

Tropicana Gold Project: Public Environmental Review

6. Existing Environment part 2



Section 7.2.3 describes the potential impacts and management strategies proposed for areas classified as significant habitat within the Pinjin Infrastructure Corridor.

6.3.5. *Early Settler Heritage*

Hocking Planning and Architecture was commissioned to complete a desktop survey to identify early settler heritage located on the Pinjin Station using resources of the Batty Library of Western Australian History, State Records Office of Western Australia and Landgate. The survey report upon which this section is based is included as Appendix 2-C4.

The report follows the approach recommended by Australia International Council on Monuments and Sites. It applies the principles set out in The Australia International Council on Monuments and Sites Charter for the Conservation of Places of Cultural Significance (The Burra Charter), Guidelines to the Burra Charter: Cultural Significance, Guidelines to the Burra Charter: Conservation Policy, and Guidelines to the Burra Charter: Procedures for Undertaking Studies and Reports.

The former settlement of Pinjin is an area historically associated with the mining and the pastoral industries. Since white settlement of the Shire of Menzies region in the 1890s, the Shire has seen periods of rapid settlement and abandonment as a result of mining booms. The pastoral industry has had a more permanent association with the region although the difficult conditions have seen many leases fail. The former town of Pinjin and the adjacent pastoral lease and homestead are typical examples of the pattern of settlement and abandonment seen in this region. There is now little physical evidence of the town's former existence and the Old Pinjin homestead is in ruins.

This assessment has determined that there are no current early settler heritage values or listings within the proposed Pinjin Infrastructure Corridor.

6.4. *TROPICANA-TRANSLINE CORRIDOR*

6.4.1. *General*

The TT Corridor extends 215 km north from the Trans Access Road (approximately 270 km east of Kalgoorlie) to the Operational Area. The proposed route is a mixture of existing 4WD tracks (approximately 120 km) and undisturbed area (approximately 95 km). A section of the corridor is located adjacent to an historic Sandalwood cutters track created in the 1950-60s and is locally known as the Cable Haul Road after a local sandalwood cutter.

6.4.2. *Flora and Vegetation*

ecologia was commissioned to survey and map the vegetation and flora values of the TT Corridor. Like the Pinjin Corridor the survey involved mapping vegetation and identifying listed flora species and communities within the Project's granted tenure, a 200 – 500 m wide corridor over a 215km length (survey corridor). Survey efforts also included areas outside of the granted tenure. The corridor route was also designed to avoid areas of higher conservation interest such as sand dunes using a combination of aerial photography, aerial reconnaissance and knowledge of the distribution of threatened species. The total area mapped by *ecologia* was approximately 43,000 ha (this equates to a two km wide corridor) which is nearly 100 times larger than the proposed disturbance area. The field work was undertaken in July and August 2007.

The survey conducted over the TT Corridor was designed to meet the requirements of a Level 1 survey as defined by the EPA Guidance Statement 51 (EPA 2004c). The results of this survey are demonstrated in Figure 6.19a-o and Figure 6.20a-o and the report upon which this section is based is included as Appendix 2-C2.

Biogeography

The majority of the TT Corridor (middle and northern section) is situated in the Helms Botanical District near the border of the GVD and the Nullarbor Plain, within the Eremaean Botanical Province. The southernmost section is situated on the boundary of the Eucla Botanical District (Nyanga Plain) within the Eremaean Botanical District and the Coolgardie Botanical District within the south-western Interzone.

The corridor traverses the following distinct vegetation units as described by Beard (1975).

- Northern section:
 - tree (*Eucalyptus gongylocarpa*, *E. youngiana*) and shrub steppe between sand hills with hummock grassland (*Triodia basedowii*);
 - *Acacia aneura* (mulga) low woodland between sand ridges; and,
 - *Acacia aneura* / *Casuarina cristata* (*C. pauper*) woodland (mulga and sheoak).
- Middle section
 - tree (*Eucalyptus gongylocarpa*, *E. youngiana*) and scattered *Acacia aneura*; and,
 - shrub steppe on sandplain with hummock grassland (*Triodia basedowii*).
- Southern section
 - mosaic of *Eucalyptus oleosa* (mallee) and *Triodia scariosa* with patches of *Eucalyptus salmonophloia* and *Eucalyptus salubris* (gimlet) woodland; and,
 - *Acacia aneura* / *Casuarina cristata* (*C. pauper*) / *Myoporum* and *Atriplex* (saltbush) or *Kochia* (bluebush) thickly wooded succulent steppe.

Vegetation

Vegetation condition along the TT Corridor ranged from pristine to degraded with fire being the main factor affecting the condition of the vegetation. Nine major plant communities were identified along the survey corridor (Figure 6.19a-o), these major communities were then further broken down into 21 sub-communities based on their structure, dominant and associated species and geographic factors. Table 6.9 lists the communities observed and provides a brief description of each one. The nine major communities observed along the survey corridor are:

- mixed *Eucalyptus* woodland over hummock grassland;
- *Callitris preissii* tall shrubland;
- mixed *Eucalyptus* woodland over *Triodia scariosa* hummock grassland;
- mixed *Eucalyptus* woodland with *Acacia* understorey, over *Triodia desertorum* hummock grassland;
- *Triodia rigidissima* hummock grasslands;
- *Acacia aneura* woodland;
- low mixed shrubland;
- *Triodia basedowii* hummock grassland; and,
- *Eucalyptus* / *Casuarina* mallee / shrubland over chenopods.

Table 6.9: Tropicana-Transline Communications Corridor Vegetation Communities

Vegetation Code	Description
Mixed <i>Eucalyptus</i> woodland over hummock grassland	
E1A (e _x L.xS.xZ.t ₇ H)	Open to sparse mixed <i>Eucalyptus youngiana</i> / <i>E. trivalva</i> / <i>E. ceratocorys</i> / <i>E. gracilis</i> / <i>E. horistes</i> mallees, over open tall <i>Acacia ligulata</i> / <i>Grevillea juncifolia</i> subsp. <i>Temulenta</i> / <i>Duboisia hopwoodii</i> / <i>Aluta maisonneuvei</i> subsp. <i>Auriculata</i> shrubs, over moderately dense <i>Keraudrenia velutina</i> subsp. <i>Elliptica</i> / <i>Acacia helmsiana</i> / <i>Hannafordia bissillii</i> subsp. <i>Bissillii</i> / <i>Dicrastylis nicholasii</i> low shrubs, over moderately dense <i>Triodia desertorum</i> hummock grasses.
E1B (e ₂₀ e ₇₁ L.xSxZ.t _x H)	Sparse mixed <i>Eucalyptus youngiana</i> / <i>Eucalyptus concinna</i> trees, over sparse to open <i>Acacia ligulata</i> / <i>Grevillea juncifolia</i> subsp. <i>Temulenta</i> / <i>Acacia murrayana</i> tall shrubs, over open to moderately dense <i>Keraudrenia velutina</i> subsp. <i>Elliptica</i> / <i>Aluta maisonneuvei</i> subsp. <i>Auriculata</i> / <i>Acacia helmsiana</i> / <i>Hannafordia bissillii</i> subsp. <i>Bissillii</i> / <i>Acacia sibina</i> , over sparse to open mixed <i>Triodia</i> spp. Hummock grasses.
E1C (e ₁₉ L.xS.xZ.t ₁₂ H)	Open <i>Eucalyptus gongylocarpa</i> mallees, over sparse <i>Acacia aneura</i> / <i>Acacia ligulata</i> / <i>Grevillea juncifolia</i> subsp. <i>Temulenta</i> tall shrubs, over open to moderately dense <i>Bertya dimerostigma</i> / <i>Acacia helmsiana</i> / <i>Keraudrenia velutina</i> subsp. <i>Elliptica</i> shrubs, over moderately dense <i>Triodia tomentosa</i> hummock grasses.
<i>Callitris preissii</i> tall shrubland	
E2A (e ₇₂ e ₂₀ L.p ₂ th ₁ S.xZ. t ₁₂ t ₈ H)	Sparse to open <i>Eucalyptus mannensis</i> / <i>E. youngiana</i> mallees, over open <i>Callitris preissii</i> / <i>Thryptomene biseriata</i> / <i>Acacia ligulata</i> tall shrubs, over open <i>Anthotroche pannosa</i> / <i>Hakea francisiana</i> shrubs, over sparse to open <i>Triodia tomentosa</i> / <i>Triodia scariosa</i> hummock grasses.
E2DC (e ₇₀ e ₂₀ L.xS.xZ).	Sparse to open <i>Eucalyptus trivalva</i> / <i>Eucalyptus youngiana</i> mallees, over open <i>Callitris preissii</i> / <i>Thryptomene biseriata</i> / <i>Leptospermum fastigiatum</i> tall shrubs, over sparse <i>Anthotroche pannosa</i> / <i>Microcorys macrediana</i> / <i>Pityrodia loricata</i> shrubs, over scattered <i>Glischrocaryon aureum</i> herbs.
E2B (e ₁₉ e ₂₀ L.xS.xZ.t _x H).	Sparse <i>Eucalyptus gongylocarpa</i> / <i>Eucalyptus youngiana</i> mallees, over open <i>Callitris preissii</i> / <i>Thryptomene biseriata</i> / <i>Acacia ligulata</i> tall shrubs, over open <i>Anthotroche pannosa</i> / <i>Hakea francisiana</i> / <i>Eremophila decipiens</i> subsp. <i>Decipiens</i> shrubs, over scattered mixed <i>Triodia</i> spp. Hummock grasses.
Mixed <i>Eucalyptus</i> woodland over <i>Triodia scariosa</i> hummock grassland	
E3A (e ₇₀ L.a ₁ S.xZ.t ₈ H).	Open <i>Eucalyptus trivalva</i> low trees, over open <i>Acacia aneura</i> tall shrubs, over sparse <i>Ptilotus obovatus</i> var. <i>obovatus</i> / <i>Senna artemisioides</i> / <i>Eremophila glabra</i> shrubs, over dense <i>Triodia scariosa</i> hummock grassland.
E3B (e ₇₁ e _x L.a ₃₃ S.xZ.t ₈ H)	Open <i>Eucalyptus concinna</i> / <i>Eucalyptus</i> spp. Mallees, over sparse <i>Acacia hemiteles</i> tall shrubs, over scattered <i>Westringia cephalantha</i> / <i>Eremophila punctata</i> / <i>Grevillea acuaria</i> shrubs, over moderately dense <i>Triodia scariosa</i> hummock grassland.
E3C (e ₇₃ e ₇₄ M.t ₈ t ₇ H)	Open <i>Eucalyptus salicola</i> / <i>Eucalyptus sheathiana</i> medium trees, over scattered <i>Senna artemisioides</i> shrubs, over sparse <i>Triodia scariosa</i> / <i>Triodia desertorum</i> hummock grasses.
Mixed <i>Eucalyptus</i> woodland with <i>Acacia</i> understorey, over <i>Triodia desertorum</i> hummock grassland	
E4A (e _x L.a ₂₁ a ₃₃ S.xZ.t ₇ H).	Open to moderately dense <i>Eucalyptus ceratocorys</i> / <i>Eucalyptus socialis</i> / <i>Eucalyptus platycorys</i> woodland, over sparse <i>Acacia ligulata</i> / <i>Acacia hemiteles</i> tall shrubs, over sparse <i>Halgania cyanea</i> / <i>Eremophila glabra</i> / <i>Daviesia benthamii</i> subsp. <i>Acanthoclona</i> shrubs, over moderately dense to dense <i>Triodia desertorum</i> hummock grasses.
E4B (e ₇₁ e ₁₉ L.a ₂₁ a ₃₃ S.xZ.t ₇ H).	Open <i>Eucalyptus concinna</i> / <i>Eucalyptus gongylocarpa</i> mallees, over sparse to open <i>Acacia ligulata</i> / <i>Acacia hemiteles</i> tall shrubs, over scattered <i>Alyogyne pinoniana</i> / <i>Scaevola spinescens</i> / <i>Westringia cephalantha</i> shrubs, over open to moderately dense <i>Triodia desertorum</i> hummock grassland.

Vegetation Code	Description
<i>Triodia rigidissima</i> hummock grasslands	
T5A (e ₇₅ e ₇₁ L.t ₁₄ H)	Open <i>Eucalyptus eremicola</i> subsp. <i>Peeneri</i> mallees, sometimes with <i>E. concinna</i> , over scattered <i>Gyrostemon ramulosus</i> tall shrubs, over scattered <i>Rulingia crauophylla</i> shrubs, over open <i>Zygophyllum apiculatum</i> herbs with open <i>Triodia irritans</i> hummocks.
T5B (e ₇₁ e ₂₀ L.t ₁₃ H)	Open <i>Eucalyptus concinna</i> / <i>Eucalyptus youngiana</i> mallees, over scattered <i>Acacia ligulata</i> / <i>Acacia hemiteles</i> tall shrubs, over scattered <i>Scaevola spinescens</i> / <i>Grevillea nematophylla</i> / <i>Acacia rigens</i> / <i>Grevillea acuaria</i> , over open to moderately dense <i>Triodia rigidissima</i> hummock grassland.
T5C (t ₁₃ H).	Sparse <i>Acacia ligulata</i> / <i>Acacia hemiteles</i> tall shrubs, over scattered <i>Scaevola spinescens</i> / <i>Senna artemisioides</i> / <i>Eremophila georgei</i> shrubs, over sparse <i>Ptilotus obovatus</i> var. <i>obovatus</i> low shrubs, over dense <i>Triodia rigidissima</i> hummock grassland.
Acacia woodland	
A6A (a ₁ e _{r2} L.xS.xZ)	Moderately dense <i>Acacia aneura</i> / <i>Eremophila longifolia</i> tall shrubs, over sparse <i>Acacia burkittii</i> / <i>Acacia tetragonophylla</i> / <i>Prostanthera sericea</i> shrubs, over scattered <i>Eremophila latrobei</i> / <i>Eremophila decipiens</i> subsp. <i>Decipiens</i> / <i>Ptilotus obovatus</i> subsp. <i>Obovatus</i> low shrubs.
A6B (a ₁ L.xS.xZ)	Moderately dense to dense <i>Acacia aneura</i> tall shrubs, over open to moderately dense <i>Aluta maisonneuvei</i> subsp. <i>Auriculata</i> / <i>Eremophila forrestii</i> shrubs, with sparse emergent <i>Psydrax suaveolens</i> tall shrubs, over <i>Eremophila latrobei</i> / <i>Eremophila decipiens</i> subsp. <i>Decipiens</i> / <i>Senna artemisioides</i> low shrubs, over scattered <i>Brachyscome blackii</i> herbs.
Mixed low shrubland	
E7 (xZ.t ₁₅ t ₂ H)	Sparse <i>Eucalyptus oleosa</i> subsp. <i>Oleosa</i> / <i>Eucalyptus orbifolia</i> mallees, over dense <i>Leptosema daviesioides</i> and open <i>Enekbatus eremaeus</i> / <i>Keraudrenia velutina</i> subsp. <i>Elliptica</i> shrubs, over scattered <i>Dianella revoluta</i> subsp. <i>Divaricata</i> and open to moderately dense <i>Triodia schinzii</i> / <i>T. basedowii</i> hummock grasses.
<i>Triodia basedowii</i> hummock grassland	
T8A (e ₂₀ L.xS.t ₂ H)	Sparse <i>Eucalyptus youngiana</i> mallees, over scattered <i>Acacia ligulata</i> tall shrubs, over sparse <i>Grevillea acacioides</i> / <i>Grevillea juncifolia</i> subsp. <i>Temulenta</i> / <i>Mirbelia seorsifolia</i> / <i>Keraudrenia velutina</i> subsp. <i>Elliptica</i> shrubs, over open to moderately dense <i>Triodia basedowii</i> hummock grassland.
T8B (a _x S.t ₂ H)	Sparse to open <i>Acacia ligulata</i> / <i>Acacia burkittii</i> / <i>Acacia aneura</i> tall shrubs, over sparse <i>Senna artemisioides</i> shrubs, over open to moderately dense <i>Triodia basedowii</i> hummock grasses.
<i>Eucalyptus</i> / <i>Casuarina</i> mallee/shrubland over chenopods	
C9A (e ₂₂ L.xS.xZ)	Open to moderately dense <i>Eucalyptus oleosa</i> subsp. <i>Oleosa</i> mallees with sparse <i>Casuarina pauper</i> tall shrubs, over open to moderately dense <i>Eremophila scoparia</i> / <i>Senna artemisioides</i> / <i>Alectryon oleifolius</i> subsp. <i>Canescens</i> tall shrubs, over scattered <i>Ptilotus obovatus</i> var. <i>obovatus</i> / <i>Solanum nummularium</i> / <i>Olearia muelleri</i> / <i>Sclerolaena diacantha</i> low shrubs.
C9B (c ₂ a ₂ S.xS.k ₂ xZ)	Open to moderately dense <i>Casuarina pauper</i> / <i>Alectryon oleifolius</i> subsp. <i>Canescens</i> tall shrubs, over open to moderately dense <i>Eremophila scoparia</i> / <i>Senna artemisioides</i> / <i>Atriplex nummularia</i> subsp. <i>Spathulata</i> / <i>E. glabra</i> shrubs, over open to moderately dense <i>Maireana sedifolia</i> / <i>Solanum nummularium</i> / <i>Ptilotus obovatus</i> var. <i>obovatus</i> low shrubs.
E9C (e ₈ M.xS.k ₂ xZ)	Open <i>Eucalyptus salmonophloia</i> trees, over open <i>Casuarina pauper</i> / <i>Alectryon oleifolius</i> subsp. <i>Canescens</i> tall shrubs, over open to moderately dense <i>Eremophila scoparia</i> / <i>Senna artemisioides</i> / <i>Scaevola spinescens</i> shrubs, over open to moderately dense <i>Maireana sedifolia</i> / <i>Solanum nummularium</i> / <i>Ptilotus obovatus</i> var. <i>obovatus</i> low shrubs, over sparse <i>Paspalidium constrictum</i> soft grasses.

Communities of Conservation Concern

No TECs defined by the EPBC Act or the DEC were observed within the TT Corridor. Like the Pinjin Infrastructure Corridor, there is the possibility that sections of the TT Corridor are located within the PEC as described in section 6.3.2. This PEC is further discussed in section 6.5.

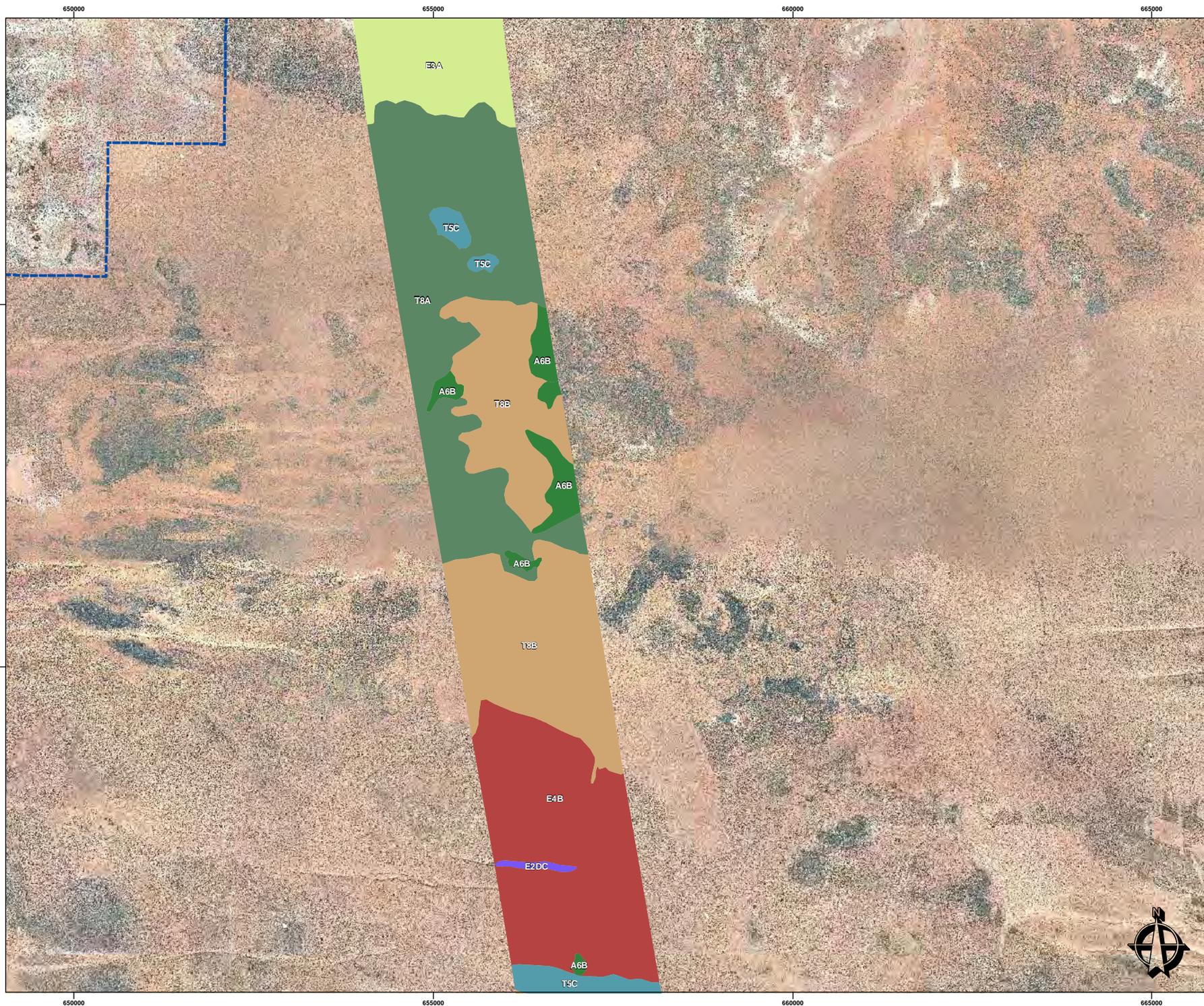
Six plant communities within the survey corridor have been identified as of conservation interest; these are E1B, E1C, E2B, E2D, T5B and T8A. These communities were identified as being important, either because they contain habitat suitable to support DRF species (E2D) or other conservation interest species, or because they have a limited distribution within the survey corridor (T5B).

Legend

TTC Corridor Vegetation Communities

- E1A** Open to sparse mixed *Eucalyptus youngiana* / *Eucalyptus trivalva* / *Eucalyptus ceratocorys* / *E. gracilis* / *E. horistes* mallee, over open tall *Acacia ligulata* / *Grevillea juncea* subsp. *temulenta* / *Duboisia hopwoodii* / *Aluta maisonneuvei* subsp. *auriculata* shrubs, over moderately dense *Keraudrenia velutina* subsp. *elliptica* / *Acacia helmsiana* / *Hannafordia bissillii* subsp. *bissillii* / *Dicrastylis nicholasii* low shrubs, over moderately dense *Triodia desertorum* hummock grasses
- E1B** Sparse mixed *Eucalyptus youngiana* / *Eucalyptus concinna* trees, over sparse to open *Acacia ligulata* / *Grevillea juncea* subsp. *temulenta* / *Acacia murrayana* tall shrubs, over open to moderately dense *Keraudrenia velutina* subsp. *elliptica* / *Aluta maisonneuvei* subsp. *auriculata* / *Acacia helmsiana* / *Hannafordia bissillii* subsp. *bissillii* / *Acacia sibirica*, low shrubs over sparse to open mixed *Triodia* spp. hummock grasses
- E1C** Open *Eucalyptus gongylocarpa* mallees, over sparse *Acacia aneura* / *Acacia ligulata* / *Grevillea juncea* subsp. *temulenta* tall shrubs, over open to moderately dense *Bertya dimerostigma* / *Acacia helmsiana* / *Keraudrenia velutina* subsp. *elliptica* shrubs, over moderately dense *Triodia tomentosa* hummock grasses
- E2A** Sparse to open *Eucalyptus mannensis* / *Eucalyptus youngiana* mallees, over open *Callitris preissii* / *Thryptomene biseriala* / *Acacia ligulata* tall shrubs, over open *Anethroche pannosa* / *Hakea francisiana* shrubs, over sparse to open *Triodia tomentosa* / *Triodia scariosa* hummock grasses
- E2B** Sparse *Eucalyptus gongylocarpa* / *Eucalyptus youngiana* mallees, over open *Callitris preissii* / *Thryptomene biseriala* / *Acacia ligulata* tall shrubs, over open *Anethroche pannosa* / *Hakea francisiana* / *Eremophila decipiens* subsp. *decipiens* shrubs, over scattered mixed *Triodia* spp. hummock grasses
- E2DC** Sparse to open *Eucalyptus trivalva* / *Eucalyptus youngiana* mallees, over open *Callitris preissii* / *Thryptomene biseriala* / *Leptospermum fastigiatum* tall shrubs, over sparse *Anethroche pannosa* / *Microrhynchus macreadiana* / *Ptyrodia lorica* shrubs, over scattered *Gilchristocaryon aureum* herbs
- E3A** Open *Eucalyptus trivalva* low trees, over open *Acacia aneura* tall shrubs, over sparse *Ptilotus obovatus* var. *obovatus* / *Senna artemisioides* / *Eremophila glabra* shrubs, over dense *Triodia scariosa* hummock grassland
- E3B** Open *Eucalyptus concinna* / *Eucalyptus* spp. mallees, over sparse *Acacia hemiteles* tall shrubs, over scattered *Westringia cephalantha* / *Eremophila punctata* / *Grevillea acuraria* shrubs, over moderately dense *Triodia scariosa* hummock grassland
- E3C** Open *Eucalyptus salicola* / *Eucalyptus sheathiana* medium trees, over scattered *Senna artemisioides* shrubs, over sparse *Triodia scariosa* / *Triodia desertorum* hummock grasses
- E4A** Open to moderately dense *Eucalyptus ceratocorys* / *Eucalyptus sciaisia* / *Eucalyptus platycorys* woodland, over sparse *Acacia ligulata* / *Acacia hemiteles* tall shrubs, over sparse *Halgania cyanea* / *Eremophila glabra* / *Daviesia benthamii* subsp. *acanthoclona* shrubs, over moderately dense to dense *Triodia desertorum* hummock grasses
- E4B** Open *Eucalyptus concinna* / *Eucalyptus gongylocarpa* mallees, over sparse to open *Acacia ligulata* / *Acacia hemiteles* tall shrubs, over scattered *Alyogyne pinoniana* / *Scævola spinescens* / *Westringia cephalantha* shrubs, over open to moderately dense *Triodia desertorum* hummock grassland

- T5A** *E. concinna*, over scattered *Gyrostemon ramulosus* tall shrubs, over scattered *Ruingia craurphylla* shrubs, over open *Zygochylum apiculatum* herbs with open *Triodia irritans* hummocks
- T5B** Open *Eucalyptus concinna* / *Eucalyptus youngiana* mallees, over scattered *Acacia ligulata* / *Acacia hemiteles* tall shrubs, over scattered *Scævola spinescens* / *Grevillea nematophylla* / *Acacia rigens* / *Grevillea acuraria*, over open to moderately dense *Triodia rigidissima* hummock grassland
- T5C** Sparse *Acacia ligulata* / *Acacia hemiteles* tall shrubs, over scattered *Scævola spinescens* / *Senna artemisioides* / *Eremophila georgei* shrubs, over sparse *Ptilotus obovatus* var. *obovatus* low shrubs, over dense *Triodia rigidissima* hummock grassland
- A6A** Moderately dense *Acacia aneura* / *Eremophila longifolia* woodland/shrubland, over sparse *Acacia burkittii* / *Acacia tetragonophylla* / *Prostanthera sericea* shrubs, over scattered *Eremophila latrobei* / *Eremophila decipiens* subsp. *decipiens* / *Ptilotus obovatus* subsp. *obovatus* low shrubs
- A6B** Moderately dense to dense *Acacia aneura* woodland/shrubland, over open to moderately dense *Aluta maisonneuvei* subsp. *auriculata* / *Eremophila forrestii* shrubs, with sparse emergent *Psychodra suaveolens* tall shrubs, over *Eremophila latrobei* / *Eremophila decipiens* subsp. *decipiens* / *Senna artemisioides* low shrubs, over scattered *Brachyscomum blackii* herbs
- E7** Sparse *Eucalyptus oleosa* subsp. *oleosa* / *Eucalyptus orbifolia* mallees, over dense *Leptosema daviesioides* and open *Enekbatus eremaeus* / *Keraudrenia velutina* subsp. *elliptica* shrubs, over scattered *Dianella revoluta* subsp. *divaricata* and open to moderately dense *Triodia schinzii* / *T. basedowii* hummock grasses
- T8A** Sparse *Eucalyptus youngiana* mallees, over scattered *Acacia ligulata* tall shrubs, over sparse *Grevillea acacioides* / *Grevillea juncea* subsp. *temulenta* / *Mitelia seorsifolia* / *Keraudrenia velutina* subsp. *elliptica* shrubs, over open to moderately dense *Triodia basedowii* hummock grassland
- T8B** Sparse to open *Acacia ligulata* / *Acacia burkittii* / *Acacia aneura* tall shrubs, over sparse *Senna artemisioides* shrubs, over open to moderately dense *Triodia basedowii* hummock grasses
- C9A** Open to moderately dense *Eucalyptus oleosa* subsp. *oleosa* mallee with sparse *Casuarina pauper* tall shrubs, over open to moderately dense *Eremophila scoparia* / *Senna artemisioides* / *Alectryon oleifolius* subsp. *canescens* tall shrubs, over scattered *Ptilotus obovatus* var. *obovatus* / *Solanum nummularium* / *Olearia muelleri* / *Sclerolobena diacantha* low shrubs
- C9B** Open to moderately dense *Casuarina pauper* / *Alectryon oleifolius* subsp. *canescens* tall shrubs, over open to moderately dense *Eremophila scoparia* / *Senna artemisioides* / *Atriplex nummularia* subsp. *sphaulata* / *Eremophila glabra* shrubs, over open to moderately dense *Maireana sedifolia* / *Solanum nummularium* / *Ptilotus obovatus* var. *obovatus* low shrubs
- E9C** Open *Eucalyptus salmophloia* trees, over open *Casuarina pauper* / *Alectryon oleifolius* subsp. *canescens* tall shrubs, over open to moderately dense *Eremophila scoparia* / *Senna artemisioides* / *Scævola spinescens* shrubs, over open to moderately dense *Maireana sedifolia* / *Solanum nummularium* / *Ptilotus obovatus* var. *obovatus* low shrubs, over sparse *Paspalum constrictum* soft grasses



Legend

-  Operational Area
- Vegetation Communities**
-  E2DC
-  E3A
-  E4B
-  T5C
-  A6B
-  T8A
-  T8B

Refer to page 6-103 for vegetation description

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SCALE



LOCALITY MAP



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 Vegetation of the TTC
 Figure 6.19a





Legend

Vegetation Communities

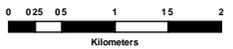
- E1B
- E1C
- E2DC
- E4A
- E4B
- T5B
- T9C
- A6B
- T8A
- T8B

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100%	MGA ZONE 51

HORIZONTAL DATUM	HEIGHT DATUM
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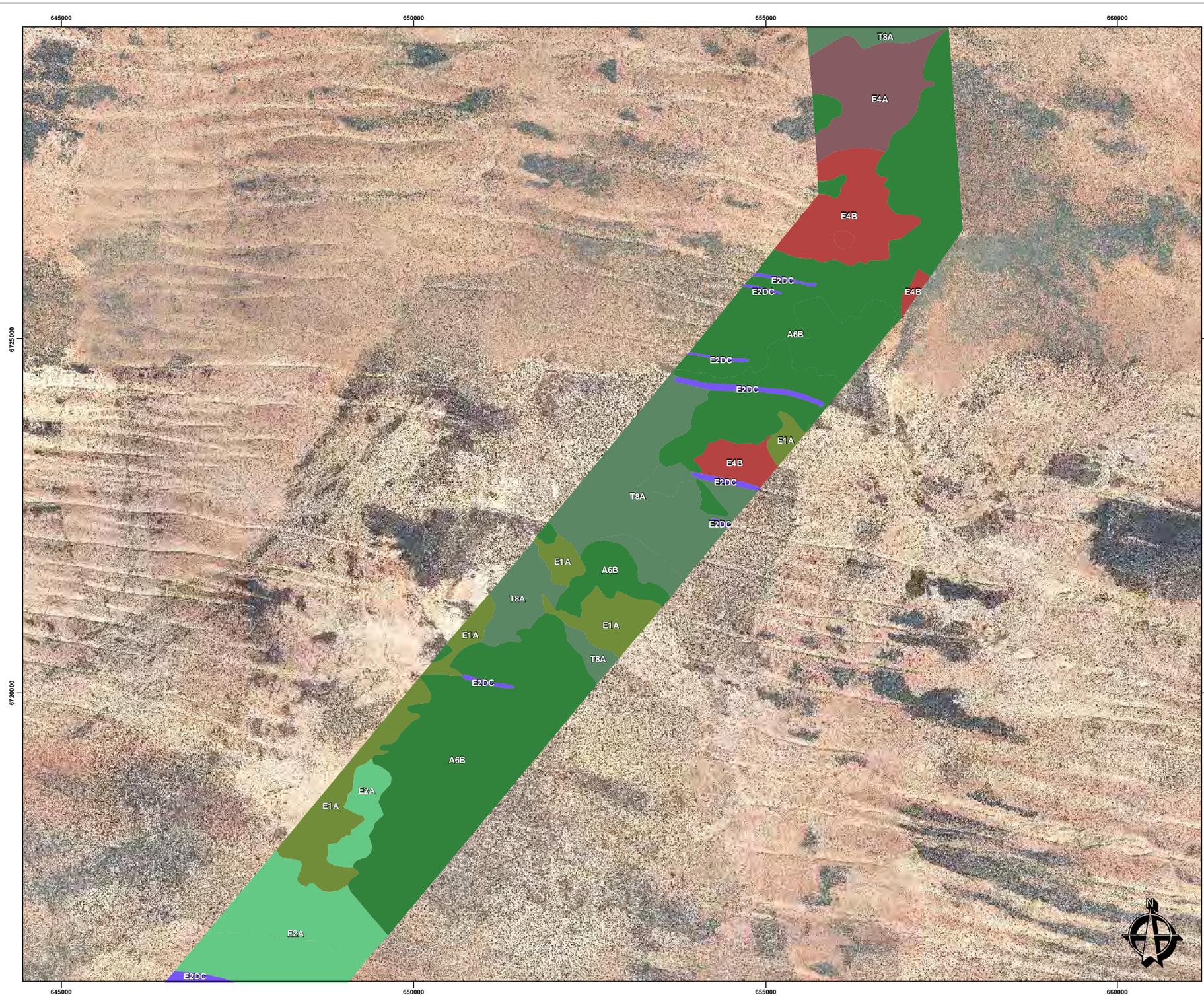
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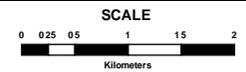


- Legend**
- Vegetation Communities**
- E1A
 - E2A
 - E2DC
 - E4A
 - E4B
 - A6B
 - T8A

Refer to page 6-103 for vegetation description

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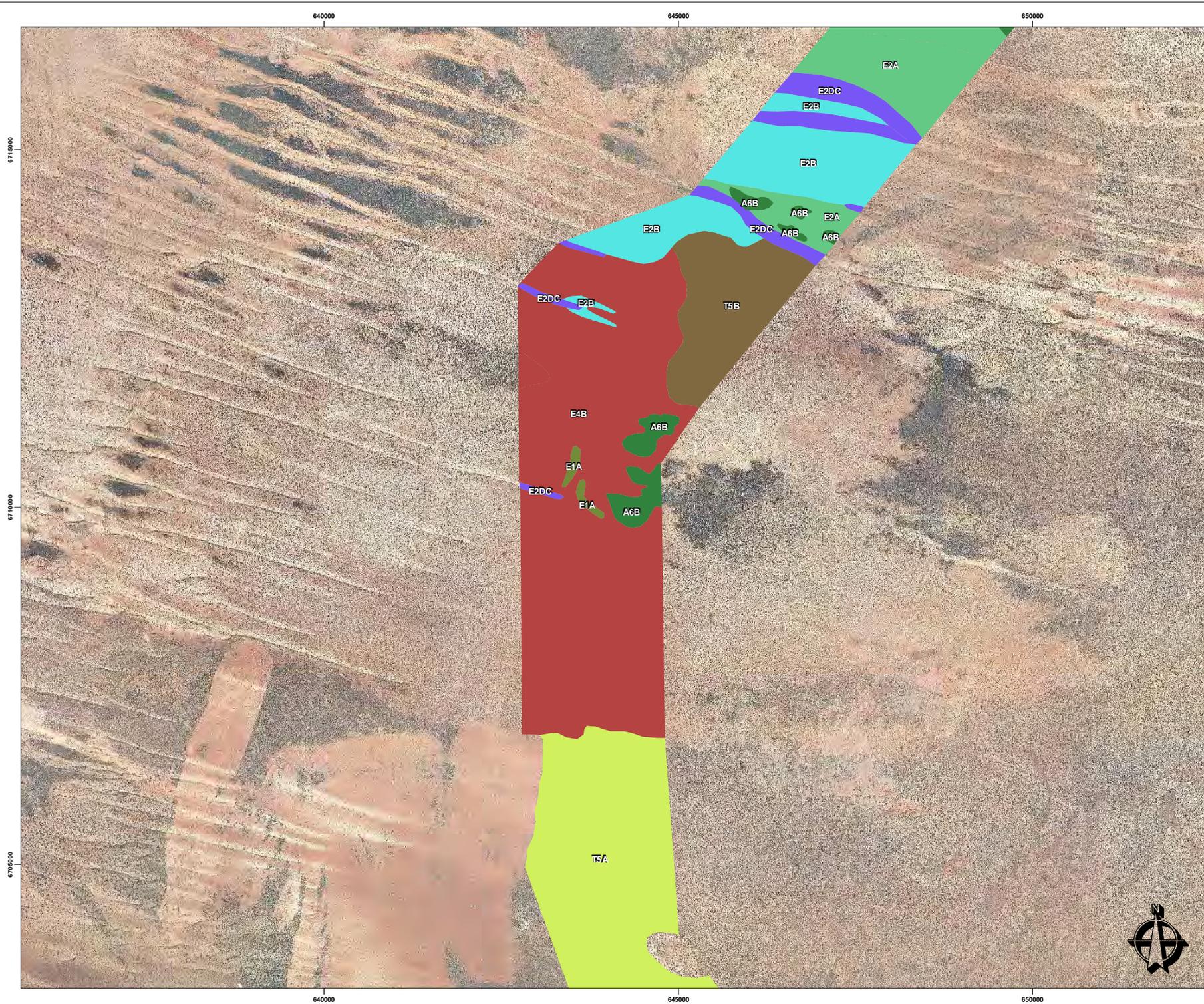
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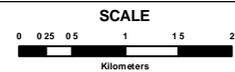


- Legend**
- Vegetation Communities
- E1A
 - E2A
 - E2B
 - E2DC
 - E4B
 - T5A
 - T5B
 - A6B

Refer to page 6-103 for vegetation description

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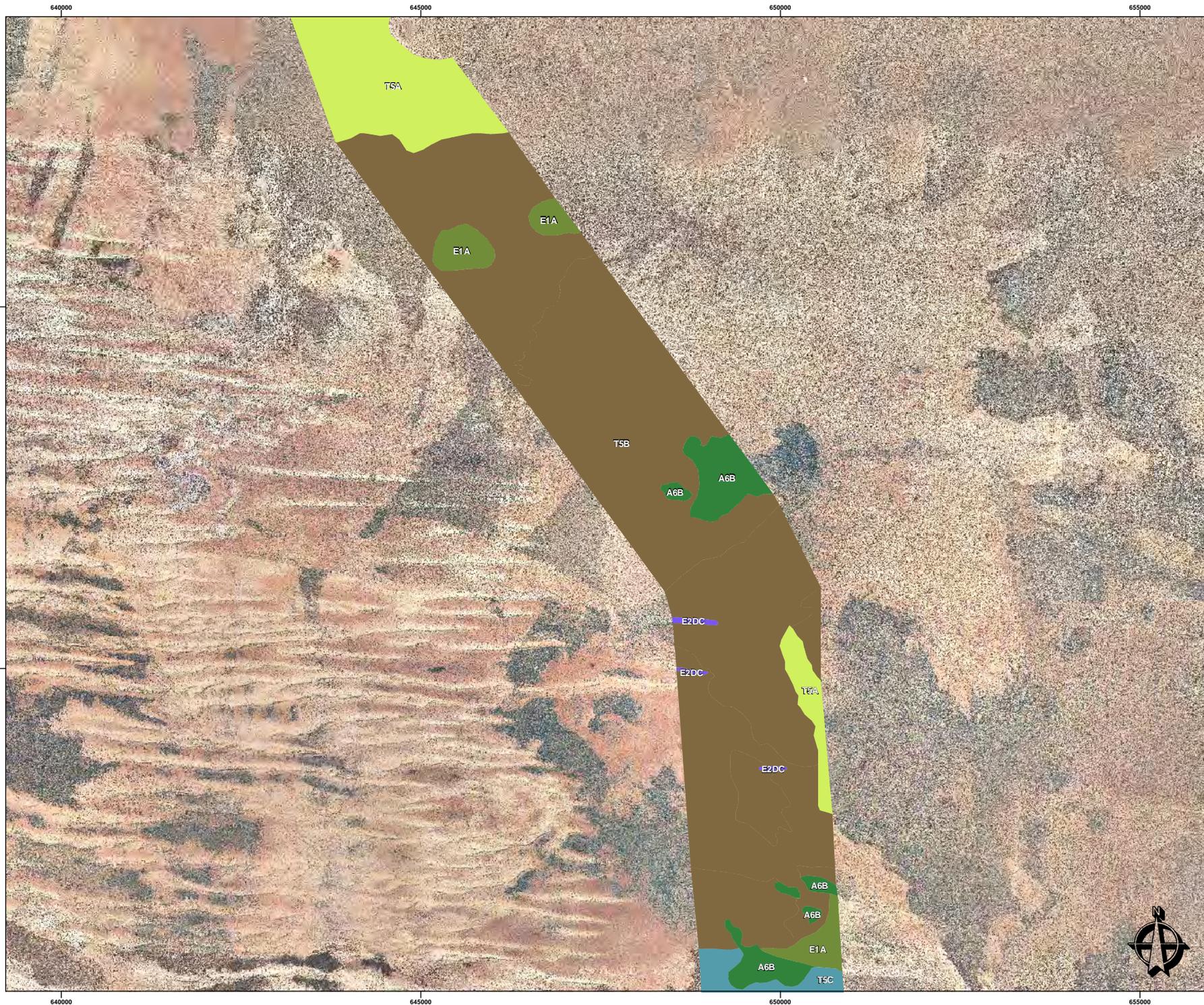
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Legend

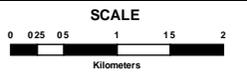
Vegetation Communities

- E1A
- E2DC
- T5A
- T5B
- T5C
- A6B

Refer to page 6-103 for vegetation description

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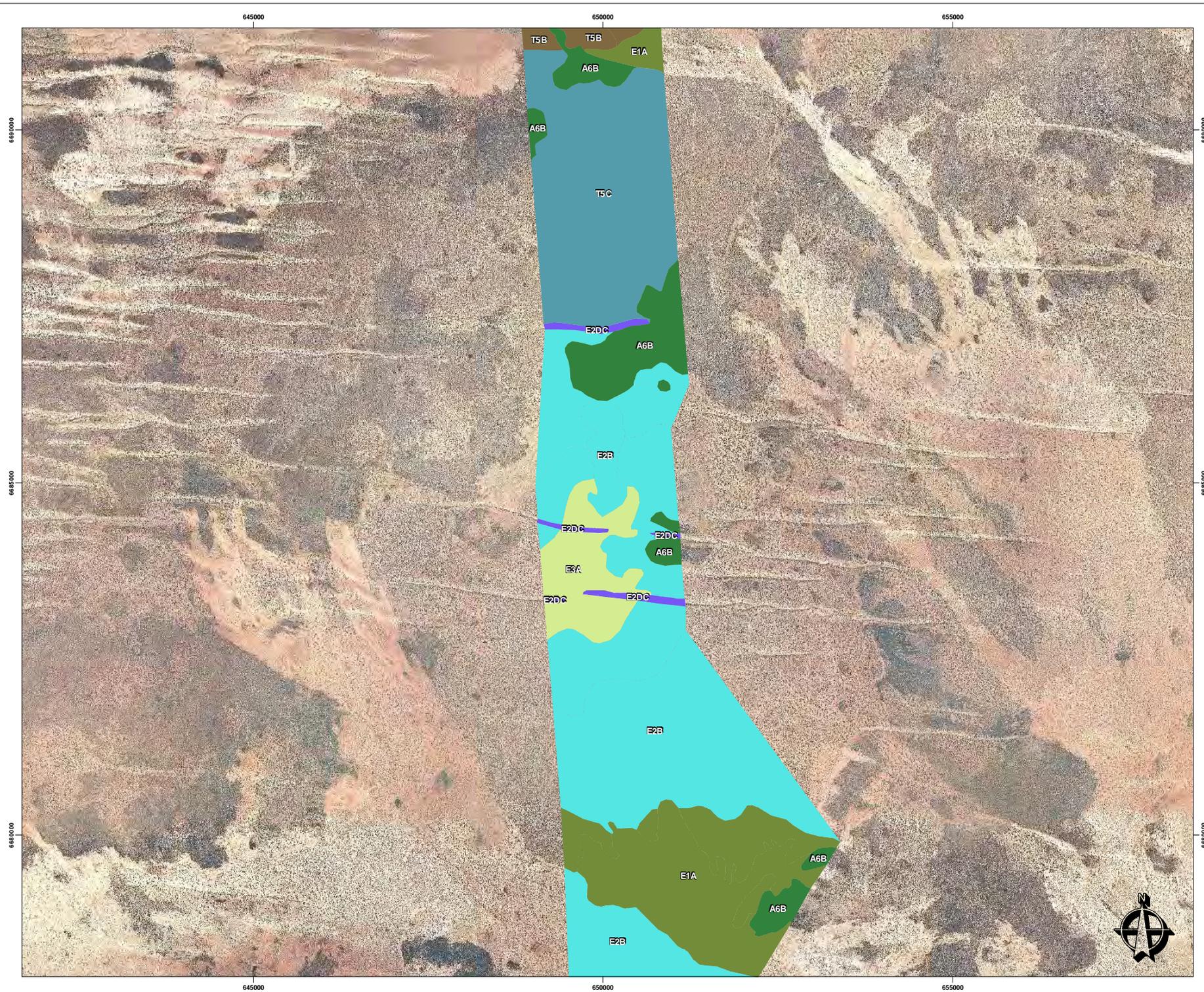
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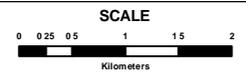


- Legend**
- Vegetation Communities**
- E1A
 - E2B
 - E2DC
 - T3A
 - T5B
 - T5C
 - A6B

Refer to page 6-103 for vegetation description

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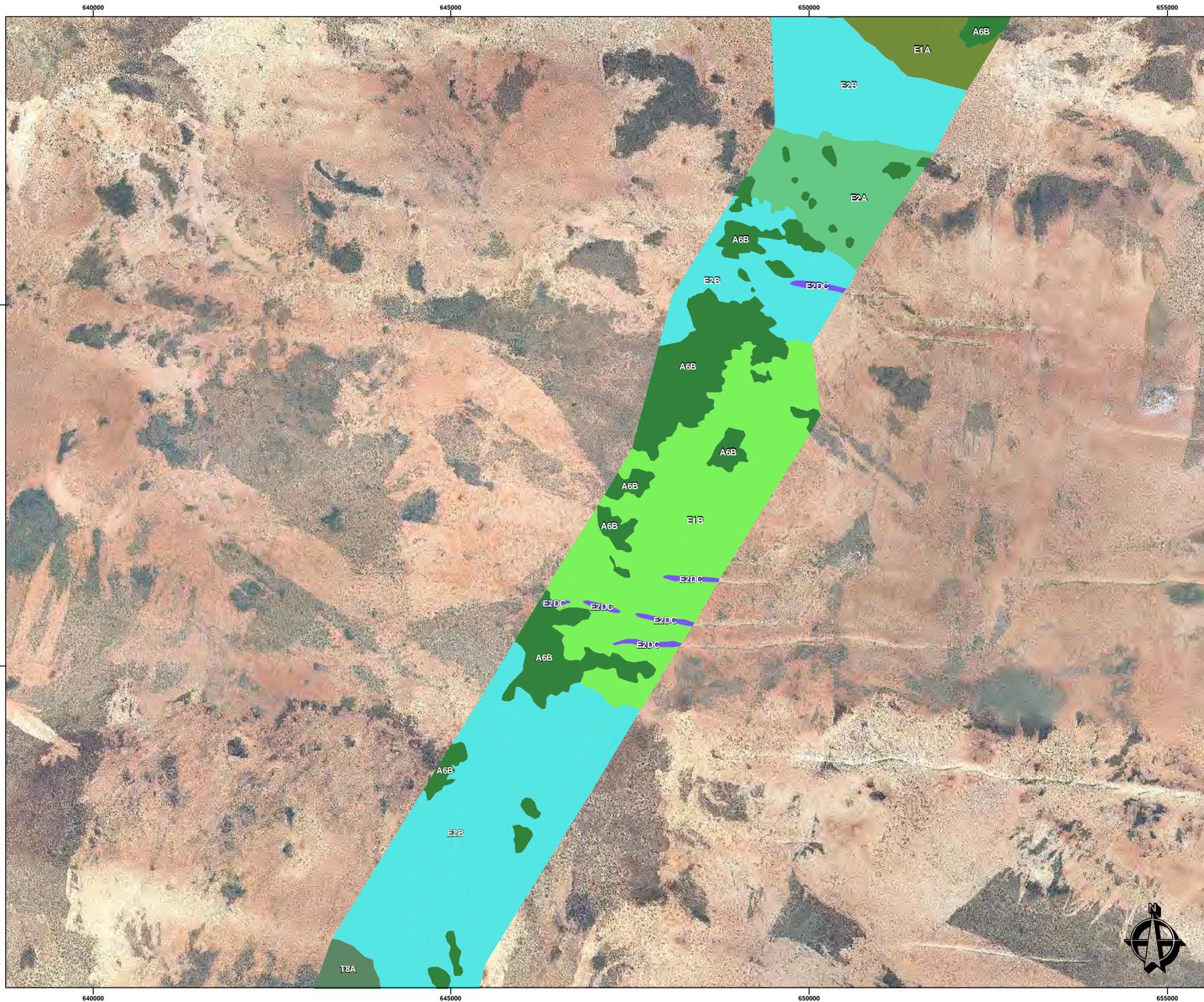
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Legend

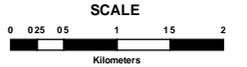
Vegetation Communities

- E1A
- E1B
- E2A
- E2B
- E2DC
- A6A
- T8A

Refer to page 6-103 for vegetation description

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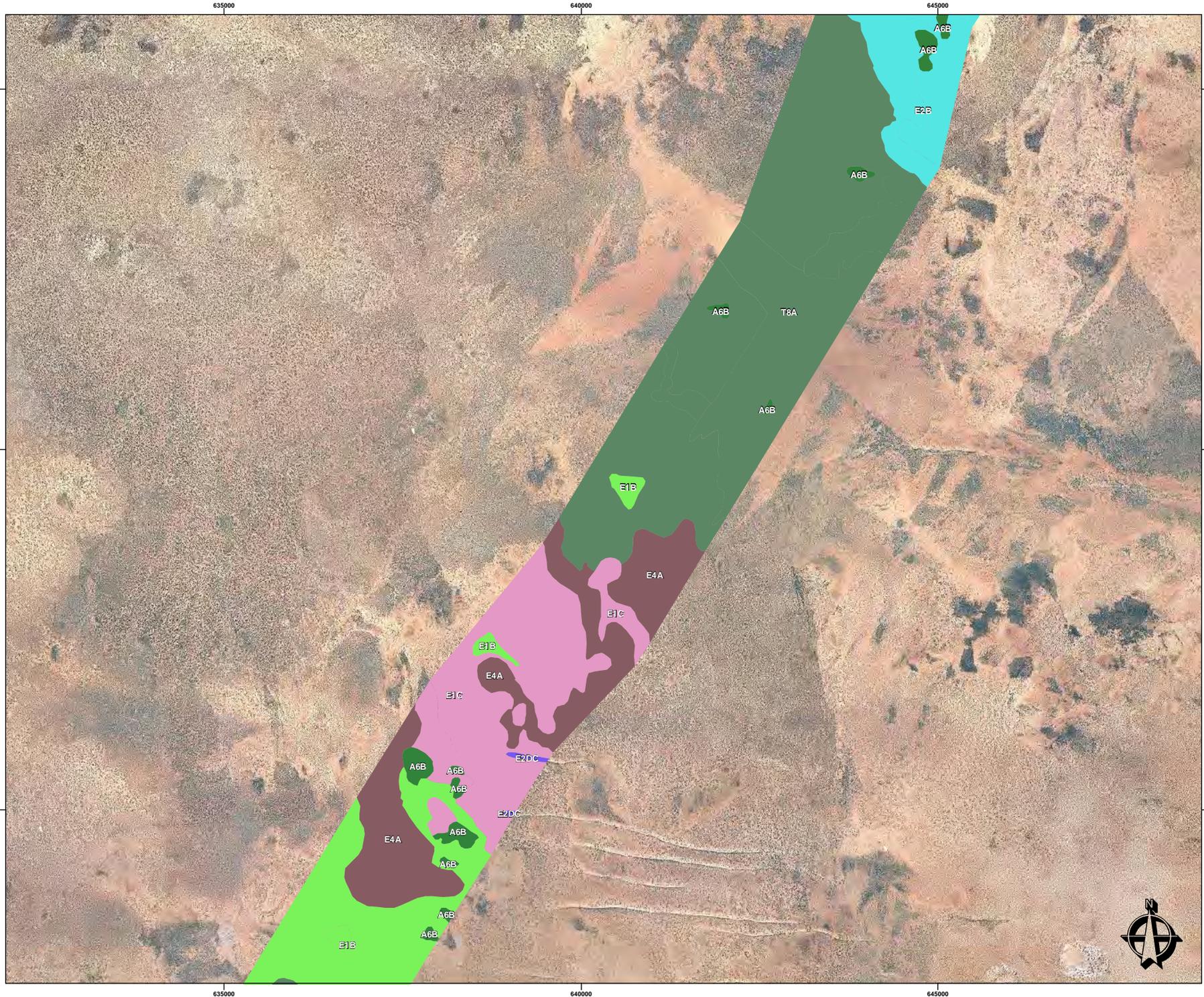
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 Figure 6.19g



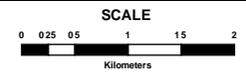


- Legend**
- Vegetation Communities**
- E1B
 - E1C
 - E2B
 - E2DC
 - E4A
 - AB
 - T8A

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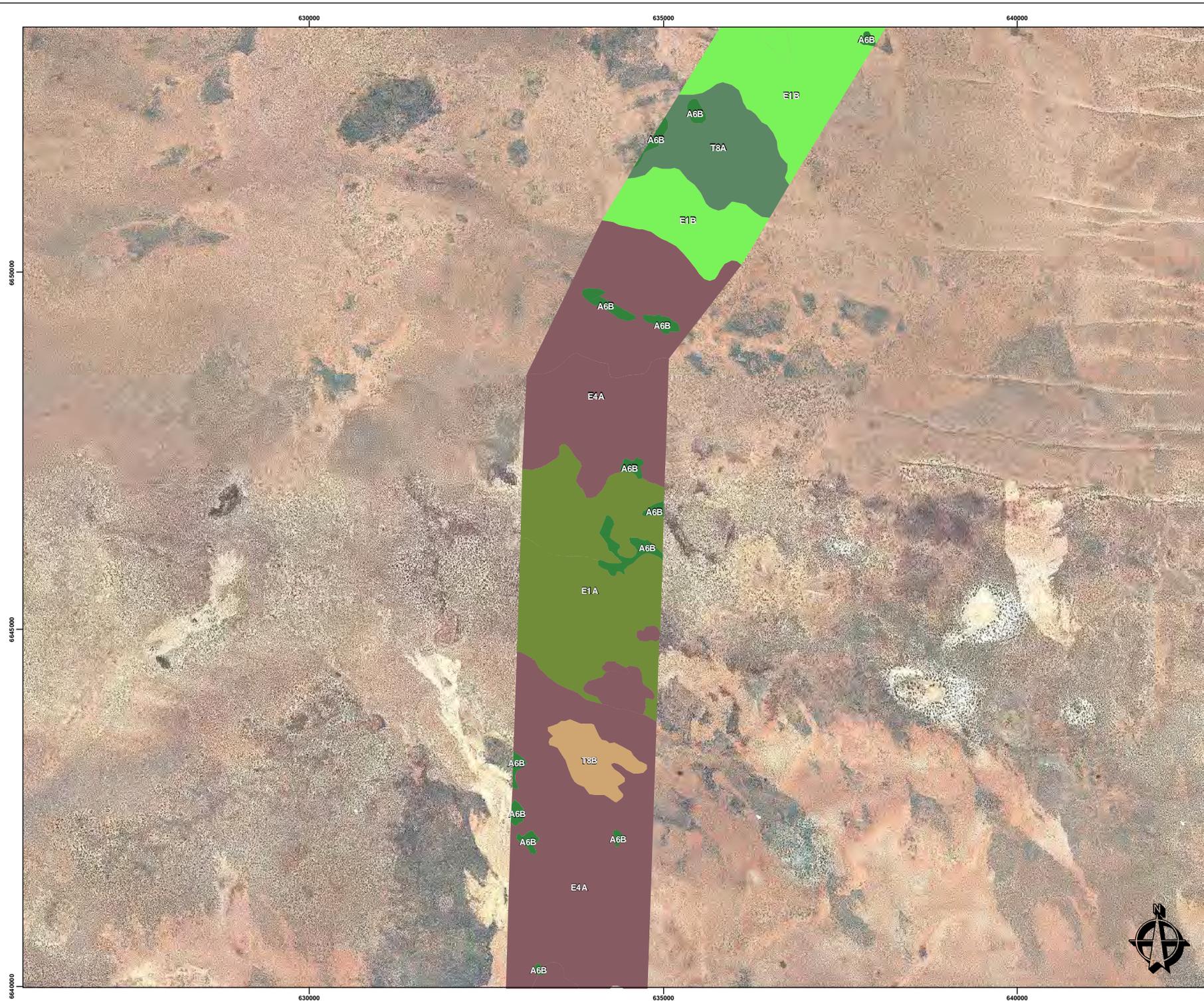
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 Figure 6.19h





- Legend**
- Vegetation Communities**
- E1A
 - E1B
 - E4A
 - A6B
 - T8A
 - T8B

Refer to page 6-103 for
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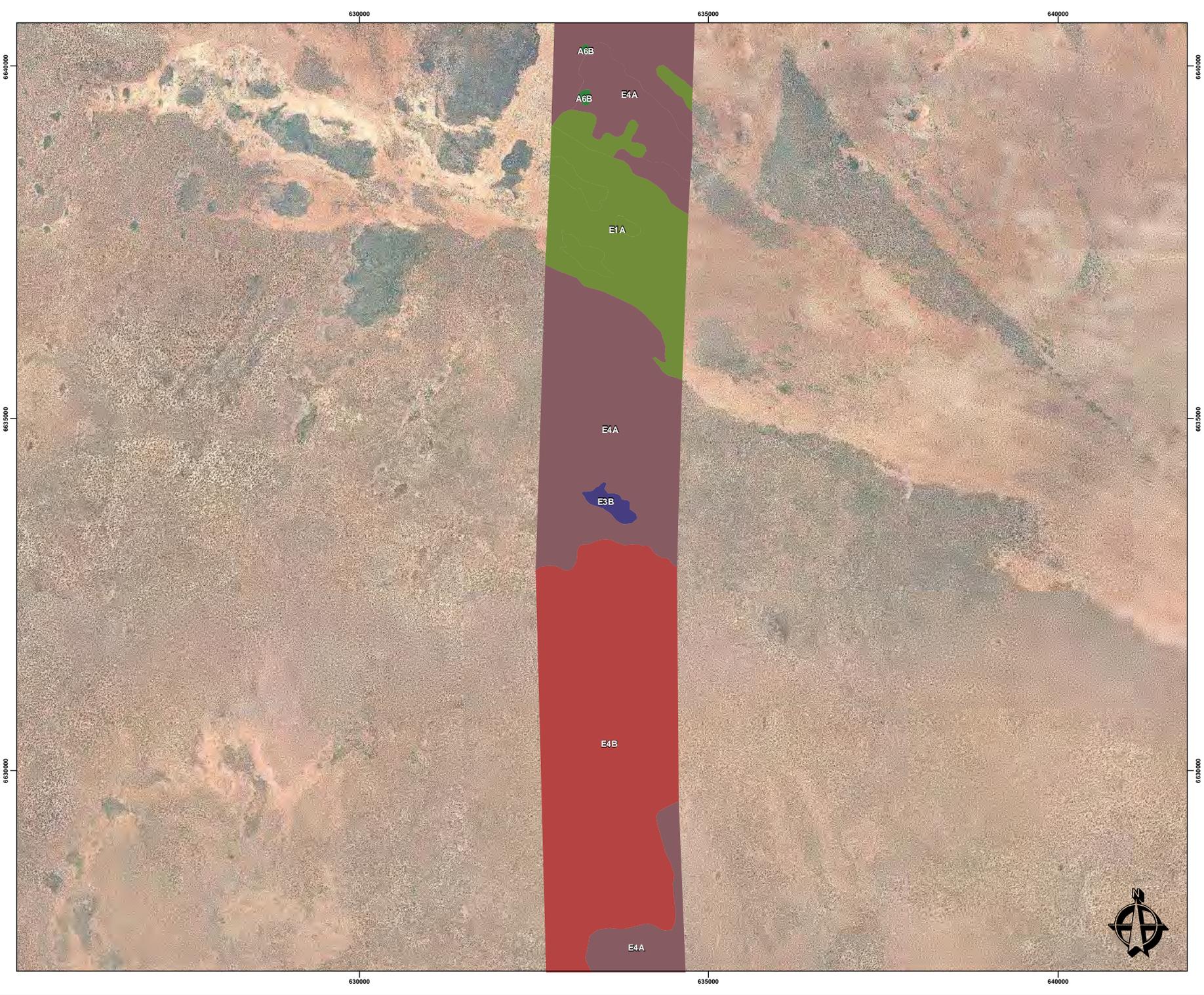
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Figure 6.191



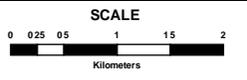


- Legend**
- Vegetation Communities**
- E1A
 - E3B
 - E4A
 - E4B
 - A6B

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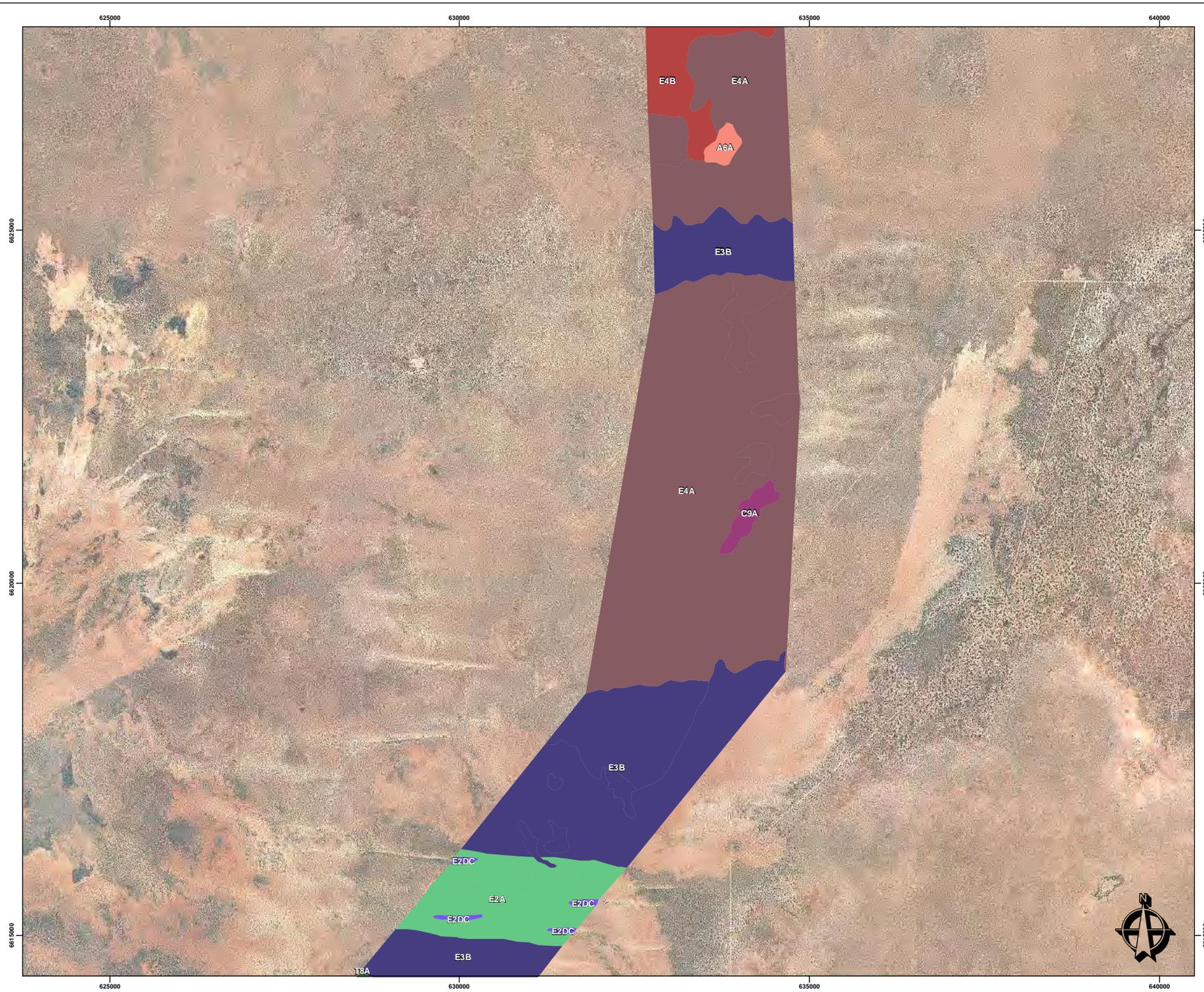
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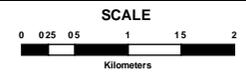


- Legend**
- Vegetation Communities**
- E2A
 - E2DC
 - E3B
 - E4A
 - E4B
 - A6A
 - T8A
 - C9A

Refer to page 6-103 for vegetation description

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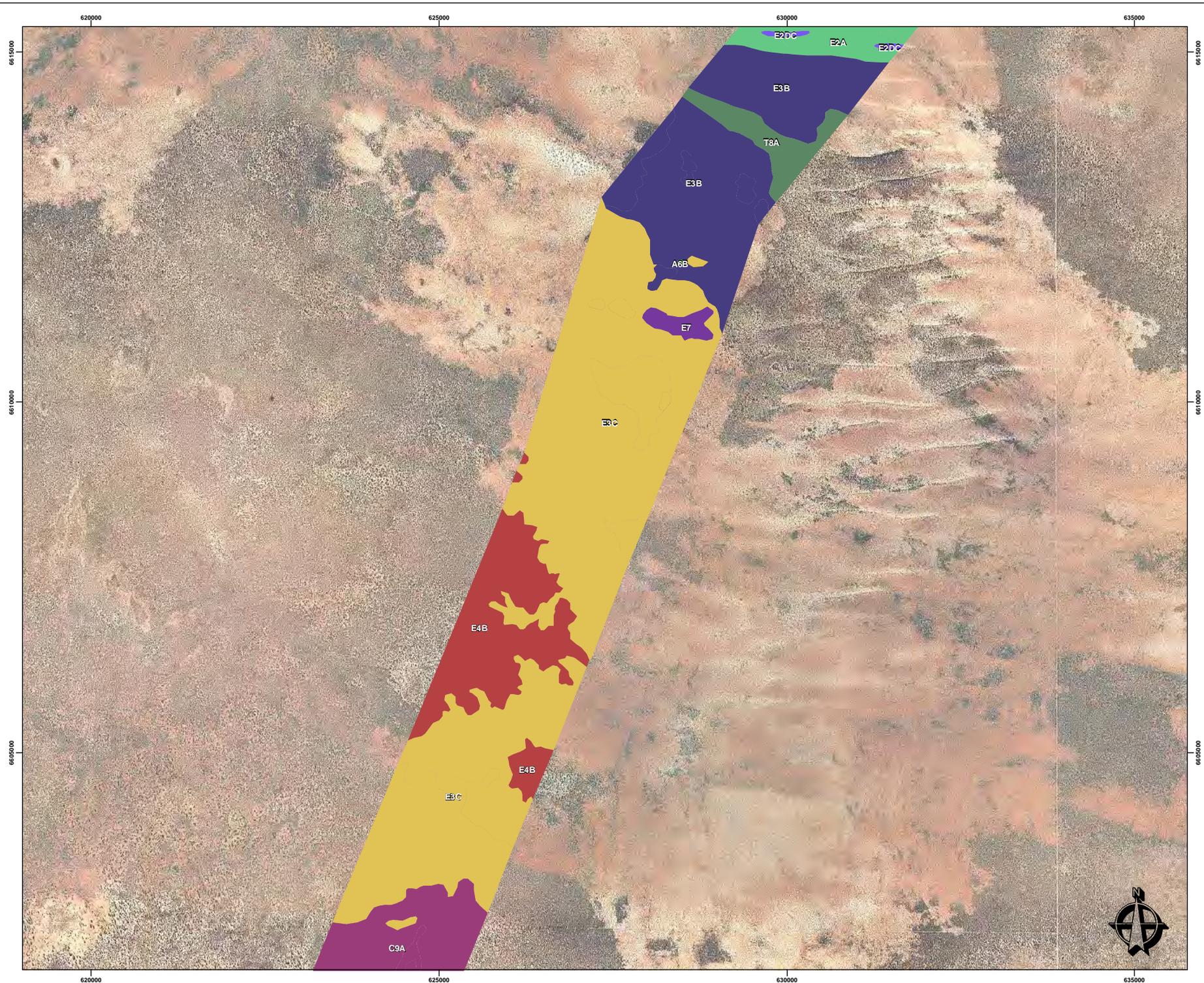


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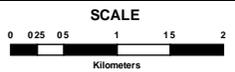


- Legend**
- Vegetation Communities**
- E2A
 - E2DC
 - E3B
 - E3C
 - E4B
 - A6B
 - A6A
 - E7
 - T8A
 - C9A

Refer to page 6-103 for vegetation description

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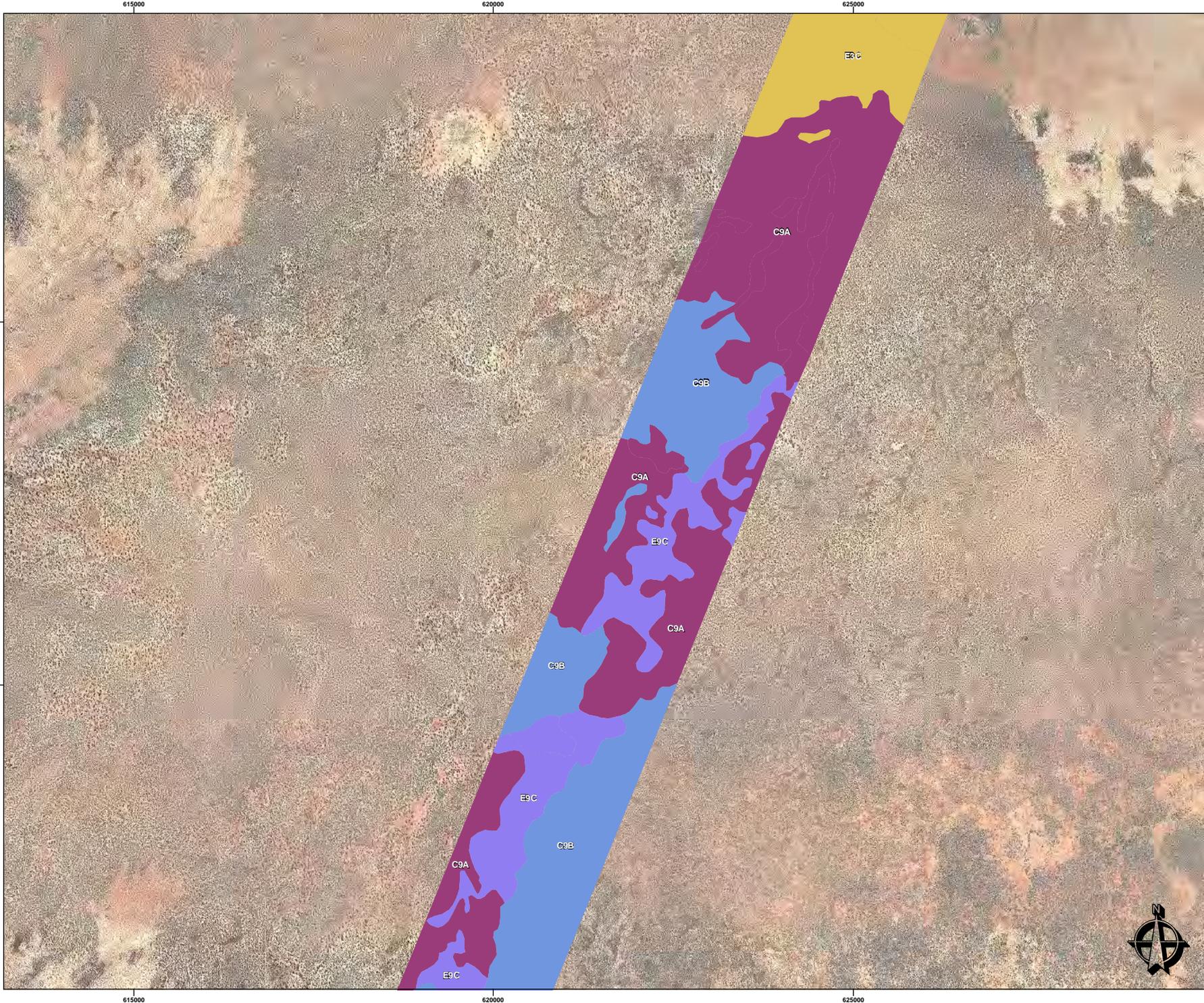
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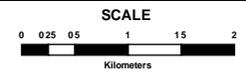


- Legend**
- Vegetation Communities**
- E3C
 - E4A
 - C9A
 - C9B
 - C9C

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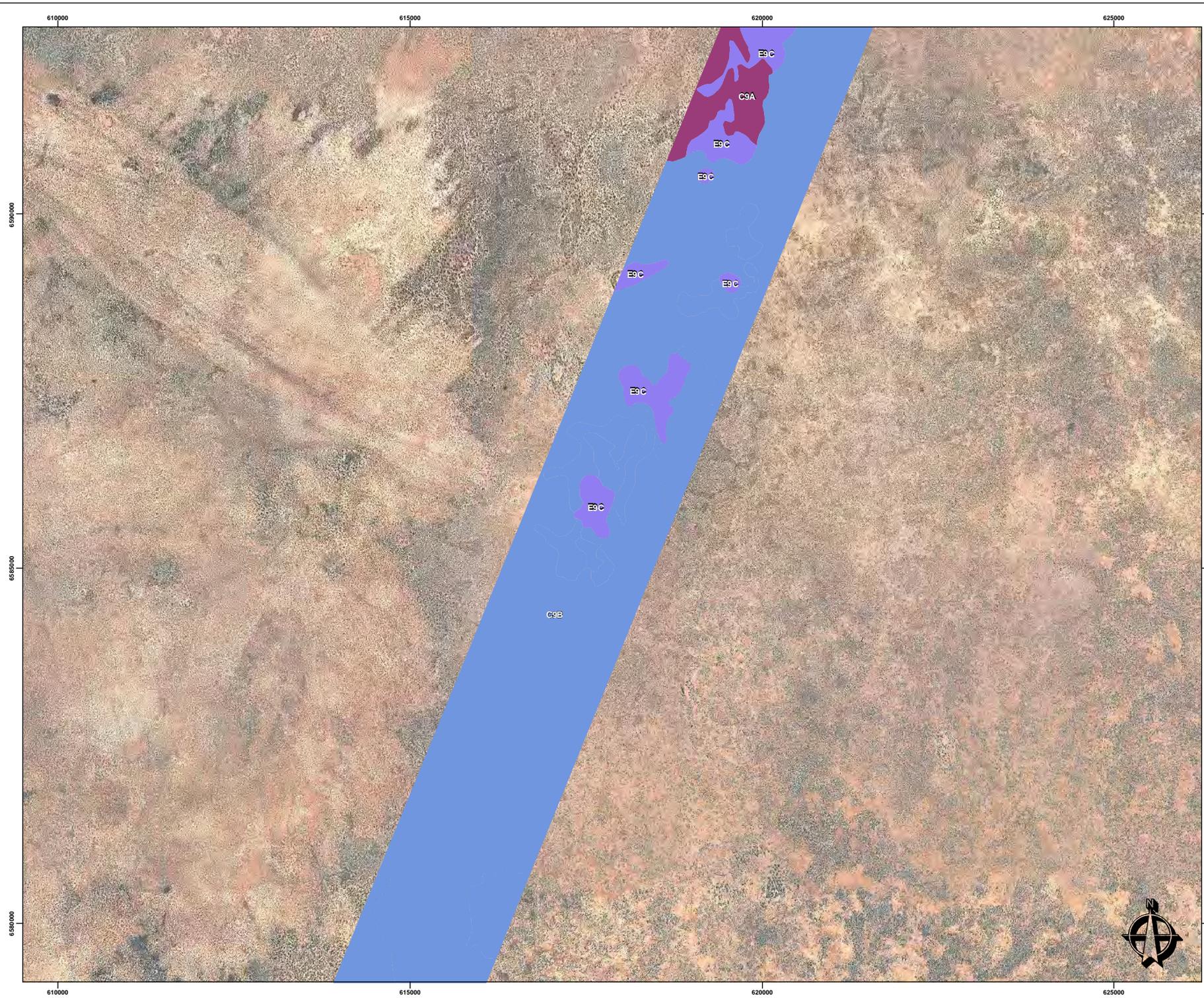
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Legend

Vegetation Communities

- C9A
- C9B
- C9C

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SCALE



LOCALITY MAP



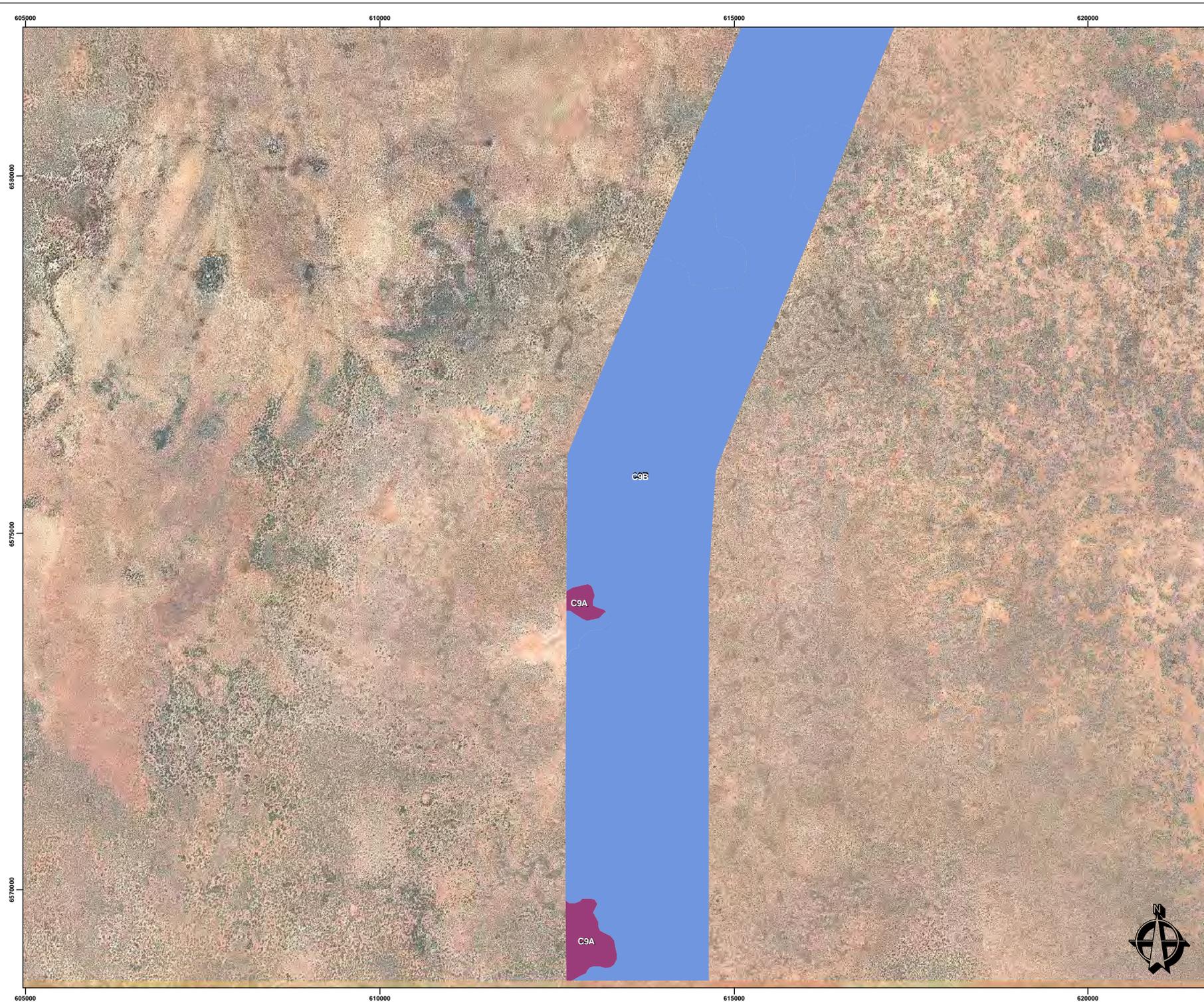
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Legend

Vegetation Communities

- C9A
- C9B

Refer to page 6-103 for vegetation description

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 Figure 6.19a



Flora

The *ecologia* survey identified 417 flora taxa comprising 52 families, 142 genera and 372 confirmed species in the TT corridor. The most diverse families were: Myrtaceae (43 taxa), Mimosaceae (34 taxa), Poaceae (29 taxa), Chenopodiaceae (26 taxa) and Myoporaceae (25 taxa). The most diverse genera were *Acacia* (34 taxa), *Eucalyptus* (29 taxa) and *Eremophila* (24 taxa). Two of the specimens were identified to family only, 10 to genus only, one to a query genus and 32 to queried species. One specimen could not be identified. More than 1500 collections were made during the survey. Of the 417 flora taxa 89% of these were determined to species or sub-species level.

As was the case in the Operational Area survey, the collections which could not be identified beyond genus level or were identified to species level with some uncertainty within the TT Corridor (47 collections) were not fully identified due to a lack of flowering material (see section for further discussion). Further investigation of these specimens is considered unlikely to provide a conclusive identification. In order to evaluate the possibility that some of the sterile collections may be taxa not recorded elsewhere during the survey areas and potentially of conservation significance, a review of all taxa within these genera that have been previously recorded within the Nullabor, Coolgardie and Great Victoria Desert Regions was conducted. The probability that the unidentified collections are DRF or Priority taxa has been evaluated based on the known distribution and habitat preferences of each taxon and is considered to be low (*ecologia* pers. comm. to B.Bastow 3 July 2009).

Listed Species

A search of the WA Herbarium and DEC flora database identified the potential for one DRF and 16 Priority Flora species could occur along the corridor. The survey found 14 priority flora species within the 43,000 ha corridor (Figure 6.20a and Table 6.10).

Table 6.10: Flora Species of Conservation Interest observed within the Tropicana-Transline Survey Corridor

Species	Conservation Status
<i>Dampiera eriantha</i>	P1
<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	P2
<i>Dicrastylis nicholasii</i>	P2
<i>Grevillea secunda</i>	P2
<i>Isotropis ?canescens</i>	P2
<i>Malleostemon</i> sp. Officer Basin	P2
<i>Olearia arida</i>	P2
<i>Physopsis chrysotricha</i>	P2
<i>Dicrastylis cundeeleensis</i>	P3
<i>Microcorys macredieana</i>	P3
<i>Micromyrtus stenocalyx</i>	P3
<i>Comesperma viscidulum</i>	P4
<i>Daviesia purpurascens</i>	P4
<i>Lepidobolus deserti</i>	P4

Flora Species of Conservation Interest

Other species of conservation significance recorded during *ecologia* surveys include:

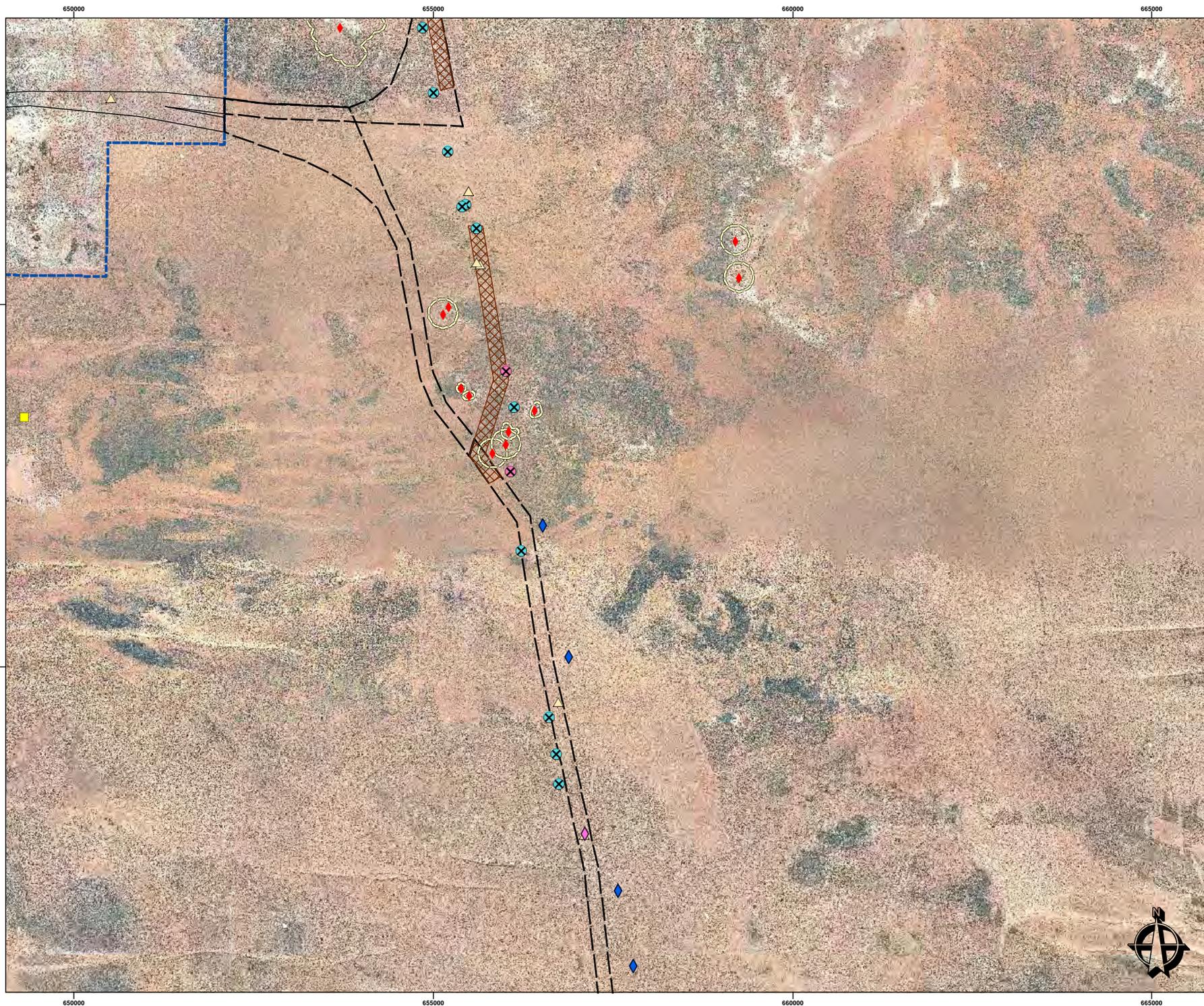
- a previously undescribed taxon – *Caesia talinyka*, specimens of this species have previously been identified as *Caesia rigidifolia* (P1) and is likely to be listed as a Priority taxon; and,
- range extensions – *Allocasuarina campestris*, *Adriana urticoides* var. *hookeri*, *Eucalyptus intertexta* and *Swainsona colutoides*; no previous record of these species occur in these bioregions.

Two unconfirmed species were recorded during the survey – *Psyrax ?ammophila* and *Solanum ?chippendalei*. If confirmed, these would represent large range extensions.

Section 7.2.2 provides specific information on the level of impact on the listed species located within the actual infrastructure corridor. The corridor has been designed to avoid crossing over dunes which appear to be the preferred habitat of many of the Listed and conservation interest species.

Introduced Species

One introduced (weed) species, *Carrichtera annua* (Ward's weed) was recorded during the survey from three sites.



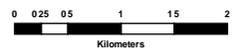
Legend

- ◆ Heritage Site
- Heritage Site Buffer
- Listed Flora**
- Daviesia purpurascens*
- ▲ *Dicrastylis nicholasii*
- ◆ *Microcorys macrediana*
- ◆ *Olearia arida*
- Listed Terrestrial Fauna Habitat**
- ✕ Mulgara
- ✕ Regent Parrots
- Listed Terrestrial Fauna Habitat
- Conceptual Corridor
- Granted Tenure
- Operational Area
- (No listed terrestrial fauna)

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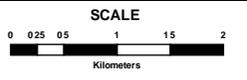
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 Flora and Fauna Values and Indigenous
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 Figure 6.20a





- Legend**
- Listed Flora**
- *Baeckea* sp. Great Victoria Desert
 - *Conospermum toddii*
 - *Dicrastylis cundeeleensis*
 - △ *Dicrastylis nicholasii*
 - ▲ *Grevillea secunda*
 - ◆ *Microcorys macredleiana*
 - ◇ *Olearia arida*
- Listed Terrestrial Fauna**
- ✕ Malleefowl (Inactive Mound)
 - ▨ Listed Terrestrial Fauna Habitat
- Existing Roads and Tracks**
- Gravel Road
 - Track
 - Granted Tenure
- (No heritage sites)

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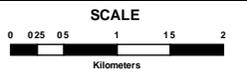
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- Legend**
- ◆ Heritage Site
 - ▭ Heritage Site Buffer
 - Listed Flora**
 - *Baeckea* sp. Great Victoria Desert
 - *Dicrasylis cundeeleensis*
 - ▲ *Dicrasylis nicholasii*
 - ◆ *Microcorys macrediana*
 - ◇ *Olearia arida*
 - Listed Terrestrial Fauna**
 - ✕ Malleefowl (Tracks & Inactive Mound)
 - Listed Terrestrial Fauna Habitat**
 - ✕ Malleefowl
 - ✕ Mulgara
 - ✕ Regent Parrots
 - ✕ Marsupial Mole
 - ✕ Listed Terrestrial Fauna Habitat
 - ▭ Granted Tenure

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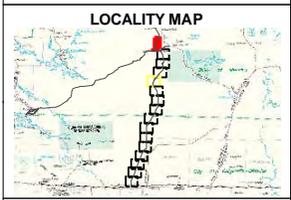
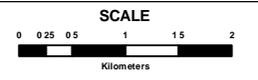




- Legend**
- Listed Flora**
- *Baeckea* sp. Great Victoria Desert
 - *Conospermum toddii*
 - *Daviesia purpurascens*
 - *Dicrastylis cundeeleensis*
 - ▲ *Dicrastylis nicholasii*
 - ▲ *Grevillea secunda*
 - ▲ *Lepidobolus deserti*
 - ◆ *Malleostemon* sp. Officer Basin
 - ◆ *Microcorys macredieana*
 - ◆ *Micromyrtus stenocalyx*
- Listed Terrestrial Fauna Habitat**
- ⊗ Regent Parrots
 - Granted Tenure
- (No heritage sites or listed terrestrial fauna)

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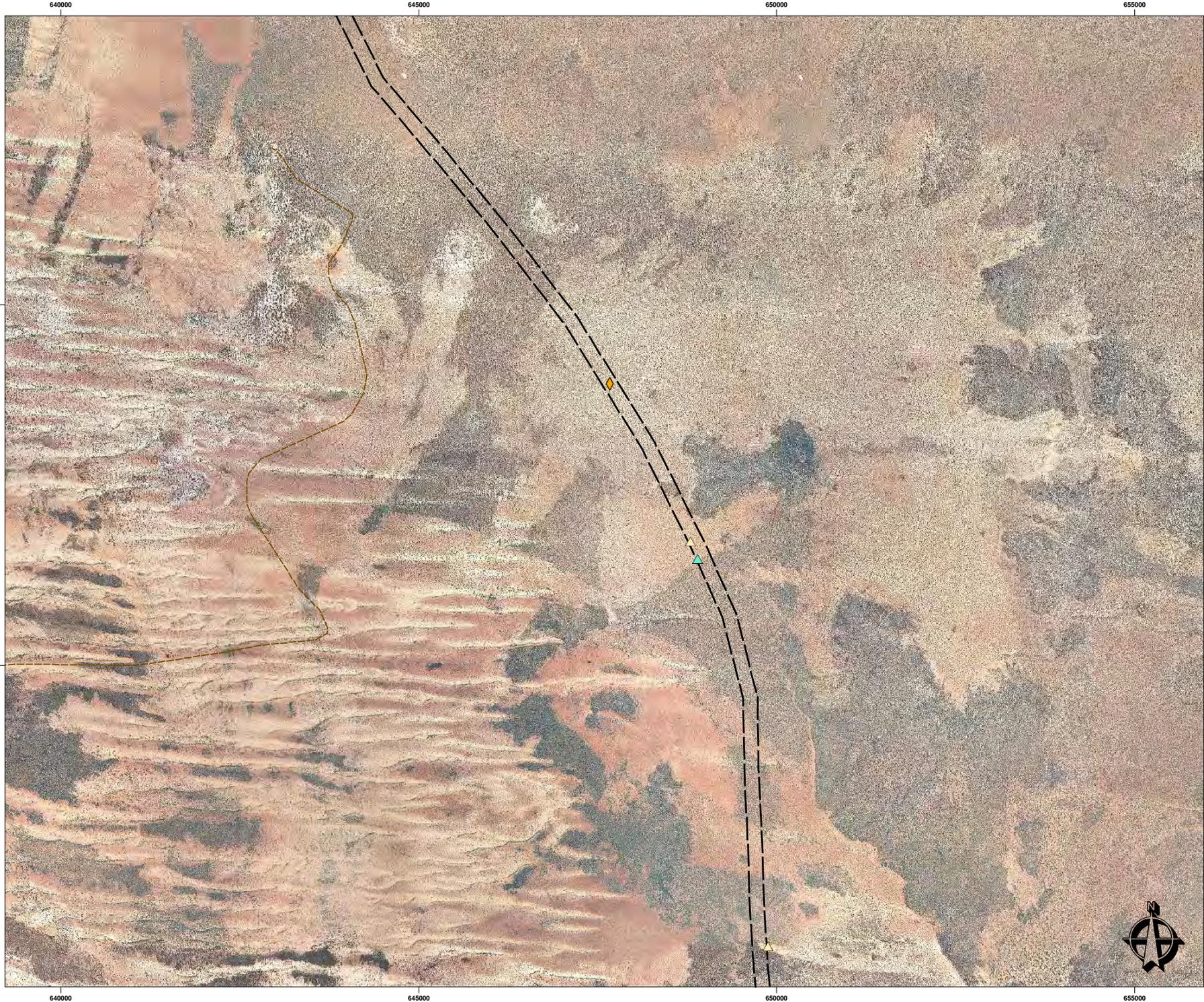
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Figure 6.20d



Legend

Listed Flora

-  *Dicrasyllis nicholasii*
-  *Lepidobolus deserti*
-  *Physopsis chrysotricha*

Existing Roads and Tracks

-  Gravel Road
-  Track
-  Granted Tenure

(No heritage sites, listed terrestrial fauna habitats or listed terrestrial fauna)

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Legend

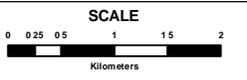
- Listed Flora**
- *Baeckea* sp. Great Victoria Desert
 - *Caesia talingka* C. Tauss ms
 - *Dampiera eriantha*
 - *Dicrastylis cundeeleensis*
 - ▲ *Dicrastylis nicholasii*
 - ▲ *Grevillea secunda*
 - ▲ *Lepidobolus deserti*
 - ◆ *Malleostemon* sp. Officer Basin
 - ◆ *Microcorys macrediana*
 - ◆ *Micromyrtus stenocalyx*
 - ◆ *Olearia arida*

- Listed Terrestrial Fauna**
- ✕ Malleefowl (Inactive Mound)
 - ✕ Marsupial Mole (Holes)

▨ Listed Terrestrial Fauna Habitat

- Existing Roads and Tracks**
- Gravel Road
 - Track
 - ▭ Granted Tenure (No heritage sites)

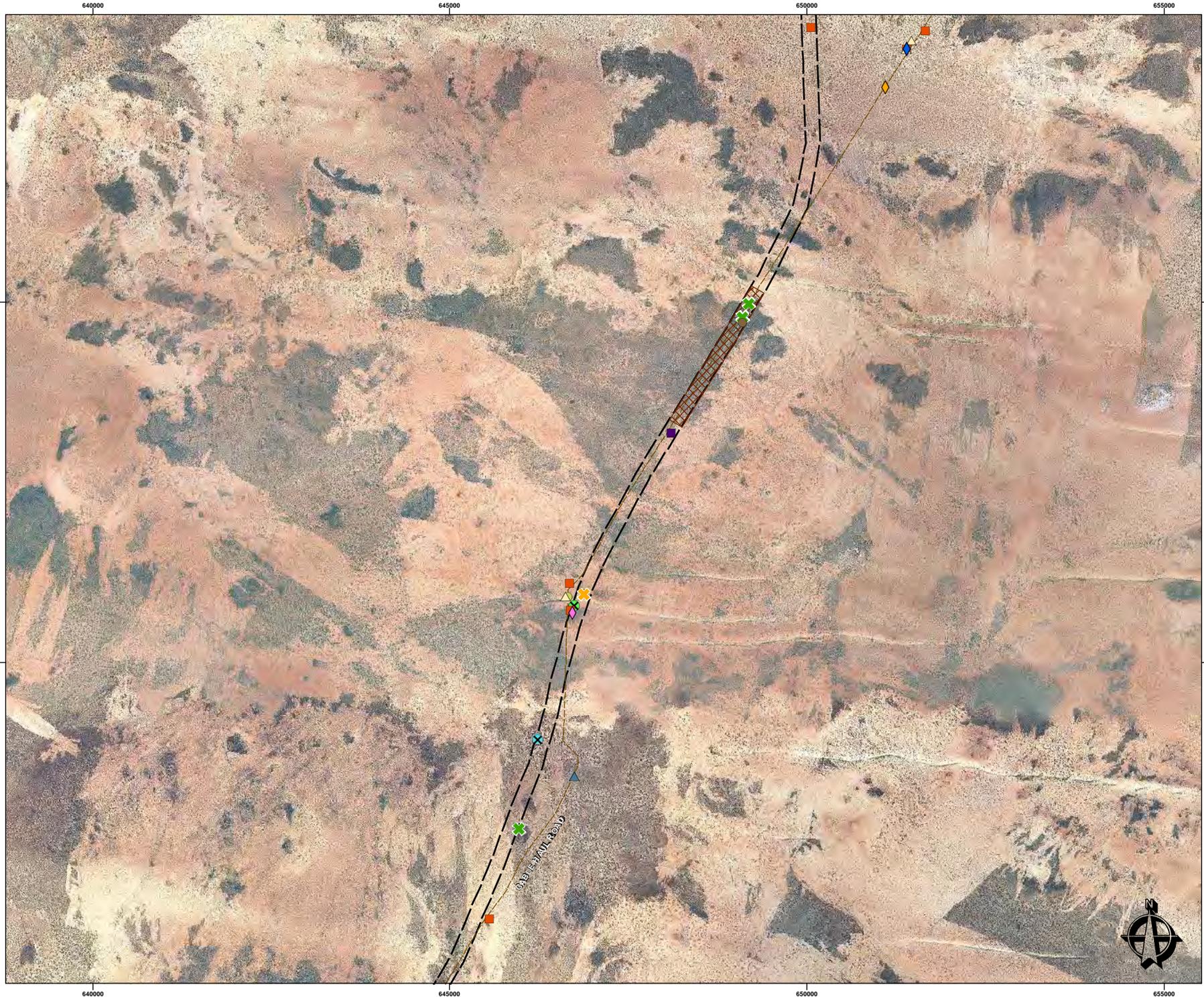
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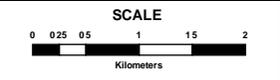
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- Legend**
- Listed Flora**
- *Baeckea* sp. Great Victoria Desert
 - *Caesia talingka* C. Tauss ms
 - *Comesperma viscidulum*
 - *Dicrastylis cundeeleensis*
 - ▲ *Dicrastylis nicholasii*
 - ▲ *Grevillea secunda*
 - ◆ *Microcorys macredleana*
 - ◇ *Olearia arida*
 - ◇ *Physopsis chrysostricha*
- Listed Terrestrial Fauna**
- ✕ Malleefowl (Inactive Mound)
 - ✕ Marsupial Mole (Holes)
- Listed Terrestrial Fauna Habitat**
- ✕ Regent Parrots
 - ✕ Marsupial Mole
 - ✕✕ Listed Terrestrial Fauna Habitat
- Existing Roads and Tracks**
- Gravel Road
 - Track
 - ▭ Granted Tenure (No heritage sites)

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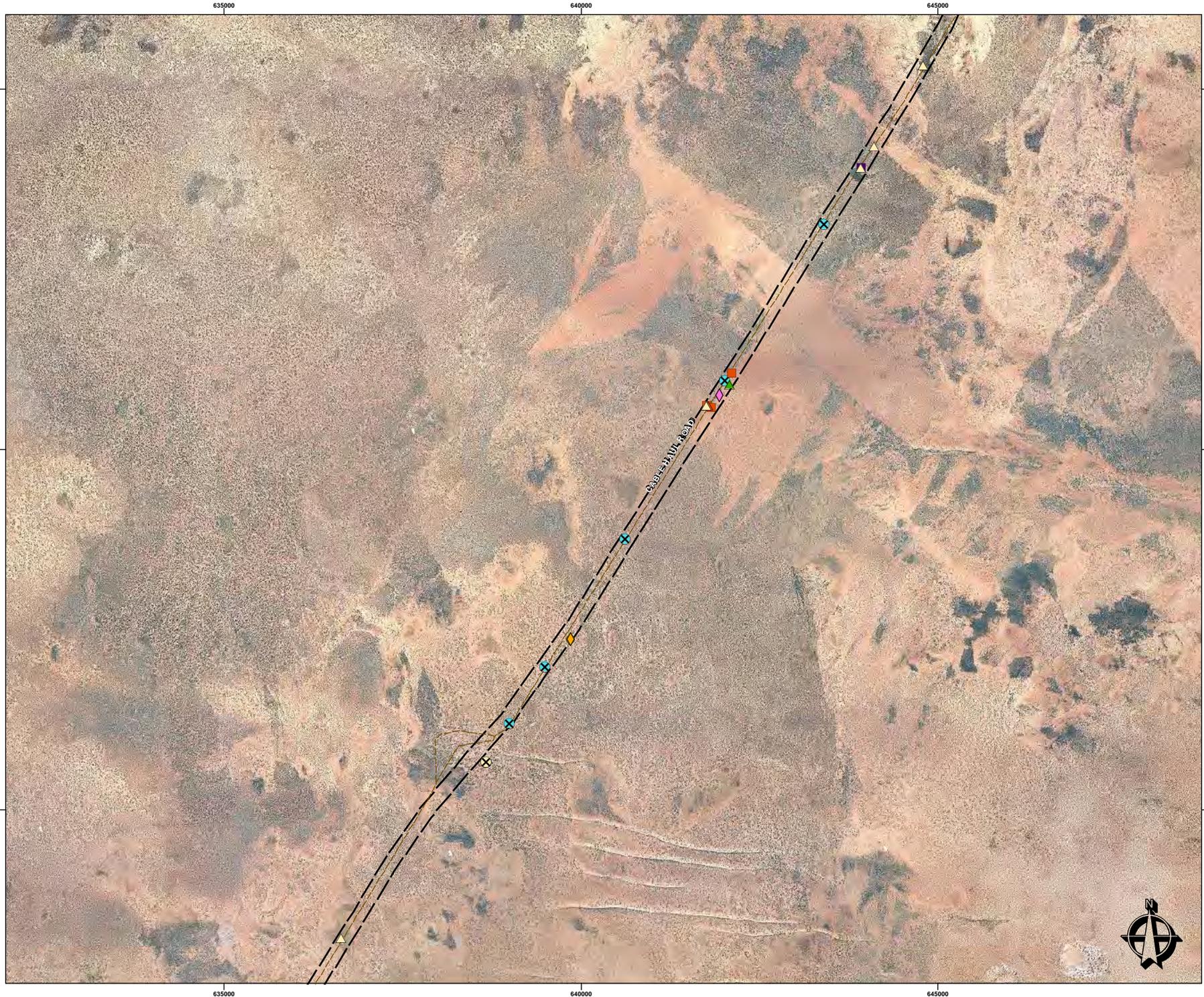
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Legend

Listed Flora

- *Baeckea* sp. Great Victoria Desert
- *Comeosperma viscidulum*
- *Dicrastylis cundeeleensis*
- ▲ *Dicrastylis nicholasii*
- ▲ *Isotropis canescens*
- ▲ *Olearia arida*
- ◆ *Physopsis chrysostricha*

Listed Terrestrial Fauna Habitat

- ⊗ Regent Parrots
- ⊗ Sandhill Dunnart
- ⊗ Marsupial Mole

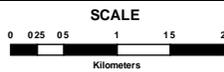
Existing Roads and Tracks

- Gravel Road
- Track
- Granted Tenure

(No heritage sites or listed terrestrial fauna)

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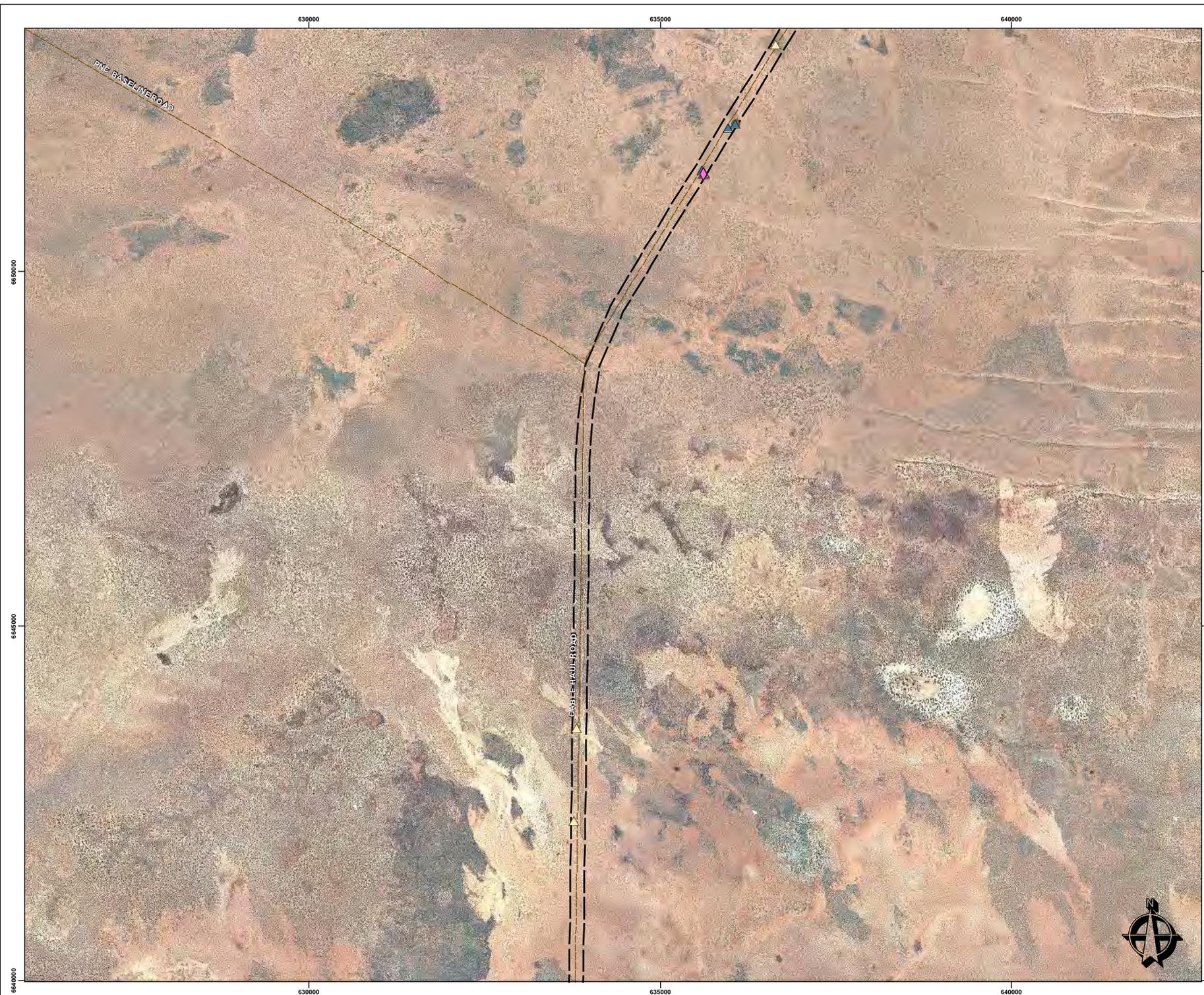
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Legend

Listed Flora

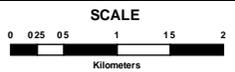
- *Baeckea* sp. Great Victoria Desert
- ▲ *Dicrastylis nicholasii*
- ▲ *Grevillea secunda*
- ◆ *Olearia arida*

Existing Roads and Tracks

- Gravel Road
 - - - Track
 - ▭ Granted Tenure
- (No heritage sites, listed terrestrial fauna habitats or listed terrestrial fauna)

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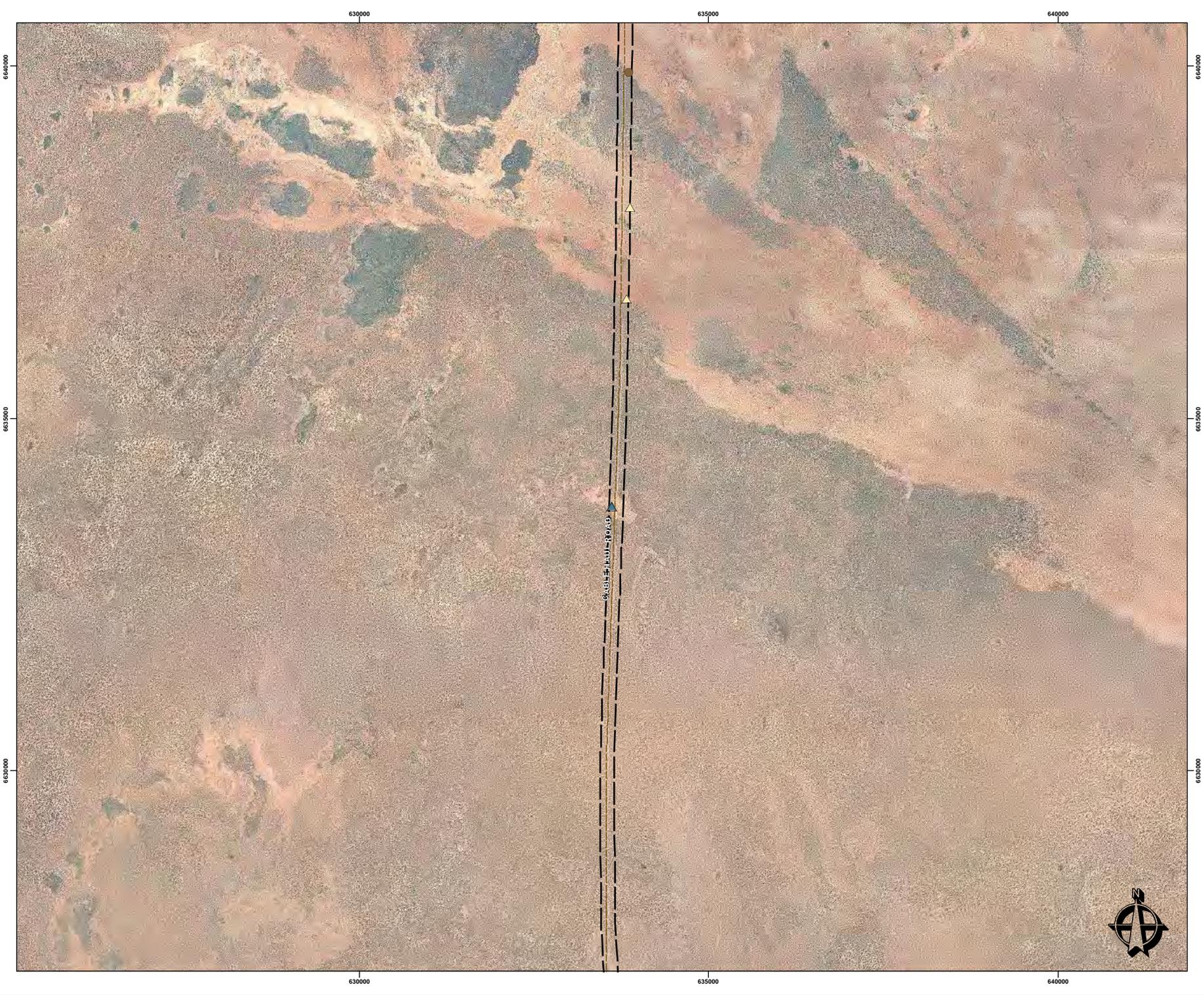
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664000

663500

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663500

663000

Legend

Listed Flora

- *Baeckea* sp. Great Victoria Desert
- ▲ *Dicrastylis nicholasii*
- ▲ *Grevillea secunda*

Existing Roads and Tracks

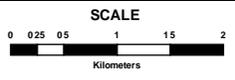
- Gravel Road
- - - Track

Granted Tenure

(No heritage sites, listed terrestrial fauna habitats or listed terrestrial fauna)

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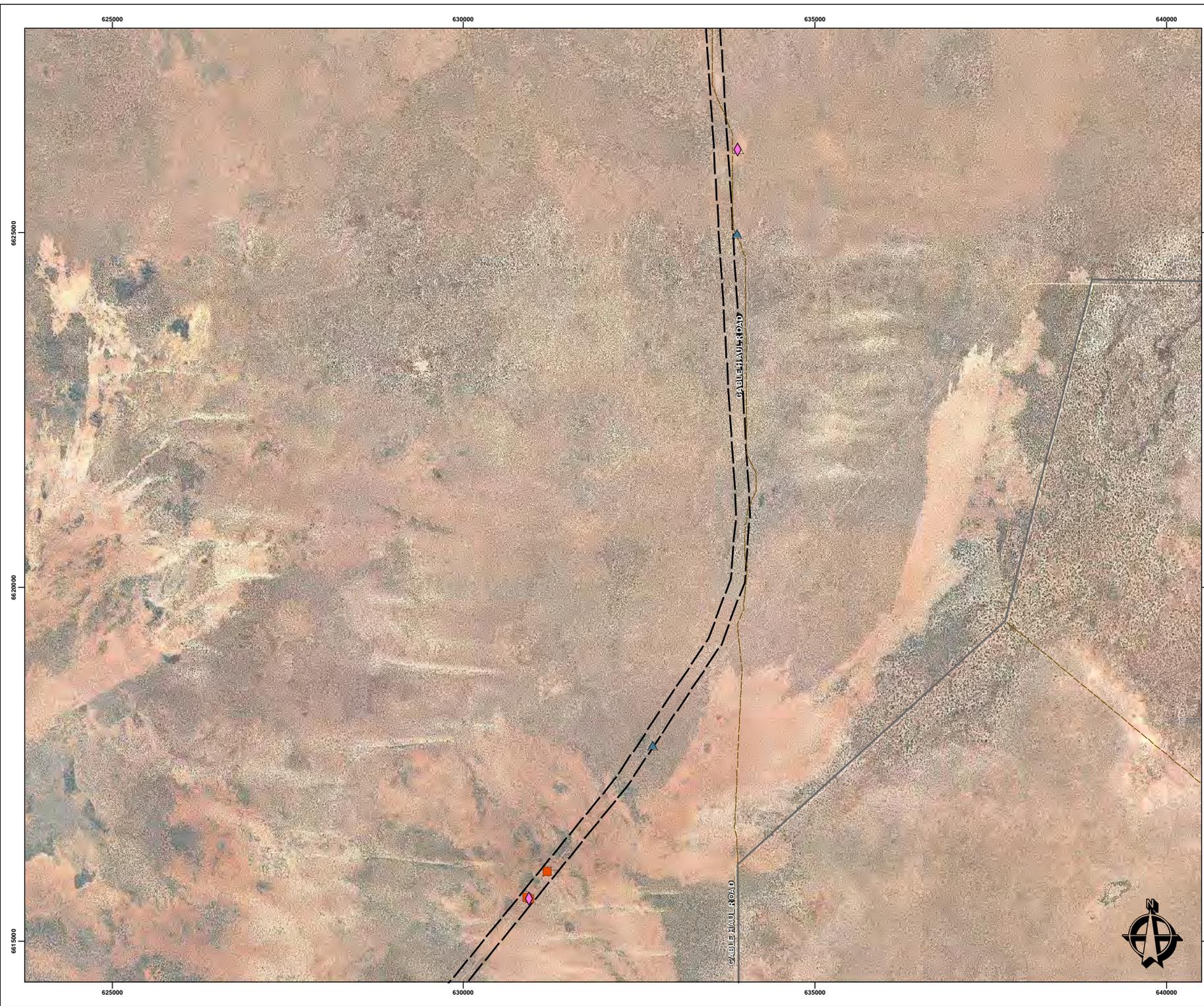
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Legend

Listed Flora

- *Dicrastylis cundeeleensis*
- ▲ *Dicrastylis nicholasii*
- ◆ *Grevillea secunda*
- ◆ *Olearia arida*

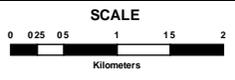
Existing Roads and Tracks

- Gravel Road
- Track
- Granted Tenure

(No heritage sites, listed terrestrial fauna habitats or listed terrestrial fauna)

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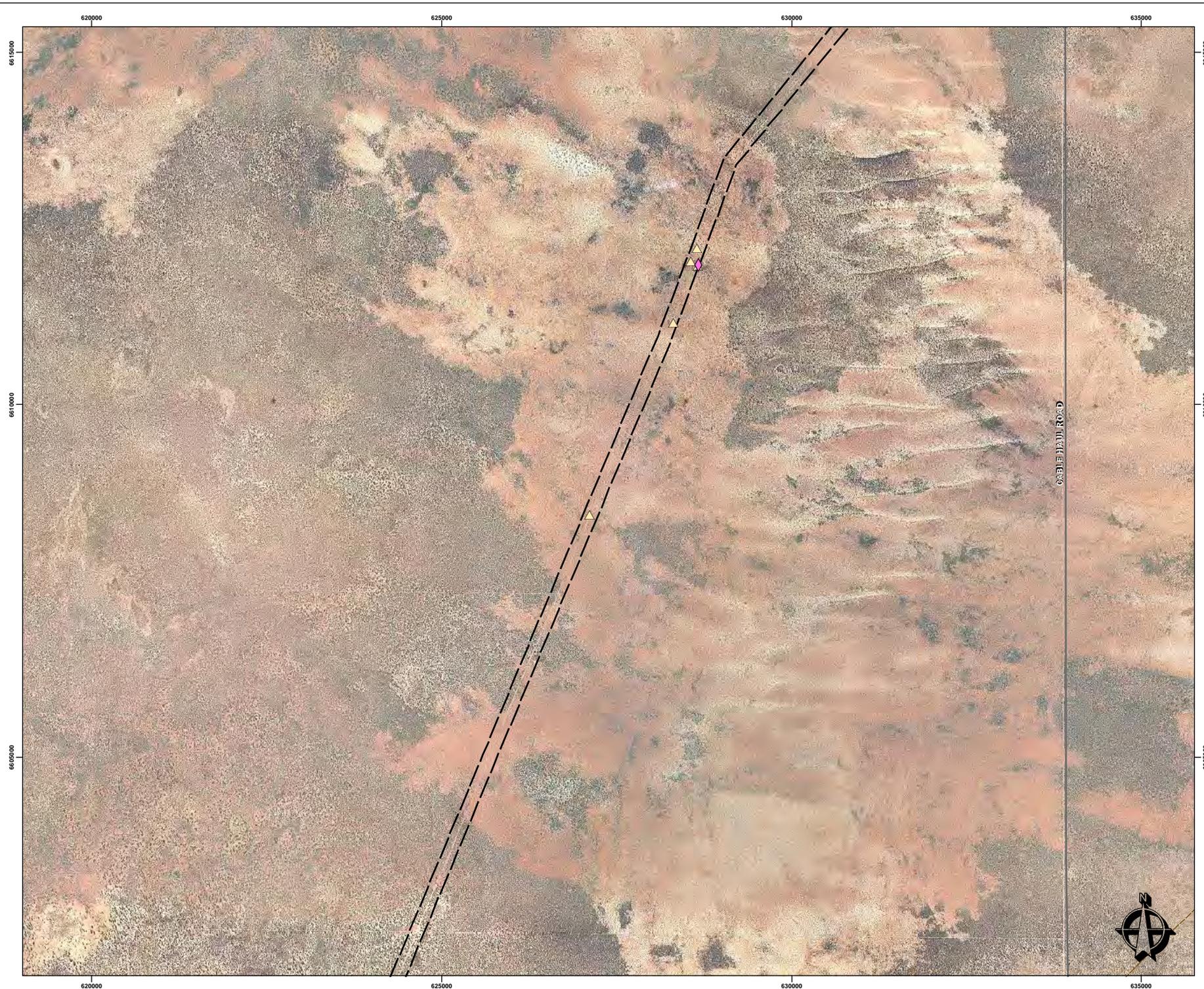
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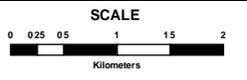


Legend

- Listed Flora**
- ▲ *Dicrastylis nicholasii*
 - ◆ *Olearia arida*
- Existing Roads and Tracks**
- Gravel Road
 - Track
 - Granted Tenure
- (No heritage sites, listed terrestrial fauna habitats or listed terrestrial fauna)

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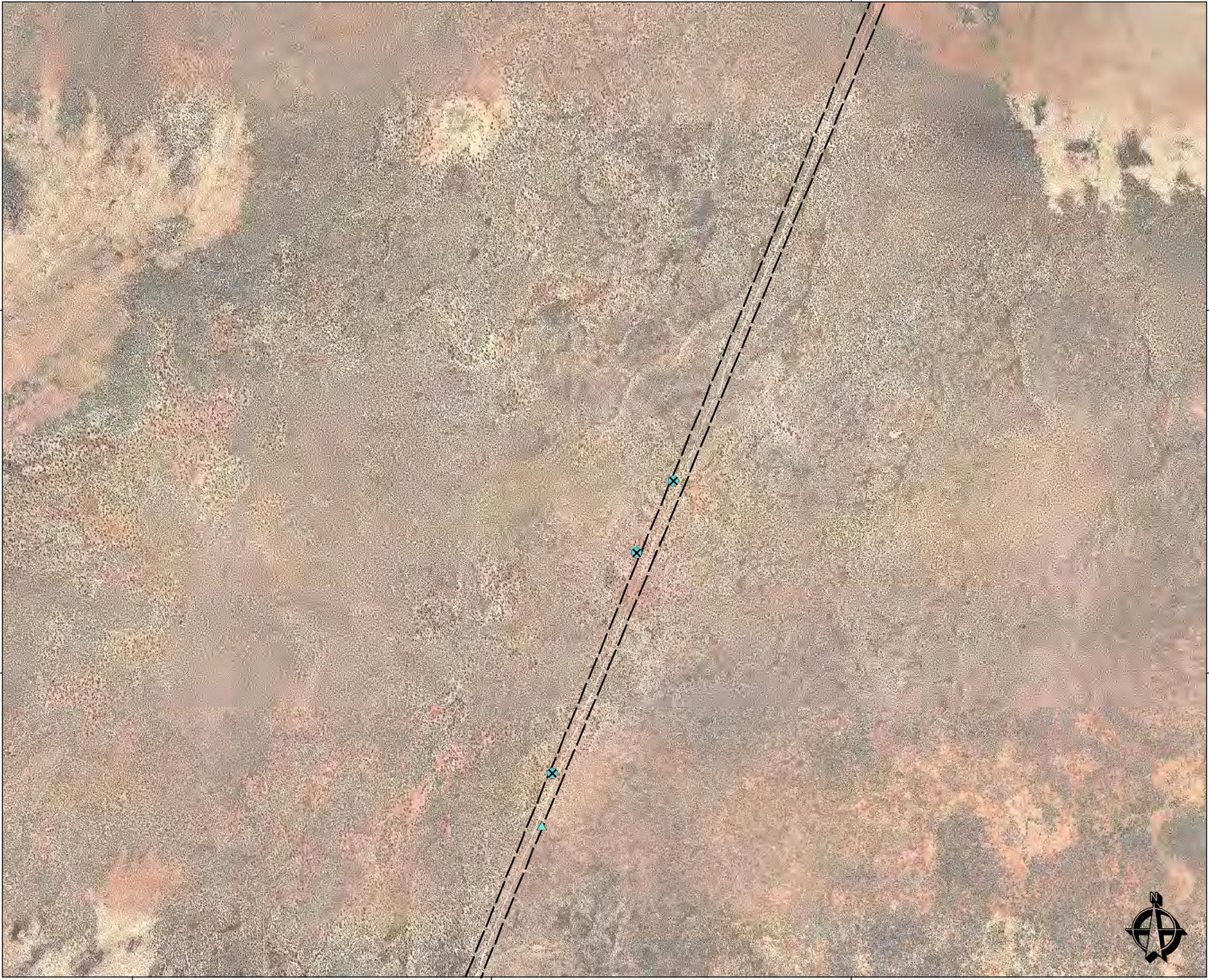


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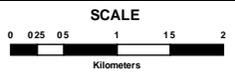


Legend

- Listed Flora**
- ▲ *Lepidobolus deserti*
- Listed Terrestrial Fauna Habitat**
- ✕ Regent Parrots
- Granted Tenure
- (No heritage sites or listed terrestrial fauna)

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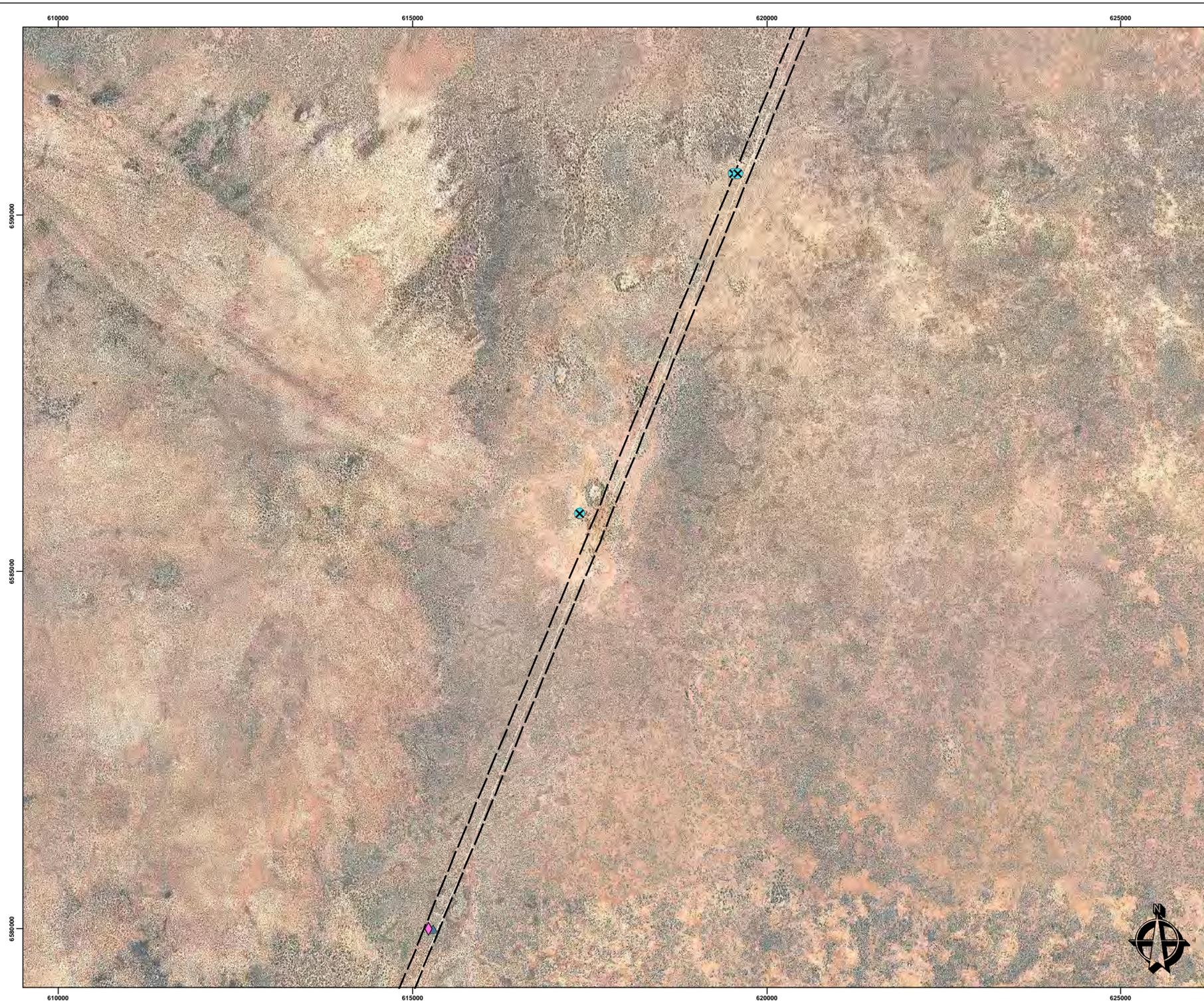
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Legend

Listed Flora

- ▲ *Grevillea secunda*
- ◆ *Olearia arida*

Listed Terrestrial Fauna Habitat

- ✕ Regent Parrots
- Granted Tenure

(No heritage sites or listed terrestrial fauna)

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SCALE



LOCALITY MAP



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Legend

Listed Flora

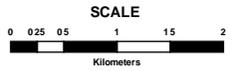
-  *Grevillea secunda*
-  *Olearia arida*

 Granted Tenure

(No heritage sites, listed terrestrial fauna habitats, sand ridges or listed terrestrial fauna)

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 Heritage of the TTC
 Figure 6.20a



6.4.3. Fauna

ecologia Environment was commissioned to undertake a Level 1 Reconnaissance Survey to assess fauna values along the TT Corridor. The field work was undertaken over two field trips in July and August 2007. The survey incorporated a targeted survey for the Marsupial Mole and a habitat suitability assessment for the Sandhill Dunnart. This fauna assessment has been designed to meet the requirements of the Environmental Protection Authority's Guidance Statement 56 (2004d). Habitat assessments for the presence of conservation interest species were incorporated into all the surveys.

Like the Pinjin Infrastructure survey the fauna assessment along the TT Corridor has been conducted over a much greater area than will be affected by the proposed infrastructure.

The findings of the survey are demonstrated in Figure 6.20a-o summarised in this section and the full report has been included in Appendix 2-C1.

Birds

A desktop assessment of the survey area suggested that 116 bird species could be present. Work completed by *ecologia* identified 45 bird species from 25 families during the survey.

Listed Bird Species

Evidence of two listed bird species was observed during the survey. These were the Malleefowl (eight mounds and fresh tracks) (Plate 6.25) and the Australian Bustard. Table 6.11 identifies other listed species that might occur along the corridor due to the presence of suitable habitats.

Table 6.11: Listed Bird Species likely to Occur along the Tropicana-Transline Communications Corridor

Species	Conservation Status
Princess Parrot (<i>Polytelis alexandrae</i>)	EPBC Act Vulnerable, DEC Priority 4
Naretha Blue Bonnet (<i>Northiella haematogaster narethae</i>)	WC Act Schedule 4
Peregrine Falcon (<i>Falcon peregrinus</i>)	WC Act Schedule 4
Grey Falcon (<i>Falco hypoleucos</i>)	DEC Priority 4

Bird Species of Conservation Interest

One species of conservation interest was observed during the survey, the Regent Parrot (*Polytelis anthopeplus*). This species was observed in the southern section of the survey corridor in Salmon Gum woodland (Plate 6.26). Sightings of this species north of its core habitat, such as Project are rare and indicate the edge of the species range.

Section 7.2.3 discusses the possible impact of the infrastructure corridor on the listed and conservation interest bird species recorded within the proposed infrastructure corridor.



Plate 6.25: Inactive Malleefowl Mound in a Burnt Mulga Woodland in the Northern Section of the Corridor



Plate 6.26: Salmon Gum Woodland Typical Habitat of Regent Parrots

Native Mammals

A desktop assessment of the survey area suggested that 31 mammal species may occur along the alignment of the proposed infrastructure corridor. Eight native mammals were either observed or evidence of their activities was noted during the survey. Table 6.12 contains a list of the species observed either directly or indirectly.

Table 6.12: Mammals Observed or Evidence Recorded within the Tropicana-Transline Communications Corridor

Species	Conservation Status
Mulgara (<i>Dasyercus blythi</i>) ¹	DEC Priority 4
Western Grey Kangaroo (<i>Macropus fuliginosus</i>)	-
Red Kangaroos (<i>Macropus rufus</i>)	-
Spinifex Hopping Mouse (<i>Notomys alexis</i>)	-
Marsupial Mole (<i>Notoryctes typhlops</i> or <i>caurinus</i>) ²	Endangered / Schedule 1
<i>Pseudantechinus</i> sp.	-
Echidna (<i>Tachyglossus aculeatus</i>)	-
Hill's Sheathtail Bat (<i>Taphozous hilli</i>)	-

1. Burrows possibly belonging to Mulgara were observed

2. Evidence of Marsupial Moles observed

Listed Mammal Species

No listed mammal species were recorded along the corridor. Secondary evidence of Marsupial Mole activity was identified in sand dune/ plain sections along the corridor (mole holes). The survey also identified six areas of suitable habitat for Mulgara and one area of potentially suitable Sandhill Dunnart habitat.

Herpetofauna

Desktop assessment of the survey area suggests that 102 reptile and four frog species could occur along the survey corridor. Seventeen species of reptiles were recorded during the survey including two agamids, two elapids, six geckos and seven skinks. Despite some rainfall during the trip, no amphibians were recorded.

Herpetofauna of Conservation Interest

No herpetofauna species of conservation significance were recorded during the survey.

Introduced Fauna

Two introduced species were recorded during the survey; these were camels and rabbits.

6.4.4. Fauna Habitat

The fauna habitats occurring along the survey corridor are consistent with the vegetation types described by Beard (1975). In the northern section, sand ridges are encountered with bands of mixed mulga and eucalypt woodland occurring between them. Further south, the sand ridges give way to open sandplain supporting mixed *Eucalyptus* and *Acacia* woodlands with some Salmon Gum (*Eucalyptus salmonophloia*) woodland (near the eastern margin of this woodland). Continuing south, major habitat changes occur with the transition from the Great Victoria Desert bioregion to the Nullarbor bioregion; this corresponds with the change from the Helms botanical district to the Coolgardie/ Eucla botanical districts. A large proportion of the southern end of the corridor had been subject to intensive burning and it was unlikely that this section could support most native fauna.

The common habitat types observed along the survey corridor include:

- mixed low shrubland with sparse spinifex on dune (Plate 6.27);
- open *Eucalyptus gongylocarpa*/ *Callitris columellaris* woodland (Plate 6.28);
- interdunal moderately dense mulga (*Acacia aneura*) woodland (Plate 6.29);
- *Acacia aneura* low trees over mixed shrubs over spinifex hummock;
- mixed *Acacia*/ *Eucalyptus*/ *Casuarina* open woodland over spinifex on sandplain or stone soils;
- open *Eucalyptus* mallee woodland over sparse *Senna* species and spinifex on sand; (Plate 6.30)
- open low Salmon Gum woodland over *Maireana sedifolia* on sandy soil; and,
- open *Casuarina* woodland over *Maireana sedifolia* shrubs.

Of the fauna habitats encountered during the survey five are considered of significance to fauna within the survey corridor. These include:

- remnant areas of unburnt mulga woodland with Malleefowl nests;
- vegetated yellow sand dunes with large spinifex (potentially supporting Marsupial Moles);
- vegetated sand plains with dense spinifex (potentially supporting Sandhill Dunnarts and Brush-tailed Mulgara);
- remnant areas of unburnt large eucalypts with tree hollows (potentially supporting conservation interest parrots); and,
- rocky outcrops (possibly supporting *Pseudantechinus* sp.).



Plate 6.27: Mixed Low Shrubland with Spinifex



Plate 6.28: Open *Eucalyptus gongylocarpa* *Callitris columellaris* woodland



Plate 6.29: Interdunal Mulga woodland with Hard Red Soil



Plate 6.30: Open Eucalypt Woodland over Spinifex on Sand

Section 7.2.3 discusses the possible impact of the infrastructure corridor on the identified significant faunal habitats.

6.5. WATER SUPPLY AREA AND PIPELINE

6.5.1. Hydrology/ Hydrogeology

The arid climate in the area around the Operational Area is not suitable for the development of reliable surface water resources and therefore the Joint Venture considers the local groundwater resources to be the only viable water resource for the Project. The Project is situated on the south-western margin of the Gunbarrel and Officer Basins and overlies crystalline basement rocks of the Yilgarn Craton and Albany-Fraser Orogen that have a southwest boundary running through the region.

An initial scoping study was undertaken to investigate three potential water resource targets within a 150 km radius of Operational Area, these being:

- tertiary palaeochannel deposits infilling the Lake Rason drainage valley, located 40 to 80 km northwest of the Operational Area;

- potential sandstone aquifers located within the Minigwal Trough area of the Officer Basin, to the south of Lake Rason, 40 to 60 km northwest of the Operational Area; and,
- dolomitic sandstone aquifer identified near Neale Junction, 115 km northeast of the Operational Area, believed to be part of the Officer Basin sequence.

Since the cost of water pipelines and power transmission are significant, these targets were prioritised according to their proximity to the Project. The Lake Rason palaeochannel deposits were discounted after preliminary drilling and airborne survey results suggested they lacked sufficient aquifer storage and were too hypersaline to meet Project requirements. The exploration program then shifted focus to determining the potential of the sandstone aquifers in the Minigwal Trough to sustainably support the Project. Water investigations in the Minigwal Trough were conducted between October 2007 and September 2008 and included:

- acquisition of 2306 line km of airborne TDEM using the RepTEM system;
- drilling of nine reverse circulation exploratory holes of 230 m depth to define the geometry of the sandstone aquifers;
- drilling and hydraulic testing of eight mud rotary test production water bores and two observation water bores to between 250 and 350 m depth in the Minigwal Trough;
- hydrochemical analysis of groundwater samples taken from each bore; and,
- numerical simulation of the borefield development and impacts.

These studies determined that a viable resource was present in a sandstone aquifer located in the Minigwal Trough (part of the Officer Basin). The Officer Basin comprises an inter-cratonic downwarp structure that extends 1,500 km from the south-eastern flank of the Pilbara Craton to the central west of South Australia, covering an area of over 350,000 km². The structure contains up to 12,000 m of Proterozoic and Palaeozoic sedimentary and volcanic rocks. The Basin is bounded to the northeast by the Musgrave and Rudall Igneous Complexes and to the southwest by the granite-greenstone terrain of the Yilgarn Craton. The Earraheedy and Bangemall Basins bound the western limits and the overlying Eucla Basin defines the southern margin. Deposition of the Officer Basin sedimentary sequence commenced in the Early Proterozoic (Meso- or Paleoproterozoic) (~ 1500 Ma) on the edge of the Achaean West Australian Shield, incorporating the Pilbara and Yilgarn Craton, within the Naberu and Bangemall basins.

The Minigwal Trough is an informal name describing a 300 km long by 50 km wide north-south sedimentary trough abutting the western margin of the Archean basement on the Fraser Range. The Minigwal Trough corresponds to the Rason Regional Gravity Low described by Shevchenko (2002). It was formed and subsequently modified during several periods of tectonic faulting. The earliest tectonic activity possibly pre-dating formation of the Minigwal Trough was associated with formation of the Proterozoic Albany-Fraser Orogen, and although it did not directly lead to the development of the trough, zones of weakness from earlier tectonic features were later reactivated as faults/fractures or have been preferentially eroded – such as the Lake Rason drainage where it crosses the Fraser Range north of Operational Area.

The proposed borefield will target a 120 m thick, fine sandstone unit at the base of the sequence, referred to as the Lower Sandstone, which is semi-confined beneath 50 m of shale. Several test production bores have been developed in the Lower Sandstone and yielded between 0.3 and 0.5 ML/day. Although the Lower Sandstone aquifer has almost negligible exposure to rainfall recharge beneath the shale and relatively poor aquifer transmissivity (measured at between 4 to 14 m²/day), the aquifer nonetheless represents a considerable stored water resource, with a water quality within Project quality requirements (ranging from 40,000 to 80,000 mg/L TDS) and has an acceptable degree of available drawdown in the proposed borefield area (Appendix 2-D4).

To simulate the feasibility of abstracting the Project water requirements from the sandstone, a FEFLOW numerical groundwater model of the aquifer was developed. Model results indicate that:

- the model outcome is most sensitive to the specific storage parameter. Nonetheless, sensitivity simulations were conducted with expected and worst case values;
- a borefield with 40 bores in the deeper areas of the sandstone aquifer can sustain the Project's requirements over a 15 year period;
- 98% of the groundwater abstracted will come from aquifer storage in the sandstone; and,
- depressurisation in the sandstone due to pumping will spread up to 5 km from the borefield, but will not reach the Lake Rason edge.

Section 7.2.6 discusses the potential impacts of groundwater abstraction on the environment adjacent to the Water Supply Area.

6.5.2. *Flora and Vegetation*

Botanica Consulting was commissioned to survey and map the vegetation and flora values of the Minigwal Trough Water Supply Area and pipeline corridor (the survey area). At the time of commencing the survey it was unclear exactly where the Water Supply Area was going to be located, as a result 44,000 ha of native vegetation has been mapped with the intention of identifying vegetation communities and habitats that should be avoided. The area mapped is approximately 200 times larger than the proposed disturbance area. The field work component of this survey was conducted in November and December 2008, including a post rain survey between the 10 and 12 December 2008.

The survey conducted was designed to meet the requirement of a Level 1 survey as defined by the EPA Guidance Statement 51 (EPA 2004c). The results of this survey are demonstrated in Figures 6.22, 6.23a and 6.23b and the survey report upon which this section is based is included as Appendix 2-D2.

Biogeography

The survey area lies in the Helms Botanical District within the GVD (Beard, 1990) within the Eremaean Province of Western Australia. The Helms Botanical District is described as mulga low woodland on hardpan soils between dunes. The GVD is mantled with hummock grasslands formed by spinifex, *Triodia basedowii*, in which there are scattered trees, mallees, sclerophyll tall shrubs and small ericoid shrubs. The characteristic tree is the marble gum *Eucalyptus gongylocarpa* (Beard 1990).

Vegetation

Vegetation condition for all vegetation groups varies from excellent to degraded. The areas classified as degraded have been affected by severe fires over 5-10 years. Five major plant communities were identified within the survey area based on landform; some of the major communities were then broken down into sub-communities. A total of 13 separate vegetation sub-communities were identified within the survey area (Figure 6.21). Table 6.13 lists all the communities identified and provides a brief description of each one.

Table 6.13: Vegetation Communities identified within the Minigwal Trough Survey Area

Vegetation Code	Description
Longitudinal red sand dunes	
E1 (e ₁₉ xS.t ₂ H)	Scattered <i>Eucalyptus gongylocarpa</i> over mixed shrubs over <i>Triodia basedowii</i> .
Sandy flats and swales	
E2 (e ₁₉ L.a ₁ S.t ₂ H)	<i>Eucalyptus gongylocarpa</i> over mixed <i>Acacia</i> over mixed moderately open to moderately dense shrubs over <i>Triodia basedowii</i> .
E3 (e ₁₉ e ₂₀ L.xS.t ₂ H)	Mixed eucalypt woodlands dominated by <i>Eucalyptus gongylocarpa</i> / <i>E. youngiana</i> over mixed open shrubs and <i>Triodia basedowii</i> .
E4 (e _x L.t ₂ H)	Open mallee <i>Eucalyptus concinna</i> over sparse to open <i>Triodia basedowii</i> .
A1 (a ₁ L.xS.t ₂ H)	Moderately dense to dense <i>Acacia aneura</i> woodland over isolated shrubs over scattered <i>Triodia basedowii</i> .
T1 (xS.t ₂ H)	Open to moderately open mixed shrubs over <i>Triodia basedowii</i> .
C1 (c ₂ L.xS.t ₂ H)	Moderately open to moderately dense <i>Casuarina pauper</i> woodland over open mixed shrubs over scattered <i>Triodia basedowii</i> .
A2 (a ₁ L.alxS.t ₂ H)	Open to moderately open <i>Acacia aneura</i> over <i>Aluta maisonneuvei</i> subsp <i>auriculata</i> over scattered <i>Triodia basedowii</i> .
Rocky breakaway and stony rises	
A3 (a ₁ L.xS.G)	Open mixed <i>Acacia</i> over mixed shrubs and scattered soft grasses.
A4 (a ₁ L.er _x S.G)	Moderately dense to dense <i>Acacia aneura</i> over mixed moderately dense shrubs dominated by <i>Eremophila latrobei</i> ssp <i>filiformis</i> over <i>Caustis dioica</i> .
A5 (a _x L.xS.G)	Moderately dense to dense Mixed <i>Acacia</i> woodland over Mixed shrubs dominated by <i>Eremophila latrobei</i> ssp <i>filiformis</i> over <i>Caustis dioica</i> .
Lake edge community	
E5 (e _x L.xS.t ₂ H)	Moderately dense <i>Eucalyptus mannensis</i> ssp <i>mannensis</i> over isolated shrubs and scattered <i>Triodia basedowii</i> .
Dry clay pan	
E6 (e _x L.k ₁ S)	<i>Eucalyptus horistes</i> over low mixed shrubs dominated by <i>Atriplex vesicaria</i> .

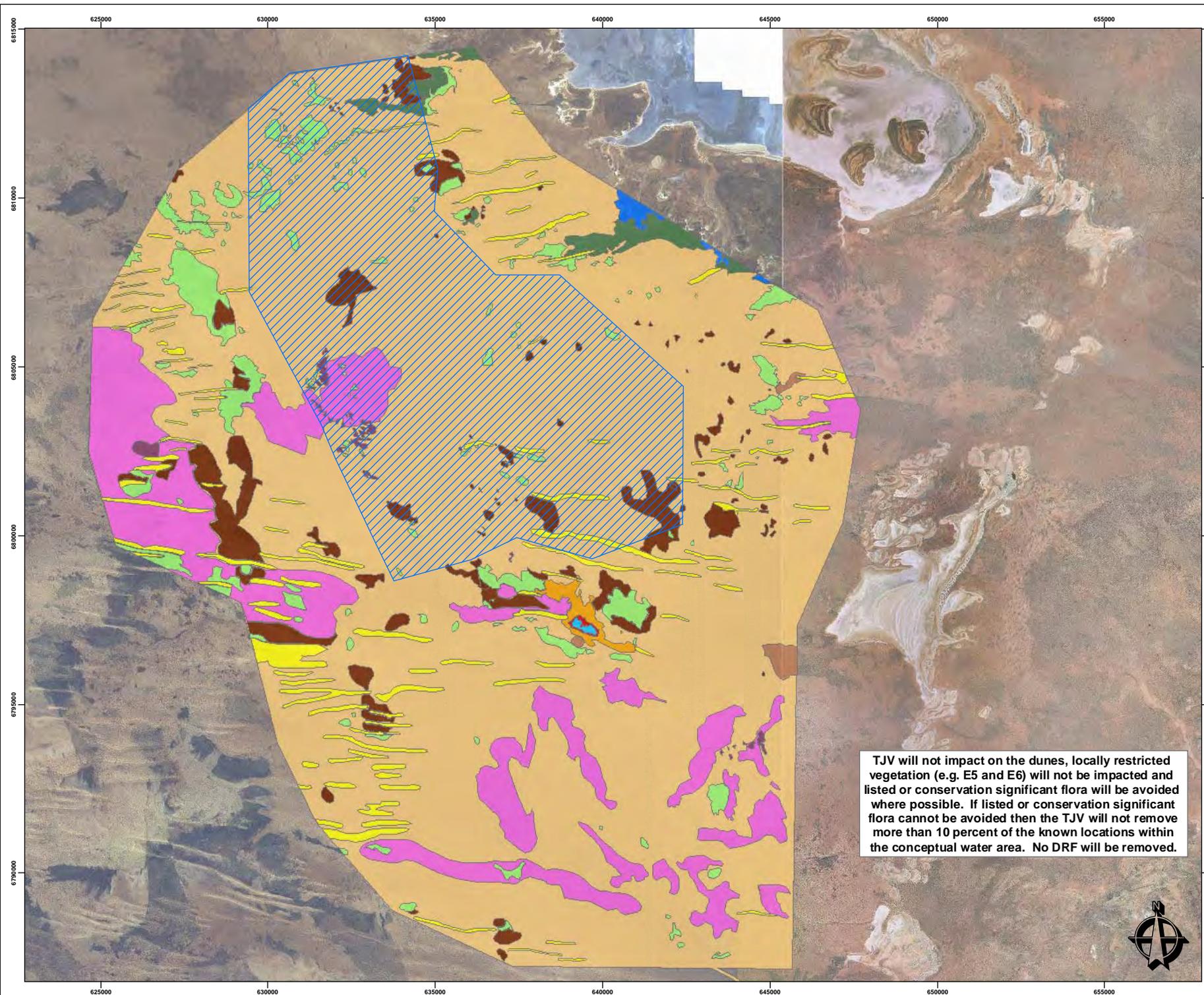
No TECs or PECs as defined by the EPBC Act or the DEC were observed in the survey area.

Two plant communities (E5 and E6) within the survey area have been classified as of conservation interest because they are the least common vegetation communities encountered.

Legend

Minigwal Vegetation Communities

	A1	Moderately dense to dense <i>Acacia aneura</i> woodland over isolated shrubs over scattered <i>Triodia basedowii</i>
	A2	Open to moderately open <i>Acacia aneura</i> over <i>Aluta maisonneuvei</i> subsp <i>auriculata</i> over scattered <i>Triodia basedowii</i>
	A3	Open mixed acacia over mixed shrubs and scattered soft grasses
	A4	Moderately dense to dense <i>Acacia aneura</i> over mixed moderately dense shrubs dominated by <i>Eremophila latrobei</i> ssp <i>filiformis</i> over <i>Caustis dioica</i>
	C1	Moderately open to moderately dense <i>Casuarina pauper</i> woodland over open mixed shrubs over scattered <i>Triodia basedowii</i>
	E1	<i>Eucalyptus gongylocarpa</i> over mixed shrubs over <i>Triodia basedowii</i>
	E2	<i>Eucalyptus gongylocarpa</i> over mixed <i>Acacia</i> over mixed moderately open to moderately dense shrubs over <i>Triodia basedowii</i>
	E3	Mixed <i>Eucalypt</i> woodlands dominated by <i>Eucalyptus gongylocarpa</i> / <i>E. youngiana</i> over mixed open shrubs and <i>Triodia basedowii</i>
	E4	Open mallee <i>Eucalyptus concinna</i> over sparse to open <i>Triodia basedowii</i>
	E5	Moderately dense <i>Eucalyptus mannensis</i> ssp <i>mannensis</i> over isolated shrubs and scattered <i>Triodia basedowii</i>
	E6	Sparse <i>Eucalyptus horistes</i> over low mixed shrubs dominated by <i>Atriplex vesicaria</i>
	T1	Open to moderately open mixed shrubs over <i>Triodia basedowii</i>

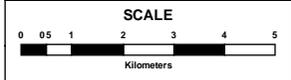


- Legend**
- Proposed Borefield Area
 - Vegetation Communities**
 - A1
 - A2
 - A3
 - A4
 - C1
 - E1
 - E2
 - E3
 - E4
 - E5
 - E6
 - T1

Refer to page 6-143 for vegetation description

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TJV will not impact on the dunes, locally restricted vegetation (e.g. E5 and E6) will not be impacted and listed or conservation significant flora will be avoided where possible. If listed or conservation significant flora cannot be avoided then the TJV will not remove more than 10 percent of the known locations within the conceptual water area. No DRF will be removed.

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Flora

The Botanica survey identified 179 species comprising of 35 Families and 81 Genera in the water survey area. The most diverse families were: Mimosaceae (31 taxa), Myrtaceae (26 taxa), Myoparaceae (18 taxa), Chenopodiaceae (15 taxa), Lamiaceae (13 taxa), and, Poaceae (12 taxa). The most diverse genera were *Acacia* (31 taxa), *Eremophila* (18 taxa) and *Eucalyptus* (15 taxa).

Listed Species

A desktop review of the WA Herbarium and the DEC Flora database identified the potential for one DRF and eight Priority Flora species to occur within the survey area; as a result of the field assessment no DRF species and seven Priority species were identified, three of which were not identified during the desktop assessment (Figure 6.21). Table 6.14 lists the priority species located within the survey area.

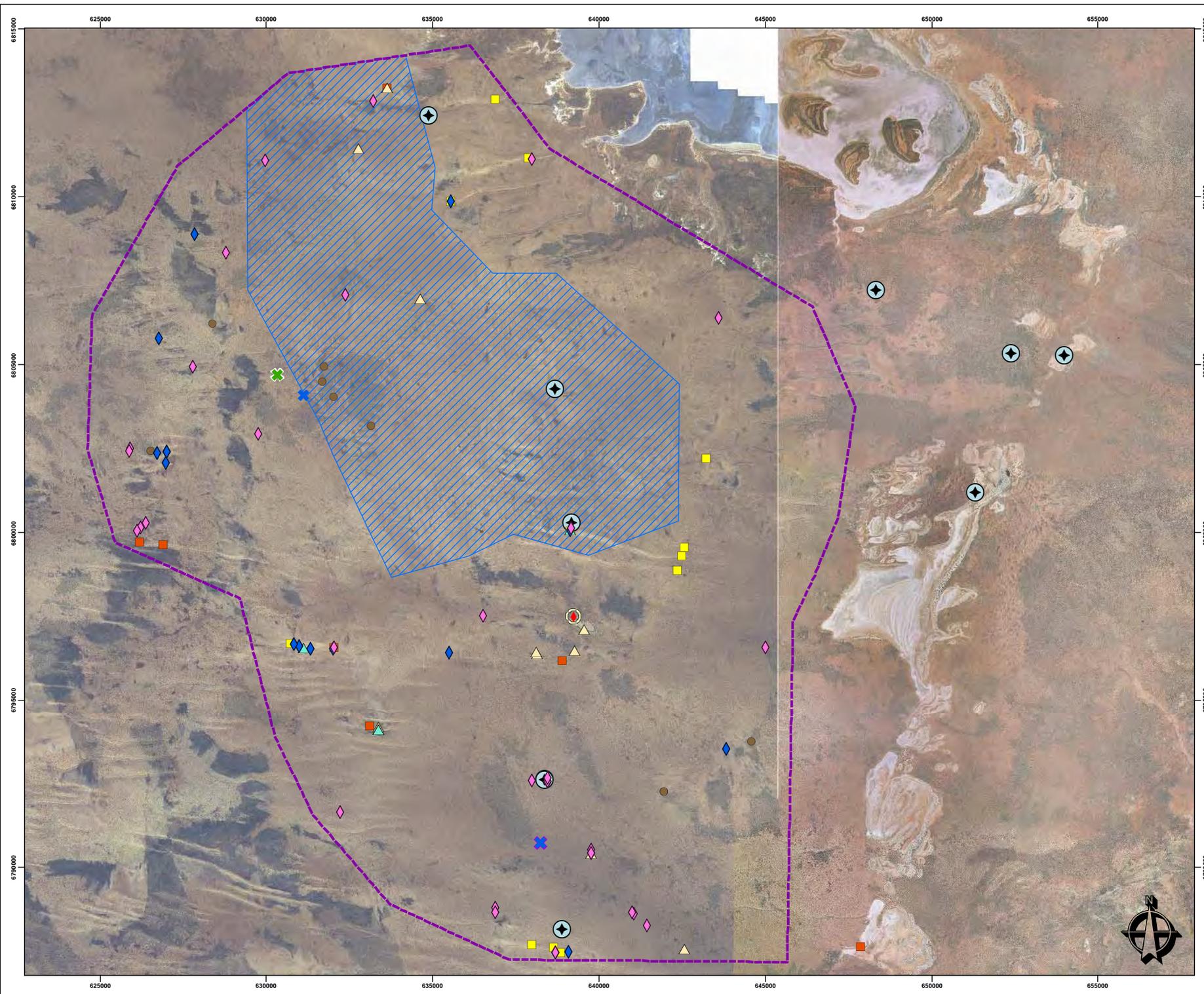
Table 6.14: Listed species observed within the Minigwal Trough Survey Area

Species	Conservation Status
<i>Baeckea</i> sp. Great Victoria Desert (A.S. Weston 14813)	P2
<i>Dicrastylis nicholasii</i>	P2
<i>Olearia arida</i>	P2
<i>Dicrastylis cundeeleensis</i>	P3
<i>Microcorys macrediana</i>	P3
<i>Daviesia purpurascens</i>	P4
<i>Lepidobolus deserti</i>	P4

Section 7.2.2 provides specific information on the level of impact and management strategies proposed for the flora and vegetation.

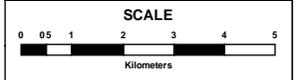
Introduced Species

No introduced flora species were found during the time of survey or during the post-rain survey.



- Legend**
- ◆ Heritage Site
 - ▭ Heritage Site Buffer
 - Listed Flora**
 - *Baeckea* sp. Great Victoria Desert
 - *Daviesia purpurascens*
 - ▲ *Dicrastylis cundeeleensis*
 - ▲ *Dicrastylis nicholasii*
 - ▲ *Lepidobolus deserti*
 - ◆ *Microcorys macredleiana*
 - ◆ *Olearia arida*
 - Listed Terrestrial Fauna**
 - ✖ Australian Bustard (Tracks)
 - ✖ Fork-tailed Swift (Observation)
 - ✖ Malleefowl (Active and inactive mounds)
 - ⊕ Stygofauna Sampling Location
 - ▭ Fauna Survey Area
 - ▨ Proposed Borefield Area

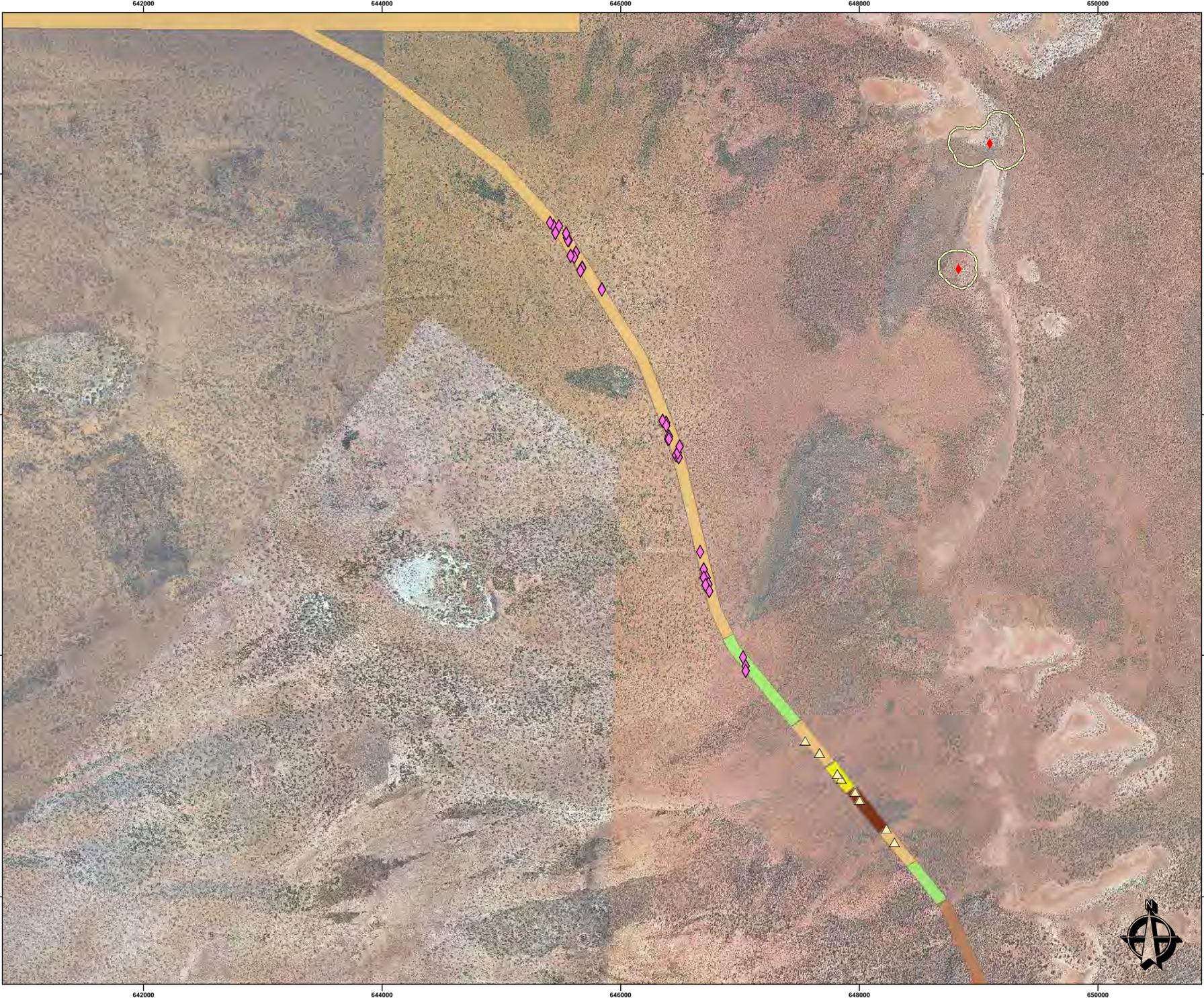
Imagery is a composite of aerial and satellite photography
 NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
 -AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2007
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GWa	BP	FD	
DATE	REVISION	DRAWING NO.	
11.08.09	0	351-2.15	

Tropicana Joint Venture
TROPICANA GOLD PROJECT
 Public Environmental Review
 Environmental Values, Heritage Values
 and Stygofauna Sampling Locations
 Figure 6.22

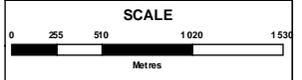


- Legend**
- ◆ Heritage Site
 - Heritage Site Buffer
 - Listed Flora**
 - ▲ *Dicrastylis nicholasii*
 - ◆ *Olearia arida*
 - Vegetation Communities**
 - A1
 - E1
 - E3
 - E4
 - T1

Refer to page 6-143 for vegetation description

Imagery is a composite of aerial and satellite photography

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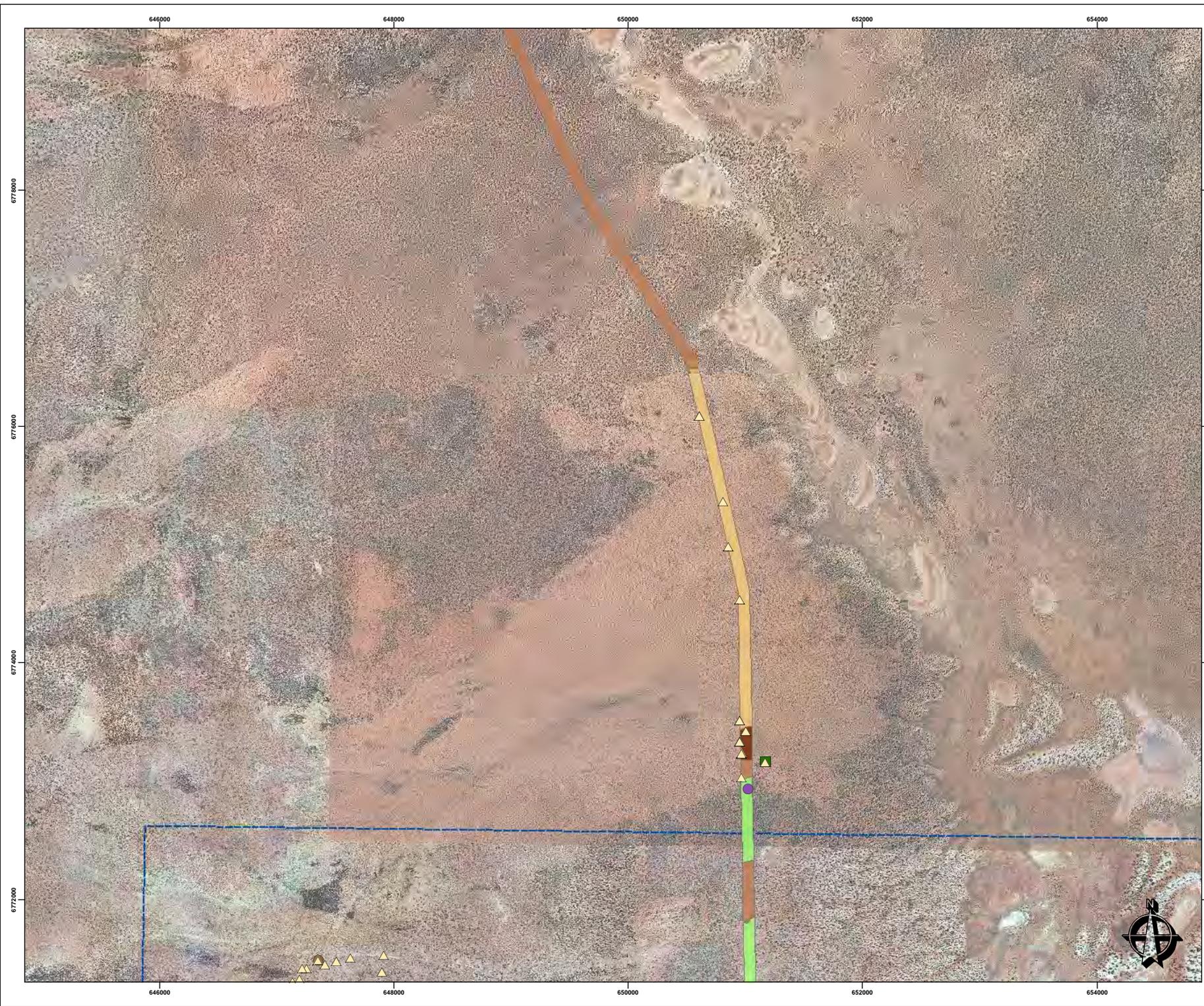
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Tropicana Joint Venture
TROPICANA GOLD PROJECT

Public Environmental Review
 Vegetation, Environmental and Heritage
 Values of the Pipeline Corridor
 Figure 6.23a



Legend

Listed Flora

- *Acacia eremophila* numerous-nerved variant
- *Baeckea* sp. Great Victoria Desert
- *Conospermum toddii*
- ▲ *Dicrastylis nicholasii*

Vegetation Communities

- A1
- E1
- E3
- E4
- T1
- Operational Area Boundary
(No indigenous heritage sites)

Refer to page 6-143 for vegetation description

Imagery is a composite of aerial and satellite photography

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-AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2007
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SCALE



LOCALITY MAP



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100%		MGA ZONE 51	
HORIZONTAL DATUM		HEIGHT DATUM	
GDA 94		N/A	
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GWa	BP	FD	
DATE	REVISION	DRAWING NO.	
19.08.09	0	351-2.16b	

Tropicana Joint Venture
TROPICANA GOLD PROJECT

Public Environmental Review
Vegetation, Environmental and Heritage
Values of the Pipeline Corridor
Figure 6.23b



6.5.3. Fauna (Terrestrial and Subterranean)

ecologia was commissioned to undertake a Level 1 Reconnaissance Survey to assess terrestrial fauna values within the Minigwal Trough Water Supply Area and pipeline corridor (Appendix 2-D3). The field work was conducted in March 2008. The survey was designed to meet the requirements of EPA Guidance Statement 56 (EPA 2004d). Similar to the flora survey, the fauna assessment covered a much larger area than will be impacted by the Project. The aim of this was to identify areas that should be avoided wherever practical.

Subterranean Ecology Pty Ltd was commissioned to undertake a desktop assessment and pilot study of the Minigwal Trough Water Supply to determine the presence of Stygofauna. This assessment and pilot study was undertaken between February and May 2008. The desktop assessment and pilot survey were designed to meet the requirements of EPA Guidance Statement 54 (2003) and 54a (2007a).

The findings of these surveys are demonstrated in Figure 6.22, summarised in this section and the full reports are included as Appendices 2-D3 (terrestrial fauna) and 2-D5 (stygofauna).

Birds

Desktop assessment of the survey area suggested that 114 bird species may occur, of which 38 species from 21 families were recorded during the survey.

Listed Bird Species

Evidence of two listed bird species was observed during the survey, these were the Malleefowl (single old mound) and Australian Bustard (tracks) (Figure 6.22). Table 6.15 lists the conservation interest bird species potentially occurring within the survey area.

Table 6.15: Listed Bird Species Likely to Occur within the Minigwal Trough Water Supply Area

Species	Conservation Status
Slender-billed Thornbill (<i>Acanthiza iredalei iredalei</i>)	EPBC Vulnerable, DEC Priority 4
Princess Parrot (<i>Polytelis alexandrae</i>)	EPBC Act Vulnerable, DEC Priority 4
Naretha Blue Bonnet (<i>Northiella haematogaster narethae</i>)	WC Act Schedule 4
Peregrine Falcon (<i>Falcon peregrinus</i>)	WC Act Schedule 4
Grey Falcon (<i>Falco hypoleucos</i>)	DEC Priority 4

Native Mammals

A desktop assessment of the survey area determined that 34 native mammal species could potentially occur. During the field assessment five native mammals were encountered and one species was assumed to be present by the occurrence of sand dunes, these where:

- Red Kangaroo (*Macropus rufus*);
- Western Grey Kangaroo (*Macropus fuliginosus*);
- Gould's Wattled Bat (*Chalinolobus gouldii*);
- Inland Broad-nosed Bat (*Scotorepens balstoni*);
- Dingo (*Canis lupus dingo*); and,
- Marsupial Mole (*Notoryctes typhlops* or *caurinus*).

Species of Conservation Interest

No mammals of conservation interest were observed during the field survey although habitat suitable for the Marsupial Mole and Mulgara was encountered (Plate 6.31).



Plate 6.31: Vegetated Sand Dunes - Suitable Habitat for the Marsupial Mole

Herpetofauna

Six species of reptile were encountered during the survey of the predicted 102 species. Several snake tracks were observed on the dune slopes and varanid tracks and burrows were also noted at several sites.

No frog species were observed during the survey, despite wet conditions during the survey.

Herpetofauna Species of Conservation Interest

No herpetofauna species of conservation interest were recorded during the survey. One listed species, the Great Desert Skink (*Egernia kintorei*), has a low potential to occur in this area. The nearest record of this species is 150 km to the north.

Introduced Fauna

Evidence of three, potentially four introduced species were observed during the survey these were: feral cat, camels, wild dog and potentially European fox.

Subterranean Fauna

The desktop review by Subterranean Ecology concluded that the lower sandstone aquifer of the Minigwal Trough has a very low likelihood of supporting habitat suitable for stygofauna because:

- the aquifer geohydrology is deep, confined and fully saturated. Most stygofauna are known from shallow depths in unconfined and unsaturated aquifers. Stygofauna is less likely to occur in deep, confined and fully saturated aquifers, and from Subterranean Ecology's perspective, no stygofauna have been recorded from this type of aquifer in Western Australia;
- the aquifer typology is compact with very fine grain size (0.1 mm), so there is a lack of interstitial space and the interstitial pressures will be extremely high which will exclude most stygofauna groups except possibly burrowing forms;
- the compact sediment texture implies reduced hydrologic conductivity for exchange of nutrients and oxygen;
- the aquifer is deep and isolated from overlying superficial aquifer by an aquitard, so vertical inputs of energy and oxygen from surface are prevented;
- recharge and through-flow rates are likely to be extremely low, so nutrients and oxygen inputs are likely to be limited, and gradually depleted along the confined flow path;
- the high salinities probably exclude many species which occur in fresher groundwaters. Some measured salinities lie near the upper limits or exceed the tolerance limits recorded for stygofauna;
- Lake Rason is located near the southern boundary of the Yilgarn stygoregion coinciding with the absence of major calcrete aquifers that elsewhere harbour rich stygofauna communities in the northern Yilgarn; and,
- the Eocene marine transgression may have eliminated freshwater lineages from the Lake Rason area.

To verify the conclusion obtained during the desktop assessment a pilot field survey was conducted. Ten accessible bores were sampled by net hauling or pumping methods, and water physico-chemistry parameters (temperature, pH, salinity, conductivity, redox, dissolved oxygen) were measured to characterise and evaluate water quality conditions for stygofauna. The pilot field survey detected no stygofauna in the sampled bores, consistent with the conclusions of the desktop review.

To evaluate, in an Australia-wide context, the suitability of the lower sandstone aquifer of the Minigwal Trough to support stygofauna, the geohydrology, aquifer typology and physico-chemical attributes were compared with data from other studies where stygofauna have been recorded. This evaluation revealed major geohydrological, aquifer typological and some groundwater quality differences between the lower sandstone aquifer in the Minigwal Trough and other sampled aquifers which contain stygofauna. This supports the conclusion obtained during the desktop review and the field assessment.

6.5.4. Fauna Habitat

Five major fauna habitat types for terrestrial fauna were identified in the Water Supply Area:

- recently burnt open eucalypt woodland;
- mulga thickets (Plate 6.31);
- dense eucalypt woodland (Plate 6.33);
- sand dune systems; and,
- claypans.



Plate 6.32: Dense Mulga Woodland on Clayey Soil



Plate 6.33: Unburnt Scattered Mallee over Spinifex on Red Sandy Soil

No TECs or PECs were identified during this survey. A number of fauna habitats have been identified as locally important and should be avoided.

Section 7.2.3 discusses the possible impacts of the proposed water supply and pipeline corridor on fauna and fauna habitats within this area.

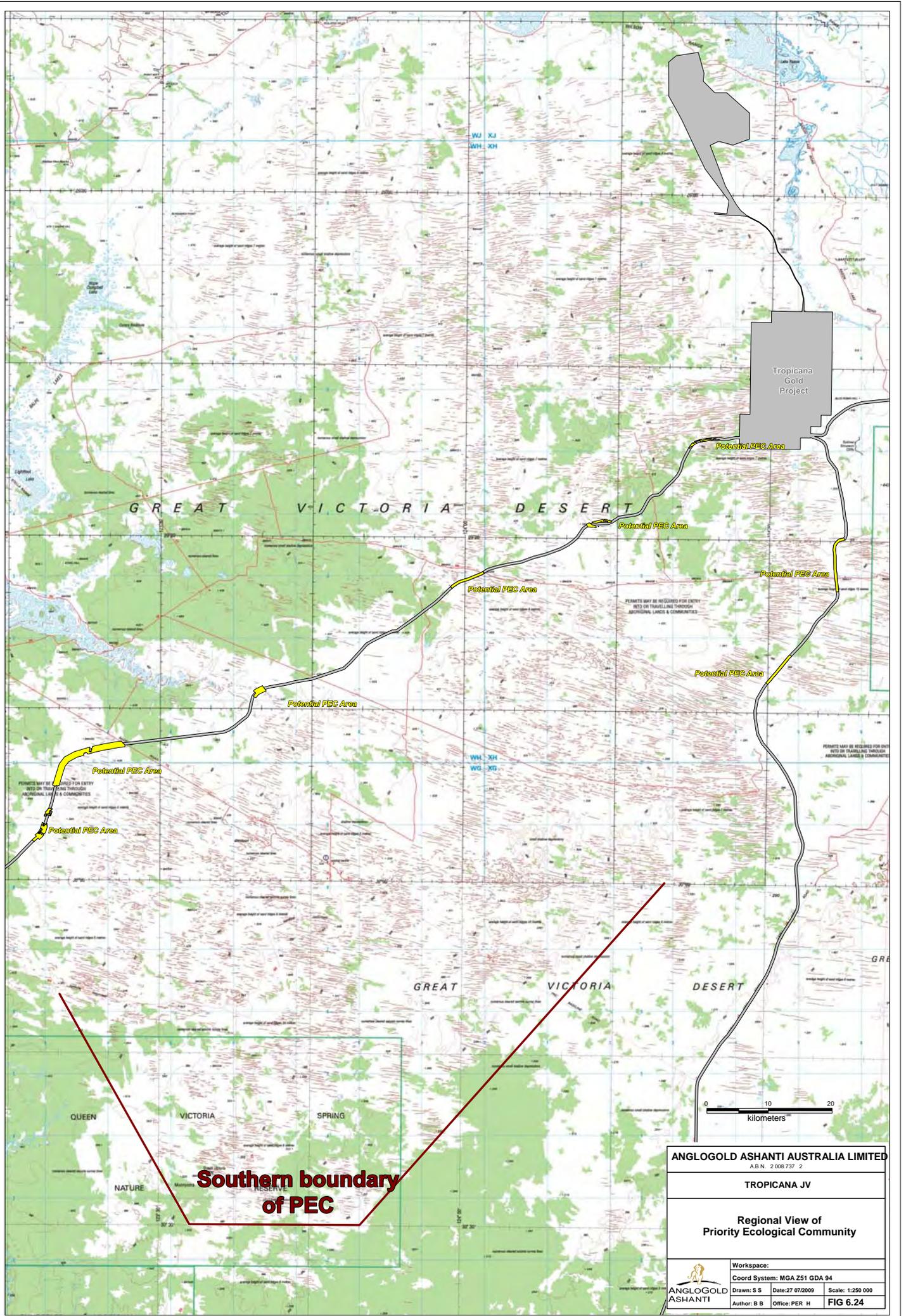
6.6. PRIORITY ECOLOGICAL COMMUNITY

The DEC has nominated the 'Yellow sandplain communities of the Great Victoria Desert' as a Priority 3 (ii) ecological community. This PEC is described as containing highly diverse mammalian and reptile fauna, with distinctive plant communities. At this point in time the DEC has not been able to provide the Joint Venture with an accurate description of the vegetation communities that comprise the PEC. The Joint Venture has used indicator species (such as *Persoonia* and *Xanthorrehea*) and the presence of yellow to yellow-orange sands to identify vegetation communities that might represent the PEC. The DEC has supplied the Joint Venture with what they consider to be the southern boundary of this PEC, however little information is known about the full extent of the community (e.g. northern, western and eastern boundaries). At its closest point to the Project, the DEC-confirmed southern boundary of the PEC is 20 km to the south-east of the Pinjin infrastructure corridor (Figure 6.24). Work completed by Mattiske Consulting and ecologia has identified that sections of both infrastructure corridors appear to intersect the potential PEC (Chapter 7, Figures 7.2 and 7.3; Appendix 2- C2 [Figure 4.1] and Appendix 2-C5). The PEC appears to be widespread throughout the surrounding area (Figure 6.24; Appendix 2-C5).

The vegetation community that appears to be the most representative of the PEC in the area around the Project is comprised of Low Open Shrubland of *Calothamnus gilesii*, *Persoonia pertinax* and mixed low shrubs with occasional emergent *Eucalyptus youngiana* and *Eucalyptus gongylocarpa* on yellow sands flats on undulating sandplains may also be associated with this PEC (Appendix 2-F8). This vegetation community has not been observed in either the Pinjin or the TT Corridor survey area but has been observed more widely throughout the region (Appendix 2-C5).

There are six sections of the proposed Pinjin infrastructure corridor and two section of the TT Corridor that potentially intersect with the PEC (Figures 6.24, 7.2 and 7.3). Vegetation communities within the Pinjin survey corridor that show greatest similarity to the PEC include S11 on the yellow and yellow-orange dunes and S5 on yellow to yellow-orange sand on slopes. Other communities that show some similarities, but are present on non-typical substrate include S8 and S9 on orange and yellow-orange sandy-loams on lower slopes and flats, and E4 on orange, red-orange, yellow-orange and yellow sandy loams on mixed topographies (Appendix 2-F8).

In the sections thought to intersect with the PEC, the proposed infrastructure corridor passes predominantly through vegetation community E4, as well as S5 and S9. E4, *Eucalyptus gongylocarpa* with *Callitris preissii* and *Eucalyptus* spp. over mixed shrubs over *Triodia* spp., is unlikely to form part of the PEC as it is the most widespread vegetation community within the proposed corridor, and throughout the region. The proposed corridor avoids S11 the community mapped (Appendix 2-C1, 2-C2 and 2-C5).



**Southern boundary
of PEC**

ANGLOGOLD ASHANTI AUSTRALIA LIMITED
A.B.N. 2 008 737 2

TROPICANA JV

Regional View of
Priority Ecological Community

Workspace:			
Coord System: MGA 251 GDA 94			
Drawn: S S	Date: 27 07/2009	Scale: 1:250 000	
Author: B B	Office: PER H	FIG 6.24	

6.7. MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Under the EPBC Act, actions that have, or are likely to have, a significant impact on a matter of 'national environmental significance' (NES) require approval from the Australian Government Minister for the Environment, Heritage and the Arts (the Minister) (DEWHA 2008).

A significant impact is an impact which is important, notable, or of consequence, having regard to its context or intensity (DEWHA 2008). Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts (DEWHA 2008).

Matters of NES protected by the EPBC Act include:

- World and National Heritage Places;
- Wetlands of International Importance;
- listed threatened species;
- listed migratory species;
- nuclear actions; and,
- Federal Marine Areas.

Under the EPBC Act, the proposed Project (as described in Chapter 2) was considered to be a 'controlled action', requiring assessment, due to the following controlling provisions:

- listed threatened species and communities (sections 18 and 18A); and,
- listed migratory species (sections 20 and 20A).

6.7.1. *Matters of National Environmental Significance Relevant to the Tropicana Gold Project*

An estimated 21 threatened and/ or migratory species listed under the Federal EPBC Act could potentially occur within the areas affected by the Project. Under the EPBC Act an action will require approval from the Minister if the action has, will have, or is likely to have, a significant impact on a matter of national environmental significance (NES).

Listed Threatened Species

A search of the EPBC Act Protected Matters Interactive Search Tool indicated that a total of 13 threatened terrestrial fauna species listed under the Federal EPBC Act as Endangered or Vulnerable could potentially occur within the Project area.

Evidence of two species was recorded within the Project surveys areas:

- Marsupial Moles (*Notoryctes typhlops* or *caurinus*) which is listed as Endangered under the EPBC Act.
 - No Marsupial Moles were recorded during surveys of the Project. Determining the occurrence of the Marsupial Mole was based on the presence and identification of Marsupial Mole holes.
 - Mole holes were recorded in discrete portions within suitable habitats within all areas surveyed for the Project.

- Malleefowl (*Leipoa ocellata*) which is listed as Vulnerable under the EPBC Act.
 - A number of inactive Malleefowl mounds within the Project fauna survey areas.
 - Malleefowl tracks were observed within the Pinjin and TT Corridor Survey areas.
 - One active Malleefowl mound was observed within the Pinjin survey area.
 - An individual Malleefowl was observed approximately 600 m from the proposed Pinjin alignment.

In addition to the above species, habitats suitable for two other species have been observed within the Project survey area:

- Sandhill Dunnart (*Sminthopsis psammophila*) which is listed as Endangered under the EPBC Act.
 - Four potential habitat locations were located within the Operational Area.
 - Three potential habitats located within or on the edge of the Pinjin Survey corridor.
 - Trapping was undertaken but no animals were captured.
 - Eleven areas contain vegetation that may have future potential as habitat.
- Crest-tailed Mulgara (*Dasyercus cristicauda*) which is listed as Vulnerable.
 - Potential habitat for the Mulgara has been observed in parts of all areas surveyed. However, as the Mulgara genus (*Dasyercus*) has recently undergone taxonomic review, if Mulgara are present it is more likely to be *Dasyercus blythi* which is not listed under the EPBC Act.

Two threatened flora species under the EPBC Act are predicted to occur within the Project area, *Eucalyptus articulata* (listed as Vulnerable) and *Conospermum toddii* (listed as Endangered); of these only the latter was recorded during the survey. *C. toddii* was recorded in the Operational Area and within the Pinjin Survey Corridor. While not recorded in the TT Corridor Survey, habitat suitable for *C. toddii* is also present along the proposed route.

Listed Migratory Species

Results of the search of the EPBC Act Protected Matters Interactive Search Tool indicated that six migratory fauna species listed under the EPBC Act could potentially occur in the areas affected by the Project. The species identified are a mixture of terrestrial and migratory birds. The Rainbow Bee-eater (*Merops ornatus*) which is listed as Migratory under the EPBC Act was sighted on 60 occasions in surveys of the proposed Pinjin Infrastructure, Operational Area and Water Supply Area. Two other EPBC Act Migratory species were observed during the Pinjin survey; these were the Wood Sandpiper (*Tringa glareola*) and Common Greenshank (*Tringa nebularia*). These birds were observed on a small lake that had formed following rain on the Pinjin Station.

An assessment of potential impacts to matters of NES is addressed in chapter 7.2.11.

6.8. INFRASTRUCTURE CORRIDOR – GAS PIPELINE

360 Environmental Pty Ltd (360 Environmental) was commissioned by the Joint Venture to undertake a desktop assessment of two potential gas pipeline options to assist the Joint Venture in assessing power options for the Project (Appendix 2-E1). Gas is not currently considered to be a viable option for the Joint Venture due to current market constraints, however if additional gas supplies become available, additional field surveys will be undertaken and all relevant approvals will be progressed outside of this PER process. The Pinjin Pipeline Option is the preferred option (in the event that gas does become a viable option) and is located east of Menzies and north east of Kalgoorlie. In addition to Level 1 Flora and Fauna surveys conducted on the Pinjin Infrastructure Corridor (section 6.3), a desktop assessment was undertaken for the remaining area of the proposed gas pipeline.

6.8.1. Vegetation

The proposed gas pipeline route (where it extends west from Pinjin) is located in the eastern Murchison IBRA region.

Vegetation in the Murchison is dominated by *Acacia* woodlands and is often rich in ephemerals, hummock grasslands, saltbush shrublands and Halosarcia shrublands.

The major vegetation communities described by Beard (1975) as occurring within the assessment area include:

- *Acacia* forests and woodlands;
- *Acacia* shrublands;
- *Acacia* open woodlands; and,
- hummock grassland – this vegetation community is more dominant in the Pinjin survey area.

As previously mentioned in section 6.3, 37 plant communities were defined within the Pinjin Infrastructure Corridor.

6.8.2. Flora

Two DRF species *Gastrolobium graniticum* and *Conospermum toddii* (listed as Endangered under the EPBC Act) are predicted to occur within the area of the possible gas pipeline. Of these, only *C. toddii* was recorded in the Pinjin Infrastructure Corridor survey.

Twenty five Priority Flora species as defined by the DEC are predicted to occur within in the survey area, of which thirteen were recorded in the Pinjin Access Road surveys.

6.8.3. Fauna

Ten native mammal species of conservation significance are predicted to occur within the gas pipeline survey area. No listed native mammal species were observed during the Pinjin survey (section 6.3). However, the following secondary evidence of species presence was noted along the Pinjin Infrastructure Corridor:

- mole holes were identified on several dunes along the corridor; and,
- potentially suitable habitat for Mulgara and Sandhill Dunnarts was noted at several locations.

Fourteen bird species of conservation significance were predicted. The following listed bird species (or their nests) were recorded during the surveys:

- Malleefowl (*Leipoa ocellata*) - Vulnerable, EPBC Act and Schedule 1, WC Act;
- Rainbow Bee-eater (*Merops ornatus*) - Migratory, EPBC Act; and,
- Bustard (*Ardeotis australis*) - Priority species by the DEC.

Three reptile species of conservation significance are predicted to occur however none were recorded during the survey.