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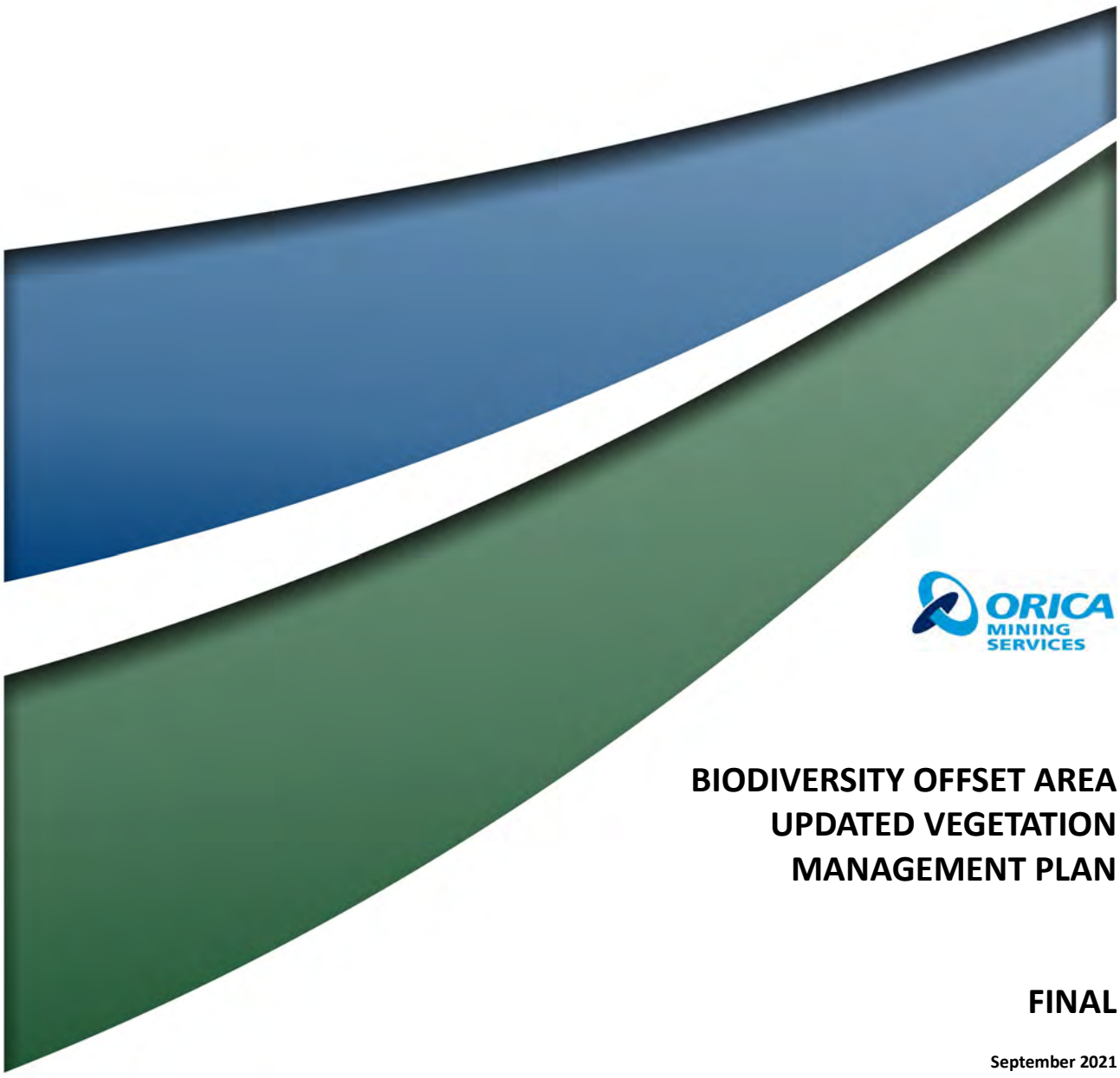

ORICA MINING SERVICES

BIODIVERSITY OFFSET AREA UPDATED VEGETATION MANAGEMENT PLAN

FINAL

September 2021

BIODIVERSITY OFFSET AREA UPDATED VEGETATION MANAGEMENT PLAN

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Orica (Australia) Pty Limited

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Report No.	21377/R01
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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
1	Shaun Corry	12 April 2021	Shaun Corry	12 April 2021
2	Shaun Corry	12 May 2021	Shaun Corry	12 May 2021
3	Philippa Fagan	5 October 2021	Shaun Corry	5 October 2021

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1.0 Introduction

The Orica Technology Centre is a research and Ammonium Nitrate Emulsion (ANE) Production facility operated by Orica (Australia) Pty Limited (Orica) at Richmond Vale, New South Wales (refer to **Figure 1.1**). On 26 July 2010, Orica received approval for the construction and operation of an Ammonium Nitrate Emulsion Production Facility (the Project) under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The new project approval (DA09_0090) also provided for the continuation of existing operations at the Orica Technology Centre.

In accordance with DA09_0090, Orica was required to establish a Biodiversity Offset Area to offset the impacts of the Project on flora and fauna. Schedule 3, Condition 14 of DA09_0090 required the preparation of a Vegetation Management Plan (VMP) in order to implement appropriate measures for the protection and maintenance of the Biodiversity Offset Area. A VMP was prepared by Umwelt Environmental and Social Consultants (Umwelt) in 2012 to satisfy the requirements outlined in the project approval.

It was recommended in the original VMP that it be reviewed every three years in light of any new information gained since its preparation in 2012. This review is therefore the third update to the VMP and is a revision to the 2018 document. This revised VMP has been prepared following a comprehensive review of the document and subsequent monitoring reports to report on any changes in environmental conditions within the Biodiversity Offset Area, whilst outlining ongoing management requirements and maintaining adherence with DA09_0090.

1.1 Purpose and Scope

The purpose of this VMP is to describe the ecological management strategies, procedures, controls and monitoring programs that are to be implemented for the flora and fauna within the Biodiversity Offset Area.

This VMP has been reviewed and prepared to satisfy Conditions 12 and 14 of Schedule 3 of the project approval. The relevant conditions are outlined below in **Section 1.1.1**.

1.1.1 Conditions of Project Approval

Schedule 3, Condition 12 of DA09_0090 required Orica to establish a Biodiversity Offset Area in accordance with the commitments made by Orica in the Response to Submissions report (Umwelt 2010).

Offset Strategy

12. Within 6 months of the date of this approval, the Proponent shall implement the offset strategy to the satisfaction of the Director-General. The Proponent shall:

a) *implement the offset strategy described in the Response to Submissions and summarised in Table 3 (shown below); and*

b) *make suitable arrangements, in consultation with DECCW, to provide for appropriate long term conservation security for the offset area.*

Table 3: Offset Strategy

Offset Area	*Minimum Size*
Biodiversity Offset Area	*31.7ha*

Schedule 3, Condition 14, of DA09_0090 requires Orica to prepare a VMP for the Biodiversity Offset Area in consultation with the NSW Office of Environment and Heritage (OEH) and submit it to the Director-General of the Department of Planning and Infrastructure (D&PI) for approval prior to the commencement of operations at the ANE Production Facility.

Schedule 3, Condition 14 of DA09_0090 is outlined below:

Vegetation Management Plan

14. The Proponent shall prepare and implement a Vegetation Management Plan for the project to the satisfaction of the Director-General. The plan must:

a) be prepared in consultation DECCW, and be approved by the Director-General prior to the commencement of the operation of the ANE Facility;

b) describe the detailed measures that would be implemented to protect the Biodiversity Offset Areas; and

c) describe the detailed measures that would be undertaken to maintain the Biodiversity Offset Areas for the life of the Project.

Image Source: Google Earth (2009)

0 1.0 2.0 3.0km
1:60 000

Legend

- Technology Centre Boundary
- Biodiversity Offset Area

FIGURE 1.1

Locality Plan

1.2 Background

The Orica Technology Centre (the Site) is situated on the southern side of George Booth Drive, Richmond Vale, NSW. The Technology Centre commenced operation in 1991 as an explosives research and production facility. The Site comprises 292 hectares of predominantly open forest vegetation, of which eight hectares was already occupied by the Technology Centre operations.

On 26 July 2010, development approval under Part 3A of the EP&A Act was granted for the continuation of the existing operations at the Technology Centre as well as the construction and operation of a proposed ANE Production Facility.

The ANE Production Facility includes:

- chemical, fuel, water and product tanks
- an ANE manufacturing plant
- truck weighing, loading and unloading facilities
- stormwater and spill management controls
- an office, control room, switch room and quality control laboratory and
- an access road.

The ANE Production Facility resulted in the disturbance of an additional 8 hectares of the existing 292-hectare site. The layout of the Technology Centre and ANE Production Facility site is shown on **Figure 1.2**.

The ANE Production commenced operation in 2012.

As a result of the potential impacts associated with the Project, a Biodiversity Offset Area was developed to offset the impacts of the project on threatened species, endangered ecological communities (EECs) and their habitats. The size of the Biodiversity Offset Area was increased from approximately 17 hectares to 31.7 hectares following consultation with the (former) Office of Environment and Heritage (OEH) as part of the Response to Submissions process.

1.3 Authority Consultation

The original VMP was prepared in consultation with OEH – Conservation Partnerships Delivery Unit (OEH).

In January 2012, Orica and OEH finalised a Conservation Agreement under the *National Parks and Wildlife Act 1974* (NPW Act) to provide for the in-perpetuity conservation of the Biodiversity Offset Area. A key element of the consultation process with OEH was to integrate the VMP with the requirements of the conservation agreement and the OEH reporting processes.

As part of the consultation process, OEH reviewed a draft of the original VMP and provided comments. The OEH comments on the draft VMP were integrated in the final VMP (Umwelt 2012a).

OEH no longer exists but instead has been split into two new agencies, being the Biodiversity Conservation Trust (BCT) and the Biodiversity Conservation Division (BCD). This document has been updated to reflect the new agencies. The BCD were consulted during the preparation of this version of the VMP and their comments have been addressed in this revision.

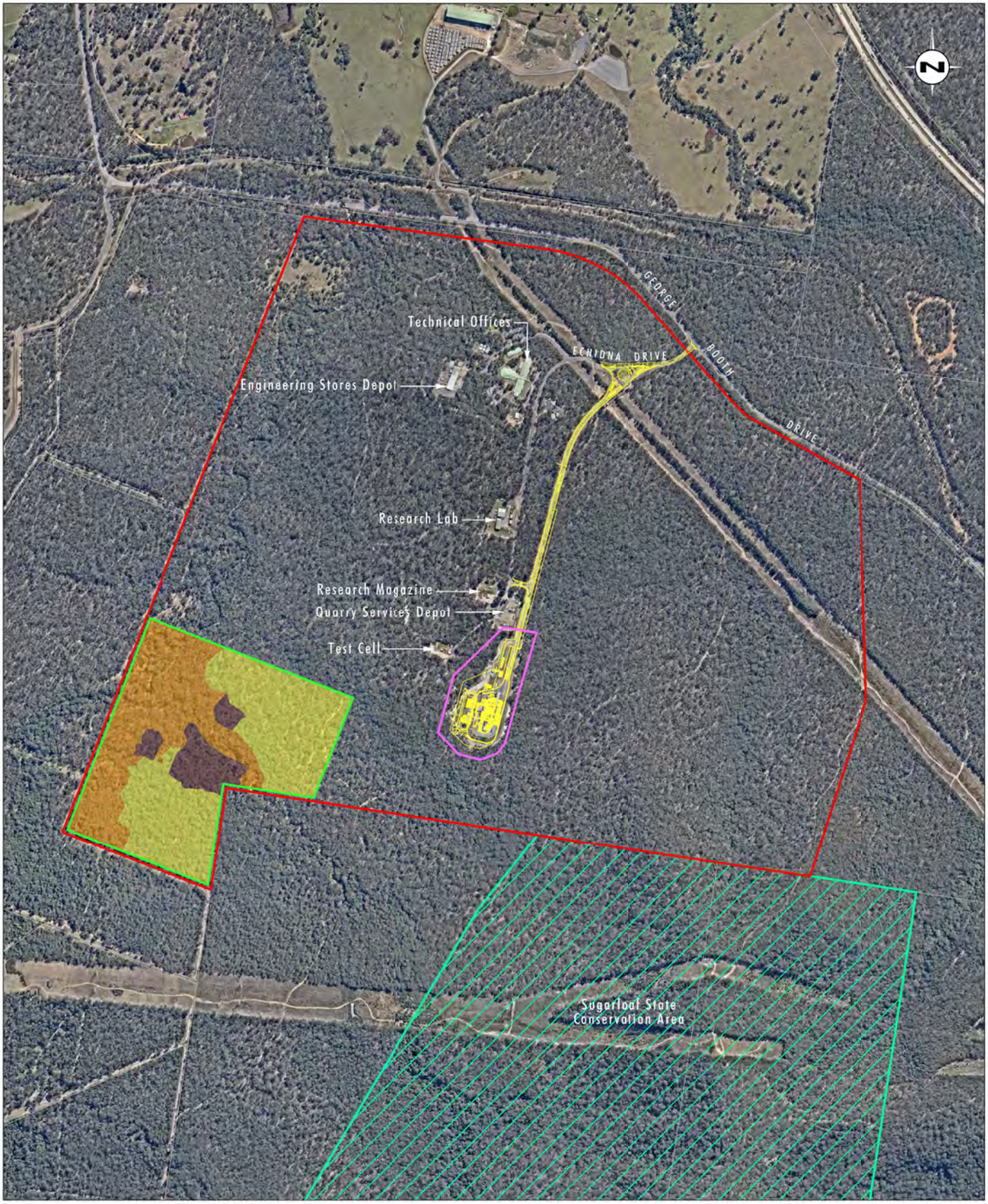

Image Source: Nearmap (Sep 2018)
Data Source: Orica (2008), LPI (2009)

0 250 500 750m
1:15 000

Legend

- ANE Production Facility and Access Road
- 30m Bushfire Buffer Clearance Area
- Technology Centre Boundary
- Biodiversity Offset Area
- Sugarloaf State Conservation Area
- Coastal Plains Smooth-barked Apple Woodland
- River-flat Eucalypt Forest
- Lower Hunter Spotted Gum-Ironbark Forest

FIGURE 1.2

Site Plan

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20181205 13.29

1.4 Roles and Responsibilities

Responsibilities for the review, approval and implementation of various aspects of the VMP are provided in **Table 1.1**.

Table 1.1 Roles and Responsibilities

Role	Responsibility
Kurri Technical Centre Site Manager	• ensure that sufficient resources are allocated for the implementation of this VMP; and • authorising internal and external reporting requirements as well as subsequent revisions of this VMP.
Site Services Manager	• implementation of this plan for operations to ensure compliance with project approval requirements; and • co-ordinate the day-to-day implementation of this VMP, including installation of nest boxes and annual ecological monitoring.
OMS Australia Asia Sustainability Manager	• ensure that sufficient time and resources are allocated to allow for the implementation of ecological management for the Biodiversity Offset Area.

2.0 Existing Environment

2.1 Technology Centre

The Technology Centre site encompasses approximately 292 hectares. The existing operations at the Technology Centre, including the ANE Production Facility occupy approximately 16 hectares of the site. The majority of the site comprises native open forest vegetation. Numerous fire trails have been cleared within the site and an approximately 90-metre-wide electricity easement runs through the north-eastern portion of the site.

The topography of the site is undulating and rolling hills, with long drainage plains (>500 metres) that are gently inclined. The site is located in the catchment area of Surveyors Creek, a tributary of Wallis Creek, on the footslopes of the Sugarloaf Range. The site is traversed by a number of small drainage flow paths that form part of the Surveyors Creek catchment.

The soil types occurring within the site are the Beresfield and Killingworth soil landscapes. The Beresfield soil landscape is characterised by deep Podzolic and Soloth soils which have formed from in situ weathering of parent material and are moderately well to imperfectly drained. The Killingworth soil landscape is primarily sculpted by erosion. Soils in the Killingworth soil landscape are typically shallow to moderately deep and vary from well to imperfectly draining. A variety of soil types exist within the Killingworth landscape varying from Yellow Podzolic and Soloth soils and Gleyed Soloths on crests and slopes to Structured Loams, Bleached Loams and Lithosols on some crests. The soil depth is typically shallow and of variable origin. Some of the limitations of both soil landscapes include being potentially highly erodible, highly acidic and seasonally waterlogged.

The area surrounding the site encompasses a variety of land use activities including agriculture, bushland, rural residential, rural industrial activities, transport corridors and the Sugarloaf State Conservation Area. Tasman Underground Mine is located approximately 2.5 kilometres to the south-east of the site.

2.1.1 Flora

The vegetation within the site and area disturbed for the ANE Production Facility is dominated by native species. A total of 243 plant species have been identified within the site by Umwelt (2012 to 2020), Mitchell McCotter (1990) and EDAW (1992). This includes 22 introduced species, comprising approximately 9 per cent of the species recorded.

Two vegetation communities, Lower Hunter Spotted Gum – Ironbark Forest and Coastal Plains Smooth-barked Apple Woodland occurred within the disturbance footprint of the ANE Production Facility.

The vegetation community Lower Hunter Spotted Gum – Ironbark Forest is listed as an Endangered Ecological Community (EEC) under the *Biodiversity Conservation Act 2016* (BC Act). The distribution of Lower Hunter Spotted Gum – Ironbark Forest EEC is restricted to a range of approximately 65 kilometres by 35 kilometres centred on the Cessnock-Beresfield area in the central and lower Hunter Valley and the remaining core is fragmented (NPWS 2000 and Bell and Driscoll 2008).

Black-eyed Susan (*Tetratheca juncea*) occurred within the disturbance footprint of the ANE Production Facility. *Tetratheca juncea* is listed as vulnerable under the BC Act and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A population of approximately 50 - 100 individual plants were identified within the south-eastern corner of the disturbance footprint for the ANE Production Facility.

Small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*) also occurred within the disturbance footprint for the ANE Production Facility. Small-flower grevillea is listed as vulnerable under the BC Act and EPBC Act.

2.1.2 Fauna

The disturbance footprint for the ANE Production Facility contained high quality habitat for fauna species, including threatened species such as the yellow-bellied glider (*Petaurus australis*), the powerful owl (*Ninox strenua*), little bentwing-bat (*Miniopterus australis*) and southern myotis (*Myotis macropus*).

A total of 143 fauna species have been identified within the site by Umwelt (2012-2020), Mitchell McCotter (1990) and EDAW (1992). This includes 96 bird species, 10 amphibians, 6 reptiles and 31 mammals. The threatened fauna species identified within the site are listed below in **Table 2.1**.

Table 2.1 Threatened Fauna Species

Species	Listing
gang-gang cockatoo (*Callocephalon fimbriatum*)	Vulnerable (BC Act)
little lorikeet (*Glossopsitta pusilla*)^	Vulnerable (BC Act)
powerful owl (*Ninox strenua*)^	Vulnerable (BC Act)
scarlet robin (*Petroica boodang*)	Vulnerable (BC Act)
varied sittella (*Daphoenositta chrysoptera*)	Vulnerable (BC Act)
brown treecreeper (eastern subsp.) (*Climacteris picumnus victoriae*)	Vulnerable (BC Act)
yellow bellied glider (*Petaurus australis*)^	Vulnerable (BC Act)
grey-headed flying fox (*Pteropus poliocephalus*)^	Vulnerable (BC Act and EPBC Act)
little bentwing-bat (*Miniopterus australis*)^	Vulnerable (BC Act)
eastern bentwing-bat (*Miniopterus schreibersii oceanensis*)^	Vulnerable (BC Act)
large-eared pied bat (*Chalinolobus dwyeri*)^	Vulnerable (BC Act and EPBC Act)
southern myotis (*Myotis macropus*)^	Vulnerable (BC Act)
yellow-bellied sheathtail bat (*Saccolaimus flaviventris*)^	Vulnerable (BC Act)
swift parrot (*Lathamus discolor*)	Endangered (BC Act) and Critically Endangered (EPBC Act)
dusky woodswallow (*Artamus cyanopterus cyanopterus*)	Vulnerable (BC Act)
eastern cave bat (*Vespadelus troughtoni*)^	Vulnerable (BC Act)

Notes:
BC Act = *Biodiversity Conservation Act 2016*
EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*.
'^'= Known to occur within the Biodiversity Offset Area.

2.2 Biodiversity Offset Area

The Biodiversity Offset Area encompasses 31.7 hectares of land and is located in the south-west corner of the site (refer to **Figure 1.2**). The Biodiversity Offset Area is approximately 250 metres west of the ANE Production Facility within the Technology Centre boundary.

There are a number of small trails located within the Biodiversity Offset Area. The trails are not regularly used by Orica. Trail bike riders have previously accessed the area illegally when riding in the vicinity. One larger fire trail through the centre of the Biodiversity Offset Area provides access for vehicles. Two additional fire trails also surround the Biodiversity Offset Area to the south and west. These fire trails are located on neighbouring properties.

The Biodiversity Offset Area contains two small drainage flow paths that form part of the Surveyors Creek catchment. The topography is generally flat in the vicinity of the floodplain of the tributary. The topography rises on the eastern side of the Biodiversity Offset Area as it becomes more undulating.

The Biodiversity Offset Area is immediately adjacent to the Sugarloaf State Conservation Area (SCA). The land located to the west of the Biodiversity Offset Area is subject to a Conservation Agreement. The Biodiversity Offset Area will provide a secure vegetated link between the Sugarloaf SCA and neighbouring land which is subject to the Conservation Agreement.

A survey of the Biodiversity Offset Area was undertaken by qualified ecologists as part of the Ecological Assessment prepared for the Environmental Assessment (Umwelt 2009) and subsequent surveys have been undertaken as part of the annual monitoring program from 2012 to 2020 (Umwelt 2012b, 2013-2020). An aerial map of the Biodiversity Offset Area is provided on **Figure 2.1**.

2.2.1 Flora

The Biodiversity Offset Area comprises:

- Coastal Plains Smooth-barked Apple Woodland
- River-flat Eucalypt Forest EEC
- Lower Hunter Spotted Gum – Ironbark Forest EEC.

No threatened flora species were recorded within the Biodiversity Offset Area during the surveys conducted for the Environmental Assessment (Umwelt 2009). However, *Grevillea parviflora* subsp. *parviflora* was recorded by the former OEH during an inspection of the Biodiversity Offset Area in December 2010. This species has not been observed within the Biodiversity Offset Area by Umwelt in any of the monitoring surveys from 2013 to 2020, but the Biodiversity Offset Area is believed to provide suitable habitat for the species.

The vegetation communities and threatened species locations are shown on **Figure 2.2**.

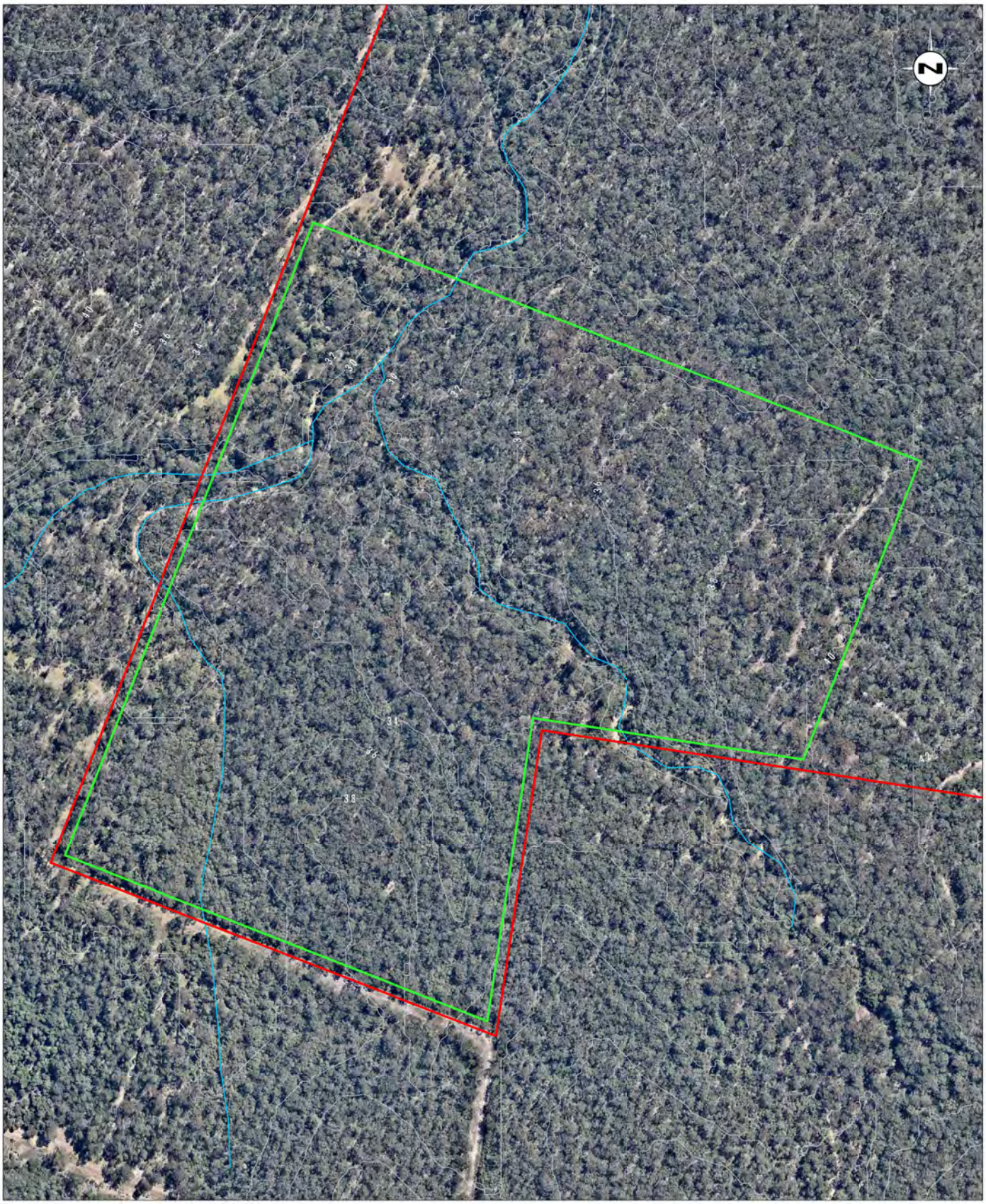


Image Source: Nearmap (Sep 2018)
Data Source: Orica (2008), LPI (2009)
Note: Contour interval 2m

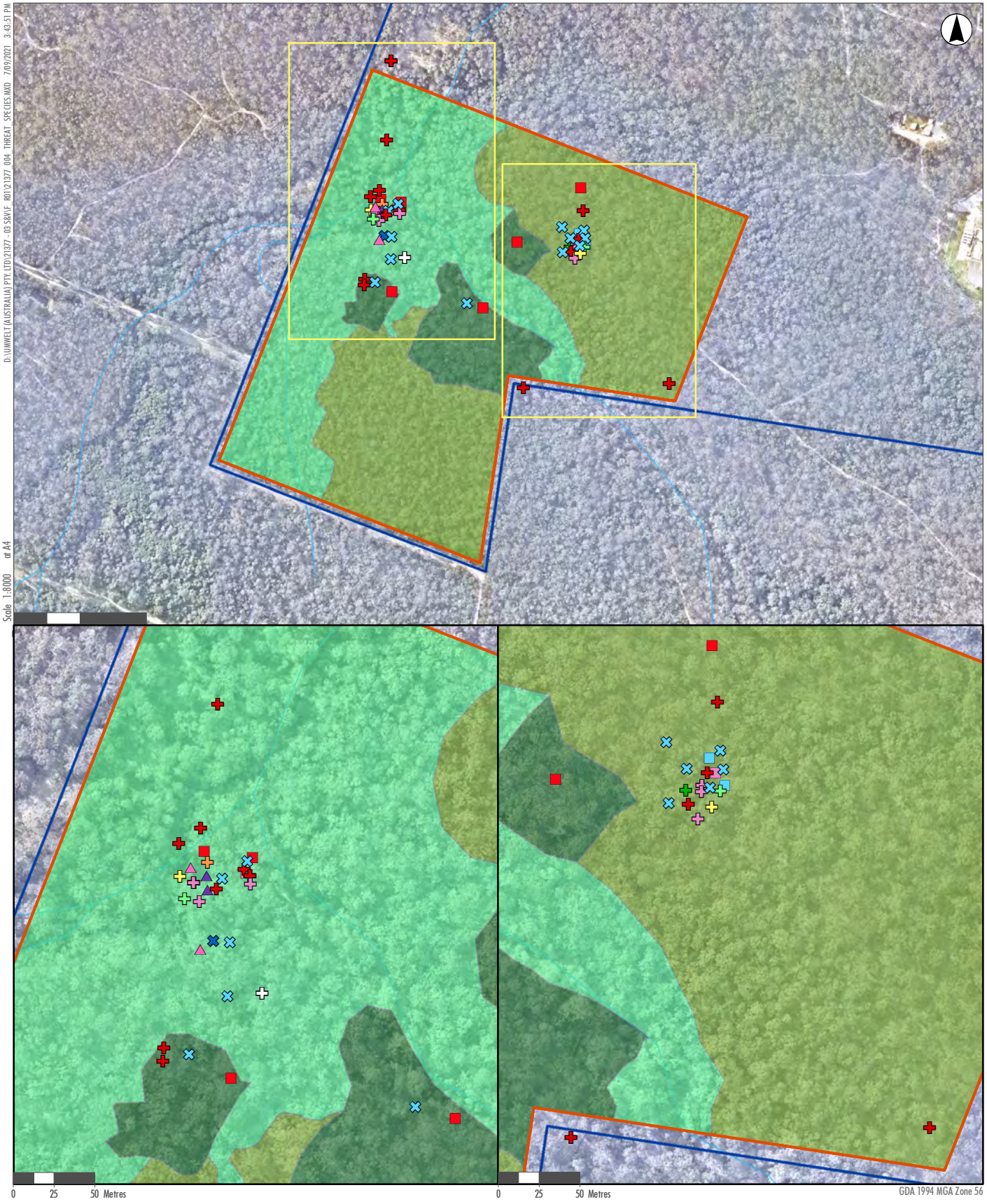
0 50 100 200m
1:5 000

Legend

- Technology Centre Boundary
- Biodiversity Offset Area
- Creek Line

FIGURE 2.1

Biodiversity Offset Area



Legend

- Biodiversity Offset Area
- Technology Centre Area
- Creek Line

Records 2020:

- Little bent-winged bat
- Little lorikeet
- Yellow-bellied glider

Previous Records 2012-2019:

- Eastern cave bat
- Eastern bentwing-bat
- Eastern freetail-bat
- Large-eared pied bat
- Little lorikeet
- Little bentwing-bat
- Masked owl
- Powerful owl
- Squirrel glider
- Yellow-bellied glider
- Yellow-bellied sheathtail-bat

Vegetation Communities

- Coastal Plains Smooth Bark Apple Forest
- River Flat Eucalyptus Forest
- Spotted Gum Ironbark Forest

FIGURE 2.2

Vegetation Communities and Threatened Species

Image Source: Nearmap (Sept 2020) Data source: DFSI (2020)

2.2.2 Fauna

Fauna habitat resources within the Biodiversity Offset Area include a canopy which provides foraging and nesting habitat, understorey providing refuge and foraging habitat and fallen timber providing valuable refuge for small mammals, amphibians and reptiles.

The fauna habitat within the Biodiversity Offset Area is similar to the habitat recorded within the site, however the vegetation is slightly younger, although not significantly so. Hollow density was slightly lower than the remainder of the site, with smaller size classes available due to the age of the vegetation.

A number of threatened fauna species have been recorded within the Biodiversity Offset Area. These are listed below in **Table 2.2**. The locations of threatened fauna species within the Biodiversity Offset Area are shown on **Figure 2.2**.

Table 2.2 Threatened Fauna Species

Species	Conservation Status
little lorikeet (*Glossopsitta pusilla*)	Vulnerable (BC Act)
powerful owl (*Ninox strenua*)	Vulnerable (BC Act)
masked owl (*Tyto novaehollandiae*)	Vulnerable (BC Act)
yellow-bellied glider (*Petaurus australis*)	Vulnerable (BC Act)
squirrel glider (*Petaurus norfolcensis*)	Vulnerable (BC Act)
grey-headed flying fox (*Pteropus poliocephalus*)	Vulnerable (BC Act and EPBC Act)
little bentwing-bat (*Miniopterus australis*)	Vulnerable (BC Act)
eastern bentwing-bat (*Miniopterus schreibersii oceanensis*)	Vulnerable (BC Act)
east coast freetail bat (*Mormopterus norfolkensis*)	Vulnerable (BC Act)
large-eared pied bat (*Chalinolobus dwyeri*)	Vulnerable (BC Act and EPBC Act)
southern myotis (*Myotis macropus*)	Vulnerable (BC Act)
yellow-bellied sheathtail bat (*Saccolaimus flaviventris*)	Vulnerable (BC Act)
eastern cave bat (*Vespadelus troughtoni*)^	Vulnerable (BC Act)

Notes:
BC Act = *Biodiversity Conservation Act 2016*.
EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*.

Due to the similarity of the habitat within the Biodiversity Offset Area and the remainder of the site, it is likely these highly mobile threatened fauna species would occur within similar forested habitats of the area. In particular, the heavily vegetated habitats to the south of the site which connect with the Sugarloaf SCA and further south into Watagans National Park would be used by such species.

3.0 Regulatory Requirements

Three key pieces of legislation are relevant to this VMP. Details of the relevance of EP&A Act, the BC Act and the EPBC Act are outlined below and the full legislation can be found on www.legislation.nsw.gov.au.

3.1 EP&A Act

On 26 July 2010, Orica received approval for the construction and operation of an Ammonium Nitrate Emulsion Production Facility (the Project) under Part 3A of the EP&A Act. The Project Approval (DA09_0090) also provided for the continuation of existing operations at the Orica Technology Centre.

The preparation of a VMP was required by Schedule 3, Condition 14 of DA09_0090. Details of the condition are provided in **Section 1.1**.

Schedule 3, Condition 12 of DA09_0090 required Orica to establish a Biodiversity Offset Area in accordance with the commitments made by Orica in the Response to Submissions report (Umwelt 2010). In accordance with this condition, Orica was also required to make suitable arrangements, in consultation with the former OEH, to provide for appropriate long term conservation security for the offset area. Orica has established a Conservation Agreement in order to comply with this condition.

3.2 BC Act

The BC Act replaced the *Threatened Species Conservation Act 1995*. The BC Act provides protection for threatened species and communities native to NSW (excluding fish and marine vegetation). Species, populations and ecological communities listed under Schedule 1 (threatened species) and Schedule 2 (threatened ecological communities (TECs)) are considered to be threatened in NSW.

Protection is provided by integrating the conservation of threatened species, endangered populations and TECs into development control processes under the EP&A Act.

The impact assessment applied as part of the Environmental Assessment concluded that the project would not result in a significant impact on the Lower Hunter Spotted Gum – Ironbark Forest EEC or recorded threatened flora and fauna species, providing that appropriate tree clearing procedures and other mitigation measures were followed. These required controls were included in the Environmental Assessment Statement of Commitments.

Part 5 Division 3 of the BC Act also sets the regulatory requirements for Conservation Agreements, which is an in-perpetuity agreement between Orica and the Minister for the Environment. This replaces the former National Parks and Wildlife Act 1995, which has been repealed.

3.3 EPBC Act

Under the Commonwealth EPBC Act, approval from the Commonwealth Minister for the Environment is required for any action that may have a significant impact on matters of national environmental significance. The Environmental Assessment for the project (Umwelt 2009) determined that the project would not have a significant impact on any matters of national environmental significance. The project did not therefore require the approval of the Commonwealth Minister.

4.0 Management Strategies

In order to ensure that the Biodiversity Offset Area is effective in addressing the identified impacts of the Project, it is necessary to ensure that the ecological value is not affected by land use activities and that the ecological value is maintained as part of the ongoing management and monitoring of the Biodiversity Offset Area. The following sections outline the ecological management strategies required to maintain and enhance the ecological values of the Biodiversity Offset Area.

4.1 Conservation Agreement

To secure the ecological value of the Biodiversity Offset Area for the long term, Orica signed a Conservation Agreement with the NSW Minister for the Environment in January 2012. The Conservation Agreement outlines the key ecological features of the Biodiversity Offset Area, the permitted use of the Biodiversity Offset Area and the agreed management actions that may be carried within the Biodiversity Offset Area. Those specific management measures relevant to the VMP include:

- the control of weeds and non-indigenous flora
- the control of pest animals and non-indigenous fauna
- use by domestic animals
- fire management
- vehicle access
- threatened species
- restoration of indigenous vegetation and
- monitoring.

Where applicable, these agreed management measures are discussed in the sections below.

4.2 Access and Signage

The Technology Centre has some existing perimeter fencing which has remained unchanged. Fencing surrounds the Biodiversity Offset Area on two of the five sides of the boundary however the whole Biodiversity Offset Area is within the bounds of the Orica Technology Centre with no formal public access.

The 2018 and 2019 monitoring results from the Biodiversity Offset Area identified an increase in illegal access to the site from motorbikes. This was evident in track erosion areas containing visible evidence of motorbike tyre tracks, as well as a portion of fence missing in 2019. Monitoring in 2020 did not record any unauthorised access into the area, however it has been repeatedly recorded in previous years.

Orica is aware that some illegal use of the area does occur, mostly by trail bike riders. Signage has been erected at each entry point into the Biodiversity Offset Area. The signage identifies that it is a conservation area, and that access is not permitted. Access restrictions via locked boundary gates and regular inspections should reduce the rate of illegal access into the Biodiversity Offset Area. The illegal use of the area will continue to be monitored by Orica and if the signage and gates are not effective in deterring this type of activity, additional measures will be designed and implemented in consultation with BCD.

Further fencing will not be established around the remainder of the Biodiversity Offset Area as it is considered that a fence would restrict the natural movement of fauna species to and from the area.

Orica will continue to monitor the levels of track use within the Biodiversity Offset Area and undertake remedial repair to tracks if damage to the tracks has the potential to impact on ecological values. Since the baseline monitoring data was collected in 2012 the condition of access tracks, within the Biodiversity Offset Area, has been generally improving.

Vehicle access to the Biodiversity Offset Area by Orica or any Orica contractors will continue to be via existing trails and tracks. Access to areas of the Biodiversity Offset Area which cannot be accessed via existing trails will be undertaken on foot, with a priority given to using existing tracks.

4.3 Habitat Management

Orica will continue to manage the habitat values of the Biodiversity Offset Area through a combination of management measures which aim to maintain or improve the quality of the habitat within the Biodiversity Offset Area. Habitat management will include:

- weed management and control
- feral animal monitoring and control
- sediment and erosion control
- restriction of access and
- ecological monitoring to determine the ongoing condition of the Biodiversity Offset Area and to determine any necessary management actions.

Details of these measures are provided in **Section 4.4**.

4.4 Maintenance of Biodiversity Offset Area

4.4.1 Weed Management

Nineteen introduced flora species have been recorded in the Biodiversity Offset Area since monitoring began:

- *lantana (*Lantana camara*)
- crofton weed (*Ageratina adenophora*)
- tall mallow (*Malva sylvestris*)
- moth vine (*Araujia sericifera*)
- spear thistle (*Cirsium vulgare*)
- wild tobacco tree (*Solanum mauritianum*)
- green cestrum (*Cestrum parqui*)
- *Paddy's lucerne (*Sida rhombifolia*)

- *cobblers pegs (*Bidens pilosa*)
- *flatweed (*Hypochaeris radicata*)
- lambs tongues (*Plantago lanceolata*)
- flaxleaf fleabane (*Conyza bonariensis*)
- arsenic bush (*Senna septemtrionalis*)
- *Cyperus eragrostis*
- common passionfruit (*Passiflora edulis*)
- purpletop (*Verbena bonariensis*)
- bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*)
- *fireweed (*Senecio madagascariensis*) and
- blackberry (*Rubus fruticosus* sp. *aggregate*).

Those indicated with an asterisk were detected during monitoring in 2020. Of the weed species recorded in the Biodiversity Offset Area, four are listed as 'priority weeds' for the Hunter Region (DPI, 2021). Areas supporting weeds within the Biodiversity Offset Area is shown in **Figure 4.1**.

The priority weeds and prescribed duty are identified in **Table 4.1**.

Table 4.1 Priority Weeds for the Hunter Region

Weed	Duty
lantana (*Lantana camara*)	**Prohibition on dealings** Must not be imported into the State or sold.
green cestrum (*Cestrum parqui*)	**Regional Recommended Measure** Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment. Land managers reduce impacts from the plant on priority assets.

Weed	Duty
bitou bush (*Chrysanthemoides monilifera* subsp. *rotundata*)	**Prohibition on dealings** Must not be imported into the State or sold. **Biosecurity Zone** The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high-water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south. Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone.
blackberry (*Rubus fruticosus* sp. *aggregate*)	**Prohibition on dealings** Must not be imported into the State or sold. All species in the *Rubus fruiticosus* species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree. **Regional Recommended Measure** The plant should not be bought, sold, grown, carried or released into the environment. Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread from their land. Land managers to reduce impacts from the plant on priority assets.

4.4.2 Management and Control of Weed Species

The *Biosecurity Act 2015* came into force on 1 July 2017 and replaces the *Noxious Weeds Act 1993*. Under the Biosecurity Act, the local council is the control authority for weed management within the Local Government Area (LGA). Therefore, the Cessnock Council Local Control Plans (LCPs) still apply to the Biodiversity Offset Area.

The requirements of the Cessnock LCPs that must be followed for the control of blackberry and lantana are to control the growth and spread of the weed specified by the LCP using the following control measures:

- The growth of the plant must be managed in a manner that reduces it numbers and incidence and continually inhibits its reproduction.
- The plant must not be imported into the State or sold.

In addition to the measures required by the LCP, Orica will continue to undertake management of lantana, blackberry, bitou bush, crofton weed and green cestrum as required to maintain the habitat values of the Biodiversity Offset Area. The control of these weed species has been incorporated in the annual weed control program.

The recommended control techniques for weed species known to occur in the Biodiversity Offset Area are provided in **Table 4.2**. This table has been produced based on recommendations from the LCP (for blackberry and lantana) and from the *New South Wales Weed Control Handbook - A Guide to Weed Control in Non-crop, Aquatic and* Bushland *Situations* (DPI 2018).

Table 4.2 Weed Species Recorded in the Biodiversity Offset Area and Recommended Control Methods

Scientific Name	Common Name	Control Method
Ageratina adenophora	crofton weed	Apply herbicides specified in DPI (2018).
Araujia sericifera	moth vine	Apply herbicides specified in DPI (2018). Physical removal of young plants; bag and remove any fruit (DPI 2018). Note: minor-use permits are required for some of the chemicals recommended.
Bidens pilosa	cobblers pegs	Not specified, however hand removal of this weed should be utilised where appropriate.
Cestrum parqui	green cestrum	Apply herbicides specified in DPI (2018). Note: minor-use permits are required for some of the chemicals recommended.
Chrysanthemoides monilifera subsp. *rotundata*	bitou bush	Apply herbicides specified in DPI (2018). Hand removal of young plants, encourage native regeneration and integrate the use of biological control agents. Fire can be effective where practical (DPI 2018). Note: minor-use permits are required for some of the chemicals recommended.
Cirsium vulgare	spear thistle	Apply herbicides specified in DPI (2018). Hoe or chip to remove small infestations (DPI 2018).
Conyza bonariensis	flaxleaf fleabane	Not specified, however hand removal of this weed should be utilised where appropriate.
Cyperus eragrostis		Not specified, however hand removal of this weed should be utilised where appropriate.
Hypochaeris radicata	flatweed	Not specified, however hand removal of this weed should be utilised where appropriate.
Lantana camara	lantana	Apply herbicides specified in DPI (2018). Manual control can be effective by slashing, burning or manual removal, integrated together with pasture improvement (DPI 2018b).

Scientific Name	Common Name	Control Method
Malva sylvestris	tall mallow	Not specified, however hand removal of this weed should be utilised where appropriate.
Passiflora edulis	common passionfruit	Not specified, however hand removal of this weed should be utilised where appropriate.
Plantago lanceolata	lambs tongues	Not specified, however hand removal of this weed should be utilised where appropriate.
Rubus anglocandicans	blackberry	Apply herbicides specified in DPI (2018). Slashing of juvenile bushes and the use of goats will give some control. Biological control agents are also available. Improve pastures with a vigorous perennial species (DPI 2018).
Senecio madagascariensis	fireweed	Apply herbicides specified in DPI (2018). Hand removal of this weed should be utilised where appropriate.
Senna septemtrionalis	arsenic bush	Apply herbicides specified in DPI (2018). Note: minor-use permits are required for some of the chemicals recommended.
Sida rhombifolia	Paddy's lucerne	Not specified, however hand removal of this weed should be utilised where appropriate.
Solanum mauritianum	wild tobacco tree	Apply herbicides specified in DPI (2018). Seedlings can be manually removed (DPI 2018). Note: minor-use permits are required for some of the chemicals recommended.
Verbena bonariensis	purpletop	Not specified, however hand removal of this weed should be utilised where appropriate.

Note: Not all species need to be managed as some are only small annual herbs whose impacts on the Biodiversity Offset Area would be minor. Although there is no legal requirement to manage these species, their presence will continue to be monitored. Removal of these species will be undertaken opportunistically during the annual weed control program.

4.4.3 Weed Control Program

A weed control program as outlined below, and detailed in the Land Management Action Plan, will continue to be implemented by a suitably qualified bush regeneration specialist to limit the spread and colonisation of noxious and environmental weeds within the Biodiversity Offset Area. This annual weed control program includes the management of weeds through:

- the control of weeds in accordance with all relevant legislation
- the use of herbicide(s) (refer to Table 4.1 "Control Method")
- removal of weeds by hand (refer to Table 4.1 "Control Method")

- ensure weed control is undertaken when the timing and extent of weed removal will minimise adverse effects on wildlife

- monitoring and inspections of areas to assess the effectiveness of the weed control program and to ascertain the requirement for further work

- ongoing consultation with the relevant authorities regarding weed listings, weed occurrence and management technologies and

- the evaluation of any chemicals to be used on site for the purposes of weed control with their Material Safety Data Sheet and chemical label to determine their registration for control of target species, as well as the safety and environmental requirements during their use.

4.4.3.1 Weed Control Program Inspection and Monitoring

In April 2012 weed control was carried out in the Biodiversity Offset Area. This was an initial treatment of the target weeds as identified in the original VMP (Umwelt 2012). The weed control conducted was primarily achieved by cut and paint or hand removal. Some foliar spray using low volume application was used on species such as lantana (*Lantana camara*). As required by the original VMP, a site inspection was carried out within 3 months of the initial treatment, which indicated that control measures were successful across the site in reducing weed densities.

Further weed control was conducted under the 2012-13 Weed Action Plan. A Land Management Action Plan (HLM 2013 to 2020) was then developed to report on weed control measures, other weed issues identified and broader management issues impacting the overall health of the Biodiversity Offset Area.

The Land Management Action Plan is revised annually and is prepared by appropriately qualified land managers following the ecological monitoring each year. No specific triggers for weed management actions, performance indicators or completion criteria exist in regard to weed management in this VMP however management actions, where required, are identified and reported annually in the ecological monitoring report. Management actions are recommended where there is an increase in diversity or density of weed species that are likely to reduce the ecological function of the Biodiversity Offset Area. Therefore, the most recent Land Management Action Plan guides the requirement for weed control works in regard to location, species and intensity.

This approach has been effective since the establishment of the Biodiversity Offset Area and resulted in a reduction in density and species of weeds initially within the Biodiversity Offset Area and the management of weeds to a satisfactory level each year since 2012. This is demonstrated in the persistence of all ecological values since the inception of monitoring and the fact that areas initially mapped as high density weeds are no longer present in the Biodiversity Offset Area (HLM 2020).

The weed control program will continue to be carried out as recommended in monitoring reports and within the Land Management Action Plan reports. Where required the weed control program will be modified to address any significant weeds that have not been discussed in this management plan or any newly established weed infestations and at that point the VMP will be revised to include a Trigger Action Control Plan (TARP) which, at a minimum, will review the frequency of weed monitoring inspections and ongoing weed control activities.

A summary of the weed management activities carried out on site and the outcomes will be reported in the ecosystem function assessment each year via the (former) OEH Report form (refer to **Appendix 1**) (now submitted to BCT).

FIGURE 4.1

Areas Supporting Weeds and Areas of Erosion

Image Source: Nearmap (Sept 2020) Data source: DFSI (2020)

4.4.4 Feral Fauna Management

Feral fauna have been recorded within the Biodiversity Offset Area as part of the monitoring surveys from 2012 to 2020 (Umwelt 2012 - 2020). Feral fauna species have also been recorded within the broader Technology Centre Site and are likely to also occur within the Biodiversity Offset Area. The feral fauna species recorded within the Biodiversity Offset Area and/or Technology Centre Site are listed in **Table 4.3**.

Table 4.3 Feral Fauna Species Recorded within the Biodiversity Offset Area and/or Technology Centre Site

Common Name	Scientific Name
common starling	*Sturnus vulgaris*
rabbit	*Oryctolagus cuniculus*
black rat	*Rattus rattus*
red fox	*Vulpes*
cat	*Felis catus*
feral dog	*Canis lupus familiaris*
house mouse	*Mus musculus*
pig	*Sus scrofa*
European cattle	*Bos taurus*
Fallow deer	*Dama dama*

Small numbers of feral fauna species have been observed within the Biodiversity Offset Area during monitoring surveys between 2012 and 2020, however no substantial ecological damage was recorded. In July and October 2014, targeted feral dog eradication was undertaken in response to concerns from the community and included traps, baiting and shooting methods as outlined in the Conservation Agreement. Further vertebrate pest management has occurred using 1080 baiting and shooting from 2015 to 2020 specifically targeting foxed and dogs and will continue until at least June 2021 (Umwelt 2020).

Where required, Orica will co-operate with local authorities and any programs for the control of feral fauna species within the region.

The ongoing ecological monitoring program (refer to **Section 5.1.4**) will continue to include surveys for the presence of significant populations of feral fauna species.

The results of the ecological monitoring program will continue to be reported in the Annual Environmental Management Report.

Should any targeted control measures be required to manage any significant changes in feral fauna species populations, Orica will consult with BCT and Local Land Services.

4.4.5 Erosion and Sediment Control

The Biodiversity Offset Area has been affected by erosion. Significant erosion has been identified within stream banks and gullies within in the central region of the Biodiversity Offset Area. Monitoring in 2019 and 2020 again confirmed the presence of significant erosion along Surveyors Creek.

Key causes of erosion within the Biodiversity Offset Area include:

- natural processes within the creek lines
- vehicle access and
- illegal trail bike use.

In order to minimise the potential for erosion to impact on the Biodiversity Offset Area, Orica will continue to undertake the following mitigation measures:

- restrict access of vehicles to formed trails (refer to **Section 4.2**)
- limit vehicle access for maintenance purposes only (refer to **Section 4.2**)
- any sediment and erosion control works within creek lines will be undertaken in consultation with the BCT and, as required, in accordance with a Controlled Activity Approval under the NSW *Water Management Act 2000* and
- provide signage identifying that the area is a conservation area and access is not permitted (refer to **Section 4.2**).

The Land Management Action Plan (HLM 2020) indicates that creek erosion continues to pose a threat to the biodiversity of the Biodiversity Offset Area. Bed lowering continues to cause undercutting of the banks in the main creek line and head cuts of small tributaries to cause further erosion. A Stream Rehabilitation Plan (HLM 2015) was developed in early 2015 with a continuation of investigation into the stream remediation plan during 2020-21, including consultation with neighbouring properties (HLM 2020).

BCD recommends that the gully erosion from head cuts along the creek in the central region of the BOA, and its tributaries within the BOA, is treated and stabilised during the period from 2021 to the next VMP review (2024). Areas of erosion detected during monitoring events are shown on **Figure 4.1.** but are likely to be more extensive than that shown.

4.4.6 Bushfire Management

The Biodiversity Offset Area is subject to the risk of bushfire. Potential causes of bushfire within the Biodiversity Offset Area may include:

- arson
- car dumping
- arcing of electrical powerlines
- escapes from legal burning activities
- illegal burning activities and

- natural processes such as lightning.

The Technology Centre Site is located within the area subject to the Rural Fire Service Hunter Fire Management Plan (HBFMC 2009). The Hunter Fire Management Plan identifies specific land uses within the Cessnock and Maitland Local Government Areas and the relevant fire management activities which are required.

The Hunter Fire Management Plan identifies the Technology Centre site as a commercial land use with a very high priority risk rating. Existing fire management activities undertaken by the RFS at the Technology Centre Site include hazard reduction, preparedness activities (such as fire trail maintenance) and property planning.

The Hunter Fire Management Plan includes an allowance for environmental land use categories. The environmental land use category recognises that the presence of threatened species, populations and ecological communities affects the fire management activities to be undertaken. To ensure that these records are accurate for the site and in particular the Biodiversity Offset Area and inform the RFS land use mapping, Orica will continue to provide the vegetation community and threatened species records for the Biodiversity Offset Area to the RFS.

Any hazard reduction activities within the Biodiversity Offset Area will be undertaken in coordination with the RFS and will be designed to minimise impacts on ecological values. In the instance of bushfire in the Biodiversity Offset Area, the fire will be suppressed as quickly as possible with the aim of keeping the fire to a small area, if possible.

5.0 Monitoring

The ecological monitoring program commenced in 2012 to gain baseline data of the Biodiversity Offset Area, with annual monitoring undertaken in 2013 to 2020 to assess potential changes in ecological condition. The ecological monitoring program was developed to be consistent with the requirements of the (former) OEH Conservation Area Monitoring Protocol. This Protocol provides for monitoring data to be collected using the same methods at every conservation area. The data collected at each conservation area is used to compile a state-wide report on the status of conservation areas.

In 2016, with the repeal of the TSC Act and the introduction of the BC Act, also came the retirement of the BioBanking Assessment Methodology (BBAM) and introduction of the Biodiversity Assessment Method (BAM). These methodologies pertain to the monitoring of floristic structure and function.

For any ecological monitoring beyond the approval of this updated VMP, the ecological monitoring program will adopt the BAM for flora monitoring.

The monitoring surveys will continue to be undertaken by a suitably qualified ecologist.

The ongoing ecological monitoring will aim to determine:

- any perceived changes in populations of native flora and fauna
- any destruction, removal or dieback of native flora
- any changes to native vegetation structure including any improvements in vegetation quality
- evidence of exotic plants and animals and whether there have been any changes in distribution or numbers and
- impacts to the Biodiversity Offset Area by unauthorised access.

5.1.1 Baseline Monitoring

The baseline monitoring of the Biodiversity Offset Area was undertaken in March 2012 and reported on Orica Richmond Vale Biodiversity Offset Area Monitoring Report – 2012 (Umwelt 2012b). The baseline monitoring assessed the following issues:

- occurrence of erosion and likely causes of erosion
- fire history
- visitation
- vehicle use
- impacts of human use and
- conservation values.

The baseline survey included quantitative monitoring for the following issues:

- evidence of feral animal usage

- weed presence and occurrence
- floristic composition
- evidence of natural recruitment
- presence of habitat features and
- presence of fauna species.

The baseline survey was conducted at four locations as specified in the Conservation Agreement. The survey locations are shown on **Figure 5.1.**

5.1.2 Monitoring of Conservation Values

The ecological monitoring that has been undertaken for the Biodiversity Offset Area has been integrated with the requirements for the monitoring of conservation values of the Biodiversity Offset Area. The monitoring program was developed in consultation with OEH (now BCD and BCT).

5.1.2.1 Monitoring Points

Four monitoring points were selected within the Biodiversity Offset Area and detailed in the Conservation Agreement. The four points listed in **Table 5.1** and shown in **Figure 5.1** form the basis of the monitoring required by the conservation agreement.

Table 5.1 Biodiversity Offset Area Ecological Monitoring Points

Monitoring Point	Coordinates	Description	Survey Type
1	Lat -32.86840634; Long 151.52749359	Located in an area of *Smooth-barked Apple – Red Bloodwood open forest* dominated by smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*), grey ironbark (*Eucalyptus paniculata*).	Flora and Fauna
2	Lat -32.86905678; Long 151.5259084	Located on the creek line in the central region of the Biodiversity Offset Area in an area of *Lower Hunter Spotted Gum- Ironbark Forest*.	Flora
3	Lat -32.86877205; Long 151.52417209	Located in an area of *Lower Hunter Spotted Gum – Ironbark Forest.* The dominant species present include spotted gum (*Corymbia maculata*), broad-leaved ironbark (*Eucalyptus fibrosa*) with occasional grey gum (*Eucalyptus punctata*).	Flora
4	Lat -32.8679616; Long 151.52435197	Located adjacent to the creek line in an area of *River-flat Eucalypt Forest*. The dominant canopy species is forest red gum (*Eucalyptus tereticornis*).	Flora and Fauna

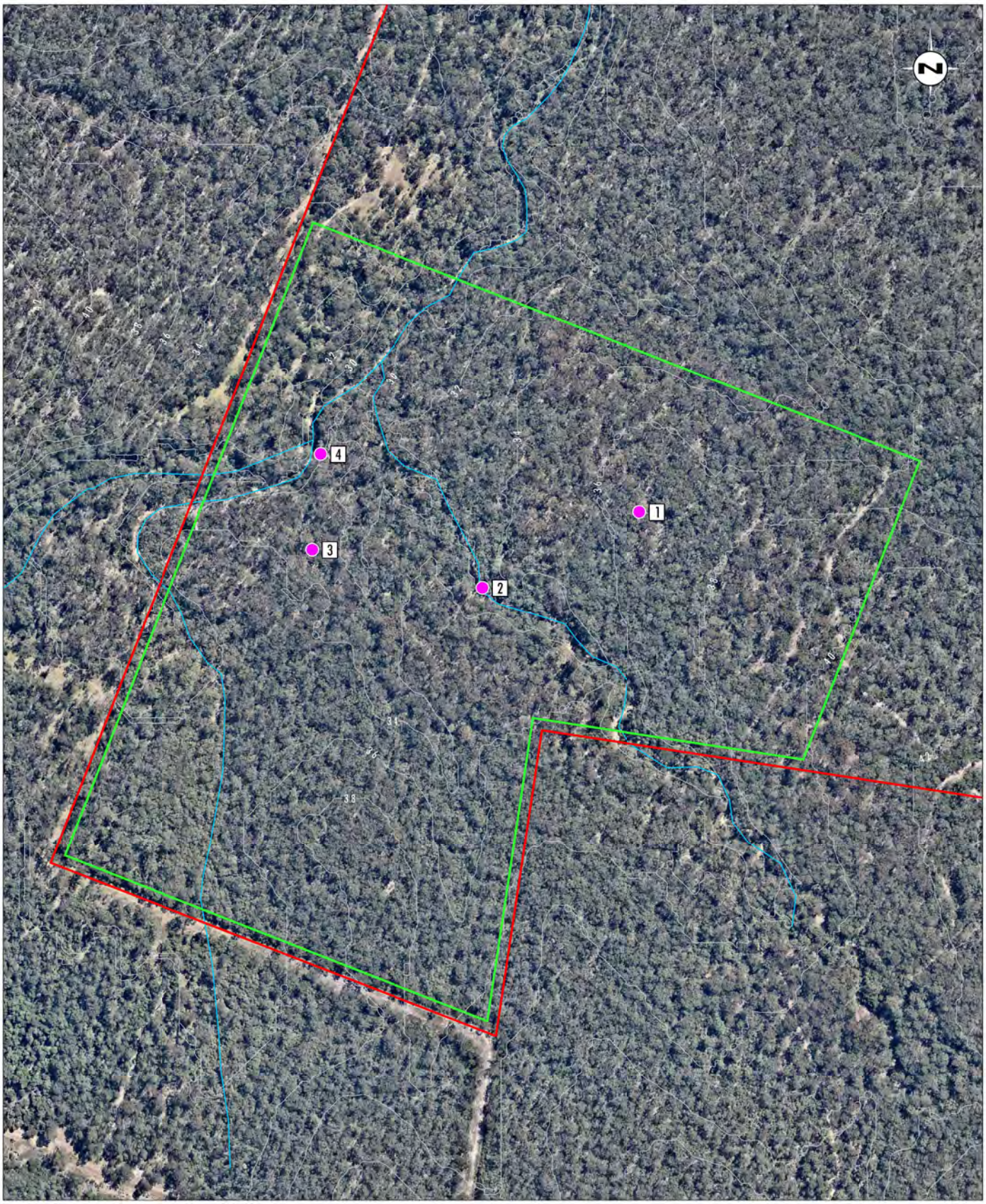


Image Source: Nearmap (Sep 2018)
Data Source: Orica (2008), LPI (2009), Orica Richmond Vale Conservation Agreement
Note: Contour interval 2m

0 50 100 200m
1:5 000

Legend

- Technology Centre Boundary
- Biodiversity Offset Area
- Creek Line
- Monitoring Point

FIGURE 5.1

Biodiversity Offset Area
Ecological Monitoring Points

5.1.2.2 Photo Monitoring

At each monitoring point, photos will continue to be taken at each end of the established vegetation transect. The exact orientation and location of the photo points was established during the baseline survey.

5.1.2.3 Ecosystem Function Assessment

An annual ecosystem function assessment will continue to be undertaken at each of the four monitoring points. The assessments will be undertaken annually.

The ecosystem function assessment has been and will continue to be undertaken using the OEH Biometric methodology for conservation agreements and reported using the OEH monitoring report form (refer to **Appendix 1**).

5.1.3 Flora Monitoring

- Flora monitoring will continue to be undertaken as part of the ecological monitoring program. The flora monitoring aims to provide information on:
    - floristic composition (including cover and abundance of species) and structure
    - general health of vegetation (including weed density and dieback)
    - evidence of natural recruitment
    - presence of important habitat features such as tree hollows and nests
    - evidence of feral animal usage
    - signs of disturbance
    - erosion and need for repair
    - fire management
    - success of any management programs implemented and
    - any other management issues.

The specific methods of the flora survey will continue to involve:

- semi quantitative floristic plots at each monitoring point in accordance with the BAM (2020) and
- photo monitoring at fixed points at each of the plots.

5.1.4 Fauna Monitoring

Fauna monitoring within the Biodiversity Offset Area will continue to be undertaken as part of the ecological monitoring program at the same frequency as flora monitoring. Two fauna monitoring sites are located within the Biodiversity Offset Area including one within the riparian vegetation and one within the woodland vegetation as indicated by Points 1 and 4 in **Figure 5.1** and referenced in **Table 5.1**.

The following methods will continue to be undertaken at both sites to determine ongoing fauna use of habitat within the Biodiversity Offset Area, particularly focusing on the presence of key threatened species:

- one person hour of spotlighting including herpetofauna, mammal and bird observations
- one person hour diurnal herpetofauna and bird census points
- Anabat bat echolocation call surveys for the duration of nocturnal surveys and
- one nocturnal call playback session, involving the calls of:
    - yellow-bellied glider (*Petaurus australis*)
    - koala (*Phascolarctos cinereus*)
    - squirrel glider (*Petaurus norfolcensis*)
    - powerful owl (*Ninox strenua*)
    - sooty owl (*Tyto tenebricosa*) and
    - masked owl (*Tyto novaehollandiae*).

The swift parrot (*Lathamus discolor*) is listed as endangered (BC Act) and critically endangered (EPBC Act) and was identified during the 2018 monitoring of the Biodiversity Offset Area. The swift parrot was observed feeding in the canopy of red ironbark (*Eucalyptus fibrosa*) adjacent to the Orica Site Compound approximately 1.1 kilometres north from the Biodiversity Offset Area. This species is only present in their non-breeding season and occurs in northern NSW in the autumn and winter months (OEH 2021).

The dusky woodswallow (*Artamus cyanopterus cyanopterus*) is listed as vulnerable (BC Act) and was also recorded in proximity to the Biodiversity Offset Area. This species occurs throughout most of NSW primarily within dry, open eucalypt forests. Breeding occurs on the western slopes of the Great Dividing Range (OEH 2017a).

The powerful owl (*Ninox strenua*) is listed as vulnerable (BC Act) and was identified during the 2018 and 2019 monitoring of the Biodiversity Offset Area. This species is endemic to eastern and south-eastern Australia and in NSW, it occurs throughout the eastern forests from the coast inland to tablelands, with scattered records on the western slopes occurring in range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest (OEH 2017b).

The yellow- bellied glider (*Petaurus australis*) is listed as vulnerable (BC Act) and has been recorded during monitoring of the Biodiversity Offset Area in all years since 2013, except for 2016 (Umwelt 2013 to 2020). These large, mobile gliders occupy tall mature forests on the east coast, and it is sociable and vocal (OEH 2017c).

These threatened species will continue to be monitored during all fauna surveys and opportunistic survey as part of the annual monitoring of the Biodiversity Offset Area. No update to the current monitoring program is required.

If further threatened species, or significant new records of existing threatened species, are collected, the significance of such records will be reviewed and considered. This may include a review of the monitoring program, and/or a review of the management of the threatened species.

The fauna survey will also target the presence of feral fauna species.

5.1.4.1 Monitoring of Management Issues and Threats

Qualitative monitoring of management issues and threats within the Biodiversity Offset Area will continue to be undertaken on an annual basis as part of the monitoring program. The qualitative monitoring will be undertaken using the OEH Monitoring Report Form included in **Appendix 1**. The management issues and threats which will be monitored include:

- management works and actions undertaken in the last 12 months
- fire history
- visitation
- conservation values
- feral animals
- weeds
- impacts of human use
- vehicle use and
- other permitted use.

The outcomes of the qualitative monitoring program will continue to provide Orica with the information required to determine whether any works are required to manage any of the issues or threats.

6.0 Reporting

An Ecological Monitoring Report will continue to be prepared after each monitoring event and will document the monitoring methods and results from the monitoring program. This report provides a comparison of the data collected with previous results and includes management recommendations and ameliorative methods for ongoing management of the Biodiversity Offset Area.

A copy of the Ecological Monitoring Report and reports on the weed control program and results will be provided to BCT as part of the reporting requirements for the Conservation Agreement (refer to **Appendix 1**). Results of the ecological monitoring will also be included in the Annual Environmental Management Report provided to the Department of Planning and Environment (DPE).

7.0 Review

A review of this VMP is to be undertaken every three years or as required. The revised version of the VMP will be submitted to DPIE and BCT for review as necessary. The next scheduled review will be in 2024.

8.0 References

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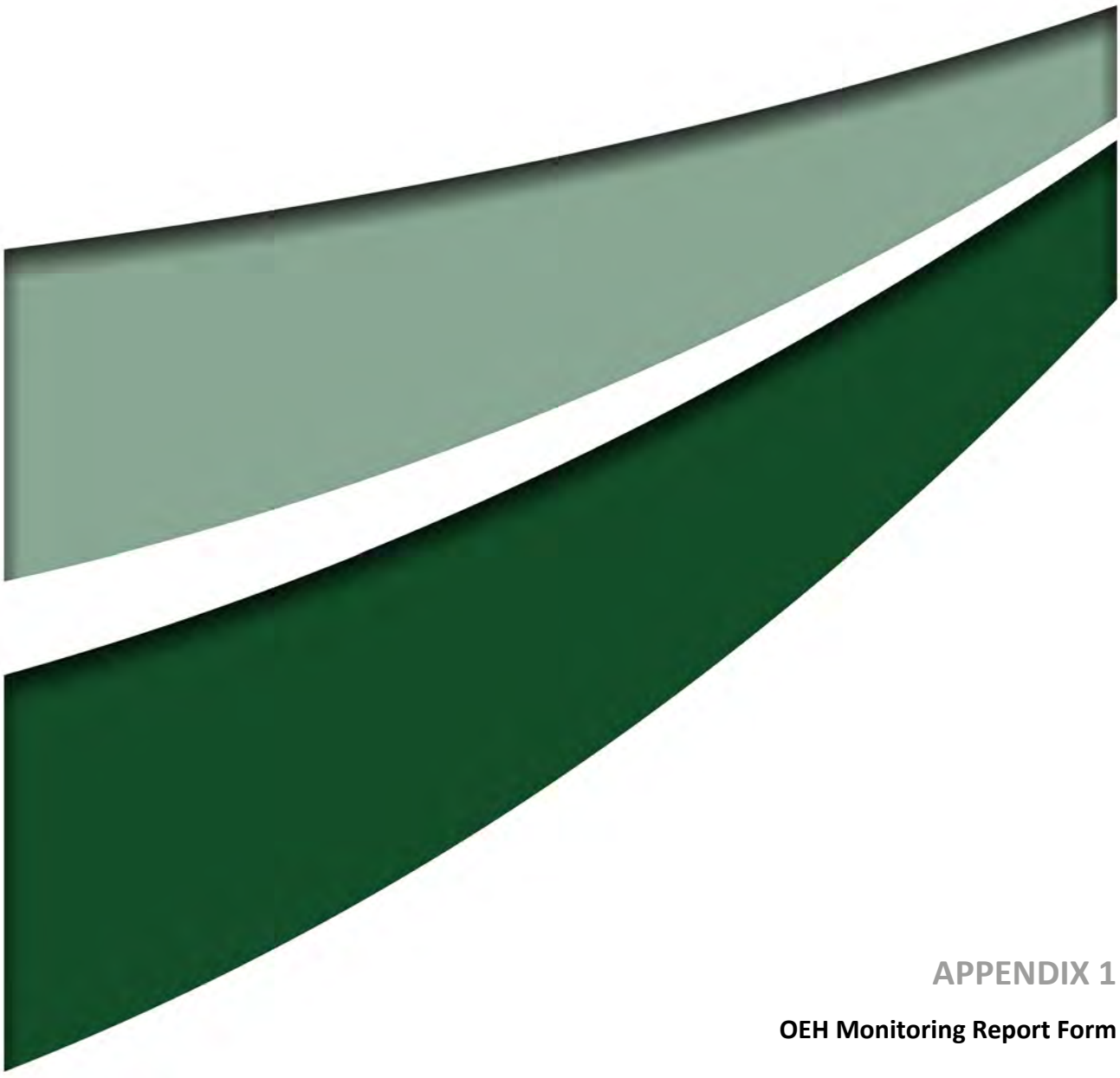

APPENDIX 1

OEH Monitoring Report Form

MONITORING REPORT FORM

This form is being completed for the following reason:

- ☐ Annual Report by landholder (self reporting)
- ☐ Routine visit by OEH with landholder
- ☐ Compliance visit by OEH with landholder
- ☐ Change of ownership visit by OEH with landholder
- ☐ Conservation Agreement
- ☐ Wildlife Refuge
- ☐ Property Agreement

Please make three copies of the completed form and any additional information. One to be retained by the landowner, one for the local Area office of NPWS and the third to go to Conservation Partnerships Delivery Unit, OEH, PO Box A290, Sydney South NSW 1232.

A LANDOWNER AND PROPERTY DETAILS

Property Owner	
Property Name	
Property Address	
CA number	
Area (ha)	
CMA Region	
Agreement signed	
Date of last monitoring visit	
Date of visit	
Officer undertaking visit	

B LANDHOLDER OVERVIEW SINCE LAST VISIT

1 LANDHOLDER EXPERIENCES RELATING TO THE IMPLEMENTATION OF THE CONSERVATION AGREEMENT /WILDLIFE REFUGE

Points to note	*Comments*

☐ Please place an X in this box if new issue(s)/problem(s) require management help

2 WORKS UNDERTAKEN SINCE LAST VISIT

Description of work undertaken	*Source of funding and amount*	*Date completed*

3 FIRE HISTORY MONITORING

Date of fire	*Area burnt (% of c.a./approx ha)*	*Reason (hazard red./wild)*	*Intensity (low/medium/high)*

4 VISITATION

Average No. of Visitors per year	*Purpose of Visitation*	*Visitation effects*	*Strategies to overcome effects*

5 COMMUNITY CONSULTATION AND INPUT INTO DECISION MAKING

Type of Involvement	*Numbers involved*	*Outcomes*

C CONSERVATION VALUES

	Conservation Values noted in Agreement and its significance	Current condition ** (I = improving M= maintain D= declining) *Anecdotal evidence only available at present*	Current and emerging threats	Level (*severe, high, moderate or low*) and extent (*throughout, widespread, scattered or localised*) of threats	New findings; any other relevant information.
Landscape/ Catchment - World/national heritage listings - Landscape & scenic values					
Biological - Vegetation Communities - Flora - Fauna & habitat - Water bodies					
Geological					
Cultural Heritage - Aboriginal - Historic					
Research/ education					
Other					

** Current Condition: determine change by comparison with previous Condition Assessments (Pages 5 to 8). Carry out new assessment if not done previously. Biometric can also be used.

D MANAGEMENT ISSUES

	Describe the Issue (short description of current extent of impacts, new sightings and any other relevant information	Description of planning and implementation of control measures being and to be undertaken, and duration
Weeds (where applicable, infestation can be given as a % of total vegetation)		
Pest Animals - Feral - Domestic - Native		
Fire Management		
Threatened species; endangered ecological communities etc		
Cultural Heritage Management		
Visitor Impact Management		
Community Consultation and input into decision making.		
Research/ Education programs		
Other permitted uses -vehicle access - use of timber -seed collection - etc		

E WORKPLAN TO ADDRESS MANAGEMENT ISSUES (in priority order)

Action to be completed or ongoing action (discuss on site and where necessary confirm details later)	*Cost and possible funding sources*	*Completion Date*	*Responsibility (landholder, OEH, other)*

F ATTACHMENTS

- ☐ Map showing location of activities referred to above eg weed infestations; fire; location of past and future management actions.

List further attachments if relevant:

- ☐ Photos from previously/new identified photopoints
- ☐ Rapid Assessment Sheets for previous/new sites.
- ☐ Other Monitoring results.

I/we confirm a field inspection has been undertaken and this form is a summary of the conservation values and management issues discussed.

Signature: _____ _____
Landowner Visiting OEH/NPWS Officer, if applicable

Date report completed: _____

Level of threat definition

Table 4 Description of the level of impact categories (adapted from State of the Parks 2007 Guidelines)

Impact of the threat	Description of category
Severe	The threat will lead to loss of property value(s) in the foreseeable future if it continues to operate at current levels
High	The threat will lead to a significant reduction of property e values(s) if it continues to operate at current levels.
Moderate	The threat is having a detectable impact on reserve values(s) but damage is not considered significant.
Mild	The threat is having minor or barely detectable impact on property value(s).

Extent of threat definition For cultural heritage places, sites and objects, classify the extent the impact is having on the place/site/object itself.

Table 5: Description of the extent categories (adapted from State of the Parks 2007 Guidelines)

Extent of the threat	Description of category
Throughout	The impact is occurring in 50% or more of property area/cultural place/site/object.
Widespread	The impact is occurring in more than 15% but less than 50% of reserve area/cultural place/site/object.
Scattered	The impact is occurring in between 5 and 15% of reserve area/cultural place/site/object.
Localised	The impact is occurring is less than 5% of reserve area/cultural place/site/object.

CONDITION ASSESSMENT NATIVE VEGETATION

For native bushland and grassland sites and paddocks containing scattered shade trees

Site number or name:	**Monitoring date:**	
Assessment questions		**Answer Yes, No or N/A**
1.	Is the area fenced to manage stock access and grazing? *Healthy bush should be rested for long periods to allow regeneration. To achieve this, it should be fenced off.*	
2.	Is there regeneration of native trees and shrubs, or if in grassland, regular germination of native herbs eg perennials such as lilies or orchids and annuals such as daisies? *Regeneration of trees and shrubs is necessary for the bush to maintain health, diversity and a range of habitats. An understorey of shrubs encourages small insect eating birds and other native animals.*	
3.	Is there a diverse range of tree and shrub species present, eg more than 20 (coast), 15 (tablelands), 10 (western slopes and plains)? (Note: healthy river red gum forest may have only one tree and 5-10 shrub species present). *Diversity encourages a range of native animals and helps the bush withstand attacks of insects and other adverse conditions.*	
4.	If grassland, is there a diverse range of grasses and broad leaf herbs present?	
5.	Is there adequate ground cover, eg leaves, bark and twigs, or litter (dead grasses)? *Ground cover indicates whether the area is being disturbed by stock and is a measure of tree canopy density and the domination of exotic grasses and weeds.*	
6.	Are mosses or lichens on rocks, fallen branches and the ground surface, or are these species, along with liverworts, forming a crust on bare soil?	
7.	Are weeds uncommon, sparsely scattered, absent, or mainly around edges of the area? *The understorey may have exotic weeds present. Too many are undesirable and you may need a management plan for their control. Weeds compete with native plants for light, space, water and nutrients.*	
8.	Is there a very low incidence of pest animals, eg foxes and rabbits? *Remnant bush can be a refuge for pest animals as well as natives. The feral animals should be controlled.*	
9.	Is the patch shape a block or part of a corridor more than 30 metres wide rather than a thin strip? *Blocks of native vegetation have less edge area than strips, so they are less influenced by changes in levels of weeds, predators, noise and climatic effects.*	
10.	Is the area greater than 1 ha (coast), 5 ha (tablelands), 10 ha (western slopes), 20 ha (plains), 50 ha (Western Division)?	
11.	Is the remnant linked to other remnants by corridors, eg. roadside vegetation, or scattered trees no more than 50 m apart ? *Corridors provide shelter and pathways for native organisms (other than birds) to move over the landscape for feeding, breeding, roosting and expanding territory*.	
12.	Is there a mix of tree ages present, ie saplings through to old growth with hollows ? *A range of ages and conditions means the bush is regenerating itself and each stage of growth is suitable habitat for native organisms.*	
13.	If trees are present is an understorey also present? *An understorey of shrubs encourages small insect eating birds and other native animals.*	
14.	Is the understorey mostly comprised of native shrubs and / or grasses and broad leaf	

herbs?	
15. Area there standing trees (alive or dead) with hollows, present in the remnant or paddock ? *Dead trees with hollows are essential for roosting and nesting of a large range of native birds such as parrots and of bats.*	
16. Are the trees mainly healthy, with little or no dieback? *Dieback is apparent if there are bare twigs at the outer part of the tree canopy. It is usually a sign of severe insect attack.*	
17. Are there less than 20 % of trees affected by mistletoe? *Mistletoe is a parasite that invades trees and causes them to lose vigour. Where many trees in an area are affected it is likely to indicate that the area of vegetation is under severe stress.*	
18. Are there logs and fallen timber on the ground? *Logs and dead material are essential habitat for smaller native organisms. But they can also be a harbour for pest animals.*	
19. If scattered paddock trees are unfenced, are stock camps absent? *Bare ground, bare tree roots or the movement of soil all can indicate erosion which needs to be managed and controlled.*	
20. If scattered paddock trees are unfenced, is evidence of stock ringbarking or rubbing absent?	
21. Is the area free of herbicide, insecticide or fertiliser overspray from adjoining areas? *Herbicides and insecticides can kill native plants and small organisms. Fertiliser encourages exotic species by raising nutrient levels.*	
22. Is the area free from the threat of salinity and / or high water tables?	
Total number of 'yes' answers	

Condition rating - native vegetation

Number of 'yes' answers			**Vegetation condition rating**	**Need for management attention**
Remnant bushland	**Remnant grassland**	**Scattered paddock trees**		
14 +	9 +	12 +	Healthy	Maintain current management
9 - 13	6 - 8	8 - 11	Good	Needs some management attention
5 - 8	3 - 5	5 - 7	Fair	Needs a significant level of management attention
0 - 4	0 - 2	0 - 4	Poor	Urgent management necessary if you wish to retain area as stock shelter

CONDITION ASSESSMENT - WATER BODIES

For creeks, rivers, farm dams and natural or artificial wetlands

Site number or name:	**Monitoring date:**
Assessment questions	**Answer Yes, No or N/A**
1. Is all or part of the site fenced to control stock access?	
2. Is there a diverse range of native tree and shrub species present upslope of the dam or wetland, or along the creek?	
3. Are there any standing trees (dead or alive), with hollows near to, or within the dam or wetland, or along the creek?	
4. Is the site linked to remnant vegetation by corridors, eg. roadside or scattered trees no more than 50m apart?	
5. Is the site free of herbicide, insecticide or fertiliser overspray or run off?	
6. Are weeds uncommon, sparsely scattered or absent from the site?	
7. Is there an earthen or floating island within the dam?	
8. Does the dam have an irregular margin?	
9. Does 50% of the dam edge have a gentle slope?	
10. Is 50% of the dam less than 800mm deep when the dam's full?	
11. Are there any native fish species present in the dam or creek?	
12. Are introduced fish species (eg. carp) absent from the dam or creek?	
13. Are there hollow logs, rocks and litter around the dam or along the creek?	
14. Is more than 50% of the creek corridor vegetated with native species?	
15. Are the creek banks stabilised by vegetation?	
16. Are there wider patches of native vegetation along the creek corridor eg 20-30m wide?	
17. Is the area immediately adjacent to the creek free from cultivation?	
18. Are aquatic insects present under small to medium rocks or logs within the creek?	
19. Is the creek's water free from regular algal blooms?	
20. Does foliage of trees or shrubs hang over the creek, dam or wetland?	
21. Is there any regeneration of reeds and rushes upslope of the dam or wetland?	
22. Is there a buffer zone of ungrazed vegetation around the wetland?	
23. Is the area free of irrigation tailwater or polluted stormwater?	
24. Is the area free of fire during bird breeding seasons?	
25 Are patches of vegetation left unburnt as wildlife breeding habitat?	
26 If the area has original vegetation, has the water regime remained largely unmodified?	
27. Does the water level fluctuate regularly (seasonally)?	
Totals number of 'yes' answers	

Condition rating - water bodies				
Number of 'yes' answers			**Water resource condition rating**	**Need for management attention**
Dam	**Creek**	**Wetland**		
11 +	13 +	10 +	Healthy	Maintain current management
7 – 10	9 - 12	7 - 9	Good	Needs some management attention
4 – 6	5 - 8	4 - 6	Fair	Needs a significant level of management attention
0 – 3	0 - 4	0 - 3	Poor	Urgent management required to improve the resource condition

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