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Chapter 9

Flora

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Genex Kidston Connection Project - Ministerial Infrastructure Designation Assessment Report

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9.0 Flora

9.1 Existing Environment

This chapter provides an assessment of flora values associated with the proposed transmission line and switching station site. References to the Preferred Alignment in this Chapter refers to the entire Project (i.e. transmission line and Mount Fox switching station). Detailed ecology survey reports are provided in Appendix D Ecology Technical Report, and summarised within this Chapter.

9.1.1 Methodology

Flora values associated with the Preferred Alignment have been assessed through a range of methodologies.

- Desktop assessment to characterise and identify potential flora species and their habitat that may be present within the Preferred Alignment. The desktop assessment included a review of literature, searches of publicly available datasets and online mapping and work previously completed by AECOM and others.
- Field surveys to classify and map Regional Ecosystems (RE) and to identify flora species, including conservation significant and introduced flora. Four separate field surveys targeting flora values were undertaken from November 2017 to August 2018. A Protected Plants survey was undertaken in accordance with the *Nature Conservation Act 1992* (NC Act) requirements where the alignment crosses a high-risk area. Additional flora and fauna field assessments have since been completed in August 2021, targeted to this section of the Preferred Alignment that was previously unable to be accessed. Methodology and results used in the August 2021 assessments can provided in a supplementary report if requested.
- A likelihood of occurrence assessment for conservation significant flora species and communities identified during the desktop review was undertaken. The assessment considered known habitat and ecological requirements of the threatened species against the vegetation communities and habitat values identified in the field surveys.
- Potential habitat maps for the conservation significant flora identified as having a likelihood presence of ‘potential’, ‘high’ or ‘known’ have been created to identify potential habitat across the Preferred Alignment.

The Preferred Alignment in this location traverses the Kidston Mining Lease (ML3347) held by Genex. The site is heavily disturbed due to previous mining activity, and the flora values are limited. Flora values associated with this short connection are therefore not considered further in this chapter.

A significant residual impact assessment for MNES and MSES in accordance with both the Commonwealth and State criteria has been undertaken and is discussed in Chapter 11 Matter of Environmental Significance.

9.1.2 Bioregion and subregion

The Preferred Alignment is primarily located within the Einasleigh Uplands bioregion. This bioregion largely consists of a series of ranges and plateau surfaces, varying in altitude between 100 m in the west to 1,100 m in the east.

Approximately 500 m of the eastern end of the Preferred Alignment, including the Mount Fox switching station site is within the Wet Tropics bioregion. This bioregion is dominated by rugged, rainforest mountains as well as extensive plateau areas and low lying coastal plains.

9.1.3 Vegetation communities

The Department of Resources (DoR) RE mapping was reviewed as part of the desktop assessment to determine the extent of REs across the Preferred Alignment. The Preferred Alignment was shown to primarily comprise remnant vegetation (including heterogenous polygons) analogous to up to forty-seven (47) REs.

Based on the status under the *Vegetation Management Act 1994* (VM Act) five of the of the mapped REs are listed Of Concern (RE 7.5.4f, 7.8.18a, 7.12.29a, 9.3.23 & 9.12.10) and the remaining are

Least Concern. No state mapped REs are listed Endangered under the VM Act. Desktop RE mapping and a comparison to ground-truthed REs is shown in Figure 7 of Appendix D.

Results of the field survey confirmed the presence of twenty (20) of the 47 mapped REs as well as seventeen additional REs not previously mapped within the Preferred Alignment. Ground-truthed RE mapping is show in Figure 7 of Appendix D. For areas that could not be accessed during the survey, RE classification and extent was determined based on a combination of state mapping, extrapolated field data and aerial photograph interpretation.

To understand the ecologically distinct vegetation communities present within the Preferred Alignment, field-validated REs have been grouped based on their associated regional (1:1,000,000) Broad Vegetation Group (BVG) (Table 9-1). Sixteen different BVGs are represented by the vegetation of the Preferred Alignment.

Table 9-1 Preferred Alignment BVGs, REs and associated state conservation status

Vegetation Community	BVG	Relevant REs	VM Act Status	EP Act Biodiversity Status
Closed to open forest of *C. intermedia* and *Eucalyptus tereticornis* on coastal ranges	9c	7.8.7	Of Concern	Endangered
		7.8.18	Of Concern	Of Concern
		7.12.29	Least Concern	No Concern at Present
Open woodland dominated by *Eucalyptus crebra* on basalt plains	11b	9.8.1	Least Concern	No Concern at Present
		9.8.4	Least Concern	No Concern at Present
Eucalyptus microneura woodland on rolling metamorphic hills	13b	9.11.23b	Least Concern	No Concern at Present
Open forests and woodlands of *Eucalyptus crebra* and *Eucalyptus sp.* on granitic and metamorphic ranges	13c	9.11.2a	Least Concern	No Concern at Present
		9.11.16	Least Concern	No Concern at Present
		9.11.15a	Least Concern	No Concern at Present
		9.12.1a	Least Concern	No Concern at Present
		9.12.10	Of Concern	Of Concern
		9.12.12	Least Concern	No Concern at Present
		9.12.16	Of Concern	Of Concern
Eucalyptus moluccana woodland on igneous rocks	13d	9.12.26	Of Concern	Of Concern
Eucalyptus camaldulensis, Casuarina cunninghamiana and *Melaleuca sp*. riparian open forest on alluvium	16a	9.3.1	Least Concern	Of Concern
Eucalyptus leptophleba open woodland on alluvium	16b	9.3.3, 9.3.3a	Least Concern	Of Concern

Vegetation Community	BVG	Relevant REs	VM Act Status	EP Act Biodiversity Status
Eucalyptus platyphylla or *Eucalyptus crebra* woodlands on floodplains	16c	9.3.6a	Least Concern	No Concern at Present
		9.3.16	Least Concern	Of Concern
		9.3.22a	Least Concern	Of Concern
Eucalyptus brownii woodland on alluvium	17a	9.3.5	Least Concern	Of Concern
Eucalyptus melanophloia or *Eucalyptus shirleyi* low open woodland on hills and ranges	17b	9.11.1a	Least Concern	No Concern at Present
Eucalyptus crebra woodland on colluvial plains	18b	9.5.3	Least Concern	No Concern at Present
Eucalyptus microneura open forest to woodland on alluvium	18d	9.3.20	Least Concern	No Concern at Present
Eucalyptus persistens open forest to woodland on hills and ranges	19d	9.5.11	Least Concern	No Concern at Present
		9.7.1	Least Concern	No Concern at Present
		9.11.5	Least Concern	No Concern at Present
		9.12.32	Least Concern	No Concern at Present
Melaleuca spp., *Eucalyptus camaldulensis* and *Casuarina cunninghamiana* riparian open forest	22c	9.3.13	Least Concern	Of Concern
Acacia shirleyi low open forest on laterite	24a	9.7.2	Least Concern	No Concern at Present
Tussock grassland dominated by *Dichanthium spp.* on on undulating downs or clay plains	30b	9.3.25	Least Concern	Of Concern
		9.8.13	Least Concern	No Concern at Present

9.1.4 Regulated Vegetation

A review of the DoR Regulated Vegetation mapping identified the presence of regulated vegetation at various locations within the Preferred Alignment. The Preferred Alignment contains large portions of Category B (remnant vegetation) mapping, as well as portions of Category C, R and X (Figure 5 in Appendix D).

9.1.5 Threatened Ecological Communities

One Endangered Threatened Ecological Community (TEC) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was identified in the desktop assessment as having potential to occur within the Preferred Alignment, being the Broad leaf tea-tree TEC. In Queensland, Broad leaf tea-tree TEC corresponds to the following REs: 7.3.8a, 7.3.8b, 7.3.8c, 7.3.8d, 7.5.4g, 8.3.2a, 8.5.2c and 8.5.6.

No TECs were encountered during the field surveys. REs confirmed during the field surveys were not analogous to the REs associated with the Broad leaf tea-tree TEC, and vegetation within the Preferred Alignment does not meet the key diagnostic features or condition thresholds for the TEC, as detailed in the Listing Advice.

9.1.6 Conservation significant flora

The desktop assessment identified 22 conservation significant flora species as having the potential to occur within 20 km of the Preferred Alignment, including 14 EPBC Act listed species and 20 NC Act listed species.

The likelihood of occurrence assessment identified four flora species that are known, likely or have potential to occur within the Preferred Alignment, based on the flora and habitat observed during the field surveys (Table 9-2).

Table 9-2 Flora Likelihood of Occurrence Assessment Results

Species	EPBC Act Status	NC Act Status	Likelihood of Occurrence
Tingoora wattle *Acacia tingoorensis*	Not listed	Vulnerable	Potential
Bluegrass *Dichanthium setosum*	Vulnerable	Not listed	Potential
Leptospermum pallidum	Not listed	Near Threatened	Known
Tephrosia leveillei	Vulnerable	Vulnerable	Potential

Two species are listed under the EPBC Act, and all four species are listed under the NC Act. A complete likelihood of occurrence assessment is provided in Appendix D. One conservation significant flora species was identified during the field surveys, being *Leptospermum pallidum*, listed as Near Threatened under the NC Act.

This species was discovered approximately 34 m north of the Preferred Alignment (-18.971496, 144.723464) on Lot 547/SP242570. The location of the record is shown on Figure 12 of Appendix D. The population was identified on the slopes of a lateritic jump-up (RE 9.7.2) and comprised >50 individuals. The species identification was confirmed by the Queensland Herbarium.

9.1.7 Essential Habitat

The desktop assessment identified a section adjacent to the east of the Preferred Alignment (Mount Fox end) that is mapped as essential habitat for the conservation significant flora species *Acacia tingoorensis* (Tingoora wattle) (Figure 6 in Appendix D). This species is listed as Vulnerable under the NC Act and is discussed further in the following section. An additional area of essential habitat for *Leptospermum pallidum* is mapped within the Study Area in Lot 547/SP242570 (Figure 6 in Appendix D).

9.1.8 Protected Plants

The desktop assessment identified a section in the east of the Project Area (Mount Fox end) that is mapped as a 'high risk area' on the Protected Plants Flora Survey Trigger Map (Figure 6 of Appendix D). An additional area of 'high risk area' for *Leptospermum pallidum* is mapped within the Study Area in Lot 547/SP242570 (Figure 6 in Appendix D).

A protected plants survey was undertaken in accordance with the *Flora Survey Guidelines – Protected Plants*. The threatened species triggering the high risk area was not able to be confirmed by the Queensland Herbarium due to insufficient data. An area of essential habitat for *Acacia tingoorensis* (Tingoora wattle) is mapped by DES nearby, and a targeted search for this species was undertaken concurrently with the protected plants survey.

No conservation significant flora species were identified within the high risk trigger area in the east. However, *Leptospermum pallidum* was identified within Lot 547/SP242570 in the Study Area, and therefore may have impact and management implications for the Project. The survey has since expired, and will be redone in Late 2021.

9.2 Potential Impacts

The following section details the potential impacts to flora values within the Preferred Alignment. The potential impacts have been considered in the following ways:

- construction phase impacts
- operation and maintenance phase impacts.

9.2.1 Construction phase impacts

The greatest risk of potential impact on ecological values from the Project will occur during the construction phase. The construction activities to support the installation of switching station, transmission towers, associated lines and access tracks will involve vegetation clearing, excavation and ground reinstatement. Direct and indirect impacts potentially associated with this are described below.

9.2.1.1 Direct Impacts

Vegetation clearing is a direct impact that can result in the loss of vegetation values and habitat. Potential impacts resulting from clearing native vegetation can include the following.

- Reduced patch size of vegetation communities potentially compromising the viability of the community and associated habitat.
- Loss of habitat causing a reduction of biological diversity or loss of local populations and genotypes.
- Loss of or disturbance to microhabitat features such as tree hollows, leaf litter, ground timber, dense shrubs and hollows.
- Loss of floristic diversity and the food resources this provides such as foliage, flowers, nectar, fruit and seeds.
- Destruction of abiotic features necessary to support vegetation communities and habitat types.

Pre-clearance surveys will identify any potentially occurring threatened flora species within the Preferred Alignment. Should threatened flora species be identified, these individuals will be demarcated and avoided by construction.

The total extent of Preferred Alignment is 575.02 ha and includes 529.28 ha of mapped reginal ecosystems (Table 3).

Table 3 REs within the Preferred Alignment

RE ID	Short Description[1]	VM Act Status[2]	Extent within Project footprint (ha)
7.12.29	*Corymbia intermedia* and/or *Lophostemon suaveolens* open forest to woodland +/- areas of *Allocasuarina littoralis* and *A. torulosa* on uplands on granites and rhyolites.	Least Concern	1.98
7.8.18	*Corymbia intermedia* (pink bloodwood) and/or *Lophostemon suaveolens* (swamp mahogany) +/- *Allocasuarina torulosa* (forest sheoak) open forest to woodland. Basalt.	Of Concern	19.39
9.3.1	*Eucalyptus camaldulensis* and/or *Eucalyptus tereticornis* +/- *Melaleuca* spp. +/- *Casuarina cunninghamiana* fringing woodland on channels and levees.	Least Concern	3.24
9.3.3	*Corymbia spp*. and *Eucalyptus spp.* dominated mixed woodland on alluvial flats, levees and plains.	Least Concern	0.09
9.3.3a	Woodland to low open woodland of *Eucalyptus leptophleba* +/- *Eucalyptus platyphylla* +/- *Corymbia confertiflora* +/- *Eucalyptus crebra* or *Eucalyptus cullenii* +/- *Corymbia clarksoniana* on alluvial plains and terraces.	Least Concern	1.20
9.3.5	*Eucalyptus brownii* +/- *Eucalyptus* spp. +/- *Corymbia* spp. open woodland on alluvial plains.	Least Concern	3.35
9.3.6a	Woodland to open woodland of *Eucalyptus platyphylla* +/- *Corymbia clarksoniana* +/- *Corymbia tessellaris* +/- *Eucalyptus tereticornis* on alluvial plains.	Least Concern	1.96
9.3.13	*Melaleuca* spp., *Eucalyptus camaldulensis* and *Casuarina cunninghamiana* fringing open forest on streams and channels.	Least Concern	7.71
9.3.20	*Eucalyptus microneura* +/- *Corymbia* spp. +/- *Eucalyptus leptophleba* woodland on alluvial plains.	Least Concern	1.37
9.3.22a	Open woodland to woodland of *Eucalyptus crebra*, *Corymbia clarksoniana* and/or *Corymbia dallachiana* +/- *Eucalyptus platyphylla* +/- *Eucalyptus brownii* +/- *Eucalyptus* spp. on levees, terraces and banks of larger rivers and on flat to very gentle slopes associated with drainage lines.	Least Concern	31.39
9.3.25	*Dichanthium* spp., and/or *Astrebla* spp. +/- *Iseilema* spp. grassland on alluvial deposits derived from basalt soils.	Least Concern	0.75
9.5.3	*Eucalyptus crebra* or *Eucalyptus drepanophylla* and *Corymbia clarksoniana* woodland on sand plains.	Least Concern	37.19
9.5.11	*Eucalyptus persistens* +/- *Eucalyptus crebra* woodland on flats on Tertiary remnant plains.	Least Concern	16.58

RE ID	Short Description[1]	VM Act Status[2]	Extent within Project footprint (ha)
9.7.1	*Eucalyptus persistens* woodland on lateritised and deeply weathered surfaces on undulating terrain.	Least Concern	43.07
9.7.2	*Acacia shirleyi* low woodland on mesas and lateritised surfaces.	Least Concern	5.44
9.8.1	*Eucalyptus crebra* +/- *Corymbia dallachiana* +/- *E. leptophleba* open woodland on plains and rocky rises of basalt geologies.	Least Concern	8.70
9.8.4	*Eucalyptus crebra* and/or *E. tereticornis* open woodland on basalt plains.	Least Concern	4.90
9.8.13	*Iseilema* spp. and/or *Dichanthium* spp. tussock grassland on basalt plains.	Least Concern	0.48
9.11.1a	Low woodland to low open woodland of *Eucalyptus melanophloia* +/- *Eucalyptus persistens* +/- *Eucalyptus crebra* +/- *Corymbia dallachiana* +/- *Corymbia peltata* +/- *Eucalyptus brownii* +/- *Acacia julifera* on skeletal soils of slopes and crests of undulating rises and low hills of folded metasediments and other metamorphic rocks.	Least Concern	4.07
9.11.2a	Woodland to open woodland of *Eucalyptus crebra* +/- *Corymbia dallachiana* +/- *Corymbia erythrophloia* +/- *Corymbia clarksoniana* +/- *Eucalyptus* spp. +/- *Corymbia* spp. on metamorphic hills and rises.	Least Concern	52.31
9.11.2a / 9.11.5	Woodland to open woodland of *Eucalyptus crebra* +/- *Corymbia dallachiana* +/- *Corymbia erythrophloia* +/- *Corymbia clarksoniana* +/- *Eucalyptus* spp. +/- *Corymbia* spp. on metamorphic hills and rises. / *Eucalyptus persistens* +/- *Eucalyptus crebra* woodland on low metamorphic hills.	Least Concern	22.00
9.11.5	*Eucalyptus persistens* +/- *Eucalyptus crebra* woodland on low metamorphic hills.	Least Concern	40.72
9.11.5 / 9.22.2a	*Eucalyptus persistens* +/- *Eucalyptus crebra* woodland on low metamorphic hills. / Woodland to open woodland of *Eucalyptus crebra* +/- *Corymbia dallachiana* +/- *Corymbia erythrophloia* +/- *Corymbia clarksoniana* +/- *Eucalyptus* spp. +/- *Corymbia* spp. on metamorphic hills and rises.	Least Concern	44.10
9.11.5 / 9.7.2 / 9.7.1	*Eucalyptus persistens* +/- *Eucalyptus crebra* woodland on low metamorphic hills. / *Acacia shirleyi* low woodland on mesas and lateritised surfaces. / *Eucalyptus persistens* woodland on lateritised and deeply weathered surfaces on undulating terrain.	Least Concern	51.06

RE ID	Short Description[1]	VM Act Status[2]	Extent within Project footprint (ha)
9.11.15a	Woodland to low open woodland of *Eucalyptus crebra* or *Eucalyptus cullenii* +/- *Corymbia erythrophloia* or *Corymbia pocillum* +/- *Corymbia dallachiana* +/- *Erythrophleum chlorostachys* +/- *Eucalyptus microneura* on low hills and rises with moderately deep soils derived from metamorphic geologies.	Least Concern	62.46
9.11.16	*Eucalyptus crebra* +/- *Corymbia erythrophloia* or *Corymbia pocillum* woodland on steep to rolling hills.	Least Concern	6.24
9.11.16 / 9.11.23	*Eucalyptus crebra* +/- *Corymbia erythrophloia* or *Corymbia pocillum* woodland on steep to rolling hills. / *Eucalyptus microneura* +/- *Corymbia erythrophloia or C. pocillum* low open woodland on rolling metamorphic hills and rises	Least Concern	0.66
9.11.23b	Low open woodland to woodland of *Eucalyptus microneura* +/- *Eucalyptus cullenii* or *Eucalyptus crebra* on metamorphic hills.	Least Concern	21.87
9.12.1a	Woodland to low open woodland of *Eucalyptus crebra* +/- *Corymbia dallachiana* +/- *Corymbia erythrophloia* +/- *Corymbia clarksoniana* +/- *Corymbia* spp. *Eucalyptus exilipes* on a variety of landforms from undulating plains to steep hills.	Least Concern	5.21
9.12.10	*Corymbia confertiflora* and *Eucalyptus crebra* +/- *Corymbia clarksoniana* open woodland on rolling igneous hills.	Of Concern	13.03
9.12.12	*Eucalyptus crebra* and *Corymbia erythrophloia* +/- *Eucalyptus microneura* open woodland on igneous rocks.	Least Concern	2.09
9.12.16	*Eucalyptus crebra* and *Corymbia dallachiana* +/- *C. erythrophloia* open woodland on pre-Cainozoic basalt loams and flats to undulating plains	Of Concern	10.51
9.12.26	*Eucalyptus moluccana* +/- *E. crebra* and/or *E. granitica* woodland on igneous rocks.	Of Concern	2.19
9.12.32	*Eucalyptus persistens* woodland on rhyolites and granites.	Least Concern	1.97

[1] Short description as per the Regional Ecosystem Description Database (REDD). Version 12 (March 2021)

[2] Conservation status of the RE under the VM Act.

[3] Biodiversity (BD) status under the EP Act of the RE based on an assessment of the condition of remnant vegetation in addition to the pre-clearing and remnant extent of a regional ecosystem.

9.2.1.2 Indirect Impacts

The loss of vegetation and habitat as well as the construction activities required to be undertaken to clear vegetation or complete construction, can potentially result in indirect or secondary impacts to the associated floristic values. This includes the following.

- Increased edge effects reducing the condition of quality of remaining vegetation communities and habitat types.
- Although exotic weeds were found to be relatively common across the Preferred Alignment, further disturbance can permit the establishment and spread of exotic species that may displace native species, native habitat resources and alter fire regimes.
- Generation of dust emissions leading to excessive deposition of dust on leaves of plants suppressing photosynthesis and growth.

9.2.2 Operation

Potential impacts on ecological values during the operation and maintenance phase of the Project are likely to be low. Activity within the Preferred Alignment will be very low and limited to periodic maintenance.

Maintenance will involve vegetation clearing (predominantly treatment of regrowth) in areas that were cleared during the construction phase and along tracks. As parts of the Preferred Alignment are dominated by highly erodible soils, this further removal of vegetation may lead to new occurrences of erosion or increased severity in areas already eroded. Increased erosion will result in the loss of soil structure and inadvertently lead to the loss of vegetation in adjacent areas over time.

9.3 Mitigation and Management Measures

To mitigate potential impacts to potentially occurring flora values, an Environmental Management Plan (Appendix B) has been developed for the Project. The follow sections further describe mitigation and management measures.

9.3.1 Vegetation clearance

Vegetation clearing for the Project will be limited to only where there is a statutory requirement under the *Electricity Act 1994* and *Electrical Safety Regulation 2013* to maintain safe clearances between conductors and the vegetation, and to enable safe working conditions for construction (particularly heli-stringing) and maintenance crews.

A key benefit of co-locating the Preferred Alignment with the existing Ergon lines will be the reduced amount of additional clearing required when compared to a standalone transmission line. While the extent of the transmission line will mean that impacts on remnant vegetation communities are unavoidable, there are a range of measures that will be implemented in addition to the Environmental Management Plan (Appendix B) to minimise the level of impact from clearing vegetation. These include the following measures.

- The Project Environmental Management Plans and EWPs will include vegetation management and mapping to provide clear guidance on areas to be cleared and retained, methods for clearing and other relevant environmental protection measures.
- During detailed design, scalloping or spanning over sensitive environments to be applied where practicable.
- Workers will be made aware of management requirements in induction training and through work instructions.

9.3.2 Increased dust

To minimise the deposition of dust on adjacent vegetation, dust generation from Project activities will be minimised by engineering controls and dust suppression measures will be used, such as water trucks and sprinklers. Vehicle speeds will also be restricted on cleared tracks to minimise the generation of dust.

9.3.3 Edge effects

To minimise edge effects within the Preferred Alignment, the following measures will be implemented.

- Clear demarcation of remnant vegetation at the boundary of the clearing footprint that must not be disturbed, to avoid inadvertent clearing and disturbance.
- Implementation of a Biosecurity Management Plan which incorporates monitoring of the Preferred Alignment for incursion of weed species and application of weed management, as required.

9.3.4 Species Specific Mitigation

Any vegetation clearing in the areas adjacent to known or potential conservation significant species, must be undertaken carefully so as not to inadvertently disturb any individuals of this species. The following mitigations are proposed.

- Prior to construction, individuals of this species will be identified and flagged to ensure all construction personnel are aware of its location. A picture of the species and its location will be included in the EMP and EWP maps.
- Maintain a maximum distance as possible from all individuals.
- Maintain standard weed management practices as per Biosecurity Management Plan.

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