 |
| | Rehabilitation credit | 0.00 |
| | Significant residual impact | 0.06 |

WA Environmental Offsets Calculator

# Step 3: Calculating offsets

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| | | | |
|---|---|---|---|
| Environmental value (step 1) | SCP 3a - Corymbia calophylla – Kingia australis woodlands on heavy soils | Significant impact (step 2, part A) | 0.10 |
| | | Rehabilitation credit (step 2, part B) | 0.00 |
| | | Significant residual impact (step 2, part C) | 0.06 |

***Area*** **(offset site)**

**Offset calculation**
***Area***

| Offsets calculation | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Description** | **Proposed offset (area in hectares)** | 0.87 | **Duration of offset implementation (maximum 20 years)** | 20.00 | **Offset value** | **0.06** |
| | Cardup Nature Reserve (R2457), Lot 180 Cardup Siding Road, Cardup | **Current quality of offset site (scale)** | 6.00 | **Time until offset site secured (years)** | 1.00 | | **100.6%** |
| | | **Future quality WITHOUT offset (scale)** | 5.00 | **Risk of future loss WITHOUT offset (%)** | 0.0% | | |
| | | **Future quality WITH offset (scale)** | 7.00 | **Risk of future loss WITH offset (%)** | 0.0% | | |
| | | **Time until ecological benefit (years)** | 10.00 | | | | |
| | | **Confidence in offset result (%)** | 67.0% | | | **OFFSET ADEQUATE?** | **YES** |

WA Environmental Offsets Calculator

# Rationale for scores used in the offsets calculator

| Environmental value to be offset | | | |
|---|---|---|---|
| ***Calculation*** | ***Score (Area)*** | | ***Rationale*** |
| ***Conservation significance*** | | | |
| Description | SCP 3a - Corymbia calophylla – Kingia australis woodlands on heavy soils | | The proposed clearing will impact on 0.1 ha of Critically Endangered Ecological Community SCP 3a (Corymbia calophylla – Kingia australis woodlands on heavy soils) |
| Type of environmental value | Ecological community | | SCP 3a is listed as Critically Endangered under the BC Act. |
| Conservation significance of environmental value | Threatened ecological community - critically endangered | | SCP 3a is listed as Critically Endangered under the BC Act and Endangered under the EPBC Act. |
| Landscape-level value impacted | yes/no | | NA |
| ***Significant impact*** | | | |
| Description | Clearing of 0.1 ha of Critically Endangered SCP 3a (Corymbia calophylla – Kingia australis woodlands on heavy soils) | | Native vegetation representative of SCP 3a is proposed to be cleared for the Tonkin Highway Extension. |
| Significant impact (hectares) / Type of feature | 0.10 | | THE will impact 0.1 ha of SCP 3a. |
| Quality (scale) / Number | 6.00 | | The quality score of the SCP 3a impact has been determined based on the proportional condition of the vegetation impacted. The entire area is of 'Very Good' condition and a score of 6 has been applied |
| ***Rehabilitation credit*** | | | |
| Description | 0 | | |
| Proposed rehabilitation (area in hectares) | 0.00 | | |
| Current quality of rehabilitation site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation | 0.00 | | |
| Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in rehabilitation result (%) | 0 | | |
| ***Offset*** | | | |
| Description | Cardup Nature Reserve (R2457), Lot 180 Cardup Siding Road, Cardup | | SCP 3a within Cardup Nature Reserve |
| Proposed offset (area in hectares) | 0.87 | | 0.87 ha of SCP 3a within Cardup Nature Reserve |
| Current quality of offset site / Start number (of type of feature) | 6.00 | | Vegetation is currently in 'Very Good' condition (6), but under threat from edge effects and infrastructure maintenance |
| Future quality WITHOUT offset (scale) / Future number WITHOUT offset | 5.00 | | Vegetation will decline over time due to ongoing threats - rabbit grazing, weed invasion, disturbance and edge effects. Without active management the site is likely to decline in quality over time. |
| Future quality WITH offset (scale) / Future number WITH offset | 7.00 | | Active enhancment and management will improve the vegetation conditon to 'Very Good - Excellent' (7). By actively managing the site for conservation, through fencing, weed control and restoration activities, including adaptive management based on monitoring results it is expected the site condition will improve over time. |
| Time until ecological benefit (years) | 10.00 | | The ecological benefit will be realised in 10 years |
| Confidence in offset result (%) | 0.67 | | Moderate level of confidence that management actions will achieve results within the predicted timeframe. |
| Duration of offset implementation (maximum 20 years) | 20.00 | | Main Roads will fund the implementation of the offset for 20 years. |
| Time until offset site secured (years) | 1.00 | | Offset site will be secured once offset is approved |
| Risk of future loss WITHOUT offset (%) | 0.0% | | Site is in secure tenure. No risk of loss. |
| Risk of future loss WITH offset (%) | 0.0% | | Site is in secure tenure. No risk of loss. |
| Offset ratio (Conservation area only) | N/A | | |

# WA Environmental Offsets calculator

**PLEASE ENABLE MACROS FOR THIS SPREADSHEET**

**Produced by:**

The Department of Water and Environmental Regulation (DWER) in consultation with stakeholder working groups

**Purpose:**

Use the WA Envirionmental Offsets calculator in conjunction with the *Environmental offsets metric: Quantifying environmental offsets in Western Australia* guideline. Together, they form a supplement to section 4 of the *WA Environmental Offsets Guidelines* and provide information to help decision-makers, government officers, industry and the community to quantify environmental offsets.

**Data currency:**

The correct application of the WA Environmental Offsets Calculator relies on access to current datasets (such as vegetation extent and land tenure).

**Process for using the WA Environmental Offsets Calculator**

| Step | Worksheet | Component |
|---|---|---|
| **Step 1: Determining conservation significance** | **Step1_ConservationSignificance** | **Conservation significance determination** |
| | | Combined *area* / *feature* |
| **Step 2: Calculating significant residual impact** | **Step2_SignificantResidualImpact** | **Part A: Significant impact calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part B: Rehabilitation credit calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part C: Significant residual impact calculation** |
| | | Separate *area* or *feature* calculations |
| **Step 3: Calculating offsets** | **Step3_Offsets** | **Offsets calculation** |
| | | Separate *area* or *feature* calculations |
| **Rationale for scores used in the Offsets Calculator** | **Rationale** | **All** |

WA Environmental Offsets Calculator

# Step 1: Determining conservation significance

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores (Or, if appropriate, manual data entry permitted)

***Area / feature*** **(Impact site)**

| Conservation significance determination for the environmental value impacted | | |
|---|---|---|
| Conservation significance | **Description** | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365 |
| | **Type of environmental value** | Conservation area |
| | **Conservation significance of environmental value** | Bush Forever site |
| | **Conservation significance score** | **A conservation significance score does not apply in this case; an offset ratio may be appropriate (step 3)** |

| | |
|---|---|
| **Please select *area* or *feature* for the calculations** | **Area** |

WA Environmental Offsets Calculator

# Step 2: Calculating significant residual impact

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| Environmental value (step 1) | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365 |
|---|---|

***Area* (impact site)**

**Part A: Significant impact calculation *Area***

| Significant impact | Description | Quantum of impact | |
|---|---|---|---|
| | Clearing of 'Very High' conservation significant Bush Forever sites 351, 360, 365 | Significant impact (hectares) | 1.91 |
| | | Quality (scale) | |
| | | Total quantum of impact | 0.00 |

**Part B: Rehabilitation credit calculation *Area* (onsite)**

| Rehabilitation Credit | Description | Proposed rehabilitation (area in hectares) | | Time until ecological benefit (years) | |
|---|---|---|---|---|---|
| | | Current quality of rehabilitation site (scale) | | Confidence in rehabilitation result (%) | |
| | | Future quality WITHOUT rehabilitation (scale) | | Rehabilitation credit | 0.00 |
| | | Future quality WITH rehabilitation (scale) | | | |

**Part C: Significant residual impact calculation *Area***

| Significant residual impact | | |
|---|---|---|
| | Total quantum of impact | 0.00 |
| | Rehabilitation credit | 0.00 |
| | Significant residual impact | 0.00 |

WA Environmental Offsets Calculator

# Step 3: Calculating offsets

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| | | | |
|---|---|---|---|
| Environmental value (step 1) | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365 | Significant impact (step 2, part A) | 1.91 |
| | | Rehabilitation credit (step 2, part B) | 0.00 |
| | | Significant residual impact (step 2, part C) | 0.00 |

***Area* (offset site)**

**Offset calculation**
***Area***

| Offsets calculation | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Description** | **Proposed offset (area in hectares)** | 0.87 | **Duration of offset implementation (maximum 20 years)** | | | |
| | Cardup Nature Reserve (R2457), Lot 180 Cardup Siding Road, Cardup | **Current quality of offset site (scale)** | | **Time until offset site secured (years)** | | | |
| | | **Future quality WITHOUT offset (scale)** | | **Risk of future loss WITHOUT offset (%)** | | **Offset value Conservation area** (applied to step 2, part A) | **2** |
| | | **Future quality WITH offset (scale)** | | **Risk of future loss WITH offset (%)** | | | **22.8%** |
| | | **Time until ecological benefit (years)** | | | | | |
| | | **Confidence in offset result (%)** | | | | **OFFSET ADEQUATE?** | **NO** |

WA Environmental Offsets Calculator

# Rationale for scores used in the offsets calculator

| Environmental value to be offset | | | |
|---|---|---|---|
| ***Calculation*** | ***Score (Area)*** | | ***Rationale*** |
| ***Conservation significance*** | | | |
| Description | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365 | | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365, |
| Type of environmental value | Conservation area | | Bush Forever Sites under SPP 2.8 |
| Conservation significance of environmental value | Bush Forever site | | Clearing regionally significant bushland within Bush Forever sites, 1.91 ha of 'Very High' conservation significance under SPP 2.8. |
| Landscape-level value impacted | yes/no | | NA |
| ***Significant impact*** | | | |
| Description | Clearing of 'Very High' conservation significant Bush Forever sites 351, 360, 365 | | Clearing regionally significant bushland within Bush Forever sites, 1.91 ha of 'Very High' conservation significance under SPP 2.8. |
| Significant impact (hectares) / Type of feature | 1.91 | | Clearing regionally significant bushland within Bush Forever sites, 1.91 ha of 'Very High' conservation significance under SPP 2.8. |
| Quality (scale) / Number | 0.00 | | NA |
| ***Rehabilitation credit*** | | | |
| Description | 0 | | |
| Proposed rehabilitation (area in hectares) | 0.00 | | |
| Current quality of rehabilitation site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation | 0.00 | | |
| Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in rehabilitation result (%) | 0 | | |
| ***Offset*** | | | |
| Description | Cardup Nature Reserve (R2457), Lot 180 Cardup Siding Road, Cardup | | |
| Proposed offset (area in hectares) | 0.87 | | |
| Current quality of offset site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT offset (scale) / Future number WITHOUT offset | 0.00 | | |
| Future quality WITH offset (scale) / Future number WITH offset | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in offset result (%) | 0 | | |
| Duration of offset implementation (maximum 20 years) | 0.00 | | |
| Time until offset site secured (years) | 0.00 | | |
| Risk of future loss WITHOUT offset (%) | 0.0% | | |
| Risk of future loss WITH offset (%) | 0.0% | | |
| Offset ratio (Conservation area only) | 2 | | SPP2.8 requires a 2:1 offset ratio for impacting of regionally significant bushland of 'Very High' conservation significance. |

# Appendix B – Mundijong Road Offset Calculator (SCP3c), Bush Forever and CCW

# WA Environmental Offsets calculator

**PLEASE ENABLE MACROS FOR THIS SPREADSHEET**

**Produced by:**

The Department of Water and Environmental Regulation (DWER) in consultation with stakeholder working groups

**Purpose:**

Use the WA Envirionmental Offsets calculator in conjunction with the *Environmental offsets metric: Quantifying environmental offsets in Western Australia* guideline. Together, they form a supplement to section 4 of the *WA Environmental Offsets Guidelines* and provide information to help decision-makers, government officers, industry and the community to quantify environmental offsets.

**Data currency:**

The correct application of the WA Environmental Offsets Calculator relies on access to current datasets (such as vegetation extent and land tenure).

**Process for using the WA Environmental Offsets Calculator**

| Step | Worksheet | Component |
|---|---|---|
| **Step 1: Determining conservation significance** | **Step1_ConservationSignificance** | **Conservation significance determination** |
| | | Combined *area* / *feature* |
| **Step 2: Calculating significant residual impact** | **Step2_SignificantResidualImpact** | **Part A: Significant impact calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part B: Rehabilitation credit calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part C: Significant residual impact calculation** |
| | | Separate *area* or *feature* calculations |
| **Step 3: Calculating offsets** | **Step3_Offsets** | **Offsets calculation** |
| | | Separate *area* or *feature* calculations |
| **Rationale for scores used in the Offsets Calculator** | **Rationale** | **All** |

WA Environmental Offsets Calculator

# Step 1: Determining conservation significance

**Key:**

| | |
|---|---|
| | **Data to be entered** |
| | **Drop-down selection** |
| | **Automatically-generated scores** |

**(Or, if appropriate, manual data entry permitted)**

***Area / feature*** **(Impact site)**

| **Conservation significance determination for the environmental value impacted** | | |
|---|---|---|
| **Conservation significance** | **Description** | SCP 3c - Corymbia calophylla - Xanthorrhoea preissii Woodlands and Shrublands of the Swan Coastal Plain TEC |
| | **Type of environmental value** | Ecological community |
| | **Conservation significance of environmental value** | Threatened ecological community - endangered |
| | **Conservation significance score** | **1.2%** |

| | |
|---|---|
| **Please select *area* or *feature* for the calculations** | **Area** |

WA Environmental Offsets Calculator

# Step 2: Calculating significant residual impact

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| | |
|---|---|
| Environmental value (step 1) | SCP 3c - Corymbia calophylla - Xanthorrhoea preissii Woodlands and Shrublands of the Swan Coastal Plain TEC |

***Area* (impact site)**

**Part A: Significant impact calculation *Area***

| | Description | Quantum of impact | |
|---|---|---|---|
| Significant impact | Clearing of 3.37 ha of Critically Endangered SCP 3c (Corymbia calophylla – Xanthorrhoea preisii woodlands and shrublands of the Swan Coastal Plain) | Significant impact (hectares) | 3.37 |
| | | Quality (scale) | 3.00 |
| | | Total quantum of impact | 1.01 |

**Part B: Rehabilitation credit calculation *Area* (onsite)**

| | Description | | | | |
|---|---|---|---|---|---|
| Rehabilitation Credit | | Proposed rehabilitation (area in hectares) | | Time until ecological benefit (years) | |
| | | Current quality of rehabilitation site (scale) | | Confidence in rehabilitation result (%) | |
| | | Future quality WITHOUT rehabilitation (scale) | | Rehabilitation credit | 0.00 |
| | | Future quality WITH rehabilitation (scale) | | | |

**Part C: Significant residual impact calculation *Area***

| | | |
|---|---|---|
| Significant residual impact | Total quantum of impact | 1.01 |
| | Rehabilitation credit | 0.00 |
| | Significant residual impact | 1.01 |

WA Environmental Offsets Calculator

# Step 3: Calculating offsets

Key:

| | |
|---|---|
| | Data to be entered |
| | Drop-down selection |
| | Automatically-generated scores |

| | | | |
|---|---|---|---|
| Environmental value (step 1) | SCP 3c - Corymbia calophylla - Xanthorrhoea preissii Woodlands and Shrublands of the Swan Coastal Plain TEC | Significant impact (step 2, part A) | 3.37 |
| | | Rehabilitation credit (step 2, part B) | 0.00 |
| | | Significant residual impact (step 2, part C) | 1.01 |

***Area* (offset site)**

**Offset calculation**
***Area***

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Offsets calculation | **Description** | **Proposed offset (area in hectares)** | 3.65 | **Duration of offset implementation (maximum 20 years)** | 20.00 | **Offset value** | **0.65** |
| | Mundijong Road Offset Site | **Current quality of offset site (scale)** | 4.00 | **Time until offset site secured (years)** | 1.00 | | **64.4%** |
| | | **Future quality WITHOUT offset (scale)** | 3.00 | **Risk of future loss WITHOUT offset (%)** | 0.0% | | |
| | | **Future quality WITH offset (scale)** | 6.00 | **Risk of future loss WITH offset (%)** | 0.0% | | |
| | | **Time until ecological benefit (years)** | 10.00 | | | | |
| | | **Confidence in offset result (%)** | 67.0% | | | **OFFSET ADEQUATE?** | **NO** |

WA Environmental Offsets Calculator

# Rationale for scores used in the offsets calculator

| Environmental value to be offset | | | |
|---|---|---|---|
| ***Calculation*** | ***Score (Area)*** | | ***Rationale*** |
| ***Conservation significance*** | | | |
| Description | SCP 3c - Corymbia calophylla - Xanthorrhoea preissii Woodlands and Shrublands of the Swan Coastal Plain TEC | | The proposed clearing will impact on 3.37 ha of Critically Endangered Ecological Community SCP 3c (Corymbia calophylla – Xanthorrhoea preisii woodlands and shrublands) |
| Type of environmental value | Ecological community | | SCP 3c is listed as Critically Endangered under the BC Act. |
| Conservation significance of environmental value | Threatened ecological community - endangered | | SCP 3c is listed as Critically Endangered under the BC Act and Endangered under the EPBC Act. |
| Landscape-level value impacted | yes/no | | NA |
| ***Significant impact*** | | | |
| Description | Clearing of 3.37 ha of Critically Endangered SCP 3c (Corymbia calophylla – Xanthorrhoea preisii woodlands and shrublands of the Swan Coastal Plain) | | Native vegetation representative of SCP 3c is proposed to be cleared for the Tonkin Highway Extension. |
| Significant impact (hectares) / Type of feature | 3.37 | | THE will impact 3.37 ha of SCP 3c. |
| Quality (scale) / Number | 3.00 | | The quality score of the SCP 3c impact has been determined based on the proportional condition of the vegetation impacted. A score of '3' was based on:<br>Very Good (6) - 0.671 ha<br>Good (4) - 0.170 ha<br>Degraded (2) - 1.936 ha<br>Completely Degraded (0) - 0.653 ha<br>This gives an average condition of 2.501, which has been rounded to '3' |
| ***Rehabilitation credit*** | | | |
| Description | 0 | | |
| Proposed rehabilitation (area in hectares) | 0.00 | | |
| Current quality of rehabilitation site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation | 0.00 | | |
| Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in rehabilitation result (%) | 0 | | |
| ***Offset*** | | | |
| Description | Mundijong Road Offset Site | | SCP 3c within Mundijong Road Offset Site |
| Proposed offset (area in hectares) | 3.65 | | 3.65 ha of SCP 3c within Mundijong Road Offset Site |
| Current quality of offset site / Start number (of type of feature) | 4.00 | | Vegetation is currently in 'Good' condition (4), but under threat from edge effects, grazing and infrastructure maintenance |
| Future quality WITHOUT offset (scale) / Future number WITHOUT offset | 3.00 | | Considering the existing threatening processes (weed, grazing and edge effects) and lack of active management, the vegetation quality within the Mundijong Road road reserve is expected to continue to decline over time. |
| Future quality WITH offset (scale) / Future number WITH offset | 6.00 | | With active management the vegetation condition can be improved from 'Good' (4) to 'Very Good' (6) . By actively managing the site for conservation, through fencing, weed control and restoration activities, including adaptive management based on monitoring results it is expected the site condition will improve over time. |
| Time until ecological benefit (years) | 10.00 | | The ecological benefit will be realised in 10 years |
| Confidence in offset result (%) | 0.67 | | Moderate to high level of confidence that management actions will achieve results within the predicted timeframe |
| Duration of offset implementation (maximum 20 years) | 20.00 | | Main Roads will fund the implementation of the offset for 20 years. |
| Time until offset site secured (years) | 1.00 | | Offset site will be secured once offset strategy is approved |
| Risk of future loss WITHOUT offset (%) | 0.0% | | No risk of loss as the site is currently Bush Forever. |
| Risk of future loss WITH offset (%) | 0.0% | | No risk of loss as the site is currently Bush Forever. |
| Offset ratio (Conservation area only) | N/A | | |

# WA Environmental Offsets calculator

**PLEASE ENABLE MACROS FOR THIS SPREADSHEET**

**Produced by:**

The Department of Water and Environmental Regulation (DWER) in consultation with stakeholder working groups

**Purpose:**

Use the WA Envirionmental Offsets calculator in conjunction with the *Environmental offsets metric: Quantifying environmental offsets in Western Australia* guideline. Together, they form a supplement to section 4 of the *WA Environmental Offsets Guidelines* and provide information to help decision-makers, government officers, industry and the community to quantify environmental offsets.

**Data currency:**

The correct application of the WA Environmental Offsets Calculator relies on access to current datasets (such as vegetation extent and land tenure).

**Process for using the WA Environmental Offsets Calculator**

| Step | Worksheet | Component |
|---|---|---|
| **Step 1: Determining conservation significance** | **Step1_ConservationSignificance** | **Conservation significance determination** |
| | | Combined *area* / *feature* |
| **Step 2: Calculating significant residual impact** | **Step2_SignificantResidualImpact** | **Part A: Significant impact calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part B: Rehabilitation credit calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part C: Significant residual impact calculation** |
| | | Separate *area* or *feature* calculations |
| **Step 3: Calculating offsets** | **Step3_Offsets** | **Offsets calculation** |
| | | Separate *area* or *feature* calculations |
| **Rationale for scores used in the Offsets Calculator** | **Rationale** | **All** |

WA Environmental Offsets Calculator

# Step 1: Determining conservation significance

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores (Or, if appropriate, manual data entry permitted)

***Area / feature*** **(Impact site)**

| Conservation significance determination for the environmental value impacted | | |
|---|---|---|
| Conservation significance | **Description** | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |
| | **Type of environmental value** | Wetland/watercourse |
| | **Conservation significance of environmental value** | Vegetation associated with a wetland or watercourse for which an offset is required |
| | **Conservation significance score** | **0.1%** |

| | |
|---|---|
| **Please select *area* or *feature* for the calculations** | **Area** |

# Step 2: Calculating significant residual impact

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| | |
|---|---|
| Environmental value (step 1) | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |

***Area* (impact site)**

**Part A: Significant impact calculation *Area***

| Significant impact | Description | Quantum of impact | |
|---|---|---|---|
| | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | Significant impact (hectares) | 2.83 |
| | | Quality (scale) | 2.00 |
| | | Total quantum of impact | 0.57 |

**Part B: Rehabilitation credit calculation *Area* (onsite)**

| Rehabilitation Credit | Description | | | | |
|---|---|---|---|---|---|
| | | Proposed rehabilitation (area in hectares) | | Time until ecological benefit (years) | |
| | | Current quality of rehabilitation site (scale) | | Confidence in rehabilitation result (%) | |
| | | Future quality WITHOUT rehabilitation (scale) | | Rehabilitation credit | 0.00 |
| | | Future quality WITH rehabilitation (scale) | | | |

**Part C: Significant residual impact calculation *Area***

| Significant residual impact | | |
|---|---|---|
| | Total quantum of impact | 0.57 |
| | Rehabilitation credit | 0.00 |
| | Significant residual impact | 0.57 |

WA Environmental Offsets Calculator

# Step 3: Calculating offsets

Key:

| | |
|---|---|
| | Data to be entered |
| | Drop-down selection |
| | Automatically-generated scores |

| | | | |
|---|---|---|---|
| Environmental value (step 1) | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | Significant impact (step 2, part A) | 2.83 |
| | | Rehabilitation credit (step 2, part B) | 0.00 |
| | | Significant residual impact (step 2, part C) | 0.57 |

***Area*** **(offset site)**

| Offset calculation *Area* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Offsets calculation | **Description** | **Proposed offset (area in hectares)** | 1.70 | **Duration of offset implementation (maximum 20 years)** | 20.00 | **Offset value** | **0.34** |
| | Mundijong Road Offset Site | **Current quality of offset site (scale)** | 4.00 | **Time until offset site secured (years)** | 1.00 | | **59.8%** |
| | | **Future quality WITHOUT offset (scale)** | 3.00 | **Risk of future loss WITHOUT offset (%)** | 0.0% | | |
| | | **Future quality WITH offset (scale)** | 6.00 | **Risk of future loss WITH offset (%)** | 0.0% | | |
| | | **Time until ecological benefit (years)** | 10.00 | | | | |
| | | **Confidence in offset result (%)** | 67.0% | | | **OFFSET ADEQUATE?** | **NO** |

WA Environmental Offsets Calculator

# Rationale for scores used in the offsets calculator

| Environmental value to be offset | | | |
|---|---|---|---|
| ***Calculation*** | ***Score (Area)*** | | ***Rationale*** |
| ***Conservation significance*** | | | |
| Description | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | | The proposed clearing will impact up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |
| Type of environmental value | Wetland/watercourse | | Wetland Categorised as CCW. |
| Conservation significance of environmental value | Vegetation associated with a wetland or watercourse for which an offset is required | | Clearing of 2.83 ha of CCW. |
| Landscape-level value impacted | yes/no | | NA |
| ***Significant impact*** | | | |
| Description | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | | The proposed clearing will impact up to a total of 2.83 ha of native vegetation associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |
| Significant impact (hectares) / Type of feature | 2.83 | | Clearing of 2.83 ha of native vegetation associated with CCW under the Geomorphic Wetlands of the Swan Coastal Plain dataset. |
| Quality (scale) / Number | 2.00 | | The quality score of the CCW impact has been determined based on the proportional condition of the vegetation impacted. A score of '2' was based on:<br>Very Good (6) - 0.62 ha<br>Good (4) - 0 ha<br>Degraded (2) - 0.6 ha<br>Completely Degraded (0) - 0.69 ha<br>Cleared (0) - 0.69 ha<br>This gives an average condition of 1.75, which has been rounded to '2' |
| ***Rehabilitation credit*** | | | |
| Description | 0 | | |
| Proposed rehabilitation (area in hectares) | 0.00 | | |
| Current quality of rehabilitation site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation | 0.00 | | |
| Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in rehabilitation result (%) | 0 | | |
| ***Offset*** | | | |
| Description | Mundijong Road Offset Site | | Mundijong Road Offset Site contains CCW. |
| Proposed offset (area in hectares) | 1.70 | | 1.7 ha of CCW within Mundijong Road Offset Site is proposed as an offset for THE impacts |
| Current quality of offset site / Start number (of type of feature) | 4.00 | | Vegetation condition assessments conducted within the offset site indicates that the average condition is 'Good'. A value of '4' has been assigned for vegetation condition. |
| Future quality WITHOUT offset (scale) / Future number WITHOUT offset | 3.00 | | Considering the existing threatening processes (weed, grazing and edge effects) and lack of active management, the vegetation quality within the Mundijong Road road reserve is expected to continue to decline over time. |
| Future quality WITH offset (scale) / Future number WITH offset | 6.00 | | With active management the vegetation condition can be improved from 'Good' (4) to 'Very Good' (6) . By actively managing the site for conservation, through fencing, weed control and restoration activities, including adaptive management based on monitoring results it is expected the site condition will improve over time. |
| Time until ecological benefit (years) | 10.00 | | The ecological benefit will be realised in 10 years. |
| Confidence in offset result (%) | 0.67 | | Moderate to high level of confidence that management actions will achieve results within the predicted timeframe. |
| Duration of offset implementation (maximum 20 years) | 20.00 | | Main Roads will fund the implementation of the offset for 20 years. |
| Time until offset site secured (years) | 1.00 | | The site will be secured within 1 year. |
| Risk of future loss WITHOUT offset (%) | 0.0% | | No risk of loss as the site is currently Bush Forever. |
| Risk of future loss WITH offset (%) | 0.0% | | No risk of loss as the site is currently Bush Forever. |
| Offset ratio (Conservation area only) | N/A | | |

# WA Environmental Offsets calculator

**PLEASE ENABLE MACROS FOR THIS SPREADSHEET**

**Produced by:**

The Department of Water and Environmental Regulation (DWER) in consultation with stakeholder working groups

**Purpose:**

Use the WA Envirionmental Offsets calculator in conjunction with the *Environmental offsets metric: Quantifying environmental offsets in Western Australia* guideline. Together, they form a supplement to section 4 of the *WA Environmental Offsets Guidelines* and provide information to help decision-makers, government officers, industry and the community to quantify environmental offsets.

**Data currency:**

The correct application of the WA Environmental Offsets Calculator relies on access to current datasets (such as vegetation extent and land tenure).

**Process for using the WA Environmental Offsets Calculator**

| Step | Worksheet | Component |
|---|---|---|
| **Step 1: Determining conservation significance** | **Step1_ConservationSignificance** | **Conservation significance determination** |
| | | Combined *area* / *feature* |
| **Step 2: Calculating significant residual impact** | **Step2_SignificantResidualImpact** | **Part A: Significant impact calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part B: Rehabilitation credit calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part C: Significant residual impact calculation** |
| | | Separate *area* or *feature* calculations |
| **Step 3: Calculating offsets** | **Step3_Offsets** | **Offsets calculation** |
| | | Separate *area* or *feature* calculations |
| **Rationale for scores used in the Offsets Calculator** | **Rationale** | **All** |

WA Environmental Offsets Calculator

# Step 1: Determining conservation significance

**Key:**

| | |
|---|---|
| | **Data to be entered** |
| | **Drop-down selection** |
| | **Automatically-generated scores** |

**(Or, if appropriate, manual data entry permitted)**

***Area / feature* (Impact site)**

| **Conservation significance determination for the environmental value impacted** | | |
|---|---|---|
| **Conservation significance** | **Description** | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365, |
| | **Type of environmental value** | Conservation area |
| | **Conservation significance of environmental value** | Bush Forever site |
| | **Conservation significance score** | **A conservation significance score does not apply in this case; an offset ratio may be appropriate (step 3)** |

| | |
|---|---|
| **Please select *area* or *feature* for the calculations** | **Area** |

WA Environmental Offsets Calculator

# Step 2: Calculating significant residual impact

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| Environmental value (step 1) | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365, |
|---|---|

***Area* (impact site)**

**Part A: Significant impact calculation *Area***

| | Description | Quantum of impact | |
|---|---|---|---|
| Significant impact | Clearing of 1.91 ha of 'Very High' conservation significant Bush Forever sites 351, 360, 365 | Significant impact (hectares) | 1.91 |
| | | Quality (scale) | |
| | | Total quantum of impact | 0.00 |

**Part B: Rehabilitation credit calculation *Area* (onsite)**

| | Description | | | | |
|---|---|---|---|---|---|
| Rehabilitation Credit | | Proposed rehabilitation (area in hectares) | | Time until ecological benefit (years) | |
| | | Current quality of rehabilitation site (scale) | | Confidence in rehabilitation result (%) | |
| | | Future quality WITHOUT rehabilitation (scale) | | Rehabilitation credit | 0.00 |
| | | Future quality WITH rehabilitation (scale) | | | |

**Part C: Significant residual impact calculation *Area***

| | | |
|---|---|---|
| Significant residual impact | Total quantum of impact | 0.00 |
| | Rehabilitation credit | 0.00 |
| | Significant residual impact | 0.00 |

WA Environmental Offsets Calculator

# Step 3: Calculating offsets

**Key:**

| | |
|---|---|
| | **Data to be entered** |
| | **Drop-down selection** |
| | **Automatically-generated scores** |

| | | | |
|---|---|---|---|
| Environmental value (step 1) | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365, | Significant impact (step 2, part A) | 1.91 |
| | | Rehabilitation credit (step 2, part B) | 0.00 |
| | | Significant residual impact (step 2, part C) | 0.00 |

***Area* (offset site)**

| Offset calculation *Area* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Offsets calculation | **Description** | **Proposed offset (area in hectares)** | 3.65 | **Duration of offset implementation (maximum 20 years)** | | | |
| | Mundijong Road Offset Site | **Current quality of offset site (scale)** | | **Time until offset site secured (years)** | | | |
| | | **Future quality WITHOUT offset (scale)** | | **Risk of future loss WITHOUT offset (%)** | | **Offset value Conservation area** (applied to step 2, part A) | **2** |
| | | **Future quality WITH offset (scale)** | | **Risk of future loss WITH offset (%)** | | | **95.5%** |
| | | **Time until ecological benefit (years)** | | | | | |
| | | **Confidence in offset result (%)** | | | | **OFFSET ADEQUATE?** | **NO** |

WA Environmental Offsets Calculator

# Rationale for scores used in the offsets calculator

| Environmental value to be offset | | | |
|---|---|---|---|
| ***Calculation*** | ***Score (Area)*** | | ***Rationale*** |
| ***Conservation significance*** | | | |
| Description | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365, | | Clearing of 1.91 ha of Bush Forever sites 351, 360, 365 |
| Type of environmental value | Conservation area | | Bush Forever Sites under SPP 2.8 |
| Conservation significance of environmental value | Bush Forever site | | Clearing regionally significant bushland within Bush Forever sites, 1.91 ha of 'Very High' conservation significance under SPP 2.8. |
| Landscape-level value impacted | yes/no | | NA |
| ***Significant impact*** | | | |
| Description | Clearing of 1.91 ha of 'Very High' conservation significant Bush Forever sites 351, 360, 365 | | 1.91 ha of 'Very High' conservation significance regionally significant bushland. |
| Significant impact (hectares) / Type of feature | 1.91 | | Clearing of 1.91 ha of regionally significant bushland within Bush Forever sites considered to be of 'Very High' conservation significance under SPP 2.8. |
| Quality (scale) / Number | 0.00 | | NA |
| ***Rehabilitation credit*** | | | |
| Description | 0 | | |
| Proposed rehabilitation (area in hectares) | 0.00 | | |
| Current quality of rehabilitation site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation | 0.00 | | |
| Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in rehabilitation result (%) | 0 | | |
| ***Offset*** | | | |
| Description | Mundijong Road Offset Site | | |
| Proposed offset (area in hectares) | 3.65 | | |
| Current quality of offset site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT offset (scale) / Future number WITHOUT offset | 0.00 | | |
| Future quality WITH offset (scale) / Future number WITH offset | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in offset result (%) | 0 | | |
| Duration of offset implementation (maximum 20 years) | 0.00 | | |
| Time until offset site secured (years) | 0.00 | | |
| Risk of future loss WITHOUT offset (%) | 0.0% | | |
| Risk of future loss WITH offset (%) | 0.0% | | |
| Offset ratio (Conservation area only) | 2 | | SPP2.8 requires a 2:1 offset ratio for impacting of regionally significant bushland of 'Very High' conservation significance. |

# Appendix C – Alternate Mundijong Road Offset Calculator (SCP3a)

# WA Environmental Offsets calculator

**PLEASE ENABLE MACROS FOR THIS SPREADSHEET**

**Produced by:**

The Department of Water and Environmental Regulation (DWER) in consultation with stakeholder working groups

**Purpose:**

Use the WA Envirionmental Offsets calculator in conjunction with the *Environmental offsets metric: Quantifying environmental offsets in Western Australia* guideline. Together, they form a supplement to section 4 of the *WA Environmental Offsets Guidelines* and provide information to help decision-makers, government officers, industry and the community to quantify environmental offsets.

**Data currency:**

The correct application of the WA Environmental Offsets Calculator relies on access to current datasets (such as vegetation extent and land tenure).

**Process for using the WA Environmental Offsets Calculator**

| Step | Worksheet | Component |
|---|---|---|
| **Step 1: Determining conservation significance** | **Step1_ConservationSignificance** | **Conservation significance determination** |
| | | Combined *area* / *feature* |
| **Step 2: Calculating significant residual impact** | **Step2_SignificantResidualImpact** | **Part A: Significant impact calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part B: Rehabilitation credit calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part C: Significant residual impact calculation** |
| | | Separate *area* or *feature* calculations |
| **Step 3: Calculating offsets** | **Step3_Offsets** | **Offsets calculation** |
| | | Separate *area* or *feature* calculations |
| **Rationale for scores used in the Offsets Calculator** | **Rationale** | **All** |

WA Environmental Offsets Calculator

# Step 1: Determining conservation significance

**Key:**

| | |
|---|---|
| | **Data to be entered** |
| | **Drop-down selection** |
| | **Automatically-generated scores** |

**(Or, if appropriate, manual data entry permitted)**

***Area / feature* (Impact site)**

| **Conservation significance determination for the environmental value impacted** | | |
|---|---|---|
| **Conservation significance** | **Description** | SCP 3a - Corymbia calophylla - Kingia australis Woodlands and Shrublands of the Swan Coastal Plain TEC |
| | **Type of environmental value** | Ecological community |
| | **Conservation significance of environmental value** | Threatened ecological community - critically endangered |
| | **Conservation significance score** | **6.8%** |

| | |
|---|---|
| **Please select *area* or *feature* for the calculations** | **Area** |

WA Environmental Offsets Calculator

# Step 2: Calculating significant residual impact

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| | |
|---|---|
| Environmental value (step 1) | SCP 3a - Corymbia calophylla - Kingia australis Woodlands and Shrublands of the Swan Coastal Plain TEC |

***Area* (impact site)**

**Part A: Significant impact calculation *Area***

| | Description | Quantum of impact | |
|---|---|---|---|
| Significant impact | Clearing of 0.1 ha of Critically Endangered SCP 3a (Corymbia calophylla – Kingia australis woodlands and shrublands of the Swan Coastal Plain) | Significant impact (hectares) | 0.10 |
| | | Quality (scale) | 6.00 |
| | | Total quantum of impact | 0.06 |

**Part B: Rehabilitation credit calculation *Area* (onsite)**

| | Description | | | | |
|---|---|---|---|---|---|
| Rehabilitation Credit | | Proposed rehabilitation (area in hectares) | | Time until ecological benefit (years) | |
| | | Current quality of rehabilitation site (scale) | | Confidence in rehabilitation result (%) | |
| | | Future quality WITHOUT rehabilitation (scale) | | Rehabilitation credit | 0.00 |
| | | Future quality WITH rehabilitation (scale) | | | |

**Part C: Significant residual impact calculation *Area***

| | | |
|---|---|---|
| Significant residual impact | Total quantum of impact | 0.06 |
| | Rehabilitation credit | 0.00 |
| | Significant residual impact | 0.06 |

WA Environmental Offsets Calculator

# Step 3: Calculating offsets

Key:

| | |
|---|---|
| | Data to be entered |
| | Drop-down selection |
| | Automatically-generated scores |

| | | | |
|---|---|---|---|
| Environmental value (step 1) | SCP 3a - Corymbia calophylla - Kingia australis Woodlands and Shrublands of the Swan Coastal Plain TEC | Significant impact (step 2, part A) | 0.10 |
| | | Rehabilitation credit (step 2, part B) | 0.00 |
| | | Significant residual impact (step 2, part C) | 0.06 |

***Area*** **(offset site)**

| Offset calculation *Area* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Offsets calculation | **Description** | **Proposed offset (area in hectares)** | 0.56 | **Duration of offset implementation (maximum 20 years)** | 20.00 | **Offset value** | **0.06** |
| | Mundijong Road Offset Site | **Current quality of offset site (scale)** | 2.00 | **Time until offset site secured (years)** | 1.00 | | **100.0%** |
| | | **Future quality WITHOUT offset (scale)** | 2.00 | **Risk of future loss WITHOUT offset (%)** | 0.0% | | |
| | | **Future quality WITH offset (scale)** | 6.00 | **Risk of future loss WITH offset (%)** | 0.0% | | |
| | | **Time until ecological benefit (years)** | 14.00 | | | | |
| | | **Confidence in offset result (%)** | 67.0% | | | **OFFSET ADEQUATE?** | **YES** |

WA Environmental Offsets Calculator

# Rationale for scores used in the offsets calculator

| Environmental value to be offset | | | |
|---|---|---|---|
| ***Calculation*** | ***Score (Area)*** | | ***Rationale*** |
| ***Conservation significance*** | | | |
| Description | SCP 3a - Corymbia calophylla - Kingia australis Woodlands and Shrublands of the Swan Coastal Plain TEC | | The proposed clearing will impact on 0.1 ha of Critically Endangered Ecological Community SCP 3a (Corymbia calophylla – Kingia australis woodlands and shrublands) |
| Type of environmental value | Ecological community | | SCP 3a is listed as Critically Endangered under the BC Act. |
| Conservation significance of environmental value | Threatened ecological community - critically endangered | | SCP 3c is listed as Critically Endangered under the BC Act and Endangered under the EPBC Act. |
| Landscape-level value impacted | yes/no | | NA |
| ***Significant impact*** | | | |
| Description | Clearing of 0.1 ha of Critically Endangered SCP 3a (Corymbia calophylla – Kingia australis woodlands and shrublands of the Swan Coastal Plain) | | Native vegetation representative of SCP 3a is proposed to be cleared for the Tonkin Highway Extension. |
| Significant impact (hectares) / Type of feature | 0.10 | | THE will impact 0.1 ha of SCP 3a. |
| Quality (scale) / Number | 6.00 | | The quality score of the SCP 3a impact has been determined based on the proportional condition of the vegetation impacted. The entire area is of 'Very Good' condition and a score of 6 has been applied |
| ***Rehabilitation credit*** | | | |
| Description | 0 | | |
| Proposed rehabilitation (area in hectares) | 0.00 | | |
| Current quality of rehabilitation site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation | 0.00 | | |
| Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in rehabilitation result (%) | 0 | | |
| ***Offset*** | | | |
| Description | Mundijong Road Offset Site | | SCP 3a within Mundijong Road Offset Site |
| Proposed offset (area in hectares) | 0.56 | | 0.56 ha of SCP 3a within Mundijong Road Offset Site |
| Current quality of offset site / Start number (of type of feature) | 2.00 | | Vegetation is currently in 'Degraded' condition (2), but under threat from edge effects, grazing and infrastructure maintenance activities. |
| Future quality WITHOUT offset (scale) / Future number WITHOUT offset | 2.00 | | Considering the existing threatening processes (weed, grazing and edge effects) and lack of active management, the vegetation quality within the Mundijong Road road reserve is expected to continue to decline over time. |
| Future quality WITH offset (scale) / Future number WITH offset | 6.00 | | With active management the vegetation condition can be improved from 'Degraded' (2) to 'Very Good' (6) . By actively managing the site for conservation, through fencing, weed control and restoration activities, including adaptive management based on monitoring results it is expected the site condition will improve over time. |
| Time until ecological benefit (years) | 14.00 | | The ecological benefit will be realised in 14 years |
| Confidence in offset result (%) | 0.67 | | Moderate to high level of confidence that management actions will achieve results within the predicted timeframe |
| Duration of offset implementation (maximum 20 years) | 20.00 | | Main Roads will fund the implementation of the offset for 20 years. |
| Time until offset site secured (years) | 1.00 | | Offset site will be secured once offset strategy is approved |
| Risk of future loss WITHOUT offset (%) | 0.0% | | No risk of loss as the site is currently Bush Forever. |
| Risk of future loss WITH offset (%) | 0.0% | | No risk of loss as the site is currently Bush Forever. |
| Offset ratio (Conservation area only) | N/A | | |

# Appendix D – Waterloo Nature Reserve Field Notes

**Waterloo Nature Reserve site visit field notes – 11 July 2024. [redacted] (DBCA) and [redacted] (Main Roads) ([redacted] (DBCA) and [redacted] (Main Roads) were apologies).**

---

## Background

The purpose of the site visit was to assess the potential for the Waterloo Nature Reserve (WNR) to be used by Main Roads as an environmental offset for FCT3c '*Corymbia calophylla* — *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain' Threatened Ecological Community. If it was agreed that the site was available for use as environmental offset, the intention was then to determine the agreed baseline vegetation condition and the management actions that could be applied to improve that condition.

## Description

The WNR totals approximately 18.95 ha and comprises R2806 and R46108. DBCA's TEC layer indicates the site contains two patches of FCT3c totalling 14.5 ha (shown in blue in Figure 1) and one patch of FCT08 totalling 10.3 ha (shown in green), noting that the mapped TEC patches extend in the adjacent road reserves outside of the NR.

Only FCT3c patches will be discussed here as this is the TEC value that is being proposed to be managed by Main Roads as an environmental offset.

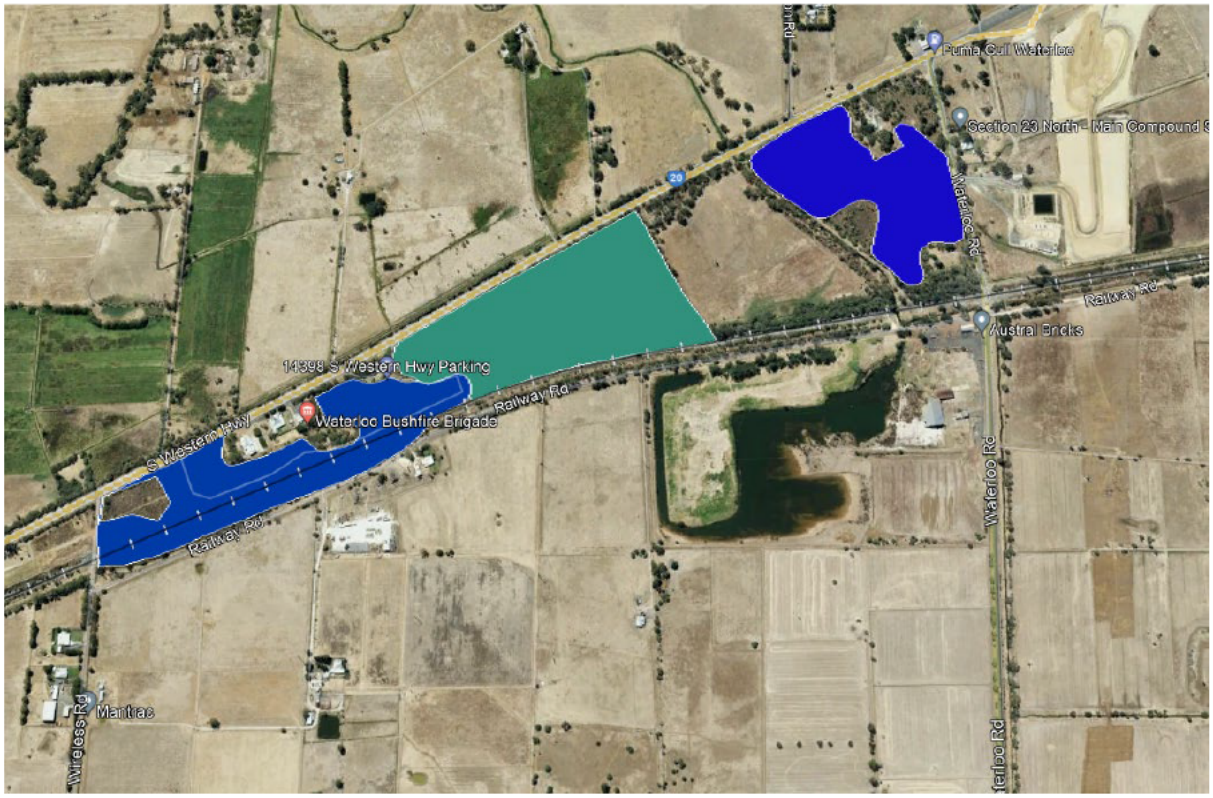


Figure 1. Waterloo Nature Reserve showing mapped occurrences of FCT3c and FCT08

[redacted] has advised that the mapping of FCT03c for the NR is incorrect and needs to be re-visited, an inferred revised extent of FCT03c is shown in Figure 2. Spring quadrat based surveys will be undertaken to confirm this inferred mapping


Figure 2. inferred revised extent of FCT03c at Waterloo Nature Reserve

With reference to the FCT03c patches as numbered in Figure 2, vehicle access to the eastern patch 1 is via Waterloo Road, noting that Western Power have blocked access to the main access path into the eastern patch, this is yet to be resolved. There is only vehicle access adjacent to patch 2 from the SW Hwy, and the two small western patches (3 &4) are accessible via both the SW Hwy and Wireless Road (locked DBCA gates).

Vegetation at Waterloo NR is generally more degraded than Roselands NR with the eastern patch 1 considerably disturbed and weedy. Patch 2 is generally of a Very Good condition with patches 3 & 4 of a Good to Degraded condition. Regardless, the values present are still extremely sensitive and weed control must be undertaken very carefully.

Weeds present include babiana, oxalis, watsonia (west of the drain), *Centranthus sp* (to be confirmed), silver wattle, and others.

Weed control may be required on the road shoulder and verge of both Waterloo Road and SW Hwy as well as within the NR (liaison with Shire of Dardanup required).

Kangaroo grazing impacts are evident and kangaroos were observed within the NR during the site visit. Fauna fencing to exclude kangaroos may be required, as well as kangaroo control.

<u>Agreed vegetation condition:</u>

Good condition, averaged by area.

<u>Over-arching management strategy:</u>

Start weed control in the eastern patch 1 focussing on larger obvious areas of oxalis, watsonia etc whilst learning the site and species present, and making the photo and/or specimen herbarium of weedy and native species that may be mis-identified (see below);

2-3 years after the above, expand and start undertaking careful weed control (which will generally be by hand only for both mechanical and chemical methods) in the more intact FCT03c areas, essentially applying the Bradley method of restoration.

Actions:

- In consultation with DBCA a detailed works plan will be developed. Among other things this plan is to provide a basis for DBCA consultation (ie: agreement of proposed contractors, a notification template, a requirement for regular progress reviews). The plan will also detail agreed methodologies and timing for weed control and/or rehabilitation and detail other approvals that may be required.
- Weed contractor (yet to be identified) to visit the site in early spring, late spring and summer to familiarise with the site and species present, and prepare a photo and/or specimen herbarium, particularly the grasses, at juvenile and flowering stages.
- Assess kangaroo and/or rabbit grazing impacts to determine whether fencing is required (may include motion sensor camera monitoring)
- [redacted] to conduct quadrat-based survey to confirm/re-map the FCT03c boundary and compile a species list spring 2024 or 2025
- Weed mapping and development of a weed management plan
- Weed control (careful)
- Introduce rust to control bridal creeper infestations if not already present
- Areas left bare after successful weed control to be revegetated with species locally present, grown from seed collected locally.

# Appendix E – Waterloo Nature Reserve Offset Calculators

# WA Environmental Offsets calculator

**PLEASE ENABLE MACROS FOR THIS SPREADSHEET**

**Produced by:**

The Department of Water and Environmental Regulation (DWER) in consultation with stakeholder working groups

**Purpose:**

Use the WA Envirionmental Offsets calculator in conjunction with the *Environmental offsets metric: Quantifying environmental offsets in Western Australia* guideline. Together, they form a supplement to section 4 of the *WA Environmental Offsets Guidelines* and provide information to help decision-makers, government officers, industry and the community to quantify environmental offsets.

**Data currency:**

The correct application of the WA Environmental Offsets Calculator relies on access to current datasets (such as vegetation extent and land tenure).

**Process for using the WA Environmental Offsets Calculator**

| Step | Worksheet | Component |
|---|---|---|
| **Step 1: Determining conservation significance** | **Step1_ConservationSignificance** | **Conservation significance determination** |
| | | Combined *area* / *feature* |
| **Step 2: Calculating significant residual impact** | **Step2_SignificantResidualImpact** | **Part A: Significant impact calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part B: Rehabilitation credit calculation** |
| | | Separate *area* or *feature* calculations |
| | | **Part C: Significant residual impact calculation** |
| | | Separate *area* or *feature* calculations |
| **Step 3: Calculating offsets** | **Step3_Offsets** | **Offsets calculation** |
| | | Separate *area* or *feature* calculations |
| **Rationale for scores used in the Offsets Calculator** | **Rationale** | **All** |

WA Environmental Offsets Calculator

# Step 1: Determining conservation significance

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores (Or, if appropriate, manual data entry permitted)

***Area / feature*** **(Impact site)**

| Conservation significance determination for the environmental value impacted | | |
|---|---|---|
| Conservation significance | **Description** | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |
| | **Type of environmental value** | Wetland/watercourse |
| | **Conservation significance of environmental value** | Vegetation associated with a wetland or watercourse for which an offset is required |
| | **Conservation significance score** | **0.1%** |

| | |
|---|---|
| **Please select *area* or *feature* for the calculations** | **Area** |

# Step 2: Calculating significant residual impact

Key:
- Data to be entered
- Drop-down selection
- Automatically-generated scores

| | |
|---|---|
| Environmental value (step 1) | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |

***Area* (impact site)**

**Part A: Significant impact calculation *Area***

| | Description | Quantum of impact | |
|---|---|---|---|
| Significant impact | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | Significant impact (hectares) | 2.83 |
| | | Quality (scale) | 2.00 |
| | | Total quantum of impact | 0.57 |

**Part B: Rehabilitation credit calculation *Area* (onsite)**

| | Description | | | | |
|---|---|---|---|---|---|
| Rehabilitation Credit | | Proposed rehabilitation (area in hectares) | | Time until ecological benefit (years) | |
| | | Current quality of rehabilitation site (scale) | | Confidence in rehabilitation result (%) | |
| | | Future quality WITHOUT rehabilitation (scale) | | Rehabilitation credit | 0.00 |
| | | Future quality WITH rehabilitation (scale) | | | |

**Part C: Significant residual impact calculation *Area***

| | | |
|---|---|---|
| Significant residual impact | Total quantum of impact | 0.57 |
| | Rehabilitation credit | 0.00 |
| | Significant residual impact | 0.57 |

WA Environmental Offsets Calculator

# Step 3: Calculating offsets

Key:

| | |
|---|---|
| | Data to be entered |
| | Drop-down selection |
| | Automatically-generated scores |

| | | | |
|---|---|---|---|
| Environmental value (step 1) | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | Significant impact (step 2, part A) | 2.83 |
| | | Rehabilitation credit (step 2, part B) | 0.00 |
| | | Significant residual impact (step 2, part C) | 0.57 |

***Area*** **(offset site)**

| Offset calculation *Area* | | | | | | | |
|---|---|---|---|---|---|---|---|
| Offsets calculation | **Description** | **Proposed offset (area in hectares)** | 1.15 | **Duration of offset implementation (maximum 20 years)** | 20.00 | **Offset value** | **0.23** |
| | Revegetation and management of 2.84 ha within Waterloo Nature Reserve | **Current quality of offset site (scale)** | 4.00 | **Time until offset site secured (years)** | 1.00 | | **40.4%** |
| | | **Future quality WITHOUT offset (scale)** | 3.00 | **Risk of future loss WITHOUT offset (%)** | 0.0% | | |
| | | **Future quality WITH offset (scale)** | 6.00 | **Risk of future loss WITH offset (%)** | 0.0% | | |
| | | **Time until ecological benefit (years)** | 10.00 | | | | |
| | | **Confidence in offset result (%)** | 67.0% | | | **OFFSET ADEQUATE?** | **NO** |

WA Environmental Offsets Calculator

# Rationale for scores used in the offsets calculator

| Environmental value to be offset | | | |
|---|---|---|---|
| ***Calculation*** | ***Score (Area)*** | | ***Rationale*** |
| ***Conservation significance*** | | | |
| Description | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | | The proposed clearing will impact up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |
| Type of environmental value | Wetland/watercourse | | Wetland Categorised as CCW. |
| Conservation significance of environmental value | Vegetation associated with a wetland or watercourse for which an offset is required | | Clearing of 2.83 ha of CCW. |
| Landscape-level value impacted | yes/no | | NA |
| ***Significant impact*** | | | |
| Description | Clearing of up to a total of 2.83 ha associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) | | The proposed clearing will impact up to a total of 2.83 ha of native vegetation associated with a CCW (0.001 ha UFI 14495, 0.711 ha UFI 14817, 0.841 ha UFI 14945 and 1.275 ha UFI 14985) |
| Significant impact (hectares) / Type of feature | 2.83 | | Clearing of 2.83 ha of native vegetation associated with CCW under the Geomorphic Wetlands of the Swan Coastal Plain dataset. |
| Quality (scale) / Number | 2.00 | | The quality score of the CCW impact has been determined based on the proportional condition of the vegetation impacted. A score of '2' was based on:<br>Very Good (6) - 0.62 ha<br>Good (4) - 0 ha<br>Degraded (2) - 0.6 ha<br>Completely Degraded (0) - 0.69 ha<br>Cleared (0) - 0.69 ha<br>This gives an average condition of 1.75, which has been rounded to '2' |
| ***Rehabilitation credit*** | | | |
| Description | 0 | | |
| Proposed rehabilitation (area in hectares) | 0.00 | | |
| Current quality of rehabilitation site / Start number (of type of feature) | 0.00 | | |
| Future quality WITHOUT rehabilitation (scale) / Future number WITHOUT rehabilitation | 0.00 | | |
| Future quality WITH rehabilitation (scale) / Future number WITH rehabilitation | 0.00 | | |
| Time until ecological benefit (years) | 0.00 | | |
| Confidence in rehabilitation result (%) | 0 | | |
| ***Offset*** | | | |
| Description | Revegetation and management of 2.84 ha | | Waterloo Nature Reserve contains CCW. |
| Proposed offset (area in hectares) | 1.15 | | 1.15 ha of CCW within Waterloo Nature Reserve is proposed as an offset for THE impacts. |
| Current quality of offset site / Start number (of type of feature) | 4.00 | | DBCA and Main Roads under took a site inspection in July 2024 and agreed the overall quality of the vegetation within Waterloo Nature Reserve was in 'Good' condition. A value of '4' has been assigned for a vegetation condition of '4'. |
| Future quality WITHOUT offset (scale) / Future number WITHOUT offset | 3.00 | | Considering the existing threatening processes (weeds, grazing and edge effects) and lack of active management, the vegetation quality within the Waterloo Nature Reserve is expected to continue to decline over time. |
| Future quality WITH offset (scale) / Future number WITH offset | 6.00 | | With active management the vegetation condition can be improved from 'Good' (4) to 'Very Good' (6). By actively managing the site for conservation, through fencing, weed control and restoration activities, including adaptive management based on monitoring results it is expected the site condition will improve over time. |
| Time until ecological benefit (years) | 10.00 | | The ecological benefit will be realised in 10 years. |
| Confidence in offset result (%) | 0.67 | | A moderate to high degree of confidence in achieving the completion criteria within 10 years. |
| Duration of offset implementation (maximum 20 years) | 20.00 | | Main Roads will fund the implementation of the offset for 20 years. |
| Time until offset site secured (years) | 1.00 | | Site is already in secure tenure. Agreement between Main Roads and DBCA will be established to allow works to commence within 1 year |
| Risk of future loss WITHOUT offset (%) | 0.0% | | Site is in secure tenure. No risk of loss. |
| Risk of future loss WITH offset (%) | 0.0% | | Site is in secure tenure. No risk of loss. |
| Offset ratio (Conservation area only) | N/A | | |