Technical Note

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Mount Dromedary Graphite Project, Site-specific EA application, DES Information Request 101/0021264; AR096425: Response to Flora and Fauna Items

Introduction
In December 2016, Novonix Ltd (NVX) (formerly GraphiteCorp Ltd) submitted an Environmental Authority (EA) application for the Mount Dromedary Graphite Project (the Project). In March 2017, the Queensland Department of Environment and Heritage Protection (now the Department of Environment and Science (DES)) issued an Information Request (IR) in relation to the application. NRA Environmental Consultants (NRA), on behalf of NVX, has since clarified items in the IR with DES, including a meeting in May 2017. The following report addresses IR item 6, which relates to the assessment of Significant Residual Impacts (SRIs) on terrestrial biodiversity values. The information required to address IR item 6 was discussed in the May 2017 meeting with DES.

Matters of State Environmental Significance – Overview
Matters of State Environmental Significance (MSES) that relate to terrestrial biodiversity values are present in the Project area; these comprise ‘Regulated Vegetation’ and ‘Protected Wildlife Habitat’. These MSES, and the potential for SRI, were assessed in NRA (2016)1 with reference to the Queensland Environmental Offsets Policy: Significant Residual Impact Guideline (EHP 20142). In this Technical Note, the SRI determinations are reviewed in light of feedback received from DES, and additional studies on proposed groundwater interference at the project.

Regulated Vegetation
The Project will not impact on Regional Ecosystems (REs) listed as ‘Of Concern’ or ‘Endangered’ as defined under the Queensland Vegetation Management Act 1999 (VM Act), nor will it impact on a wetland as shown on the VM Act wetlands map. The Project will impact on vegetation on watercourses as shown on the VM Act watercourse map (NRA 2016). Areas of impact are shown on Figure 1.

In the May 2017 meeting, DES advised NRA that the criteria in EHP (2014) for assessing potential SRI on Regional Ecosystems (REs) with a ‘sparse’ structure category also apply to REs with a ‘very sparse’ structure category. As a consequence of this advice, the potential for SRI on Regulated Vegetation as described in NRA (2016) requires revision. This revision is provided below.

The proposed Project mine infrastructure will require vegetation clearing within 5 m of a watercourse, as defined under the VM Act (Figure 1). The REs that will be impacted are listed below with their structure category (shown in parenthesis). The list includes REs that are dominant and subdominant as shown on the RE mapping.

- RE 1.11.3x1b (very sparse)
- RE 1.11.3b (very sparse)
- RE 1.11.2a (very sparse).

In relation to VM Act mapped watercourses, EHP (2014) states that Regulated Vegetation is a ‘prescribed regional ecosystem’ that is located within the defined distance from the defining banks. For the Project, the impacted watercourses are 1st order streams. The Queensland Environmental Offsets Policy (Version 1.1) (EHP 2014) states that 25 m from the defining bank is the defined distance for a 1st order stream in the Northwest Highlands Bioregion.

The area of impact on the above REs was estimated using GIS software and was calculated to be 4.8 ha. This area of impact is likely to be an overestimate because field observations indicate that the watercourse through the proposed mine pit is not as extensive as shown on the VM Act watercourse map. The observed location and extent of the mapped watercourse through this area, as verified in the field by NRA, is shown on Figure 2. Photographs were taken along this watercourse; these are shown on Plates 1 to 4 (photograph locations shown on Figure 2). The area of impact based on the revised mapping for the watercourse is 2.2 ha.

The above indicates that the area of impact on Regulated Vegetation as a consequence of vegetation clearing for the proposed mine infrastructure is 4.8 ha or 2.2 ha, depending on which mapping data is applied. The relevant thresholds for SRI as described in EHP (2014) are listed below. On this basis, a SRI is likely based on both watercourse mapping sources when assessed using a single decimal point. If the area calculations are rounded to a whole number then an SRI is only likely based on the VM Act watercourse mapping data source.

- A SRI is likely when clearing in a RE with a ‘sparse’ [sic and ‘very sparse’] structure category exceeds 2 ha.

3 Structure categories as defined in the Regional Ecosystem Description Database (REDD).
4 Calculations assume that Project roads will be <20 m wide. In accordance with EHP (2014), a SRI is not likely for ‘sparse’ REs if clearing for linear infrastructure is <20 wide.
Figure 1: Potential impacts of infrastructure on Regulated Vegetation associated with VM Act mapped watercourses

Project: Mount Dromedary Graphite Project, Site-specific EA application, DES Information Request 101/0021264; AR096425: Response to Flora and Fauna Items

Source:
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Relevant to the SRI determination is that groundwater drawdown is proposed and, as a consequence, tree dieback may occur in the predicted drawdown area (RLA 2018\(^5\)). The dominant tree species within the drawdown area are Eucalypts (*Eucalyptus* spp.) and Melaleucas (*Melaleuca* spp.)\(^6\). Research and observations from other locations indicate that certain species of Eucalypt and Melaleuca are susceptible to the impacts of groundwater drawdown. The susceptibility of the tree species within the predicted groundwater drawdown area is unknown. A best-case scenario is that little to no discernible impact on Regulated Vegetation will occur as a consequence of groundwater drawdown. A worst-case scenario is that impacts will occur across the entire drawdown area. The most likely scenario is that impacts will occur to vegetation on the banks of the watercourse. Modelling of the predicted groundwater drawdown area is shown on **Figure 3**. On the basis of this model, and assuming the worst-case scenario, the area of impact would increase by approximately 0.1 ha, *ie* ‘clearing’ of Regulated Vegetation. The area of impact due to all Project-related activities would therefore be 4.9 ha (*ie* 4.8 ha + 0.1 ha) or 2.3 ha (*ie* 2.2 ha + 0.1 ha) depending on which watercourse mapping is applied (*ie* based on NRA observed conditions (**Figure 2**) or existing VM Act mapping (**Figure 1**)). This increase has no effect on the aforementioned SRI determination for Regulated Vegetation.

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**Figure 3**

Plate 1: Photo point (PP) 31 along watercourse (photo location shown on **Figure 2**)
Plate 2: Photo point (PP) 33 where watercourse changes to drainage line (photo location shown on Figure 2)

Plate 3: Photo point (PP) 34 along drainage line (photo location shown on Figure 2)

Plate 4: Photo point (PP) 35 along drainage line (photo location shown on Figure 2)
Figure 2: NRA observed watercourse location

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Source: © State of Queensland (Department of Natural Resources and Mines) 2017, NRA 2018, Geotrac Maps

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Figure 3: Predicted life of mine maximum groundwater drawdown area
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- **MLA 100121**
- **Proposed infrastructure areas**
- **VM Act mapped watercourses**
- **Maximum predicted groundwater drawdown area**

Source: © State of Queensland (Department of Natural Resources and Mines) 2017, NRA 2018, Graphitecorp Ltd, AGE 2018, RLA 2018

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Protected Wildlife Habitat

In the May 2017 meeting, DES advised NRA that the Department required further clarification and discussion about the potential for SRI on Protected Wildlife Habitat. This is provided below.

NRA (2016) reported that the Vulnerable (Queensland Nature Conservation Act 1992 (NC Act)) Purple-necked Rock Wallaby (*Petrogale purpureicollis* (PNRW)) was the only Threatened species recorded in the Project area. No other NC Act threatened species (flora or fauna) are expected to occur on a regular or predictable basis.

NRA (2016) mapped PNRW denning/shelter habitat and foraging habitat using field observations and modelling. A simplified version of this mapping is provided on Figure 4 and indicates that predicted habitat occurs within the area of proposed Project-related disturbance (Figure 5). Essential Habitat for the PNRW is also mapped within the area of proposed Project-related disturbance (Figure 5). The NRA (2016) habitat mapping (Figure 4) is a more reliable (cf Essential Habitat mapping) representation of where important habitats for PNRW occur.

Areas of high and low quality PNRW habitat are identifiable on the Project area and are described as follows.

- The largest rocky outcrops, which are the highest quality denning habitat for PNRW on the Project area, occur on low hills in the north-eastern section of the Project area and on Black Mountain (Figure 4). Large outcrops may occur in the north-western section of the Project area (Figure 4); these areas were not field verified. On the Project area, PNRW activity (foraging and general activity) is likely to be centred on these large, rocky outcrops. Foraging is likely to extend onto the slopes and plains adjacent to the large rocky outcrops. These outcrops and associated foraging habitat predominantly occur outside the area of direct potential Project impact (Figure 5).

- Low rocky outcropping occurs in patches along the low hills and ranges of the Project area, including areas in and near the proposed low-grade ore stockpile (Figure 4). These areas are not permanent denning/shelter sites, and PNRW activity in these areas is likely to be much lower than in the areas where large outcrops occur. The presence of PNRW scats amongst sections of this low rocky outcropping in and near the proposed low-grade ore stockpile suggests these areas are probably used for foraging and/or movement.

- Mid-dense to dense patches of *Acacia chisholmii* are present in and near the above-described habitats (Figure 4). Grass cover (and therefore foraging habitat) is sparse or absent in these patches, and the patches are unlikely to be used by PNRWs.
Figure 4: Locations of Purple-necked Rock Wallaby activity and potential habitat
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Legend:
- --- --- Extent of predictive mapping for
- - - - - Purple-necked Rock Wallaby habitat
Purple-necked Rock Wallaby Habitat
- Unlikely habitat - Acacia Chisholmii patches
- Predicted foraging habitat - supplementary
- Predicted foraging habitat - preferred
- Known and potential denning and shelter habitat

MLA 100121
Purple-necked Rock Wallaby Records (NRA 2016)
- Sightings and camera trap records
- Probable scats

Source:
© State of Queensland (Department of Natural Resources and Mines) 2017, NRA 2016, Graphitecorp Ltd, NRA 2016.
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Figure 5: Potential impact areas on Purple-necked Rock Wallaby habitat

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- MLA 100121
- Proposed infrastructure areas
- Purple-necked Rock Wallaby habitat
- Predicted foraging habitat (preferred and supplementary)
- Known and potential denning and shelter habitat
- Essential Habitat - Purple-necked Rock Wallaby
- Potential wildlife corridors that will remain near operational areas of mine

Source:
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The Project-related impacts on the PNRW are as follows.

- Clearing and excavation has the potential to result in the direct loss of PNRW habitat as quantified below. The magnitude and duration of impact can be reduced by implementing the recommendations described in Section 5 of NRA (2016).
  
  - **Rocky outcrops (shelter and/or denning).** Approximately 0.3 ha of low rocky outcrops will be impacted. This equates to approximately 3% of all denning/shelter habitat mapped over the Project area. Areas of potential impact are shown on Figure 5. These outcrops are, at most, likely to provide shelter for individuals (as opposed to colonies), and usage of these areas may be episodic and temporary. For example, the PNRW may use these areas for cover whilst foraging or moving between areas of better quality habitat, and/or a few individuals (as opposed to colonies) may use a small number of outcrops as temporary den sites.
  
  - **Foraging habitat.** Approximately 12 ha of ‘preferred foraging habitat’ and 25 ha of ‘supplementary foraging habitat’ will be impacted. This equates to approximately 4% and 5%, respectively, of these habitat types mapped over the Project area. These foraging habitats are predominantly near the low rocky outcrops. Areas of potential impact are shown on Figure 5.

- Clearing and excavation associated with the open pit, low-grade ore stockpile and mine related infrastructure will reduce, though not negate, north-south connectivity between PNRW habitats on Black Mountain and the habitats east and west of the open pit and low-grade ore stockpile. The magnitude of impact will be reduced by implementing the recommendations described in Section 5 of NRA (2016).
  
  - Once site infrastructure is constructed, north-south connectivity for the PNRW will remain; *ie* connectivity will remain during operation of the Project. Areas of habitat connectivity (north-south) will remain west of the pit and east of plant and hardstand areas (Figure 5). Access roads will likely be the only physical breaks in north-south habitat connectivity following construction. These access roads already exist and PNRWs are presumably accustomed to moving across them. Indirect threats in the form of vehicle strike and behavioural interference have a low probability of occurring because the Project will operate during daylight hours when the nocturnal PNRW is relatively inactive.
  
  - Once site infrastructure is constructed, east-west connectivity for the PNRW will remain in areas south of the pit (vicinity of Black Mountain) and north of the pit (Figure 5).

- The Project poses a number of indirect threats to the PNRW. These can be mitigated by implementing the recommendations described in Section 5 of NRA (2016). These threats are described in NRA (2016) and comprise:
  
  - habitat degradation (weed ingress and proliferation)
  - habitat degradation (fugitive dust)
  - pest fauna introduction
  - accidental fire resulting in unfavourable regimes
  - release of contaminated waters
  - ingestion of toxic waste water
  - habitat fragmentation
  - vehicle strike.
EHP (2014) advises that an action is likely to have a SRI on NC Act Endangered and Vulnerable wildlife if the impact on the habitat is likely to:

- (a) lead to a long-term decrease in the size of a local population; or
- (b) reduce the extent of occurrence of the species; or
- (c) fragment an existing population; or
- (d) result in genetically distinct populations forming as a result of habitat isolation; or
- (e) result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species’ habitat; or
- (f) introduce disease that may cause the population to decline, or
- (g) interfere with the recovery of the species; or
- (h) cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.

Based on the information provided above, the Project residual impacts (ie following mitigation) on PNRW are not likely to result in items (a) to (g). The project will disrupt an ecologically significant location (item (h)) in the form of low rocky outcropping (shelter) and foraging habitat; however, the potential for SRI is mitigated by the following circumstances.

- The disruption is not likely to result in criteria (a) to (g).
- The area of impact is small relative to the extent of available PNRW habitat of similar type and quality in the surrounding area.
- The impact will occur along the edges (as opposed to central portions) of potentially important PNRW habitats, and connectivity (site and local scales) can be maintained.
- The impact will affect habitats that are of relatively low quality (at the site and local scales), and are potentially used by a small proportion of the local PNRW population.
- The disruption has the potential to be short-term to medium-term if rehabilitation designs include specific consideration of PNRW habitat requirements ie rocky outcrops and grass cover.

**Summary of Findings**

- **Regulated Vegetation:**
  - The area of impact due to clearing for infrastructure is 4.8 ha or 2.2 ha, depending on which watercourse mapping data is applied (ie based on NRA observed conditions (Figure 2) or existing VM Act mapping (Figure 1)).
  - The potential area of impact associated with groundwater drawdown is not confirmed. This is due to an absence of knowledge on how trees along the watercourse will respond to groundwater drawdown. Groundwater drawdown may increase the above-described area of impact by nil or by up to approximately 0.1 ha.
  - A SRI on Regulated Vegetation, in the form of clearing REs within the defined distance of a watercourse, is likely based on the VM Act regulated vegetation mapping. The VM Act mapping appears to be an over-estimate of vegetation associated with a watercourse.

- **Protected Wildlife Habitat:**
  - The Project will impact upon the NC Act Vulnerable PNRW; however, a SRI is not anticipated.
  - Approximately 0.3 ha (3%) of large rocky outcrops (used for shelter) will be impacted (Figure 5). The large rocky outcrops, upon which the PNRW population is centred (Figure 4), will not be directly impacted.
- Approximately 37 ha (5%) of foraging habitat will be impacted. These foraging habitats are predominantly near the low rocky outcrops, and away from the large rocky outcrops upon which the PNRW population is centred.
- Project direct and indirect threats can be mitigated.