Appendix H - Annual Biodiversity & Rehabilitation Management Report

ANNUAL BIODIVERSITY & REHABILITATION MANAGEMENT REPORT Old Northern Road 2020

Prepared for Dixon Sand Pty Ltd

September 2020 V.1

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Annual Biodiversity

&

Rehabilitation Management

Report

Old Northern Road

2020

Dixon Sand Pty Ltd

This assessment has been prepared by

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September 2020 V.1

Date

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Abbreviations

Abbreviation	Description
BC Act	*Biodiversity Conservation Act 2016*
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
HRBOA	Haerses Road Biodiversity Offset Area
HTW	High Threat Weed
KPI	Key Performance Indicators
KTP	Key Threatening Process
LEP	Local Environmental Plan
Mod 4	Modification 4
Mod 5	Modification 5
NSW OEH	New South Wales Office of Environment and Heritage
NVC	Native Vegetation Corridor
ONR	Old Northern Road
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
THSC	The Hills Shire Council
VIS	Vegetation Information System
WoNS	Weed of National Significance

1 INTRODUCTION

This report presents the findings of the annual monitoring of the biodiversity value and rehabilitation effort within the Dixon Sand operation at Old Northern Road Maroota and the biodiversity value of the offset vegetation at Haerses Road Maroota.

1.1 BACKGROUND

Dixon Sand Pty Ltd operates a sand extraction and processing operation across 58.4 hectares on Lot 29 DP752025, Lot 196 DP752025, Lot 1 DP547255 and Lot 2 DP547255 Old Northern Road Maroota. The quarry operates in compliance to Development Consent 250-09-01 issued by the Land and Environment Court in 2004.

Several modifications have been made to the Development Consent, the most recent being described as Modification 5. The previous modification, known as Mod 4, involved the clearing of native vegetation for continued sand extraction resulting in consent conditions requiring the management of biodiversity values and impacts. Thus a Biodiversity Offset Strategy for the Old Northern Road quarry site was established which includes a Native Vegetation Corridor (NVC) and the Haerses Road Biodiversity Offset Area (HRBOA).

1.2 OBJECTIVES

The objectives of this Annual Biodiversity and Rehabilitation Management Report is to describe the current condition of the NVC and the HRBOA and to advise Dixon Sand on the appropriate management measures required to be implemented in order to meet the expectations of the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018) prepared by Umwelt (Australia) Pty Ltd.

This report will:

- identify native flora and fauna species, populations and ecological communities known to or likely to occur within the NVC and HRBOA;
- describe the native vegetation and habitats within the NVC and HRBOA;
- describe the current condition of the threatened flora and its habitat found outside of the NVC at Old Northern Road;
- determine the legislative and conservation significance of species, populations and ecological communities known or likely to occur within the NVC and HRBOA with reference to the Commonwealth *EPBC Act 1999* and the *NSW BC Act 2016*;
- recommend appropriate biodiversity and environmental management measures that should be implemented to reach criteria for monitoring success set by the Old Northern Road Quarry Biodiversity and Rehabilitation Management Plan (2018);
- provide an independent monitoring report for inclusion as part of the external reporting for the quarry Annual Review.

2 METHODOLOGY

2.1 SITE HISTORY

2.1.1 Old Northern Road Native Vegetation Corridor

The NVC on the Old Northern Road quarry site is 6.83 hectares, approximately 100m wide and 650m in length in an east-west direction. Approximately half the area of the NVC has been, or is currently, disturbed for sand extraction and areas dedicated as silt ponds. Approximately 0.8 hectares is currently under active rehabilitation as will be discussed further in this report.

The remaining vegetation within the NVC is disturbed and modified. Livestock grazing, timber removal and fruit orchards in the immediate and adjacent lands have contributed to the ongoing disturbance over many years within this area. As a result, exotic weed species are prolific and at times dominate the landscape. Farm dams have been dug which once provided irrigation to the fruit orchards and watered livestock. They now provide a water source for native and exotic species which occur in the immediate area.

Unsealed tracks are found throughout the NVC which currently provide easy access for vehicles or pedestrians.

2.1.2 Haerses Road Biodiversity Offset Area

The HRBOA is relatively undisturbed native vegetation which covers an area of 8.7 hectares. Four vegetation communities have been identified within the offset which includes habitat for threatened species known to occur in the area. Old vehicle tracks occur within the site although over time, with very little use, the tracks are now suitable for pedestrian access only.

2.1.3 Threatened flora habitat

An area to the west of the Old Northern Road NVC contains threatened flora habitat which has previously been identified and monitored. This area has had very little disturbance due to its location and unsuitability for grazing, farming or logging. A haul road had previously been constructed adjacent to the site however this road is no longer in use and most likely had very minimal impact upon the threatened flora habitat.

2.2 FIELD SURVEY

Botanical surveys of the study area were conducted over several days spread throughout July and August 2020. Fixed quadrat surveys were set up with long edges running in a west-east direction. Quadrat locations in the HRBOA were each marked with a permanent steel post and a yellow cap in the centre location along the western edge of the quadrat. The Old Northern Road NVC quadrats were marked with flagging tape given that some vegetation within the NVC is still subject to disturbance by sand extraction.

Each quadrat was 20m x 50m which included a subplot of 20m x 20m and 5 line plots of 1m x 1m. A random meander was conducted through most other areas of native vegetation within the study area, to search for threatened flora species, and to record information on habitat condition.

All flora species recorded are listed in Appendix A, B and C of this report.

Vegetation communities were identified and described with reference to the vegetation maps developed by THSC, the NSW Vegetation Information System (VIS), the descriptions in Tozer et al

(2010), and with reference to vegetation descriptions included by the Scientific Committee final determinations to list threatened communities under the *BC Act 2016 and* the *EPBC Act 1999.*

An assessment of fauna habitat was conducted within each survey quadrat to identify suitability for potential threatened fauna species known to occur in the local area.

The habitat assessment included the suitability of landscape features, hollow-bearing trees, stags, fallen timber and logs, rocky outcrops and boulders, flowering Eucalypts, specific feed trees for Glossy Black Cockatoo's, Swift Parrot, Koalas, Grey-headed Flying Fox, site connectivity, vegetation structure and vegetation types.

Searches were also undertaken for indirect evidence of native fauna, including scratches, scats, nests, hollows in use, camps, roosts, den sites etc. Opportunistic sightings of all fauna species were recorded throughout the survey period.

The following fauna survey methods were performed to target threatened species known to occur or likely to occur in the local area:

- General searched with direct observation of any fauna species present within the study area, including diurnal and nocturnal call identifications;
- Early morning dedicated bird surveys;
- Unbaited motion detection infra-red digital camera left within the NVC for a total of 16 survey nights;
- Anabat recording device left within the NVC and HRBOA for a total of 14 survey nights.

A list of fauna species recorded across all sites is provided in appendix D and E.

Within each 50m x 20m quadrat the following information was recorded:

- centre of western edge GPS location
- aspect and slope of midline
- photograph of midline from western centre edge
- IBRA region
- vegetation class
- Plant Community Type (PCT)
- stem class including recruitment
- standing hollow count
- overall length of logs

The quadrats 20m x 20m recorded:

- every flora species identified
- abundance of each species recorded
- count of stratum richness
- percentage of High Threat Weed (HTW) cover

From within the five 1m x 1m plots the following information was recorded:

- litter cover
- native overstorey foliage cover
- native midstorey foliage cover
- native groundcover foliage cover
- cryptogam cover
- rock cover

- bare ground

Results collected from the 1m x 1m plots at each site is displayed as an average.

2.3 CRITERIA TO MONITOR SUCCESS OF REHABILITATION

The Key Performance Indicators (KPI) to measure success of the biodiversity and rehabilitation effort of the Old Northern Road NVC and the vegetation management within the HRBOA have been outlined by Umwelt (Australia) Pty Ltd 2018. The following tables depict the performance and completion criteria for both locations.

Table 1. Performance and completion criteria for Old Northern Road NVC (taken from Umwelt Pty Ltd 2018)

Rehabilitation Performance and Completion Criteria	
Native Vegetation	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities
	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites (i.e. evidence of fruiting of native species observed)
	More than 75 percent of trees are healthy and growing as indicated by long term monitoring
	More than 50 percent of translocated or propagated threatened flora species survive as indicated by long term monitoring
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum
Weeds and Pests	Regular inspections indicate a decline in weed diversity, density and abundance and a decline in signs of feral animal activity
	There is no significant weed infestation such that weeds do not comprise a significant proportion of species in any stratum
	There is no evidence of significant damage resulting from feral animal activity

Table 2. Performance and measurable indicators for HRBOA (taken from Cumberland Ecology 2016)

Performance and measurable indicators	
Native Vegetation	Maintenance of current level of native species diversity and abundance
	Maintenance of current level of canopy regeneration
	Measurable increase in habitat features
	Measurable decrease in impacts from feral fauna activity
Weeds	Measurable decline in weed density and distribution
	Measurable decline in weed diversity
	Limited recruitment of new weed species
Feral Animals	Observable reduction in decline of native fauna populations due to either predation by feral species, habitat degradation caused by feral fauna or competition with feral fauna
	Limited recruitment of new feral species
General	Measurable increase in the condition of vegetation

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Observable reduction in signs of erosion (if any)
Evidence of restrictions to site access
Observable decrease in bushfire risk

Furthermore, threatened flora species KPI for the translocated individuals and the flora species in-situ are to maintain or increase resident species population from the baseline levels which will be determined from this report.

Threatened fauna species previously identified at the Old Northern Road site and HRBOA are to be maintained or increase in population size based on a presence or absence survey each year following the baseline information within the Biodiversity Rehabilitation Management Plan (Umwelt Pty Ltd 2018).

2.4 SURVEY LIMITATIONS

The flora survey was conducted within a short timeframe during winter. Therefore some plant species may not have been identified due to the survey being performed when not in flower, or when dormant. It is noted that some flora species are seasonal, and may not have been visible at the time of the surveys. It is also worthy to note that the locality of each monitoring location is recovering from drought conditions which extended beyond 2 years. Recent rainfall has seen an increase in opportunistic species, such as annual weeds, while perennial species are still recovering slowly. A return to average rainfall conditions should see an increase in native abundance and diversity over time.

The survey limitations have been addressed through:

- consideration of flora and fauna species known to occur in the locality (including number of records from Bionet);
- consideration of habitat suitability present within the study areas and connectivity to other areas of habitat in the local landscape;
- consideration of current weather conditions;
- a conservative approach in assuming the presence of a species that could potentially be present in the study areas.

Where the study area contains potential habitat for threatened fauna species known to occur in the locality, and where survey areas support a likelihood of occurrence, it has been assumed on a conservative approach that such species may occur in the study area.

3 RESULTS

Results from the field surveys conducted over July and August 2020 have been separated into four distinct areas to enable quantification of condition for each specific location and its monitoring objectives.

3.1 OLD NORTHERN ROAD

The Old Northern Road NVC is currently in the mid stage of its rehabilitation strategy. Rehabilitation has begun within Lot 29 while extraction continues in Lot 1 and 2. Collection of propagation material from threatened flora species has taken place with numbers of successful clone individuals yet to reach the approved quota. Until this occurs, removal of the parent plant will be postponed.

Dedicated rehabilitation of native vegetation on Lot 29 begun in late 2017. An area of approximately 0.8 hectares was selected and prepared for three rehabilitation methods to use as a comparison for future reference. The larger area (approximately 0.4 hectares) has been planted out using local provenance stock and plants derived from material collected from threatened species onsite. In total 47 species have been planted within the rehabilitation area, including two threatened species. Artificial habitat structures such as rock, logs and plant debris have been placed around the rehabilitation site to provide habitat for small birds and reptiles.

Two adjacent areas, of approximately similar sizes, have undergone rehabilitation in conjunction with the planted rehabilitation. The area to the immediate south of the planted rehabilitation has undergone translocation of plant material, including root balls of several species together. This is a particularly successful conservation tool when used for threatened species which have little chance of survival in their current location. This approach has been used here to relocate *Darwinia fascicularis subsp*. *oligantha* along with flora species found within immediate and close proximity of each cluster of the threatened plants. Habitat features such as rocks, logs and plant debris have also been placed around the site to provide habitat for small birds, reptiles and to create microhabitats for dependant flora species.

The far western area of the NVC rehabilitation area has been spread with soil containing native seed bank and supplementary planting of threatened flora species. Habitat features have also been provided in this location.

Monitoring of vegetation condition has begun in other areas of the NVC, including areas which will be subjected to disturbance from sand extraction. The information gained from the pre-disturbance monitoring will provide Dixon Sand with quantitative data which can be used to rehabilitate the NVC back to, or close to, its pre-disturbance state.

Other areas of vegetation monitoring outside of the established rehabilitation corridor has also taken place to determine the effects of the sand extraction project on retained vegetation.

3.1.1 Rehabilitation area – Planted

The planted rehabilitation area is approximately 0.4 hectares in size and has been planted with 47 native species including 2 species listed on the *BC Act 2016* as being species of significance, *Melaleuca deanei* (vulnerable) and *Darwinia fascicularis subsp. Oligantha* (endangered population). In addition to the revegetation planting a number of species have emerged from seed bank storage from the sub-soil which was spread over the rehabilitation site before planting commenced. In total 43 native species which were not recorded as planted within the rehabilitation site were identified

during the survey period including the endangered species *Acacia byoneana*. This is an increase of 12 species since last year despite the dry weather conditions which had impacted on the area over a period of two years. There were 2 weed species identified, 1 of which is listed as a High Threat Weed.

There were 15 live specimens of *Melaleuca deanei,* 20 live specimens of *Darwinia fascicularis subsp. Oligantha* and 8 live specimens of *Acacia byoneana* located within the planted rehabilitation area. Although there is a slight reduction of live specimens located this year it could be that these individuals were unable to be located due to the density of regrowth which has occurred throughout the site over the past 12 month period.

Image 1. View of planted rehabilitation area from north-west corner looking east 2019

Image 2. Comparison view of planted rehabilitation area from north-west corner looking east 2020

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Image 3. View of planted rehabilitation area from south-east corner looking west 2019

Image 4. Comparison view of planted rehabilitation area from south-east corner looking west 2020

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Image 5. Planted *Melaleuca deanei* within the planted rehabilitation area 2020

Image 6. Planted *Darwinia fascicularis subsp. Oligantha* within the planted rehabilitation area 2020

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Image 7. *Acacia byoneana* within the planted rehabilitation area 2020

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3.1.2 Rehabilitation area – Translocated

The translocated rehabilitation area was not subjected to a flora survey as per the vegetation survey site locations suggested in the Biodiversity Rehabilitation Management Plan 2018. However a random meander through the area recording flora species was undertaken. Species identified and recorded can be found in Appendix B. Photo monitoring should, over time, be sufficient to determine the rehabilitation success of this area.

Overall coverage of vegetation from the translocation and continued recruitment from seed bank storage appears to be ample. Translocated *Darwinia fascicularis subsp. Oligantha* is numerous, particularly on the western side of the site. All age classes were observed from small seedlings to adult shrubs which were flowering well at the time of the survey period.

A single *Tetratheca glandulosa* which was translocated during the reporting period appears to have survived the relocation and is currently in a healthy state. Flowers were present during August suggesting flowering will continue to occur over the coming months.

Image 8. Translocated *Tetratheca glandulosa* flowering within the translocation area August 2020

One *Melalueca deanei* which was planted within this area in 2017 is still present and appears healthy.

There is currently no upper canopy within this area however *Eucalyptus sp,, Corymbia sp.* and *Angophora hispida* recruits were observed. Shrubs and ground cover plants are reasonably abundant throughout the area.

3.1.3 Rehabilitation area – Soil seed bank

The soil seed bank rehabilitation area was also not subjected to a flora survey as per the vegetation survey site locations suggested in the Biodiversity Rehabilitation Management Plan 2018. A random meander through the area recording flora species was undertaken and a count of living planted threatened species was recorded. Photo monitoring of the area will determine rehabilitation success.

Ample natural recruitment of native species is occurring across the site with recruitment of *Darwinia fascicularis subsp. Oligantha* evident. No canopy stratum is present although juvenile *Eucalyptus sp* were observed. *Acacia suaveolens* dominates the recovering shrub layer with *Grevillea buxifolia* and *Banksia ericifolia* also widespread. Ground cover species are present throughout.

There was 23 *Darwinia fascicularis subsp. oligantha* identified scattered throughout the site. One planted *Melaleuca deanei* was located. The density of the shrub regrowth is suspected of hampering the efforts to locate other individuals. All the surviving threatened species present appear to be healthy.

Image 9. View of translocated rehabilitation area from south-west looking east 2019

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Image 10. Comparison view of translocated rehabilitation area from south-west looking east 2020

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Image 11. View of translocation rehabilitation area from north-west looking east 2019

Image 12. Comparison view of translocation rehabilitation area from north-west looking east 2020

Image 13. Mature *Darwinia fascicularis subsp. oligantha* shrub with some flowers visible 2020

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Image 14. View of soil seed bank rehabilitation area from north looking south 2019

Image 15. Comparison view of soil seed bank rehabilitation area from north looking south 2020

Image 16. View of soil seed bank rehabilitation area from south looking north 2019

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Image 17. Comparison view of soil seed bank rehabilitation area from south looking north 2020

3.1.4 Vegetation monitoring within NVC

The Biodiversity Rehabilitation Management Plan 2018 indicates that nine vegetation monitoring sites should be established across the Old Northern Road site. Five of these sites occur within the NVC including the planted rehabilitation area discussed in 3.1.1 of this report.

From the remaining four sites only one could be safely accessed for monitoring. Two of the monitoring sites are currently disturbed for sand extraction while one of the other sites contain thickets of *Lantana camara* deeming the quadrat impenetrable for safe surveying.

The fifth site also contained thickets of *Lantana camara* however a section of native vegetation adjacent to the marked location was surveyed to provide some detail of biodiversity condition within the NVC.

The vegetation in the surveyed area is described in the Biodiversity Rehabilitation Management Plan 2018 as being *Eucalyptus punctata* woodland. The vegetation community in this location appears to be in a transition zone with influences from dry ridgetop woodland, heathland and gully forests emerging in one location. The species recorded within the survey site came to the determination that the VIS classification for this PCT best fit is *1328 - Yellow Bloodwood - Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion.* Information collected during the survey period has been summarised in Table 3 while a full list of flora recorded can be found in Appendix A.

The overall health of the vegetation and biodiversity in the location of the survey site was moderate. There has been historic disturbance in the area most likely from livestock grazing and timber removal. The continued dry conditions throughout 2018 and 2019 no doubt impacted upon the diversity of vegetation observed and identified during the survey period, in particular the forbs and ferns. Recent rainfall in the local area has assisted in the recovery of vegetation across all affected stratums with ground cover species showing good signs of recovery.

The remaining areas throughout the NVC appear to be severely impacted from the presence of *Lantana camara*. An effort to remove and control the species appears to have begun within the *Eucalyptus punctata* woodland however much more work is needed to manage the species across the entire site.

Table 3. Survey summary from NVC survey site location ONR quadrat 2.

1328 - Yellow Bloodwood - Narrow-leaved Apple heathy woodland on hinterland plateaux of the Central Coast, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0313182 Northing – 06296257 Midline - 89°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	15 – 20m	*Corymbia gummifera, Eucalyptus punctata, Eucalyptus haemastoma, Angophora bakeri, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Acacia linifolia, Grevillea buxifolia, Persoonia pinifolia, Phyllanthus hirtellus, Lambertia Formosa, Petrophile pulchella*		
Groundcover	0.1 – 0.5m	*Pratia purpurascens, Lomandra longifolia, Entolasia stricta, Themeda australis,*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		1	2
30-49cm	✓		2	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	70	
Shrubs		22	50	
Grasses etc		8	55	
Forbs		3	7	
Ferns		1	1	
Other		1	3	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	46 m			
Litter cover	60%			
Bare ground cover	0%			
Cryptogam cover	36%			
Rock cover	5%			
Overstorey foliage cover	50%			
Mid-storey foliage cover	56%			
Groundcover foliage cover	42%			

Image 18. Midline view of NVC survey quadrat 2 2020

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Image 19. Impenetrable thicket of *Lantana camara* which has been treated with herbicide and is awaiting removal by weed management contractors within NVC 2020

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3.1.5 Vegetation monitoring outside NVC

There were four monitoring sites identified outside of the NVC which were proposed to be surveyed. Two of these locations were unable to be accessed due to sand extraction currently taking place. Another of the locations was not able to be accessed due to impenetrable thickets of *Lantana camara*. Therefore only one location was surveyed to provide baseline data for ongoing assessment.

The vegetation was determined to be PCT *1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*. This survey location is outside of the NVC although within the 250m buffer area to Maroota Public School in the southeast corner of the site. This area has had historic disturbance most likely from timber harvesting. An abundance of *Eucalyptus piperita* are regenerating within this quadrat at around the same age class which suggests at some stage the area was once cleared. Despite this, the diversity within the survey site is reasonable and the biodiversity values are moderate. The area where this quadrat is located will not be subjected to clearing so will therefore provide an opportunity for monitoring the effects of sand extraction in nearby retained vegetation.

The remaining vegetation within the 250m buffer area appeared to have some impacts from the spread and growth of *Lantana camara* therefore a second survey quadrat within this area was not undertaken. Efforts have been made to reduce the impacts from the invasive species however the dead canes have been left in-situ rather than removed making access to the site difficult. It is recommended the dead *Lantana camara* canes are cut to ground level to enable access to the site for surveying and easier access for bush regenerators to treat emerging Lantana recruits. Dead canes can be left onsite as a mulch layer and to reduce surface water runoff in areas where natural rehabilitation is beginning to occur.

Table 4. Survey summary for area outside NVC Survey site location ONR quadrat 3

1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0313250 Northing – 06296390 Midline - 230°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Eucalyptus piperita, Eucalyptus punctata, Angophora costata, Allocasuarina littoralis, Ceratopetalum gummiferum*		
Shrubs	0.5 – 2m	*Leptospermum polygalifolium, Kunzea ambugia, Phyllanthus hirtellus, Lambertia formosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Lomandra filiformis, Pteridium esculentum, Lomandra longifolia, Cythochaeta diandra, Entolasia stricta, Microleana stipoides*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm				
30-49cm	✓		1	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	80	
Shrubs		13	45	
Grasses etc		10	50	
Forbs		8	7	
Ferns		1	2	
Other		3	4	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	13.1m			
Litter cover	80%			
Bare ground cover	0%			
Cryptogam cover	40%			
Rock cover	5%			
Overstorey foliage cover	75%			
Mid-storey foliage cover	50%			
Groundcover foliage cover	40%			

Image 20. Midline view of ONR quadrat 3 2020

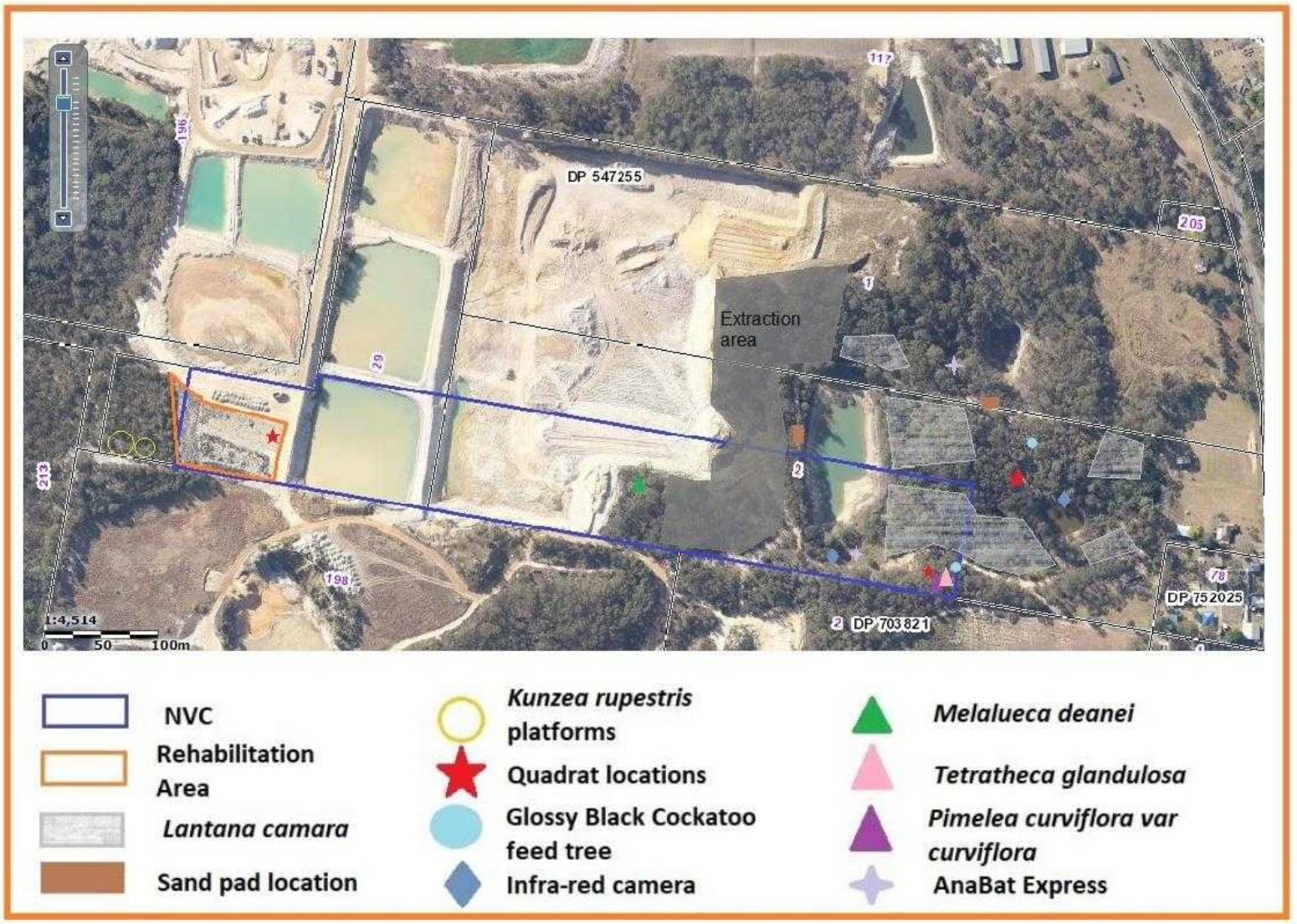

Image 21. ONR survey site locations 2020

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3.2 HAERSES ROAD BIODIVERSITY OFFSET AREA

The HRBOA has a total of five monitoring sites specifically to provide benchmark values for the vegetation communities found within the site. Baseline data collected and discussed within this report will enable a measurable value of success for management actions which may be implemented over the life of the offset.

It is expected over time there will be an increase in biodiversity, habitat features, ongoing evidence of natural recruitment and a decrease in exotic fauna and flora presence.

Each of the survey locations has been permanently marked with a steel post and yellow cap indicating the plot identification number.

Cumberland Ecology (2016) had previously identified four vegetation communities onsite as Sydney sandstone Ridgetop Woodland, Sydney Hinterland Transition Woodland, Sydney Sandstone Gully Forest and Sydney Sandstone Heath (Heath/Woodland Complex). Each survey location surveyed was given a best fit PCT based on the classification of the VIS which was determined by the native species most abundant throughout the quadrat. Therefore the following PCT's were identified:

- Plot 1 - *1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*
- Plot 2 – *1641 – Dwarf Apple – Scribbly Gum heathy low woodland on sandstone ranged of the Central Coast*
- Plot 3 - *1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*
- Plot 4 – *1627 – Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast*
- Plot 5 – *1643 – Red Bloodwood – Smooth-barked Apple – Scribbly Gum – Old Man Banksia heathy woodland on sandstone ranges of the Central Coast*

These PCT's are in line with the broader definition given in the Cumberland Ecology Biodiversity Management Plan 2016, although the location of the Sydney Hinterland Transition Forest was not surveyed.

Plot 2 had an abundance of the threatened flora species *Darwinia biflora* present. This shrub was noted to be very well represented throughout the entire area of the PCT 1641.

Overall there was an increase to foliage cover and structure cover in most stratums at most survey sites. There was evidence of some loss of individuals within quadrats due to the effects of drought conditions. Grass and ground cover species appear to have improved in density following recent rainfall. Extensive Long-nosed Bandicoot digs were noted in an area close to Quadrat 1 and within Quadrat 4. A single Red Crowned Toadlet *Pseudophryne australis* was heard calling within the drainage line of Quadrat 3. No physical search for the individual was undertaken as disturbance to the habitat would have been deemed unnecessary. Bird presence and density has increased from last survey period, likely due to the favourable weather conditions.

The following tables (6 – 10) are a summary of the survey results at each of the plot locations across HRBOA.

Table 5. Survey summary for survey site location HRBOA quadrat 1

1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0312740 Northing – 06293489 Midline - 130°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Angophora costata, Corymbia gummifera, Allocasuarina littoralis, Ceratopetalum gummiferum, Banksia Serrata*		
Shrubs	0.5 – 2m	*Leptospermum trinervium, Persoonia pinifolia, Lambertia Formosa, Bossiaea scolpendria, Grevillea speciosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Caustis flexosa, Pteridium esculentum, Lomandra glauca, Cassytha glabella, Smilax glyciphylla, Xanthorrhoea media*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		1	1
30-49cm	✓		1	
20-29cm	✓	✓		
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	60	
Shrubs		19	60	
Grasses etc		7	10	
Forbs		4	5	
Ferns		1	15	
Other		3	5	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	26.5m			
Litter cover	80%			
Bare ground cover	0%			
Cryptogam cover	2%			
Rock cover	30%			
Overstorey foliage cover	70%			
Mid-storey foliage cover	40%			
Groundcover foliage cover	20%			

Image 22. Midline view of HRBOA quadrat 1 2020

Table 6. Survey summary for survey site location HRBOA quadrat 2

1641 – Dwarf Apple – Scribbly Gum heathy low woodland on sandstone ranged of the Central Coast				
AGD Zone 56 Easting – 0312750 Northing – 06293649 Midline - 100°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	2 – 10m	*Angophora hispida, Eucalyptus haemastoma*		
Shrubs	0.5 – 2m	*Banksia ericifolia, Hakea sericea, Leptospermum trinervium, Hakea dactyloides, Lambertia Formosa, Bossiaea scolpendria, Grevillea speciosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Caustis pentandra, Actinotus minor, Xanthoria tridentata, Asplenium trichomanes, Lepidosperma laterale, Cassytha glabella, Entolasia stricta*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		1	
30-49cm		✓		
20-29cm	✓			
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		

Composition & Structure	**Composition Count**	**Structure cover %**
Trees	2	20
Shrubs	24	100
Grasses etc	7	70
Forbs	1	5
Ferns	2	2
Other	3	4
High Threat Weeds	0	0

Ecosystem Functions	
Length of habitat logs	9.3m
Litter cover	40%
Bare ground cover	0%
Cryptogam cover	10%
Rock cover	5%
Overstorey foliage cover	15%
Mid-storey foliage cover	50%
Groundcover foliage cover	50%

Image 23. Midline view of HRBOA quadrat 2 2020

Image 24. Flowering *Darwinia biflora* located within HRBOA quadrat 2

Table 7. Survey Summary of survey location HRBOA quadrat 3

1181 – Smooth-barked Apple – Red Bloodwood – Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion				
AGD Zone 56 Easting – 0312877 Northing – 06293628 Midline - 110°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Corymbia gummifera, Eucalyptus piperita, Eucalyptus punctata, Banksia serrata, Ceratopetalum gummiferum, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Leptospermum trinervium, Dodonea viscosa, Persoonia pinifolia, Bossiaea lenticularis, Grevillea speciosa, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Dianella caerulea, Pteridium esculentum, Lindsaea microphylla, Lomandra filliformis, Lomandra multiflora, Cassytha glabella, Entolasia stricta, Caustis flexosa*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm	✓		3	
30-49cm	✓		1	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		6	90	
Shrubs		17	45	
Grasses etc		8	10	
Forbs		7	2	
Ferns		3	6	
Other		3	3	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	10.1m			
Litter cover	55%			
Bare ground cover	5%			
Cryptogam cover	18%			
Rock cover	22%			
Overstorey foliage cover	20%			
Mid-storey foliage cover	10%			
Groundcover foliage cover	10%			

Figure 25. View of midline HRBOA quadrat 3 2020

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Table 8. Survey Summary of survey location HRBOA quadrat 4

1627 – Smooth-barked Apple – Turpentine – Sydney Peppermint heathy woodland on sandstone ranges of the Central Coast				
AGD Zone 56 Easting – 0312847 Northing – 06293808 Midline - 100°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Corymbia gummifera, Eucalyptus resinifera, Angophora costata, Callicoma serratifolia, Ceratopetalum gummiferum, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Leptospermum trinervium, Telopea speciossima, Persoonia pinifolia, Bossiaea lenticularis, Lambertia formosa, Boronia floribunda*		
Groundcover	0.1 – 0.5m	*Dianella caerulea, Pteridium esculentum, Gahnia sieberiana, Lomandra filliformis, Lomandra longifolia, Smilax glyciphylla, Entolasia stricta, Caustis flexosa*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+	2		2	1
50-79cm	✓		2	3
30-49cm	✓		2	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		

Composition & Structure	**Composition Count**	**Structure cover %**
Trees	7	80
Shrubs	18	70
Grasses etc	13	24
Forbs	5	3
Ferns	3	12
Other	3	2.5
High Threat Weeds	0	0

Ecosystem Functions	
Length of habitat logs	45.3m
Litter cover	45%
Bare ground cover	5%
Cryptogam cover	40%
Rock cover	5%
Overstorey foliage cover	25%
Mid-storey foliage cover	60%
Groundcover foliage cover	20%

Image 26. View of midline HRBOA quadrat 4 2020

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Table 9. Survey Summary of survey location HRBOA quadrat 5

1643 – Red Bloodwood – Smooth-barked Apple – Scribbly Gum – Old Man Banksia heathy woodland on sandstone ranges of the Central Coast				
AGD Zone 56 Easting – 0312938 Northing – 06293983 Midline - 130°				
Vegetation Layer	**Height Range**	**Vegetation Layer**		
Trees	20 – 30m	*Eucalyptus punctata, Eucalyptus haemastoma, Angophora hispida, Banksia serrata, Allocasuarina littoralis*		
Shrubs	0.5 – 2m	*Lambertia formosa, Persoonia pinifolia, Bossiaea scolopendra, Grevillea buxifolia, Banksia ericifolia, Boronia floribunda, Epacris pulchella*		
Groundcover	0.1 – 0.5m	*Actinotus minor, Xanthosia pilosa, Lomandra longifolia, Entolasia stricta, Xanthorrhoea resinosa*		
Stem Class			**Hollows**	
Dbh	**Eucalyptus**	**Non-Eucalypt**	<20cm	>20cm
80cm+				
50-79cm				
30-49cm	✓		3	
20-29cm	✓			
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Composition & Structure		**Composition Count**	**Structure cover %**	
Trees		5	20	
Shrubs		24	70	
Grasses etc		11	20	
Forbs		4	5	
Ferns		1	5	
Other		3	1	
High Threat Weeds		0	0	
Ecosystem Functions				
Length of habitat logs	18.9m			
Litter cover	59%			
Bare ground cover	1%			
Cryptogam cover	20%			
Rock cover	30%			
Overstorey foliage cover	15%			
Mid-storey foliage cover	30%			
Groundcover foliage cover	15%			

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Image 27. View of midline HRBOA quadrat 5 2020

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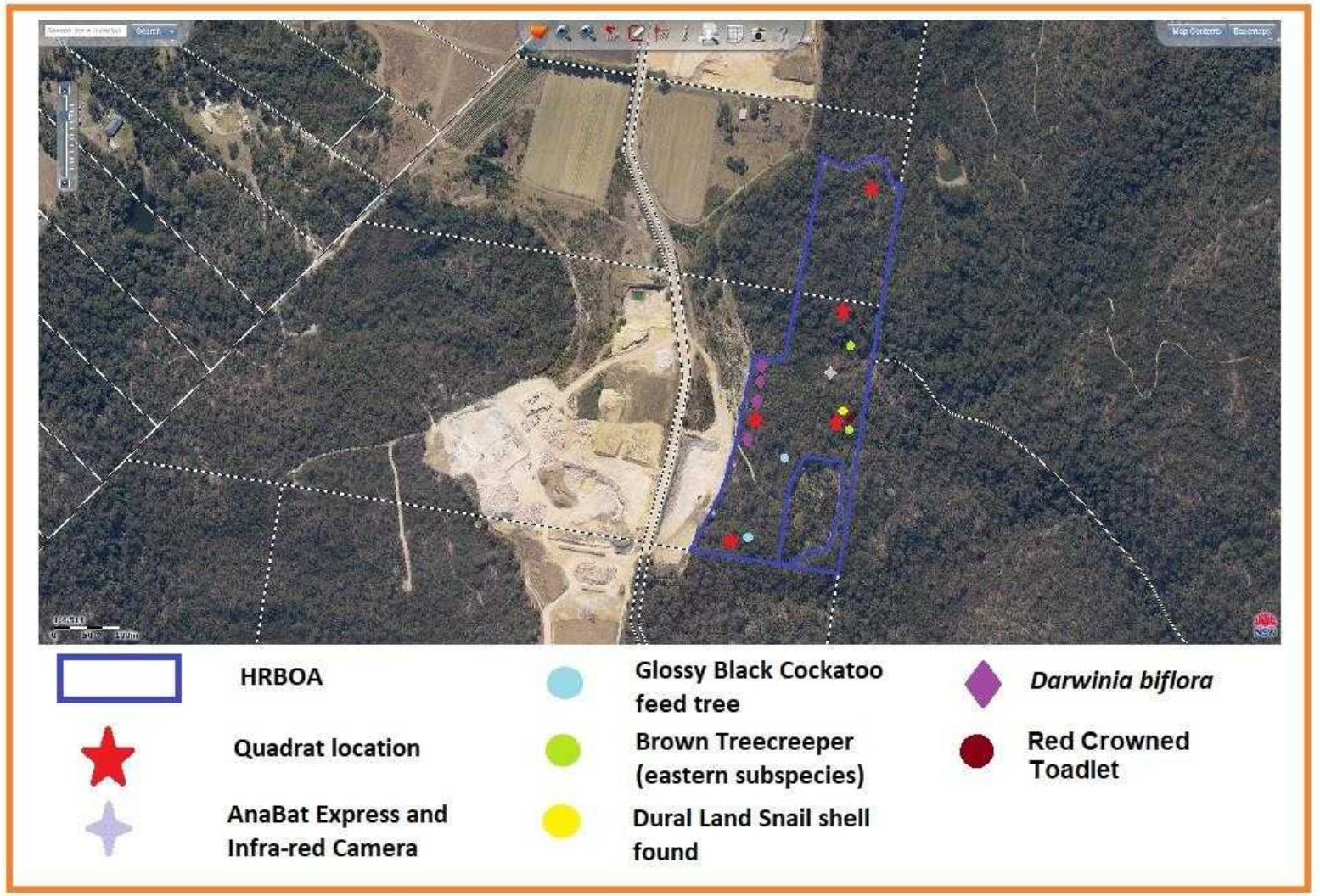

Image 28. HRBOA site location

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3.3 Threatened Flora Monitoring

The threatened flora monitoring details the current condition of the four threatened flora species and their immediate habitat which has been previously recorded onsite. The far western area of Lot 29 contains a significant rock platform which supports *Kunzea rupestris* and *Darwinia fascicularis subsp oligantha*. Lot 2 contains *Melaleuca deanei* and *Tetratheca glandulosa*. During flora surveying in July 2020 several *Pimelea curviflora var curviflora* were also identified.

The overall health of the *Kunzea rupestris* population is reasonable considering the two years of dry weather conditions. Some dieback and plant loss was observed however the remaining plants appear to be in good health. Some recruitment was evident, particularly on the western rock platform where vacant soil is available. Flower buds were observed during the survey period, however flowering had not yet occurred. Mosses and lichens were present in each patch on both platforms.

The eastern rock platform has been divided into four individual patches. Patch one had previously identified twenty six individual plants. During the August 2020 survey period twenty two individuals were counted. The dry conditions over 2018 and 2019, and in particular the extreme heat days which were experienced during the summer months throughout that time, is the expected cause for loss of plant density. Some remaining plants still have dead limbs attached although many appear to have new shoots sprouting below the dead wood. The remaining patch is in relatively good health given the extreme dry weather conditions. *Darwinia fascicularis subsp oligantha* is also present within this patch.

Patch two is much smaller with only three plants present. All three have dead limbs from dry weather dieback although new growth is occurring across the live branches. Within patch three the two persistent plants have also showed signs of dry weather dieback although appear to be recovering with new growth present. In patch four the five *Kunzea rupestris* appear to have survived despite showing some signs of minor dieback.

The western rock platform has been divided into five individual patches which are much more widely distributed than the patches on the eastern rock platform. Within this section the *Kunzea rupestris* grows within a vegetation community with far more flora diversity than what is present on the eastern rock platform. Some of the shrubs are therefore much larger as soil depth and protection from external influences (such as wind and radiant heat) is more readily available.

Patch one has six plants present. *Calytrix tetragona* and *Darwinia fascicularis subsp oligantha* were also present within this patch. A standing dead *Banksia ericifolia* remains within the patch. Patch two is a long patch which runs down the length of the rock platform. There appears to have been very little change to this patch from last year. New recruits have appeared particularly on the edge of the soil profile. In total twenty-eight individual plants were identified within this patch. All plants in this location are low growing and showed little or no evidence of dieback. Additional species identified within this patch included *Calytrix tetragona*, *Acacia hispidula*, *Grevillea buxifolia, Caustis flexuosa* and *Darwinia fascicularis subsp oligantha.*

Patch three does not contain any *Kunzea rupestris* plants. The patch is considered for monitoring over time with the hope that new recruits will eventually appear. A single *Leucopogon parviflorus* is currently the only species within this patch.

Patch four currently has twenty four *Kunzea rupestris* plants with several of those being juvenile recruits. There was no evidence of dieback on any of the plants identified in this patch. Other flora

species identified within the patch were *Calytrix tetragona*, *Grevillea buxifolia, Caustis flexuosa*, *Darwinia fascicularis subsp oligantha, Banksia ericifolia, Isopogon anethifolius, Bossiaea scolopendria* and *Petrophile pulchella.*

Patch five had twenty *Kunzea rupestris* growing within a diverse mix of shrub species. Several of the counted individuals appear to be new recruits close to the old haul track. No plants appear to have evidence of dieback although some *Banksia ericifolia, Isopogon anethifolius* and *Calytrix tetragona* were demonstrating some dieback and loss. Other species within this patch include *Acacia ulicifolia, Corymbia eximia, Dianella revolute, Grevillea buxifolia, Grevillea speciosa, Leucopogon parviflorus, Angophora hispidula, Caustis flexuosa*, *Persoonia levis*, *Isopogon anethifolius* and *Petrophile pulchella.*

Other threatened species located onsite were observed and inspected for current health and condition. The previously recorded *Melaleuca deanei* is still currently undisturbed within the Banksia heath plant community. Propagation material was removed during Autumn 2020 in an attempt to produce further successful clones from the parent plant. The plant appears to have not suffered any ill effects from previous multiple small branch removal during propagation. No flowers were observed during the 2019-2020 period. In total there were 31 stems in 18 clumps covering an area of 25m². The highest shrubs were approximately 2.5m tall.

Darwinia fascicularis subsp oligantha was observed as being plentiful in the location of the *Kunzea rupestris* population and surrounding area. Plants were flowering well and new recruits were evident throughout the area. They were also very well represented throughout the rehabilitation areas. The *Tetratheca glandulosa* plant previously observed onsite by Umwelt could not be located. It is likely this plant has died from the dry weather conditions or has fallen victim to predation from herbivore grazers. However there were *Tetratheca glandulosa* identified within Quadrat 2 during the August 2020 flora survey period. In addition to this an abundance of flowering *Pimelea curviflora var curviflora* was also identified within the same quadrat site. These species within this location will continue to be monitored each year they remain present onsite.

Image 29. *Kunzea rupestris* monitoring eastern rock platform photo location 1 2020

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Image 30. *Kunzea rupestris* monitoring eastern rock platform photo location 2 2020

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Image 31. 2020 eastern rock platform patch number 1-3, top 1 - bottom 3

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Image 32. *Kunzea rupestris* monitoring western rock platform photo location 1 2020

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Image 33. *Kunzea rupestris* monitoring western rock platform photo location 2 2020

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Image 34. *Kunzea rupestris* monitoring western rock platform photo location 3 2020

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Image 35. 2020 western rock platform patch number 1-5, top left 1 top right 2 middle left 3 middle right 4 bottom 5

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Image 36. *Kunzea rupestris* flower buds forming on eastern rock platform August 2020

Image 37. *Darwinia fascicularis subsp. oligantha* in flower on western rock platform August 2020

Image 38. *Tetratheca glandulosa* within Quadrat 2 2020

Image 39. *Pimelea curviflora var curviflora* within Quadrat 2 2020

3.4 Threatened Fauna Monitoring

Threatened fauna previously located within the Old Northern Road site included four species of microchiropteran bat and a Glossy Black Cockatoo.

A search was undertaken for Glossy Black Cockatoo feed trees throughout the site. Feed tree location was confirmed within transect 3 of the NVR and within the 250m buffer from Maroota

Public School. Five individual birds were observed feeding in trees within Lot 2 during the survey period in August 2020. The sex and age of the birds were undetermined.

An AnaBat Express sound recorder was left in place over 7 survey nights. The results were sent to Dr Anna McConville from Echo Ecology and Surveying for analysis. Three of the previously recorded threatened bat species were recorded within the survey area during this survey period, *Chalinolobus dwyeri* Large-eared Pied Bat, *Miniopterus australis* Little Bent-winged Bat and *Mormopterus norfolkensis* Eastern Free-tailed Bat. In addition to this the Greater Broad-nosed Bat *Scoteanax rueppellii*, Eastern False Pipistrelle *Falsistrellus tasmaniensis*, Southern Myotis *Myotis Macropus* and Eastern Cave Bat *Vespadelus troughtoni* potentially occurred within the site however the recorded calls could not be confidently identified. Live trapping was not conducted to reduce unnecessarily stress on fauna. The extreme hot and dry weather conditions over the summer period following nearby intense and widespread bushfires when this survey was undertaken may have influenced the foraging movement of these nomadic species. Continued summer surveying for bat species will provide tangible conclusions for which species are expected to occur annually within the site.

No other threatened fauna were observed within or immediately surrounding the Old Northern Road site during the survey period. The resident pair of Wedged-tailed Eagles were observed flying over the site again this year.

The HRBOA previously had two threatened fauna species recorded on the property, although outside of the offset area. A historic Bionet record of a Koala and Glossy Black Cockatoo sighting to the north of the property towards Hitchcock Road was not investigated any further for the purpose of this report. Koala sightings in the area, particularly around Glenorie, have increased since the Wollemi/Yengo mega-bushfire over the spring/summer of 2019. A search for Koala scat under *Eucalyptus punctata* within all survey quadrats at the HRBOA was undertaken. No scats were found.

Glossy Black Cockatoo feed trees were observed within quadrat 1 and a pair of individuals were observed feeding in Allocasuarina trees adjacent to the rehabilitation area. It is likely more feed trees will be observed within the site over time as more surveying is undertaken. Several Brown Treecreepers were observed foraging again during the 2020 survey period within the site at various locations indicating these are permanent residents within the site. A Red Crowned Toadlet was heard calling within the drainage line of Quadrat 3 during the field survey in August 2020. This species has not been recorded on site previously however an increase to population could occur with the return to average rainfall patterns. The Dural Land Snail was again confirmed within Quadrat 3 during the August 2020 survey period. A survey for microchiropteran bat species using an AnaBat Express sound recorder was undertaken during February 2020. The Large-eared Pied Bat and the Little Bent-winged Bat were identified by Dr Anna McConville over 7 nights of survey effort. The survey fauna results can be seen in Appendix D and E.

3.5 Exotic Species

Exotic flora species were identified within the NVC and 250m buffer area at the Old Northern Road site. Three species considered as High Threat Weeds (HTW) under the *Biosecurity Act 2015* occur on the property, Whiskey Grass *Andropogon virginicus,* Fireweed *Senecio madagascariensis* and the most widespread on the property Lantana *Lantana camara.* Two of those weed species, Fireweed and Lantana, are also listed as Weeds of National Significance (WoNS) as determined by the Commonwealth Government. A weed management program is currently in place and will continue throughout the life of the rehabilitation plan. There were no weeds identified within the HRBOA

however annual sweeps of the property are recommended to ensure any outbreaks are managed and controlled before species become established.

A weed distribution map has been developed which will be updated yearly to allow for annual comparison. The weed management contractor should aim to reduce the size of these areas on an annual basis with the ultimate goal of eradication, particularly of WoNS and HTW.

Exotic fauna species were identified within the NVC at the Old Northern Road site. Infra-red cameras were left in place for 14 survey nights and 2 sand plots were established and checked every second morning for 7 days.

The sand plots had evidence of several species using the trails. For the purpose of the exotic fauna monitoring three species were identified: European Red Fox, Cat and Dog. The full results can be seen in Appendix D. Sand plot monitoring was not undertaken at HRBOA however tracks were regularly checked for fauna prints. One fox print was identified on a track between quadrat 1 and 2.

European Rabbit scats were observed in several locations within the NVC in low to moderate density. It could then be assumed that carnivore scats also observed onsite were most likely from the European Red Fox. As no Rabbits were observed feeding during the day, scats were not in high density and warrens were not observed the population can be considered to be low to moderate and likely to be kept under control by biological means such as predation from foxes, dogs, cats and birds of prey such as the Wedge-tailed Eagle observed flying nearby. Should the number of rabbits become problematic then it may be necessary to engage in a control program to reduce or eliminate the population.

The Noisy Minor, *Manorina melanocephala*, was also observed within the NVC and 250m buffer area at the Old Northern Road Site. Although this bird is a native species to eastern Australia it is worth mentioning here as the species is considered a pest in high density and a Key Threatening Process to many threatened species of small bird including the Brown Treecreeper, which was identified at HRBOA. The population of Noisy Minor appeared to be small and a variety of small birds were observed on site during the survey period. The population should be monitored over time to ensure the species does not become dominant and eliminate other bird species from the vegetation.

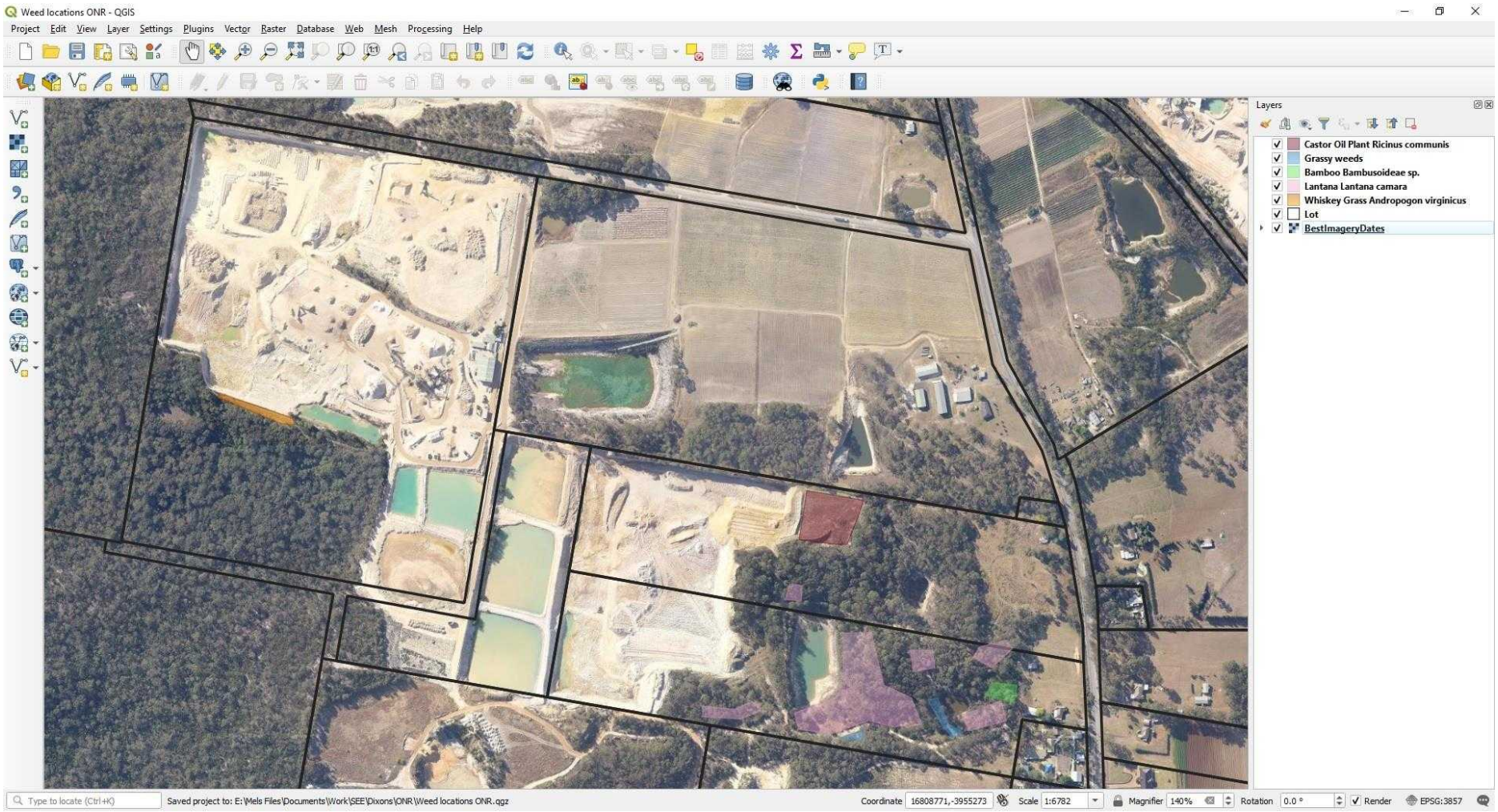

Figure 40. Annual weed distribution map ONR 2020

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3.6 Assessment Against Criteria

The results of the field survey were assessed against the criteria for successful rehabilitation (Table 10).

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Table 10. Assessment against criteria to monitor success of rehabilitation

Category	Performance Criteria	Target Achieved	Comments
Native Vegetation	More than 75% of trees are healthy and growing as indicated by long term monitoring	YES	More than 75% of the native vegetation within the active rehabilitation area is healthy and is growing as expected for long term survival. All shrub and ground cover species have reached maturity with flowering and seed production observed. Some species have begun self-propagation within rehabilitation sites. *Eucalyptus, Angophora* and *Corymbia* species have not yet reached maturity.
	More than 50% of translocated or propagated threatened flora species survive as indicated by long term monitoring	YES	More than 50% of translocated and planted propagated threatened flora species has survived despite the dry conditions of the previous reporting period which led into this current reporting period. To date at least 45 propagated *Darwinia fascicularis subsp. Oligantha* and 21 propagated *Melaleuca deanei* have survived transplanting in the rehabilitation area. A complete count of translocated *Darwinia fascicularis subsp. Oligantha* was not undertaken at the time of relocation however it appears that any losses that may have occurred were minimal and new recruits are now visible throughout much of the area.
Vegetation Structure	Revegetation areas contain flora species assemblages characteristic of the desired native vegetation communities	N/A	At this stage it is too early in the rehabilitation process to determine if the desired vegetation community is being established. Species planted have been specifically chosen to recreate a Banksia Heath community.
Ecosystem Function	Second generation tree seedlings are present or likely to be, based on monitoring comparable older rehabilitation sides (evidence of fruiting of native species observed)	N/A	It is too early in the rehabilitation process for second generation tree seedlings. Fruiting of tree species is not expected for 5 years following the original planting (i.e. 2022).
	Habitat values retained or beginning to develop and improve over time (leaf litter, fallen timber etc)	N/A	Habitat values have been added to the rehabilitation site in the form of logs and vegetation debris. The site is not yet at the age where it will begin to form its own habitat value. This is expected

			to begin between 5-10 years following the original planting. That being said, leaf litter is beginning to form.
Weeds and Pests	Regular inspections indicate a decline weed diversity, density and abundance and a decline in signs of feral animal activity	YES	There were very few weed species within the rehabilitation area. There are no signs of feral animal activity.
	There is no significant weed infestation such that weeds do not comprise a significant proportion of the species in the stratum	YES	There is no significant weed infestation within the rehabilitation area. Significant weed infestations are located within the NVC outside of the rehabilitation area. These areas are being actively addressed by weed management contractors.
	There is no evidence of significant damage resulting from feral animal activity	YES	There is no evidence of significant damage caused from feral animal activity within the rehabilitation area.

4 DISCUSSION AND RECOMMENDATIONS

This is the third Annual Biodiversity and Rehabilitation Management Report produced for Dixon Sand Modification 5. Rehabilitation work is in the early stages and will increase with both intensity and measurable criteria in the years that follow.

This report provides information which will allow for measurable and quantifiable data to be compared over time as the rehabilitation and monitoring continues.

The return of near normal rainfall over autumn and winter of this reporting period has provided ideal growing conditions for the rehabilitation areas of the NVC. Flora within all stratums have increased in size, maturity and density during the past six month period. New juvenile recruits are evident from shrub and ground cover species while an increase in species diversity was also recorded. Canopy species are growing well and are expected to reach maturity within the next reporting period.

The remaining vegetation areas within the ONR site are still recovering from the drought conditions. Some loss to flora is still evident although there does not appear to be a loss of specific species, rather a loss to individuals who were in compromised habitat positions making them more vulnerable to prolonged intense heat or dehydration. These losses do not appear to have had a major impact upon vegetation structure as new juvenile recruitment is evident throughout native vegetation areas. However, areas which have sustained loss should be monitored over the next reporting period to ensure weed species are not able to invade and become established.

Vegetation within the HRBOA has proved to be reasonably resilient to the previous hot and dry conditions with very little vegetation changes observed throughout the site. A single Red Crowned Toadlet was heard calling within a natural drainage line. The call was heard coming from a thicket of Sheath Rush *Cyathochaeta diandra*. This is the first record of this species onsite since monitoring began. It is highly likely the species occurred offsite and further down the drainage line during drought conditions and has moved up the drainage line since the return of rainfall. Bird species were particularly abundant during the August 2020 survey period, a welcome increase also attributed to the change in rainfall and overall weather conditions.

Threatened species located within the NVC have persisted despite the drought conditions of 2017-2019. The *Kunzea rupestris* was adversely impacted by the drought, particularly from radiant heat reflection from the surrounding sandstone. Although the species is well suited to enduring dry seasons and limited water resources some losses did occur to individuals within the population. New juvenile recruitment is already evident thanks to recent rainfall with further recruitment likely over the next reporting period. A small population of *Pimelea curviflora var curviflora* was identified within the NVC during the August 2020 survey period. This species had not been previously recorded onsite and is likely to have sprouted as a response to the recent rainfall. All other threatened species previously recorded onsite were located and appear healthy.

Weed species, particularly *Lantana camara*, within the NVC and 250m school buffer area of the Old Northern Road site should remain a priority management species for removal and control over the next twelve month period. Management of the species has commenced by the bush regeneration contractors however removal of the dead canes should take place to allow native species rehabilitation in these areas. Without management this species is likely to spread over a larger area in turn supporting habitat for exotic fauna species such as the European Rabbit and the European Red Fox. Suitable techniques for removal have been provided in appendix F.

Rehabilitation efforts have continued in earnest with native plant relocation, propagation and planting taking place over the preceding three years. Continued propagation of threatened species will persist and supplementary planting within the rehabilitation area will continue.

It is not expected any new rehabilitation areas will commence over the next twelve month period within the NVC however native rehabilitation work will continue along the western embankment at the front entrance to the quarry site.

5 LIMITATIONS AND ASSUMPTIONS

This study was limited by the timing and frequency of the survey. There may be flora and/or fauna species present at the site that were not recorded due to their seasonal, territorial or cryptic nature.

It can never be proven that threatened species have not, do not or will not use the site as habitat. The conclusions drawn in this report are a result of testing, observation and experience.

This report describes the habitat and vegetation of the site at the time of the field survey. Vegetation and habitat will change over time and therefore the findings of this report are only relevant for the current proposal and for the duration of the application.

6 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR AND FIELD ECOLOGIST

The Author and Field Ecologist, Melissa Mass, has formal qualifications including a Bachelor of Applied Science (B. App. Sc.), majoring in Ecology, and a Certificate 3 in Horticulture. Her current Scientific Licence number issued from the NSW OEH is SL101441 with expiry date 31st Oct 2020. Furthermore an Animal Research Authority issued by the NSW Animal Care and Ethics Committee is current to undertake general survey work in THSC local government area with expiry 23rd Mar 2021. Melissa is an accredited Biodiversity Assessor conforming to the requirements as imposed by OEH with Accreditation number being BAAS18053.

Melissa has been working as an Ecologist for 12 years. Her work has included targeted threatened species assessment and management, reviews of environmental factors, bush regeneration, environmental impact assessments, and environmental survey and monitoring.

Melissa has a strong focus on threatened species ecology and has actively contributed to the Long-nosed Potoroo National Recovery Plan.

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8 APPENDIX

APPENDIX A – FLORA SPECIES IDENTIFIED WITHIN THE ONR STUDY AREA

Status	Botanical Name	Common Name	Plot 1	Plot 2
	Acacia linifolia	White Wattle	*	
	Acacia parrattensis	Parramatta Wattle	*	
	Acacia suaveolens	Sweet Wattle	*	*
	Acacia ulicifolia	Prickly Moses	*	
	Actinotus minor	Lesser Flannel Flower		*
	Allocasuarina littoralis	Black She-oak	*	*
	Angophora bakeri	Narrow-leaved Apple	*	
	Angophora costata	Smooth Barked Apple		*
	Aristida vagans	Threeawn Speargrass	*	*
	Aristida warburgii	Fine Leaf Wire Grass	*	*
	Austrostipa pubescens	Spear Grass	*	*
	Banksia spinulosa	Hairpin Banksia	*	
	Billardiera scandens	Hairy Apple Berry	*	*
	Bossiaea obcordata	Spiny Bossiaea	*	*
	Cassytha glabella	Slender Devils Twine		*
	Ceratopetalum gummiferum	NSW Christmas Bush		*
	Corymbia gummifera	Red Bloodwood	*	*
	Desmodium varians	Slender Tick Tre-foil	*	
	Dianella caerulea var. product	Blue Flax Lily	*	*
	Dodena viscosa	Sticky Hop Bush	*	
	Entolasia marginata	Bordered Panic	*	
	Entolasia stricta	Wiry Panic	*	*
	Epacris pulchella	Wallum Heath		*
	Eragrostis brownii	Brown's Lovegrass	*	*
	Eucalyptus haemastoma	Scribbly Gum	*	
	Eucalyptus piperita	Sydney Peppermint		*
	Eucalyptus punctata	Grey Gum	*	*
	Gonocarpus teucrioides	Raspwort	*	
	Goodenia rotundifolia	Star Goodenia		*
	Grevillea buxifolia	Grey Spider Flower	*	*
	Grevillea mucronulata	Green Spider Flower		*
	Grevillea speciosa	Red Spider Flower	*	
	Hakea dactyloides	Broad Leaved Hakea	*	
	Hakea sericea	Needlebush	*	*
	Hardenbergia violacea	False Sarsaparilla	*	*
	Hovea linearis	Common Hovea	*	*
	Imperata cylindrica	Blady Grass	*	*
	Jacksonia scoparia	Dogwood	*	
	Kunzea ambigua	Tickbush		*
	Lambertia formosa	Mountain Devil	*	

	Leptospermum polygalifolium	Tantoon		*
	Lindsaea microphylla	Lacy Wedge Fern		*
	Lomandra filiformis	Wattle Mat-rush	*	*
	Lomandra longifolia	Spiny-headed Mat-rush	*	*
	Lomandra multiflora	Many Flowered Mat-rush	*	*
	Lomandra obliqua	Fish Bones	*	*
	Lomatia silaifolia	Crinkle Bush	*	
	Ozothamnus diosmifolius	Rice Flower	*	*
	Persoonia levis	Broad Leaved Geebung	*	*
	Persoonia pinifolia	Pine-leaved Geebung	*	
	Petrophile pulchella	Conesticks	*	*
	Phyllanthus hirtellus	Thyme Spurge	*	*
V	*Pimelea curviflora var. Curviflora*	Pimelea curviflora var. curviflora	*	
	Pimelea linifolia	Slender Rice Flower	*	
	Platysace linearifolia	Carrot Tops		*
	Pomax umbellata	Pomax	*	
	Pratia purpurascens	Whiteroot	*	
	Pteridium esculentum	Bracken Fern	*	*
	Pultenaea flexilis	Graceful Bush Pea	*	*
	Rytidosperma racemosum	Wallaby Grass	*	
	Scaevola ramosissima	Purple Fan-flower		*
	Smilax glyciphylla	Sweet Sarsaparilla		*
	Stylidum lineare	Slender Trigger Grass		*
V	*Tetratheca glandulosa*	Glandular Pink Bells	*	
	Themeda australis	Kangaroo Grass	*	*
	Xanthorrhoea resinosa	Grass Tree	*	
	Xanthosia pilosa	Woolly Xanthosia		*
	Xanthosia tridentata	Rock Xanthosia		*

V – Vulnerable Species

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APPENDIX B – FLORA SPECIES IDENTIFIED WITHIN ONR REHABILITATION AREA

Status	Botanical Name	Common Name	Rehab 1	Translocate	Soil seedbank
En	*Acacia byoneana*	Byone's Wattle	Seed bank		
	Acacia linifolia	White Wattle	Seed bank	*	*
	Acacia myrtifolia	Red-stemmed Wattle	Seed bank	*	
	Acacia parramattensis	Parramatta Wattle	Seed bank	*	*
	Acacia suaveolens	Sweet Wattle	Planted	*	*
	Acacia ulicifolia	Prickly Moses	Planted	*	*
	Actinotus minor	Lesser Flannel Flower	Seed bank	*	*
	Allocasuarina littoralis	Black She-oak	Planted	*	*
HTW	*Andropogon virginicus*	Whiskey Grass	Seed bank		*
	Angophora bakeri	Narrow-leaf Apple	Seed bank	*	
	Angophora costata	Smooth Barked Apple	Planted		
	Angophora hispida	Dwarf Apple	Planted	*	*
	Anisopogon avenaceus	Oat Spear Grass	Seed bank	*	*
	Aristida vagans	Threeawn Speargrass	Planted	*	*
	Aristida warburgii	Fine-leafed Wire Grass		*	
	Asplenium trichomanes	Common Spleenwort		*	
	Austrostipa pubescens	Spear Grass	Seed bank	*	*
	Banksia ericifolia	Heath-leaved Banksia	Planted	*	*
	Banksia serrata	Old Man Banksia	Planted	*	*
	Banksia spinulosa	Hairpin Banksia	Planted	*	
	Billardiera scandens	Hairy Apple Berry	Seed bank	*	*
	Boronia floribunda	Pale Pink Boronia	Seed bank	*	*
	Boronia ledifolia	Sydney Boronia	Seed bank	*	*
	Bossiaea heterophylla	Variable Bossiaea	Seed bank	*	
	Bossiaea obcordata	Spiny Bossiaea	Planted	*	
	Callistemon linearis	Narrow-leaved Bottlebrush	N/Id		
	Callistemon pinifolius	Pine-leaved Bottlebrush	N/Id		
	Calytrix tetragona	Common Fringe Myrtle	Planted		
	Cassytha glabella	Slender Devils Twine	Seed bank	*	*
	Caustis pentandra	Curly Wig	Seed bank	*	
	Cheilanthes seiberi	Mulga Fern	Seed bank	*	*
	Corymbia eximia	Yellow Bloodwood	Planted		
	Corymbia gummifera	Red Bloodwood	N/Id		
EnP	*Darwinia fascicularis subsp. oligantha*		Planted	Planted	Planted
	Daviesia acicularis	Sandplain Bitter-pea	N/Id		
	Dianella caerulea	Blue-flax Lily		*	
	Dianella prunina	Native Flax Lily	Planted		
	Dichelachne inaequiglumis	Short-hair Plume Grass		*	
	Dillwynia floribunda	Showy Parrot Pea	Seed bank		
	Dillwynia retorta	Parrot Pea	Seed bank	*	*
	Echinopogon caespitosus	Bushy Hedgehog Grass	Planted		
	Entolasia marginata	Bordered Panic	Planted		
	Entolasia stricta	Wiry Panic	Seed bank	*	*
	Epacris pulchella	Wallum Heath	Seed bank	*	

	Eragrostis brownii	Brown's Lovegrass	Seed bank	*	*
	Eucalyptus haemastoma	Scribbly Gum	Planted	*	
	Eucalyptus piperita	Sydney Peppermint	N/Id		
	Eucalyptus punctata	Grey Gum			
	Eucalyptus tereticornis	Forest Redgum	Planted		
	Gompholobium grandiflorum	Large Wedge Pea	Seed bank	*	*
	Gonocarpus teucrioides	Raspwort	Planted	*	*
	Goodenia hederacea	Forest Goodenia	Planted	*	*
	Grevillea buxifolia	Grey Spider Flower	Planted	*	*
	Grevillea mocronulata	Green Spider Flower			*
	Grevillea sericea	Pink Spider Flower	Planted		
	Grevillea speciosa	Red Spider Flower	Planted	*	*
	Hakea sericea	Needlebush	Planted	*	*
	Hardenbergia violacea	False Sarsparilla	Seed bank	*	*
	Hibbertia aspera	Rough Guinea Flower	Planted		
	Hibbertia diffusa	Wedge Guinea Flower	Planted		
	Hovea linearis	Common Hovea	Seed bank	*	
W	*Hypochoeris radicata*	Flatweed	Seed bank	*	
	Imperata cylindrica	Blady Grass	Seedbank	*	*
	Isopogon anemonifolius	Broad-leaved Drumsticks	Planted		
	Juncus usitatus	Common Rush			
	Kunzea capitata	Pink Kunzea	Planted		
	Lambertia formosa	Mountain Devil	N/Id		
	Laxmannia gracilis	Slender Wire Lily	Seed bank	*	*
	Leptospermum trinervium	Flaky-barked Tea-tree	Planted	*	
	Leucopogon juniperinus	Prickly-beard Heath	Planted		
	Leucopogon microphyllus	Small-leaved White Beard		*	
	Lomandra brevis	Tufted Mat-rush	Seed bank	*	
	Lomandra glauca	Pale Mat-rush		*	*
	Lomandra longifolia	Spiny-headed Mat-rush	Planted	*	*
	Lomandra multiflora	Many Flowered Mat-rush	Seed bank	*	*
	Lomandra obliqua	Fishbones	Seed bank	*	
	Lomatia silaifolia	Crinkle Bush	Seed bank		
V	*Melaleuca deanei*	Deane's Paperbark	Planted	Planted	Planted
	Melaleuca nodosa	Prickly-leaved Paperbark	N/Id		
	Microlaena stipoides	Weeping Grass	Seed bank	*	
	Micromyrtus ciliata	Fringed Heath Myrtle		*	
	Mirbelia rubiifolia	Heath Mirbelia	Seed bank	*	*
	Mirbelia speciosa	Mirbelia	Seed bank		
	Patersonia sericea	Purple Flag Flower	Seed bank	*	*
	Persoonia linearis	Narrow-leaved Geebung	N/Id		
	Persoonia pinifolia	Pine-leaved Geebung	Seed bank	*	*
	Petrophile pulchella	Conesticks		*	
	Petrophile sessilis	Prickly Conesticks	Planted		
	Phyllanthus hirtellus	Thyme Spurge	Planted	*	*
	Phyllota phylicoides	Heath Phyllota			
	Pimelea linifolia	Slender Rice Flower	Seed bank		
	Platysace linearifolia	Carrot Tops	Seed bank	*	*

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	Poa affinis	Tussock Grass	N/Id		
	Prostanthera granitica	Granite Mintbush	N/Id		
	Pteridium esculentum	Bracken Fern	Seed bank	*	
	Rytidosperma racemosum	Wallaby Grass	Seed bank	*	*
	Scaevola ramosissima	Purple Fan Flower	Seed bank	*	
	Schoenus ericetorum	Heath Bog Rush	Seed bank	*	*
	Stylidium graminifolium	Grass Trigger Plant		*	
	Tetratheca thymifolia	Black-eyed Susan	N/Id		
	Themeda australis	Kangaroo Grass	Seedbank	*	*
	Trema tomentose	Native Peach	Seed bank	*	*

En – Endangered species
EnP – Endangered Population
V – Vulnerable species
HTW – High Threat Weed
W – Weed species

N/Id – Planted previously but not identified during this survey

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APPENDIX C – FLORA SPECIES IDENTIFIED AT HRBOA

Status	Botanical Name	Common Name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
	Acacia hispidula	Little Harsh Acacia		x	x		
	Acacia linearifolia	Narrow-leaved Wattle				x	
	Acacia linifolia	White Wattle	x				
	Acacia suaveolens	Sweet Wattle		x	x		
	Acacia terminalis	Sunshine Wattle	x				
	Acacia ulicifolia	Prickly Moses	x				x
	Actinotus minor	Lesser Flannel Flower	x	x	x		x
	Allocasuarina distyla	Scrub She-oak		x			
	Allocasuarina littoralis	Black She-oak	x			x	x
	Angophora costata	Smooth Barked Apple	x			x	
	Angophora hispida	Dwarf Apple					x
	Aristida vagans	Threeawn Speargrass		x			x
	Aristida warburgii	Fine-leafed Wire Grass		x		x	
	Asplenium trichomanes	Common Spleenwort		x		x	x
	Austrostipa pubescens	Spear Grass		x	x		
	Banksia ericifolia	Heath-leaved Banksia	x	x	x		x
	Banksia oblongifolia	Fern-leaved Banksia		x			
	Banksia serrata	Old Man Banksia	x		x		x
	Banksia spinulosa	Hairpin Banksia				x	
	Billardiera scandens	Hairy Apple Berry		x	x		x
	Boronia floribunda	Pale Pink Boronia	x		x	x	x
	Boronia ledifolia	Sydney Boronia	x	x			x
	Bossiaea hetrophylla	Variable Bossiaea		x			x
	Bossiaea lenticularis	Bossiaea	x		x	x	
	Bossiaea scolopendra	Sword Bossiaea	x	x			x
	Callicoma serratifolia	Black Wattle				x	
	Calochlaena dubia	Soft Braken Fern			x		
	Calytrix tetragona	Common Fringe Myrtle		x			
	Cassytha glabella	Slender Devils Twine	x	x	x	x	x
	Carex inversa	Knob Sedge					x
	Caustis flexuosa	Curly Wig	x	x	x	x	x
	Caustis pentandra	Thick Twist Rush		x			
	Ceratopetalum gummiferum	NSW Christmas Bush	x		x	x	
	Cheilanthes seiberi	Mulga Fern			x	x	
	Corymbia eximia	Yellow Bloodwood			x		
	Corymbia gummifera	Red Bloodwood	x		x	x	
	Cyathochaeta diandra	Sheath Rush	x			x	x
	Cymbidium sp	Orchid				x	
V	*Darwinia biflora*			x			
	Dianella caerulea var. producta	Blue Flax Lily			x	x	
	Dianella prunina						x
	Dillwynia floribunda		x				x
	Dillwynia retorta	Parrot Pea		x			x
	Dodonaea viscosa	Sticky Hop Bush			x		

	Dracophyllum secundum	Dracophyllum	x		x		
	Drosera auriculata	Sundew					x
	Elaeocarpus reticulatus	Blueberry Ash				x	
	Entolasia stricta	Wiry Panic	x	x	x	x	x
	Epacris microphylla	Coral Heath		x			
	Epacris pulchella	Wallum Heath	x	x	x		x
	Eucalyptus haemastoma	Scribbly Gum		x			x
	Eucalyptus pilularis	Blackbutt	x				
	Eucalyptus piperita	Sydney Peppermint			x		
	Eucalyptus punctata	Grey Gum			x		x
	Eucalyptus resinifera	Red Mahogony				x	
	Gahnia sieberiana	Red-fruit Saw-sedge				x	
	Gonocarpus teucrioides	Raspwort	x				x
	Gompholobium glabratum	Dainty Wedge Pea		x		x	x
	Gompholobium latifolium	Golden Glory Pea				x	
	Grevillea buxifolia	Grey Spider Flower	x				x
	Grevillea speciosa	Red Spider-flower	x	x	x		x
	Hakea dactyloides	Broad-leaved Hakea		x			x
	Hakea propinqua	Large Fruit Hakea		x			
	Hakea sericea	Needlebush		x		x	
	Hibbertia aspera	Rough Guinea Flower			x		x
	Hovea linearis	Common Hovea			x		
	Imperata cylindrica	Blady Grass				x	x
	Isopogon anemonifolius	Broad-leaved Drumsticks	x		x		x
	Lambertia formosa	Mountain Devil	x	x	x	x	x
	Lepidosperma laterale	Variable Swordsedge		x			
	Leptospermum polygalifolium	Tantoon			x		
	Leptospermum trinervium	Flaky-barked Tea-tree	x	x	x	x	x
	Leucopogon ericoides					x	
	Leucopogon juniperinus	Prickly-beard Heath					x
	Lindsaea microphylla	Lacy Wedge Fern			x		
	Lomandra brevis	Tufted Mat-rush			x	x	x
	Lomandra filiformis	Wattle Mat-rush			x	x	
	Lomandra glauca	Pale Mat-rush	x	x	x		x
	Lomandra gracilis	Small Lomandra					x
	Lomandra longifolia	Spiny-headed Mat-rush				x	x
	Lomandra multiflora	Many Flowered Mat-rush	x	x	x	x	x
	Lomandra obliqua	Fish Bones	x		x		x
	Lomatia silaifolia	Crinkle Bush	x		x	x	x
	Micrantheum ericoides			x			
	Micromyrtus ciliata	Fringed Heath-myrtle					x
	Mirbelia rubiifolia	Heath Mirbelia		x			
	Patersonia sericea	Purple Flag Flower	x				
	Persoonia lanceolate	Lance Leaf Geebung	x				
	Persoonia levis	Broad Leaved Geebung			x	x	x

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	Persoonia pinifolia	Pine-leaved Geebung	x	x	x	x	x
	Petrophile pulchella	Conesticks	x	x			x
	Phyllanthus hirtellus	Thyme Spurge		x	x	x	
	Phyllota phylicoides	Heath Phyllota		x			
	Platysace linearifolia	Carrot Tops	x	x	x		x
	Pomax umbellata	Pomax			x		
	Pratia purpurascens	Whiteroot			x		
	Pteridium esculentum	Bracken Fern	x	x	x	x	
	Rytidosperma racemosum	Wallaby Grass				x	
	Scaevola ramosissima	Purple Fan-flower			x		
	Schoenus melanostachys	Black Bog Rush					x
	Smilax glyciphylla	Sweet Sarsaparilla	x		x	x	
	Stylidium graminifolium	Grass Trigger Plant	x		x	x	
	Telopea speciosissima	NSW Waratah				x	
	Tetratheca thymifolia					x	
	Themeda australis	Kangaroo Grass					x
	Xanthorrhoea resinosa	Grass Tree	x	x		x	x
	Xanthosia pilosa	Woolly Xanthosia	x			x	x
	Xanthosia tridentata	Rock Xanthosia		x	x		
	Xylomelum pyriforme	Woody Pear				x	

V – Vulnerable species

APPENDIX D – FAUNA SPECIES IDENTIFIED WITHIN ONR SURVEY AREA

	Scientific Name	Common name	Method of observation
BIRDS			
	Acanthiza lineata	Striated Thronbill	On site observation
	Anthochaera chrysoptera	Little Wattlebird	On site observation
	Aquila audax	Wedge-tailed Eagle	Flying above
V	*Calyptorhynchus lathami*	Glossy Black Cockatoo	On site observation
	Colluricincla harmonica	Grey Shrike-thrush	On site observation
	Cracticus tibicen	Australian Magpie	On site observation
	Cracticus torquatus	Grey Butcherbird	On site observation
	Dacelo novaeguineae	Laughing Kookaburra	On site observation
	Eopsaltria australis	Eastern Yellow Robin	On site observation
	Falco cenchroides	Nankeen Kestral	Flying above
	Lichenostomus leucotis	White-eared Honeyeater	On site observation
	Leucosarcia melanoleuca	Wonga Pigeon	On site observation
	Malurus cyaneus	Superb Fairy Wren	On site observation
	Manorina melanocephala	Noisy Minor	On site observation
	Meliphaga lewinii	Lewin's Honeyeater	On site observation
	Melithreptus brevirostris	Brown-headed Honeyeater	On site observation
	Neochmia temporalis	Red-browed Finch	On site observation
	Pardalotus punctatus	Spotted Pardalote	On site observation
	Phylidonyris novaehollandiae	New Holland Honeyeater	On Site observation
	Ptilonorhynchus violaceus	Satin Bowerbird	On site observation
	Rhipidura albiscapa	Grey Fantail	On site observation
	Sericornis frontalis	White-browed scrubwren	On site observation
	Strepera graculina	Pied Currawong	On site observation
MAMMALS			
	Austronomus australis	White-striped Free-tailed Bat	AnaBat Express
P	*Canis lupus familiaris*	Dog	Sand pad
V	*Chalinolobus dwyeri*	Large-eared Pied Bat	AnaBat Express
	Chalinolobus gouldii	Gould's Wattled Bat	AnaBat Express
	Chalinolobus morio	Chocolate Wattled Bat	AnaBat Express
P	*Felis catus*	Domestic Cat	Sand pad
V	*Miniopterus australis*	Little Bent-winged Bat	AnaBat Express
V	*Mormopterus norfolkensis*	Eastern Free-tailed Bat	AnaBat Express
	Mormopterus ridei	Ride's Free-tailed Bat	AnaBat Express
	Perameles nasuta	Long-nosed Bandicoot	Prints in mud
P	*Oryctolagus cuniculus*	European Rabbit	Scat/digs/sand pad
	Rhinolophus megaphyllus	Eastern Horseshoe Bat	AnaBat Express
	Tachyglossus aculeatus	Short-beaked Echidna	Sand pad
	Trichosurus vulpecula	Brush-tailed Possum	Scat
P	*Vulpes vulpes*	European Red Fox	Scat/Sand pad
	Wallabia bicolor	Swamp Wallaby	On site observation/scat/Infra-red camera/Sand pad

AMPHIBIANS			
	Crinia signifera	Common Eastern Froglet	Heard at farm dam
	Litoria peronei	Peron's Tree Frog	Heard in distance
REPTILES			
	Ctenotus robustus	Eastern Striped Skink	On site observation
	Lampropholis guichenoti	Common Garden Skink	On site observation
	Pseudonaja textilis	Eastern Brown Snake	On site observation
	Varanus varius	Lace Monitor	Sand pad

V – Vulnerable species
P – Pest species

APPENDIX E – FAUNA SPECIES IDENTIFIED WITHIN HRBOA SURVEY AREA

	Scientific Name	Common name	Method of observation
BIRDS			
	Acanthorhynchus tenuirostris	Eastern Spinebill	On site observation
	Alisterus scapularis	King Parrot	On site observation
	Anthochaera chrysoptera	Little Wattlebird	On site observation
V	*Calyptorhynchus lathami*	Glossy Black Cockatoo	On site observation
V	*Climacteris picumnus*	Brown Treecreeper	On site observation
	Colluricincla harmonica	Grey Shrike-thrush	On site observation
	Cracticus tibicen	Australian Magpie	On site observation
	Cracticus torquatus	Grey Butcherbird	On site observation
	Dacelo novaeguineae	Laughing Kookaburra	On site observation
	Eopsaltria australis	Eastern Yellow Robin	On site observation
	Falco cenchroides	Nankeen Kestrel	On site observation
	Lichenostomus chrysops	Yellow-faced Honeyeater	On site observation
	Lichenostomus leucotis	White-eared Honeyeater	On site observation
	Leucosarcia melanoleuca	Wonga Pigeon	On site observation
	Macropygia Phasianella	Brown Cuckoo-Dove	On site observation
	Malurus cyaneus	Superb Fairy Wren	On site observation
	Meliphaga lewinii	Lewin's Honeyeater	On site observation
	Neochmia temporalis	Red-browed Finch	On site observation
	Pardalotus punctatus	Spotted Pardalote	On site observation
	Phylidonyris novaehollandiae	New Holland Honeyeater	On site observation
	Platycercus elegans	Crimson Rosella	On site observation
	Platycercus eximius	Eastern Rosella	On site observation
	Ptilonorhynchus violaceus	Satin Bowerbird	On site observation
	Rhipidura albiscapa	Grey Fantail	On site observation
	Rhipidura leucophrys	Willie Wagtail	On site observation
	Rhipidura rufifrons	Rufus Fantail	On site observation
	Sericornis frontalis	White-browed Scrubwren	On site observation
	Strepera graculina	Pied Currawong	On site observation
MAMMALS			
V	*Chalinolobus dwyeri*	Large-eared Pied Bat	AnaBat Express
	Chalinolobus morio	Chocolate Wattled Bat	AnaBat Express
	Macropus giganteus	Eastern Grey Kangaroo	Print in sand
V	*Miniopterus australis*	Little Bent-winged Bat	AnaBat Express
	Perameles nasuta	Long-nosed Bandicoot	Digs/scats
	Rhinolophus megaphyllus	Eastern Horseshoe Bat	AnaBat Express
	Trichosurus vulpecula	Brush-tailed Possum	Scat
	Vespadelus darlingtoni	Large Forest Bat	AnaBat Express
	Vespadelus vulturnus	Little Forest Bat	AnaBat Express
P	*Vulpes vulpes*	European Red Fox	Scat/prints
	Wallabia bicolor	Swamp Wallaby	Scat/prints
AMPHIBIANS			
	Crinia signifera	Common Eastern Froglet	Heard in distance
	Litoria peronei	Peron's Tree Frog	Heard in distance
V	*Pseudophryne australis*	Red-crowned Toadlet	Heard in drainage line plot 4

REPTILES			
	Ctenotus taeniolatus	Copper-tailed Skink	On site observation
	Lampropholis guichenoti	Common Garden Skink	On site observation
	Pseudechis porphyriacus	Red-bellied Black Snake	On site observation
GASTROPOD			
E	*Pommerhelix duralensis*	Dural Land Snail	Shell found onsite

E – Endangered species
V – Vulnerable species

APPENDIX F – LANTANA CAMARA MANAGEMENT GUIDE

How to control lantana

Quick reference guide

Lantana - lantana camara

Minimise spread and future impacts

Although lantana is widespread on the east coast of Australia, it is still absent from parts of its potential range. These areas should be protected by:

- preventing the importation of further varieties and species of lantana
- stopping more planting of lantana in gardens
- strategically controlling infestations which threaten uninfested areas.

A control program for dense infestations in pastures

The Queensland Department of Natural Resources and Mines has produced a pest series fact sheet on lantana (PP#34). They advise that herbicides are too expensive to treat large lantana infestations.

A combination of fire and mechanical control makes spot treatment of small patches with herbicides more cost-effective. The following suggested control program for dense infestations in pastures is based on the fact sheet:

1. Exclude stock to allow a fuel load to build up.
2. Bulldoze, stickrake or plough the infestation to add to the fuel load.
3. Burn the infestation after obtaining a permit. Summer burns are more effective than winter burns.
4. Sow an improved pasture. Seek advice of local council or state/territory government agencies for selection of non-weedy pasture species.
5. Continue stock exclusion until pasture has established and set seed.
6. Burn the infestation again after obtaining a permit.
7. Spot spray or grub out any regrowth or seedlings. Spraying is most effective between summer and autumn.
8. Follow-up burning, spraying and/or grubbing will be required for several years.

Lantana can escape from garden plantings into surrounding bushland.
Photo: Tim Schultz

Control options

Type of infestation	Physical	Mechanical	Chemical	Fire	Biological
Small (few plants, small area)	Hand grubbing only suitable for seedlings. Wear gloves for protection from thorns.	Not suitable.	Spot spray plants less than 2 m in height between summer and autumn with a registered herbicide.	Not suitable.	There are four useful biological control agents. They are already distributed throughout their potential range.
Medium (medium density, medium total area)		Bulldoze, plough, stick-rake or slash infestations. Soil disturbance will lead to mass seed germination, so follow up with further controls. Do not use mechanical control in areas susceptible to erosion. A permit may be required.	Spraying is uneconomical for medium or large infestations. Helicopter spraying is used when there is no access for mechanical control, eg very steep slopes.	Under permit, burn in summer with good fuel load of grass and/or mechanically cleared lantana. Also use as follow-up. Do not burn in rainforests.	
Large (many plants, many ha)					

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CRC Weed management

South East Environmental

End

Of

Report

South East Environmental

Appendix I – S94 Contribution

Dixon Sand (Penrith) Pty Ltd

PO Box 4019
PITT TOWN NSW 2756

The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 14/08/2019

Payment Number: eft

Payment Amount: $31,330.92

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
July 2019	00026072	31/07/2019	$31,330.92	$0.00	$0.00	$31,330.92

Dixon Sand (Penrith) Pty Ltd

PO Box 4019
PITT TOWN NSW 2756

The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 2/10/2019

Payment Number: eft

Payment Amount: $35,499.58

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
August 2019	00026302	31/08/2019	$35,499.58	$0.00	$0.00	$35,499.58

Dixon Sand (Penrith) Pty Ltd

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The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 9/10/2019

Payment Number: eft

Payment Amount: $33,160.58

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
Sept 2019	00026390	30/09/2019	$33,160.58	$0.00	$0.00	$33,160.58

Dixon Sand (Penrith) Pty Ltd

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The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 13/11/2019

Payment Number: eft

Payment Amount: $36,758.53

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
Oct 2019	00026612	31/10/2019	$36,758.53	$0.00	$0.00	$36,758.53

Dixon Sand (Penrith) Pty Ltd

PO Box 4019
PITT TOWN NSW 2756

The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 11/12/2019

Payment Number: eft

Payment Amount: $33,764.09

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
Nov 19	00026775	30/11/2019	$33,764.09	$0.00	$0.00	$33,764.09

Dixon Sand (Penrith) Pty Ltd

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PITT TOWN NSW 2756

The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 13/01/2020

Payment Number: eft

Payment Amount: $28,440.68

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
Dec 2019	00026852	31/12/2019	$28,440.68	$0.00	$0.00	$28,440.68

Dixon Sand (Penrith) Pty Ltd

PO Box 4019
PITT TOWN NSW 2756

The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 17/02/2020

Payment Number: eft

Payment Amount: $20,842.21

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
January 2020	00027045	31/01/2020	$20,842.21	$0.00	$0.00	$20,842.21

Dixon Sand (Penrith) Pty Ltd

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The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 10/03/2020

Payment Number: eft

Payment Amount: $22,819.79

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
Feb 2020	00027211	29/02/2020	$22,819.79	$0.00	$0.00	$22,819.79

Dixon Sand (Penrith) Pty Ltd

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The Hills Shire Council
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BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 14/04/2020

Payment Number: eft

Payment Amount: $32,471.41

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
	00027403	31/03/2020	$32,471.41	$0.00	$0.00	$32,471.41

Dixon Sand (Penrith) Pty Ltd

PO Box 4019
PITT TOWN NSW 2756

The Hills Shire Council
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BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 13/05/2020

Payment Number: eft

Payment Amount: $37,702.27

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
April 2020	00027622	30/04/2020	$37,702.27	$0.00	$0.00	$37,702.27

Dixon Sand (Penrith) Pty Ltd

PO Box 4019
PITT TOWN NSW 2756

The Hills Shire Council
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BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 10/06/2020

Payment Number: eft

Payment Amount: $36,001.53

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
MAY 2020	00027785	31/05/2020	$36,001.53	$0.00	$0.00	$36,001.53

Dixon Sand (Penrith) Pty Ltd

PO Box 4019
PITT TOWN NSW 2756

The Hills Shire Council
P.O. Box 7064
BAULKHAM HILLS BC 2153

REMITTANCE ADVICE

Date: 14/07/2020

Payment Number: eft

Payment Amount: $33,674.15

Payment; The Hills Shire Council

In Payment For:

SUPPLIER INV.	PURCHASE NO.	INVOICE DATE	INVOICE AMOUNT	DISCOUNTS	PREVIOUS PAYMENTS	CURRENT PAYMENT
June 2020	00027984	30/06/2020	$33,674.15	$0.00	$0.00	$33,674.15

Appendix J – Community Engagement and CCC Meeting Minutes

Dixon Sand (Penrith) Pty Ltd

MINUTES OF THE BI-ANNUAL COMMUNITY CONSULTATIVE COMMITTEE 4610 Old Northern Road, Maroota 20th November 2019

	NAME	ORGANISATION
PRESENT	Lisa Andrews (LA)	Independent Chairperson
	Kristine McKenzie (KM)	The Hills Shire Council Representative
	Pat Schwartz (PS)	Community Representative *(arrived at 1pm)*
	Farley Roberts (FR)	Community Representative
	Lisa Aylward (LAy)	Maroota Public School Representative
	Chris Spraggon (CS)	Bush Regeneration Contractor (Bush-It)
	Robert Buckham (RB)	The Hills Shire Council Representative
	Hunny Churcher (HC)	Environmental Officer, Dixon Sand
	David Dixon (DD)	General Manager, Dixon Sand
	Mark Dixon (MD)	Dixon Sand
	Melissa Mass (MM)	Dixon Sand - Ecologist
APOLOGIES	Jemma Roberts	Community Representative (alternate)

Lunch was provided for CCC members 12.30pm-1pm.

The CCC meeting was opened at 12.55pm

WELCOME	The chair welcomed all present and thanked them for their attendance. Melissa Mass, Dixon Sand's new Ecologist was introduced and asked to provide some background to the CCC.	
DECLARATION OF INTEREST	LA declared that she is approved by the Department of Planning and Environment to chair the meeting and engaged by Dixon Sand.	**No changes to previous declarations by members.**
BUSINESS ARISING	**Action Item** 1 HC to send link to Fact Sheet once prepared and upload to website. Complete 2/9/19.	
CORRESPONDENCE (as emailed with Meeting Notice on 21/10/19)	• 21/5/19 - Draft minutes sent to members for review. • 30/5/19 - Finalised minutes sent to members. • 11/6/19 – Advice from HC regarding the Q&A sheet for the Modification to Operations application. • 20/8/19 – Email from RW Corkery advising of their appointment by DPIE to undertake an Independent Environmental Audit of the Quarries. This email forwarded on to CCC members requesting feedback of any items they wish included in the audit by the consultant. • 23/8/19 – Email from LAylward with no comments to add for audit. • 28/8/19 - Email from KM advising that Council will be preparing a submission direct to RW Corkery.	

	• 2/9/19 – Email from HC attaching Haerses Road Quarry - Modification 3 - Community Flyer No. 2 • 29/9/19 – Email from HC advising that the Annual Review 2018-19 for the Old Northern Road and Haerses Road quarries has been submitted to DPIE. • 8/10/19 – Email from HC with Melissa Mass's completed declaration & code of conduct forms. • 21/10/19 – Email to CCC members with the Meeting Notice, Agenda for this meeting.	
PROJECT REPORT, INCLUDING PRODUCTION/SALES OLD NORTHERN ROAD QUARRY, HAERSES ROAD QUARRY AND HEARSES ROAD QUARRY MODIFICATION 3 FOR HEARSES ROAD	**See attached presentation.** DD provided a project update to members: • Operations are steady with the rush to Christmas. Sales have been constant and the sandstone logs are moving quite well. • There has been a fair bit of rehabilitation at Haerses Rd with the final dam being constructed. • Intersection works for Modification 1 commenced on Monday and will get to a certain stage prior to the closure time over the Christmas break (2 weeks). Works should be completed at the end of February 2020 and were held up due to the other roadworks in the area (Nicholsons). Concerns were raised by LAy regarding the design and the inability to turn right out of this intersection, thus vehicles will turn left and drive past Dixon Sand Quarry to turn around at the Haerses Road/Wisemans Ferry Road intersection. HC commented that they may have to address this issue in the Traffic Management Plan and when inducting truck drivers to work on the sites. Further, that it is proposed that Hearses Rd will be 20kph. • The Statement of Environmental Effects (SEE) for Haerses Road Mod 3 has been lodged with DPIE. Two community flyers have been delivered and feedback received to date include truck movements and buffer zones. The noise requirements have been remodelled and brought up to the current standards. • Negotiations have occurred regarding encroachments into the buffer area (Roberts), who have agreed to the application to Council. • The adequacy test of the SEE is currently occurring and once the document is placed on exhibition by DPIE, CCC members will be informed of the advertising period. • Two complaints were received by neighbours concerning a truck speeding. Investigations have revealed that it was not a Dixon Sand (or its contractors) truck. Further investigations through the Inter-Pit Policy are occurring with the other quarries, however, it appears that it is not associated with any of these operations. • LAy asked if the sand had to be covered when being trucked. DD confirmed yes, however, the sandstone logs do not. • KM enquired which site the sandstone was being mined. DD advised, this site, Old Northern Road and Laughtondale Gully Road.	**Questions were asked and answered throughout the presentation.**
ENVIRONMENTAL MONITORING RESULTS	HC provided results of the environmental monitoring program: o Environmental Monitoring Locations	**Questions were asked and answered**

	○ TEMO- PM10 results ○ Dust deposition results ○ Noise results ○ Ground water and surface water data. HC went into detail regarding the dust exceedance results, which were due to regional dust events, scheduled hazard reduction burns and bushfire events. KM enquired whether the site was closed down because of the exceedances, with HC advising no, as it was classified as an "un-natural'' event	**throughout the presentation.**
BUSH REGENERAITON WORKS	CS advised that one of the company's long term supervisors was leaving and there would be new management for the site. There have been lots of issues with recent bush fires. The revegetation is looking good despite the dry period, however is not showing too much growth. CS presented on the : ○ Native Vegetation Corridor – Western Revegetation ○ Eastern Woodland ○ Lot 196 Embankment Rehabilitation ○ Old Norther Road Biodiversity Offset ○ Haerses Road Offset ○ Haerses Road Visual Screen HC advised that they took more cutting for the endangered species at the Old Northern Road (Melaleuca deanei and Darwinia fascicularis ssp. oligantha) working with EcoFlora a local native nursery. KM enquired what the survival rate was; with DD responding – about 50% for the M. deanei but much higher for D. fasicularis ssp. oligantha. PS asked CS whether they were keeping an eye out for Crofton Weed as it follows water ways so upstream control is very important. PS also stated that the downstream environment from Hearses Rd site is weed free along Little Cattai Creek through the Maroota Forest to the Broadwater Wetland. CS responded that this weed likes moisture so the dry conditions have helped in supressing it. PS explained a technique for removing the plant.	**Photographs were shown in the presentation depicting the rehabilitation works.**
GENERAL BUSINESS	○ PS enquired whether any Koalas have been sighted in the area; stating that following the 2002 bush fires the population has not come back. Discussions ensued about this subject. ○ MM advised that she has been surveying the area and has only found scats across the river – none in the local area. The University of Western Sydney is obtaining funding for survey work for vulnerable species. ○ HC advised that she is moving to Tasmania, however, will be continuing her compliance work with Dixon Sand. MM will take over field work, ecology and bush management.	**CCC members wished HC well in her move to Tasmania.**
MEETING SCHEDULE FOR 2020	It was agreed to continue the bi-annual meetings with the existing schedule: ➢ **Wednesday - 13th May 2020; and** ➢ **Wednesday - 11th November 2020.**	**Agreed.**

Meeting closed at 2.08pm with LA thanking all CCC members for their attendance and as it was the last meeting of the year, wished them a Merry Christmas and Happy New Year.

ACTION ITEM

1	**Advise CCC members when SEE goes on exhibition.**	**HC**

Dixon Sand (Penrith) Pty Ltd

MINUTES OF THE BI-ANNUAL
COMMUNITY CONSULTATIVE COMMITTEE
4610 Old Northern Road, Maroota
HELD VIRTUALLY VIA EMAIL DUE TO COVID-19
13 MAY 2020

	NAME	ORGANISATION
PRESENT	Lisa Andrews (LA)	Independent Chairperson
	Kristine McKenzie (KM)	The Hills Shire Council Representative
	Pat Schwartz (PS)	Community Representative
	Farley Roberts (FR)	Community Representative
	Lisa Aylward (LAy)	Maroota Public School Representative
	Chris Spraggon (CS)	Bush Regeneration Contractor (Bush-It)
	Hunny Churcher (HC)	Environmental Officer, Dixon Sand
	David Dixon (DD)	General Manager, Dixon Sand
	Melissa Mass (MM)	Dixon Sand - Ecologist
APOLOGIES	Jemma Roberts (JR)	Community Representative (alternate)
	Mark Dixon (MD)	Dixon Sand

**Due to the COVID-19 pandemic, this meeting was conducted remotely via email. The presentation was emailed to all CCC members on the scheduled meeting date of 13 May 2020. Members were requested to review the document and provide any questions/comments within 7 days. After this time, this information was coordinated by LA and forwarded through to the company for its response.*

The answers were incorporated into these minutes as a record of the outcome of the engagement process.

The subject presentation forms as an attachment to these minutes.

The CCC meeting was opened at 10.13am (13/5/20).

WELCOME & INTRODUCTION	LA sent the project presentation to the CCC on 13/5/20 at 10.13am, attaching the presentation and providing directions on how to participate in this virtual meeting.	
DECLARATIONS OF INTEREST	LA declared that she is approved by the Department of Planning and Environment to chair the meeting and engaged by Dixon Sand.	**No changes to previous declarations by members.**
BUSINESS ARISING	**Action Items:** 1 Email extraordinary minutes to assessing officer of Mod 3. (LA – Complete.) 2 Write to local MP regarding school zone times. (LA – Complete.) LAy thanked LA for writing to Robyn Preston MP and is looking forward to a positive response.	

	PS thanked LA for actioning the items from the 24 February 2020 meeting. KM requested that an action item be recorded for the November 2020 meeting: LA to provide the CCC with an update on whether a response is received from Robyn Preston MP regarding the school zone.	**Action: LA to follow-up response from Robyn Preston MP.**
CORRESPONDENCE (as emailed with Meeting Notice on 21/10/19)	• 28/2/20 - Draft minutes sent to members for review • 7/3/20 - Finalised minutes sent to members. • 7/3/20 – Finalised minutes sent to assessing officer of Haerses Road Quarry Mod 3 application at DPIE (Lauren Evans). • 9/4/20 – Email to members regarding proposed meeting for 13/5/20 and providing options on whether to hold virtual or postpone. Responses received from all members. • 17/4/20 – Email to HC advising that meeting will proceed with Option 1 (virtual meeting via email). • 12/5/20 – Email to Robyn Preston MP, regarding the school zone outside Maroota Public School. • 13/5/20 – Email to CCC members with the Project Presentation and directions on how to participate in this meeting 'virtually'. KM provided comments on two typographical errors in the cover email sent with the CC presentation. (Noted.)	

PROJECT REPORT, INCLUDING PRODUCTION/SALES OLD NORTHERN ROAD QUARRY, HAERSES ROAD QUARRY AND HEARSES ROAD QUARRY MODIFICATION 3 FOR HEARSES ROAD	• COVID-19 Update (Slide 6)
	• Operations & Progress (Slide 7):
	  ○ Production/Sales
	  ○ Old Northern Road Quarry; and
	  ○ Hearses Road Quarry (Slide 8)
	
	KM requested that Dixon Sand clarify the reference to Lot ½ in relation to the cuttings removed from the Old North Road Quarry.
	Dixon Sand Response: Apologised – this was a typographical error. It should read 'Lot 1 & 2 Operation' on Page 7.
	
	• Hearses Road Quarry Mod. 3 (Slide 9)
	
	• Independent Environmental Audit (Slides 10-12)
	
	KM requested further comments in regard to the IEA (slides 10-12), if any action was required to be undertaken by Dixon Sand as identified by RW Corkery in the Audit.
	Dixon Sand Response: Felt that the proposed recommendations by the auditors were fair; stating that a number of the non-compliances were considered 'administrative' in nature, however, the IEA was conducted under the new DPIE IEA guidelines, which eliminated this compliance classification category and only three compliance status descriptors	

	can be adopted – (1) Compliant (2) Non-compliant and (3) Not triggered. The majority of the recommendations have been actioned through onsite operational changes, onsite rectification and an extensive review and revision of the EMS and Management Plans. The status and specific details of the proposed recommendations and actions will be included in this year's Annual Review, which will be submitted by September 2020.	
ENVIRONMENTAL MONITORING RESULTS	**Environmental Monitoring Results (Slides 13-54):** o Environmental Monitoring Locations (Maps) o TEOM – PM10 data o Dust Deposition data o Noise Monitoring data o Ground water and Surface water data.	
BUSH REGENERAITON WORKS	**Bush Regeneration Works (Slides 55 - 76):** o Rehabilitation and Bush Regeneration activity report for May 2020. o Key Actions – treatment of weed species o ONR – Native Vegetation Corridor and canopy species establishment. o Photographs of habitat density, regeneration, diversity and species. o Hearses Road Area – photographs and explanation of offset areas for ONR o Lots 1 & 2 – weed removal and regeneration. PS commented that the photos of the bush regeneration sites were good and great that the bush regeneration sites are coming along so well.	
GENERAL BUSINESS	o FR - the use of exhaust brakes has markedly increased in intensity since the speed restrictions for the roadworks were introduced. Nothing surprising there, except my naivety in assuming a possible improvement. o It was noted that "attendee" members acknowledged reading the CCC presentation and provided comments to the Chair.	
NEXT MEETING	The next CCC is scheduled for **Wednesday, 11th November, 2020.** All being well and in consultation with the company, members, as well as the latest government directives concerning the COVID-19 pandemic, the CCC will be held on site at **12.30pm** with a light lunch, followed by the CCC commencing at 1pm.	

The meeting was technically closed by the chair following responses from CCC members and the company, compiled into the draft minutes and emailed to members on 26/5/20.

ACTION ITEM

Item	Issue	Responsibility
1	Follow-up response from Robyn Preston MP regarding the school zone	LA

Appendix K – Complaints Register

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 31 July 2019	0	19 August 2019

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 31 Aug 2019	0	10 September 2019

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 30 Sep 2019	0	01 October 2019

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 31 Oct 2019	2	07 November 2019

15/10/2019	Verbal	David Dixon	David Dixon informed the Weighbridge Operator he had received 2 complaints concerning the driver of XXXXXX – 'company name' truck. David said one was from a Telstra technician and the other from a local who has never lodged a complaint us in the past. David explained that both people had said the truck xxxxxx was exceeding the speed limit on Wisemans Ferry road.	David instructed me to let the driver know we had received the complaints and to ensure that the driver was aware we considered this was unacceptable behaviour at approximately 7.35am 15/10/19. The driver denied that he was exceeding the speed limit. Informed David Dixon of this at approximately 10am 15/10/19 and he asked the Weighbridge Operator to make record.	21/10/19	David Dixon contacted the haulage company informing their management/owner of the complaint he had received on the particular truck and driver. The owner of the haulage company has committed to installing a GPS tracking system in the truck so that the driver can be monitored at all times. The owner informed David that if any complaints are received they will be able to pinpoint the time and review the speeds and act accordingly. The driver is fully aware of the system and fully aware that they must adhere to the limits or seek employment elsewhere. David contacted the complainant and informed them of what had been actioned and should the complainant have any further concerns to please contact him.	21/10/19

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 30 November 2019	0	06 December 2019

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 31 December 2019	0	06 January 2020

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 31 January 2020	0	04 February 2020

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 29 February 2020	0	02 March 2020

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 31 March 2020	0	02 April 2020

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 30 April 2020	0	6 May 2020

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 31 May 2020	0	1 June 2020

Dixon Sand Pty Ltd

Old Northern Road Quarry

Complaints Register - Summary

Period	Number of Complaints received	Complaint Register Published on Website
1 – 30 June 2020	0	1 July 2020

Appendix L – Waste Register

Old Northern Road
Waste Tracking Register 2019 - 2020

Date	Waste Type	Amount	Measurement	Contractor	Disposal / Recycle	Receipt No
01/07/18 - 30/06/19	General Solid Waste - recyclable	13	cubic metre	Council Waste Contractor	Recycle	Council Rate
01/07/18 - 30/06/19	Genral Solid Waste - putrescible	78	cubic metre	Council Waste Contractor	Disposal	Council Rate
13/02/2019	Grease	300	Litres	Grease Eater	Recycle	84397
29/07/2019	Grease	300	Litres	Grease Eater	Recycle	83126
28/08/2019	Grease	300	Litres	Grease Eater	Recycle	83422
25/09/2019	Grease	300	Litres	Grease Eater	Recycle	83656
24/10/2019	Grease	300	Litres	Grease Eater	Recycle	83925
18/11/2019	Grease	300	Litres	Grease Eater	Recycle	84158
15/01/2020	Grease	600	Litres	Grease Eater	Recycle	84642
12/02/2020	Grease	300	Litres	Grease Eater	Recycle	84891
9/03/2020	Grease	300	Litres	Grease Eater	Recycle	85207
6/04/2020	Grease	300	Litres	Grease Eater	Recycle	85466
5/05/2020	Grease	300	Litres	Grease Eater	Recycle	85698
3/06/2020	Grease	300	Litres	Grease Eater	Recycle	86016
26/07/2019	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8482
19/08/2019	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8495
9/09/2019	Non-putrescible	6	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8556
9/10/2019	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8573
25/10/2019	Non-putrescible	2	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8583
3/12/2019	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8616
18/12/2019	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8627
21/01/2020	Non-putrescible	6	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8637
21/02/2020	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8703
17/03/2020	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8722
25/03/2020	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8732
24/04/2020	Non-putrescible	6	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8747
4/06/2020	Non-putrescible	4	cubic metre	Asquith Mini Skips	Sort / Recycle / Disposal	8777
01/07/18 - 30/06/19	Printer Cartridges	0.5	cubic metre	Post Office Collection Bin	Recycle	N/A
17/06/2020	Scrap Metal	11.14	tonnes	Westland Metals	Recycle	WM23933
8/11/2019	Waste Oil	600	Litres	Southern Oil	Treatment	248879
31/01/2020	Waste Oil	2200	Litres	Southern Oil	Treatment	261044
13/03/2020	Waste Oil	1600	Litres	Southern Oil	Treatment	261380
18/05/2020	Waste Oil	1600	Litres	Southern Oil	Treatment	253731

Total	Scrap Metal	11.1	tonnes
	Non-Putrescible	56.0	m3
	Waste oil	6000.0	litres
	Genral Solid Waste - putrescible	78.0	m3
	General Solid Waste -	13.0	m3
	Printer Ink Catridge	0.5	m3
	Grease	3900.0	litres

Appendix M – RFS Meeting Minutes

Meeting with Maroota Rural Fire Brigade – August 2018

Date: 21/08/2019

Time: 09:03 am– 09:30 am

Attendees:

- Hunny Churcher (HC) –Dixon Sand's Environment Officer
- Peter Kazzi (PK) – Maroota Rural Fire Brigade Captain

Agenda:

- Annual review of bushfire mitigations and risk analysis with local RFS representative.

Point of Discussion

- PK advised that:
    - Due to the dry condition and elevated fuel load, the bushfire season is likely to be brought forward this year (1st September 2019).
    - A number of Hazard Reduction burns were conducted in the Maroota area earlier this year, both by The Hills and Hornsby RFS
    - It is predicted the fire season will experience exceptionally dry and hot conditions.
    - A Permit is required from the RFS to undertake any pile burn during the bushfire season.
- HC conveyed with PK that:
    - The Bushfire Management Plans (BFMP) for both quarries have been reviewed and revised with only administrative changes made.
    - No changes to the Northern Road and Haerses Road quarry operations, therefore assets and mitigation measures remain the same.
- Both quarries remain low risk of bushfire due to quarry operations acting as a fire break, low risk of infrastructure catching fire.

Action

Action	To Action By:
PK to supply map(s) showing the areas depicting the planned and/or executed hazard reduction burns in the area (The Hills RFS District)	PK
HC will enquire with Hornsby RFS District for any maps of planned / executed hazard reduction burns in the area.	HC