ABN: 30 003 178 318

Statement of Environmental Effects

for the modification of the

Hitchcock Road Sand Extraction and Rehabilitation Project

Project Approval 06_0104

Prepared by:

R.W. CORKERY & CO. PTY. LIMITED

June 2020

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Hitchcock Road Sand Extraction and Rehabilitation Project

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LIST OF ACRONYMS

ASS	Acid Sulfate Soils
CCC	Community Consultative Committee
ENM	Excavated Natural Material
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC	Environment Protection and Biodiversity Conservation
DPE	Department of Planning and Environment
DPIE	Department of Planning, Industry and Environment
OEH	Office of Environment and Heritage
PA	Project Approval
PASS	Potential Acid Sulfate Soils
PCT	Plant Community Types
RWC	R.W. Corkery & Co Pty Limited
SHTW	Sydney Hinterland Transition Woodland
SoEE	Statement of Environmental Effects
VENM	Virgin Excavated Natural Material

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1. INTRODUCTION

1.1 SCOPE

This *Statement of Environmental Effects* (SoEE) has been prepared by R.W. Corkery & Co. Pty Limited (RWC) on behalf of PF Formation Pty Ltd ("the Applicant") to accompany a Section 4.55(2) modification application under the *Environmental Planning and Assessment Act 1979* (EP&A Act) to Project Approval (PA) 06_0104 granted for the Hitchcock Road Sand Extraction and Rehabilitation Project ("the Project"). **Figure 1** presents the location of the Project in Maroota, located approximately 50km northwest of the Sydney Central Business District and approximately 8km south of Wisemans Ferry.

The information contained within this SoEE relates specifically to those aspects of the Project to be modified, providing a summary of the background to the modification, a description of the modifications proposed, and a review of the potential environmental effects that would result from the proposed modifications.

1.2 FORMAT OF THE REPORT

This SoEE has been prepared in following six sections and a set of appendices.

Section 1: Introduces the proposed modification, the Applicant and provides relevant background information.

Section 2: Describes the Applicant's proposed modifications in sufficient detail to enable the application to be assessed.

Section 3: Outlines the consultation undertaken in relation to the proposed modification and the statutory context of the proposed modification.

Section 4: Describes the anticipated impacts, if any, associated with the proposed modifications.

Section 5: Provides a brief conclusion to the outcomes of the assessment.

Section 6: Lists the various source documents referred to within the SoEE.

Appendices: Present the following additional information.

- A revised Statement of Commitments
- Biodiversity Reporting

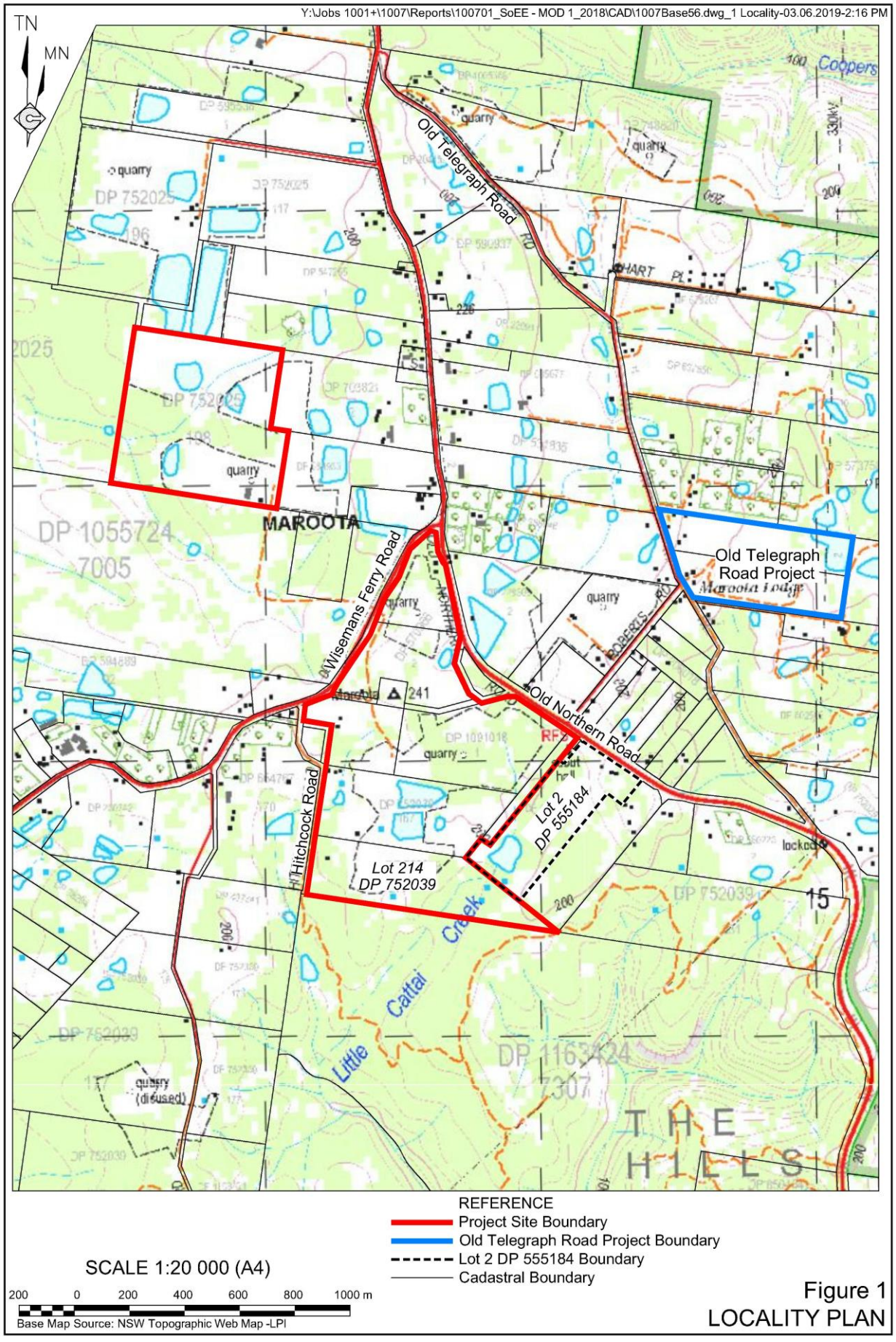

Figure 1
LOCALITY PLAN

1.3 THE APPLICANT

The Applicant, PF Formation Pty Ltd, is a family owned and operated business established in 1956, and is now managed by two grandsons of the founder. The Applicant has been operating at Maroota since 1983 principally supplying Tertiary sand, used mainly in concrete related products, and friable sandstone, used for bricklaying sand.

1.4 BACKGROUND TO THE PROPOSAL

Approval for the Project was granted by the NSW Land and Environment Court in 1998 (following a non-determination by Council), with approval to produce a maximum of 400 000tpa of processed sand with a daily limit of 200 laden vehicle movements from the processing plant and a Project life to 30 November 2028.

The current Project Approval (PA 06_0104), granted 3 February 2009, approved sand extraction within additional parcels of land, amended the allowable depth of extraction from 187m AHD to 183m AHD, and approved the importation of Virgin Excavated Natural Material (VENM) to the site for recycling or processing. However, PA 06_0104 restricted laden truck movements for trucks importing VENM to the site to 20 per day but as a sub-limit within the total truck movements already approved. No alterations were made to the initial conditions of approval including the 400 000tpa upper limit of extraction, 200 total laden truck movement per day, or Project life.

Since the grant of PA 06_0104 the Applicant has received Development Consent DA 1380/2014, amended 5 February 2019 approving the export of 20 loads of VENM from the Applicant's Old Telegraph Road Project, located ~1.9km by road from the Project Site (see **Figure 1**) for a period of 20 years (i.e. to July 2037). With the importation of VENM from the Old Telegraph Road Project to the Project Site, the entire sub-limit of 20 loads per day for VENM importation is utilised for the duration of the Project. As a result, no further VENM from other sources can be imported to the Project Site presenting a lost opportunity for the reuse / recycling of VENM.

The availability of Excavated Natural Material (ENM) and other materials have also increased since grant of PA 06_0104 and legislation now provides for its beneficial use through Resource Recovery Orders and Exemptions. As a result, the Applicant has the opportunity to attract VENM, ENM and other approved materials to the Project Site, thereby increasing the life of the Project. Furthermore, as less overburden material (non-saleable material) has been encountered than originally anticipated and fewer fines have been generated from washing, the amount of material available to achieve the final landform has not been realised. Therefore, additional capacity is available for placement of fines generated from washing of imported materials as well as direct placement of suitable materials to create the final landform.

Additionally, since the grant of PA 06_0104 the Applicant has purchased adjoining land parcel (Lot 2 DP 555184), allowing the removal of previous buffer requirements. The Applicant has also purchased Lot 214 DP 52039, the southern land parcel within the Project Site (see **Figure 1**). The availability of Lot 214 for use in biodiversity offsetting has prompted a reconsideration of the approved biodiversity offset strategy which currently relies upon the use of rehabilitation. A range of rationalisations and functional improvements in the wording of conditions and commitments are also proposed.

The proposed modifications would result in substantially the same development and provide for the creation of the intended final landform. Therefore, with the discontinuation of the transitionary arrangements for Part 3A Projects, the proposed modification is sought under Section 4.55(2) of the EP&A Act and the Project will be transitioned from a Major Project to a State Significant Development.

1.5 MANAGEMENT OF INVESTIGATIONS

This document has been prepared by Mr Scott Hollamby, Senior Environmental Consultant with R.W. Corkery & Co. Pty Limited, with the assistance of Mr Jack Flanagan, Environmental Consultant with the same company.

On behalf of the Applicant, Mr Joshua Graham, Managing Director, assisted with the preparation of this document.

Ms Melissa Mass, Senior Ecologist with South East Environmental prepared the biodiversity reporting (**Appendices 2** and **3**) and provided input relating to biodiversity.

2. DESCRIPTION OF THE PROPOSED MODIFICATION

2.1 OVERVIEW OF PROPOSED MODIFICATIONS

The proposed modifications can be broadly categorised into the following.

- Provision for the receipt of ENM and other materials with applicable Resource Recovery Orders and Exemptions[1].
- Modification of the biodiversity offset strategy.
- Modification of conditions and rationalisation of commitments.

The following subsections provide further information on how these aspects are proposed to be modified.

2.2 RECEIPT OF ENM AND OTHER APPROVED MATERIALS

Currently PA 06_0104 provides for the receipt of up to 20 loads per day of VENM to the Project Site. Received VENM is then processed to generate saleable products. Pending the nature of the received VENM, this may or may not involve washing.

The NSW Waste Classification Guideline (EPA, 2014) classifies VENM as:

> *"natural material (such as clay, gravel, sand, soil or rock fines):*
>
> - *that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities*
> - *that does not contain sulfidic ores or soils, or any other waste,*
>
> *and* ***includes excavated natural material*** *that meets such criteria for virgin excavated natural material as may be approved from time to time by a notice published in the NSW Government Gazette."*

On 24 November 2014 the NSW EPA issued by Government Gazette the '*Excavated Natural Material Order 2014*' and '*Excavated Natural Material Exemption 2014*'. In the order, ENM means:

> *"naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:*
>
> *a) been excavated from the ground, and*
>
> *b) contains at least 98% (by weight) natural material, and*
>
> *c) does not meet the definition of Virgin Excavated Natural Material in the Act.*

[1] Issued in accordance with Clauses 91 and 92 of the *Protection of the Environment Operations (Waste) Regulation 2014* (or its latest amendment).

Excavated natural material does not include material located in a hotspot; that has been processed; or that contains asbestos, Acid Sulfate Soils (ASS), Potential Acid Sulfate soils (PASS) or sulfidic ores."

Orders and exemptions have also been issued under the *Protection of the Environment Operations (Waste) Regulation 2014* including, for example, materials generated from specific projects such as the Sydney tunnels. Additional orders and exemptions will continue to be issued by the NSW Environment Protection Authority as appropriate. As for the ENM order and exemption, these will include a specification of the material and what the material can be utilised for.

It is proposed that, in addition to VENM, ENM and other materials with applicable[2] Resource Recovery Exemptions and Orders also be received on the Project Site for processing and generation of saleable products in the same manner as VENM. It is also proposed that suitable materials be applied to land within the Project Site as part of ongoing rehabilitation activities. This may include capping of silt ponds, filling to achieve the final landform, and use as soil material for revegetation.

Receipt of ENM and other approved materials and the utilisation of these materials for selected rehabilitation activities would not result in any functional changes to the approved operations, however, appropriate updates to the existing Environment Protection Licence 3047 would be sought and documented procedures established for receipt and verification of ENM and other materials in accordance with the applicable Resource Recovery Order and Exemption.

In consideration of the additional volumes of material that could be attracted to the Project Site, the following modifications are also sought.

- Retention of the total truck limit but removal of the sub-limit of 20 laden VENM trucks per day.

  Currently a total of 200 laden trucks per day are permitted with a sub-limit of 20 laden VENM trucks per day. Removal of the sub-limit for VENM trucks would provide flexibility in the proportion of daily VENM and other materials received compared with product trucks without changing the maximum number of daily truck movements.

- A 10-year increase to the approved life of the Project to 30 November 2038.

  The receipt of ENM and other materials would provide the opportunity to increase the proportion of sales of recovered/recycled materials, reducing the rate of extraction within the Project Site. As a result, the overall Project life would be extended. This would also provide for the ongoing receipt and processing of VENM and other materials following the exhaustion of on-site extractive materials, including from the Old Telegraph Road Project which, as discussed in Section 1.4, is approved to export of 20 loads of VENM to the Project Site until July 2037.

[2] Materials with orders and exemption which allow for the receipt of the material to the Quarry and either processing of that material or application to land.

2.3 MODIFIED BIODIVERSITY OFFSET STRATEGY

The current biodiversity offset strategy requirement (Condition 3(22) and Appendix 5 of PA 06_0104) is for the rehabilitation of disturbed areas to provide a total of 12ha of on-site area rehabilitated to:

- Sydney Hinterland Transition Woodland (SHTW) (7.9ha); and
- other woodland communities (4.1ha).

For the purposes of the current offset, these rehabilitated must meet the completion criteria presented in Appendix 6 of PA 06_0104 and be secured in the long-term (such as through a positive public covenant). This was required to provide an offset for the clearing of 3.7ha of SHTW. To date, 4.2ha of disturbed land has been rehabilitated to SHTW and has been approved by the (then) Department of Planning and Environment (DPE) as meeting the required standard as specified in Appendix 6 of PA 06_0104.

As discussed in Section 1.4, the Applicant has purchased Lot 214 DP 52039, the southern land parcel within the Project Site (see **Figure 2**). Lot 214 contains an existing approximately 8ha of the following plant community types (PCTs).

- 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 – approximately 2ha.
- PCT 1255 - Sydney sandstone hinterland dry sclerophyll forest of the Sydney Basin Bioregion – approximately 3.5ha.
- PCT 1787 - Red Bloodwood - Scribbly Gum – Stringybark open forest on sandstone ridges along the western side of the Woronora and Hornsby plateaus – approximately 0.5ha.
- PCT 1134 - Scribbly Gum - Hairpin Banksia - Dwarf Apple heathy woodland on hinterland sandstone plateaux of the Central Coast, Sydney Basin Bioregion – approximately 2ha.

Given the purchase of Lot 214, an alternative / reconfigured biodiversity offset strategy is proposed in which the existing 8ha of vegetation communities within Lot 214 is secured through a positive public covenant within 12 months of approval rather than reliance being placed upon future areas of rehabilitation.

2.4 SITE REHABILITATION AND FINAL LAND USE

The proposed modification would result in a minor change to the overall proportion of land rehabilitated to woodland and that rehabilitated for ongoing agricultural / horticultural use. However, the rehabilitation methods and technics would remain unchanged.

Beyond the proposed offset area, the existing 4.2ha rehabilitated to woodland and approved as meeting the required standards would be retained. A further approximately 3.1ha would also continue to be rehabilitated resulting in a total of 7.3ha of woodland rehabilitated to the standard required in Appendix 6 of the current Project Approval.

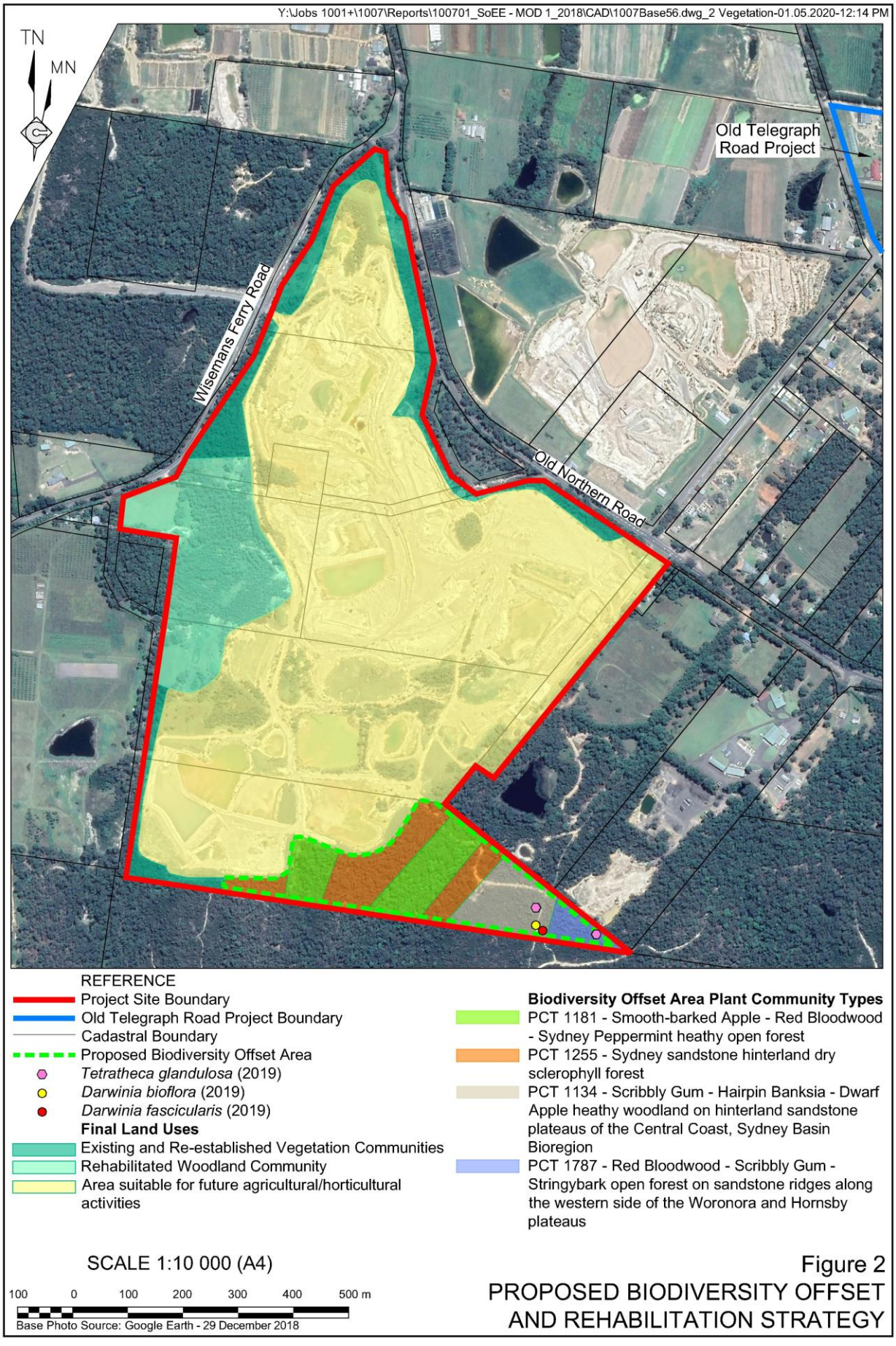

Figure 2
PROPOSED BIODIVERSITY OFFSET AND REHABILITATION STRATEGY

In addition to the biodiversity offset area, this 7.3ha area rehabilitated to woodland would be retained as part of the final landform. Additionally, a further approximately 5.5ha of existing and previously restored woodland would also be retained within the final landform. The remaining approximately 54ha would be rehabilitated for ongoing agricultural / horticultural use.

2.5 PROPOSED MODIFICATION OF CONDITIONS AND COMMITMENTS

Since the issue of PA 06_0104, the Applicant has purchased Lot 2 DP 555184 and therefore buffer requirements from this land parcel are no longer required. As a result of this and the proposed modifications several conditions within PA 06_0104 are proposed to be modified. **Table 1** provides a summary of the existing condition, proposed modification and a reasoning/justification.

A range of updates to the Statement of Commitments are also proposed. These seek to ensure consistency with the modified approval, remove commitments which simply repeat conditional requirements and commitments that are more appropriately addressed through the mandatory management plans. The updated Statement of Commitments is presented as **Appendix 1**.

Table 1
Proposed Modification of Selected Conditions within PA 06_0104

Cond No.	Existing Condition	Proposed Condition	Reason/Justification
2(6)	Extraction and processing operations may take place until 30 November 2028.	Extraction and processing operations may take place until 30 November 2038.	Extend the life of the Project by 10 years to provide for ongoing importation and processing of VENM and other materials (see Section 2.2).
2(8)	The Proponent shall restrict total laden truck movements associated with the project to: (a) 200 per day, for the Proponent's combined operations at Maroota; (b) 20 per day, for trucks importing VENM to the site; and (c) 10 per day, for trucks entering/exiting the site between 6.00am and 7.00am. *Note: For the avoidance of doubt, 200 is the maximum laden truck movement volume allowed on any one day, including the VENM and early morning truck movements.*	The Proponent shall restrict total laden truck movements associated with the project to: (a) 200 per day, for the Proponent's combined operations at the Hitchcock Road Project and Central Wash Plant site (Lot 198 DP 752025); and (b) 10 per day, for trucks entering/existing the site between 6:00am and 7:00am. *Note: For the avoidance of doubt, 200 is the maximum laden truck movement volume allowed on any one day, including any imported materials and early morning truck movements*	Clarification of the operations for which the truck limit applies to. Removal of the sub-limit for importing VENM will allow additional VENM and other materials to be attracted to site for recycling and extend the life of the in-situ extractive materials without changing the total maximum daily truck movements.
3(2b)	Notwithstanding the layout plans in Appendix 2, the Proponent shall not undertake extraction within: (a) 30 metres of Hitchcock Road; and (b) 10 metres of the property boundary of Lot 2 DP 555184, unless sand extraction has commenced on that lot, and extraction in this buffer has been agreed by the Director-General.	Notwithstanding the layout plans in Appendix 2, the Proponent shall not undertake extraction within 30 metres of Hitchcock Road.	Remove the buffer requirement to Lot 2 DP 555184, as the Applicant now owns this land parcel.

Table 1 (Cont'd)
Proposed Modification of Selected Conditions within PA 06_0104

<table>
<tr><th>Cond No.</th><th>Existing Condition</th><th>Proposed Condition</th><th>Reason/Justification</th></tr>
<tr><td>3(22)</td><td>The Proponent shall implement the Offset Strategy described in the preferred project report, and summarised in Table 6 (shown conceptually on the plan in Appendix 5), to the satisfaction of the Director-General.

Table 6: Offset Strategy
<table><tr><th>Area</th><th>Minimum Size (hectares)</th></tr><tr><td>On-Site Revegetation Area (SHTW)</td><td>7.9</td></tr><tr><td>On-Site Revegetation Area (Other Woodland)</td><td>4.1</td></tr><tr><td>Total</td><td>12</td></tr></table></td><td>The Proponent shall implement the Offset Strategy described in the SoEE accompanying MOD1 and shown conceptually on the plan in Appendix 5, to the satisfaction of the Secretary.</td><td>Alteration to reflect use of the alternative offset strategy (see Section 2.3, 4.2 and Appendices 2 and 3).</td></tr>
<tr><td>3(23)</td><td>Within 3 years of the date of this approval, the Proponent shall make suitable arrangements to provide appropriate long term security for the offset areas to the satisfaction of the Director-General.</td><td>Within 12 months of the date of the determination of MOD1, the Proponent shall secure the approved offset area through a positive public covenant to the satisfaction of the Secretary.</td><td>To reflect the proposed 6 month timeframe for securing the proposed offset utilising a positive public covenant (see Section 2.3).</td></tr>
<tr><td>3(35)</td><td>The Proponent shall:
(a) only import VENM to the site; and
(b) minimise the amount of waste generated by the project to the satisfaction of the Director-General.</td><td>The Proponent shall:
(a) only import to the site VENM or other materials for which an applicable Resource Recovery Order and Exemption has been issued; and
(b) minimise the amount of waste generated by the project to the satisfaction of the Director- General.
Note: Importation of material is only approved where an applicable Resource Recovery Order and Exemption, issued in accordance with Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 (or its latest amendment), is in place and which allows the material to be received to the Project Site and either processed or applied to land.</td><td>To allow importation of both VENM and other materials suitable for processing or application to land (see Section 2.2).</td></tr>
</table>

3. CONSULTATION AND STATUTORY CONTEXT

3.1 CONSULTATION

3.1.1 Community Consultation

The Applicant has maintained an open relationship with the community surrounding the Project Site through a range of formal and informal consultations held with individual community members and groups. In particular, Community Consultative Committee (CCC) meetings are held biannually at which environmental and operational progress of the Project are discussed and an opportunity is provided to discuss any concerns held by the community. It is noted that there have been no community complaints for 7 years.

The proposed modification was discussed at the CCC at the November 2018 and May and November 2019 meetings. The committee was provided with an opportunity to ask questions and present matters that they would like to see addressed in this document. No matters relevant to the proposed modification were raised and no specific issues to be addressed were identified.

3.1.2 Consultation with Government Agencies

The Applicant has held a range of discussions with DPE / Department of Planning, Industry and Environment (DPIE), principally in relation to the biodiversity offset requirements, and a meeting was held on 4 May 2018 to discuss the proposed modification. On behalf of the Applicant, RWC also submitted an email transmission to (then) DPE on 16 October 2018 to provide an overview of the proposed modification, confirm the appropriate approvals pathway, and to seek DPE's input on matters to be addressed in this SoEE. Discussions with (then) DPE confirmed that the approvals pathway was appropriate and the matters being addressed were generally appropriate. These discussions also confirmed that the (then) OEH declined to consult with the Applicant or it's representatives. Further consultation was undertaken through a scoping meeting held with DPIE on 5 November 2019 with subsequent correspondence received 6 November 2019 requesting the following matters be addressed.

- *A detailed assessment of the vegetation and its condition within the proposed 8 hectare offset area.*
- *A clear description of existing requirements for offset vegetation in the quarry's rehabilitation areas, what vegetation will remain and planned method of rehabilitation of the quarry.*
- *An assessment of impacts to the road network that would be caused by the transportation of additional ENM and VENM to the quarry.*

In addition to consultation with State government agencies, The Hills Shire Council attends and chairs the CCC. No issues relating to the proposed modification have been raised by The Hills Council officers.

3.2 STATUTORY CONTEXT

Project Approval 06_0104 was originally issued under Part 3A of EP&A Act on 3 February 2009. To date, no modification applications have been lodged. With the discontinuation of the transitionary arrangements for Part 3A Projects, the proposed modification is sought under Section 4.55(2) of the EP&A Act and the Project would be transitioned from a Major Project to a State Significant Development. Section 4.55(2) requires that the proposed modification be substantially the same and that an SoEE accompany the application. This SoEE addresses the proposed modification in a manner which the application can be assessed under either assessment pathway.

The current Environment Protection Licence 3407 issued by the NSW Environment Protection Authority for the Project would be varied to permit the acceptance and processing of ENM and other materials.

A Controlled Action approval (EPBC 2003/991) was issued by the (then) Commonwealth Department of the Environment, Water, Heritage and the Arts on 30 March 2009. The approval was issued in relation to the flora species *Tetratheca glandulosa* and requires that no activity be undertaken within the area containing *Tetratheca glandulosa*. Since issue of the approval, *Tetratheca glandulosa* has been delisted from the Commonwealth *Environment Protection and Biodiversity Act 1999*. Notwithstanding, the proposed modification does not change the area of disturbance and, in fact, includes known *Tetratheca glandulosa* within the proposed biodiversity offset area. Therefore, no change to the Controlled Action approval is required.

The proposed modification would not result in any changes in how other approvals, licences or statutory requirements are applied to the Project.

4. ASSESSMENT OF ENVIRONMENTAL EFFECTS

4.1 INTRODUCTION

Section 4 of DFA (2007) provides a range of background information in relation to aspects of the environment within and surrounding the Project Site. That section also provides an assessment of anticipated impacts associated with the Project as it was then understood. This section provides an assessment of anticipated changes to the Project's impacts that would result from the proposed modification and, if applicable, any changes to environmental management measures.

4.2 BIODIVERSITY

An assessment of the proposed alternative biodiversity offset has been undertaken by South East Environmental and is included in full as **Appendices 2** and **3** to this SoEE. The assessment concludes that the proposed biodiversity offset would provide an equal, if not superior biodiversity outcome to the current approved offset which relies upon rehabilitation of fully disturbed areas.

4.3 TRAFFIC AND TRANSPORTATION

No increase in the maximum daily laden truck movements is proposed. Rather, the importation of VENM and other materials would be included in the existing maximum daily laden truck movements. However, the removal of the sub-limit for VENM and other materials would provide for an increase in the Project life and result in an overall increase in average laden truck movements to/from the site. As peak movements would not change, the key impact arising would be a greater impact on the road surface / increased maintenance requirements due to the increase in average laden trucks.

However, it is important to note that the increased number of laden trucks to the Project Site would be associated with incoming VENM and other materials from other developments. These developments would generate laden truck movements regardless of whether the material was received to the Project Site or a different site. Currently VENM is received from multiple locations, principally within the Sydney region, and from multiple types of development including car parks and basements, tunnel projects, and other civil projects. It is expected that materials would continue to be received from similar types of projects together with the Applicant's Old Telegraph Road site (see Section 1.4).

Access to/from Hitchcock Road Sand Project would remain unchanged with imported material ultimately arriving via Old Northern Road and/or Wisemans Ferry Road, both State controlled roads, i.e. managed by Transport for NSW (TfNSW). Currently the Applicant pays S7.11 road contributions in accordance with the Hills Contribution Plan for all exported material, including all processed VENM subsequently transported off site. It is understood that these monies are placed in a trust fund for TfNSW to complete road maintenance works as required.

The Hills Contribution Plan does not require contributions for incoming trucks which import material to the Project Site. It is considered that this remains appropriate for any additional material imported to site given that those laden movements would be generated by other

developments, even in the absence of the Hitchcock Road Sand Project, and that those developments would need to pay road contributions for road maintenance in accordance with the relevant council's contributions plan.

Therefore, no modification to traffic management measures are proposed with the increased impact to road surfacing mitigated through continued payment of road contributions (by either the Applicant or the sites generating the imported material, as applicable).

4.4 SURFACE WATER AND EROSION & SEDIMENT CONTROL

The proposed modification would result in the generation of additional silts over the life of the Project. Silts are currently managed within a number of settlement ponds located within the extraction area. As discussed in Section 1.4, as less overburden/non-saleable material has been encountered than originally anticipated and fewer fines have been generated from washing, the amount of material available to achieve the final landform has not been realised. Therefore, the formation of additional settlement ponds within the extraction area could be readily accommodated. Previously installed diversion banks and bunds would continue to adequately provide for the ongoing diversion of clean water and capture of any sediment-laden runoff.

Following settling, clean water from the settlement ponds would continue to be returned for re-use in on-site processing and washing operations. As the rate of processing is not proposed to change, the proposed modification would not result in a change to annual water usage requirements.

4.5 EMPLOYMENT AND ECONOMIC CONTRIBUTIONS

The Project currently provides employment for approximately:

- 20 to 22 full time employees; and
- truck drivers, including permanent staff as well as those contracted or employed by clients or customers.

The Project provides a secure supply of high-quality construction sand which is a limited resource in the Sydney Region. Alternative sources outside of the Maroota area would result in increased product transport costs and associated increases in environmental impacts due to an increase in distance from the primary market for these products.

The extension of the life of the Project by ten years until 2038, combined with approvals to facilitate the importation and processing of VENM and other materials, would secure both a local supply of construction materials as well as the ongoing employment of 20 to 22 full-time staff employed by the Applicant. An extension to the Project life would also continue to support employment in equipment supply and maintenance and ongoing contributions to economic development in the local area through the purchase of various services and consumables.

4.6 OTHER ENVIRONMENTAL CONSIDERATIONS

Air and Noise

Given that the proposed modification would not result in an increase in the intensity of activities, change in equipment, alteration of processing operations, or hours of operation, there would be no significant changes to air quality or noise impacts or alteration of existing management measures.

Heritage

Previous surveys have not located any Aboriginal heritage items within the approved area of disturbance. The proposed modification does not seek to alter the area of disturbance and therefore would not change the potential for heritage impacts or require modification of existing management measures.

Visual Amenity

The proposed modification would not result in any significant changes to the potential visual amenity impacts or require modification of existing management measures.

Groundwater

The proposed modification would not result in any change to the potential for impacts upon groundwater or require modification of existing management measures.

5. CONCLUSIONS

The assessment undertaken in this SoEE has established that the proposed modification would not result in any significant changes to the approved environmental effects. The proposed modification would, however:

- provide ongoing employment opportunities and economic benefits;
- encourage recycling/reuse of VENM and other materials; and
- enable a biodiversity offset providing an equal, if not superior biodiversity outcome, to be secured in the short term.

6. REFERENCES

DFA Consultants Pty Ltd (DFA) (2007). *Hitchcock Road Sand Extraction and Rehabilitation Project - Environmental Assessment*. November 2007.

Environment Protection Authority (EPA) (2014) *Waste Classification Guidelines – Part 1: Classification of waste.*

Appendices

(Total No. of pages including blank pages = 56)

Appendix 1 Revised Statement of Commitments (4 pages)

Appendix 2 Biodiversity Report (16 pages)

Appendix 3 Biodiversity Assessment Proposed Offset Lot 214 (36 pages)

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Appendix 1

Revised Statement of Commitments

(Total No. of pages including blank pages = 4)

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GENERAL

1. All monitoring, reporting and management measures will be undertaken as outlined within the approved management plans as required by PA 06_0104.

ACCESS AND TRAFFIC

2. If the sand slurry plant and transport system is unusable, due to breakdown or during maintenance periods, trucks will be used for the transport of extractive material on a temporary basis. This will cease once the system is operating satisfactorily.
3. All truck drivers and staff will be informed of the need to comply with on and off-site road rules, speed restrictions and considerate driving practices.
4. Ensure truck drivers and staff are aware of all relevant operational hours.

WATER MANAGEMENT

5. The groundwater table will not be breached or contaminated. In the event that either should occur, operations will cease in the affected area and the Natural Resources Access Regulator consulted to determine the basis on which extraction may recommence.

FLORA, FAUNA AND REHABILITATION

6. The boundary of the site will be fenced to prevent inadvertent external access.
7. Cleared vegetation will be used for rehabilitation and/or habitat improvement.
8. Setbacks to all roads and adjacent properties will be defined taking account of existing trees and other features.
9. Mound construction and visual screen planting will be undertaken as required in the Rehabilitation Plan.
10. Progressive rehabilitation will be undertaken as areas become available following completion of extraction and capping of sediment basins.
11. The final rehabilitated landform will be established in conformity with the approved Rehabilitation Plan.

WASTE MANAGEMENT

12. Appropriate procedures will be prepared and implemented for the verification of received VENM and other materials.
13. All recyclables, general waste and maintenance wastes will be placed in appropriate waste receptacles and disposed of off-site.

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Appendix 2

Biodiversity Report

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Hitchcock Road Offset Proposal
Biodiversity Report

PF Formation
Hitchcock Road Sand Extraction Project

Prepared by

Melissa Mass B.App.Sc.

For PF Formation

November 2019

South East Environmental ABN 13 927 340 723
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1. INTRODUCTION

South East Environmental has been commissioned by PF Formation to assess a proposed alternative biodiversity offset for the clearing of 3.7ha of Sydney Hinterland Transition Woodland (SHTW) associated with the Hitchcock Road Sand Project. The Hitchcock Road Sand Project was approved in 2009 with Schedule 2 Condition 10 of Project Approval (PA) 06_0104 requiring that:

"The Proponent shall not disturb any SHTW vegetation (as shown on the plan in Appendix 5) on site without the prior written approval of the Director-General. In seeking this approval the Proponent shall demonstrate, to the satisfaction of the Director-General, that it has established at least 3.7 hectares of SHTW on the site, to a standard that meets the criteria in Appendix 6."

Rehabilitation of SHTW on the site begun in 2004 with approximately 4.2ha of land having been rehabilitated to the specified criteria and to the satisfaction of the Department. In accordance with Schedule 3 Condition 22, a further 7.8 hectares to SHTW and other vegetation communities are required to be rehabilitated to the specified criteria. This rehabilitation would be undertaken over the remainder of the approved Project life.

However, PF Formation propose an alternative offset strategy using and improving approximately 8ha existing native vegetation located within Lot 214 DP752039, being the southernmost land parcel of the Project Site and recently purchased by PF Formation.

Parsons Brinckerhoff set criteria to monitor success of the rehabilitation effort which was accepted and approved with the project approval in Appendix 6. Using this criteria as reference to success of the rehabilitation effort was crucial to the ability for the project to extend operations into the SHTW and ensure future revegetated off set areas meet the criteria. The new proposed off set area contains existing natural vegetation therefore the criteria to monitor the success of future revegetation does not exist and this reports demonstrates that the new proposed off set area already meets the criteria of appendix 6 and will result in a better biodiversity off set out come than originally proposed.

2 BIODIVERSITY OFFSET AREA

The area referred to for the purpose of this report is 3.7 hectares of disturbed vegetation which was previously known as the Maroota Trig Station. The vegetation in this area was previously identified as being Sydney Hinterland Transition Woodland.

The Trig was officially established in 1973 by the Central Mapping Authority as a Trigonometric Station used as a reference point for surveyors when measuring distance and direction in particular for the creation of maps. In order for the Trig to be effective it needed to be visible from all directions over long distances which is why it was located on the highest hill within the area. It goes without reason that the vegetation surrounding the Trig was completely removed in order for it to serve its purpose. In this instance, and many others, the Trig was established in this location because the vegetation was already removed and therefore perfect for the purpose it needed to serve. Much

of the Maroota area in the mid 1900's was cultivated for livestock farming and citrus orchard growing for the local Cottee's Cordial factory. Many of these orchards suffered enormous loss in the 1970's when repeated hail storms decimated the trees and caused the closure of the factory. It is therefore likely the regrowth of the vegetation at the Trig station started to occur at some point following this downturn in the local economy and subsequent reduction in agricultural use / intensity.

A photo taken of the Trig in 2012 (below) shows exotic weed species, including agricultural weeds, which generally occur in open or cleared areas.

Image 1 and 2. Maroota Trig Station 2012 (Source Geocaching Australia - rogerw3)

A land assessment of the Maroota Trig undertaken by the Department of Conservation and Land Management in 1992 found the vegetation on the northern half of the trig to be largely cleared while the southern half was native woodland with Prickly Pear colonising the fringe. This assessment also addressed the erosion which was considered at the time to be moderate to high. The land capability for Environmental Protection and Nature Conservation were both rated as low significance due to the previous disturbance and current condition of the vegetation. Parsons Brinckerhoff undertook vegetation surveys in 2008 within the 3.7 hectares around the Trig to determine the plant community type present. Within the concluding notes of the Parsons Brinckerhoff survey results document it has been recorded that areas of the forest vegetation were too degraded to accurately determine (with 95% confidence limits) the vegetation community present. However, the survey results suggested that the vegetation most closely fit with SHTW.

A walk through in August 2018 of the remaining vegetation classified as STHW by Parsons Brinckerhoff found that although natural regeneration has been taking place over time, weed species still persist and in some areas dominate the understorey stratum. Weeds identified included Lantana, Green Cestrum, African Lovegrass, Whiskey Grass, Kikuyu Grass, Spear thistle, Wild

Tobacco, Bridal Creeper, Asparagus Fern, Moth Vine, Black Nightshade, Passionfruit Vine, Tradescantia and many agricultural weeds and garden escapee plants.

Image 3. Remaining Sydney Hinterland Transition Woodland

Image 4. Exotic vegetation growing within remaining Sydney Hinterland Transition Woodland

3 Assessment of Alternative Biodiversity Offset

Given the recent purchase of Lot 214 DP752039, PF Formation propose an alternative / reconfigured biodiversity offset strategy in which the existing 8ha of woodland within Lot 214 (see Image 5) is

secured through a positive public covenant rather than reliance being placed upon areas of rehabilitation. The vegetation community on this property is similar to the Sydney Hinterland Transition Woodland with transitional vegetation occurring as evident from the change in canopy species with Ironbark occurring in some areas. Sandstone Gully Forest extends from the lower elevations of the lot before the transition of species occurs midway up the slope and extends to the ridgeline where further transition woodland and Sandstone Heath occurs.

Image 5. Proposed area for offset (green boundary) at Lot 214 DP752039 (red boundary) Hitchcock Road Maroota

The vegetation communities present within the remaining native vegetation located on Lot 214 DP752039 Hitchcock Road Maroota include the Plant Community Types (PCT) of the following:

- 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
- 1255 - Sydney sandstone hinterland dry sclerophyll forest of the Sydney Basin Bioregion
- 1787 - Red Bloodwood - Scribbly Gum - Stringybark open forest on sandstone ridges along the western side of the Woronora and Hornsby plateaus
- 1134 - Scribbly Gum - Hairpin Banksia - Dwarf Apple heathy woodland on hinterland sandstone plateaux of the Central Coast, Sydney Basin Bioregion

These PCT have been confirmed along with additional information found within the Biodiversity Assessment undertaken in conjunction with this report.

Photos of the typical vegetation within these communities taken during a June 2019 walk through are presented as Images 8 to 10.

Figure 6. Location of PCT in proposed offset area

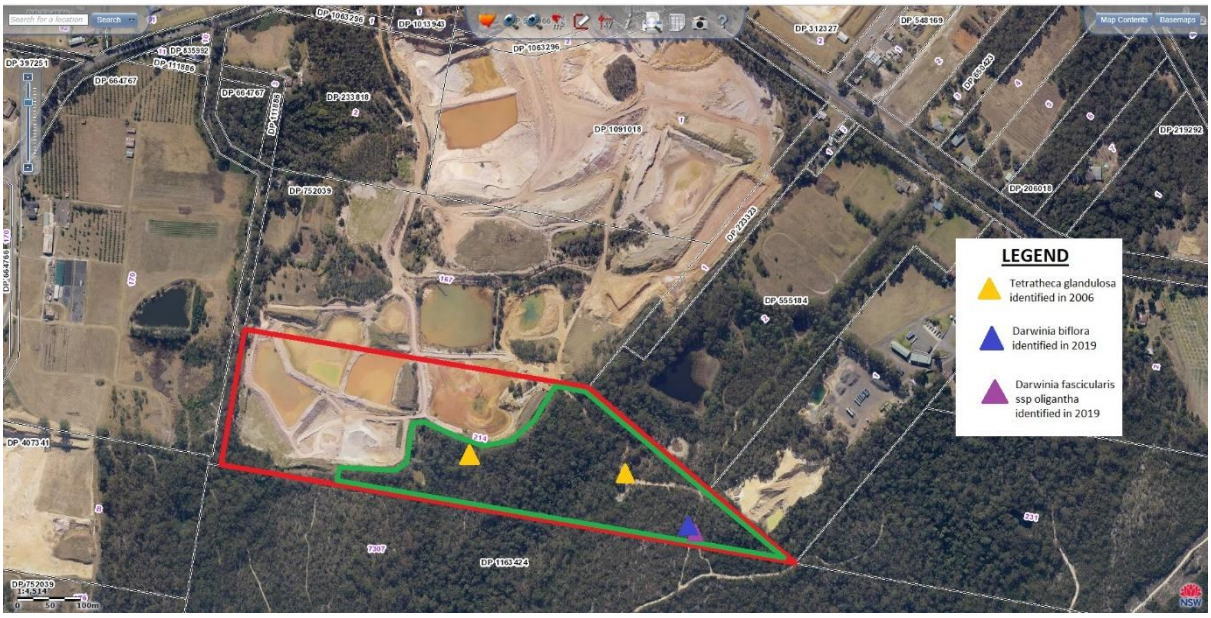

Figure 7. Location of known threatened flora species within the proposed offset area

During the June 2019 walkthrough, it was noted that, within the gully, there were several large trees exceeding 80cm diameter at breast height which could constitute old growth forest. Hollow bearing trees appeared to be common throughout much of the proposed offset area as did fallen timber and the occasional sandstone rock outcrop. Much of the heathland area had extremely dense vegetation cover which could be considered impenetrable without damaging the shrub structure. Other areas had evidence of some previous disturbance adjacent to old and presently unused vehicular tracks.

Threatened flora species were previously identified within the proposed offset area by Parsons Brinkerhoff in 2006 including *Tetratheca glandulosa* and *Grevillea parviflora*. During June 2019 two additional threatened species were identified within the proposed offset area being *Darwinia biflora* and *Darwinia fascicularis subsp oligantha*. Both these species were located on the edge of a vehicular track within the heath vegetation (see Image 10). Further flora surveys were undertaken in November 2019 confirming the threatened species identified in June 2019 and identifying a further

location for *Tetratheca glandulosa*. Information recorded during the November 2019 assessment can be found in the Biodiversity Assessment for Lot 214 submitted with this report.

Figure 8. Sandstone Gully Forest – PCT 1181

Figure 9. Sydney Hinterland Transition Woodland – PCT 1255

Figure 10. Sandstone Heath – PCT 1134

Whilst the proposed offset area includes outstanding biodiversity features, further improvements would be achieved through the closure of the existing tracks which would enable natural regeneration of these areas and reduce edge effects. PF formation could also fence the northern boundary of the offset area which will reduce inadvertent access and separate the area from future agricultural activities. Over time both these measures would further improve the vegetation condition and habitat value.

The criteria set by Parsons Brinckerhoff for monitoring the rehabilitation success is already achieved within the proposed offset area as can be demonstrated in Table 1 which draws off the flora survey data obtained in November 2019.

The offsetting of the 8 hectares at Lot 214 DP752039 Hitchcock Road Maroota could be officially achieved via a positive covenant on the property title for a restriction of use in the offset area.

Table 1. Proposed offset area and criteria to monitor success of revegetation

Category	Criteria	Target 15 years	PCT 1255	PCT1181	PCT1134	PCT1787	Vegetation removed condition
Native species	Native species diversity (average number per 400m² quadrat)	40	43	42	44	46	46
	Average number of characteristic species for the site occurring within 400m²						
	Native species cover (% of native cover in 400m² quadrat)	>95	100	100	100	100	99 – Weeds were present so this number seems incorrect
Weeds	Weed abundance (% of vegetation cover in 400m² quadrat)	<5	<1	<1	<1	<1	<1 – Weeds were present so this number seems incorrect
	Invasive or noxious (now Weeds of National Significance) weed species	Controlled	Not present	Not present	Not present	Not present	Restricted – Lantana, Blackberry and Asparagus Fern were present
Vegetation Structure	Vegetation structure	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units
Canopy	Average canopy height (m)	12	15-20	15-20	4-10	12-16	12-16
	Native canopy cover (% minimum cover)	50-75	50-75	75-100	50-75	50-75	50-75
Shrub layer	Average shrub layer height (m)	1	1.5	1.5	1.5	1.5	1.25
	Native shrub layer cover (% minimum cover)	25-50	25-50	50-75	75-100	25-50	25-50
Ground cover	Native ground cover (% minimum cover)	5-25	25-50	5-25	5-25	25-50	5-25
Ecosystem function	Habitat values	Woodland birds recorded. Habitat structure beginning to develop including groundcover such as leaf litter and fallen timber	Good habitat value with hollow limbs present, leaf litter, fallen timber and natural rock	Good habitat value with hollow limbs present, leaf litter, fallen timber and natural rock. Flowing water within community	Good habitat value with hollow limbs present, leaf litter, fallen timber and natural rock	Good habitat value with hollow limbs present, leaf litter, fallen timber and natural rock	Provides minimal habitat for fauna however many woodland birds present. Well structured habitat includes levels of leaf litter and fallen timber
	Natural regeneration indicating dispersal of seed into site and/or presence of soil seed bank	Yes	Yes	Yes	Yes	Yes	Yes

4 JUSTIFICATION AND CONCLUSION

An alternative offset area with a similar vegetation community has become available (due to purchase of the land by the Company) within Lot 214 DP752039, Hitchcock Road Maroota. This proposed area of approximately 8ha is complete and relatively undisturbed with 4ha being similar vegetation classification to that found within the 3.7ha of vegetation disturbed at the Trig location. Notwithstanding, proposed management measures, including closing of access tracks and fencing, would result in further improvement in the condition of the vegetation community and habitat values.

In comparison to the approved offset strategy which relies upon rehabilitation, the proposed offset would protect in perpetuity an area with some outstanding biodiversity features which the 3.7ha of disturbed vegetation lacked prior to clearing. In particular, the proposed offset area contains habitat features, such as hollow bearing trees, fallen timber and rock outcrops, which the current offset strategy would not achieve until the long term (>50 to 80 years) or not at all in the case of rock outcrops. In addition to being mature growth forest, threatened flora species have been confirmed to be present which were not previously identified within the 3.7ha disturbance area or areas of current rehabilitation.

Therefore, it is concluded that the proposed biodiversity offset would provide an equal, if not superior biodiversity outcome to the currently approved offset which relies upon rehabilitation of fully disturbed areas.

5 QUALIFICATIONS OF THE AUTHOR

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 2019. 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 date 23rd Mar 2021.

Melissa is an Accredited Biodiversity Assessment Method Assessor, accreditation number BAAS18053, with accreditation valid until 20/03/2021. Her accreditation covers all areas of NSW.

Melissa has been working as an Ecologist for 10 years. Her work has included targeted threatened species assessment and management, reviews of environmental factors, bush regeneration, environmental impact assessments, vegetation management plans and environmental survey and monitoring.

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7 APPENDIX

1. Project Approval Appendix 6

APPENDIX 6
CRITERIA TO MONITOR SUCCESS OF REVEGETATION

PB PARSONS BRINCKERHOFF

Methodology to assess success of revegetation within Hitchcock Road site

Table 3-1 Criteria to monitor success of revegetation

Category	Criteria	Target 5 years	Target 10 years	Target 15 years	Existing condition of vegetation to be removed
Native species	Native species diversity (average number per 400m^2 quadrat)	20	35	40	46
	Average number of characteristic species for the site occurring within 400m^2	15	20	27	34.5 (+/- 1.5)
	Native species cover (% of vegetation cover in 400m^2 quadrat)	>50	>85	>95	99
Weeds	Weed abundance (% of vegetation cover in 400m^2 quadrat)	<50	<15	<5	<1
	Invasive or Noxious weed species (e.g. Lantana, Blackberry, exotic vines)	Controlled	Controlled	Controlled	Restricted
Vegetation structure	Vegetation structure	Canopy, shrublayer and groundcover species present. However, structure limited, generally consisting of low canopy and ground cover.	Canopy, shrublayer and groundcover species present. Structure beginning to develop.	Well structured and includes canopy, mid-storey and ground cover units	Well structured and includes canopy, mid-storey and ground cover units
Canopy[a]	Average canopy height (m)	4	8	12	12-16
	Native canopy cover (minimum % cover)	5	5	5	5
	[modified braun blanquet scale] [b]	[3]	[3]	[3]	[3]
Shrub layer[a]	Native shrub cover (minimum % cover)	10	15	25	32.5 (+/-7.5)
	[modified braun blanquet scale] [b]	[3]	[3]	[4]	[4]
	Average shrub layer height (m)	0.5	1	1	1.25
Ground cover	Native ground cover (minimum % cover)	5	10	10	15 (+/-5)
	[modified braun blanquet scale] [b]	[3]	[3]	[3]	[3]

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South East Environmental

PARSONS BRINCKERHOFF

Methodology to assess success of revegetation within Hitchcock Road site

Category	Criteria	Target			Existing condition of vegetation to be removed
		5 years	10 years	15 years	
Ecosystem function	Habitat values	Vegetation structure beginning to develop.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Woodland birds recorded. Habitat structure beginning to develop, including groundcover such as leaf litter and fallen timber.	Provides minimal habitat for fauna, however, many woodland birds present. Well structured habitat, includes moderate levels of leaf litter and fallen timber.
	Natural regeneration indicating dispersal of seed into site and/or presence of soil seed bank	Yes	Yes	Yes	Yes

Notes: a) cover of canopy species and shrubs may be higher initially due to successional changes with dense growth potentially occurring initially particularly due to the presence of colonising species. Natural thinning is expected as colonising species senesce and canopy species mature, however, some thinning of vegetation may be required after 10 years if too dense.

b) Modified braun blanquet scale:

1. <5%- rare or few individuals
2. <5% common
3. 5-25%
4. 25-50%
5. 50-75%
6. 75-100%

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South East Environmental

Appendix 3

Biodiversity Assessment Proposed Offset Lot 214

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BIODIVERSITY ASSESSMENT

Proposed Offset Lot 214

Hitchcock Road Sand

Extraction Project

Maroota

Prepared for PF Formation Pty Ltd

November 2019 V.1

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Biodiversity Assessment

Proposed Offset Lot 214

Hitchcock Road Sand

Extraction Project

Maroota, NSW, 2756

This assessment has been prepared by

Melissa Mass

Accreditation Number
BAAS18053

November 2019 V.1

Date

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Abbreviations

Abbreviation	Description
APZ	Asset Protection Zone
BAM	Biodiversity Assessment Method
BAOS	Biodiversity Assessment of Significance
BC Act	*NSW Biodiversity Conservation Act 2016*
BC Reg	*NSW Biodiversity Conservation Regulation 2017*
DA	Development Application
DBH	Diameter at Breast Height
DPIE	NSW Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
IBRA	Interim Biogeographic Regionalisation of Australia
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	NSW Local Land Services
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
SAII	Serious and irreversible impacts
SEED	Sharing & Enabling Environmental Data
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
THSC	The Hills Shire Council

1 INTRODUCTION

1.1 BACKGROUND

This Biodiversity Assessment (BA) has been prepared to accompany a Section 4.55(1A) modification application (Mod 1) under the *Environmental Planning and Assessment Act 1979* (EP&A Act) to Project Approval (PA) 06_0104 granted for the Hitchcock Road Sand Extraction Project in 2009.

This assessment has been deemed necessary to accompany the Biodiversity Assessment Report which will be presented to the NSW Department of Planning, Industry and Environment (DPIE) for consideration. This report assesses the biodiversity value which is currently present within Lot 214 DP752039.

Database records and information reviewed in the preparation of this report include:

- Aerial photography of the subject property and of the local landscape obtained from the Department of Lands Spatial Information Exchange;
- NSW Department of Planning, Industry and Environment (DPIE) Biodiversity Value Map;
- NSW Local Land Services (LLS) Native Vegetation Regulatory Map;
- Vegetation maps of the region (NSW Gov. SEED);
- Data on the NSW Office of Environment and Heritage (NSW OEH) BioNet database of the targeted threatened species predicted to occur on the study site (data obtained November 2019);
- Final determinations, NPWS OEH species profiles, and other available information pertaining to threatened species known to occur in the locality;
- Flora and Fauna Assessment Report prepared by Parsons Brinckerhoff 2006.

1.2 GOVERNMENT LEGISLATION AND POLICY

This study was undertaken with regards to the local, state and commonwealth legislative requirements addressing the ecological issues within the study area.

The *EP&A Act* provides the framework for the planning and assessment of development proposals throughout NSW and ensures environmental issues are addressed and considered during the planning phase. Biodiversity of regional landscapes and threatened species protection are considerations under this Act.

The *BC Act* requires that impacts to biodiversity are considered during the planning stage of development using a scientific method of assessment known as the BAM.

The *Biosecurity Act 2015*, in this instance, addresses any pest species which are likely to have an adverse effect upon the environment in the immediate local landscape.

The *EPBC Act* applies to any action that is likely to have an impact to matters of national environmental significance during the course of, or outcome of, a development. This legislation refers to threatened species, populations and communities, migratory species and national heritage areas.

1.3 DESCRIPTION OF THE STUDY SITE AND ADJACENT LAND

This study area is within The Hills Shire Council (THSC) of the Sydney Basin NSW Catchment Area. The proposed offset area is eight hectares within Lot 214 DP752039 zoned RU1 – Primary Production under THSC Local Environment Plan 2012 (LEP). The 8ha proposed for offset is hereafter referred to as the 'study area'.

The proposed 8ha of offset currently has no dwelling however does contain disused vehicular tracks which provide access into and through the site.

The native vegetation within the proposed offset area is relatively intact with evidence of old growth forest, particularly in the gully areas which were most likely deemed too steep for primary production or timber retrieval. The head waters of Little Cattai Creek begin within the study area and continue on to the south, passing through Broadwater Swamp to eventually meet with the Hawkesbury River along the northern boundary of Cattai National Park some 15kms downstream. Habitat features are ample within the study area with hollow bearing trees in abundance, sandstone rock platforms and outcrops, fallen timber and in some areas dense leaf litter. All stratums of vegetation structure are present in all vegetation communities present onsite. Threatened flora species were observed to be present.

This assessment focuses on the southern and eastern areas of land within Lot 214 DP 752039 for the sole purpose of creating an offset for vegetation removal within the Hitchcock Road Sand Project only. The remaining north and western areas of the Lot has been subjected to sand extraction from the Hitchcock Road Sand Project. Over time this area will be rehabilitated to agricultural land as per the projects Rehabilitation Plan.

Figure 1. Aerial photo of Lot 214 DP 752039, demonstrating the proposed offset study area (Sixmaps 2019)

South East Environmental

2 LANDSCAPE CONTEXT

The study area is located within the Interim Biogeographic Regionalisation of Australia (IBRA) of the Sydney Basin, subregion Yengo. The property is situated within the locality of Maroota which is within The Hills Shire Council local Government area. The native vegetation throughout the immediate surrounding area is mosaicked around existing dwellings, small agricultural lots and extractive industry. Large conservation estates occur to the north and east being Parr State Conservation Area, Dharug National Park and Marramarra National Park with smaller estates such as Maroota Ridge State Conservation Area, Cattai National Park and Scheyville National Park being located to the south.

2.1 IDENTIFYING LANDSCAPE FEATURES

The study area has good native vegetation connectivity to the south and east. Connectivity to the north and west is reasonable although the landscape dramatically changes within these areas from agricultural use and extractive industry. The landscape within the connectivity areas are of high biodiversity and conservation value due to their proximity to conservation lands to the east. Much of the connectivity areas outside of conservation estates remain undisturbed due to the steep terrain and poor soil structure found within the ridgetop and gully areas. Rocky outcrops escarpments and small sandstone caves are common within this locality.

Significant Biodiversity Value has been identified within the study area as shown in figure 3. The significance being the head waters of Little Cattai Creek.

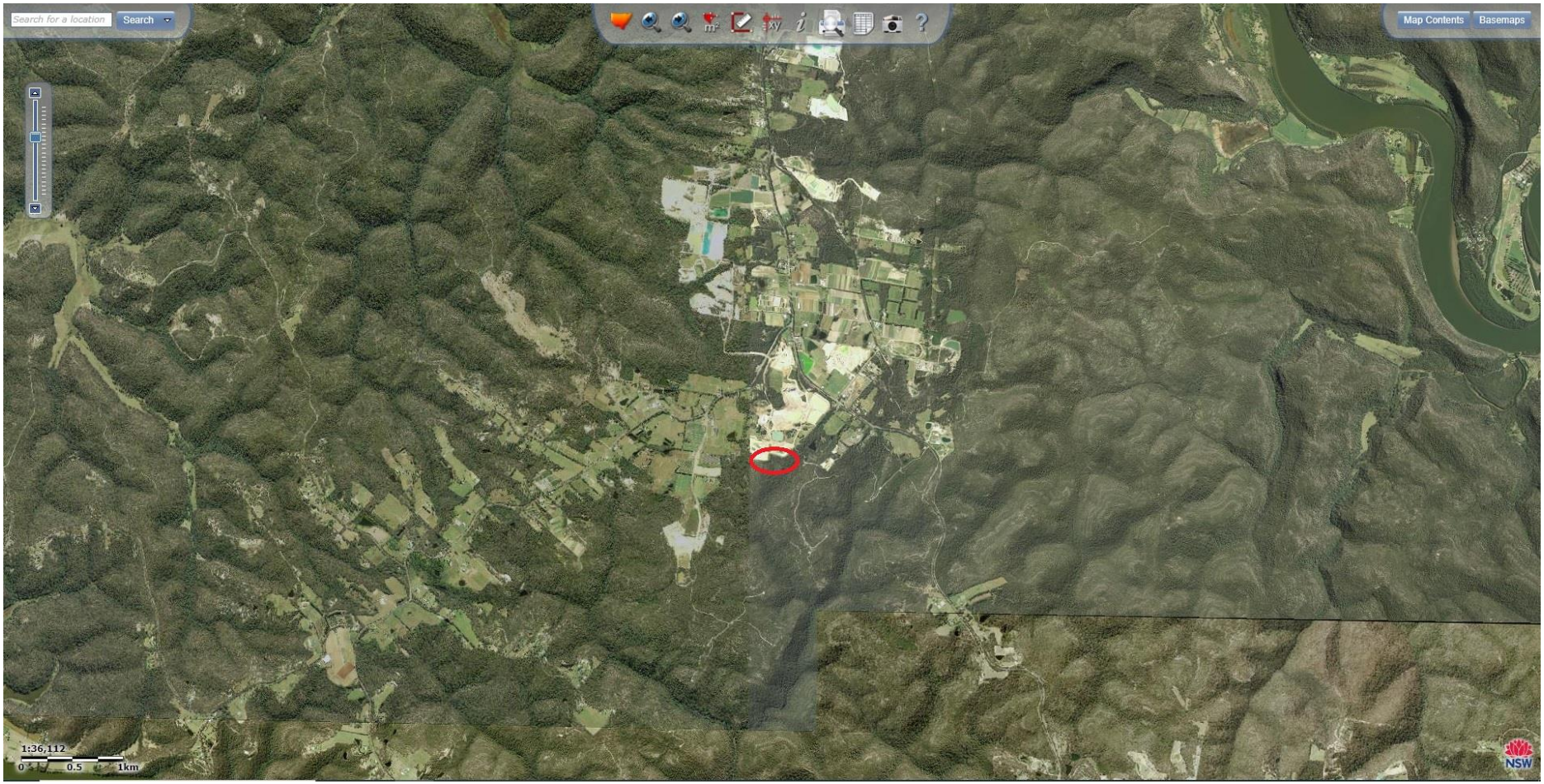

Figure 2. Landscape context of study area

South East Environmental

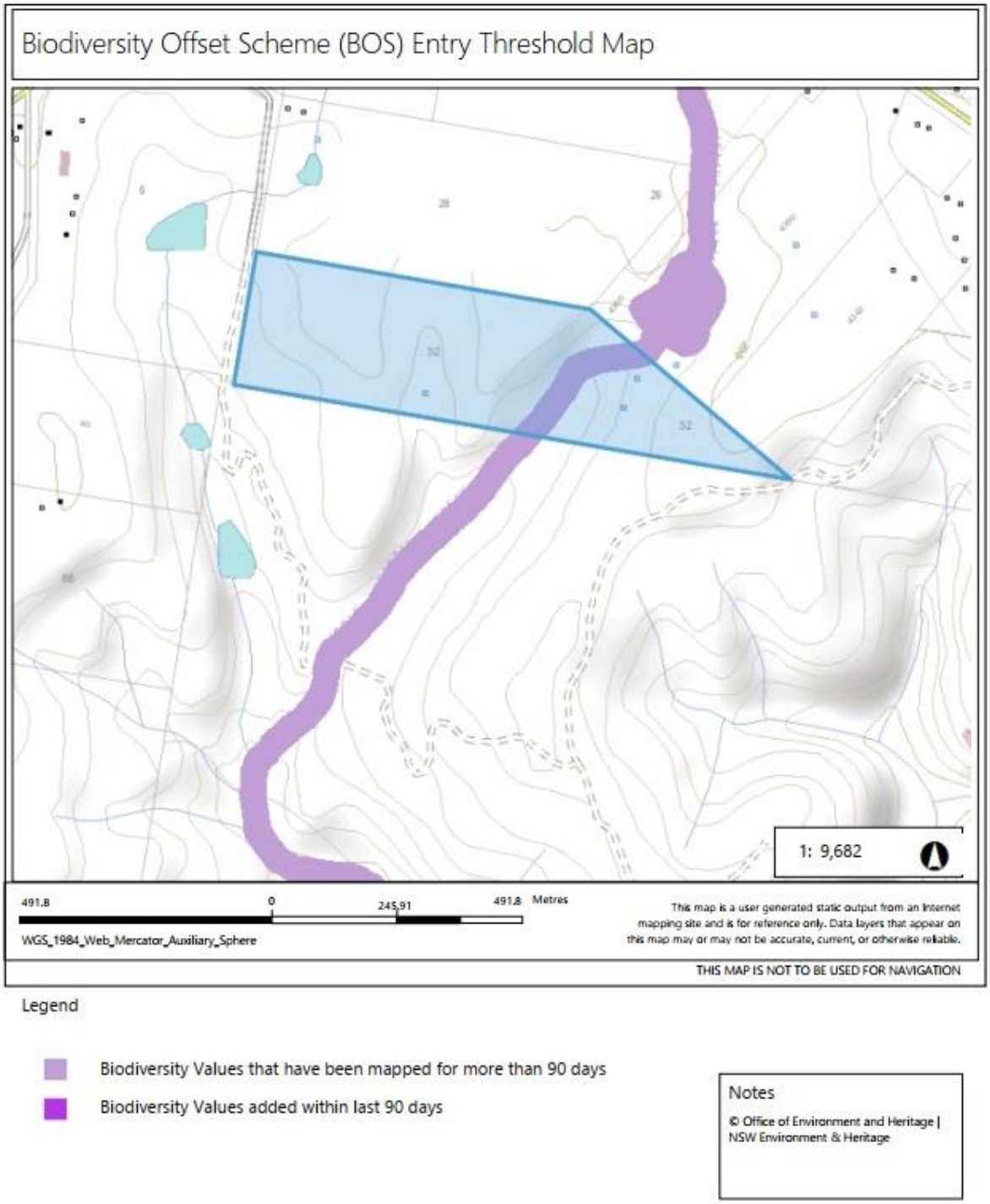

Figure3a. Biodiversity Value Map Page 1

South East Environmental

NSW GOVERNMENT

Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	27/11/2019 5:20 PM		**BDAR Required***
Total Digitised Area	16.06	ha	
Minimum Lot Size Method	LEP		
Minimum Lot Size	10	ha	
Area Clearing Threshold	0.5	ha	
Area clearing trigger Area of native vegetation cleared	Unknown #		Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	yes		yes
Date of the 90 day Expiry	N/A		

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is "likely to significantly affect threatened species' as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BOSET user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Office of Environment and Heritage and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies will all aspects of the *Biodiversity Conservation Act 2016*.

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature_____ Date: 27/11/2019 05:20 PM

Figure 3b. Biodiversity Value Map Page 2

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3 ASSESSING NATIVE VEGETATION

The 8ha study area has been determined to have four different vegetation communities present. Heath vegetation is commonly found within the higher slopes in the east with gully forest, as expected, within the lower elevations and the gully head of Little Cattai Creek. Dry Sclerophyll forest occurs to the west of the study area which has a woodland structure quite easy to transverse.

3.1 IDENTIFYING NATIVE PLANT COMMUNITY TYPES AND ECOLOGICAL COMMUNITIES ON THE SUBJECT LAND

Botanical surveys of the study area were conducted on the 15th of November 2019, by Melissa Mass. The survey undertaken during November included a four BAM survey quadrats, one in each distinct vegetation community. Approximately 4.5 hours were spent conducting botanical surveying throughout the study area. Each BAM quadrat included a 50m x 20m plot to assess habitat features and attributes, a 20m x 20m flora survey recording vegetation diversity and density and five 1m x 1m litter cover attribute surveys.

The flora survey undertaken recorded the following information:

- species name – scientific and common;
- growth form of each species recorded;
- stratum layer each species occurs in;
- the estimated percentage of foliage cover each species created within the plot; and
- the abundance of each species within the plot.

Flora species recorded are listed in Appendix A of this report.

Plant Community Type (PCT) was identified and described with reference to the vegetation maps developed and made available by the OEH SEED portal, the descriptions as outlined in the NSW Plant Community Type Classification, and with reference to vegetation mapping supplied by The Hills Shire Council Interactive Mapping Tool.

Limited information was available on the OEH SEED portal for the study area however THSC suggests two plant communities of Sandstone Gully Forest and Sandstone Heath as being present within the study area and throughout much of the local landscape. In 2006 Parsons and Brinckerhoff conducted botanical surveying within the study area finding the plant community to be Sydney Sandstone Gully Forest and Sydney Sandstone Ridgetop Woodland. The survey conducted for this report in November 2019 confirms these now generic community names and has refined the vegetation communities to be in line with the OEH BioNet Vegetation Information System classifications.

The dominant canopy species identified within the survey area were searched within the BioNet Vegetation Information System which gave several results for each vegetation

community. Those with the best fit upper, mid and ground stratum species were selected as being the most likely to be present onsite. The results were as follows:

1787 - Red Bloodwood - Scribbly Gum - Stringybark open forest on sandstone ridges along the western side of the Woronora and Hornsby plateaus – approximately 0.5ha

1134 - Scribbly Gum - Hairpin Banksia - Dwarf Apple heathy woodland on hinterland sandstone plateaux of the Central Coast, Sydney Basin Bioregion – approximately 2ha

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 – approximately 2ha

1255 – Sydney sandstone hinterland dry sclerophyll forest of the Sydney Basin Bioregion – approximately 3.5ha

None of these PCT's are associated with any Threatened Ecological Communities (TEC).

Dominant species identified as present within PCT 1787 were *Corymbia gummifera* Red Bloodwood, *Syncarpia glomulifera* Turpentine, *Eucalyptus haemastoma* Scribbly Gum, *Banksia serrata* Old Man Banksia, *Persoonia levis* Broad-leaf Geebung, *Grevillea buxifolia* Grey Spider Flower, *Isopogon anethifolius* Broad-leaf Drumsticks, *Entolasia stricta* Wiry Panic, *Themeda australis* Kangaroo Grass, *Lomandra obliqua* Fishbones, *Cyathochaeta diandra* Sheath Rush and *Actinotus minor* Lesser Flannel Flower.

Dominant species identified as present within PCT 1134 were *Eucalyptus haemastoma* Scribbly Gum, *Eucalyptus gummifera* Red Bloodwood, *Eucalyptus squamosa* Scaly Bark, *Angophora hispida* Dwarf Apple, *Banksia ericifolia* Heath leaved Banksia, *Petrophile pulchella* Conesticks, *Leptospermum trinervium* Flaky-bark Tea-tree, *Actinotus minor* Lesser Flannel Flower, *Rytidosperma racemosum* Wallaby Grass and *Austrostipa pubescens* Spear Grass.

Dominant species identified as present within PCT 1181 were *Angophora costata* Smooth-barked Apple, *Corymbia gummifera* Red Bloodwood, *Syncarpia glomulifera* Turpentine, Ceratopetalum gummiferum NSW Christmas Bush, *Leptospermum trinervium* Flaky-bark Tea-tree, *Callicoma serratufolia* Black Wattle, *Persoonia levis* Broad-leaf Geebung, *Bossiaea obcordata* Spiny Bossiaea, *Dianella caerulea* Blue Flax Lily, *Entolasia marginata* Bordered Panic, *Lindsaea microphylla* Lacy Wedge Fern, *Pteridium esculentum* Bracken Fern and *Smilax glyciphylla* Sweet Sarsaparilla.

Dominant species identified as present within PCT 1255 were *Syncarpia glomulifera* Turpentine, *Angophora costata* Smooth-barked Apple, *Corymbia gummifera* Red Bloodwood, *Eucalyptu pilularis* Blackbutt, *Elaeocarpus reticulatus* Blueberry Ash, *Grevillea buxifolia* Grey Spider Flower, *Dodonaea triquetra* Large-leaf Hop Bush, *Leptospermum polygalifolium* Tantoon, *Gompholobium grandiflorum* Dainty Wedge Pea, *Aristida vagans* Three-awned Grass, *Caustis flexuosa* Curly Wig, *Imperata cylindrica* Blady Grass and *Clematis aristata* Old Man's Beard.

Figure 4. Plant Community Type identified with transect locations and directions in the study area

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3.2 THREATENED ECOLOGICAL COMMUNITIES AND THREATENED FLORA SPECIES

No TEC was identified within the study area.

A threatened flora species, *Tetratheca glandulosa* Glandular Pink Bells listed as Vulnerable in the *BC Act*, was identified within both PCT 1787 and 1134. This species potentially occurs throughout the study area with the exception of the moister areas of the gully vegetation. Furthermore the threatened species *Darwinia biflora,* listed as Vulnerable with both the *BC Act* and *EPBC Act*, was identified outside of the survey quadrat but within the study area. This species was located along the edge of a vehicular access track but is also likely to occur within the heath understorey of PCT 1134. A species listed as an Endangered Population within the Baulkhams Hills District under the *BC Act*, *Darwinia fascicularis subsp oligantha*, was also identified outside of the survey quadrat but within the study area. This species is especially suited to rock platforms within heath vegetation such as that found within PCT 1134.

Figure 5. Location of threatened species identified during the November 2019 survey

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Figure 6. *Tetratheca glandulosa* within Survey quadrat 1.

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Figure 7. *Darwinia fascicularis subsp. oligantha* located within the study area. Flower detail inset picture.

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Figure 8. *Darwinia biflora* located within the within study area

ASSESSING HABITAT SUITABILITY FOR THREATENED SPECIES

3.3 ASSESSMENT OF THREATENED FLORA SPECIES

A 10km radius search for threatened flora species around the study area identified twenty two threatened species, several of which may occur within the study area however were not identified during the survey period. Results can be seen in Table 1. Conservation of the study area would help to ensure continued presence of threatened flora species within the immediate and local landscape.

3.4 ASSESSMENT OF FAUNA HABITAT

The study area was assessed for suitability as habitat for native fauna, especially those listed on the *BC Act*.

The study area contains an ephemeral creek line being the head of Little Cattai Creek, although in this location it is more likely considered a drainage line. Wet seepages at the head of this drainage line eventually lead to trickling water flow by the southern boundary of the study area.

There are ample trees located within the study area which are suitable roosting or nesting habitat for threatened mammal or bird species with several large hollows noted within the survey quadrats. There were trees present which are commonly used as foraging trees for the Glossy Black Cockatoo however no evidence that any of these trees have been used by the species was found during the survey period. There are trees present onsite which are listed as core feed tree species for the Koala in Schedule 2 of SEPP 44. It is very likely that the vegetation within the study area is used for foraging by a variety of species however there were no habitat features or vegetation communities identified considered as critical habitat for any listed species.

There were some fallen timber present which could provide habitat for small reptiles and invertebrates. There are rocky overhangs, ledges and crevices that could be used for roosting by microchiropteran bats.

Overall the fauna habitat within the study area is of high value for conservation.

A 10km radius online search using the BioNet database identified several threatened fauna species that have historically occurred on the study site or within the immediate local area.

Table 1. Threatened flora species historically found within 10kms of the study area

Listed flora species historically found within 10kms of Lot214 DP752039		
Botanical Name	Common Name	Conservation Status
Acacia bynoeana	Bynoe's Wattle	BC – Endangered EPBC – Vulnerable
Acacia gordonii		BC – Endangered EPBC – Endangered
Amperea xiphoclada var. pedicellata		BC – Presumed extinct EPBC - Extinct
Ancistrachne maidenii		BC - Vulnerable
Asterolasia elegans		BC – Endangered EPBC - Endangered
Callistemon linearifolius	Netted Bottle Brush	BC – Vulnerable
Darwinia biflora		BC – Vulnerable EPBC – Vulnerable
Darwinia fascicularis subsp. oligantha		BC – Endangered population
Darwinia peduncularis		BC - Vulnerable
Grammitis stenophylla	Narrow-leaf Finger Fern	BC - Endangered
Dillwynia tenuifolia		BC - Vulnerable
Dillwynia tenuifolia		BC – Endangered population
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	BC – Vulnerable EPBC - Vulnerable
Grevillea parviflora sp. supplicans		BC – Endangered
Hibbertia puberula		BC - Endangered
Hibbertia superans		BC – Endangered
Kunzea rupestris		BC – Vulnerable EPBC - Vulnerable
Lasiopetalum joyceae		BC – Vulnerable EPBC – Vulnerable
Leucopogon fletcheri subsp. fletcheri		BC - Endangered
Melaleuca deanei	Deane's Paperbark	BC – Vulnerable EPBC - Vulnerable
Micromyrtus blakelyi		BC – Vulnerable EPBC - Vulnerable
Olearia cordata		BC – Vulnerable EPBC – Vulnerable
Persoonia hirsuta	Hairy Persoonia	BC – Endangered EPBC – Endangered
Pimelea curviflora var.curviflora		BC – Vulnerable EPBC – Vulnerable
Tetratheca glandulosa		BC – Vulnerable
Zieria involucrata		BC – Endangered EPBC - Vulnerable

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Table 2. Threatened fauna species historically recorded within 10kms of the study area

Threatened fauna species historically located within 10km Lot 214 DP752039		
Common name	**Scientific name**	**Conservation status**
BIRDS		
Black Falcon	*Falco subniger*	BC – Vulnerable
Brown Treecreeper	*Climacteris picumnus*	BC – Vulnerable
Flame Robin	*Petroica phoenicea*	BC – Vulnerable
Gang-gang Cockatoo	*Callocephalon fimbriatum*	BC – Vulnerable
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	BC – Vulnerable
Little Eagle	*Hieraaetus morphnoides*	BC - Vulnerable
Little Lorikeet	*Glossopsitta pusilla*	BC - Vulnerable
Masked Owl	*Tyto novaehollandiae*	BC – Vulnerable
Powerful Owl	*Ninox strenua*	BC – Vulnerable
Sooty Owl	*Tyto tenebricosa*	BC – Vulnerable
Turquoise Parrot	*Neophema pulchella*	BC – Vulnerable
Varied Sittella	*Daphoenositta chrysoptera*	BC – Vulnerable
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	BC - Vulnerable
MAMMALS		
Eastern Freetail-bat	*Mormopterus norfolkensis*	BC – Vulnerable
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	BC – Vulnerable
Eastern Cave Bat	*Vespadelus troughtoni*	BC - Vulnerable
Eastern Pygmy-possum	*Cercartetus nanus*	BC - Vulnerable
Grey-headed Flying -Fox	*Pteropus poliocephalus*	BC – Vulnerable EPBC - Vulnerable
Koala	*Phascolarctos cinereus*	EPBC – Vulnerable BC – Vulnerable
Large-eared Pied Bat	*Chalinolobus dwyeri*	BC – Vulnerable
Little Bentwing-bat	*Miniopterus australis*	BC – Vulnerable
Yellow-bellied Glider	*Petaurus australis*	BC – Vulnerable
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	BC - Vulnerable
AMPHIBIANS		
Giant Burrowing Frog	*Heleioporus australiacus*	BC – Vulnerable
Red-crowned Toadlet	*Pseudophryne australis*	BC – Vulnerable

4 CONCLUSION

The study area has a limited history of disturbance which makes it ideal for conservation. Three threatened flora species listed with the *BC Act*, and one with the *EPBC Act*, were identified within the study area. Several large trees which could be considered as significant old growth were located within the study area. These trees are important habitat features for many fauna species as they contain multiple sized hollows, including large hollows more than 20cm in diameter. The remaining vegetation contains significant natural resources and ample habitat features for a range of threatened and non-threatened flora and fauna species.

It is the opinion of South East Environmental that a long term conservation agreement of the 8ha study area would be a suitable offset for the 3.7ha of Sydney Hinterland Transition Woodland which will be removed for the Hitchcock Road Sand Project. The study area contains approximately 4ha of Sydney Hinterland Transition Woodland consisting of PCT 1787 and 1255. The remaining vegetation communities, being heathland and gully forest, are of high value for conservation and in particular the conservation of the existing transition woodland which stems from these communities.

The current offset agreement aims to rehabilitate 8ha of Sydney Hinterland Transition Forest on post-quarried areas. Currently 4.2ha of rehabilitation have already commenced during 2004, 2006 and 2011. Although the vegetation within the 2004 and 2006 rehabilitation areas are now representative of a self-sustaining woodland they lack important habitat features which only occurs in older vegetation stands such as hollow bearing limbs and sufficient ground timber habitat. Diversity of vegetation species is increasing over time however is lacking in comparison to the proposed 8ha offset area of Lot 214. It would take another 30-50 years of growth within the rehabilitation area to resemble the vegetation and habitat features found within the study area.

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.

This report does not include assessment of the ongoing impacts associated with the sand extraction operation at the Hitchcock Road Sand Project that may cause additional disturbance as these are not known.

The assessment and conclusions are current with relevant legislation at the time of writing.

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 APPENDICES

Appendix A - Flora species identified within the study area

Botanical Name	Common Name	PI 1	PI 2	PI 3	PI 4
Acacia linifolia	White Wattle			*	*
Acacia myrtifolia	Red-stemmed Wattle	*			
Acacia parramattensis	Parramatta Wattle	*			
Acacia suaveolens	Sweet Wattle	*			
Acacia terminalis	Sunshine Wattle			*	
Actinotus helianthi	Flannel Flower	*			
Actinotus minor	Lesser Flannel Flower	*	*		
Allocasuarina littoralis	Black She-oak	*		*	*
Anisopogon avenaceus	Oat Speargrass	*			
Anogophora costata	Smooth Bark Apple			*	*
Angophora hispida	Dwarf Apple		*		
Aristida vagans	Three-awned Speargrass				*
Aristida warburgii	Fine-leaved Wire Grass	*			*
Asplenium attenuatum	Simple Spleenwort				*
Asplenium flabellifolium	Necklace Fern		*		*
Austrostipa pubescens	Spear Grass		*	*	
Banksia ericifolia	Heath-leaved Banksia	*	*	*	
Banksia serrata	Old Man Banksia	*		*	
Banksia spinulosa	Hairpin Banksia			*	*
Billardiera scandens	Hairy Apple Berry	*		*	*
Boronia floribunda	Pale Pink Boronia			*	
Boronia ledifolia	Sydney Boronia		*		
Bossiaea lenticularis	Bossiaea				*
Bossiaea obcordata	Spiny Bossiaea	*		*	
Bossiaea scolopendria	Sword Bossiaea		*		
Callicoma serratifolia	Black Wattle			*	
Cassytha glabella	Slender Devils Twine	*		*	*
Caustis flexuosa	Curly Wig	*			*
Caustis pentandra	Thick Twist Rush	*	*		
Centipida minima	Spreading Sneezeweed				
Ceratopetalum gummiferum	New South Wales Christmas-bush			*	
Cheilanthes sieberi	Mulga Fern	*			*
Clematis aristata	Old Mans Beard				*
Conospermum longifolium	Long Leaf Smoke Bush		*		
Corymbia eximia	Yellow Bloodwood	*	*		
Corymbia gummifera	Red Blood Wood	*	*	*	
Cyathochaeta diandra	Sheath Rush	*			
Cyathea australis	Rough Tree Fern			*	
Dianella caerulea var caerulea	Blue Flax-lily			*	*
Dianella longifolia	Blueberry Lily				*

Dianella prumia	Native Flax		*		
Dillwynia retorta	Healthy Parrot Pea			*	*
Dipodium roseum	Pink Hyacinth Orchid				*
Dodonaea triquetra	Large-leaf Hop-bush	*			*
Einadia hastata	Berry Saltbush				
Elaeocarpus reticulatus	Blueberry Ash				*
Entolasia marginata	Bordered Panic			*	
Entolasia stricta	Wiry Panic	*			*
Epacris pulchella	Wallum Heath	*			
Eucalyptus haemostoma	Scribbly Gum	*	*		
Eucalyptus pilvlaris	Blackbutt				*
Eucalyptus punctata	Grey Gum			*	*
Eucalyptus sparsifolia	Small Leaf Stringy Bark		*		
Eucalyptus squamosa	Scaly Bark		*		
Exocarpos cupressiformis	Cherry Ballart				*
Gahnia sieberiana	Red-fruited Saw-sedge	*		*	
Gleichenia dicarpa	Pouched Coral Fern			*	
Gompholobium glabratum	Dainty Wedge Pea		*		*
Grevillea buxifolia	Grey Spider Grevillea	*	*		*
Grevillea speciosa	Red Spider Flower			*	
Hakea dactyloides	Finger Hakea		*	*	*
Hakea sericea	Bush Needlebush	*	*		*
Hardenbergia violacea	False Sarsaparilla			*	
Hibbertia diffusa	Wedge Guinea Flower			*	
Hibbertia scandens	Climbing Guinea Flower		*		
Hovea longifolia	Rusty Pods	*	*		
Imperata cylindrica	Blady Grass				*
Isopogon anemonifolius	Broad-leaved Drumsticks	*	*		
Jacksonia scoparia	Dogwood	*			*
Kunzea ambigua	Tick Bush	*			
Lambertia formosa	Mountain Devil	*	*		*
Lepidosperma laterale	Variable Swordsedge				*
Leptospermum polygalifolium	Tantoon		*		*
Leptospermum trinervium	Flaky Bark Tea-tree	*	*	*	
Leucopogon juniperinus	Prickly Beard-heath	*	*		
Leucopogon virgatus	Common Beard Heath		*		
Lindsaea microphylla	Lacy Wedge Fern			*	
Lomandra gracilis	Mat-rush		*		
Lomandra longifolia	Spiny-headed Mat-rush			*	*
Lomandra multiflora	Many Flowered Mat-rush	*	*		
Lomandra obliqua	Fish Bones	*	*	*	
Lomatia silaifolia	Crinkle Bush			*	*
Micromyrtus ciliata	Fringe Heath-myrtle		*		
Mirbelia rubiifolia	Heath Mirbelia		*		
Persoonia lanceolata	Lance Leaved Geebung		*		
Persoonia levis	Broad Leaved Geebung		*	*	
Persoonia pinifolia	Pine Leaved Geebung	*		*	*
Petrophile pulchella	Conesticks	*	*		
Phyllanthus hirtellus	Thyme Spurge		*	*	*

Pimelea linifolia	Slender Rice Flower		*		
Pittosporum undulatum	Sweet Pittosporum				*
Platysace linearifolia	Carrot Tops		*	*	
Polyscias sambucifolia	Elderberry Panax				*
Pomax umbellata	Pomax	*			
Pratia purpurascens	White Root	*			
Pteridium esculentum	Bracken Fern	*		*	
Rytidosperma racemosum	Wallaby Grass	*	*		
Scaevola ramosissima	Purple Fan Flower	*	*	*	
Smilax glyciphlla	Sweet Sarsaparilla			*	*
Syncarpia glomulifera	Turpentine	*		*	*
Telopea speciosissima	NSW Waratah			*	
***Tetratheca glandulosa*[T]**	Glandular Pink Bells	*	*		
Tetratheca thymifolia	Black-eyed Susan			*	
Themeda australis	Kangaroo Grass	*	*		*
Xanthorrhoea media	Grass Tree	*		*	
Xanthorrhoea resinosa	Grass Tree		*		

[T] – Threatened Species,

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Appendix B - Quadrat structure and habitat attributes

Structure attribute		
Quadrat 1 – PCT 1787		
Attribute	Class	Value
Composition Count	Trees	7
	Shrubs	18
	Grasses etc	11
	Forbs	5
	Ferns	2
	Other	3
	High Threat Weeds	0.1
Quadrat 2 – PCT 1134		
Composition Count	Trees	6
	Shrubs	25
	Grasses etc	8
	Forbs	3
	Ferns	1
	Other	1
	High Threat Weeds	0
Quadrat 3 – PCT 1181		
Composition Count	Trees	7
	Shrubs	19
	Grasses etc	5
	Forbs	2
	Ferns	3
	Other	6
	High Threat Weeds	0
Quadrat 4 – PCT 1255		
Composition Cover	Trees	6
	Shrubs	19
	Grasses etc	8
	Forbs	3
	Ferns	3
	Other	4
	High Threat Weeds	0

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Habitat attributes				
Stem class			Hollows	
Quadrat 1 – PCT 1787				
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+	✓(1)		✓	✓
50-79cm	✓(2)		✓	✓
30-49cm	✓		✓	✓
20-29cm	✓		✓	
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Length of logs in total	29.3m	Litter cover	74%	
Quadrat 2 – PCT 1134				
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+				
50-79cm				
30-49cm	✓		✓	
20-29cm	✓			
10-19cm	✓			
5-9cm	✓			
<5cm	✓			
Length of logs in total	4.7m	Litter cover	51%	
Quadrat 3 – PCT 1181				
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+	✓(2)		✓	✓
50-79cm	✓(4)		✓	✓
30-49cm	✓		✓	✓
20-29cm	✓		✓	
10-19cm	✓	✓		
5-9cm	✓	✓		
<5cm	✓	✓		
Length of logs in total	28.1m	Litter cover	30%	
Quadrat 4 – PCT 1255				
Dbh	Eucalyptus	Non-Eucalypt	<20cm	>20cm
80cm+				
50-79cm	✓(3)		✓	✓
30-49cm	✓		✓	✓
20-29cm	✓		✓	
10-19cm	✓			
5-9cm	✓	✓		
<5cm	✓	✓		
Length of logs in total	54.5m	Litter cover	40%	

Appendix G – Photos of survey site

Centreline Quadrat 1.

Centreline Quadrat 2

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Centreline quadrat 3

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Centreline Quadrat 4

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END

OF

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