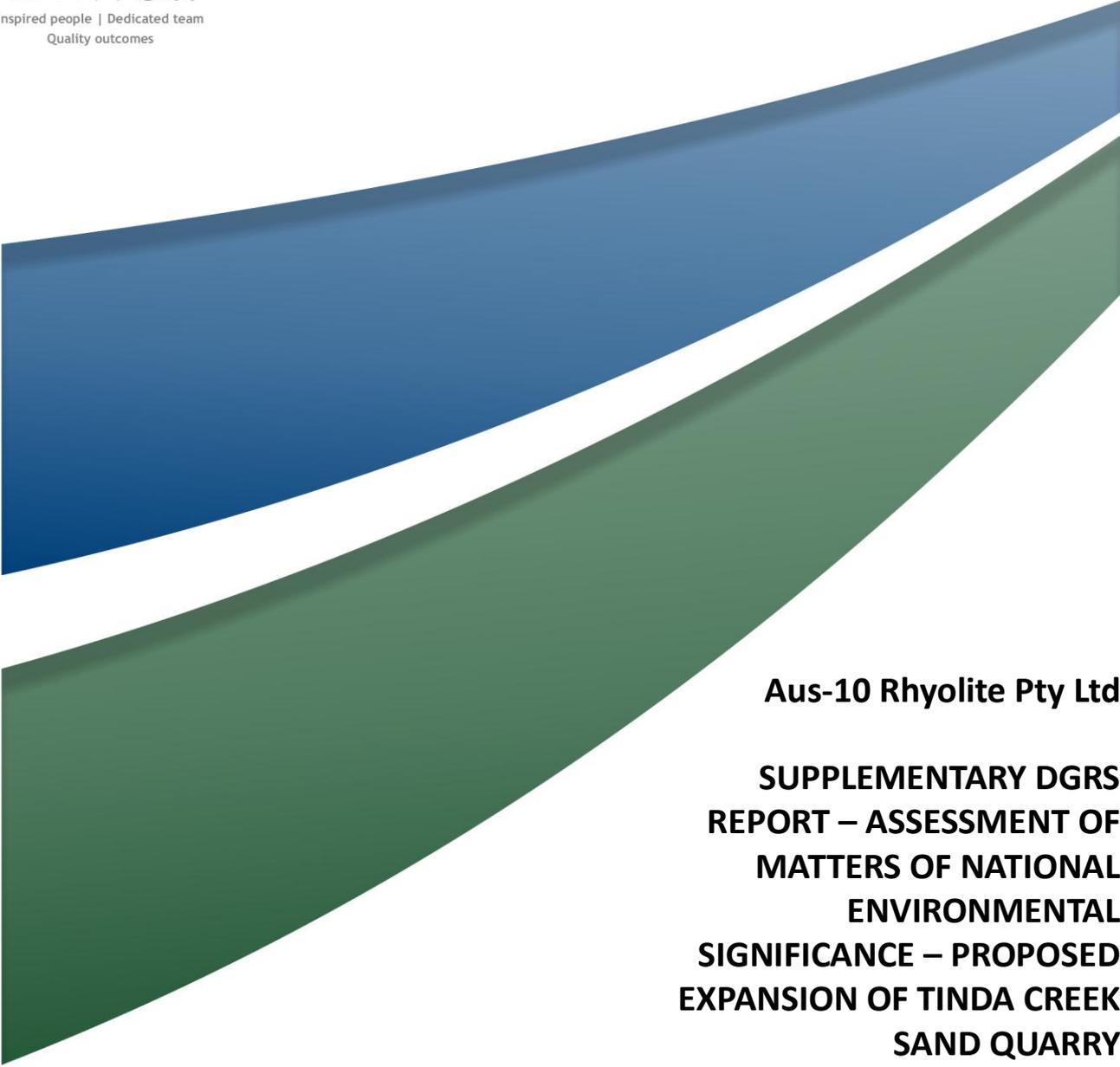




APPENDIX 6

EPBC Act Assessment



Aus-10 Rhyolite Pty Ltd

**SUPPLEMENTARY DGRS
REPORT – ASSESSMENT OF
MATTERS OF NATIONAL
ENVIRONMENTAL
SIGNIFICANCE – PROPOSED
EXPANSION OF TINDA CREEK
SAND QUARRY**

Aus-10 Rhyolite Pty Ltd

**SUPPLEMENTARY DGRS REPORT –
ASSESSMENT OF MATTERS OF
NATIONAL ENVIRONMENTAL
SIGNIFICANCE – PROPOSED
EXPANSION OF TINDA CREEK SAND
QUARRY**

June 2014

Prepared by
Umwelt (Australia) Pty Limited

on behalf of
Aus-10 Rhyolite Pty Ltd

Project Director: **Peter Jamieson**
Report No. **1731/R26/FINAL**
Date: **June 2014**



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1.0 Introduction

The proposed Expansion of Tinda Creek sand Quarry Project (the Action) was referred to the Department of the Environment (DoE) on 16 October 2013 as a proposed Action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (email submission). On 20 November 2013, the Minister's delegate determined that the Action (2013/7028) to be a Controlled Action that requires the approval of the Commonwealth Minister for the Environment.

Aus-10 Rhyolite Pty Ltd trading as Hy-Tec Concrete and Aggregates (Hy-Tec) is proposing to extend its existing operations at Tinda Creek Quarry in Blue Mountains area of New South Wales (NSW) (refer to **Figure 1.1**). The proposed Action will increase production from Tinda Creek Quarry from approximately 125,000 tonnes per annum (tpa) to 300,000 tpa. Hy-Tec is also seeking to increase the area of the site subject to sand extraction to include additional resource domains, which have been identified through geotechnical assessment of the site. The Action includes:

- extraction of a total product-sand resource of 7 million tonnes (Mt) within a proposed extraction area of up to 46.9 hectares (ha) comprised of five extraction domains;
- dredging of the resource and dewatering, with return waters flowing back to the dredge ponds; and
- backfilling of the dredge ponds to a minimum of 50% of extraction volume.

The Action will allow for the continuation of the existing extraction operations at Tinda Creek Sand Quarry, enabling the extraction of approximately 7 Mt of product-sand beyond the current life of the operations to continue from 2018 to 2043, based on the production schedule. The Action will also assist in meeting the strong, ongoing demand for construction sand driven primarily by development within the Sydney region, in particular the Northwest Subregion.

Specifically, the DoE determined in their correspondence of 24 October 2013, that 'the Action is likely to have an impact on the EPBC Act listed vulnerable small-flowered grevillea. The action is also likely to have a significant impact on the Greater Blue Mountains World Heritage Area (GBMWA), which is also a National Heritage Place'. The location of the GBMWA is shown on **Figure 1.2**.

The Action will be assessed in accordance with the one-off accredited assessment process and as such, the environmental assessment of the impacts of the controlled action will be assessed under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

To ensure that sufficient information is provided to enable an appropriate level of assessment of relevant Matters of National Environmental Significance (MNES), the Director-General of the NSW Department of Planning and Infrastructure (DP&I), now known as the Department of Planning and Environment (DP&E), issued on 4 December 2013 Supplementary requirements (Supplementary Director-General's Requirements – DGRs) for the Environmental Impact Statement (EIS) for the Project, under section 78A(8A) of the EP&A Act. This report provides a detailed response to the Supplementary DGRs. **Table 1.1** presents each of the Supplementary DGRs and the section reference of this document where each is addressed.

This document seeks to provide an integrated assessment of all relevant information from the EIS that relates to MNES, without repeating the volumes of relevant material in other



Source: Google (2002)

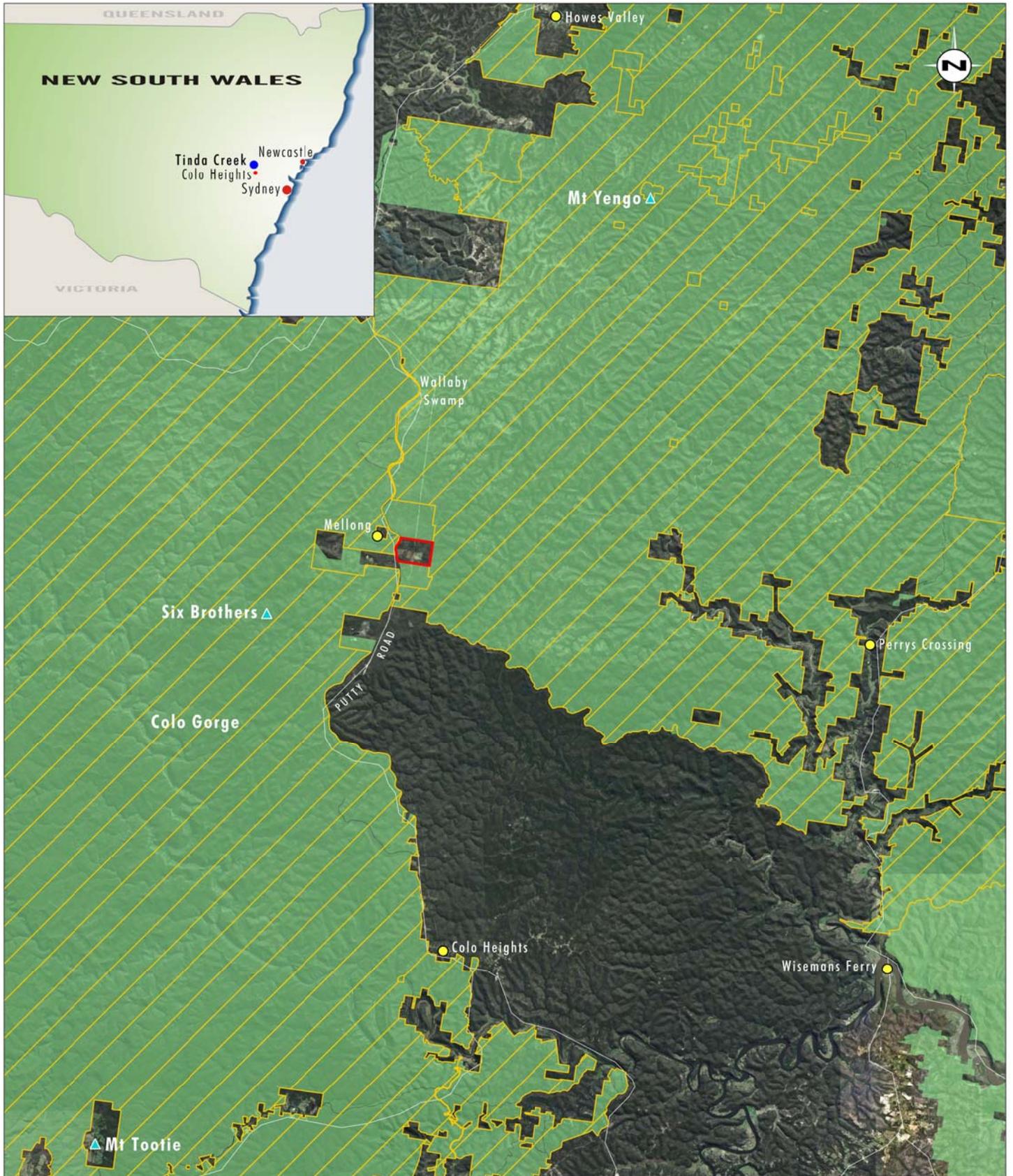
0 0,5 1,0 2km
1:35 000

Legend

 Project Area

FIGURE 1.1

Locality Map



Source: OEH (2013), Google Earth (2006), Australian Government Department of the Environment - Water - Heritage and the Arts (2007)

0 5 10 15 km
1:300 000

Legend

- Project Area (DP 628806)
- National Park
- Greater Blue Mountains World Heritage Area

FIGURE 1.2
Regional Context

sections and appendices of the EIS. Therefore, it is important for the reader to review this report in conjunction with other parts of the EIS as described in each section of this report.

Table 1.1 – Supplementary DGRs

Requirement	Section Reference
General Information	
1. The background of the action, including:	
a) the title of the action	Section 2.1
b) the full name and postal address of the designated proponent	Section 2.2
c) a clear outline of the objective of the action	Section 2.3
d) the location of the action	Section 2.4
e) the background to the development of the action	Section 2.5
f) how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action	Section 2.6
g) the current status of the action, and	Section 2.5
h) the consequences of not proceeding with the action.	Section 2.7
Description of the Controlled Action	
2. A description of the action, including:	
a) all the components of the action	Section 3.1
b) the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts	Section 3.2
c) how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts	Section 3.2
d) the timing and duration of the works to be undertaken, and	Section 3.2
e) to the extent reasonably practicable, a description of any feasible alternatives to the controlled action that have been identified through the assessment, and their likely impact, including:	Section 3.3
i) if relevant, the alternative of taking no action	Section 3.3
ii) a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action, and	Section 3.3
iii) sufficient detail to clarify why any alternative is preferred to another	Section 3.3
Description of the Existing Environment	
3. A description of the existing environment of the proposal location and the surrounding areas that may be affected by the action, including but not limited to:	
a) surveys using accepted methodology for targeting listed threatened species, ecological communities and their respective habitat, including but not limited to OEH's Survey and assessment guidelines (2009), available at: http://www.environment.nsw.gov.au/threatenedspecies/surveymethodsfauna.htm and the Department of the Environment's species-specific survey guidelines for nationally threatened species, available at: http://www.environment.gov.au/cgi-bin/spraVpublic/sprat.pl	Section 4.1.1

Table 1.1 – Supplementary DGRs (cont)

Requirement	Section Reference
b) a description of the distribution and abundance of threatened species and ecological communities, as well as suitable habitat (including breeding, foraging, roosting habitat, habitat critical to the survival of threatened species) within the site and in surrounding areas that may be impacted by the proposal. Specifically, this must include but not be limited to <i>Grevillea parviflora</i> .	Section 4.1.2
c) the regional distribution and abundance of suitable and potential habitat for threatened species and ecological communities surrounding the site	Section 4.1.3
Description of the Relevant Impacts of the Controlled Action	
4. An assessment of all relevant impacts with reference to the <i>EPBC Act Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significance (2009)</i> and species specific guidelines as relevant (available at: www.environment.gov.au/epbc/guidelines-policies.html) that the controlled action has, will have, or is likely to have. Information must include:	
a) a description of the relevant impacts of the action on matters of national environmental significance:	Section 5.1.1
<ul style="list-style-type: none"> • listed species and communities (including, but not limited to <i>Grevillea parviflora</i>) 	Section 5.1.1
<ul style="list-style-type: none"> • a World Heritage Place and a National Heritage Property 	Section 5.1.1
b) a detailed assessment of the nature and extent of the likely short term and long term relevant impacts	Section 5.1.1
c) a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible	Section 5.1.2
d) analyses of the significance of the relevant impacts, and	Section 5.1.3
e) any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	Section 5.1.4
5. Where there is a potential habitat for <i>Grevillea parviflora</i> , surveys must be undertaken. These surveys must be timed appropriately and undertaken for a suitable period of time by a qualified person. A subsequent description of the relevant impacts on such EPBC Act listed species should include, inter alia, direct, indirect, cumulative and facilitative impacts on the:	
a) population of the species at the site	Section 5.1.5
b) area of occupancy of the species	Section 5.1.5
c) habitat critical to the survival of the species	Section 5.1.5
d) breeding cycle of the population, and	Section 5.1.5
e) availability or quality of habitat for the species.	Section 5.1.5
6. An assessment of all relevant impacts to the World and National listed values of the Greater Blue Mountains World Heritage Area (GBMWhA). The assessment should include:	
a) a detailed description of the potential and likely hydrological change, including changes to water quality and quantity entering the heritage area, that may occur as a result of the proposed action. Direct and indirect impacts must be included. Cumulative and facilitative impacts should also be included. Water quality impacts of unplanned discharges should also be addressed	Section 5.2
b) a detailed description of flora and fauna that may be affected by identified changes and potential changes in hydrology, and	Section 5.2

Table 1.1 – Supplementary DGRs (cont)

Requirement	Section Reference
c) a detailed description of the impact of the proposed action on the wilderness quality (as determined by the National Wilderness Inventory) of the GBMWA.	Section 5.2
Proposed Safeguards and Mitigation Measures	
7. A description of feasible mitigation measures, changes to the action or procedures, which have been proposed by the proponent or suggested in public submissions, and which are intended to prevent or minimise relevant impacts on matters of national environmental significance. Information must include:	
a) a description of the mitigation measures that will be undertaken to prevent or minimise the relevant impacts of the action. These mitigation measures should be justified and based on best available practices	Section 6.1
b) an assessment of the expected or predicted effectiveness of the mitigation measures including the effect on abundance and condition of species, suitable habitat and ecological communities	Section 6.1
c) any statutory or policy basis for the mitigation measures	Section 6.1
d) the cost of the mitigation measures	Section 6.1
e) an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs (including any relevant thresholds for corrective actions) for the relevant impacts of the action. Include the person or agency responsible for implementing these programs and the effectiveness of all mitigation measures, including any provisions for independent environmental auditing	Section 6.1
f) the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program	Section 6.1
g) identification of mitigation measures proposed to be undertaken by State governments, local governments or the proponent, and	Section 6.1
h) any changes to the action which prevent or minimise relevant impacts on listed threatened species and communities.	Section 6.1
Offsets	
8. Where impacts cannot be avoided or mitigated, an offset package to compensate for any predicted or potential residual significant impacts on matters of national environmental significance. Offsets should demonstrate consistency with the Commonwealth EPBC Act Environmental Offsets Policy (October 2012, or subsequent versions), available at: www.environment.gov.au/epbc/publications/environmental-offsets-policy.html . The department's information requirements in relation to EPBC Act offset proposals is provided at Appendix B. Information must include:	
a) the description of any offset package should include how the offset compensates for the residual impacts, when the offset will be delivered and how the offset will be managed	Section 7.1
b) an assessment of the impact of the offsets on other matters of environmental, economic, or social significance, and	Section 7.2
c) analysis of cost, both financial and other, related to offsets.	Section 7.2

Table 1.1 – Supplementary DGRs (cont)

Requirement	Section Reference
Other Approvals and Conditions	
9. Any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. Information must include:	
a) details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including:	Section 8.1
i) what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy, and	Section 8.1
ii) how the scheme provides for the prevention, minimisation and management of any relevant impacts	Section 8.1
b) a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the EPBC Act), including any conditions that apply to the action	Section 8.2
c) a statement identifying any additional approval that is required, and	Section 8.2
d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.	Section 8.3
Economic and Social Matters	
10. A description of the short-term and long-term social and economic implications and/or impacts of the project.	Section 9.1
Environmental Record of Person Proposing to Take the Action	
11. Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:	
a) the proponent, and	Section 10.0
b) for an action for which a person has applied for a permit, the person making the application.	Section 10.0
12. Details of the proponent's environmental policy and planning framework.	Section 10.1
Information Sources	
13. For information given in an environment assessment, the draft must state:	
a) the source of the information	Section 11.0
b) how recent the information is	Section 11.0
c) how the reliability of the information was tested, and	Section 11.0
d) what uncertainties (if any) are in the information.	Section 11.0
Consultation	
14. Any consultation about the action, including:	
a) any consultation that has already taken place	Section 12.0
b) proposed consultation about relevant impacts of the action, and	Section 12.0
c) if there has been consultation about the proposed action – any documented response to, or result of, the consultation	Section 12.0
15. Identification of affected parties, including a statement mentioning any communities that may be affected and a description of their views.	Section 12.2

2.0 General Information

2.1 Title of the Action

1. *The background of the action, including:*

a) *the title of the action*

The title of the Action is Proposed Expansion of Tinda Creek Sand Quarry.

2.2 Name and Address of the Designated Proponent

b) *the full name and postal address of the designated proponent*

The designated Proponent for the Action is Aus-10 Rhyolite Pty Ltd trading as Hy-Tec Concrete and Aggregates (Hy-Tec).

The postal address for the designated proponent is:

PO Box 6770
SILVERWATER NSW 1811

2.3 Objective of the Action

c) *a clear outline of the objective of the action*

As discussed in **Section 1.0**, the proposed Action comprises the expansion of the existing sand extraction operations at Tinda Creek Sand Quarry. The Action will allow for the continuation of the existing extraction operations and enable the extraction of approximately 7 Mt of product-sand beyond the current life of the operations. The Action will also assist in meeting the strong, ongoing demand for construction sand driven primarily by development within the Sydney region, in particular the Northwest Subregion.

The key objectives of the Action include:

- the continued operation of the Tinda Creek Sand Quarry with a focus on:
 - maximising resource recovery from within the existing site;
 - optimising the use of existing infrastructure;
- maintaining the economic life of Tinda Creek Sand Quarry and providing ongoing employment for the existing workforce;
- further development of the existing environmental mitigation and management strategies, expanding the existing commitments to mitigate and manage the predicted impacts associated with the Action;
- maximising the use of existing disturbed areas and existing plant and infrastructure on site, thereby minimising the overall Proposed Disturbance Area as far as practicable;
- continuing to actively engage and consult with the surrounding community; and

- establishing a final landform that is safe and stable which ensures sustainable post-extraction land use options.

2.4 Location of the Action

d) the location of the action

The Action will be undertaken within parcels of rural land described in cadastral terms as Lot 1, Lot 2 and Lot 3 in DP 628806, 6102 Putty Road, Tinda Creek, approximately 23 km north of Colo Heights, NSW. Lot 1, Lot 2, and Lot 3 are 86 ha, 86.67 ha and 86 ha respectively, with a total site area of 258.67 ha. The proposal area is bounded on the north, east and south by Yengo National Park and on the west by Putty Road, several agricultural land holdings and Wollemi National Park (**Figure 1.1**)

Section 2.1 of the EIS provides further detail regarding the site of the Action and surrounding land uses.

2.5 Background to the Development/Current Status of the Action

e) the background to the development of the action

Quarrying activities have been undertaken on Lot 2 for approximately 30 years with the quarry currently producing up to 125,000 t of product sand per year. The material quarried is comprised of clayey sand that contains typically 18% to 40% silt and clay.

Tinda Creek was identified by the then Department of Mineral Resources (now Department of Resources and Energy (DRE)) as one of the long term sources of sand for the Sydney market in 2001 (Pienmunne & Whitehouse 2001). It is estimated that the Sydney Planning Region (SPR) consumes approximately 7 Mt of fine aggregate (i.e. construction sand) annually. Future fine aggregate demand within the SPR is estimated at around 75 Mt between 2010 and 2020 and 245 Mt by 2040 (Pienmunne & Whitehouse, 2001).

As existing quarries exhaust their supply, sand is being transported from further afield to meet this demand. Tinda Creek represents one of few remaining established sand resources within the Sydney Planning Region (Pienmunne & Whitehouse 2001). In response to the growing demand for sand in the Sydney Planning Region, Hy-Tec is proposing to expand its existing operations at Tinda Creek to assist in meeting this demand.

2.6 Relationship with other Actions

f) how the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action

The existing operations at Tinda Creek were approved by Hawkesbury City Council in 1996. A subsequent Modification of Consent was approved in 2008. This supplementary DGR's Report does not relate to any works which are currently authorised by existing approvals, or any modifications to these approvals.

The existing approvals relate to the approved extraction area shown on **Figure 1.1**. This area includes approximately 141 small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*)

individuals that are approved to be impacted in accordance with the existing Hawkesbury City Council approval.

There are no other established extractive industries located within 10 km of the Project area, nor are there any referrals submitted within this locality.

Therefore, the Action does not relate to any other actions in the region.

g) the current status of the action, and

Refer to **Section 2.5** above.

2.7 Consequences of not Proceeding with the Action

h) the consequences of not proceeding with the action

Section 2.4 of the EIS presents alternatives to the Action including the alternative of not proceeding. In summary, if the Action was not to proceed, Tinda Creek Sand Quarry would cease operations in 2014.

As described in Section 1.1.1 of the EIS, the high demand and lack of potential future sand resources for the Sydney market was identified by Pienmunne & Whitehouse (2001). While there have been several recent approvals relating to sand extraction to service the greater Sydney and Newcastle market, notably in the Port Stephens/Stockton Bight area and near Maroota, south of Wiseman's Ferry, it is considered that there is still insufficient secure supply of sand to meet the projected demand over the next two decades.

If the proposal does not proceed, and other sources of sand suitable for the construction needs of the Sydney basin are not met, it is likely that there would be an increased shortage of supply, leading to increased prices and a consequent potential reduction in construction activity.

In summary the Action is anticipated to have the following positive benefits that would not be realised if the Proposed Action did not proceed:

- The Project extends the operating life of an existing facility, thereby avoiding/delaying the need to develop a greenfield site to meet the need for quarry products and providing for the continued utilisation of existing equipment, facilities and environmental control measures. It also balances environmental and geological constraints with resource recovery from the quarry site while utilising existing infrastructure.
- The Project will facilitate the continued supply of high quality construction sand into the Sydney regional markets to meet identified need for these materials, in particular, to meet forecast supply deficits of fine construction sand within five years. The quarry has convenient, economic access to its core market, which assists with reducing supply costs, greenhouse gas emissions and other environmental impacts per tonne kilometre transported. Sand from the quarry will also continue to be utilised by Hy-Tec to augment manufactured sand from other Hy-Tec quarries, further increasing construction sand supply for the Sydney market.
- The Project will support the rapid growth and development of the area, in particular in north-west Sydney, through supply of high quality construction materials. As such, the project will assist in achieving the aims and objectives of the various strategic and regional planning policies, including the Northwest Subregion, Draft Subregional Strategy (NSW Government, 2007).

- The quarry is positioned away from major population centres and incompatible land uses and has a substantial existing buffer zone for the two residences located to the west and the adjoining Greater Blue Mountains World Heritage Area and Yengo National Park.
- The Project will continue to provide six current full-time positions and a further two positions when the production volume increases when fully operational. In addition, the proposed expansion of production will require approximately an additional 10 contract drivers for haulage, with flow on effects to the local and regional economy.
- The Project will provide direct economic benefits in the form of initial capital investment of approximately \$0.3M, however, the site will require ongoing capital expenditure of some \$9M to \$10M.

Refer to Section 4.14 of the EIS for further detail.

3.0 Description of the Controlled Action

3.1 Components of the Action

2. A description of the action, including:

a) all the components of the action

The proposed Action will provide for continued extraction operations within the existing Tinda Creek Sand Quarry site and includes:

- extraction of a total product-sand resource of 7 Mt within a proposed extraction area of up to 46.9 ha comprised of five extraction domains;
- dredging of the resource and dewatering, with return waters flowing back to the dredge ponds; and
- backfilling of the dredge ponds to a minimum of 50% of extraction volume.

The following sections provide a summary of the Action, including the aspects of currently approved and existing operations that are not part of the proposed Action.

The key features of the Action are shown in **Table 3.1** and **Figure 3.1**.

Table 3.1 – Overview of the Action

Project Aspect	Proposed Project
Limits on Extraction	Increase approved extraction rates. <ul style="list-style-type: none"> • Up to 300,000 tpa. • Total product sand up to 6.84 Mt.
Extraction Extent	<ul style="list-style-type: none"> • Continuation of existing extraction in approved area. • Extraction depth to approximately 15 m below ground level. • Total additional extraction area of 46.9 ha over five extraction domains.
Extraction Methods	<ul style="list-style-type: none"> • No change to extraction methods proposed.
Extraction Life	<ul style="list-style-type: none"> • Consent will be sought for 30 years (from date of Project Approval) to provide for mining until approximately 2044 and contingency for other activities such as rehabilitation.
Operating Hours	<ul style="list-style-type: none"> • Existing hours of operation are 7.00 am to 5.00 pm Monday to Friday and 7.00 am to 1.00 pm on Saturdays. • Proposed to amend to 5.00 am to 10.00 pm Monday to Friday and 5.00 am to 3.00 pm on Saturdays.
Number of Employees/Workforce Numbers	<ul style="list-style-type: none"> • At present there is six full-time staff employed at the quarry. At full capacity (i.e. 300,000 tpa) and additional two staff will be required. • An additional 10–15 contract truck drivers will be required for product haulage.
Existing Infrastructure	<ul style="list-style-type: none"> • Continued utilisation of all existing infrastructure, including the existing cyclone plant for dewatering the dredge spoil.
Construction Activities	<ul style="list-style-type: none"> • Excavation of dredge ponds. • Upgrade of site access.

Table 3.1 – Overview of the Action (cont)

Project Aspect	Proposed Project
Backfilling of dredge ponds	<ul style="list-style-type: none"> • Dredge ponds would be progressively back filled with (initially) a mixture of spoil return (35–40% of dredge volume) and imported Virgin Excavated Natural Material (VENM) and Excavated Natural Material (ENM). • Quantity of VENM/ENM imported to the site would be governed by availability of material and the logistics associated with haulage as backload to the site, though is estimated to be a minimum 15% of dredge volume. • Estimated that a minimum of 50 % of the extraction void will be filled upon completion of extraction operations, which includes backfilling all of the Domain 3 area, such that no open water bodies are in close proximity to the National Park estate.

The extraction would occur in discrete extraction domains as shown in **Table 3.1** and **Figure 3.1**. Further details of the Action are provided in Section 2.3 of the EIS.

3.2 Works/Structures and Impacts

b) the precise location of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts

Figure 3.1 illustrates the precise location of works to be undertaken and structures to be built as part of the proposed Action.

c) how the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impact

The existing quarry operations involve the extraction of sand from the quarry area using a cutter-suction dredge that floats on the active dredge pond. The sand is dredged from a depth of up to approximately 15 m below the natural ground surface and piped from the dredge pond to the sand processing plant where the sand is separated from the silt and clay. Product sand is stockpiled and subsequently transported off-site via the existing haul road. Silt, clay and water are returned to tailings dams where the sediment is allowed to settle out. Water either drains back to the dredge pond via a short overland flow path or seeps from the processing area, sediment dams and tailings dams into the underlying unconfined aquifer as groundwater recharge in the area surrounding the quarry.

The construction phase of the Project is limited to the realignment of the quarry access road to the south of Domain 1, which will occur once extraction commences in Domain 1, and for the minor entrance upgrade works (refer Section 2.3 and Section 4.0 of the EIS). The realignment of the access road and upgrade of the quarry entrance road is only anticipated to occur within the recommended standard construction hours of 7.00 am to 6.00 pm, Monday to Friday and 8.00 am to 1.00 pm on Saturday.

d) the timing and duration of the works to be undertaken, and

Refer to **Sections 3.1** and **3.2** of this report.



Source: Google Earth (2012), LPI NSW (2007)

0 250 500 750m
1:15 000

Legend

- Project Area
- National Park Boundary
- Private Holding Hobby Farm
- Private Holding Duck Farm
- Proposed Extraction Area
- Domain 3 Extraction Area
- Domain 7 Extraction Area
- Proposed Haul Road Option A
- Limit of Approved Extraction (DA 134/95)

FIGURE 3.1

Tinda Creek Sand Quarry
Existing Approved Extraction Area
and Proposed Quarry Extension Areas

3.3 Alternatives

- e) *to the extent reasonably practicable, a description of any feasible alternatives to the controlled action that have been identified through the assessment, and their likely impact, including:*
- i) *if relevant, the alternative of taking no action*
 - ii) *a comparative description of the impacts of each alternative on the matters protected by the controlling provisions for the action, and*
 - iii) *sufficient detail to clarify why any alternative is preferred to another*

As discussed in **Section 2.4** of the EIS, a number of alternatives to the proposed quarry expansion were considered as part of the detailed environmental studies to inform the proposed conceptual design for the Action. As part of this process, Hy-Tec considered:

- the alternative of expanding the quarry to fully access the identified resource on the site, with biodiversity offset areas to be provided offsite;
- using an alternative site;
- the use of alternative materials that could replace natural terrestrially-derived sand for processes requiring industrial grade or fine construction sand; and
- the alternative of not proceeding with the Action.

Details regarding the consideration of these alternatives are summarised below and detailed in **Section 2.4** of the EIS.

3.3.1 Alternative Extraction Design

An alternative considered by the proponent was to expand the quarry to fully access the identified resource on the site, with biodiversity offset areas to be provided offsite. This option, however, would likely have resulted in a relatively larger impact on site, in particular with respect to the direct removal of threatened species habitat and adversely affecting connectivity through the site. The option of providing for biodiversity offsets on site was considered to provide a more optimal balance for the Project between access to the resource and achieving conservation objectives in the locality. By not accessing the full site, Hy-Tec will substantially decrease the impact of habitat loss and decreased connectivity on locally occurring threatened flora and fauna species, however the design will result in the sterilisation of approximately 4.6 Mt of product sand.

3.3.2 Alternative Biodiversity Offset Areas

Following consultation with Richard Colbourne of the NSW National Parks and Wildlife Service (NPWS) an alternative biodiversity offset area has been considered as part of the Action, with the final biodiversity offset area to be determined in consultation with NSW Department of Planning and Infrastructure (NSW DP&I), now known as the Department of Planning and Environment (DP&E), Office of Environment and Heritage (OEH) and DoE. The currently proposed biodiversity offset strategy involves the proposed donation of the offset land to the NPWS estate to satisfy the requirement for in-perpetuity conservation. At an on-site meeting in January 2014, NPWS discussed a range of potential alterations to the proposed Strategy in relation to the location, extent and composition of the Strategy for

consideration by Hy-Tec. These options were identified as improving the offset outcomes for inclusion in the NPWS estate. The feedback included:

- Potential inclusion of the highest quality examples of Mellong Sandmass Sedgeland, identified in the south-eastern portion of the Project area, in the proposed alternate offset area.
- Potential inclusion of Domain 3 extraction area within the proposed alternate offset area and the avoidance of any impact relating to quarry activities in this area to provide a 'clean straight' boundary between the operation and NPWS estate; with quarrying to take place in Domain 7 (see **Figure 3.1**) rather than Domain 3.
- Identification of sufficient areas to meet the minimum 2:1 offset ratio required to meet State offsetting policy requirements.
- Potential inclusion of the extensive areas of *Grevillea parviflora* subsp. *parviflora* within the offset area.
- Provision of access for fire fighting between the quarry and the NPWS estate and the removal of car bodies and rubbish from Lot 1.
- Maintenance of areas of open water to facilitate fire fighting opportunities within the adjacent National Parks.

The proposed alternatives discussed at the on-site meeting (i.e. extraction to occur in Domain 7 rather than Domain 3 with Domain 3 forming part of the biodiversity offset area) would result in a decrease in the area of impact from 45.1 ha to 46.9 ha. It would also provide a substantial increase in the area proposed for biodiversity offsetting from 71.5 ha to 106.2 ha whilst not reducing the amount of sand reserve that can be extracted.

As part of the design of the proposed project, Hy-Tec has, where possible, modified the Project to avoid and minimise ecological impacts. This included further reduction to the proposed quarry plan following the receipt of Supplementary DGRs from the Commonwealth Department of the Environment in December 2013, to avoid impacting known occurrences of *Grevillea parviflora* subsp. *parviflora*. Umwelt has undertaken substantial ecological survey within Domain 7 as part of the Project (see Appendix 7 of the EIS) to facilitate an appropriate assessment of the ecological impacts and benefits of the alternate proposal discussed on-site with NPWS in January 2014. Changes to the proposed biodiversity offset area will not result in substantial changes to the proposed Action with components of the Action described in Section 3.1 above remaining substantially the same, with the only change being quarrying in Domain 7 rather than Domain 3.

Section 5.0 identifies the impacts of the proposed action and compares these with the biodiversity impacts of the alternate offset strategy proposal which would involve quarrying within Domain 7 rather than Domain 3. **Section 7.0** provides an assessment of the relative merits of both biodiversity offset scenarios, with the final biodiversity offset location to be determined in consultation with NSW DP&E, OEH and DoE.

3.3.3 Alternative Sites

Alternative sites were considered as part of the EIS process. Most land with similar topographic and soil characteristics in the region that may support suitable sand resources are conserved in perpetuity within the National Park estate. While there are other small private land holdings in the local area, in general, they do not possess suitable soil or geological features to indicate the presence of construction-quality sand. Hy-Tec also

considered the possibility of suitable sites outside of the region, however all sites were considered unworkable at the present time.

Given the availability of the resource within the existing land holdings and operations area and the fact that quarrying has been undertaken at the site for over 30 years with no adverse impacts on the surrounding ecosystem, an extension of the quarry operations was considered the most feasible option.

3.3.4 Alternative Materials

Currently, there are no alternative materials available that can replace natural terrestrially-derived sand for processes requiring industrial grade or fine construction sand. Alternatives to natural terrestrially-derived sand are available for use in some construction and fill applications and these are summarised in Section 2.4 of the EIS. The potential for alternative materials to be used to replace some or all of the natural sand produced by the proposal is considered to be limited at this time, due to the limited available quantities, inconsistent quality and the cost of production and transport.

3.3.5 Alternative of Not Proceeding

As described in Section 2.4 of the EIS, there is insufficient secure supply of sand to meet the projected demand for the Sydney/Newcastle markets over the next two decades. If the proposal does not proceed, and other sources of sand suitable for the construction needs of the Sydney basin are not met, it is likely that there would be a shortage of supply, leading to increased prices and a consequent potential reduction in construction activity. Further, should the proposal not proceed or consent not be granted to extend the life of the operations, the financial viability of the Tinda Creek Sand Quarry will be jeopardised due to the less economically viable nature of the remaining resources available under the existing consent.

4.0 Description of the Existing Environment

4.1 Biodiversity

4.1.1 Survey Methodology for Listed Threatened Species and Ecological Communities

- a) *surveys using accepted methodology for targeting listed threatened species, ecological communities and their respective habitat, including but not limited to OEH's Survey and assessment guidelines (2009), available at: <http://www.environment.nsw.gov.au/threatenedspecies/surveymethodsfauna.htm> and the Department of the Environment's species-specific survey guidelines for nationally threatened species, available at: <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>*

The survey methodology for listed threatened species and ecological communities is outlined below.

Records from the DoE Protected Matters Database and a 10 km radius search (from the centre of the Project area) of the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife were combined with records derived through literature reviews and professional opinion to identify the full range of recorded or potentially occurring EPBC Act listed threatened species and ecological communities. The identification of potentially occurring threatened species was then used to assist in the development of appropriate survey methods to be used as part of the Ecological Assessment for the Action and to determine those species that would be subject to an assessment of significance as part of this assessment.

The ecological survey strategy was designed with consideration of the requirements of the *Draft Threatened Species Survey and Assessment: Guidelines for Developments and Activities* (DEC, 2004) and survey design also considered the requirements of the DoE survey guidelines for Australia's threatened birds, frogs, mammals and reptiles (DEWHA 2010a, 2010b; DSEWPC 2011a, 2011b).

The flora survey included quadrat-based and meander transect surveys and analysis with appropriate seasonal consideration to target all of the potentially occurring threatened flora species and ecological communities that are known to occur in the local area and region. Extensive meandering transects were walked throughout the Project area targeting potentially occurring threatened flora species across the site. Along these transects, searches were undertaken for potentially occurring EPBC Act listed threatened flora species, in particular the small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*) Bynoes wattle (*Acacia bynoeana*) and *Olearia cordata*. The area searches were variable in length and location, and were tailored to suit the environment to gain maximum coverage of likely habitat for potentially occurring threatened flora species. Vegetation communities were delineated through the identification of repeating patterns of plant species assemblages in each of the identified strata.

Fauna surveys targeted threatened fauna species and their habitats in order to be able to document the extent and quality of habitat that occurs within the proposed disturbance area and an assessment of the type, condition and quality of fauna habitats. Fauna surveys included a variety of techniques recommended in OEH and DoE surveys guidelines including trapping surveys that targeted mammal, reptile and amphibian species including terrestrial Elliott A and B traps, arboreal Elliott B traps, terrestrial cage traps, terrestrial and arboreal

hair funnels, harp traps and pitfall traps. Area searches targeted a range of species using nocturnal spotlighting, call playback sessions (broadcasting targeted threatened species including koala (*Phascolarctos cinereus*)), diurnal and nocturnal reptile and amphibian searches, bird surveys and micro-bat echolocation recording. General habitat characteristics were also noted.

Additionally, specific targeted seasonal surveys for migratory bird species, including the regent honeyeater (*Anthochaera phrygia*) and swift parrot (*Lathamus discolor*) were undertaken in the recommended season, time of day and targeted suitable flowering eucalypt habitat across the Project area using area searches and transect surveys.

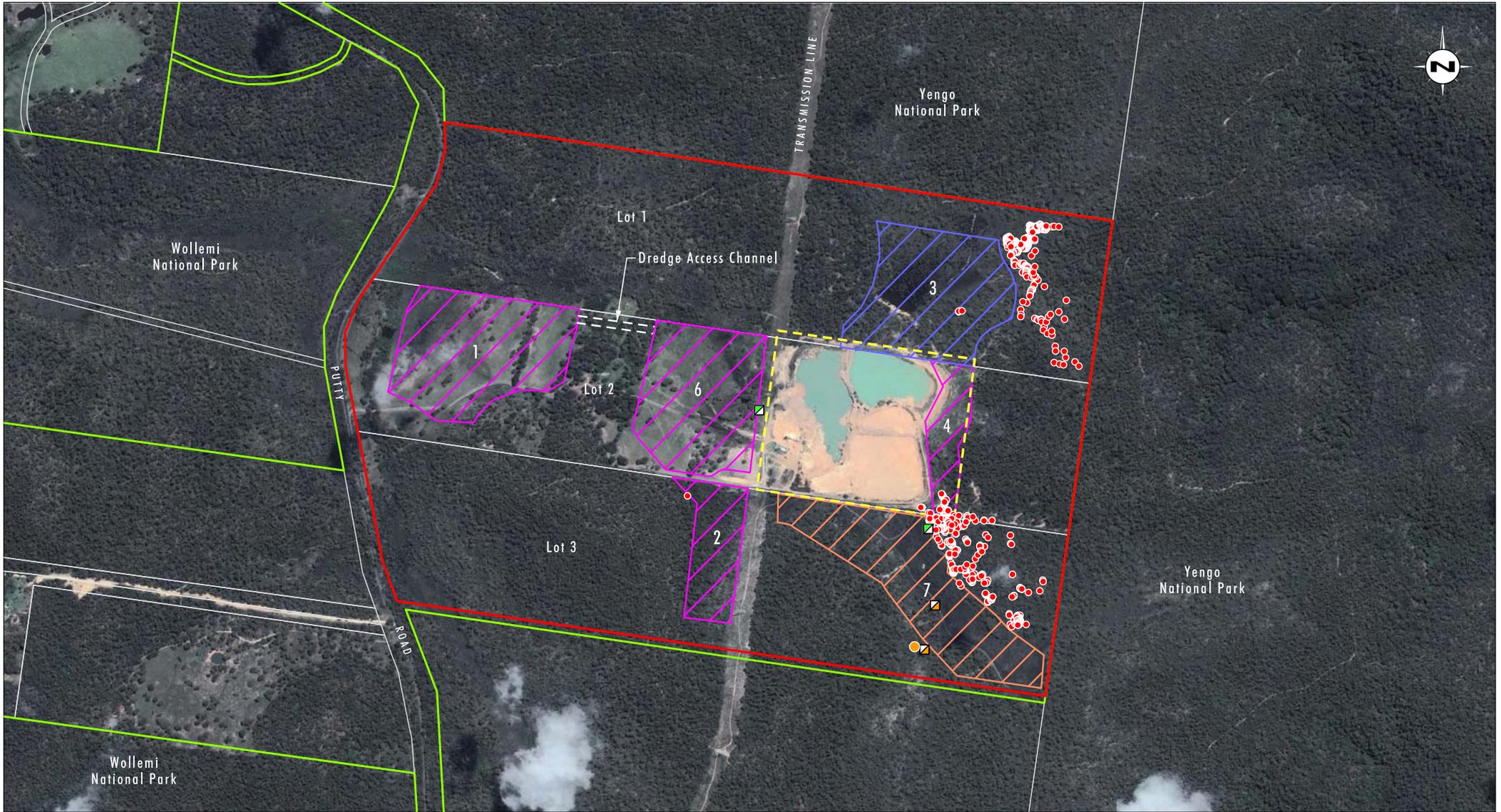
Detailed descriptions of the survey methodology are provided in Section 3.3 and 3.4 of the Ecological Assessment (refer to Appendix 7 of the EIS); the survey locations are shown on Figures 3.1 and 3.2 of that report. A discussion relating to the potential presence of EPBC Act listed ecological communities is provided in Appendix E and Section 5.6.4 of the Ecological Assessment (refer to Appendix 7 of the EIS).

4.1.2 Distribution and Abundance of Threatened Species and Ecological Communities

- b) a description of the distribution and abundance of threatened species and ecological communities, as well as suitable habitat (including breeding, foraging, roosting habitat, habitat critical to the survival of threatened species) within the site and in surrounding areas that may be impacted by the proposal. Specifically, this must include but not be limited to *Grevillea parviflora*.**
- c) the regional distribution and abundance of suitable and potential habitat for threatened species and ecological communities surrounding the site**

Searches of the DoE Protected Matters Database and the OEH Atlas of NSW Wildlife identified a range of threatened flora and fauna species and ecological communities that have been recorded, or are predicted to occur within the local area and region. An assessment of the suitability of the Project area to provide habitat for these species and communities was conducted (refer to Appendix A of the Ecological Assessment provided as Appendix 7 of the EIS). **Table 4.1** below outlines locally occurring EPBC Act listed threatened species known or considered to have the potential to occur in the Project area and their known records and distribution in the wider region. **Figure 4.1** shows the distribution of EPBC Act threatened species across the site. **Figure 4.2** shows the extent of vegetation communities within the Project area. No endangered populations or threatened ecological communities (TECs) are known to occur in the Project area.

As shown on **Figure 4.1**, approximately 139 small-flowered grevilleas were recorded with the previously approved disturbance area. This area was approved for disturbance as part of the original State approval in 1996, prior to the commencement of the EPBC Act and is therefore not being considered as part of the current Project. The extent of small-flowered grevillea in this approved extraction area was mapped in order to gain a thorough understanding of the extent of the species across the Project area.



Source: Google Earth (2012), LPI NSW (2007), OEH (2013)

0 250 500 750m
1:15,000

Legend

- Project Area
- Limit of Approved Extraction (DA 134/95)
- Proposed Extraction Area
- Domain 3 Extraction Area
- Domain 7 Extraction Area
- National Park Boundary
- *Grevillea parviflora* subsp. *parviflora*
- Koala
- Large-eared Pied Bat
- New Holland Mouse

FIGURE 4.1

EPBC Act listed Threatened Species
Recorded within the Project Area



Source: Google Earth (2012), LMPA (2009), LPI NSW (2007)

0 250 500 750m
1:15 000

Legend

- | | | |
|--|--|--|
| Project Area | Stringybark - Ironbark Forest | Hawkesbury Hornsby Plateau Exposed Woodland |
| Proposed Extraction Area | Mellong Sandmass Swamp Woodland | Hawkesbury Hornsby Plateau Exposed Woodland Derived Native Grassland |
| Domain 3 Extraction Area | Mellong Sandmass Swamp Woodland (Modified - Overstorey Absent) | Disturbed Land |
| Domain 7 Extraction Area | Mellong Sandmass Dry Woodland | Water body |
| National Park Boundary | Mellong Sandmass Dry Woodland Derived Native Grassland | Wetlands (Hawkesbury LEP 2012 mapping) |
| Limit of Approved Extraction (DA 134/95) | Mellong Sandmass Sedgeland | |

File Name (A4): R26_V1/1731_436.dgn

FIGURE 4.2
Vegetation Communities

Table 4.1 – EPBC Act-listed Threatened Species Recorded in or within 10 km of the Project Area that May be Impacted by the Project

Species	EPBC Status	Recorded in Project Area?	Location of Records and Regional Distribution
FLORA			
small-flower grevillea <i>Grevillea parviflora</i> subsp. <i>parviflora</i>	V	✓	<p>This species was recorded during field surveys of the Project area in suitable habitat in the Mellong Sandmass Dry Woodland on the eastern edges of the Project area. A total of 849 individuals were recorded within the wider Project area, of which 3 were recorded within the proposed disturbance area. A total of 18.7 ha of known and potential habitat for this species was recorded in the proposed disturbance area. All woodland and forest communities identified on Figure 4.2 are expected to provide potential habitat for the species.</p> <p>Disjunct populations of the species occur in the Putty area approximately 15 km north of the Project area. More regionally the species occurs in two distinct areas around the Lower Hunter and Picton areas to the east and south of the Project area, respectively. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>
Bynoes wattle <i>Acacia bynoeana</i>	V	×	<p>This species was not recorded during field surveys and is not known to occur in the Project area, however it has been recorded within 1 km of the Project area in similar woodland habitat.</p> <p>Few records of this species occur in the surrounding Yengo National Park. More regionally, the species occurs in strongholds near the Blue Mountains National Park, near Penrith and Murrumbidgee National Park to the south of the Project area. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>
<i>Olearia cordata</i>	V	×	<p>This species was not recorded during field surveys and is not known to occur in the Project area, however it has been recorded approximately 5 km to the south-west of the Project area in similar woodland habitat.</p> <p>Most known clustered populations occur in conservation areas in the surrounding Wollemi and Yengo National Parks. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>

Table 4.1 – EPBC Act-listed Threatened Species Recorded in or within 10 km of the Project Area that May be Impacted by the Project (cont)

Species	EPBC Status	Recorded in Project Area?	Location of Records and Regional Distribution
FAUNA			
giant burrowing frog <i>Heleioporus australiacus</i>	V	x	<p>This species was not recorded during field surveys and is not known to occur in the Project area or its immediate surrounds. Potentially suitable habitat is present for this species in the sedgeland habitats of the Project area.</p> <p>The species is known from south-eastern VIC and NSW. Other records of the species in the locality occur within the surrounding habitats of Yengo and Wollemi National Park estates. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>
broad-headed snake <i>Hoplocephalus bungaroides</i>	V	x	<p>This species was not recorded during field surveys and is not known to occur in the Project area, however records of the species occurs within 3 km to the south and 5 km to the north of the Project area. Suitable sandstone woodland habitat was identified in the Project area.</p> <p>The known distribution of this species extends from Wollemi National Park in the north, the Clyde River catchment in ranges south-west of Nowra in the south, east to the Royal National Park and near Illawarra, and west to the upper Blue Mountains at Blackheath and Newnes. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>
regent honeyeater <i>Anthochaera phrygia</i>	E MIG	x	<p>This species was not recorded during field surveys and is not known to occur in the Project area or its immediate surrounds, however potential eucalypt foraging habitat for this species occurs within the Project area.</p> <p>Scattered records of the species occur within the surrounding Yengo and Wollemi National Parks with a known important breeding site in the Capertee Valley approximately 30 km west of the Project area. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>

Table 4.1 – EPBC Act-listed Threatened Species Recorded in or within 10 km of the Project Area that May be Impacted by the Project (cont)

Species	EPBC Status	Recorded in Project Area?	Location of Records and Regional Distribution
swift parrot <i>Lathamus discolor</i>	E	x	<p>This species was not recorded during field surveys and is not known to occur in the Project area or its immediate surrounds, however potential eucalypt foraging habitat for this species occurs within the Project area.</p> <p>Records of the species generally occur outside the Yengo and Wollemi National Park estates in the Capertee Valley and around Kurrajong approximately 30 km to the west and south respectively. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>
large-eared pied bat <i>Chalinolobus dwyeri</i>	V	.✓	<p>This species was recorded using echolocation recording at two locations during the 2011 surveys undertaken for this assessment. It is likely that the Project area provides woodland foraging habitat for this species as no potential caves or roosting habitat was recorded.</p> <p>Other previous records of the species occur within 1 km of the Project area with many other records occurring throughout Wollemi and Yengo National Parks. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species, including breeding and roosting habitat.</p>
spotted-tailed quoll <i>Dasyurus maculatus</i>	E	x	<p>This species was not recorded during field surveys and is not known to occur in the Project area, however it has been recorded within 1 km south of the Project area in similar habitat. Potential woodland and forest foraging and movement habitat for this species occurs within the Project area.</p> <p>Further records of the species occur sporadically within the surrounding Yengo and Wollemi National Park estates with the species occurring along the east coast of NSW. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>

Table 4.1 – EPBC Act-listed Threatened Species Recorded in or within 10 km of the Project Area that May be Impacted by the Project (cont)

Species	EPBC Status	Recorded in Project Area?	Location of Records and Regional Distribution
brush-tailed rock-wallaby <i>Petrogale penicillata</i>	V	x	<p>This species was not recorded during field surveys and is not known to occur in the Project area, however it has been recorded within 5 km west of the Project area. Suitable habitat such as rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges facing north were not identified in the Project area.</p> <p>The species is known to occur along the Great Dividing Range with many recorded within the surrounding Yengo and Wollemi National Parks. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species where habitat meets the species requirements.</p>
Koala <i>Phascolarctos cinereus</i>	V	✓	<p>This species was recorded on two occasions in the south-east portion of the Project area during the 2011 surveys undertaken for this assessment. It is likely that the Project area provides eucalypt foraging habitat and dispersal habitat for this species. While none of the vegetation recorded in the Project area conform to Potential Koala Habitat under NSW SEPP 44 (that is greater than 15% of canopy species comprising known koala feed trees), the following communities are known to contain low proportions of known koala feed trees (refer to Figure 4.2 for the extent of each community in the Project area):</p> <ul style="list-style-type: none"> • Mellong Sandmass Dry Woodland; and • Mellong Sandmass Swamp Woodland. <p>Other previous records of the species occur immediately around the Project area with other scattered records throughout Wollemi and Yengo National Park. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat or this species.</p>
long-nosed potoroo <i>Potorous tridactylus</i>	V	x	<p>This species was not recorded during field surveys and is not known to occur in the Project area or its immediate surrounds, however potential eucalypt foraging habitat for this species occurs within the Project area.</p> <p>Records of the species in the wider region occur within the Watagans National Park and near Ourimbah State Forest approximately 50 km from the Project area. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.</p>

Table 4.1 – EPBC Act-listed Threatened Species Recorded in or within 10 km of the Project Area that May be Impacted by the Project (cont)

Species	EPBC Status	Recorded in Project Area?	Location of Records and Regional Distribution
New Holland mouse <i>Pseudomys novaehollandiae</i>	V	✓	This species was recorded during the 2011 surveys undertaken for this assessment. It is likely that the Project area provides woodland and sedgeland habitat for this species. Further records in the surrounding areas are sparse with scattered records to the north of Wollemi National Park. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.
grey-headed flying-fox <i>Pteropus poliocephalus</i>	V	x	This species was recorded outside the Project area during the 2011 surveys undertaken for this assessment. It is likely that the Project area provides woodland and forest foraging habitat for this species however no flying-fox camps were recorded. Other previous records of the species occur approximately 15 km from the Project area, however records are few in Wollemi National Park and within Yengo National Park and occur mainly on the coastal side of the range. The wider area in Yengo and Wollemi National Parks provides in excess of 600,000 ha of eucalypt forests and woodlands that provides known and potential habitat for this species.

Note:

EPBC Act = *Environment Protection and Biodiversity Conservation Act 1999*

V = Vulnerable

E = Endangered

5.0 Description of the Relevant Impacts of the Controlled Action

3. ***An assessment of all relevant impacts with reference to the EPBC Act Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significance (2009) and species specific guidelines as relevant (available at: www.environment.gov.au/epbc/guidelines-policies.html) that the controlled action has, will have or is likely to have.***
 - a) ***a description of the relevant impacts of the action on matters of national environmental significance:***
 - ***listed species and communities (including, but not limited to, *Grevillea parviflora*).***
 - ***A World Heritage Place and a National Heritage Property***
 - b) ***a detailed assessment of the nature and extent of the likely short term and long term relevant impacts***
 - c) ***a statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible***
 - d) ***analyses of the significance of the relevant impacts, and***
 - e) ***any technical data and other information used or needed to make a detailed assessment of the relevant impacts***

5.1 Ecological Impacts

A detailed ecological impact assessment has been prepared as part of the EIS for the Action. Section 5.0 of the Ecological Assessment (refer to Appendix 7 of the EIS) describes the relevant impacts of the Action on listed species and communities and includes discussion of impact avoidance and minimisation measures implemented by Hy-Tec as part of the Action. An Assessment of Significance for each of the potentially impact threatened species and ecological communities is included as Appendix E of the Ecological Assessment.

5.1.1 Relevant Impacts of the Action on MNES and the Likely Extent of Short Term and Long Term Relevant Impacts

A detailed ecological assessment has been prepared as part of the EIS. Section 5.0 of the Ecological Assessment (refer to Appendix 7 of the EIS) describes the relevant direct and indirect impacts of the Proposed Action on listed species and communities and includes discussion of impact avoidance and minimisation measures proposed to be implemented. In summary, there is one threatened flora species and three fauna species present in the proposed disturbance area; however, impacts to these species have been assessed as not significant. No EPBC Act listed vegetation communities were recorded or are expected to occur in the Project area. **Table 4.1** above lists those threatened flora and fauna species that are considered to potentially occur based on the identification of suitable habitat.

As discussed in **Section 3.3.2**, consultation with the NSW NPWS resulted in the consideration of an alternative biodiversity offset area. The alternate biodiversity offset area, if adopted, will result in a change in the proposed extraction area with quarrying occurring in Domain 7 rather than Domain 3. While the alternative biodiversity offset area will not result in substantial changes to the Project as described in **Section 3.3.2**, minor changes to the

area of vegetation communities and fauna habitats will result. A description of each of the biodiversity offset areas is provided in **Section 7.0**.

Table 5.1 lists the vegetation communities directly impacted by the Proposed Action if extraction takes place in Domain 3 or Domain 7. It also identifies the impact of the alternate biodiversity offset area described in **Section 3.3.2**.

Table 5.1 – Area of Each Vegetation Community to be removed as a Result of the Project

Formation	Vegetation Community	Area of Community in the Project Area (ha)	Area of Community in the Proposed Disturbance Area (ha) Extraction in Domain 3	Area of Community in the Proposed Disturbance Area (ha) Extraction in Domain 7
Forest and Woodland	Stringybark – Ironbark Forest	19.6	2.1	0.8
	Hawkesbury Hornsby Plateau Exposed Woodland	58.1	1.5	1.5
	Mellong Sandmass Dry Woodland	92.5	15.1	14.6
Swamp Forest and Sedgeland	Mellong Sandmass Swamp Woodland	29.6	4.8	6.7
	Mellong Sandmass Sedgeland	4.6	0.6	2.5
Derived Native Grassland	Hawkesbury Hornsby Plateau Exposed Woodland Derived Native Grassland	2.2	0.1	0.1
	Mellong Sandmass Dry Woodland Derived Native Grassland	24.4	17.5	17.5
	Mellong Sandmass Swamp Woodland (modified – overstorey absent)	6.6	3.1	3.1
Disturbed Land	Disturbed Land	21.8	0.1	0.1
Water body		0.2	0.2	0.0
Total		259.6	45.1	46.9

As noted in the referral determination, DoE considered the impact of the Project likely to significantly impact the small-flowered grevillea. As a result of this determination, the Project disturbance footprint was revised to avoid direct impacts to the small-flowered grevillea and to increase the extent of the population that would be subject to in-perpetuity conservation. The revised proposal results in the loss of three individual small-flowered grevillea.

An assessment of indirect impacts of the Project on recorded specimens of *Grevillea parviflora* subsp. *parviflora* has been undertaken. Potential indirect impacts of the Project include:

- edge effects;

- impacts from changes to runoff; and
- the effect of groundwater drawdown on plants.

Based on the assessment of the direct and indirect impacts of the Project on *Grevillea parviflora* subsp. *parviflora* it is considered likely that the extent of *Grevillea parviflora* subsp. *parviflora* occurring in the proposed biodiversity offset area is likely to remain viable in the future.

Edge Effects

Edge effects associated with the Project may include factors such as the spread of weeds, erosion and sedimentation and changes to shading, inappropriate fire regimes and increased access and these factors have the potential to extend beyond the boundary of the proposed disturbance area and affect the ecology of the broader Project area. However, the level of indirect impacts from the Project and the potential effects that these will have on the ecological values of the broader Project area, including proposed biodiversity offset areas, will likely be similar in nature and scale to those of the existing and past operations carried out at the quarry. Although some impacts will occur, the available data from detailed biodiversity surveys completed for the Project has not identified any significant impacts beyond the boundary of the current approved disturbance area.

The results of biodiversity surveys undertaken within the Project area did not indicate any significant deterioration in vegetation community quality adjacent to active quarry areas and *Grevillea parviflora* subsp. *parviflora* has been recorded regularly in vegetation communities in close proximity to active quarry operations (refer to **Figure 4.1**). Similar species (fauna and flora) have been recorded in areas in proximity to the existing operations as well as areas further away, suggesting indirect impacts from the existing mining operations are not having a significant impact on flora and fauna.

Impacts from Changes in Runoff

Surface water management procedures similar to those currently used in the approved quarry operation are proposed for the quarry expansion. This will involve ensuring the clear flow of surface water around the quarry site and the containment of existing water within a closed quarry water management system. The closed water management system will be located between the active quarry and the extent of approved disturbance.

The Effect of Groundwater Drawdown on Plants

A detailed description of the likely hydrological changes associated with the Project is provided in Section 4.9 of the EIS. Modelling of the proposed dredging operation and indicative final landform indicates that groundwater levels in adjacent vegetation and fauna habitat will not be significantly affected by proposed dredging operation with only small changes predicted in groundwater level and base flow contribution. Further, the results of biodiversity surveys undertaken within the Project area did not indicate any significant deterioration in vegetation community quality adjacent to quarry which has been active over the past approximately 30 years and *Grevillea parviflora* subsp. *parviflora* has been recorded regularly in vegetation communities in proximity to active quarry operations (refer to **Figure 4.1**).

Summary of Relevant Impacts

Based on the ecological values of the proposed disturbance area and wider Project area summarised in Section 5.2.1 of the Ecological Assessment (refer to Appendix 7 of the EIS), the Proposed Action is likely to result in a direct and indirect impact on ecological values.

Although an impact mitigation strategy will be undertaken, a biodiversity offset strategy has been prepared to address the residual and unavoidable impacts of the Proposed Action. The Proposed Action will result in the removal of approximately 24.1 ha of native vegetation and fauna habitat along with additional disturbance of derived native grasslands and disturbed lands. The proposed alternative biodiversity offset strategy will result in the loss of approximately 26.1 ha of native vegetation and fauna habitat.

A description of the relevant impact of the Action on a World Heritage Place and a National Heritage Property is discussed in **Section 5.2** below.

5.1.2 Are any Relevant Impacts Likely to be Unknown, Unpredictable or Irreversible?

The relevant impacts of the Project are considered to be well known and predictable based on the extensive knowledge regarding the ecological values of the Project area and a sound understanding of the impacts of the Project (e.g. clearing of vegetation, earthworks and water management). The direct impacts of the Project on identified MNES, as a result of vegetation clearance and construction of the Project is predicted to be permanent.

5.1.3 Analyses of the Significance of the Relevant Impacts

The EPBC Act lists criteria which are used to determine whether an action is likely to have a significant impact on MNES (DEWHA, 2009). These criteria are addressed in the Assessment of Significance provided in Appendix E of the Ecological Assessment (refer to Appendix 7 of the EIS) and included the EPBC Act listed species identified in **Table 4.1**.

No EPBC Act-listed EECs were recorded in the proposed disturbance area or Project area. The outcome of the EPBC Act Assessment of Significance (refer to Appendix E of the Ecological Assessment), in relation to the threatened species listed recorded or potentially occurring in the proposed disturbance area in **Table 4.1**, indicates that the Action is not likely to result in a significant impact on any threatened species recorded, or potentially occurring in the proposed disturbance area.

For those threatened species recorded in the Project area or potentially occurring within the Project area (refer to **Table 4.1**), an Assessment of Significance has been undertaken in accordance with the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines – Matters of National Environmental Significance (DoE, 2013) (refer to Appendix E of the Ecological Assessment). The Assessments of Significance provided in Appendix E of the Ecological Assessment, assumes a worst case scenario based on the level of impact associated with the currently proposed Project. As discussed in **Section 3.3.2** above, an alternative biodiversity offset strategy and disturbance area has been proposed following feedback from OEH, DoE and the NSW NPWS. This proposed alternative results in a slightly different impact to that of the Project and these differences are described in **Section 3.3.2**. In summary, the alternative biodiversity offset strategy results in a lower level of impact for the majority of vegetation communities and fauna habitats and therefore, the Assessments of Significance below are considered to be applicable to both proposals.

The assessment of significance concludes that the Action will not result in a significant impact on the small-flowered grevillea (*Grevillea parviflora* subsp. *parviflora*).

The proposed alternative offset strategy that is detailed in **Section 3.3.2** results in a reduction in the area of impact in relation to native vegetation and fauna habitat and therefore, consistent with the finding above, the impacts associated with the proposed alternative offset strategy would not result in a significant impact on MNES.

Further to the direct avoidance of impacts on MNES (including the altered Project boundaries to avoid dense clusters of small-flower grevillea in the north-east of the site), Hy-Tec has committed to the design and implementation of a comprehensive strategy to mitigate any potential impacts on MNES of the Project (refer to **Section 6.0** below). Additionally, a comprehensive biodiversity offset strategy has been developed, which includes the protection and enhancement of native vegetation and threatened species habitat, to develop a positive long-term outcome for the threatened species and key ecological features affected by the Project. The proposed biodiversity offset strategy is documented in Section 7.0 of the Ecological Assessment (refer to Appendix 7 of the EIS) and described in **Section 7.0** below.

5.1.4 Summary of Technical Data and Other Information Used or Needed to Make a Detailed Assessment of the Relevant Impacts

The detailed assessment of the relevant impacts of the Proposed Action was based on a thorough review of technical data and other relevant information, including but not limited to:

- results from the comprehensive ecological surveys;
- regional vegetation mapping;
- relevant national and NSW recovery and threat abatement plans; and
- DoE Protected Matters Database and OEH Atlas of NSW Wildlife database records.

The technical data and other information considered in determining the relevant impacts of the Proposed Action on listed threatened and migratory species is provided in Sections 3.1 and 3.2 of the Ecological Assessment (refer to Appendix 7 of the EIS).

5.1.5 Relevant Impacts on EPBC Act listed Threatened Species

4. *Where there is a potential habitat for *Grevillea parviflora*, surveys must be undertaken. These surveys must be timed appropriately and undertaken for a suitable period of time by a qualified person. A subsequent description of the relevant impacts on such EPBC Act listed species should include, inter alia, direct, indirect, cumulative and facilitative impacts on the:*

- a) population of the species at the site***
- b) area of occupancy of the species***
- c) habitat critical to the survival of the species***
- d) breeding cycle of the population, and***
- e) availability or quality of habitat for the species***

A detailed survey methodology was designed and completed in order to gain a thorough understanding of the ecological features of the Project area. Regarding the specific surveys undertaken for small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*), methods included a detailed literature review of relevant reports and vegetation mapping, as well as searches of relevant ecological databases. Information gathered from the literature reviews and database searches was then used to design a field survey program to accurately target small-flower grevillea and its habitats across the site. The field surveys were undertaken with consideration of the relevant DoE and OEH threatened species survey guidelines (DEC, 2004) and involved extensive meandering and targeted walking transects in identified potential habitat for the species. The surveys were undertaken by appropriately qualified and experienced botanists and were undertaken during the known flowering season for the species (November 2010, August 2011 and November 2012). Additional flora surveys

conducted outside the reported flowering period for the species were conducted in February 2011 which included additional targeted surveys for the species. Samples from the November 2012 survey were lodged with the National Herbarium of New South Wales at the Royal Botanic Gardens Sydney for official identification.

As a result of the surveys, the small-flower grevillea was recorded in large numbers in the Project area. A total of 849 individuals of this species were recorded across the wider Project area with three plants occurring within the proposed disturbance area and 390 occurring in the proposed Tinda Creek biodiversity offset area (it is noted that a total of 629 individual *Grevillea parviflora* subsp. *parviflora* occur within the proposed alternative biodiversity offset area). The area of occupancy of the species in the Project area occurs mainly in two major clusters (occupying an area of approximately 15 ha) within the Mellong Sandmass Dry Woodland community in the north-east and south-east corners of the Project area. A total of 18.7 ha of woodland and forest habitat occurring in the proposed disturbance area is considered to be high quality potential habitat for the species with only minor disturbances from tracks and quarry workings and with low weed densities occurring in the habitat occupied by the species.

The biology, including the production and viability of seed, seed predation or germination rates and requirements, of small-flower grevillea is poorly known (DoE, 2014). The species is known to flower in April, May and between July and December (DoE, 2014). One to two seeds are released at maturity (Benson and McDougall, 2000) but have limited seed dispersal of probably of less than 2 m. After fire or other disturbance, regeneration can occur from both the rhizomes and seed in the soil seedbank (DoE, 2014).

It is likely that the records within the Project area are part of the wider population of the species located in the Putty area, which is a disjunct population from the larger populations known from the Lower Hunter and Picton areas approximately 60 km and 110 km from the Project area respectively. It is likely that the disjunct Putty population of the species, including the records within the Project area, form an important population of the species due to its isolation from other known populations and its potential to form a key source for dispersal for the species in the Wollemi and Yengo National Park area. The habitat within the Project area is not considered critical for the survival of the species, but likely to be important for the continuation of the local population.

A revised Assessment of Significance has been undertaken for the species following the decision to consider the proposed Action as 'controlled' under the EPBC Act and following consultation with OEH/NPWS, as detailed in Appendix E of the Ecological Assessment (refer to Appendix 7). Following additional impact avoidance measures undertaken by Hy-Tec, the impacts to the species on the site are considered to be minor. The Project will remove three individuals from the Proposed Disturbance Area and transfer into conservation reserves 390 individuals occurring within the proposed Tinda Creek biodiversity offset area.

Assessment of the Koala in Relation to the Koala Referral Guidelines

The assessment of significance prepared for the koala as part of the Ecological Assessment has been reviewed in consideration of the Department's recently released Draft Koala Referral Guidelines.

The Assessment of Significance, undertaken in accordance with the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines – Matters of National Environmental Significance (DoE, 2013) determined that the Project area was unlikely to comprise an important population of the species.

The Department's Draft Referral Guidelines advise that the assessment of significant impacts on the koala is undertaken primarily through the assessment of habitat critical to the survival

of the koala and actions that interfere substantially with the recovery of the koala. This approach aims to avoid and address habitat loss as well as promote a streamlined assessment and approval process.

In accordance with the Draft Guideline, the habitat assessment tool was applied to the entire impact area of the proposed Action. The area of impact has been determined as the extent of vegetation that contains at least one known koala food tree, which corresponds to 15.1 ha (14.6 ha in the Alternative Project i.e. quarrying in Domain 7 rather than Domain 3) of Mellong Sandmass Dry Woodland and 4.8 ha (6.7 ha in the Alternative Project) of Mellong Sandmass Swamp Woodland. Application of the habitat assessment tool indicates that the Project area contains habitat critical to the survival of the species.

Following determination of the importance of the habitat for the koala in the Project area, an assessment was undertaken to determine the impacts which are likely to substantially interfere with the recovery of the koala. The Draft Referral Guideline identifies the following impacts listed in **Table 5.2** as likely to substantially interfere with the recovery of the koala.

Table 5.2 – Assessment of Impacts that are Likely to Substantially Interfere with the Recovery of the Koala In Accordance with the Draft Referral Guidelines for the Koala (DoE, 2013)

Potential Impact to the Koala As Identified in the Draft Koala Referral Guidelines	Level of Impact Operating in the Project Area
introducing or increasing koala fatalities in an area due to vehicle-strikes to a level that is likely to result in multiple, ongoing mortalities	The quarry is not likely to increase the threat of vehicle-strikes as the existing haul route on site will continued to be used and substantial changes to vehicle movements are not predicted.
introducing or increasing koala fatalities in an area due to dog attacks to a level that is likely to result in multiple, ongoing mortalities	The quarry will not result in the introduction of dogs to the local area and therefore will not increase the threat of dog attacks to the local koala population.
creating a barrier to movement within or between habitat critical to the survival of the koala that is likely to result in a long-term reduction in koala movement and therefore gene flow, or prevent access to important resources (such as areas with a high density of food trees or of drought refuge)	The proposed Action is a modification to an existing operation and will therefore not result in the creation of barriers to koala movement in the local area. Retained vegetation in the Project area will remain connected to vegetation within and contiguous with the Project area.
facilitating the introduction or spread of disease or pathogens to an area, for example <i>Chlamydia</i> or <i>Phytophthora cinnamomi</i> , which are likely to significantly reduce the reproductive output of female koalas or reduce the carrying capacity of the habitat	The Project is not expected to facilitate the introduction or spread of pathogens.
increasing the risk of high-intensity fire to areas of habitat critical to the survival of the koala	The Project is not expected to increase the risk of high intensity fires. Fire management practices have been incorporated into the Project design and include fire breaks and the provision of a static water supply for use by OEH in fighting bushfires within the adjacent NPWS estate.

Table 5.2 – Assessment of Impacts that are Likely to Substantially Interfere with the Recovery of the Koala In Accordance with the Draft Referral Guidelines for the Koala (DoE, 2013) (cont)

Potential Impact to the Koala As Identified in the Draft Koala Referral Guidelines	Level of Impact Operating in the Project Area
degradation of habitat critical to the survival of the koala resulting from hydrological change to the extent that the function and integrity of the habitat is jeopardised	As discussed in Section 5.1 , surveys of vegetation and fauna habitat in proximity to the existing quarry which has operated for approximately 30 years, has not identified any degradation of biodiversity values, including for the koala in adjacent, proximate habitats. Therefore, the project is not expected to result in the degradation of retained vegetation within the Project area or in the proposed biodiversity offset areas such that the function and integrity of the existing habitat for the koala is jeopardised.

In summary, while the Draft Referral Guideline indicates that the Project area contains habitat critical to the survival of the koala, the impacts of the Project are not expected to result in substantial interference of the recovery of the koala. Further consideration of the Assessment of Significance outcomes for the Project confirms that the Project area is unlikely to contain an important population of the koala as the criteria for determining an important population are not met in the Project area. That is, an important population is a population that is necessary for a species' long-term survival and recovery. This may include populations that are:

- key source populations either for breeding or dispersal; or
- populations that are necessary for maintaining genetic diversity; and/or
- populations that are near the limit of the species range.

The koala is known to occur in eucalypt woodlands and forests of the central and north coasts of NSW with few populations occurring west of the Great Dividing Range and the Project area is not at the limit of the species range. The koala was recorded on two occasions in the south-east portion of the Project area during the February and November 2011 surveys undertaken for this assessment. The individuals recorded were identified as young males that were likely to be using the habitats within the Project area dispersing into new breeding territories from a female breeding territory. The species was not recorded in the proposed disturbance area. Other previous records of the species occur within and immediately around the Project area with other scattered records throughout Wollemi and Yengo National Park (OEH, 2014). It is likely that the records in and around the Project area constitute part of a population that occurs across Wollemi and Yengo National Park, however it is unlikely that Project area contains key source populations either for breeding or dispersal or that the populations is necessary for maintaining genetic diversity.

The outcome of the assessment of significance is that the koala is not likely to be significantly impacted by the Project as the Project area does not contain an important population as described above and the Project will not result in those impacts that the Department has determined are likely to substantially interfere with the recovery of the species, in accordance with the Draft Referral Guidelines. The Project is not expected to result in a residual impact on the koala and biodiversity offsetting for the species is therefore not required.

5.2 Relevant Impacts to the World and National Listed Values of the Greater Blue Mountains World Heritage Area

5. *An assessment of all relevant impacts to the World and National listed values of the Greater Blue Mountains World Heritage Area (GBMWH). The assessment should include:*

- a) *A detailed description of the potential and likely hydrological change, including changes to water quality and quantity entering the heritage area, that may occur as a result of the proposed action. Direct and indirect impacts must be included. Cumulative and facilitative impacts should also be included. Water quality impacts of unplanned discharges should also be addressed.*

5.2.1 Potential Hydrological Impacts to GBMWH

At present, the quarry operates a closed water management system, with clean water drainage diverted around the site. This water management approach will continue for the proposed expanded operations. A detailed description of the likely hydrological changes associated with the Project is provided in Section 4.9 of the EIS. Modelling of the proposed dredging operation and final landform indicates that groundwater levels in the surrounding GBMWH will not be significantly affected by proposed dredging operation with only small changes predicted in groundwater level and base flow contribution. Further, groundwater dependent ecosystems on the site do not display any obvious signs of being adversely affected by operations at the site over the past approximately 30 years and the results of aquatic ecology monitoring undertaken in Tinda Creek (Umwelt, 2010) indicate no observable changes or adverse impacts on downstream environments.

The potential impacts of the Action to the World and National listed values of the GBMWH were assessed as part of the EIS, the findings of this assessment are outlined in Section 5.7 of the EIS and Appendix E of the Ecological Assessment (refer to Appendix 7 of the EIS).

- a) *A detailed description of flora and fauna that may be affected by identified changes and potential changes in hydrology, and*

The official values of the Greater Blue Mountains World Heritage Area, as detailed on the Australian Heritage Database, relate to the diversity of examples of on-going ecological and biological processes significant in the evolution of Australia's highly diverse ecosystems and communities of plants and animals, particularly eucalypt-dominated ecosystems. These values will not be adversely affected by the proposed expansion of quarrying operations.

The Project will not result in direct impacts to the GBMWH and none of the official values identified in Appendix E of the Ecological Assessment (refer to Appendix 7 of the EIS) will be lost, degraded or damaged as a result of the Project. The Project includes substantial impact mitigation and management measures that have been designed to ensure that there are no off-site or indirect impacts resulting from the Project, including as a result of changes to groundwater and surface water regimes; erosion and sedimentation; weeds and feral animals; uncontrolled access to the adjacent World Heritage property. The Project is not expected to adversely affect the diversity of flora and fauna species or any other biological process outside the Project area. A range of mitigation measures are recommended to minimise any potential residual impacts to the National Parks Estate/GBMWH. These mitigation measures are summarised below and discussed in Sections 6.0 and 7.0 of the Ecological Assessment (refer to Appendix 7 of the EIS).

A range of mitigation measures have been proposed relating specifically to the management of the biodiversity offset area including to mitigate potential indirect impacts of the Project such as edge effects, changes in runoff and changes to the groundwater regime, these include the:

- provision of a minimum 237 m buffer zone between Yengo National Park/Greater Blue Mountains World Heritage Area and the northern side of the Proposed Disturbance Area to minimise the potential for adverse impact to the GBMWHA;
- implementation of weed control protocols within the buffer zone to prevent weed species spreading into the GBMWHA; and
- implementation of appropriate sediment and erosion control measures to ensure that there are no off-site impacts associated with the Project.

The proposed mitigation measures detailed above also apply to the proposed alternative biodiversity offset strategy, with the exception of the buffer zone which would increase on the northern side to approximately 400 m and reduce in the southern side of the proposed disturbance area to approximately 40 m while extraction occurring within this area subsequently being reshaped and revegetated with sedgeland species. This reduction is expected to provide a sufficient buffer to minimise the potential for indirect impacts of the Action on the adjacent GBMWHA as potential offsite impacts such as weed invasion and erosion/sedimentation will be managed under an updated environmental management plan.

b) A detailed description of the impact of the proposed action of the wilderness quality (as determined by the National Wilderness Inventory) of the GBMWHA.

As discussed in **Section 5.2.1**, the Project is not expected to result in direct or indirect impacts to the GBMWHA and therefore the Project will not adversely affect the wilderness quality of the GBMWHA, as determined by the National Wilderness Inventory.

6.0 Proposed Safeguards and Mitigation Measures

6. *A description of feasible mitigation measures, changes to the action or procedures, which have been proposed by the proponent or suggested in public submissions, and which are intended to prevent or minimise relevant impacts on matters of national environmental significance. Information must include:*

6.1 Ecological Impact Mitigation Measures

- a) *a description of the mitigation measures that will be undertaken to prevent or minimise the relevant impacts of the action. These mitigation measures should be justified and based on best available practices*

Hy-Tec has sought to avoid and minimise potential impacts on the ecological values of the Project area throughout the project planning process. This has included avoidance and minimisation of disturbance of key vegetation communities and fauna habitats and threatened species. Hy-Tec has also committed to the design and implementation of a comprehensive strategy to mitigate the adverse impacts of the Project which includes the following measures.

Table 6.1 – Proposed Impact Mitigation Actions and Associated Timing/Frequency

Proposed Mitigation Action	Proposed Timing/Frequency
the rehabilitation of disturbed areas	Ongoing
weed control	Annual
sediment and erosion control	Ongoing
implementation of a robust tree felling procedure	Prior to clearing extant vegetation
nest box establishment in retained vegetation	Within 12 months of the date of consent
pre-clearance surveys in Rosenbergs goanna and threatened arboreal mammal habitat	Prior to clearing extant vegetation
removal of building materials, car bodies and rubbish from the proposed biodiversity offset area on Lot 1	Within 12 months of the date of consent

Further detail regarding the proposed management and mitigation strategy is outlined in Section 6.0 of the Ecological Assessment (refer to Appendix 7 of the EIS).

- b) *an assessment of the expected or predicted effectiveness of the mitigation measures including the effect on abundance and condition of species, suitable habitat and ecological communities and heritage values*

As outlined in Sections 6.0 of the Ecological Assessment, the mitigation measures proposed are expected to be effective in minimising the impact on the ecological features of the Project area during construction and operation of the Project (refer to Appendix 7 of the EIS). The impact mitigation measures proposed are based on best available practices and are widely used to mitigate the impact of extractive industry developments. The impact mitigation and management measures proposed as part of the Project are expected to ensure the development maintains or improves the terrestrial and aquatic biodiversity values of the region in the medium to long term.

c) any statutory or policy basis for the mitigation measures

No specific State or Commonwealth policies are currently available to form the basis of the proposed mitigation strategy. The mitigation strategy has been developed specifically for the Action based on previous learnings and experience at the site and utilising best practise guidelines in ecological impact minimisation. Consideration has also been given to State and Commonwealth Recovery Plans and Threat Abatement Plans, where relevant.

d) the cost of the mitigation measures

Table 6.2 presents all proposed mitigation actions and a conceptual cost estimate of each action. The conceptual cost estimate provides an indicative assessment of the capital requirements for the implementation of works, which will be further refined through the development of an updated Environmental Management Plan (EMP) and as informed by ongoing monitoring. A contingency factor has been applied to the conceptual cost estimate for management actions. Hy-Tec commits to the provisioning of adequate resources for the implementation of management actions at each of the proposed offset sites.

A summary of the costs of management actions is included in **Table 6.2** below.

Table 6.2 – Summary of Management Action Costs

Management Action	Proposed Works	Annual Cost for 30 Years (\$)	Cost over 30 Years
Weed Management	Targeted weed removal measures may include spraying and manual removal.	1,000	30,000
Progressive Rehabilitation	Rehabilitation works would be undertaken progressively over the life of the quarry. Works would commence as soon as practicable after disturbance and reformation of the landscape.	50,000	1,500,000
Tree Felling Procedure	A robust tree felling procedure will be implemented at the quarry to minimise the potential for impacts on native fauna species.	1,000	30,000
Nest Box Establishment	Nest boxes will be established in retained vegetation. An assessment of the number of tree hollows lost during clearing will be made as part of the tree felling activities and nest boxes will be established to compensate for this loss, where appropriate.	1,000	30,000
Rosenbergs Goanna Impact Mitigation Measures	A pre-clearance survey of the proposed disturbance areas will be undertaken prior to ground disturbance (within seven days of the planned disturbance) to ensure that no Rosenberg's Goanna burrows are present.	1,000	30,000
	Total	\$54,000	\$1,620,000

e) an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs (including any relevant thresholds for corrective actions) for the relevant impacts of the action. Include the person or agency responsible for implementing these programs and the effectiveness of all mitigation measures, including any provisions for independent environmental auditing

The detailed approach to the continuing management and monitoring of the biodiversity offset area will be documented in the updated EMP. The updated EMP will be revised within

12 months of the Action approval and will be updated to incorporate the proposed additional impact mitigation and biodiversity management commitments. The EMP will be approved by DP&E) and the Commonwealth DoE and will include provisions for independent environmental auditing.

f) *the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program*

The NSW DP&E will be responsible for endorsing the mitigation strategy and monitoring programs on approval of the Action. It is proposed that the mitigation measures will be included in an updated Environmental Management Plan for the site which is expected to be provided to the DP&E and DoE within 12 months of approval for review and endorsement and will cover both state and Commonwealth requirements.

g) *identification of mitigation measures proposed to be undertaken by State governments, local governments or the proponent, and*

Key impact mitigation strategies will be detailed in the updated EMP and will include strategies to mitigate any adverse impacts of the Project. The strategies include the rehabilitation of disturbed areas, weed control, sediment and erosion control, implementation of a robust tree felling procedure, nest box establishment in retained vegetation, and pre-clearance surveys in Rosenbergs goanna and threatened arboreal mammal habitat. These strategies are documented in Section 6.0 of the Ecological Assessment (refer to Appendix 7 of the EIS) and will be fully detailed in the amended EMP.

No mitigation measures are proposed to be undertaken by state or local government agencies.

h) *any changes to the action which prevent or minimise relevant impacts on listed threatened species and communities*

Hy-Tec has sought to avoid and minimise potential impacts on the ecological values of the Project area throughout the project planning process. This has included avoidance and minimisation of disturbance of vegetation communities and fauna habitats. These avoidance measures are described in detail in Section 5.1 of the Ecological Assessment (refer to Appendix 7 of the EIS).

Following receipt of the Supplementary DGRs in December 2013, Hy-Tec undertook further impact avoidance measures to specifically avoid the direct clearing of *Grevillea parviflora* subsp. *parviflora*, reducing the impact from 233 individuals to three.

With the proposed measures to avoid, minimise or manage impacts associated with the Project, it is anticipated that the Project can proceed without significantly changing the extent of impact on the surrounding environment or local community.

7.0 Offsets

7. ***Where impacts cannot be avoided or mitigated, an offset package to compensate for any predicted or potential residual significant impacts on matters of national environmental significance. Offsets should demonstrate consistency with the Commonwealth EPBC Act Environmental Offsets Policy (October 2012, or subsequent versions), available at: www.environment.gov.au/epbc/publications/environmental-offsets-policy.html. The department's information requirements in relation to EPBC Act offset proposals is provided at Appendix B. Information must include:***

7.1 Description of the Offset

- a) ***the description of any offset package should include how the offset compensates for the residual impacts, when the offset will be delivered and how the offset will be managed***

A comprehensive biodiversity offset strategy has been prepared in accordance with the DGRs for the Project to ensure the development maintains or improves the terrestrial and aquatic biodiversity values of the region in the medium to long term. An assessment of impacts is provided in **Section 5** that includes consideration of both direct and indirect impacts and a biodiversity offset strategy has been developed to compensate for the residual impacts of the Project. Two options exist to provide a direct, like-for-like biodiversity offset as part of the Project and are detailed in relevant sections below. The biodiversity offset strategy was developed for the Project in a manner consistent with Commonwealth and State offsetting policies.

In October 2012 the Australian Government released the EPBC Act Environmental Offsets Policy (DSEWPC, 2012a). The policy relates to all protected matters under the EPBC Act including adversely impacted heritage values, and applies to offsetting requirements in terrestrial and aquatic (including marine) environments.

The Policy has five key aims:

- to ensure the efficient, effective, timely, transparent, proportionate, scientifically robust and reasonable use of offsets under the EPBC Act;
- to provide proponents, the community and other stakeholders with greater certainty and guidance on how offsets are determined and when they may be considered under the EPBC Act;
- to deliver improved environmental outcomes by consistently applying the policy;
- to outline the appropriate nature and scale of offsets and how they are determined; and
- to provide guidance on acceptable delivery mechanisms for offsets.

According to the policy, direct offsets must constitute a minimum of 90% of the total offset requirement. The remaining offset requirement (up to a maximum of 10%) may be made up by 'other compensatory measures' to complete the 100% offset requirement. Deviation from the 90% direct offset requirement will only be considered in limited circumstances.

Recent discussions with the Department of the Environment indicate that an early application of the EPBC Offsets Calculator Assessment should be undertaken for the EPBC Act-listed

threatened species considered likely or having potential to be impacted by the Project to help engage in preliminary consultation with the Department of the Environment in evaluating the adequacy of the biodiversity offset strategy. As recommended in Appendix B of the Supplementary DGRs, the EPBC Act Offset Calculator Assessment has been applied to the impacts and proposed offsets for the small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*) which will be directly impacted as a result of the Project. The results from the EPBC Offset Assessment Guide indicate that the proposed Tinda biodiversity offset area for the Project provides a 234% of the offsetting requirements for the predicted impacts of the Project on the small-flower grevillea. This exceeds the 100% direct offset requirement for these species as specified by the EPBC Offsets Assessment Guide.

Section 7.3.2 of the Ecological Assessment provides a detailed analysis of the adequacy of the proposed biodiversity offset strategy in accordance with the Environmental Offsets Policy (DSEWPC, 2012a). The analysis demonstrates that the proposed biodiversity offset strategy provides an adequate and appropriate strategy to offset the residual impacts of the Action on listed threatened and migratory species.

The proposed biodiversity offset area is located in Lot 1 of the Project area (refer to **Figure 7.1**) and includes 71.5 ha of vegetation and habitats that are like-for-like to the area to be impacted in the Proposed Disturbance Area.

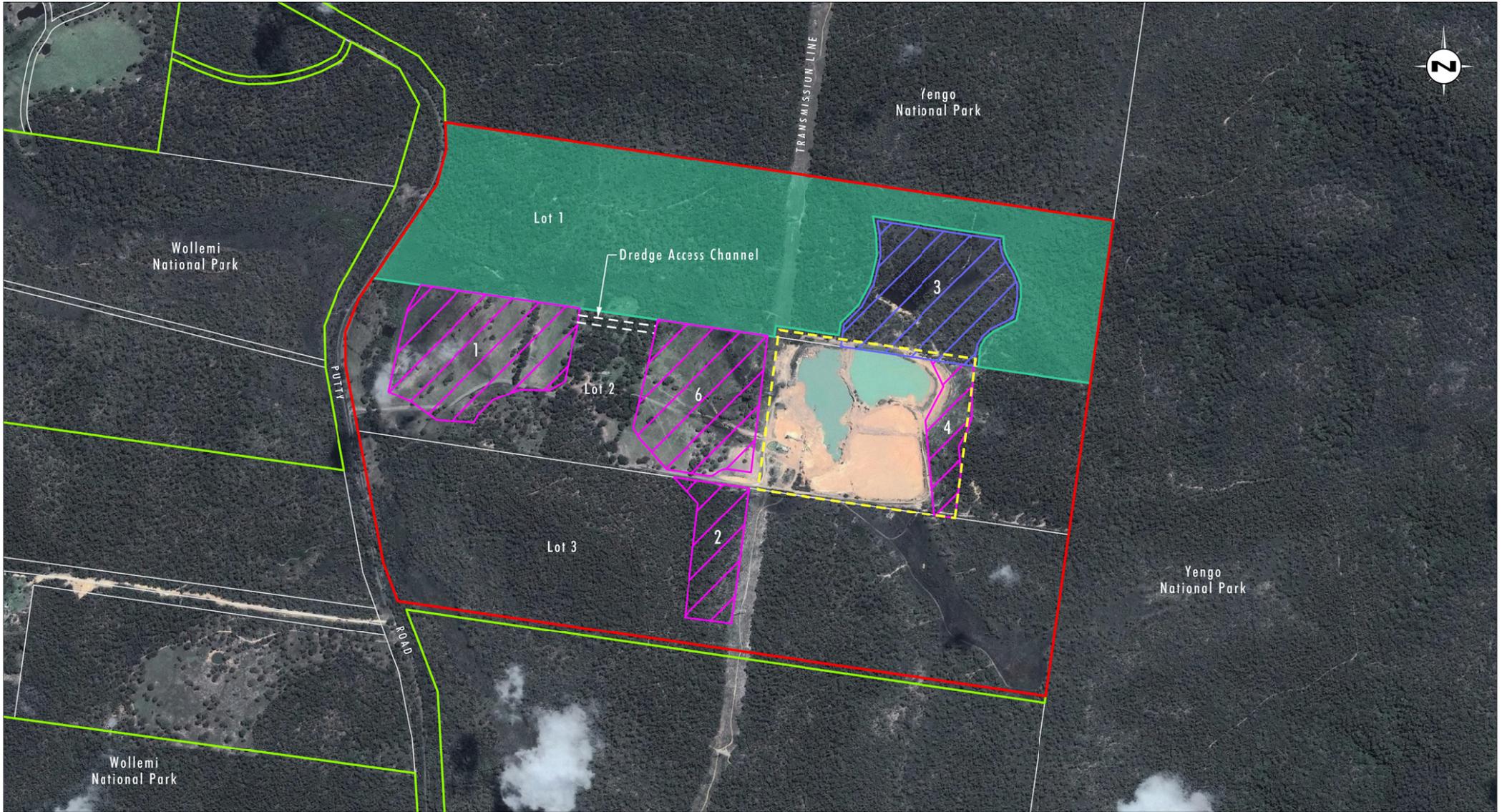
The biodiversity offset will be enforced through development consent conditions following project approval.

Vegetation Communities and Fauna Habitats

Vegetation communities occurring within the proposed biodiversity offset area were described and mapped as part of the Ecological Assessment (Appendix 7 of the EIS). The following vegetation communities occur within the biodiversity offset area:

- Mellong Sandmass Dry Woodland;
 - Variant: Mellong Sandmass Dry Woodland Derived Native Grassland.
- Mellong Sandmass Swamp Woodland;
- Mellong Sandmass Sedgeland;
- Hawkesbury Hornsby Plateau Exposed Woodland;
 - Variant: Hawkesbury Hornsby Plateau Exposed Woodland Derived Native Grassland; and
- Stringybark – Ironbark Forest.

Table 7.1 details the area of each vegetation community and broad fauna habitat classification occurring within the proposed biodiversity offset area and the offset ratios provided.



Source: Google Earth (2012), LPI NSW (2007), OEH (2013)

0 250 500 750m
1:15,000

Legend

- Project Area
- Proposed Extraction Area
- Domain 3 Extraction Area
- National Park Boundary
- Limit of Approved Extraction (DA 134/95)
- Proposed Biodiversity Offset Area

FIGURE 7.1

Tinda Creek Biodiversity Offset Area

Table 7.1 – Area of Vegetation Community and Fauna Habitat in the Tinda Creek Biodiversity Offset Area

Fauna Habitat Formation	Vegetation Community	Area of Impact (ha)	Area Present in Offset Area (ha)	Offset Ratio
Forest and Woodland	Stringybark - Ironbark Forest	2.1	8.2	3.1:1
	Hawkesbury Hornsby Plateau Exposed Woodland	1.5	14.1	
	Mellong Sandmass Dry Woodland	15.1	35.5	
Swamp Forest and Sedgeland	Mellong Sandmass Swamp Woodland	4.8	10.7	2:1
	Mellong Sandmass Sedgeland	0.6	0.0	
Total Native Woodland, Forest and Sedgeland		24.1	68.5	2.8:1
Derived Native Grassland and other highly modified communities	Hawkesbury Hornsby Plateau Exposed Woodland Derived Native Grassland	0.1	1.0	No offset proposed for DNG
	Mellong Sandmass Dry Woodland Derived Native Grassland	17.5	2.0	
	Mellong Sandmass Swamp Woodland (modified – overstorey absent)	3.1	0.0	
Total Derived Native Grassland		20.7	3.0	
Disturbed Land	Disturbed Land	0.1	0.0	No offset proposed for disturbed land
Water body		0.2	0.0	No offset proposed for waterbodies
TOTAL		45.1	71.5	

Direct Offset for Small-flower Grevillea (*Grevillea parviflora* subsp. *parviflora*)

The Project will impact known habitat for and remove three small-flower grevillea individuals within the Proposed Disturbance Area. The field surveys of the Project area identified 390 small-flower grevillea within the proposed Tinda Biodiversity Offset Site in a large cluster in the north-east of the Project area. The Tinda Biodiversity Offset Site provides a 130:1 offset for individuals of small-flower grevillea and a 3.1:1 offset in relation to known and likely habitat for the species,

Proximity to Yengo and Wollemi National Parks and the Greater Blue Mountains National Heritage Place and World Heritage Property

The Tinda Biodiversity Offset Site is located directly adjacent to Yengo National Park, on the northern boundary of the Project area. The offset site is also adjacent to the Greater Blue Mountains National Heritage Place and World Heritage Property that includes Yengo and Wollemi National Parks. The Tinda Biodiversity Offset Site is part of a vast, continuous area of vegetation that is over 600,000 ha in size and is valued for its high biodiversity of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals including features of high conservation significance. The inclusion of the Tinda Biodiversity Offset Site as an area of in-perpetuity conservation will extend this area by 71.5 ha.

The biodiversity offset strategy was developed for the Project in a manner consistent with Commonwealth and State offsetting policies. The objectives of the biodiversity offset strategy are described in **Section 7.0**. The proposed offset provides a direct, 'like for like' offset for both vegetation communities and fauna habitat and subsequently, those threatened flora and fauna species that will be directly impacted as a result of the project.

Proposed Long-term Conservation Mechanism

The biodiversity offset area is located adjacent to Yengo National Park, on its northern boundary. The proximity of the National Park and the high conservation values of the Biodiversity Offset Site suggest one option may be donation of the offset to the NPWS estate to ensure the long-term protection of the offset site. Further consultation with NPWS will be undertaken as part of the approval process to determine an appropriate long term management strategy.

Proposed Alternative Offset Site

Based on the feedback received from NPWS (Richard Colbourne) at the on-site meeting on 29 January 2014, Hy-Tec has identified a potential alternative to the extent and location of the proposed impact area and also the proposed offset area. The key differences include:

- The possible removal of Domain 3 from the proposed quarry plan, resulting in the sterilisation of approximately 2 Mt of resource and inclusion of this area in the proposed alternate biodiversity offset area (**Figure 7.2**). This loss of resource would be offset by the quarrying of approximately 2 Mt of resource from Domain 7.
- Addition of an eastern extension to the biodiversity offset area (refer to **Figure 7.2**) to protect high conservation value sedgeland, a large population of *Grevillea parviflora* subsp. *parviflora* and important threatened fauna habitat.

Table 7.2 provides a summary of the area of each vegetation community contained in the potential alternate offset area and the ratio of alternate conservation areas compared to the revised area of impact (offset ratio) that includes Domain 7.



Source: Google Earth (2012), LPI NSW (2007), OEH (2013)

0 250 500 750m
1:15 000

Legend

- Project Area
- Proposed Extraction Area
- Domain 7 Extraction Area
- National Park Boundary
- Limit of Approved Extraction (DA 134/95)
- Proposed Alternate Biodiversity Offset Area

FIGURE 7.2

Proposed Alternate Tinda Creek
Biodiversity Offset Area

Table 7.2 – Area of Vegetation Community and Fauna Habitat in the Alternative Tinda Creek Project and Biodiversity Offset Area

Fauna Habitat Formation	Vegetation Community	Area of Impact (ha)	Area Present in Offset Area (ha)	Offset Ratio
Forest and Woodland	Stringybark - Ironbark Forest	0.8	9.5	5:1
	Hawkesbury Hornsby Plateau Exposed Woodland	1.5	23.9	
	Mellong Sandmass Dry Woodland	14.6	54.4	
Swamp Forest and Sedgeland	Mellong Sandmass Swamp Woodland	6.7	14.4	1.6:1
	Mellong Sandmass Sedgeland	2.5	0.7	
Total Native Woodland, Forest and Sedgeland		26.1	102.9	3.9:1
Derived Native Grassland	Hawkesbury Hornsby Plateau Exposed Woodland Derived Native Grassland	0.1	1.4	No offset proposed for DNG
	Mellong Sandmass Dry Woodland Derived Native Grassland	17.5	1.5	
	Mellong Sandmass Swamp Woodland (modified – overstorey absent)	3.1	0.3	
Total Derived Native Grassland		20.7	3.2	
Disturbed Land	Disturbed Land	0.1	0.0	No offset required for disturbed land
Water body		0.0	0.2	No offset required for waterbodies
Total		46.9	106.2	

Direct Offset for Small-flower Grevillea (*Grevillea parviflora* subsp. *parviflora*)

Quarrying within Domain 7 to facilitate establishment of the alternative biodiversity offset area will impact known habitat for and remove 91 small-flower grevillea individuals. Six hundred and twenty-nine (629) small-flower grevilleas have been recorded within the proposed alternate biodiversity offset area in a large cluster in the north-east of the Project area. The alternate biodiversity offset area provides a 6.9:1 offset for individual stands of small-flower grevillea and a 5:1 offset in relation to known and likely habitat for the species.

Proximity to Yengo and Wollemi National Parks and the Greater Blue Mountains National Heritage Place and World Heritage Property

The alternate biodiversity offset area is located directly adjacent to Yengo National Park, on the northern and eastern boundary (refer to **Figure 7.2**). The alternate biodiversity offset area is also adjacent to the Greater Blue Mountains National Heritage Place and World Heritage Property that includes Yengo and Wollemi National Parks. The alternate biodiversity offset area is part of a vast, continuous area of vegetation that is over 600,000 ha in size and is valued for its high biodiversity of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals including features of high conservation significance. The inclusion of the alternate biodiversity offset area as an area of in-perpetuity conservation will extend this area by 106.2 ha.

The assessment of the alternate biodiversity offset area considered Commonwealth and State offsetting policies and is consistent with the objectives described in **Section 7.1**. The proposed alternate biodiversity offset area provides a direct, 'like for like' offset for both vegetation communities and fauna habitat and subsequently, those threatened flora and fauna species that will be directly impacted as a result of the project.

Proposed Long-term Conservation Mechanism

Both the proposed and the alternative biodiversity offset areas are located adjacent to Yengo National Park. The proximity of the National Park and the high conservation values of the biodiversity offset area suggest that donation of the offset to the NPWS estate to ensure the long-term protection of the offset site. Consultation with NPWS has been undertaken as part of the approval process to determine an appropriate long term management strategy.

The proposed offset will be set aside at the commencement of the Project and the measures proposed to improve the quality of the offsets (i.e. weed management) will be conducted over a 30 year period. This is further detailed in Section 7.0 of the Ecological Assessment (refer to Appendix 7 of the EIS).

7.2 Impact of Offsets

b) an assessment of the impact of the offsets on other matters of environmental, economic, or social significance, and

Hy-Tec has an option to purchase the land proposed for both the proposed biodiversity offset area and the alternative biodiversity offset area. The provision of this land as biodiversity offsets will result in the sterilisation of between 71.5 and 106.2 ha of the Project area from future sand extraction operations and in excess of 3 Mt of recoverable product sand.

Hy-Tec has an option to purchase the proposed offset areas and the establishment of the biodiversity offset strategy is not expected to result in adverse impacts on other matters of environmental, economic or social significance.

7.3 Biodiversity Offset Strategy Cost Analysis

c) analysis of cost, both financial and other, related to offsets.

The proposed Tinda biodiversity offset area is under option to purchase by Hy-Tec and property acquisition is therefore not required. The in-perpetuity conservation mechanism proposed as part of the Strategy is the transfer of the proposed offset area into the NPWS estate to form part of Yengo National Park. Involved in this transfer will be the subdivision of the offset area and transfer of title from Hy-Tec to the NPWS. Costs will also be incurred to remove rubbish and maintain a perimeter fire trail along the northern boundary of the offset area and to undertake condition and weed monitoring of vegetation communities and habitats with 100 m of the proposed extraction areas which are adjacent to the offset area boundary. Hy-Tec commit to the provisioning of adequate resources for the implementation of the biodiversity offset area. The estimated costs outlined in **Table 7.3** are considered to be applicable to both the proposed and alternative offset strategies.

Table 7.3 – Costs Related to the Establishment of the Biodiversity Offset Area

Action	Cost
Subdivision of Biodiversity Offset Area	\$10,000
Transfer of Title to NPWS	\$10,000
Rubbish Removal	\$10,000
Maintenance of Perimeter fire trail	\$5,000 per annum
Total	\$35,000 + \$5,000 per annum after first year

7.4 EPBC Offset Assessment Guide

Appendix B of the Supplementary DGRs provides a guide to the information required by the DoE to assess offset proposals. The information requirement relates to the assessment of offset proposals using the EPBC Offset Assessment Guide, including the offset calculator.

An assessment of the offsetting value of the proposed biodiversity offset areas for the MNES identified in the Supplementary DGRs has been undertaken as part of the Ecological Assessment (refer to Appendix 7 of the EIS). This was completed using the Offsets Assessment Guide in the form of a function-embedded excel spreadsheet.

Appendix B provides a detailed description of the impacts of the Proposed Action and the contribution of the proposed biodiversity offset area to meeting the minimum 90% land-based offset, in accordance with the Environmental Offsets Policy (DSEWPC, 2012). Included in the EPBC Offset Calculator Assessment is an assessment for the small-flower grevillea, listed specifically in Appendix B in the Supplementary DGRs. Currently, World Heritage properties and National Heritage places cannot be entered into the EPBC Offset Calculator Assessment.

An assessment of both the proposed and alternative biodiversity offset areas has been provided in accordance with the EPBC Offset Assessment Guide, and the offset calculator.

A summary of the presence and quality of habitat for the relevant MNES assessed in a manner consistent with the approach in How to Use the Offset Assessment Guide (DSEWPC, 2012b).

7.4.1 EPBC Calculator Assessment for the Proposed Biodiversity Offset Area

The Offset Assessment Guide indicated that the proposed Tinda biodiversity offset area would provide a 234% offset for the impacts on small-flower grevillea as a result of the Project. The Offset Assessment Guide input values used in the assessment are listed in **Table 7.4**.

Table 7.4 – Small-flower Grevillea Offset Assessment Guide Values for the Proposed Tinda Biodiversity Offset Area

	Woodland/Forest Areas to Offset Impacts on Woodland/Forest Habitat
Impact Area	18.7 ha
Impact Quality	6
Offset Area	57.8 ha
Offset Site Start Quality	8
Without Offset Quality	8
With Offset Quality	8
Risk of Loss Without Offset	75%
Risk of Loss With Offset	1%
Time Over Which Loss is Averted	20 years
Time Until Ecological Benefit	1 year
Confidence in Loss	80%
Confidence in Quality Change	80%
% of Impact Offset	234%

7.4.1.1 Habitat Quality for Small-flower Grevillea

Impact Area

Habitat quality for the small-flower grevillea was assessed as 6 out of 10 for the proposed disturbance area with moderate scores across the range of habitat quality parameters (site condition, site context, species stocking rate). The habitat quality scores were based on the known and potential habitats that occurred which included all woodland and forest habitat across the impact site.

The species has been recorded at three locations within the proposed disturbance area for the Project during surveys undertaken for this assessment and 849 individuals were recorded within the broader Project area. The habitat for the species within the proposed disturbance area is limited, with most vegetation communities conforming to Derived Native Grassland variants that do not provide known or likely habitat for this species. Where habitat does occur (in woodland and forest communities), the habitat condition is considered good with variable structure and moderate diversity of species known to occur in association with small-flower grevillea. The proposed disturbance area is currently well connected to surrounding vast habitats within the Greater Blue Mountains World Heritage Area and located in proximity to a known population of the species in the Putty area. However, the species has been recorded in low numbers in the proposed disturbance area, despite the large population occurring in the wider Project area. Known threats to the species in the proposed disturbance area are high and include habitat fragmentation, clearing and disturbance from quarry activities and the impacts of high frequency fires.

Proposed Tinda Biodiversity Offset Area

Habitat quality for the small-flower grevillea was assessed as 8 out of 10 for the Tinda biodiversity offset area with high scores across the range of habitat quality parameters (site condition, site context, species stocking rate). The habitat quality scores were based on the known and potential habitats that occurred which included all woodland and forest habitat across the offset site.

The species has been recorded within the Tinda biodiversity offset area for the Project during surveys undertaken for this assessment, with 390 individuals recorded. The habitat for the species within the Tinda biodiversity offset area is vast, with most vegetation communities comprising woodland or forest communities that provide known or likely habitat for this species. The habitat condition is considered good with variable structure and moderate diversity of species known to occur in association with small-flower grevillea. The proposed Tinda biodiversity offset area is well connected to surrounding vast habitats within the Greater Blue Mountains World Heritage Area and located in proximity to a known population of the species in the Putty area. The species has been recorded in high numbers in the Tinda biodiversity offset area. Known threats to the species in the Tinda biodiversity offset area are currently high and include habitat fragmentation, clearing and disturbance from quarry activities and the impacts of high frequency fires. It is considered that the inclusion of this area as a biodiversity offset area would reduce the threats to the species and provide in-perpetuity conservation for a large population of the species in the local area.

7.4.1.2 Time over which Loss is Averted

The 'time over which loss is averted' was entered as 20 years for the small-flower grevillea at the proposed Tinda biodiversity offset area. As it is intended for the proposed Tinda biodiversity offset area to be transferred into in-perpetuity protection to NPWS, the highest value that can be entered into the calculator is 20 years. This is consistent with the approach in the 'How to Use the Offset Assessment Guide' (DSEWPC, 2012b).

7.4.1.3 Time until Ecological Benefit

The 'time until ecological benefit' was entered as 1 year for the small-flower grevillea at the proposed Tinda biodiversity offset area as the establishment of the site would immediately reduce the threats to the population posed by the potential expansion of quarrying activities.

7.4.1.4 Risk of Loss With and Without the Offset

The 'risk of loss without the offset' percentage score was entered as 75% due to the potential loss of known and potential habitat due to the expansion of quarrying activities within the Project area. A large known and inferred sand resource is located within the area that is proposed as the Tinda biodiversity offset area. The Site is proximate to an existing approved quarry and for there is substantial demand for the quarried material. These factors combine to result in a 'high risk of loss without the offset'.

The 'risk of loss with the offset' percentage score was entered as 1% due to the reduced risk of quarry activities disturbing the population once the offset site is established.

7.4.1.5 Confidence in Loss and Quality Change

The confidence in the 'risk of loss' scores was considered to be 80% as it is likely that the risk of loss is substantially reduced for the species following the establishment of the offset site in an area threatened by the expansion of quarrying activities. A 20% margin of error has been applied to this score.

The confidence in the 'habitat quality' scores was considered to be 80% as there is no predicted change in habitat quality. A 20% margin of error has been applied to this score.

7.4.1.6 Summary and Conclusion

The Offset Calculator generated an offset percentage of 234% for the proposed Tinda biodiversity offset area. The habitat for the small-flower grevillea is considered to be much higher quality to that of the Proposed Disturbance Area, due to lower levels of disturbance and a much higher density of the species occurring in the habitats of the Offset Site. Additionally, the Offset Site contains a larger area of woodland and forest habitat for the species than the Proposed Disturbance Area. A cluster of 390 individuals in the Offset Site is considered to be a substantial population of this species which often occurs in smaller isolated numbers. Moreover, the proposed Tinda biodiversity offset area is of high conservation value proximate to the connectivity associated with Yengo National Park and the Greater Blue Mountains World Heritage property and National Heritage place. The averted loss associated with the proposed Tinda biodiversity offset area relates to the reduction in the risk of loss from 75% to 1% resulting from the implementation of the in-perpetuity Offset.

The results of the EPBC Offset Assessment Guide indicate that the proposed Tinda biodiversity offset area provides 234% of the offsetting requirements for the predicted impacts of the Project on the small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*). This exceeds the 100% offset requirement for this species as specified by the EPBC Offsets Assessment Guide.

7.4.2 EPBC Calculator Assessment for the Alternative Biodiversity Offset Area

The Offset Assessment Guide indicated that the alternative biodiversity offset area would provide a 394% offset for the impacts on small-flower grevillea as a result of the Project. The Offset Assessment Guide input values used in the assessment are listed in **Table 7.5**.

Table 7.5 – Small-flower Grevillea Offset Assessment Guide Values for the Proposed Alternative Biodiversity Offset Area

	Woodland/Forest Areas to Offset Impacts on Woodland/Forest Habitat
Impact Area	16.9 ha
Impact Quality	6
Offset Area	87.9 ha
Offset Site Start Quality	8
Without Offset Quality	8
With Offset Quality	8
Risk of Loss Without Offset	75%
Risk of Loss With Offset	1%
Time Over Which Loss is Averted	20 years
Time Until Ecological Benefit	1 year
Confidence in Loss	80%
Confidence in Quality Change	80%
% of Impact Offset	384%

7.4.2.1 Habitat Quality for Small-flower Grevillea

Impact Area

Habitat quality for the small-flower grevillea was assessed as 6 out of 10 for the proposed disturbance area with moderate scores across the range of habitat quality parameters (site condition, site context, species stocking rate). The habitat quality scores were based on the known and potential habitats that occurred which included all woodland and forest habitat across the impact site.

The species has been recorded at 91 locations within the proposed disturbance area for the alternative Project during surveys undertaken for this assessment and 849 individuals were recorded within the broader Project area. The habitat for the species within the proposed disturbance area is limited, with most vegetation communities conforming to Derived Native Grassland variants that do not provide known or likely habitat for this species. Where habitat does occur (in woodland and forest communities), the habitat condition is considered good with variable structure and moderate diversity of species known to occur in association with small-flower grevillea. The proposed disturbance area is currently well connected to surrounding vast habitats within the Greater Blue Mountains World Heritage Area and located in proximity to a known population of the species in the Putty area. However, the species has been recorded in low numbers in the proposed disturbance area, despite the large population occurring in the wider Project area. Known threats to the species in the proposed disturbance area are high and include habitat fragmentation, clearing and disturbance from quarry activities and the impacts of high frequency fires.

Alternative Biodiversity Offset Area

Habitat quality for the small-flower grevillea was assessed as 8 out of 10 for the alternative biodiversity offset area with high scores across the range of habitat quality parameters (site condition, site context, species stocking rate). The habitat quality scores were based on the known and potential habitats that occurred which included all woodland and forest habitat across the offset site.

Small-flower grevillea has been recorded within the alternative biodiversity offset area for the Project during surveys undertaken for this assessment, with 629 individuals recorded. The habitat for the species within the alternative biodiversity offset area is vast, with most vegetation communities comprising woodland or forest communities that provide known or likely habitat for this species. The habitat condition is considered good with variable structure and moderate diversity of species known to occur in association with small-flower grevillea. The alternative biodiversity offset area is well connected to surrounding vast habitats within the Greater Blue Mountains World Heritage Area and located in proximity to a known population of the species in the Putty area. The species has been recorded in high numbers in the alternative biodiversity offset area. Known threats to the species in the alternative biodiversity offset area are currently high and include habitat fragmentation, clearing and disturbance from quarry activities and the impacts of high frequency fires. It is considered that the inclusion of this area as a biodiversity offset area would reduce the threats to the species and provide in-perpetuity conservation for a large population of the species in the local area.

7.4.2.2 Time over which Loss is Averted

The 'time over which loss is averted' was entered as 20 years for the small-flower grevillea at the alternative biodiversity offset area. As it is intended for the alternative biodiversity offset area to be transferred into in-perpetuity protection to NPWS, the highest value that can be entered into the calculator is 20 years. This is consistent with the approach in the 'How to Use the Offset Assessment Guide' (DSEWPC, 2012b).

7.4.2.3 Time until Ecological Benefit

The 'time until ecological benefit' was entered as 1 year for the small-flower grevillea at the alternative biodiversity offset area as the establishment of the site would immediately reduce the threats to the population posed by the potential expansion of quarrying activities.

7.4.2.4 Risk of Loss With and Without the Offset

The 'risk of loss without the offset' percentage score was entered as 75% due to the potential loss of known and potential habitat due to the expansion of quarrying activities within the Project area. A large known and inferred sand resource is located within the area that is proposed as the alternative biodiversity offset area. The Site is proximate to an existing approved quarry and there is substantial demand for the quarried material. These factors combine to result in a 'high risk of loss without the offset'.

The 'risk of loss with the offset' percentage score was entered as 1% due to the reduced risk of quarry activities disturbing the population once the offset site is established.

7.4.2.5 Confidence in Loss and Quality Change

The confidence in the 'risk of loss' scores was considered to be 80% as it is likely that the risk of loss is substantially reduced for the species following the establishment of the offset site in an area threatened by the expansion of quarrying activities. A 20% margin of error has been applied to this score.

The confidence in the 'habitat quality' scores was considered to be 80% as there is no predicted change in habitat quality. A 20% margin of error has been applied to this score.

7.4.2.6 Summary and Conclusion

The Offset Calculator generated an offset percentage of 394% for the alternative biodiversity offset area. The habitat for the small-flower grevillea is considered to be much higher quality to that of the Proposed Disturbance Area, due to lower levels of disturbance and a much higher density of the species occurring in the habitats of the Offset Site. Additionally, the Offset Site contains a larger area of woodland and forest habitat for the species than the Proposed Disturbance Area. A cluster of 629 individuals in the Offset Site is considered to be a substantial population of this species which often occurs in smaller isolated numbers. Moreover, the alternative biodiversity offset area is of high conservation value proximate to the connectivity associated with Yengo National Park and the Greater Blue Mountains World Heritage property and National Heritage place. The averted loss associated with the alternative biodiversity offset area relates to the reduction in the risk of loss from 75% to 1% resulting from the implementation of the in-perpetuity Offset.

The results of the EPBC Offset Assessment Guide indicate that the alternative biodiversity offset area provides 394% of the offsetting requirements for the predicted impacts of the Project on the small-flower grevillea (*Grevillea parviflora* subsp. *parviflora*). This exceeds the 100% offset requirement for this species as specified by the EPBC Offsets Assessment Guide.

8.0 Other Approvals and Conditions

8. *Any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. Information must include:*

8.1 Local and State Planning Schemes/ Policies

- a) *details of any local or State government planning scheme, or plan or policy under any local or State government planning system that deals with the proposed action, including:*
- i) *what environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy, and*
 - ii) *how the scheme provides for the prevention, minimisation and management of any relevant impacts*

Details of local and State legislation applicable to the proposed action has been provided in Section 3.0 of the EIS, and includes discussion regarding the application of these planning provisions to the Project. Environmental Planning Instruments (EPIs) and Plans considered as part of the assessment process for the Project are discussed in Section 3.3 and 3.4 of the EIS and are summarised below in **Table 8.1**. This summary clearly states the environmental assessments carried out to meet the requirement of each EPI and/or Plan, and the purpose of each EPI and Plan with respect to its intent and how each provides for the prevention, minimisation and management of any relevant impacts.

8.2 State and Commonwealth Approvals

- b) *a description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the EOBC Act), including an conditions that apply to the action*

If development consent for the Project is granted under Part 4 of the EP&A Act, the approvals which are required for the Project which must not be refused by the relevant authority, and must be substantially consistent with the terms of the development consent, are listed below in **Table 8.1**.

Table 8.1 – Approvals Legislation to be Applied Consistently with Development Consent

Act	Approval	Authority
<i>Protection of the Environment Operations Act 1997</i>	Environment Protection Licences are required from the OEH for 'scheduled activities' and 'scheduled development work'. The proposal will extract more than 30,000 t of extractive material per year and therefore meets the definition of a scheduled activity under Schedule 1 of this Act. No variation to the existing licence will be required under this Act.	EPA
<i>Roads Act 1993</i>	Development that affects a public road, Crown road, highway, main road, freeway or tollway requires approval from the NSW Roads and Maritime Services (RMS) or the local Council under this Act. Compliance of the site access entrance road with AS2890.2 is required (Section 4.6.3.3 of the EIS). Should compliance require any works in the road reserve of Putty Road, an approval under the Act will be sought from RMS.	RMS

A summary of other State environmental and planning legislation potentially relevant to the Project is provided in **Table 8.2** below.

Table 8.2 – Other State Legislation of Potential Relevance to the Project

Planning Provision	Comments	Further Approval Required?
<i>Heritage Act 1977</i>	Approval is required from the Heritage Council of NSW to disturb or excavate land where this will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. No approval is required under this legislation for projects assessed as State Significant Development under Part 4 of the EP&A Act.	No
<i>National Parks and Wildlife Act 1974</i>	Approval is required from OEH to knowingly destroy, deface or damage; or knowingly cause or permit the destruction of or damage to an Aboriginal object or Aboriginal Place. The Colo River and its tributaries are declared as Wild Rivers under this Act. No approval is required under this legislation for projects assessed as State Significant Development under Part 4 of the EP&A Act. The proposed Project area is outside of the geographic limits of the Wild Rivers regulations as described within this Act.	No
<i>Native Vegetation Act 2003</i>	Approval is required under this Act from the relevant Catchment Management Authority to clear native vegetation in certain circumstances. No approval is required under this legislation for projects assessed as State Significant Development under Part 4 of the EP&A Act.	No

Table 8.2 – Other State Legislation of Potential Relevance to the Project (cont)

Planning Provision	Comments	Further Approval Required?
<i>Threatened Species Conservation Act 1995</i> (TSC Act)	Under the EP&A Act, impacts on threatened species listed under the TSC Act are required to be assessed. All threatened species listed in the TSC Act potentially located within the Project area have been assessed by the Ecological Assessment (refer to Section 4.2 and Appendix 7 of the EIS). No further approvals are required under the TSC Act.	No
<i>Water Management Act 2000</i>	Identification of licensing requirements of the Act. The Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources and the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources both commenced during 2011. In addition, an assessment against minimal impact considerations of the Aquifer Interference Policy is required. No new licences are required for the Project.	No

c) a statement identifying any additional approval that is required, and

No additional approvals are required.

8.3 Monitoring, Enforcement and Review Procedures

d) a description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action

The current development consent for the quarry was granted in 1996 by Hawkesbury City Council (HCC) for the extraction of up to 2 Mt of product sand. This consent required the proponent to prepare a site Environmental Management Plan. All current approved operations are undertaken in accordance with the existing approved site Environmental Management Plan (Umwelt, 2013).

Should the Project be approved, the development consent would include a number of management and monitoring conditions, and as such the Environmental Management Plan and related documents would be updated to maintain compliance with the new approval and any commitments outlined in the EIS or as part of any Commonwealth approval requirements. Hy-Tec will also prepare an Annual Review of the environmental performance of the Project and will make this available to the public, Hawkesbury City Council and relevant government agencies as required.

It is proposed to integrate an additional environmental management controls proposed as part of the Action with the approved Tinda Creek Environmental Management Plan (Umwelt, 2013). The Plan outlines environmental management controls currently implemented on the site, including:

- extraction staging;
- on-site materials management;
- Rehabilitation and Final Landform;
- the trail rehabilitation site;
- daily operating procedures, including environmental management controls relating to the management of:
 - equipment and hours of operation;
 - noise;
 - dust;
 - visual amenity; and
 - traffic.
- waste management for day to day operations;
- erosion and sediment controls; and
- on-site drainage processes (including the clean water diversion system, quarry water management system and the Tinda Creek flows and condition).

The EMP also outlines the ecological and groundwater monitoring regimes that are implemented on the site. The EMP specifies that annual reports will be prepared within three months of the anniversary of the date of consent and will be submitted to Hawkesbury City Council. These annual reports include:

- compliance with conditions of approval and conformance with other licence and permit conditions;
- summary and analysis of groundwater monitoring results;
- status report on the condition of the diversion drains and quarry water management system; and
- details of annual production.

Hy-Tec monitors environmental performance and legislative compliance of the existing operations at the site. Independent audits on the implementation of the EMP are undertaken annually and the results are provided to HCC. Overall, the environmental performance of the site indicates that the current operations are compliant with the relevant development consent conditions for the Operation.

As outlined above, the EMP will be updated following approval of the Project to bring it in line with the new approval and any commitments outlined in the EIS or as part of any Commonwealth approval requirements.

9.0 Economic and Social Matters

9.1 Short and Long Term Social and Economic Implications/ Impacts

The Socio-economic considerations relating to the Project are detailed in Section 4.14 of the EIS. Both short and long term social and economic implications and/or impacts have been considered as part of the EIS.

The Action is anticipated to have the following positive socio-economic impacts:

- The Project maximises the operating life of an existing facility, thereby avoiding/delaying the need to develop a greenfield site to meet the need for quarry products and providing for the continued utilisation of existing equipment, facilities and environmental control measures. It also balances environmental and geological constraints with resource recovery from the quarry site while utilising existing infrastructure.
- The Project will supply up to 300,000 tonnes per year of fine construction sand for the Sydney market. In the context of the impending closure of supply from Kurnell, (which currently supplies approximately 1 million tonnes per annum of the 7 million tonne Sydney market), the uptake of this demand by Tinda Creek is significant (approximately 20–30%) of the impending loss of annual supply from Kurnell. Therefore, the Project will act to off-set a significant decline in construction and industrial grade sand supplies sourced from within the Sydney regional market, which is being caused by diminishing availability of sand resources in the Sydney region.
- The quarry has convenient, economic access to its core market, which assists with reducing supply costs, greenhouse gas emissions and other environmental impacts per tonne kilometre transported. Sand from the quarry will also continue to be utilised by Hy-Tec to augment manufactured sand from other Hy-Tec quarries, further increasing construction sand supply for the Sydney market.
- The Project will support the rapid growth and development of the area, in particular in north-west Sydney, through supply of high quality construction materials. As such, the project will assist in achieving the aims and objectives of the various strategic and regional planning policies, including the Northwest Subregion, Draft Subregional Strategy (NSW Government, 2007).
- The quarry is positioned away from major population centres and incompatible land uses and has a substantial existing buffer zone for the two residences located to the west and the adjoining Greater Blue Mountains World Heritage Area and Yengo National Park.
- The Project will continue to provide six current full-time positions and a further two positions when the product volume increases to 300,000 tonnes per year when fully operational. In addition, the proposed expansion of production will require approximately an additional 10 contract drivers for haulage, with flow on effects to the local and regional economy.
- Hy-Tec and its employees will benefit the local and regional economies through direct spending of wages and employing the services of contractors, consultants, trades people, transport operators and other associated service providers.

- The Project will provide direct economic benefits in the form of initial capital investment of approximately \$0.3 M, however, the site will require ongoing capital expenditure of some \$9 M to \$10 M.
- Local and State government will also continue to receive economic benefits, including revenue from taxes and levies.
- The federal government will continue to receive revenue from Tinda Creek Quarry through means including company tax, excise on imported equipment and goods, fuel excise and other taxes such as the goods and services tax and income tax.

In summary, the Project will have a positive socio-economic impact on the local and regional economy and community through the provision of long-term, permanent jobs, the need for services and the capital inflows, while having minimal adverse environmental impacts.

10.0 Environmental Record of Person Proposing to Take the Action

9. *Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:*
- a) *the proponent, and*
 - b) *for an action for which a person has applied for a permit, the person making the application.*

Neither the proponent or the person making the application have been the subject of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources.

10.1 Environmental Policy and Planning Framework

The proponent (Hy-Tec) operates in accordance with the Hy-Tec Health, Safety and Environment (HSE) Management System (comprising Group Policy, Standards and Site Specific Procedures). In addition, Hy-Tec is governed by the sustainability policy of its parent company Adelaide Brighton Ltd. The comprehensive sustainability policy encompasses the company's commitment to environmental performance across three key areas that are incorporated into operational plans and work processes including: emission reduction; eco-efficiency and product stewardship. Further information is provided at <http://www.adbri.com.au/sustainability.html>

11.0 Information Sources

10. For information given in an environment assessment, the draft must state:

- a) the source of the information**
- b) how recent the information is**
- c) how the reliability of the information was tested, and**
- d) what uncertainties (if any) are in the information.**

The EIS and associated appendices include appropriate referencing of source information. The most recently available information is used and where available information was considered to be out of date, additional surveys, monitoring and investigations were undertaken in order to update information.

The reliability of information was tested during the assessment based on the experience of relevant professionals and experts preparing studies, calibration and verification processes, technical peer reviews and consultation with relevant government agencies during EIS preparation. The EIS and relevant studies provide transparent reporting of uncertainties, where relevant.

12.0 Consultation

11. Any consultation about the action, including:

- a) any consultation that has already taken place
- b) proposed consultation about relevant impacts of the action, and
- c) If there has been consultation about the proposed action – any documented response to, or result of, the consultation

Consultation has been undertaken with government agencies, Transgrid and Aboriginal heritage groups. In addition, community consultation has been undertaken by the proponent throughout the preparation of the EIS. The consultation process is detailed in Section 1.3 of the EIS. The consultation process aimed to inform stakeholders about the Project and identify key issues of concern to be investigated and assessed as part of the EIS. These key issues have been considered in the EIS.

12.1 Agency Consultation

Initial consultation with Government Agencies was undertaken through the PEA and DGRs process. Agencies that provided a response to DP&I included:

- Roads and Maritime Services (RMS). In addition, a meeting was held with RMS Sydney Region;
- Office of Environment and Heritage (OEH);
- Hawkesbury City Council; and
- Department of Primary Industries (DPI) (including NSW Office of Water; Crown Lands; and Fisheries NSW).

Consultation was also undertaken with Transgrid in relation to the existing 330 kV transmission line that traverses the quarry area and the NPWS in relation to the proposed transfer of the biodiversity offset area in the NPWS estate. In summary, Transgrid indicated that there were no objections to the Project, providing that access could be maintained to the tower structures and that various safety procedures would be enacted. A copy of all agency and stakeholder correspondence regarding the Project is provided in Appendix 2 of the EIS.

A site meeting was also undertaken with Richard Colbourne of NPWS to discuss biodiversity offset areas.

12.2 Community Consultation

Consultation has been undertaken to date with the proponent liaising with the owners of the two private properties located to the west of the Project area prior to the commencement of the public exhibition period. The consultation consisted of telephone discussions regarding the proposed Project, including provision of information regarding proposed extraction quantities, traffic movements, extent of disturbance and duration of operations. No objections were raised during this consultation process. As detailed in Section 4.4 of the EIS, extensive consultation has also been undertaken with relevant Aboriginal stakeholder groups.

12.3 Identification of Affected Parties

12. Identification of affected parties, including a statement mentioning any communities that may be affected and a description of their views.

Engagement with the community is a key component of the assessment process. Further details regarding the consultation process are provided in Section 1.3 of the EIS, including details regarding the consultation/communication methods that were employed.

As outlined in Section 2.1.3 of the EIS, the majority of the surrounding land as shown in **Figure 1.1** is reserved as National Park. While there are a few isolated landholdings nearby zoned as Rural (Mixed Agriculture), which include a hobby farm and a duck farm, the nearest residence not associated with the quarry operation is located over 1.2 km from the western extremity of the operations (separated by a ridge and dense bushland) and over 2 km from the stockpile site. The nearest community is Putty village, which is located approximately 22 km to the north of the Project area. Given the remoteness of the Project area, it is unlikely that any communities will be negatively affected by the construction or operation of the Project. Accordingly, the consultation program implemented for the Project (as outlined in **Section 12.0**) is deemed to be appropriate for the Project.

12.4 Identified Community Issues

The identified stakeholders engaged as part of the consultation process did not raise any issues/feedback regarding the Project. Further details regarding the consultation process are provided in Section 1.3 of the EIS.

13.0 References

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- Umwelt (Australia) Pty Limited (2013). Tinda Creek Sand Quarry Environmental Management Plan 2012-2013.