



GOVERNMENT OF  
WESTERN AUSTRALIA

## CLEARING PERMIT

*Granted under section 51E of the Environmental Protection Act 1986*

<b>Purpose permit number:</b>	CPS 8049/1
<b>Permit holder:</b>	Galaxy Lithium Australia Limited
<b>Duration of permit:</b>	30 September 2018 – 30 September 2023

The permit holder is authorised to clear native vegetation subject to the following conditions of this Permit.

### PART I – CLEARING AUTHORISED

**1. Purpose for which clearing may be done**

Clearing for the purpose of road construction and upgrades.

**2. Land on which clearing is to be done**

Lot 31 on Deposited Plan 224145, Ravensthorpe  
Lot 30 on Deposited Plan 224145, Ravensthorpe  
Lot 177 on Deposited Plan 141641, Ravensthorpe  
Lot 7 on Deposited Plan 150030, Ravensthorpe  
Lot 36 on Deposited Plan 80856, Ravensthorpe  
Newdegate-Ravensthorpe Road (PIN 11642231), Ravensthorpe  
Old Newdegate Road (PIN 11641220), Ravensthorpe  
Floater Road (PIN 11640466), Ravensthorpe

**3. Area of Clearing**

The permit holder must not clear more than 3 hectares of native vegetation within the area shaded yellow on attached Plan 8049/1.

**4. Application**

This Permit allows the permit holder to authorise persons, including employees, contractors and agents of the permit holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.

**5. Type of clearing authorised**

This Permit authorises the Permit Holder to clear native vegetation for activities to the extent that the Permit Holder has the right to access land under the *Land Administration Act 1997* or any other written law.

### PART II – ASSESSMENT SEQUENCE AND MANAGEMENT PROCEDURES

**6. Avoid, minimise and reduce the impacts and extent of clearing**

In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:

- (a) avoid the clearing of native vegetation;
- (b) minimise the amount of native vegetation to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

**7. Dieback and weed control**

When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (b) ensure that no known *dieback* or *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

**8. Records must be kept**

The Permit Holder must maintain the following records for activities done pursuant to this Permit, in relation to the clearing of native vegetation authorised under this Permit:

- (a) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
- (b) the date that the area was cleared;
- (c) the size of the area cleared (in hectares);
- (d) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 6 of this Permit; and
- (e) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 7 of this Permit.

**9. Reporting**

The Permit Holder must provide to the *CEO* the records required under condition 8 of this Permit, when requested by the *CEO*.

**DEFINITIONS**

The following meanings are given to terms used in this Permit:

*CEO* means the Chief Executive Officer of the Department responsible for administering the *Environmental Protection Act 1986*;


*dieback* means the effect of *Phytophthora* species on native vegetation;

*fill* means material used to increase the ground level, or fill a hollow;

*mulch* means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

*weed/s* means any plant -

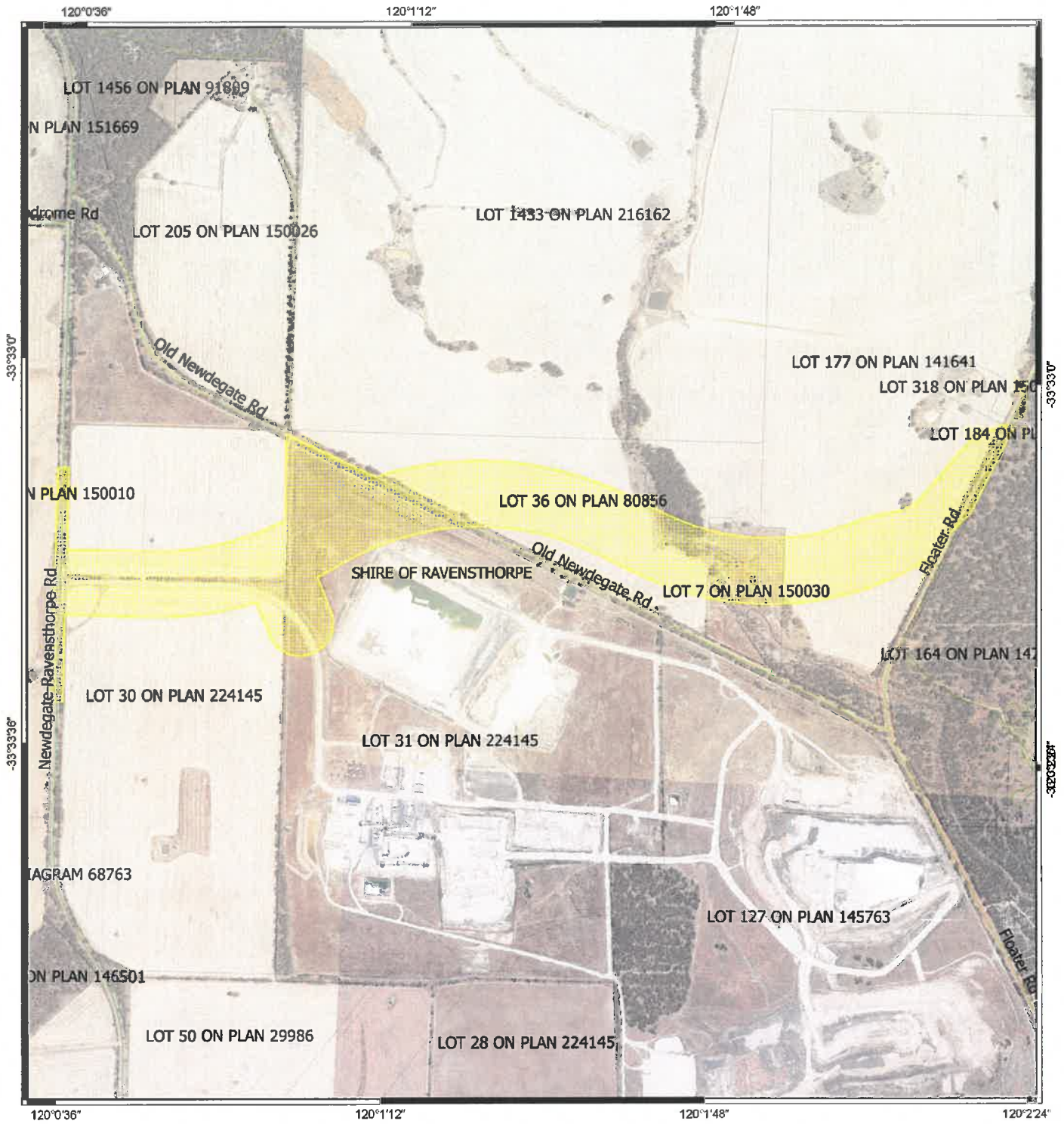
- (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
- (b) published in a Department of Biodiversity, Conservation and Attractions Regional Weed Rankings Summary, regardless of ranking; or
- (c) not indigenous to the area concerned.

  
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Mathew Gannaway  
MANAGER  
NATIVE VEGETATION REGULATION


*Officer delegated under Section 20  
of the Environmental Protection Act 1986*

31 August 2018

# Plan 8049/1



## Legend

 Areas approved to clear  
Virtual Mosaic - WA Now

 Cadastre  
 Local Government Authorities  
 Road Centrelines



MGA 94  
Geocentric Datum of Australia 1994

*M/S*  
*Matthew Connors* Date: *31/05/2018*

Officer with delegated authority under Section 20  
of the Environmental Protection Act 1986



GOVERNMENT OF  
WESTERN AUSTRALIA



## 1. Application details

### 1.1. Permit application details

Permit application No.: 8049/1  
Permit type: Purpose Permit

### 1.2. Applicant details

Applicant's name: Galaxy Lithium Australia Limited  
Application received date: 20 April 2018

### 1.3. Property details

Property: Location (a) - Newdegate-Ravensthorpe Road (PIN 11642231), Ravensthorpe  
Location (b) - Lot 31 on Deposited Plan 224145 (Mining lease), Ravensthorpe  
Lot 30 on Deposited Plan 224145 (Mining lease), Ravensthorpe  
Lot 177 on Deposited Plan 141641 (Agricultural use), Ravensthorpe  
Location (c) - Old Newdegate Road (PIN 11641220), Ravensthorpe  
Location (d) - Lot 7 on Deposited Plan 150030 (Mining lease and Cattlin Creek),  
Ravensthorpe  
Lot 36 on Deposited Plan 80856 (Agricultural use and Cattlin Creek),  
Ravensthorpe  
Location (e) - Floater Road (PIN 11640466), Ravensthorpe

Local Government Authority: Shire of Ravensthorpe  
Localities: Ravensthorpe

### 1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	Purpose category:
3		Mechanical Removal	Road construction or upgrades

### 1.5. Decision on application

Decision on Permit Application: Grant  
Decision Date: 31 August 2018  
Reasons for Decision: The clearing permit application has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986* (EP Act). It has been concluded that the proposed clearing is at variance to principle (f), may be at variance to principles (a), (b) and (h) and is not likely to be at variance to the remaining principles.

The Delegated Officer noted that the proposed clearing may result in potential impacts to vegetation which may act as a wildlife corridor and that this vegetation varies from being in a Degraded to Very Good (Keighery, 1994) condition.

The Delegated Officer took into consideration that the clearing footprint is constrained by road design criteria specified by Main Roads Western Australia and mine site exclusion zones with regards to blast zones.

Given the above, the Delegated Officer decided to grant a clearing permit subject to avoid and minimise clearing, weed and dieback management and reporting conditions.

## 2. Site Information

### Clearing Description

The application is for the proposed clearing of three hectares of native vegetation within five land parcels and three road reserves (refer to Section 1.3 above) for the purpose of a new mine access road and upgrading public roads (Figure 1).

The proposed clearing is to accommodate the future expansion of Galaxy Resources Mt Cattlin Project, with a proposed new three kilometre road between the mines existing entrance on Newdegate-Ravensthorpe Road in the west, moving east to intersect the Old Newdegate Road to the north and then finishing at Floater Road in the east. Those land parcels to be impacted are currently used for either agricultural or mining purposes (Galaxy, 2018a). A watercourse (Cattlin Creek) on agricultural land will also be impacted.

## Vegetation Description

The remnant vegetation which covers all five locations is mapped as Beard's Ravensthorpe 352 vegetation complex – summarised as a mosaic of shrublands, mallee and acacia scrub with scattered York gum (*Eucalyptus loxophleba*) and red mallee (Sheppard, et al, 2001).

More specifically, a recent vegetation and flora assessment (Mattiske, 2018) undertaken over the applicant's nearby, proposed mine expansion site, further categorised these mosaics as comprising the following units:

**Thicket:** Dominated by low mallees *Eucalyptus preissiana* and *E. lehmannii*, with *Banksia heliantha*. Other associated species include other mallees, *Banksia lemmaniana*, *Allocasuarina campestris*, *Calothamnus pinifolius*, *Melaleuca uncinata*, *Grevillea patentiloba* subsp. *platypoda* and *Eucalyptus desmondensis*.

**Mallee:** Mallee on the pediments of ranges and on a stretch of low hilly country south of Ravensthorpe. *Eucalyptus* species in this association include *E. gardneri*, *E. loxophleba*, *E. uncinata*, *E. flocktoniae*, *E. conglobata*, *E. spathulata*, *E. platypus*, *E. annulata* and *E. stoatell*. Other species associated with the vegetation type are *Hakea laurina*, *Banksia lemmaniana* and *Melaleuca uncinata*.

**Sclerophyll Woodland:** The woodlands occupy broad valleys with deep soil. In more sandy soils *Eucalyptus loxophleba* and *E. salmonophloia* occur and watercourses are dominated by *E. occidentalis*, with *E. annulata* associated locally (Mattiske, 2018).

The vegetation within the five locations is considered to resemble the mapped association. Broadly speaking the area is situated on brown clay-loam slopes supporting *Eucalyptus* mid mallee woodlands, dominated by *Eucalyptus myriadena* subsp. *myriadena*, over mid sparse shrublands, dominated by fabaceous species, over low sparse grasslands of *Austrostipa* (Mattiske, 2018).

From photographs provided by the applicant (and public submissions) (Galaxy, 2018a), information extrapolated from the Mattiske survey (Mattiske, 2018) and a fauna desktop assessment (Nixon, 2018) also undertaken over the applicant's nearby, proposed mine expansion, the vegetation within the three road reserves [Locations (a), (c) and (e)] appears typical of the local woodland, which is dominated by *Eucalypts* species such as *E. oleosa* subsp. *corvina*, *E. brachycalyx*, *E. cernua*, *E. flocktoniae*, *E. myriadena* and *E. extensa*. The locations also have a naturally sparse understorey of low shrubs and grasses. For much of the length of the roads the ground cover is intact and there are very few weeds; other areas do exhibit weed infestation and small areas devoid of vegetation (Virtual mosaic, 2018; Mattiske, 2018; Nixon, 2018).

The riparian vegetation associated with Cattlin Creek [Location (d)] includes *E. salmonophloia* (salmon gum) woodland, although some areas are in a Degraded (Keighery, 1994) condition due to adjacent agricultural activities and salinity incursion. Based on the above mentioned flora survey and fauna assessment, it has been extrapolated this woodland is associated with a shrubland dominated by *Melaleuca* spp., over *Tecticornia ?pergranulata* subsp. *pergranulata* (Mattiske, 2018; Nixon, 2018).

The agricultural and mining areas [Location (b) and (d)] are comprised predominately of pasture and agricultural weeds. Aerial imagery (Virtual mosaic, 2018) suggests small remnants within these locations are in a Degraded (Keighery, 1994) condition having been impacted by adjoining agricultural practices.

## Vegetation Condition

The vegetation within the application area (three hectares) within the 61 hectare footprint comprises vegetated road reserves, and smaller remnants associated with a watercourse (Cattlin Creek) and agricultural and mining tenement purposed lands. They all exhibit varying degrees of vegetation structure and condition.

Based on aerial imagery and photographs provided by the applicant (refer Figures 2 to 8) (Virtual mosaic, 2018; Galaxy, 2018a) it is noted that the vegetation is considered to be in the following condition:

- Very Good: Vegetation structure altered, obvious signs of disturbance; to
- Good: Vegetation structure significantly altered by very obvious signs of multiple disturbance; retains basic structure or ability to regenerate; to
- Degraded: Basic vegetation structure severely impacted by disturbance; scope for regeneration but not to a state approaching 'Good' condition without intensive management (Keighery, 1994).

The majority of the vegetation appears to be in a Degraded to Good condition.

**Soil type**

The application area occurs within the 'Ravensthorpe 2 Subsystem' soil unit that is described as 'calcareous loamy earths and shallow gravels with associated red shallow loams and bare rock' (DPIRD, 2017).

Up to 91 percent of the soil unit is categorised as 'gentle slopes', with the remainder comprising moderate to steep slopes.

The soils of the gentle slopes comprise up to 33 percent 'calcareous loamy earths on gentle slopes', 35 percent are stony soils with the remainder comprising bare rock, gravel, shallow loams and soils associated with gentle to moderate slopes (DPIRD, 2017).

**Comments**

The local area considered in the assessment of the application is described as a 10 kilometre radius measured from the application area. The local area retains approximately 51.5 per cent native vegetation cover.

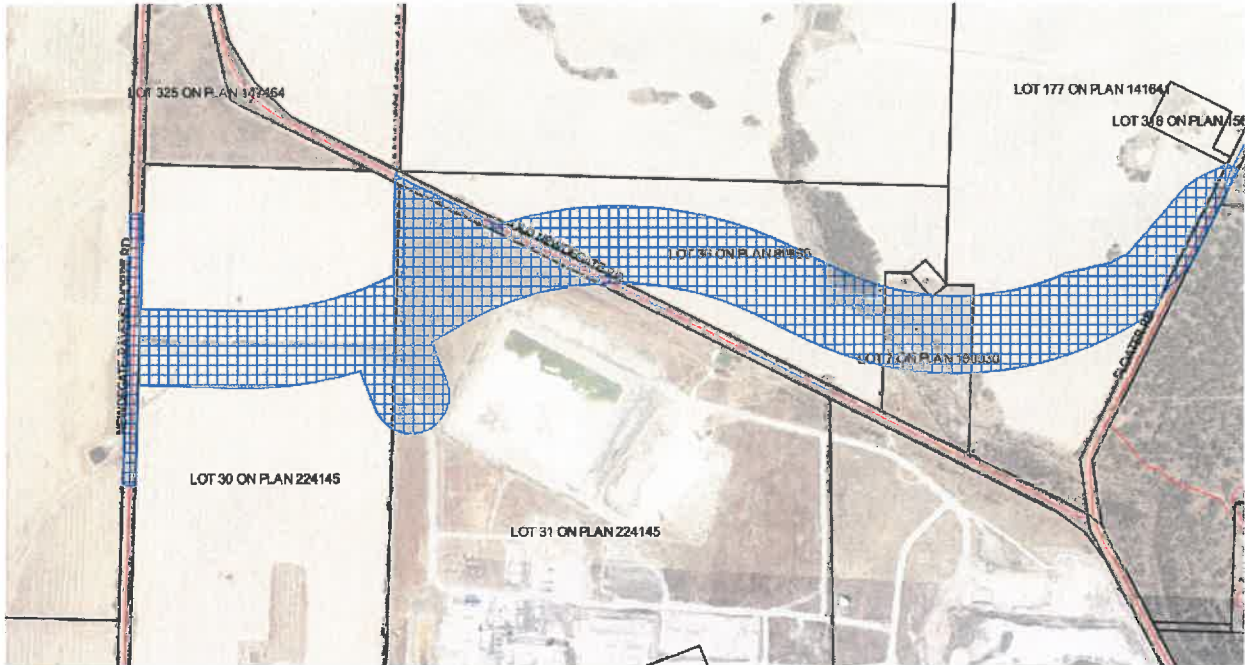


Figure 1: Map of application area (cross hatched blue). Newdegate-Ravensthorpe Road forms the western application area; moving east across agricultural land and northeast to Old Newdegate Road, then east again across agricultural land, crossing Cattlin Creek then to Floater Road at the eastern clearing area.



Figure 2: Vegetation type in the Newdegate-Ravensthorpe Road looking south (Location (a); source: Galaxy, 2018a).



Figure 3: Vegetation type in the Newdegate-Ravensthorpe Road looking north (Location (a); source: Galaxy, 2018a).



Figure 4: Vegetation type in the Old Newdegate Road looking north (Location (c); source: Galaxy, 2018a).



Figure 5: Vegetation type in the Old Newdegate Road looking north (Location (c); source: Galaxy, 2018a).



Figure 6: Vegetation type in the Old Newdegate Road looking south (Location (c); source: Galaxy, 2018a).



Figure 7: Vegetation type in Cattin Creek looking northeast (Location (d); source: Galaxy, 2018a).



Figure 8: Vegetation type on Floater Road looking west (Location (e); source: Galaxy, 2018a).

### 3. Assessment of application against clearing principles

**(a) Native vegetation should not be cleared if it comprises a high level of biodiversity.**

**Proposed clearing may be at variance to this Principle**

For the purposes of this assessment, and as outlined in Section 1.3 above, the application area comprises five areas where clearing, with varying degrees of potential environmental impact, is proposed:

- Newdegae-Ravensthorpe Road – adjacent to an existing access road to an existing minesite – western extent of clearing boundary;
- Old Newdegate Road – northern boundary of existing minesite;
- Cattlin Creek and agricultural/mining tenement – north of existing minesite;
- Floater Road – east of existing minesite; and
- agricultural and mining tenement areas.

As detailed in Section 2 above, the proposal is to clear three hectares (within a 61 hectare footprint) of native vegetation within these land parcels for the purpose of upgrading a mine access road and upgrading the associated public roads, to accommodate the future expansion of Galaxy Resources (Galaxy) Mt Cattlin Project.

As detailed in Section 2 above, the native vegetation proposed to be cleared is mapped as Beard's Ravensthorpe 352 vegetation complex – summarised as a mosaic of shrublands, mallee and acacia scrub with scattered York gum (*Eucalyptus loxophleba*) and red mallee (Sheppard, et al, 2001). From photographs supplied by the applicant (and contained within public submissions), the majority of the vegetation under application occurs within road reserves (Locations (a), (c) and (e)). This vegetation is considered to range from being in a Degraded to Very Good (Keighery, 1994) condition. It is noted that it is typical for this vegetation complex to have a naturally sparse understorey of low shrubs and grasses. Aerial imagery suggests that for much of the length of the roads, the ground cover is present; whilst other areas exhibit areas devoid of native vegetation. The small remnants of vegetation within the agricultural/mining tenements [Locations (b) and (d)] are considered to be in a Degraded (Keighery, 1994) condition, as a result of adjacent agricultural practices. Aerial imagery suggest areas of Cattlin Creek [Location (d)] are in a Degraded to Good (Keighery, 1994) condition, as some sections exhibit salinity incursion and some degradation as a result of the adjacent agricultural activities (Virtual mosaic, 2018; Galaxy, 2018a).

From photographs supplied by the applicant (and contained within public submissions), it is noted that the landscape is dominated by low woodland of Eucalyptus species that are generally tall, multi-stemmed trees with narrow diameter trunks, with a sparse understorey (Galaxy, 2018a). In addition, the applicant also provided the results of a flora and vegetation assessment survey conducted by Mattiske Consulting (Mattiske, 2018) and a fauna desktop assessment conducted by Nixon Wildlife Consulting (Nixon, 2018), both undertaken over the applicant's proposed mine expansion adjacent to and east of this current application area. From information extrapolated from these reports, the vegetation within the three road reserves [Locations (a), (c) and (e)] appears typical of the local woodland, which is dominated by mixed Eucalypt species such as *E. oleosa* subsp. *corvina*, *E. brachycalyx*, *E. cernua*, *E. flocktoniae*, *E. myriadena* and *E. extensa* (Virtual mosaic, 2018; Mattiske, 2018; Nixon, 2018).

As discussed in principle (f), the riparian vegetation associated with Cattlin Creek [Location (d)] includes *E. salmonophloia* (salmon gum) woodland, although some areas of this woodland vary between being in a Degraded to Good (Keighery, 1994) condition due to adjacent agricultural activities and salinity incursion.

According to available datasets, eighteen Priority One (P1) flora species, three P2, sixteen P3 and seventeen P4 species have been recorded in the local area (WAH, 1998-). As discussed within principle (c), no rare flora are likely to occur within the application area.

Noting the vegetation communities and soil type mapped within the clearing footprint, as discussed above, and the habitat preferences of some of the priority flora species (for example, soils types such as brown loam soil; vegetation communities such as eucalyptus woodland/mallee and positions in the landscape such as on gentle slopes) (WAH, 1998-), it is possible some sections of the vegetated areas of the clearing footprint may contain habitat for the following species which have been recorded in the local area:

- *Acacia besleyi* (P1) is known from 17 recorded populations in the Ravensthorpe local government area; all populations are recorded between 3 and 16 kilometres south of the clearing footprint; no populations are known from conservation estate.
- *Austrostipa* sp. Carlingup Road (S. Kern & R. Jasper LCH 18459) (P1) has a wide distribution recorded from 13 populations in the Coolgardie, Dundas, Esperance, Kondinin and Ravensthorpe local government area; several populations are recorded between 4 to 16 kilometres north, south and east, the remainder between 120 and 300 kilometres northeast of the clearing footprint; two populations are known from conservation estate.
- *Drosera grieviei* (P1) is known from 20 recorded populations in the Lake Grace and Ravensthorpe local government area; several populations are recorded between 4 to 10 kilometres and 60 to 80 kilometres north, one 96 kilometres west and another 33 kilometres east of the clearing footprint; two populations are known from conservation estate.
- *Grevillea sulcata* (P1) is known from 14 recorded populations in the Ravensthorpe local government area; populations occur between 2 and 17 kilometres northeast and southeast, and one 12 kilometres southwest of the clearing footprint; no populations are known from conservation estate.
- *Lepidosperma* sp. Mt Chester (S. Kern et al. LCH 16596) (P1) is known from eight records in the Ravensthorpe local government area; two populations occur 23 kilometres southwest and the remainder 8 to 32 kilometres southeast of the clearing footprint; no populations are known from conservation estate.
- *Cassinia arcuata* (P2) has a wide distribution recorded from 27 records in the Kalgoorlie-Boulder, Lake Grace and Ravensthorpe local government area; one record occurs 480kms northeast, one 87 kilometres northwest, several are 13 kilometres southwest and the remainder 3 to 10 kilometres southeast of the clearing footprint; two populations are known from conservation estate.
- *Acacia bifaria* (P3) is known from 35 records in the Ravensthorpe local government area; majority of the records are between 10 to 16 kilometres north, south, east and west; whilst several occur between 33 to 91 kilometres southwest of the clearing footprint. This species is common within and outside the clearing footprint of the proposed mine site (Mt Cattlin Project) east of Floater Road with 462 extant individuals recorded; no individuals were recorded in the adjacent Floater Road reserve. The species is also known from within Overshot Hill Nature Reserve, Fitzgerald River National Park and many of the remnant vegetation patches surrounding Ravensthorpe (Mattiske, 2018).



- *Acacia errabunda* (P3) has a wide distribution recorded from 25 records in the Albany, Broomehill-Tambellup, Gnowangerup, Jerramungup, Kulin, and Ravensthorpe local government area; populations are scattered up to 9 kilometres south, up to 20 kilometres southwest and an outlier 150 kilometres north of the application area; no populations are known from conservation estate.
- *Banksia corvijuga* (P3) is known from 22 records in the Menzies and Ravensthorpe local government area; populations occur between 4 and 10 kilometres north and others 11 to 20 kilometres southeast of the application footprint; no populations are known from conservation estate.
- *Allocasuarina hystricosa* (P4) is known from 36 records in the Jerramungup and Ravensthorpe local government area; small distribution occurs 6 kilometres north with the majority scattered between 16 and 40 kilometres east and south of the clearing footprint; two populations are known from conservation estate.
- *Banksia foliosissima* (P4) has a wide distribution recorded from 36 records in the Dumbleyung, Kent and Ravensthorpe local government area; this species occurs in two district geographical areas, one grouping is 180 kilometres northeast, the other 12 kilometres north and south of the clearing footprint; four populations are known from conservation estate.
- *Banksia laevigata* subsp. *laevigata* (P4) is known from 41 records in the Gnowangerup, Jerramungup and Ravensthorpe local government area; scattered populations between 3 and 20 kilometres north and southeast, with outliers between 30 to 150 kilometres southwest of the clearing footprint; five populations are known from conservation estate.
- *Chorizema ulotropis* (P4) has a wide distribution recorded from 24 records in the Armadale, Gnowangerup, Jerramungup, Murray, Ravensthorpe, Toodyay and Wandering local government area; populations exist between 20 and 173 kilometres southeast, and 350 kilometres northwest of the clearing footprint.; seven populations are known from conservation estate.
- *Eucalyptus desmondensis* (P4) is known from 73 records in the Ravensthorpe local government area; well distributed species with populations occurring within 1 to 30 kilometres south, southwest to southeast and northeast of the clearing footprint; no populations are known from conservation estate.

Based on the varying vegetation condition within the clearing footprint (Degraded to Very Good (Keighery, 1994) condition), the narrow width of the remnant vegetation within the road corridor and presence of invasive pasture grass species, it is considered that if any of the Priority One or Two species did occur within any of the vegetated sections of the clearing footprint, that the remnant vegetation within the footprint may not be able to support viable populations of these species. Based on the current wider distribution and population records of the priority flora (WAH, 1998-) and based on the small area of the proposed clearing, it is considered that the loss of any individuals, should they occur, would not significantly impact the conservation status of these species.

Priority Three and Priority Four flora species occur over a wide geographical area and are known from several populations, some within conservation reserves, and so their conservation status is not considered to be under any immediate threat (Jones, 2015). Noting this, and the number of records and the distribution of the above listed species, the proposed clearing is not likely to impact the conservation status of these species should any individuals occur within the clearing area.

No Priority ecological communities (PEC) or threatened ecological communities (TEC) are mapped within the application area.

According to available datasets, one PEC, listed as a priority three PEC by the Department of Biodiversity, Conservation and Attractions (DBCA), the 'Heath on Komatiite of the Ravensthorpe area', is located within the local area. Noting the type and condition of the vegetation within the application area, in particular noting the PEC community has a different species composition to that of the Mt Cattlin Project area, with only two species, *Hybanthus floribundus* and *Halgania anagalloides*, associated with this PEC recorded in the Mt Cattlin Project area, the vegetation within the application footprint is not likely to comprise this PEC (Mattiske, 2018). Also, given the footprint is restricted to narrow road reserves and small remnants on agricultural land, it is further considered that the footprint area would not be able to support viable communities that comprise this PEC.

As discussed in principle (d), two PEC/TEC communities are also noted in the local area:

- 'Banksia laevigata - Banksia lemanniana proteaceous thicket (all/or portion in EPBC listed Kwongan community)' - is listed as a P1 PEC by DBCA, and as Endangered (TEC) under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- 'Proteaceae dominated kwongan shrublands of the southeast coastal floristic province of Western Australia' - is listed as a P3 PEC by DBCA, and as Endangered (TEC) under the EPBC Act.

Noting the type and condition of the vegetation within the application area, the application area does not resemble the two abovementioned TECs.

As discussed under Principle (h), the application area is approximately 800 metres from the southern boundary of the Overshot Hill Nature Reserve. Using aerial imagery (Virtual mosaic, 2018), it is noted that the majority of vegetation remaining within the vicinity of the application footprint (at least up to six kilometres) is confined to the road reserves and watercourses. The road reserve vegetation ranges from Degraded to Very Good (Keighery, 1994) and may act as a wildlife corridor, linking larger vegetated remnants south of the application area to this nature reserve. The proposed clearing may lead to further fragmentation of this vegetation and corridor linkage. It is noted that the vegetated road reserve of the Old Newdegate Road, near to the intersection with Floater Road, is narrow and weed infested, but may still have some functionality as a corridor, more so for smaller bird species (Nixon, 2018). A similar conclusion can be made of the proposed clearing for the area adjacent to Cattlin Creek [Location (d)].

Noting the mapped priority flora within the local area, the extent of native vegetation remaining within the local area, taking into account existing areas already cleared (for agricultural and mining use), and potential function of the vegetation within the clearing footprint to act as a wildlife corridor, it is considered that the application area may comprise a high level of biodiversity in the local context.

Given the above, the proposed clearing may be at variance to this principle.

**(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.**

**Proposed clearing may be at variance to this Principle**

As noted in Section 2 above, the vegetation within the clearing footprint is mapped as Beard's Ravensthorpe 352 vegetation complex (Sheppard, et al, 2001). As discussed within principle (e), the application area is located within the Esperance Plains Interim Biogeographic Regionalisation of Australia (IBRA) bioregion, which has approximately 51.5 per cent of its pre-European vegetation extent remaining (Government of Western Australia, 2018).

The vegetation within the clearing footprint is considered to resemble the mapped association being situated on brown clay-loam slopes supporting Eucalyptus mid mallee woodlands, over mid sparse shrublands, dominated by fabaceous species, over low sparse grasslands of *Austrostipa* (Mattiske, 2018). It is also noted that it is typical for this vegetation complex to have a naturally sparse understorey of low shrubs and grasses.

As noted within Section 2, a large proportion of the 61 hectare clearing footprint covers previously cleared areas that are currently utilised for agricultural, mining activities and public roads. The application to clear three hectares of native vegetation involves relatively small occurrences of road reserve and creek line vegetation in varying degrees of vegetation structure and condition (Virtual mosaic, 2018; Galaxy, 2018a).

According to available datasets, five threatened fauna species, comprised of two mammals and three bird species, are mapped within the local area (DBCA, 2007-):

- *Dasyurus geoffroyi* (Chuditch, Western Quoll);
- *Leipoa ocellata* (Malleefowl);
- *Myrmecobius fasciatus* (Numbat, Walpurti);
- *Psophodes nigrogularis* (Western Whipbird); and
- *Psophodes nigrogularis* subsp. *nigrogularis* (Western Whipbird (western heath)).

As noted in the desktop fauna assessment prepared by Nixon Wildlife Consulting (Nixon, 2018), it has been extrapolated that the landscape is dominated by low woodland of Eucalyptus tree species, comprised of generally tall, multi-stemmed trees with a diameter at breast height (DBH) of less than 30 centimeters. This type of growth form does not support large hollows, particularly breeding habitat for black cockatoos. Whilst Carnaby's cockatoo (*Calyptorhynchus latirostris*) nesting or foraging habitat is not mapped for the local area, the mapped vegetation complex within the road reserves may have potential to support foraging habitat, whilst the salmon gum (*E. salmonophloia*) individuals associated with Cattlin Creek [Location (d)] may have potential to eventually support nesting habitat (Nixon, 2018).

Of the five fauna species listed in the Nature Map report (DBCA, 2007-) Nixon's report noted only the presence of the malleefowl in the form of one nest within the larger intact remnant east of this current clearing application footprint (but outside the proposed mine expansion zone). The appearance of the construction and minimal decomposition of the leaf litter suggests the mound is less than three years old. The size and viability of the population in the broader area is currently unknown. This species is generally wide ranging and establishes large territories. They prefer shrublands with or without mallee in deep sand habitats (Nixon, 2018). It is unlikely any of the vegetation within the clearing footprint provides suitable habitat for Malleefowl.

The numbat is considered to be locally extinct as a result of extensive land clearing, loss of suitable habitat and incursion of the fox and cat. The chuditch is unlikely to occur in the area due to the absence of suitably large areas of habitat and lack of 'denning hollows' (ground or tree hollows). The species is more prevalent in large remnants especially in conservation areas (Nixon, 2018).

As noted in principle (a), the majority of vegetation remaining within the vicinity of the application footprint is confined to the road reserves and watercourses. This remnant vegetation may function as a wildlife corridor and as such, the proposed clearing may lead to further fragmentation of this vegetation and corridor functionality.

Noting the above, the proposed clearing may be at variance to this principle.

**(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.**

**Proposed clearing is not likely to be at variance to this Principle**

As noted in Section 2 above, the vegetation within the clearing footprint is mapped as Beard's Ravensthorpe 352 vegetation complex (Sheppard, et al, 2001), whilst the soils are described as 'calcareous loamy earths and shallow gravels with associated red shallow loams and bare rock' (DPIRD, 2017).

According to available datasets, five rare flora species (one *Acacia*, one *Conostylis*, one *Daviesia*, and two *Eucalyptus* species) are mapped within the local area. No rare flora species are recorded within the application area.

Noting the vegetation communities and mapped soil type within the application area, the habitat preferences of these five species (for example, soils types such as well drained, sandy clay, yellow-grey sand over laterite, red gravelly clay; vegetation communities such as open mallee, low heath and sedge communities; positions in the landscape such as on steep slopes, undulating country; or preference for disturbed sites) and based on specimen locations recorded by the Western Australian Herbarium (WAH, 1998-), it is unlikely that these flora species will occur within the clearing footprint.

Given the above, the proposed clearing is not likely to be at variance to this principle

**(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.**

**Proposed clearing is not likely to be at variance to this Principle**

As discussed in principle (a), two TEC's are mapped within the local area, whilst none are known within the application area.

These are:

- '*Banksia laevigata* - *Banksia lemanniana* proteaceous thicket (all/or portion in EPBC listed Kwongkan community)' - listed as a P1 PEC by DBCA, and as Endangered (TEC) under the EPBC Act. This community can be excluded based on the soil, vegetation and topography of the clearing footprint compared to the preferred soil type (rocky sponelite, laterite) and topography (on hills or top of breakaways) where *B. laevigata* occurs (WAH, 1998-; Mattiske, 2018).
- 'Proteaceae dominated kwongkan shrublands of the southeast coastal floristic province of Western Australia' - listed as a P3 PEC by DBCA, and as Endangered (TEC) under the EPBC Act. Although recorded within the vicinity of the clearing footprint, this community does not intersect with the Mt Cattlin Project area and this vegetation type is associated with the Central Barren Ranges, eastern Stirling Range and Russel Range, is not expected to occur within the application area (Mattiske, 2018).

Noting this, and the mapped vegetation type within the application area, the vegetation within the application area is not likely to comprise the whole or a part of, or is necessary for the maintenance of a TEC.

Given the above, the proposed clearing is not likely to be at variance to this Principle.

**(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.**

**Proposed clearing is not likely to be at variance to this Principle**

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 percent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001).

The area under application is located within the Esperance Plains IBRA bioregion. This IBRA bioregion has approximately 51.5 per cent of its pre-European vegetation extent remaining (Government of Western Australia, 2018).

The application area is mapped as Beard vegetation complex Ravensthorpe 352. This Beard vegetation complex has approximately 28.7 percent of its pre-European extent remaining in the IBRA bioregion (Government of Western Australia, 2018).

Aerial imagery indicates that the local area retains approximately 51 per cent vegetation cover (Virtual mosaic, 2018).

The bioregion and local area retain greater than the 30 percent vegetation threshold, however the mapped Beard vegetation complex Ravensthorpe 352 retains less than this threshold. However, as the proposed clearing of three hectares represents approximately 0.04 percent of Beard's vegetation complex and 0.015 percent of the local area vegetation cover, the loss of this vegetation is not considered to be significant on a local or regional scale. This potential loss is also not considered significant as the vegetation does not comprises significant environmental values (for example, ecological communities or significant flora habitat).

Given the above, the proposed clearing is not likely to be at variance to this principle.

Table 2: vegetation extent in the IBRA Bioregion.

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Extent remaining in all DBCA managed lands (proportion of Pre-European extent) (%)
<b>IBRA bioregion:</b>				
Esperance Plains*	2,899,940	1,494,448	51.5	28.3
<b>Vegetation complex in bioregion:</b>				
Ravensthorpe (352)*	22,816.85	6,566.34	28.78	21.8

\*Government of Western Australia. (2018)

**(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.**

**Proposed clearing is at variance to this Principle**

No wetlands are mapped within the local area with none occurring within the proposed clearing footprint.

A minor, non-perennial watercourse, is mapped within the application footprint on Lot 30 east of Newdegate-Ravensthorpe Road [Location (a)]. This Lot has been historically used for agricultural purposes and has no native vegetation present. Based on aerial imagery (Virtual mosaic, 2018), this minor watercourse appears to no longer exist or has the capacity to function as a watercourse given the current land use.

Cattlin Creek (a tributary to the Jerdacuttup River), is a functional (carry's water) minor, non-perennial watercourse mapped within the clearing footprint on Lot 36 north of Old Newdegate Road [Location (d)]. The riparian vegetation associated with this creek includes a salmon gum (*E. salmonophloia*) woodland. Some areas are in a Degraded to Good (Keighery, 1994) condition due to adjacent agricultural activities and salinity incursion. This watercourse flows southeast, crossing Floater Road then linking with a large remnant (greater than 500 hectares) east of Floater Road. This riparian vegetation also has the potential to act as wildlife corridor, linking with Overshot Hill Nature Reserve to the north. The proposed clearing may lead to further fragmentation of such a corridor.

Given the impact to riparian vegetation, the proposed clearing is at variance to this principle.

**(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.**

**Proposed clearing is not likely to be at variance to this Principle**

A large proportion of the 61 hectare clearing footprint covers previously cleared areas, and is currently being utilised as agricultural and mining tenements (Virtual mosaic, 2018). The application to clear three hectares of native vegetation involves relatively small, linear occurrences of road reserve and creek line vegetation in varying vegetation structure and condition, over gentle, undulating topography.

The application area occurs within the 'Ravensthorpe 2 Subsystem' soil unit that is described as 'calcareous loamy earths and shallow gravels with associated red shallow loams and bare rock' (DPIRD, 2017).

Up to 91 percent of the soil unit is categorised as 'gentle slopes', with the remainder comprising moderate to steep slopes (these are not present within the clearing footprint).

The soils of the gentle slopes comprise up to 33 percent 'calcareous loamy earths on gentle slopes', 35 percent are stony soils with the remainder comprising bare rock, gravel, shallow loams and soils associated with gentle to moderate slopes (DPIRD, 2017).

The land contours vary gradually between 10 to 20 metres over the three kilometre length of the clearing footprint – from 255 metres at the application's western end (Newdegate-Ravensthorpe Road), to 265 metres near the application areas centre (Old Newdegate Road), falling to 245 m at Cattlin Creek and then gradually rising to 265 m at Floater Road in the east.

Given the mapped soil type present (calcareous loamy earths), the risk of water erosion is mapped as 91 percent nil to moderate. Wind erosion is predominately mapped at 60 percent nil to moderate.

Given the mapped soil type present, relatively gentle slope of the landscape, relatively low mapped erosion risks and current land use, the risk of appreciable land degradation as a result of wind and water erosion is considered unlikely.

Groundwater salinity is mapped at 17000-14,000 mg/L (Total Dissolved Solids) which is considered moderate to high (GIS datasets; DPIRD, 2017). Salinity risk levels are mapped as partial to slight, however where the clearing footprint intersects the area of Cattlin Creek, an area impacted by historical agricultural land use, surface salinity is evident and it is noted the vegetation here is in a Degraded to Good (Keighery, 1994) condition (Virtual mosaic, 2018; 2018; Submission, 2018). As the local area retains approximately 51 per cent vegetation cover, the proposed clearing of three hectares is not likely to result in an increase in groundwater levels and impacts as a result of salinity.

Given the above, the proposed clearing is not likely to cause appreciable land degradation.

**(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.**

**Proposed clearing may be at variance to this Principle**

The closest conservation area is the Overshot Hill Nature Reserve, approximately 800 metres (to the closest reserve boundary) north of the application footprint.

Given this distance and the relatively small clearing of three hectares spread over the proposed three kilometre road alignment, no direct impacts from weed or dust incursion will impact upon this reserve.

It is noted that the nature reserve is indirectly linked to the application footprint, predominantly via vegetation within the Newdegate-Ravensthorpe Road, and Cattlin Creek and adjacent Old Newdegate Road [Locations (a), (c) and (e)]. Aerial imagery suggests these roads may function as a wildlife corridor between remnant vegetation south and east of the application footprint and this nature reserve. Sections of these roads appear to be already fragmented in some areas and it is possible the proposed clearing may lead to additional fragmentation of this vegetation (Virtual mosaic, 2018).

Given the above, the proposed clearing may be at variance to this principle.

**(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.**

**Proposed clearing is not likely to be at variance to this Principle**

The application footprint occurs within the Kondinin-Ravensthorpe Groundwater Area proclaimed under *Rights in Water Irrigation Act 1914* (RIWI Act). No RIWI Act surface water or watercourses are mapped within the application area.

Groundwater salinity is mapped at 17000-14,000 mg/L (Total Dissolved Solids) which is considered moderate to high whilst the soil salinity risk is considered low (GIS datasets, DPIRD, 2017).

As outlined in principle (g) above, a large proportion of the 61 hectare clearing footprint covers previously cleared areas that are currently utilised for agricultural, mining activities and public roads. The application to clear three hectares of native vegetation involves relatively small, linear occurrences of road reserve and a smaller section of creek line vegetation, all in varying degrees of vegetation structure and condition.

Cattlin Creek, a minor, non-perennial watercourse is mapped within the application footprint [Location (d)]. The riparian vegetation associated with this creek comprises a salmon gum (*E. salmonophloia*) woodland with some sections in a Degraded to Good (Keighery, 1994) condition due to adjacent agricultural activities; surface salinity is evident also. No surface salinity or salinity affected vegetation is known from within the road reserves were clearing is proposed.

A minor, non-perennial watercourse is mapped within the application footprint [Location (a)] in an area which has been historically used for agricultural purposes and has no native vegetation present. Based on aerial imagery, this minor watercourse appears to no longer function as a watercourse given the current land use (Virtual mosaic, 2018).

The application footprint occurs within the 'Ravensthorpe 2 Subsystem' soil unit described as 'calcareous loamy earths and shallow gravels with associated red shallow loams and bare rock' (DPIRD, 2017). As noted in principle (g) above, the risk of water erosion is considered unlikely, given the gentle contour of the landscape ranges from between 10 and 20 metres across the clearing footprint.

Given the above, the proposed clearing is not likely to be at variance to this principle.

**(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.**

**Proposed clearing is not likely to be at variance to this Principle**

As outlined in principle (g) above, a large proportion of the 61 hectare clearing footprint covers previously cleared areas that are currently utilised for agricultural, mining activities and public roads. The application to clear three hectares of native vegetation involves relatively small, linear occurrences of road reserve and creek line vegetation in varying degrees of vegetation structure and condition.

The application area occurs within the 'Ravensthorpe 2 Subsystem' soil unit that are described as 'calcareous loamy earths and shallow gravels with associated red shallow loams and bare rock' (DPIRD, 2017). The soil water erosion risk is mapped at 91 percent nil to moderate. The land contours vary gradually between 10 to 20 metres over the three kilometre length of the clearing footprint.

Given the soil type present, relatively gentle slope of the landscape, relatively low mapped erosion risks also noted in principle (g) and current land use, the risk of flooding is considered to be low.

Given the above, the proposed clearing is not likely to be at variance to this principle.

### **Planning instruments and other relevant matters.**

The application footprint occurs within the Kondinin-Ravensthorpe Groundwater Area proclaimed under the *Rights in Water Irrigation Act 1914* (RIWI Act). No RIWI Act surface water or watercourses are mapped within the application area.

The proposed clearing footprint includes Cattlin Creek, a minor, non-perennial waterway that is a tributary to the Jerdacuttup River. A bed and banks permit is not required in this situation as the waterway is located on private property and the provisions for permitting works under the RIWI Act do not apply in this situation (DWER, 2018a). Despite this, measures should be put in place to minimise the clearing of riparian vegetation where the proposed road crosses the waterway and to stabilise the bed and banks of the waterway to control erosion.

The proposed clearing and associated road construction is to accommodate the future expansion of Galaxy Resources Mt Cattlin Mine Project. Two principle reasons for the design and route of the proposed road re-alignment are required to accommodate mine safety exclusion zones, such as blast exclusion zones, and that the proposed mine expansion will require the closure of Floater Road.

No Aboriginal sites of significance have been mapped within the application area.

The clearing permit application was advertised on the DWER website on 11 June 2018 with a 21 day submission period.

Four public submissions were received in relation to this application (Submissions, 2018). The submissions raised similar concerns in relation to the proposed clearing, including the application areas biodiversity values, potential impacts to flora and fauna habitat and riparian vegetation, the lack of supporting documentation, justification for the proposed road realignment, design and size of the clearing footprint. These matters have been considered through the assessment and addressed in this report. One submission also made comment concerning matters including alternative road configuration designs, installation of road safety barriers, signage, and reducing speed limits. These matters are beyond the scope of the assessment of clearing impacts and have not been addressed.

## **4. Applicant's Submissions**

On 16 August 2018, the applicant was advised that the clearing as proposed will impact riparian vegetation and the vegetation within the existing road reserves may potentially act as an ecological corridor to other vegetation of surrounding, larger remnants. The applicant was also asked to advise of any plans for re-instating any of the roads impacted by the clearing proposal once mining operations were completed (DWER, 2018b).

In response the applicant advised the road design meets Main Roads Western Australia (MRWA) RAV 7 design criteria, allowing for a 30 metre wide road reserve and approximately 17 metre wide disturbance footprint. The vegetation cannot be avoided on Floater Road and Old Newdegate Roads as to do so would result in non-compliance with the safety measures required by the MRWA standards. Similarly, an overtaking lane and slip lane is likely to be required on the Newdegate-Ravensthorpe Road which requires the clearing of vegetation on both sides of the road, again to meet MRWA standards. However, a commitment will be made to avoid or minimise disturbance to vegetation in the following ways:

- riparian vegetation has been primarily avoided by moving the proposed road alignment south of existing vegetation;
- the proposed alignment has utilised gaps in vegetation, where possible, where the road alignment crosses road reserves;
- trimming vegetation instead of complete removal will occur where practicable; and
- (Without Prejudice and non-binding) negotiating design standards with MRWA for the clearing required on Ravensthorpe-Newdegate Road.

The applicant further advised and clarified that the re-aligned road will be a permanent all-weather sealed road designed to MRWA Rav 7 standards, it is no way a temporary road and rehabilitation will not be required on this basis. The alignment will take vehicular traffic away from the adjoining mine's defined blasting zones. The reinstatement of Floater Road is a matter for the Shire of Ravensthorpe, and if required, Galaxy will commit to constructing a light vehicle access road with a more direct alignment to the Town of Ravensthorpe for resident's social purposes. The alignment will be defined by the Shire of Ravensthorpe (Galaxy, 2018b).

## 5. References

- Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.
- Department of Biodiversity, Conservation and Attractions (DBCA) (2007-) NatureMap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife. URL: <http://naturemap.dpaw.wa.gov.au/>.
- Department of Primary Industries and Regional Development (DPIRD) (2017) NRInfo Digital Mapping. Department of Primary Industries and Regional Development. Government of Western Australia. URL: <https://maps.agric.wa.gov.au/nrm-info/> (accessed April 2018).
- Department of Water and Environmental Regulation (2018a) (DWER) South Coast Region, Water and Land Use Planning advice (DWER Ref: A1699471)
- Department of Water and Environmental Regulation (2018b) (DWER) Correspondence seeking more information from applicant concerning potential environmental impacts identified during a preliminary assessment (DWER Ref: A1711958)
- Galaxy Lithium Australia (2018a) Application for clearing permit, supporting documentation and photographs (DWER Ref: A1700381 and A1707231)
- Galaxy Lithium Australia (2018b) response to DWER letter seeking more information about the clearing proposal (DWER Ref: A17112239)
- Government of Western Australia (2018) 2017 State-wide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of December 2017. WA Department of Biodiversity, Conservation and Attractions.
- Jones, A. (2015) Threatened and Priority Flora List, 11 November 2015. Department of Parks and Wildlife: Kensington, WA.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Mattiske Consulting Pty Ltd (2018) Flora and Vegetation assessment Mt Cattlin Project Area prepared for Galaxy Lithium Australia (DWER Ref: A1700372)
- Nixon Wildlife Consulting (2018) Desktop Assessment of vertebrate fauna of the proposed spondumene project prepared for Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) Native Vegetation in Western Australia, Extent, Type and Status. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- Submissions (2018) Public submissions received in relation to clearing permit application CPS 8049/1 (DWER Ref. A1699659, 1699485, 1699488 and A1700195)
- Western Australian Herbarium (WAH, 1998-) FloraBase-the Western Australian Flora. Department of Biodiversity, Conservation and Attractions. <https://florabase.dpaw.wa.gov.au/>

### GIS Databases:

- Aboriginal Sites of Significance
- Department of Biodiversity, Conservation and Attractions, Tenure
- Groundwater salinity
- Hydrography, General Hydro
- Hydrography, Wetlands
- SAC bio datasets
- TPFL Data
- WAHerb Data
- WA TEC PEC Boundaries
- Virtual Mosaic Landgate / Aerial imagery (accessed August 2018)