Western Botanical

Interim Detailed Flora and Vegetation Assessment and Gap Analysis
Moorine Rock to Mt Holland minesite.
Southern Section, Parker Range to Mt Holland,
Supporting Clearing Permit CPS 10049

Prepared for: Covalent Lithium Pty. Ltd. and Shire of Yilgarn

Report Ref: WB1003

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Contents

Appendices

Tables

Figures

Plates

Executive Summary

The Shire of Yilgarn is undertaking a road upgrade and maintenance works south and south-west of the townships of Southern Cross and Marvel Loch. This includes realignments and sealing of Stubbs Street and Parker Range Road south of Moorine Rock, the newly constructed Parker Range Road diversion around the Mt Caudan minesite and a section of the Marvel Loch to Forrestania Road from the Parker Range Road intersection to the Mt Holland minesite. The realignment, widening and sealing is required due to anticipated increase in traffic as a result of expanded mining operations within the area.

Covalent commissioned Western Botanical to conduct a Detailed Assessment of the flora and vegetation of the proposed Mt Holland Logistics Haul Road (hereafter referred to as the Study Area). As part of this, a desktop review was implemented to provide contextual information, particularly regarding flora and vegetation of conservation significance, prior to the completion of extensive floristic survey of the route.

The Study Area is approximately 113 km in length. In the area adjacent to freehold land (cleared agricultural land) the Study Area is narrow, restricted to the road easement between fencelines either side of the road. In the area south of Cockatoo Tanks (Water Reserve 12369744) at approximately chainage 46km, the vegetation has not been cleared for agricultural purposes and the Study Area extends to a 1 km wide alignment, 500m either side of the road alignment, in areas of native vegetation. The Study Area lies entirely within the Shire of Yilgarn.

This Interim Report specifically addresses CPS 10049: Southern Section (Section 2) being chainage 63.0 to 113.0: from (i) the eastern end of the Parker Range Road diversion to the intersection with the Marvel Loch – Forrestania Rd, (ii) and thence southward to the Mt Holland minesite, a total alignment of 50.0 km. The southern-most 2.15 km of road overlaps with the section of the Marvel Loch – Forrestania Road noted under Ministerial Statement MS1118. This document presents interim flora and vegetation information and associated gap analysis for the Southern Section as at 12th June 2023.

Fifty-one eucalypt-dominated Vegetation Associations and 26 Shrubland Vegetation Associations were recognised within the Entire Study Area from Chainage 0.2 km (Great Eastern Hwy) to 113 km (Mt Holland minesite), inclusive of the Moorine Rock railway siding which lies outside the current or planned Clearing Permit Applications.

A large proportion of the Southern Study Area, chainage 63.0 km to approximately 87.5 km (24.5 km, 49%), the subject of CPS 10049, lies within the Plant assemblages of the Parker Range System PEC (Vulnerable). This occurs in the eastern fringe of the Merredin IBRA subregion in this area. Almost all of this portion of the road alignment lies within Tall eucalypt Woodlands and Mallee Shrublands that correlate with the Federally listed Woodlands of the Avon Wheatbelt TEC. A small proportion of this Study Area, from approximately Chainage 102 km to 103 km (1 km,

0.88%), lies within the Ironcap Hills vegetation complexes (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded ironstone formation) Priority 3 PEC.

The majority of vegetation within the CPS 10049 application area is in Excellent to Pristine condition, with small, isolated and disjunct portions being subject to historical or current mining or borrow pit operations. Most historically disturbed sites have regenerated to a large degree through natural regeneration of eucalypt tree seedings and understorey species and are mapped as Good Condition. About 1.5 km (1.3%) of the road alignment within CPS 10049 application area represents the formerly heavily cleared "Camel Patch" location that is mapped as Completely Degraded on both sides of the road.

The overall species list for the project is still being compiled and is not presented in this report.

Only one species of Threatened Flora, *Banksia dolichostyla* (T), is known within the Study Area occurring from King Ingram Road southwards to just south of the mine access road turnoff. It is locally common on lateritic pizolitic gravelly hills with ferricrete between the Mt Holland minesite, Mt Holland hill and the Teddy Bear minesite some 5 km west of the Marvel Loch – Forrestania road alignment.

Seventy-four Priority Flora are noted as occurring within the entire Study Area from Moorine Rock to Mt Holland. These species have been extensively surveyed and mapped within the 50m either side of the road alignment and occasionally outside this alignment in opportunistic locations. These include:

- 27 Priority 1 flora
- 12 Priority 2 flora
- 26 Priority 3 flora
- 10 Priority 4 flora

Many of the Priority flora species present on the margins of the road alignment in its southern 26 km (chainage 87 to 113) are also present around the Mt Holland minesite development envelope where they have been carefully assessed and extensively mapped. Many of these species also occur within the Jilbadji Nature Reserve.

Forty-four Species of Interest are known to date within the Study Area:

- Thirty-three species are recognised to date as representing new species. Preliminary taxonomic reviews have been conducted, however, these each require dedicated taxonomic review and verification by third party (WAHERB) botanists. Sufficient material for TYPE collection has been gathered in many cases.

- Three species are recognised as new species but are common, widespread and not in need of conservation assessment.
- One taxon is noted as likely representing a new species within a broad complex.
- Two species are poorly collected in WA.
- Seven species (including one minor weed) are noted as representing Range Extensions for the species based on WAHERB data. These are largely widespread in WA and do not warrant conservation assessment.

A tabulated Impact Assessment is provided for Threatened flora, Priority flora and Species of Interest.

Further works planned for 2023 will address gaps in knowledge noted in the Limitations section.

An assessment against the EPA's 10 Clearing Principles is presented.

Geoff Cockerton

12th June 2023.

1. Introduction

The Shire of Yilgarn is undertaking a road upgrade and maintenance works south and south-west of the townships of Southern Cross and Marvel Loch. This includes realignments and sealing of Stubbs Street and Parker Range Road south of Moorine Rock, the newly constructed Parker Range Road diversion around the Mt Caudan minesite and a section of the Marvel Loch to Forrestania Road from the Parker Range Road intersection to the Mt Holland minesite, Figure 1. The realignment, widening and sealing is required due to anticipated increase in traffic as a result of expanded mining operations within the area. The road design and construction is being managed by the Shire of Yilgarn while Covalent is funding and managing the biological assessments to support Clearing Permits under the Environmental Protection Act (1986) for the road upgrade.

Covalent commissioned Western Botanical to conduct a Detailed Assessment of the flora and vegetation of the proposed Mt Holland Logistics Haul Road (hereafter referred to as the Study Area). As part of this, a desktop review was implemented to provide contextual information, particularly regarding flora and vegetation of conservation significance, prior to the completion of extensive floristic survey of the route. The Study Area for the Desktop Assessment was approximately 115 km in length and 10,914 ha in size. In the area adjacent to freehold land (cleared agricultural area) the Study Area is 200 m wide extending to a 1 km wide alignment in areas of native vegetation south of approximate chainage 4 km, Figure 2. The Study Area lies entirely within the Shire of Yilgarn.

Clearing Permit Applications for the overall road alignment are being presented for assessment in three sections, Figure 3.

- This Report addresses CPS 10049: Southern Section (Section 2) being chainage 63.0 to 113.0: from (i) the eastern end of the Parker Range Road diversion to the intersection with the Marvel Loch – Forrestania Rd, (ii) and thence southward to the Mt Holland minesite, a total alignment of 50.0 km. The southern-most 2.15 km of road overlaps with the section of the Marvel Loch – Forrestania Road noted under Ministerial Statement MS1118.

- Other sections under separate Clearing Permit Applications are:

    - CPS 10023: Northern Section (Section 1) inclusive of chainage 0.2 to 50.0: (i) the southern 450m of Stubbs Rd alignment (from 200m south of Great Eastern Hwy to the Parker Range Road); and (ii) the Parker Range Road alignment from Stubbs Road to Fence Road, a total alignment of 49.8 km. Western Botanical also assessed a small potential footprint at the Moorine Rock rail siding, however, this is not included in CPS 10023.

    - CP not yet submitted Central Section (Section 3) being chainage 50.0 to 63.0: the Parker Range diversion road recently constructed around the Mt Caudan minesite, a total alignment of 13.0 km.

This document presents interim flora and vegetation assessments and associated gap analysis for the Southern Section as at 12th June 2023.

1.1. Project Background

1.2. Previous surveys

Numerous previous surveys have been conducted in the region by ecologists for Covalent (and prior tenement holders) at the Earl Grey Lithium Project, Mt Holland site. These are referenced in the Desktop Assessment, Appendix 1.

Botanica Consulting (2010) have previously assessed flora of the Parker Range area including the newly-built Parker Range (Mt Caudan minesite) diversion road.

1.3. Current Survey

1.4. Physical Environment

The physical environment of the region encompassing the Study Area is described in Western Botanical 2023a, Appendix 1.

1.5. Biological Environment

The biological environment of the region encompassing the Study Area is described in Western Botanical 2023a, Appendix 1.

1.5.1. Roadside and Adjoining Vegetation

The Study Area in the region from Great Eastern Highway southwards to Cockatoo Tank Road, west of the Parker Range, traverses the eastern portion of the Western Australian Wheatbelt. This portion of the Study Area is represented by narrow roadside remnant vegetation within the road reserve with occasional patches of native vegetation on private land and Wockallarry Nature Reserve adjoining the road reserve. Some of this roadside reserve vegetation is largely cleared and represented by occasional single to small clumps of native trees. These areas may also support significant weed burdens. Other portions of the road reserve, from Great Eastern Highway southwards to Cockatoo Tank Road, while narrow (1 to 5m wide) are highly representative of the former native vegetation with little weed ingress. These areas were found to support a wide range of endemic species that are representative of former eastern wheatbelt.

From Cockatoo Tank Road, west of the Parker Range and southwards, native vegetation within the Study Area is largely intact, other than numerous small and often isolated historical small-scale mine-shafts, a water supply dam and an historical Government well and covered storage (locally known as “Dulcie Tanks”). Two small scale active mining operations exist between the Parker Range and Dunbar Road. An exception to this is an area of historical clearing locally

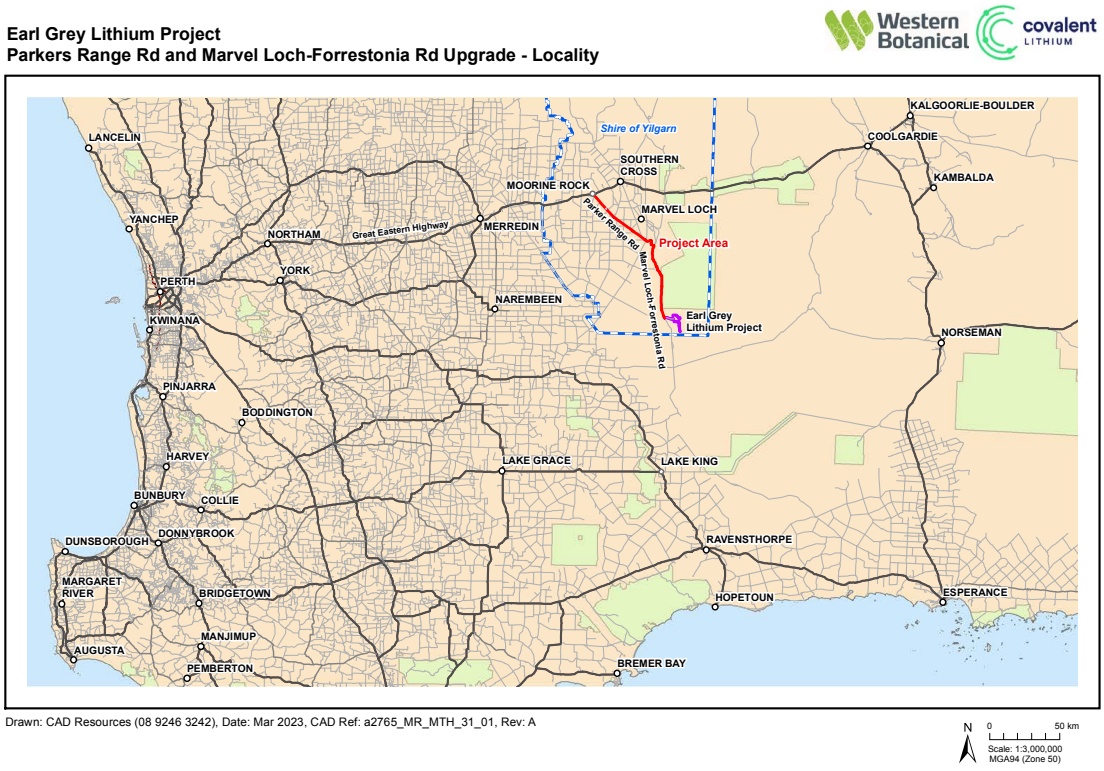
known as the "Camel Patch" which was purportedly cleared many years ago by Afghan cameleers and used as a resupply location for people travelling from Perth to Coolgardie prior to construction of the Great Eastern Highway.

Natural wildfires are a feature of the native vegetation of the region. Numerous post-fire regimes exist throughout the alignment from Parker Range southwards.

1.6. Site location map

The overall Study Area, inclusive of northern, central and southern sections, is represented in Figure 1 and Figure 2.

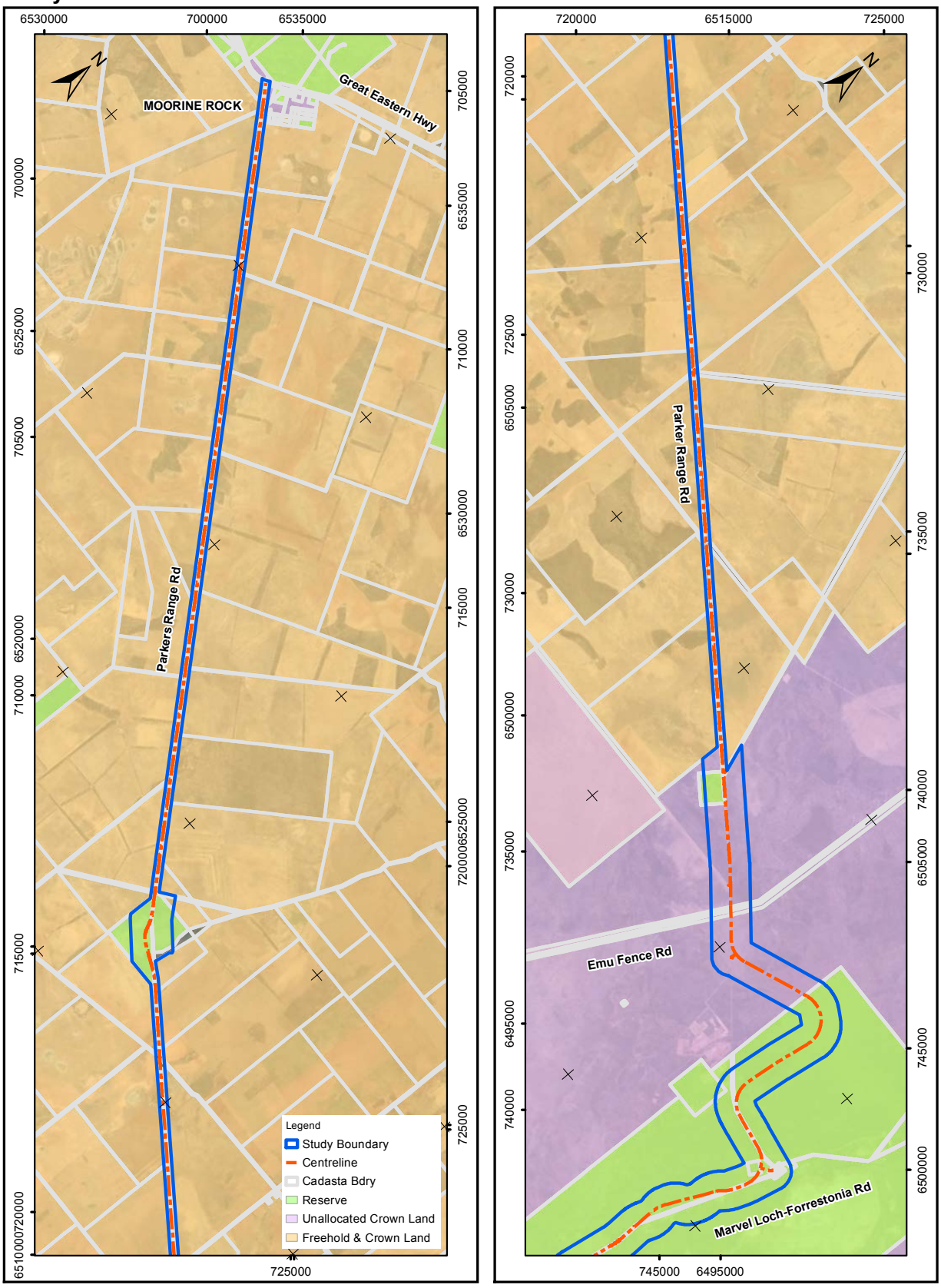
Figure 1. EGLP Logistics Road Study Area Location



The portion of the road alignment from Moorine Rock to the Mt Holland minesite addressed in this report, the subject of Clearing Permit CPS 10049, is presented in Figure 3.

Figure 2. Overall Study Area Overview

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Study Area - Sheet 1 of 2



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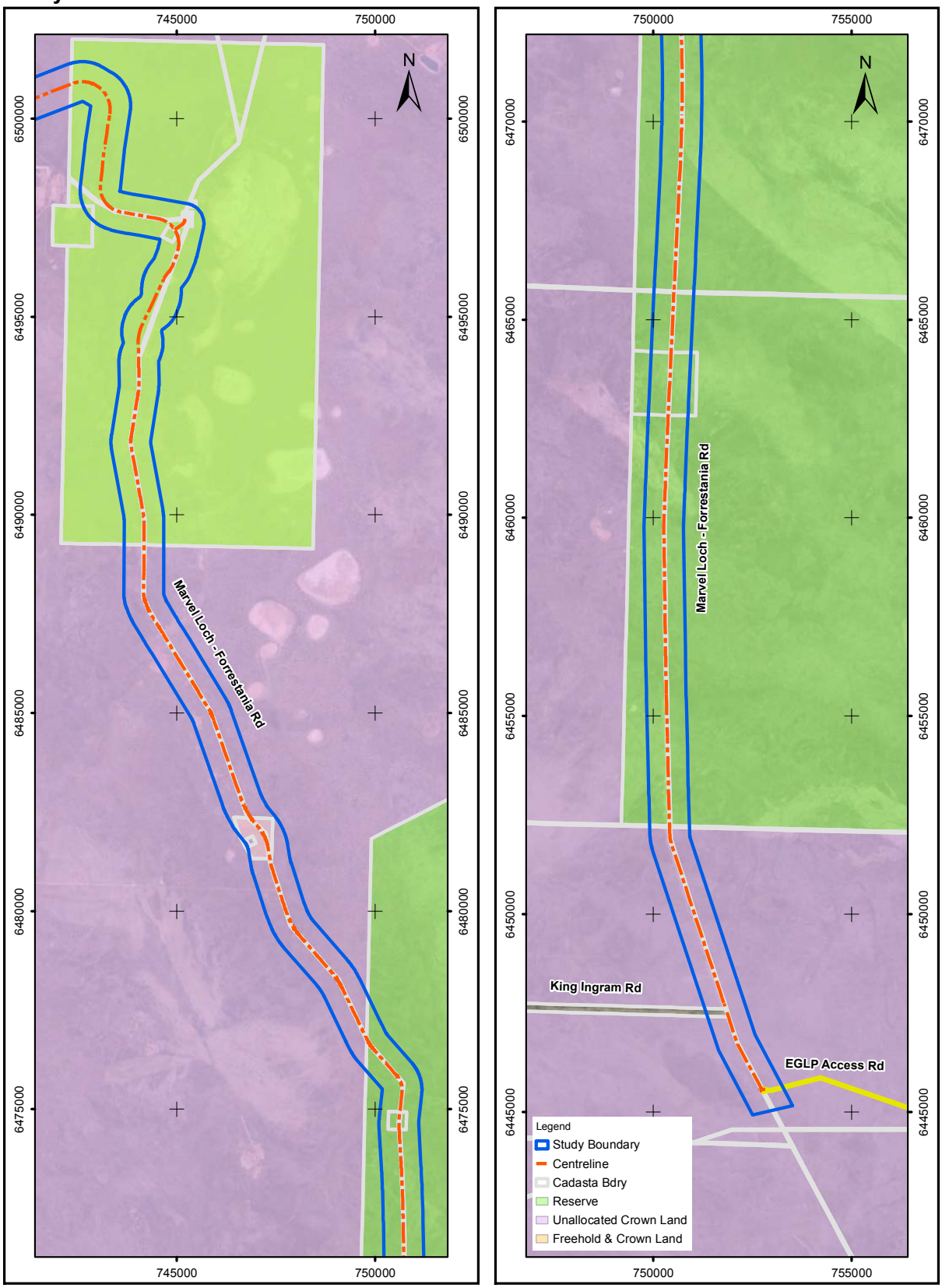
Scale 1:125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate

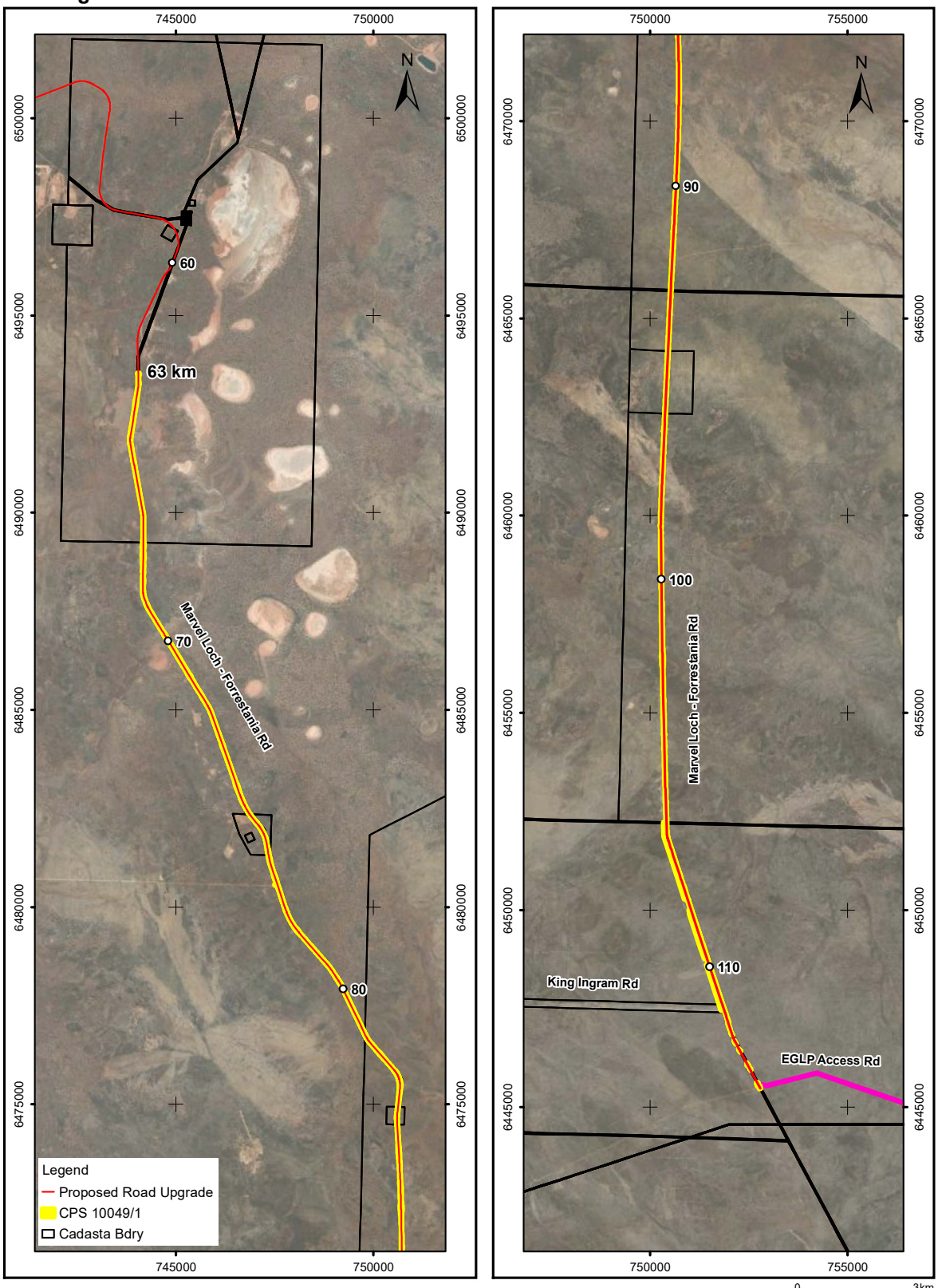
Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Study Area - Sheet 2 of 2



Drawn: CAD Resources (08 9246 3242), Date: Mar 2023, CAD Ref: a2765_MR_MTH_31_02_02, Rev: A
Scale 1125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate

Figure 3. Study Area of Clearing Permit CPS10049

Yilgarn Shire Council
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Clearing Permit CPS 10049/1



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_36_02_01, Rev: A
Scale 1125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER

2. Methods

The project was scoped as a Detailed Assessment following EPA Guidance (2016). The Study Area was centred on the road alignment and divided into two regions differing in survey intensity:

(i) High Intensity Survey conducted in a band of native vegetation from the existing road side and up to 50m either side of the road alignment (where this existed) termed the "Flora Detail" area where Vegetation Mapping with on-ground assessments was recorded, quadrats were established and where Targeted surveys for Significant Flora were conducted at high intensity – 10 m between operators walking in parallel.

(ii) Low Intensity Survey conducted in a contextual zone extending from 50 to 500m from the road alignment, termed the "Flora Inspection" area, where vegetation mapping was extrapolated, primarily utilising the high-resolution satellite imagery available with traverses and on-ground inspections where required.

2.1. Desktop Assessment

The Desktop Assessment presented in Western Botanical 2023a, Appendix 1, was prepared data inclusive of the Department of Biodiversity and Attractions' (DBCA's) WA Herbarium (WAHERB) and Threatened and Priority Flora (TPFL) databases (04-0320FL, 21-1120FL and 23-1221FL); the Threatened and Priority Ecological Communities (TECs, PECs) databases (09_1221EC); and the Protected Matters Search Tool (PMST).

The Desktop Assessment was conducted without reference to the on-going findings of field surveys which were implemented contemporaneously.

2.2. Field Survey

Field Surveys for the Study Area were conducted per the Scope and in order to meet EPA Guidance (2016) requirements for assessments of linear infrastructure as follows:

Methods employed in assessing the entire Study Area were:

(i) Vegetation mapping to NVIS Level 5 Association, prepared on 1:10,000 scale hard copy colour satellite image maps in the field at 119 Releve sites and digitised for analysis and presentation with initial brief Vegetation Association descriptions entered into a Microsoft Excel® workbook on a laptop computer.

(ii) Vegetation Condition, utilising the scale presented in EPA (2016), was used to categorise the condition of vegetation within the 100m wide Detailed Study Area centred on the road alignment with vegetation associations extrapolated to an overall width of 1 km within the Contextual Study Area using hard copy satellite imagery and the digital images available on iPads.

(iii) Species profiles for vegetation associations were prepared using 139 Quadrats (20 x 20m) for understorey and expanded to 50 x 50m for upper storey and incorporating opportunistic collections within communities. As an initial target, one quadrat was established every 1 km along the alignment with contrasting quadrats being established in areas of similar vegetation association but of differing fire regimes. Data was reviewed and corrected based on final determinations following specimen identification.

(iv) Targeted Surveys for Significant Species, defined here as (a) species listed by the DBCA as Threatened (T) or Priority (P) Flora, and (b) any anomalous species that may represent new taxa, here-in referred to as Species of Interest (SOI). Records of all Significant Species were entered into an ARCGIS Field Maps® database on iPads managed by CAD Resources Pty Ltd. Targeted Surveys were undertaken at an average of 10m between individual operators utilising survey lines defined on iPads overlaid on high resolution aerial imagery. Data was reviewed and corrected based on final determinations following specimen identification.

(v) Targeted Survey timing was planned and implemented so that (i) large and readily recognised species were surveyed in a suitable season but which may not have included their flowering period and (ii) cryptic species were surveyed during their optimal flowering period which was usually early to mid-Spring for most smaller shrub species and in late Spring to early Summer for late flowering species such as *Chamelaucium*, *Rinzia* and *Verticordia* species. This meant return visits to some areas were necessary to capture all Significant Species known to occur within a particular landscape or soil type.

(vi) Multiple specimens of Significant Species were collected throughout the Study Area, particularly at locations that represented disjunct populations. Specimens were collected noting GPS coordinates with +/- 2.5m positional error and attributing a unique collector's number utilising a Fulcrum® database.

(vii) Records of Threatened Flora were revisited and captured utilising Differential GPS with an accuracy of +/- 10 cm by a Mt Holland minesite surveyor under direct supervision by a Senior Botanist.

(viii) All specimens collected, including those readily recognised in the field, were reviewed utilising the resources at the WA Herbarium's Reference Herbarium. Challenging specimens were resolved using the WA Herbarium's Research Collection. TYPE specimens were viewed utilising the JSTORE Plants website. Reference to third party specialist taxonomists was sought where required.

(ix) Specimens of all species encountered were retained for reference. A Field Herbarium of some 600 specimens of endemic species was prepared and updated on a fortnightly basis as required to assist in uniformity of species nomenclature in surveys. Priority flora and

SOI specimens were maintained commensurate with field survey progress and reference specimens of these were retained in the field during surveys for ready reference.

(x) Weed populations were recorded as point data indicating presence only. Numbers of weeds were not estimated. Larger populations of weeds were indicated using multiple points within and at extremes of occurrences.

(xi) At least one good specimen of each Priority Flora species and Species of Interest will be vouchered at the WA Herbarium for verification of identity and for taxonomic studies as required. This task is in progress as at time of preparation of this document. Duplicates specimens of novel taxa have been submitted to act as TYPE specimens where necessary.

Multiple field surveys on a fortnightly basis were undertaken to assess the alignment in its entirety. Survey Effort to 21 February 2023 has included:

(i) To date, 24 weeks of field survey with between 4 and 6 personnel per trip have been implemented over a period of 16 months, a total of approximately 840 man-days, consisting of:

a) Fifteen x seven-day field trips (each consisting of 2 days travel and 5 days on-ground survey) with between 4 to 6 personnel commenced 29th November 2021 and continued until 23rd August 2023 on a fortnightly basis. One field trip was not undertaken to allow specimen identification and processing early in the assessment.

b) A further nine x seven-day surveys field trip of the road alignment were re-commenced 26th September 2022 and continued to 21st February 2023.

(ii) Surveys were redirected to other areas (potential borrow pits) from 29th August to 18th September 2022, reported separately by Western Botanical.

2.3. Statistical Analysis

Statistical analysis of quadrat data will be implemented utilising the PATN analysis package to verify vegetation association categorisation. At this stage, there is insufficient representation of quadrats to enable a meaningful statistical analysis to be undertaken.

3. Results and Discussion

3.1. Desktop Assessment

The results of the Desktop Assessment presented in Western Botanical 2023a, Appendix 1, are paraphrased below:

- The Study Area intersects the Merredin subregion (AVW-01) of the Avon Wheatbelt bioregion and the Southern Cross subregion (COO-02) of the Coolgardie bioregion. Average annual rainfall is 292.8 mm with monthly rainfall peaking from late autumn throughout winter (BoM, 2023a).

- Located across three regolith and seven bedrock geological units (DMIRS, 2018a; 2018b). The Study Area intersects 13 soil landscape zones (DPIRD, 2023a), which are dominated by the AC1 atlas system (~40% of the Study Area), DD15 atlas system (~19%) and the Ya28 atlas system (~15%).

- Groundwater salinities in the Study Area range predominantly from 14,000 mg/L to 35,000 mg/L (highly saline). Where the Study Area intersects paleochannels (associated with salt lakes) around the Moorine Rock townsite and a section extending approximately 7.8 km south along the Marvel Loch-Forrestania Road from the Parker Range Road intersection, groundwater salinity is >35,000 mg/L (brine) (DWER, 2023a).

- The Study Area is located across two hydrological zones; Northern Zone of Ancient Drainage and Southern Cross Zone (majority of Study Area). It is located entirely within the Avon River Basin in the Swan Avon/Yilgarn hydrographic catchment and traverses the Lake Julia (northern end of Study Area), Yellowdine (mid-section) and Lake Eva (southern end) hydrographic sub-catchments (DPIRD, 2023b).

- Thirteen pre-European vegetation system associations occur across the Study Area (where vegetation remains) with the majority pertaining to Eucalypt woodlands or mallee. The dominant pre-European vegetation associations include Parker_1068 (41% of the Study Area vegetation), Skeleton Rock_519 (11%) and Skeleton Rock_1068 (8%).

- The majority of the Study Area has been mapped as having a low to moderate potential for supporting a terrestrial GDE. The northern end of the Study Area (1 km section at the junction with Great Eastern Highway) is mapped as having a high potential where vegetation remains intact surrounding the Moorine Rock townsite and the granite outcrop located on the northern side of Great Eastern Highway (BoM, 2023b).

- The nearest significant wetland, as listed under the Directory of Important Wetlands in Australia (DBCA, 2023b) is Lake Cronin, located approximately 32 km south of the Study Area.

- The Study Area intersects three ESAs: (i) Jilbadji Nature Reserve which is listed on the Register of the National Estate; and (ii) Marvel Loch – Forrestania road, roadside vegetation supporting *Banksia dolichostyla* (T) between the intersection of King Ingram Road and the turnoff to the minesite; and (iii) the Commonwealth listed 'Eucalypt Woodland of the Western Australian Wheatbelt' TEC under the *EPBC Act* (which is synonymous with the State listed PEC of the same name).

- Database searches (state and national) and the literature review indicate 126 flora taxa of conservation significance have been recorded (or may occur) within a 50 km radius of the Study Area. A total of 20 taxa of conservation significance (one Threatened, five Priority 1, four Priority 2, nine Priority 3 and one Priority 4) have been recorded within the boundary of the Study Area with an additional 66 taxa (three Threatened, 24 Priority 1, eight Priority 2, 20 Priority 3 and 11 Priority 4) assessed as having the potential to occur within the Study Area.

- The Study Area intersects the mapped buffer zones of three ecological communities of conservation significance (DBCA, 2022d);
    - 'Ironcap Hills vegetation assemblages (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded ironstone formation)' PEC (Priority 3);
    - 'Plant Assemblages of the Parker Range System' PEC (Priority 3); and
    - 'Eucalypt Woodland of the Western Australian Wheatbelt' PEC (Priority 3). This PEC is synonymous with the Commonwealth listed TEC (of the same name) under the *EPBC Act*.

  The 'Granite outcrop pools with endemic aquatic fauna' PEC (Priority 3) is located within the Frog Rock Nature Reserve, approximately 2.7 km from the Study Area. This may also occur on the granite outcrop at the Wockallarry Nature Reserve, and on the granite outcrop north of King Ingram Road, within the Study Area.

- The Study Area is located within the western boundary of the Great Western Woodlands until it enters the extensively cleared agricultural zone along Parker Range Road.

- Within the Shire of Yilgarn there are 48 flora taxa listed as Declared Pests, including 29 taxa which are listed as Weeds of National Significance (DAWE, 2023b). The literature review of botanical surveys conducted in the area indicated no Declared Pests or WoNS to have been recorded.

3.2. Field Survey

3.2.1. Landforms

The landforms of the Southern Study Area include:

- Broad extensive loamy plains;
- Broad extensive sandy loamy plains with calcrete nodules;
- Broad, extensive aeolian yellow sandplains;
- Low rounded lateritic gravely hills;
- Small, isolated, low lateritic plateaux and associated kaolinitic clay slopes;
- Small non-saline clay-based depressions which could be inundated for short periods following heavy rainfall;
- Minor ephemeral non-saline drainage lines; and
- The margin of a saline salt-lake system with clay soil.

These landforms are characteristic of the Merredin sub-region of the Avon Wheatbelt and the Southern Cross subregion of the western Coolgardie biogeographic regions.

3.2.2. Vegetation Structural Units

Twelve structural groups of vegetation associations were recognised within the Study Area. These are managed within our data in three super-groups: those dominated by tall eucalypts in the upper-stratum (Tall eucalypt Woodlands), those dominated by mallees in the upper stratum (Mallee Shrublands); and those dominated by a wide range of other tall to low shrubs excluding eucalypts (Shrublands). These are presented in Table 1.

Table 1. ***Vegetation Super-groups***

Vegetation Super-Group	Included Vegetation Group
Tall Eucalypt Woodland	Tall Eucalypt Woodland
Mallee Shrubland	Mallee and *Allocasuarina* Shrubland
Mallee Shrubland	Mallee and *Thryptomene* Shrubland
Mallee Shrubland	Mallee Shrubland

Vegetation Super-Group	Included Vegetation Group
Shrubland	*Acacia and Allocasuarina Shrubland*
Shrubland	*Acacia* over *Rinzia and Lepidosperma Thicket in depression*
Shrubland	*Allocasuarina* Shrubland
Shrubland	Forbland on granite
Shrubland	*Melaleuca* Thicket
Shrubland	*Melaleuca* Thicket with emergent mallee and mallet
Shrubland	*Melaleuca*, *Thryptomene* and *Hysterobaeckea* Shrubland
Shrubland	*Tecticornia* Shrubland with Emergent *Melaleuca*

These structural groups are general in nature commonly encountered in the Merredin and Southern Cross IBRA sub-regions. Most contain sub-units with varying and strongly contrasting species composition which are recognised at NVIS Level 5 *Association* in our treatment of vegetation of the Study Area.

3.2.3. Vegetation Associations

Vegetation units within the entire Study Area, from Moorine Rock to Mt Holland include:

Fifty one eucalypt-dominated Vegetation Associations, Table 2; and 26 Shrubland Vegetation Associations, Table 3; were recognised within the Entire Study Area from chainage 0.2 km (Great Eastern Hwy) to 113 km (Mt Holland minesite), inclusive of the Moorine Rock railway siding which lies outside the current or planned Clearing Permit Applications.

Table 2. Eucalypt Dominated Woodland Vegetation Associations Recognised in the Entire Study Area from Chainage 0.2 to 113 km

Vegetation Association Recognised	Vegetation Code Applied
Mallee and Mallet of Melaleuca Thicket on grey clay soil	E51
Mallee Shrubland on dark red-brown clay	E36
Mallee Shrubland on lateritic pizolitic gravel	E03, E27, E30, E42
Mallee Shrubland on lateritic pizolitic gravel and ferricrete	E47
Mallee Shrubland on orange silty sand over lateritic pizolitic gravel	E50
Mallee Shrubland on pale brown clayey sand	E35
Mallee Shrubland on pinkish grey sand in valley floor	E10
Mallee Shrubland on red-brown clayey sand	E14

Vegetation Association Recognised	Vegetation Code Applied
Mallee Shrubland on red-brown clayey sand at base of granite rock	E26
Mallee Shrubland on Red-brown loam with calcrete nodules	E46
Tall eucalypt Woodland on red-brown loam with calcrete nodules	E16, E37, E38
Mallee Shrubland on red-brown silty clay	E04, E15, E21, E23, E25
Tall Eucalypt Woodland on red-brown sandy clay (complex)	E06, E09, E12, E18, E28, E29, E34, E44
Tall Eucalypt Woodland on saline red-brown sandy clay	E39
Mallee Shrubland on red-brown silty sand	E44
Mallee Shrubland on saprolite, kaolin clay	E05
Mallee and Mallets over Melaleuca Thicket on weathered lateritic pizolitic gravel, saprolite	E02
Mallee Shrubland on weathered lateritic pizolitic gravel, saprolite	E07, E08, E17, E19, E20, E31
Mallee Shrubland on yellow sand (complex)	E01, E11, E13, E22, E32, E33, E43, E49
Mallee Shrubland on yellow sand over lateritic pizolitic gravel	E24, E45
Mallee Shrubland - no soil type noted	E04, E23

Table 3. Shrubland Vegetation Associations Recognised in the Entire Study Area from Chainage 0.2 to 113 km

Vegetation Association Recognised	Vegetation Code Applied
Melaleuca Thicket with emergent mallee and mallet on mid-brown sandy clay (complex)	S02
Allocasuarina acutivalvis Shrubland on lateritic pizolitic gravel	S04
Mallee and *Allocasuarina spinosissima*, *A. corniculata* Shrubland on yellow sand or yellow sand over lateritic pizolitic gravel	S07
Melaleuca Thicket on yellow-brown sandy clay	S09, S10
Acacia, Melaleuca, Thryptomene Shrubland on yellow sand over lateritic pizolitic gravel	S11
Allocasuarina corniculata and/or *A. spinosissima* OR *A. campestris* OR *Callitris preissii* dominated Shrublands on sand or sand over lateritic pizolitic gravel (complex)	S12, S14, S16, S17, S19, S20, S23, S24, S26
Acacia Shrubland on pinkish-brown sand	S13
Forbland on Granite	S21
Acacia Shrubland at base of Granite	S22
Melaleuca Thicket on red-brown clay	S25
Melaleuca Thicket on grey clay	S30, S40, S41
Acacia over *Rinzia* and *Lepidosperma* Thicket in depression on dark red brown clay	S32
Tecticornia shrubland with Emergent Melaleuca on saline red-brown clay	S36

Vegetation Association Recognised	Vegetation Code Applied
Acacia and *Allocasuarina* Shrubland on cracking red-brown clay over basalt rocks	S42

Notes pertaining to Table 2 and Table 3:

(i) During the vegetation mapping program, several vegetation associations were combined and therefore there are no described vegetation associations for the following Codes: S03, S05, S06, S08, S15, S18, S28, E41.

(ii) The Vegetation Association coded S43 occurs on private land at the south-west corner of the intersection of Great Eastern Hwy and Stubbs Rd at Moorine Rock and has not been assessed at this stage.

(iii)Numerous Vegetation Associations have been grouped according to soil type and structural units for the purpose of organising those with some similarities in landscape units and therefore soil types. Where these are disparate and have numerous members with strongly contrasting Vegetation Associations, they have been noted as "(complex)".

Brief descriptions of Vegetation Associations are presented in Table 4 and Table 5. These are preliminary results and require validation in the field and statistical evaluation prior to finalisation.

It is recognised that the communities occurring on sandplains and sand over laterite are extremely variable over short distances and these are both noted as Complexes at this stage, pending field and statistical analyses.

Table 4. Eucalypt dominated Vegetation Associations

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
grey clay	Mallee and Mallet over Melaleuca Thicket	E51	Eucalyptus flocktoniae, E. platycorys, E. sp. Southern Wheatbelt (D. Nicolle & M. French DN5507) over Melaleuca johnsonii (or M. grieveana P1), M. lateriflora, M. uncinata, M. acuminata, M. eleuterostachya on relatively low-lying flat areas.
dark red-brown clay	Mallee Shrubland	E36	Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196) over Melaleuca pauperiflora subsp. fastigiata over Microcybe multiflora subsp. multiflora on red-brown clay in valley floor
lateritic pizolitic gravel	Mallee Shrubland	E03	Eucalyptus platycorys, E. tenera, E. flocktoniae mallee over Melaleuca hamata, M. spicigera, Dillwynia sp. mallee (W.R. Archer 179959) Shrubland on pale yellow silty sand over lateritic pizolitic gravel.

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
lateritic pizolitic gravel	Mallee Shrubland	E27	Eucalyptus loxophleba subsp. lissophloia over Acacia acuminata, Acacia colletioides, Westringia cephalantha subsp. cephalantha and Grevillea obliquistigma subsp. obliquistigma with Phebalium sp. Parker Range Road long leaf (WB40838), 1.5m on lateritic pizolitic hill
lateritic pizolitic gravel	Mallee Shrubland	E30	Eucalyptus loxophleba subsp. lissophloia mallee over Melaleuca lateriflora 4m, in depression on hill slope
lateritic pizolitic gravel	Mallee Shrubland	E42	Eucalyptus loxophleba subsp. lissophloia, Eucalyptus ecdysiastes ms, Eucalyptus capillosa mallee over Allocasuarina corniculata, A. campestris, Acacia assimilis, Grevillea obliquistigma subsp. obliquistigma over Westringia cephalantha ?var. caterva, Hibbertia eatoniae, Lepidosperma sp. GCBL-223
lateritic pizolitic gravel	Mallee Shrubland	E42	Eucalyptus loxophleba subsp. lissophloia over Melaleuca, Phebalium, Myrtaceae spp. on lateritic pizolitic gravel
lateritic pizolitic gravel and ferricrete	Mallee Shrubland	E47	Eucalyptus capillosa mallee over Allocasuarina acutivalvis over Hibbertia eatoniae 0.4m, Grevillea lissopleura P1, Rinzia carnosa, occasional Lepidosperma sp. GC-36 and Borya constricta
orange silty sand over lateritic pizolitic gravel	Mallee Shrubland	E50	Eucalyptus ecdysiastes ms, E. tenera mallee over Melaleuca calyptroides, Thryptomene kochii, Persoonia helix, Beyeria sulcata var. sulcata, Grevillea hookeriana subsp. apiciloba to 1m, over Drummondita hassellii, Grevillea neodissecta P4 to 0.5m on orange silty sand over lateritic pizolitic gravel
pale brown clayey sand	Mallee Shrubland	E35	Eucalyptus sheathiana, E. ecdysiastes ms mallee Shrubland over Melaleuca scalena, Beyeria sulcata var. sulcata, Allocasuarina spinosissima, over Hibbertia aff. pungens, Drummondita hassellii or Drummondita sp. green fls (LS-435), Euryomyrtus maidenii. Amphipogon caricinus on pale brown clayey sand.
pinkish grey sand	Mallee Shrubland	E10	Eucalyptus exigua P3, Eucalyptus ecdysiastes ms/rigidula mallee over Grevillea oncogyne, Melaleuca uncinata, M. eleuterostachya tall Shrubland over Darwinia sp. Karonie (K. Newbey 8503) low Shrubland on pinkish grey sand in valley floor
red-brown clayey sand	Mallee Shrubland	E14	Eucalyptus loxophleba subsp. lissophloia, Eucalyptus calycogona mallee over Melaleuca uncinata over M. laxiflora over Lepidosperma sanguinolentum on red-brown clayey sand
red-brown clayey sand at base of granite rock	Mallee Shrubland	E26	Eucalyptus loxophleba subsp. lissophloia, E. sheathiana over Alyxia buxifolia, Exocarpos aphyllus over Lepidosperma sanguinolentum at footslope of granite outcrop
Red-brown loam with calcrete nodules	Mallee Shrubland	E46	Eucalyptus sheathiana, Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196) Woodland over Grevillea aff. huegelii blue prostrate yellow fls Marvel Loch form (SOI) (GC&GG-781)
Red-brown loam with calcrete nodules	Tall Eucalypt Woodland	E16	Eucalyptus longicornis, E. salmonophloia, occasional Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196), Eucalyptus sp. Dunbar Road (D. Nicolle & M. French DN 5466), tall Woodland over Melaleuca pauperiflora subsp. fastigiata, M. lanceolata 'subsp. thaeroides', on alkaline loam

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
Red-brown loam with calcrete nodules	Tall Eucalypt Woodland	E37	Eucalyptus longicornis, E. extensa, E. polita, tall Woodland over Melaleuca pauperiflora subsp. fastigiata, M. lanceolata (subsp. thaeroides) over scattered Atriplex bunburyana, Acacia merrallii (low form) and Acacia asepala P2.
Red-brown loam with calcrete nodules	Tall Eucalypt Woodland	E38	Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196), Eucalyptus sp. Dunbar Road (D. Nicolle & M. French DN 5466) P1, occasional E. calycogona subsp. calycogona 5m Woodland over Melaleuca pauperiflora subsp. fastigiata, over Templetonia sulcata, Acacia asepala P2, Atriplex bunburyana on red-brown sandy clay with calcrete nodules
red-brown sandy clay	Mallee Shrubland	E15	Eucalyptus loxophleba subsp. lissophloia, Allocasuarina huegeliana, Acacia acuminata, Melaleuca viminea Woodland on red-brown clayey sand
red-brown sandy clay	Mallee Shrubland	E21	Eucalyptus loxophleba subsp. lissophloia, Acacia acuminata Woodland
red-brown sandy clay	Mallee Shrubland	E25	Eucalyptus loxophleba subsp. lissophloia, E. sheathiana over Alyxia buxifolia, Exocarpos aphyllus over Lepidosperma sanguinolentum at footslope of granite outcrop
red-brown sandy clay	Mallee Shrubland	E04	Eucalyptus tenera mallee shrubland over Melaleuca uncinata thicket over Melaleuca spicigera, M. sp VM-087, Calytrix leschenaultii, Phebalium drummondii P3 shrubs over Lepidosperma sanguinolentum on sandy clay soil
red-brown sandy clay	Mallee Shrubland	E04	Eucalyptus tenera mallee shrubland over Melaleuca uncinata thicket over Melaleuca spicigera, M. sp #VM-087, Calytrix leschenaultii, Phebalium drummondii P3 shrubs over Lepidosperma sanguinolentum on sandy clay soil
red-brown sandy clay	Mallee Shrubland	E23	Eucalyptus rigidula over Phebalium tuberculosum sens. str., Phebalium aff. brachycalyx (SOI)
red-brown sandy clay	Tall Eucalypt Woodland	E06	Eucalyptus aff. salubris pruinose branchlet form (WB40196), E. transcontinentalis, E. salmonophloia tall open Woodland over Melaleuca pauperiflora tall Shrubland over Acacia deficiens on dark red-brown fine sandy clay
red-brown sandy clay	Tall Eucalypt Woodland	E09	Eucalyptus salmonophloia tall Woodland lacking perennial shrub understorey in an internally drained low-lying area
red-brown sandy clay	Tall Eucalypt Woodland	E12	Eucalyptus salmonophloia tall woodland over E. yilgarnensis mallee over Acacia aff. enervia subsp. enervia, Daviesia aphylla, Melaleuca eleuterostachya tall shrubland on dark red-brown fine sandy clay in valley floor
red-brown sandy clay	Tall Eucalypt Woodland	E18	Eucalyptus salmonophloia, Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196), occasional E. moderata tall Woodland, patches of Eucalyptus yilgarnensis, occasional E. tephroclada mallee to 6m, occasional E. calycogona 5m over Melaleuca pauperiflora over Acacia hemiteles, A. merrallii (short form), Templetonia sulcata medium shrubs over Chenopods on dark brown clayey sandy soil
red-brown sandy clay	Tall Eucalypt Woodland	E28	Eucalyptus salmonophloia, E. salubris 8m, E. yilgarnensis, E. loxophleba subsp. lissophloia over Melaleuca lateriflora , M. acuminata, M. uncinata, Santalum acuminatum, Acacia ?enervia subsp. enervia, over Microcybe multiflora 1m on red-brown sandy loam
red-brown sandy clay	Tall Eucalypt Woodland	E29	Eucalyptus moderata over Melaleuca lateriflora, M. pauperiflora subsp. pauperiflora and M. sheathiana on brown sandy clay

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
red-brown sandy clay	Tall Eucalypt Woodland	E34	Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196) emergent, E. sheathiana, E. tephroclada, E. sp. GCBL-200 mallee Shrubland over Acacia ?eremophila GCBL-201, Melaleuca lateriflora, Daviesia argillacea on sandy clay valley floor
red-brown sandy clay	Tall Eucalypt Woodland	E40	Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196), occasional E. sheathiana, E. polita P3 tall woodland over Melaleuca pauperiflora subsp. fastigiata, M. acuminata over Halgania andromedifolia, Daviesia argillacea and Acacia castanostegia, Eutaxia lasiocalyx P3, Acacia asepala P2, on red-brown sandy gravel or with basalt rocks and clay.
red-brown sandy clay, saline	Tall Eucalypt Woodland	E39	Eucalyptus aff. salubris (G. Cockerton & J. Warden WB40196), E. longicornis tall woodland , over Tecticornia disarticulata low shrubs on red clay in valley floor
red-brown silty sand	Mallee Shrubland	E44	Eucalyptus virella, E. yilgarnensis, occasional E. salmonophloia over Acacia colletioides, Bertya dimerostigma, Microcybe multiflora subsp. baccharoides, Grevillea comosa ms and Triodia sp.
silty sand with basalt rocks and calcrete nodules	Mallee Shrubland	E48	Eucalyptus sheathiana 8m Woodland over scattered tall shrubs Melaleuca sp., Daviesia argillacea, Acacia merrallii (tall form) over Microcybe multiflora subsp. baccharoides
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E05	Eucalyptus capillosa mallee Woodland over Melaleuca uncinata, Melaleuca eleuterostachya, Melaleuca laxiflora open Shrubland on low lateritic, saprolitic hills
weathered lateritic pizolitic gravel, saprolite	Mallee and Mallet over Melaleuca Thicket	E02	Eucalyptus flocktoniae, E. tenera mallee, E. aff. salubris pruinose branchlet form (WB40196) mallets over Melaleuca lateriflora, M. johnsonii, M. spp., Daviesia argillacea, Acacia hystrix subsp. hystrix, Grevillea oncogyne thicket on lateritic pizolitic, ferricrete and saprolite
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E07	Eucalyptus capillosa mallee Woodland over Allocasuarina acutivalvis subsp. acutivalvis and Callitris preissii Shrubland on low lateritic, saprolitic hills
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E07	Eucalyptus capillosa, occasional E. aff. salubris, E. tenera over Callitris preissii, Allocasuarina acutivalvis, Alyxia buxifolia on white sandy clay overlaying on weathered lateritic pizolitic, saprolite
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E08	Eucalyptus tenera, E. sheathiana mallee Woodland over Melaleuca sheathiana, M. eleuterostachya, Acacia deficiens Shrubland on low lateritic, saprolitic hills
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E17	Eucalyptus tenera, E. sheathiana, E. moderata mallee Woodland over Melaleuca lateriflora, Daviesia argillacea over scattered Westringia cephalantha subsp. cephalantha, Eremophila drummondii, Phebalium aff. brachycalyx (SOI), on pale brown silty sand on weathered lateritic pizolitic, saprolite

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E19	Eucalyptus sheathiana Woodland over Acacia acuminata, A. resinimarginea, Callitris preissiana Shrubland on brown silty sand on weathered lateritic pizolitic, saprolite
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E20	Eucalyptus capillosa Woodland over Acacia sp. Opp 7 16/2/2022 and occasional Phebalium aff. brachycalyx (SOI)
weathered lateritic pizolitic gravel, saprolite	Mallee Shrubland	E31	Eucalyptus tephroclada, E. sheathiana, E. capillosa, E. moderata mallee Shrubland over very open Melaleuca acuminata, M. lateriflora, M. hamata tall shrubs over Daviesia argillacea, Westringia cephalantha, Olearia muelleri Shrubland. May also support Acacia concolorans P2. on weathered lateritic pizolitic, saprolite
yellow sand	Mallee Shrubland	E01	Eucalyptus platycorys, E. tenera, E. spp. mallee over Melaleuca hamata, M. calyptroides shrubs over Lepidosperma sanguinolentum on pale yellow sand
yellow sand	Mallee Shrubland	E11	Eucalyptus sheathiana, E. sp. Southern Wheatbelt (D. Nicolle & M. French DN 5507), E. neutra mallee Woodland, over Melaleuca lateriflora, M. hamata, M. eleuterostachya, M. johnsonii Thicket over diverse Myrtaceae and Cryptandra spp., occasional Acacia undosa P3 on sandy soil
yellow sand	Mallee Shrubland	E13	Eucalyptus ecdysiastes ms/rigidula mallee Shrubland over Melaleuca calyptroides, Hakea erecta, Gastrolobium spinosum Shrubland on yellow sandplain
yellow sand	Mallee Shrubland	E22	Eucalyptus rigidula, Eucalyptus leptopoda subsp. leptopoda; over Acacia beauverdiana 4m, Hakea francisiana 4m, Santalum acuminatum 3.5m, Allocasuarina corniculata 2.5m, Allocasuarina acutivalvis 4m; over Beyeria sp. VM 70-06 1.8m, Phebalium sp. ovate (WB40839) 1m, Thryptomene kochii 1m,
yellow sand	Mallee Shrubland	E32	Eucalyptus ecdysiastes ms mallee over Acacia yorkrakinensis subsp. acrita, Acacia heteroneura var. jutsonii over Myrtaceae spp. on yellow sand.
yellow sand	Mallee Shrubland	E33	Eucalyptus sporadica, E. sheathiana over Melaleuca scalena, M. hamata, M. spicigera, Callitris preissii, Leptospermum sp. GCBL-171 over Hibbertia pungens in broad valley floor on yellow sand
yellow sand	Mallee Shrubland	E43	Eucalyptus virella, Melaleuca halmaturorum, M. lateriflora, Hakea preissii, with Acacia asepala P2 on the sandy margin of salt lake playa
yellow sand	Mallee Shrubland	E49	Eucalyptus ecdysiastes ms mallee Shrubland over Melaleuca calyptroides, Thryptomene kochii, Persoonia helix, Beyeria sulcata subsp. sulcata, Phebalium filifolium medium leaf 10 to 12mm, over Grevillea hookeriana subsp. apiciloba, Chamelaucium ciliatum, Rinzia sessilis, Cryptandra crispula (P3), Drummondita sp. green fls (LS-435) on yellow sand.
yellow sand over lateritic pizolitic gravel	Mallee Shrubland	E24	Eucalyptus loxophleba subsp. lissophloia over Acacia colletioides, Phebalium tuberculosum sens. lat., on shallow sand over lateritic pizolitic over weathered granite

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
yellow sand over lateritic pizolitic gravel	Mallee Shrubland	E45	Eucalyptus rigidula mallee 5 to 6m over Acacia assimilis, over Thryptomene kochii, Beyeria sp., Leptospermum ?fastigiatum, Grevillea obliquistigma subsp. obliquistigma, Phebalium tuberculosum sens. lat., Phebalium sp. Yerilgee Sandplain (J. Jackson 223) P1, Phebalium filifolium, Euryomyrtus maidenii on yellow sand over lateritic pizolitic gravel

Table 5. Shrubland dominated Vegetation Associations

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
clay	Melaleuca Thicket	S30	Melaleuca lateriflora, Melaleuca johnsonii Shrubland on clay soil
clay	Melaleuca Thicket	S40	Melaleuca halmaturorum, M. atroviridis, M. lateriflora Shrubland
Clay, brown cracking	Melaleuca Thicket	S10	Melaleuca sp., M. strobophylla, M. ochroma P2 Shrubland in drainage line Shrubland on heavy cracking clay soil in valley floor
Clay, red-brown	Melaleuca Thicket	S25	Melaleuca eleuterostachya, M. pauperiflora subsp. pauperiflora, M. uncinata, M. acuminata 2.5m, PFC 50% over M. laxiflora 1.5m, Phebalium tuberculosum sens. str. 1.2m, Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628) 1m, PFC 10% on red brown clay.
Clay, cracking red-brown, over basalt rocks	Acacia and Allocasuarina Shrubland	S42	Allocasuarina helmsii, Acacia neurophylla subsp. neurophylla southern variant resinous veins (GC-797) 1.2m SOI, Trymalium elachophyllum, Hemigenia sp. Newdegate (E. Bishop 75) P1, Teucrium diabolicum P3 on cracking red-brown clay over basalt rocks
dark red brown clay	Acacia over Rinzia and Lepidosperma Thicket in depression	S32	Acacia acuminata narrow phyllode form (BR Maslin 7831) over Phebalium tuberculosum sens. lat. over Lepidosperma sanguinolentum and Rinzia medifila P1 and Prostanthera semiteres subsp. semiteres in low lying area with dark red-brown clay soil
granite outcrop	Acacia Shrubland	S22	Malleostemon tuberculatus 2.1m, Acacia sp. VM83-02 2.5m Shrubland
granite outcrop	Forbland on granite	S21	Borya constricta hummocked Forbland
lateritic pizolitic gravel	Allocasuarina corniculata, Acacia assimilis Shrubland	S12	Allocasuarina corniculata, Acacia assimilis, Grevillea hookeriana subsp. apiciloba, Grevillea neodissecta P4, Persoonia helix Shrubland with emergent Eucalyptus ecdysiastes ms mallee on lateritic pizolitic gravel
lateritic pizolitic gravel	Allocasuarina Shrubland	S04	Allocasuarina acutivalvis 3m, Calothamnus gilesii 3m, PFC 50% over Thryptomene kochii 1.2m, Grevillea paradoxa 1.5m, PFC 10% over Melaleuca cordata 05m, PFC 0.1% on lateritic pizolitic gravel
lateritic pizolitic gravel	Allocasuarina Shrubland	S04	Allocasuarina acutivalvis 4.0m, Allocasuarina spinosissima 3.0m, Eucalyptus burracoppinensis 4.0m PFC 20%. Over Melaleuca condylosa 1.7m, Thryptomene kochii 1.2m, Melaleuca cordata 0.8m

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
lateritic pizolitic gravel	Allocasuarina Shrubland	S04	Allocasuarina acutivalvis, Allocasuarina spinosissima, Melaleuca uncinata, Banksia elderiana, B. laevigata subsp. fuscolutea, Banksia cirsioides Shrubland
lateritic pizolitic gravel	Allocasuarina Shrubland	S19	Allocasuarina campestris, occasional A. corniculata, A. acutivalvis over Grevillea paradoxa, Acacia neurophylla subsp. neurophylla on lateritic pizolitic gravel
lateritic pizolitic gravel	Allocasuarina Shrubland	S33	Allocasuarina corniculata over Hysterobaeckea ochropetala subsp. reliqua and Myrtaceae spp. on lateritic pizolitic gravel
lateritic pizolitic gravel	Allocasuarina Shrubland	S39	Allocasuarina corniculata Thicket with emergent Eucalyptus leptopoda subsp. elevata, Acacia beauverdiana, over Baeckea elderiana, Thryptomene kochii over Hibbertia eatoniae
lateritic pizolitic gravel	Allocasuarina Shrubland	S27	Allocasuarina corniculata, Acacia beauverdiana, Melaleuca uncinata, Leptospermum sp. VM92-01 over Acacia neurophylla short form VM92-02, Baeckea ochropetala subsp. reliqua, Phebalium sp. Parker Range Road VM92-03 on lateritic pizolitic gravel
lateritic pizolitic gravel	Mallee and Allocasuarina Shrubland	S01 Complex	Allocasuarina acutivalvis 4.0m, Allocasuarina spinosissima 3.0m, Eucalyptus burracoppinensis 4.0m PFC 20%. Over Melaleuca calyptroides 1.7m, Thryptomene kochii 1.2m, Melaleuca cordata 0.8m. Post fire regeneration
lateritic pizolitic gravel	Melaleuca, Thryptomene and Hysterobaeckea Shrubland	S29	Acacia beauverdiana over Leptospermum sp. VM95-01, Hysterobaeckea ochropetala subsp. reliqua, Thryptomene kochii, Verticordia sp. VM95-3, Euryomyrtus maidenii
lateritic pizolitic gravel	Melaleuca, Thryptomene and Hysterobaeckea Shrubland	S29	Melaleuca hamata over Hysterobaeckea ochropetala subsp. reliqua, Thryptomene kochii, Baeckea elderiana on lateritic pizolitic gravel.
lateritic pizolitic gravel	Thryptomene with emergent Mallee Shrubland	S31	Thryptomene kochii Shrubland with emergent Hakea francisiana, Eucalyptus leptopoda subsp. leptopoda, E. ecdysiastes ms, on lateritic pizolitic gravel
lateritic pizolitic gravel over ferricrete	Allocasuarina Shrubland	S39	Allocasuarina corniculata Thicket with emergent Eucalyptus leptopoda subsp. elevata, Acacia beauverdiana, over Baeckea elderiana, Thryptomene kochii over Hibbertia eatoniae
lateritic pizolitic gravel over ferricrete	Melaleuca Shrubland	S35	Melaleuca acuminata, M. eleuterostachya, M. hamata 2.5, PFC 35% over Phebalium tuberculosum sens. lat. 1.5m, PFC 5% over Lepidosperma sp. ironstone rises GCBL-210 and Cryptandra sp. GCBL-211 on ferricrete rise
mid brown sandy clay.	Melaleuca Thicket with emergent mallee and mallet	S02	Melaleuca johnsonii, M. lateriflora, M. uncinata Shrubland with emergent Eucalyptus flocktoniae, E. platycorys, E. sp. Southern Wheatbelt (D. Nicolle & M. French DN5507) on a mid-brown sandy clay
pinkish-brown sand	Acacia coolgardiensis Shrubland	S13	Acacia coolgardiensis over Verticordia sp. (glabrous hypanthium) and Euryomyrtus maidenii over Lepidosperma sp. terete, Spartochloa scirpoidea 1m on pinkish-brown sand
Saline red-brown clay	Tecticornia shrubland with Emergent Melaleuca	S36	Tecticornia Shrubland with emergent Melaleuca halmaturorum
sandy clay	Melaleuca Thicket	S41	Callistemon phoeniceus, Melaleuca laxiflora, Leptospermum erubescens

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
weathered banded ironstone	Allocasuarina Shrubland	S34	Allocasuarina acutivalvis, occasionally Hakea pendens P3 Shrubland with emergent Eucalyptus capillosa mallee over Phebalium tuberculosum sens. str., Hibbertia aff. exasperata, Stenanthemum aff. bremerense P4 on weathered lateritic pizolitic, saprolite
weathered lateritic pizolitic, saprolite	Allocasuarina Shrubland	S38	Allocasuarina acutivalvis 1.5m, PFC 50% over Hibbertia eatoniae 0.3m, PFC 20%, Acacia acanthaster, Melaleuca cordata 0.6m, Acacia neurophylla subsp. neurophylla 1.2m, Phebalium sp. ?Parker Range Road 0.7m, Grevillea lissopleura P1 on weathered lateritic pizolitic, saprolite
yellow sand	Acacia and Allocasuarina Shrubland	S26	Acacia resinimarginea, Santalum acuminatum, Allocasuarina helmsii, Hakea minyma over grasses on yellow sand
yellow sand	Acacia Shrubland	S20	Acacia resinimarginea 4m over Thryptomene kochii 1.5m, Exocarpos aphyllus 1.5m, Myrt sp. Opp 16 (16/2/22) 1m.
yellow sand	Acacia Shrubland	S24	Phebalium lepidotum over Ecdeiocolea monostachya with emergent Acacia beauverdiana on yellow clayey sand.
yellow sand	Allocasuarina Shrubland	S16	Eucalyptus leptopoda subsp. leptopoda mallee, Callitris preissii 8m over Allocasuarina acutivalvis, Santalum acuminatum, Melaleuca ?hamata, Leptospermum erubescens, Allocasuarina spinosissima on yellow sand
yellow sand	Allocasuarina Shrubland	S01 Complex	Allocasuarina spinosissima, Hakea spp. over Beaufortia micrantha, Thryptomene kochii, Isopogon scabriusculus, Leucopogon sp.
yellow sand	Mallee and Allocasuarina Shrubland	S01 Complex	S1 community, Post fire regeneration
yellow sand	Hakea and Beaufortia Shrubland	S01 Complex	Hakea meisneriana 0.6m, Hakea erecta 0.5m, Banksia laevigata subsp. fuscolutea 1.5m, Acacia sp. GCEJM-098 PFC 30% over Beaufortia schaueri 0.5m, Beaufortia micrantha 0.5m, Leucopogon sp. Forrestania (GF Craig 2386), Petrophile stricta 0.6m, Isopogon scabriusculus 0.4m, Melaleuca calyptroides 0.5m PFC 35% with emergent Eucalyptus ?ecdysiastes/rigidula.
yellow sand	Mallee Shrubland	S16	Eucalyptus rigidula, Eucalyptus platycorys, Eucalyptus burracoppinensis 8m, Eucalyptus leptopoda subsp. leptopoda mallee Shrubland over thicket of Allocasuarina spinosissima and A. corniculata
yellow sand	Mallee Shrubland	S17	Eucalyptus leptopoda subsp. leptopoda mallee with Acacia resinimarginea, Santalum acuminatum on yellow sand
yellow sand	Mallee Shrubland	S23	Callitris preissii Thicket with emergent Eucalyptus rigidula
yellow sand over lateritic pizolitic gravel	Acacia, Melaleuca, Thryptomene Shrubland	S11	Acacia beauverdiana, Melaleuca uncinata (short leaves) over Melaleuca laxiflora over Cryptandra apetala var. anomala with emergent mallee
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S01 Complex	Allocasuarina spinosissima Shrubland with emergent mallee
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S01 Complex	Allocasuarina spinosissima Shrubland with emergent mallee

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S01 Complex	Allocasuarina corniculata 2.1m, Melaleuca uncinata 2.4m, Callitris verrucosa 3.0m, Hakea multilineata, Eucalyptus spp. over Thryptomene kochii, Melaleuca calyptroides, Melaleuca cordata on sand over lateritic pizolitic gravel
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S01 Complex	Allocasuarina spinosissima, Melaleuca cordata Shrubland on lateritic pizolitic gravel
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S01 Complex	Thryptomene kochii 0.6m, Melaleuca calyptroides 0.8m PFC 60% over Lepidosperma sp. with emergent Allocasuarina spinosissima 2.5m, Hakea sp #25, Melaleuca uncinata.
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S01 Complex	Acacia sp #111 3.0m, Leptospermum erubescens 2.8m, Melaleuca uncinata over Thryptomene kochii 1.4m, Melaleuca calyptroides 1.0m, Melaleuca laxiflora 1.3m, Chamelaucium sp. Mt Holland (G. Cockerton & G. Grigg 780) P1 (formerly within Chamelaucium sp. Parker Range (B.H. Smith 1255)) 1.3m, Beyeria minor 1.6m, Thryptomene sp Hyden (B.J. Lepschi & L.A. Craven 4477) P1, Leucopogon sp #113 1.0m, Lepidosperma sp. #112 PFC 30% over Amphipogon caricinus var. caricinus PFC 2%.
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S04	S4 Community, Post fire regeneration
yellow sand over lateritic pizolitic gravel	Allocasuarina Shrubland	S04	Allocasuarina acutivalvis, Thryptomene kochii, Hakea meisneriana, Melaleuca cordata Shrubland (few Banksia spp.)
yellow sand over lateritic pizolitic gravel	Allocasuarina spinosissima Shrubland	S14	Allocasuarina spinosissima, Hakea erecta, Grevillea excelsior and occasional Eucalyptus sp. VM63-1 on shallow yellow sand over lateritic pizolitic gravel
yellow sand over lateritic pizolitic gravel	Mallee and Allocasuarina Shrubland	S01 Complex	Eucalyptus burracoppinensis 4.0m, Eucalyptus tenera 3.0m over Banksia elderiana 1.8m, Banksia laevigata sub sp fuscolutea 2.0m, Acacia sp #80 resinimarginea, 1.7m, Allocasuarina acutivalvis 2.5m, Allocasuarina spinosissima 1.8m, Melaleuca uncinata 2.1m, Hakea erecta over Thryptomene sp. Hyden (B.J. Lepschi & L.A. Craven 4477) P1 1.0m, Melaleuca cordata 1.0m, Melaleuca calyptroides 1.0m, Leucopogon sp. Forrestania (GF Craig 2386) 1.0m, Isopogon scabriusculus 1.0m, Beaufortia micrantha 0.7m, Drummondita hassellii sens. str. 0.5m PFC. May represent an ecotone between the S01 and S04 vegetation associations.
yellow sand over lateritic pizolitic gravel	Mallee and Allocasuarina spinosissima, A. corniculata Shrubland	S07	Allocasuarina spinosissima, Hakea erecta over Beaufortia micrantha, Thryptomene kochii, Isopogon scabriusculus, Leucopogon sp.

Soil Type	Structural Vegetation Group	Vegetation Association Code	Vegetation Association Name
yellow sandy clay	Acacia Shrubland	S37	Acacia acuminata (narrow phyllode form) 7m, Melaleuca hamata 4m, M. stereophloia 4m, Melaleuca hamulosa 6m, tall Shrubland over Hysterobaeckea setifera subsp. meridionalis 2.5m, Leptospermum erubescens 1.8m, Myrtaceae sp. GC-003 1.2m, occasional Rinzia torquata P3 0.7m, over weedy grasses Avena fatua* and Bromus diandrus* in broad drainage line on yellow sandy clay.
yellow-brown sandy clay	Melaleuca Thicket	S09	Melaleuca uncinata Shrubland over Lepidosperma sanguinolentum on sandy clay soil in valley floor
red-brown sandy clay		S43	Shrubland, not assessed, in private land

3.2.4. Quadrat Representation of Vegetation Associations

Utilising the initial aim of establishing one quadrat per 1 km of the Study Area, about half the Vegetation Associations recognised within the entire Study Area have representative quadrats established within them, Table 6. Some of these Vegetation Associations only have one quadrat established. Additional quadrats are planned to be established in 2023 to allow adequate representation for statistical analysis to meet EPA Guidance (2016) requirements.

Table 6. Quadrat representation of Vegetation Associations

Veg Assoc Code	# Quadrats
E01	0
E02	1
E03	1
E04	0
E05	0
E06	3
E07	2
E08	3
E09	0
E10	2
E11	2
E12	1
E13	0
E14	0
E15	0
E16	7
E17	0
E18	18
E19	0
E20	0
E21	0
E22	1
E23	0
E24	0
E25	0
E26	0
E27	0
E28	0
E29	0
E30	0

Veg Assoc Code	# Quadrats
E31	2
E32	1
E33	0
E34	0
E35	1
E36	2
E37	3
E38	4
E39	1
E40	4
E42	2
E43	1
E44	2
E45	0
E46	0
E47	0
E48	0
E49	0
S01	10
S02	2
S04	8
S07	4
S08*	1
S09	1
S10	0
S11	2
S12	1
S13	0
S14	0
S15*	3

Veg Assoc Code	# Quadrats
S16	0
S17	0
S19	0
S20	0
S21	0
S22	0
S23	0
S24	0
S25	1
S26	0
S27	0
S28*	5
S29	3
S30	0
S31	1
S32	1
S33	3
S34	1
S35	0
S36	2
not assigned	10

Notes pertaining to Table 6:

* Vegetation Codes S08, S15, S28 are noted having quadrats established within them, however, these are pending re-assignment to other Vegetation Associations. Ten quadrats had not been assigned to a Vegetation Association at time of preparation of this Interim report.

The 139 quadrats already established (in 2021-22) have only been assessed once, at establishment, in summer, and require a Spring assessment to capture all flora and to reconcile indeterminate (Indet.) specimens collected.

Additional quadrats are planned to be established in 2023 to allow representative assessment of Vegetation Associations.

3.2.5. Statistical Analysis of Vegetation Associations

Statistical analysis of quadrat data will be implemented utilising the PATN analysis package to verify vegetation association categorisation and homogeneity. At this stage, there is insufficient representation of quadrats to enable a meaningful statistical analysis to be undertaken.

3.2.6. Vegetation Condition

Vegetation condition within the Study Area has been assessed against the Vegetation Condition Scale presented in EPA (2016), Appendix 2. The majority of the Study Area was mapped mostly as Excellent to Pristine Condition. This included

(i) areas of mature vegetation that had not been burnt in a very long time;

(ii) areas that had been burnt in natural wildfires in the relatively recent past and where post-fire regeneration of vegetation was progressing well with all aspects of the vegetation well represented; and

(iii) areas that had been chained and burnt for the development of Strategic Firebreaks in sandplain vegetation in the southern portion of the Study Area which though temporarily altered, were regenerating well. However, many obligate-seeder species such as *Allocasuarina* species were notably absent following chaining and burning.

Exceptions to this are (i) areas of historical disturbance due to small scale-mining operations including open shafts, small waste dumps and areas of disturbance; (ii) occasional tracks; (iii) gravel pits operated by the Shire of Yilgarn; (iv) historical water catchment areas such as Dulcie Tank and the large area (approximately 1. 5 km of road alignment) known locally as the “Camel

Patch". Areas that have been totally cleared are mapped as Completely Degraded Condition. However, most historically disturbed sites have regenerated to large degree through natural regeneration of eucalypt tree seedings and understorey species and are mapped as Good Condition.

3.2.7. Priority and Threatened Ecological Communities

A large proportion of the Southern Study Area, the subject of CPS 10049, lies within the Parker Range PEC, which correlates strongly with the eastern fringe of the Merredin IBRA subregion, from chainage 63.0 to approximately 87.5km (24.5 km, 49%). Almost all of this portion of the road alignment lies within Tall eucalypt Woodlands and Mallee Shrublands that correlate with the Federally listed Woodlands of the Avon Wheatbelt TEC.

3.2.8. Flora

Much of the flora of the Study Area is highly representative of the Merredin IBRA subregion (occurring to the west, inclusive of parts of the Study Area within the Avon-Wheatbelt IBRA region) and the Southern Cross IBRA subregion (occurring to the east and inclusive of parts of the Study Area within the Coolgardie IBRA region). Some species recorded are more widely known in the Western Mallee IBRA subregion which occurs outside and to the south of the Study Area. The position of the Study Area in relation to IBRA regions and subregions are discussed in Western Botanical (2023a, Appendix 1).

The flora of the region from Parker Range to Mt Holland is complex, diverse, often demonstrates high endemism, has a strong correlation with soil type and landscape position and demonstrates high species turnover both between vegetation communities and within those communities occurring on aeolian yellow sandplains and lateritic gravel and ferricrete soil types.

The cumulative species list for the Entire Study Area is being compiled at present and is not presented within this document.

Much of the focus to date has been on identifying and adequately addressing Threatened flora, Priority flora and Species of Interest (representing new taxa). These are presented in the next section.

Specimens of all Significant Flora are currently being compiled for vouchering at the WA Herbarium with as much information as possible accompanying each specimen to facilitate a relatively rapid third part confirmation of Priority flora and validation of the new species to be recognised by the WA Herbarium.

3.2.9. Significant Flora

Assessments of Significant Flora inclusive of Threatened and Priority flora and Species of Interest (new species) were conducted at high density, at 10 m intervals between operators. Productivity for a team of 5 to 6 people in the Targeted Surveys ranged from a maximum linear length of 5.4

km of roadside vegetation per day in areas where relatively few significant species were encountered to a minimum of 850m per day where many significant species were encountered in large numbers.

Conservation Codes for Western Australian Flora and Fauna are presented in Appendix 3.

3.2.9.1. Threatened Flora

Only one species of Threatened Flora, *Banksia dolichostyla* T (formerly *Banksia sphaerocarpa* var. *dolichostyla* (T)) is known within the Study Area. This population occurs from King Ingram Road southwards to just south of the mine access road turnoff. *Banksia dolichostyla* is locally common on lateritic pizolitic gravelly hills with ferricrete and studies for this assessment have located tens of thousands of individuals of this species, associated with the lateritic gravelly hills between the Mt Holland minesite, Mt Holland hill and the Teddy Bear minesite some 5 km west of the Marvel Loch – Forrestania road alignment.

Several individuals of *Banksia dolichostyla* occur adjacent to the road alignment south of King Ingram Rd within the Study Area but none are planned to be directly impacted in road upgrade operations.

3.2.9.2. Priority Flora

Seventy-four Priority Flora are noted as occurring within the entire Study Area from Moorine Rock to Mt Holland. This includes:

- 27 Priority 1 flora
- 12 Priority 2 flora
- 26 Priority 3 flora
- 10 Priority 4 flora

Threatened and Priority Flora of the entire Study Area are presented in Table 7.

Maps depicting the distribution of Threatened Flora within the Study Area are presented in Appendix 5.

Maps depicting the distributions of Priority Flora are presented in Appendix 6.

Descriptions of Priority Flora are presented in Appendix 8.

Table 7. Threatened and Priority Flora of the Entire Study Area

Threatened

1. *Banksia sphaerocarpa* var. *dolichostyla* T

Priority 1

1. *Acacia* sp. Moorine Rock (B.R. Maslin 4474) P1
2. *Alyogyne* sp. Hyden (G.S. Durell GD 127) P1
3. *Brachyloma stenolobum* P1
4. *Chamelaucium* sp. Jaurdi (GC & GG-782) P1 Currently in the *Chamelaucium*. sp. Parker Range P1 complex
5. *Chamelaucium sp. Mt Holland (GC & GG-780) P1* (white flowers). Currently in the *Chamelaucium*. sp. Parker Range P1 complex
6. *Chamelaucium* sp. Parker Range (B.H. Smith 1255) sens. str. (Pink flowers) P1
7. *Cryptandra exerta P1*
8. *Dicrastylis capitellata* P1
9. *Eucalyptus calycogona* subsp. *miraculum* P1
10. *Eucalyptus* sp. Dunbar Road (D. Nicolle & M. French DN 5466) P1
11. *Eutaxia* sp. North Ironcap (P. Armstrong PA 06/898) P1
12. *Grevillea lissopleura* P1
13. *Hemigenia* sp. Newdegate (E. Bishop 75) P1 – may not be in alignment
14. *Labichea rossii* P1 (borrow pit MLF85)
15. *Lepidosperma* aff. *jacksonense* P1
16. *Lepidosperma* aff. *amantiferrum* P1
17. *Lepidosperma* aff. *lyonsii* P1
18. *Lepidosperma ferriculmen* P1
19. *Leucopogon* sp. Yellowdine (M. Hislop & F. Hort MH 3194) P1
20. *Melaleuca grieveana* P1
21. *Melichrus* sp. Coolgardie (KR Newbey 8698) P1
22. *Microcorys elatoides* P1
23. *Microcorys* sp. Mt Holland broad leaf (G. Barrett s.n. PERTH 04104927) P1
24. *Rinzia fimbriolata* P1
25. *Rinzia medifila* P1
26. *Thryptomene* sp. Hyden (B.J. Lepschi & L.A. Craven 4477) P1
27. *Verticordia roei* subsp. *meiogona* P1

Priority 2

1. *Acacia asepala* P2
2. *Acacia concolorans* P2
3. *Balaustion grandibracteatum* subsp. *juncturum* P2
4. *Dampiera orchardii* P2
5. *Eutaxia hirsuta* P2

6. *Eutaxia lasiocalyx* P2
7. *Lepidium merrallii* P2
8. *Logania nanophylla* P2
9. *Microcorys* sp. Parker Range (C. Hancock s.n. PERTH 09215123) P2
10. *Phebalium* sp. Yerilgee Sandplain (J. Jackson 223) P2 (also in SOI list)
11. *Poranthera dissecta* P2 (GC&GG-731). New Priority species for project.
12. *Verticordia multiflora* subsp. *solox* P2

Priority 3

1. *Acacia crenulata* P3
2. *Acacia undosa* P3
3. *Balaustion grandibracteatum* subsp. *grandibracteatum* P3
4. *Boronia ternata* var. *promiscua* P3
5. *Chorizema circinale* P3
6. *Cryptandra crispula* P3
7. *Cyathostemon verrucosus* P3 (LS-410, GC-590, RS-005) RE
8. *Daviesia sarissa* subsp. *redacta* P3
9. *Eucalyptus exigua* P3
10. *Eucalyptus polita* P3
11. *Gompholobium cinereum* P3
12. *Hakea pendens* P3
13. *Hibbertia glabriuscula* P3
14. *Lepidosperma* aff. *ferricola* P3
15. *Melaleuca ochroma* P3
16. *Notisia intonsa* P3
17. *Phebalium drummondii* P3
18. *Prostanthera nanophylla* P3
19. *Rinzia torquata* P3
20. *Rinzia triplex* P3
21. *Seringia adenogyna* P3
22. *Stylidium sejunctum* P3
23. *Teucrium diabolicum* P3
24. *Verticordia gracilis* P3
25. *Verticordia mitodes* P3
26. *Verticordia stenopetala* P3

Priority 4

1. *Banksia shanklandiorum* P4
2. *Eremophila caerulea* subsp. *merrallii* P4
3. *Eremophila inflata* P4
4. *Grevillea marriottii* P4
5. *Grevillea neodissecta* P4
6. *Gyrostemon ditrigynus* P4
7. *Microcorys* sp. Forrestania (V. English 2004) P4
8. *Myriophyllum petraeum* P4

9. *Stenanthemum* aff. *bremerense* P4 – (probably a new species)
10. *Wurmbea murchisoniana* P4

3.2.9.3. Species of Interest

Species of Interest are presented in the following groups:

- Species of Interest (new taxa) – 34 species
- Species of Interest – Widespread undescribed species not warranting Conservation Assessment – 3 species
- Species of Interest – Species Complexes in Need of Revision of WAHERB Research Collection Material – 2 species complexes
- Species of Interest – Poorly Collected in W.A. – 2 species
- Species of Interest – Range Extensions – 7 species

Species of Interest (new taxa)

The following 34 are species that are recognised to date as representing new species. Preliminary taxonomic reviews have been conducted, however, these each require dedicated taxonomic review and verification by third party (WAHERB) botanists. Sufficient material for TYPE collection has been gathered in many cases. Species are briefly annotated where possible.

Further review of as yet unidentified specimens collected to date may add to this list.

Not all data points representing each of these species are presented on maps of SOI species at this stage. Further data management is required.

Maps depicting the distributions of Species of Interest are presented in Appendix 7.

Descriptions of Species of Interest will be presented in Appendix 9 (to be populated).

1. *Acacia intricata* Southern Cross – Marvel Loch form. FABACEAE. Bruce Maslin has viewed this but has not progressed it.

2. *Acacia neurophylla* subsp. neurophylla (southern variant resinous veins) (GC-797). FABACEAE –See the Wattle description (link below) which notes another entity that may warrant taxonomic recognition. The resinous nerves on phyllodes are diagnostic. https://apps.lucidcentral.org/wattle/text/entities/acacia_neurophylla_subsp._neurophylla.htm.

3. *Chamelaucium sp.* King Ingram Road (MHGG-035). MYRTACEAE Has affinities to *Ch. drummondii*, with ciliate leaf margins). Highly disjunct from the closest morphologically similar species known in the Perenjori area.

4. *Cryptandra* sp. zigzag (GC-319). RHAMNACEAE. No close matching specimens at PERTH

5. *Drummondita* sp. green flowers (L. Shelton-304). RUTACEAE – needs further revision of distribution at WAHERB. Differs from *Drummondita hassellii* sens. str. in having green flowers.

6. *Drummondita* sp. hairy sepals (L. Shelton-409). RUTACEAE – needs further revision of distribution at WAHERB. Differs from *Drummondita hassellii* sens. str. in having pilose calyx lobes.

7. *Grevillea* aff. *huegelii* Marvel Loch form (P.M. Olde 91/4). PROTEACEAE. Yellow flowered prostrate plant only known in the study area from the NE corner of the bend in the Parker Range diversion road – and then in an NE direction through to the Marvel Loch – Forrestania road

8. *Grevillea communis* ms P.M. Olde. PROTEACEAE (formerly in the *Grevillea acacioides* group)

9. *Grevillea comosa* ms (P.M. Olde 91/14, 7 Sep 1991 (NSW). PROTEACEAE (formerly within the *Grevillea acuaria* group)

10. *Hibbertia sp. Forrestania (H. lateritica* ms K.R. Thiele). DILLENIACEAE. K.R. Thiele undertaking taxonomy of this one. Reference this as one of the WB specimens and voucher at WAHERB.

11. *Leptospermum* sp. aff. *spinescens* non-corky bark (MHDL-164). MYRTACEAE. Large shrub, lignotuberous, non-corky bark, differs from the typical form of *L. spinescens*.

12. *Lotus* aff. *cruentus* (EJOPP#007). FABACEAE. White flowers in pairs, dehisced pods 27 mm long, twisted. Ours has note of white flowers and *Lotus cruentus* is noted for red flowers, therefore probably not this species. Also, see Florabase map of distribution, indicative of two taxa in the one species name, Ref: https://florabase.dpaw.wa.gov.au/browse/profile/4061.

13. *Melaleuca* aff. *lateralis* (GC&BL s.n., WP103/662). MYRTACEAE. Can't match it to anything else, this is the closest thing. *M. lateralis* occurs significantly south of our Study Area. https://florabase.dpaw.wa.gov.au/browse/profile/5924.

14. *Melaleuca* aff. *spicigera* (GC458, 638, 698b, 765). MYRTACEAE, a possible hybrid between *M. spicigera* and *M. laxiflora*, but locally common, uniform and may be worthy of recognition. Both putative parents are known in close proximity and *M. laxiflora* grows within the same vegetation community.

15. *Melaleuca* sp. pink lateral fls, 3mm dark green leaf (GC & GG-768) MYRTACEAE. No close specimens at WAHERB.

16. *Persoonia burracoppinensis* ms PROTEACEAE (elevated from *Persoonia angustiflora* var. *burracoppinensis* which had been sunk by Peter Weston), new species, not warranting Pri status.

17. *Phebalium* aff. *drummondii.* RUTACEAE. Phebalium drummondii is P3.

18. *Phebalium filifolium* subsp. *filifolium* LS-387 (white fls,20 to 30mm leaf). RUTACEAE

19. *Phebalium filifolium* subsp. *intermediate* GC-260 (white fls,10-12mm leaf). RUTACEAE

20. *Phebalium filifolium* subsp. short leaf (white fls, 6 to 7mm leaf). RUTACEAE

21. *Phebalium* aff. sp. Yerilgee Sandplain (4mm leaf). RUTACEAE. Has a citrus fragrance to the cut stems, leaves and fragrance very similar to *P.* sp. Yerilgee Sandplain (J. Jackson 223) P1.

22. *Phebalium* sp. British Hill (WB41040). RUTACEAE. Vouchered at WAHERB as *Phebalium* sp. PERTH 09184392. A readily identified taxon based on shrub habit, foliage and flowers.

23. *Phebalium* sp. Dunbar Road (GC-544). RUTACEAE (pink flowered, aff. *P. laevegatum eastern form*) = *Phebalium sp.* 'aff. laevegatum' (WB40871) Phebalium sp. "planar-roseum" collected by (J. Warden & J. Paterson at Sandy Ridge). Matches the description of the eastern form of *Phebalium laevegatum*, informal, however, should be reviewed and formalised as it is locally abundant, uniform and quite distinct form the more typical form of *Phebalium laevegatum*.

24. *Phebalium sp.* Helena and Aurora Range V leaf (WB35642). RUTACEAE. A species widely distributed but poorly collected.

25. *Phebalium* sp. ovate leaf (G. Cockerton & E.J. Mellersh WB40839). RUTACEAE Inclusive of *Phebalium* sp. retuse tip (GC-426), *Phebalium* sp. ovate emarginate *and Phebalium* sp. ovate glossy, 2 rows of oil vesicles, one either side of prominent mid rib (VM 70-03 16/2/2022 (WB 40839). Uncommon in the Study Area and relatively uniform between populations noted.

26. *Phebalium* sp. Parkers Range Rd long narrow leaf sens. str. (25 to 40mm) (GC & BL-161, WB40838). RUTACEAE. A locally common and uniform species.

27. *Phebalium* sp. Parkers Range Rd short broad leaf (15 to 20mm) (GC-335). RUTACEAE. A locally uncommon and uniform species.

28. *Phebalium* sp. Parkers Range Rd short narrow leaf (15 to 20mm) (GC-055). RUTACEAE. A locally uncommon and uniform species.

29. *Phebalium* aff. brachycalyx RUTACEAE complex, poorly recognised in the field and readily confused. Note: True *Phebalium brachycalyx* is restricted to the Wongan Hills. Inclusive of:

    a. *Phebalium* aff. brachycalyx (WB40873) – common and abundant in the Study Area.

    b. *Phebalium* megaphyllum lumpy leaf

30. *Phebalium sp. supermegawarty* (GC-396, GC-385). RUTACEAE. This may be the real TYPE of *Phebalium tuberculosum* (see Fl Aust.) This form is illustrated in Fl. Aust. Vol 26, p463, but the specimen was not vouchered, collected from Mt. Desmond (Ravensthorpe). Not the same as *P. tuberculosum* TYPES available in JSTOR Plants website.

31. *Prostanthera* aff. *campbellii* (LS-125). LAMIACEAE = *Prostanthera* sp. "no smell" (GC-711, GCEJM025, DL-165, MH060-07 and Wpt130 DL&PL). Need to spend some time in the *P. campbellii* folders at WAHERB main collection which need sorting and differentiation of several variants within.

32. *Stenanthemum* aff. *bremerense* (WB40845) RHAMNACE. Has smaller leaves and differs in flora characters to typical *Stenanthemum bremerense* from the Bremer Range some 100 km east of the Study Area.

33. *Swainsona* sp. aff. *microphylla* (LS-388). FABACEAE. Identified by MTC as *Swainsona microphylla*, a species complex with at least 2 taxa in it and with (i) Pilbara and (ii) GVD (TYPE) distribution. This and PERTH 03205185 (south of Bullabulling) need review as they may be the same species. Five subspecies recognised in *S. microphylla*, all are significantly larger plants than ours.

34. *Thryptomene ?australis* subsp. *brachyandra.* MYRTACEAE (collected as *Thryptomene* sp. Hyden (GC-654)) - keys out to *T. salina* but leaves are not correct for this species. Note Mattiske have recorded *T. salina* P1 at the Mt Holland site, just SE of this point.

Species of Interest – Widespread undescribed species not warranting Conservation Assessment

Three species are recognised as new species but are common, widespread and not in need of conservation assessment.

35. *Coopernookia sp.* Mt Holland (GC-381) GOODENIACEAE. Confirmed new species, many specimens currently curated within the *C. strophiolata* complex, is readily distinguished from *C. strophiolata* and definitely a new species. Widespread from Pingrup to Mt Holland. WAHERB Reference Collection has been segregated into typical and Mt Holland variants. A third entity from EYRE district is also present.

36. *Eucalyptus* aff. *salubris* pruinose branchlets form (WB40196) MYRTACEAE. Confirmed new species, Vouchered at WAHERB, reviewed by Malcolm French, widespread in the Coolgardie biogeographic region. Represents the genetic clade that nests within other Gimlet species noted in Binks R.M. et. al. (2021).

37. *Thysanotus* "species blue" ASPARAGACEAE – new species, widespread, part of the *T. manglesianus* complex. Not conservation-significant. This group being revised by Dr. Terry McFarlane, WAHERB.

Species of Interest – Species Complexes in Need of Revision of WAHERB Research Collection Material

Several *Cryptandra* species collected in a vegetative state within the Study Area could not be identified to species level. One taxon is noted as likely representing a new species within a broad complex:

1. *Cryptandra spyridioides* RHAMNACEAE May be more than one species based upon distribution noted on Florabase map and morphology - see https://florabase.dpaw.wa.gov.au/browse/profile/4811

2. *Lepidosperma* species.

Species of Interest – Poorly Collected in W.A.

Two species are poorly collected in WA.

1. *Olearia magniflora* ASTERACEAE. Poorly collected in WA with 6 populations noted, four of which occur between Marvel Loch and Jilbadji Nature Reserve. One record from Norseman and one from between Fraser Range and Balladonia. Also known from South Australia and Victoria. Record within Study Area represents a minor (40 km) southerly range extension from Jilbadji NR to intersection of Dunbar Rd and the Marvel Loch – Forrestania Rd.

2. *Harmsiodoxa brevipes var. brevipes* BRASSICACEAE. Seven populations known in W.A. Known from central Avon Wheatbelt biogeographic region (200km north-west of Study Area) and eastern Coolgardie biogeographic region (200 km east of Study Area). Record within Study Area represents a range in-fill point approximately mid-way between southern extremes of known range

Species of Interest – Range Extensions

Seven species (including one minor weed) are noted as representing Range Extensions for the species based on WAHERB data. These are largely widespread in WA and do not warrant conservation assessment.

1. *Banksia audax*. PROTEACEAE. The occurrence of *Banksia audax* within the Study Area represents a range infill. *B. audax* is currently known from a series of populations following the Gt. Eastern Hwy from Southern Cross to Boorabbin (northern populations) and a series of populations from near Hyden and Lake Grace to east of Forrestania (southern populations). Our records near Mt Holland would be regarded a northerly extension of the southern populations.

2. *Brachyloma geissoloma* (Inland variant) (MH12-20) ERICACEAE. Minor range extension northwards. Project lies beyond northern edge of known distribution. Inland Variant informal at this stage and part of a poorly assessed complex. Mike Hislop (WAHERB) has commented on material.

3. *Eucalyptus kochii subsp. yellowdinensis* MYRTACEAE. Minor southerly range extension, known from Great Eastern Hwy alignment from west of Moorine Rock to Boorabbin, Marvel Loch and northern margin of Jilbadji Nature Reserve.

4. *Hakea leucoptera subsp. sericipes* PROTEACEAE. Approximately 300km southerly range extension in WA, however is probably poorly collected as it has also been recorded by the author at Norseman, approximately 200km east of the Study Area on the sandy shores of Lake Cowan. Also known from South Australia.

5. *Harmsiodoxa brevipes var. brevipes* BRASSICACEAE. Seven populations known in W.A. Known from central Avon Wheatbelt biogeographic region (200km north-west of Study Area) and eastern Coolgardie biogeographic region (200 km east of Study Area). Record within Study Area represents a range in-fill point approximately mid-way between southern extremes of known range

6. *Malleostemon roseus* MYRTACEAE. Widespread in the Avon-Wheatbelt and western Coolgardie biogeographic regions, record within Study Area (on and around granite rocks) represents a southerly range extension of approximately 100 km.

7. *Moraea lewisiae – Weed* IRIDACEAE. Known from Bunbury to Carnamah, occurrence within Study Area represents a significant (250 km) range extension to the east.

3.3. Interim Impact Assessment – Flora

3.3.1. Interim Impacts to Priority Flora

The following presents information on the proportion of each Threatened or Priority flora species known at 12th June 2023 that is proposed to be impacted in development of the Moorine Rock to Mt Holland Road within CPS 10049.

Priority - Taxon	Taken - CPS 10049	Grand Total	Taken % in CPS-10049
T			
Banksia dolichostyla		24,884	0.00%
Eremophila verticillata		9,662	0.00%
Eucalyptus steedmanii		2	0.00%
P1			
Acacia lachnocarpa		30,361	0.00%
Acacia sp. Forrestania (D. Angus DA 3001)		7,569	0.00%
Alyogyne sp. Hyden (G. Durell 127)		934	0.00%
Baeckea sp. Crossroads (B.L. Rye & M.E. Trudgen 241186)		2	0.00%
Brachyloma stenolobum	8	1,358	0.59%
Chamelaucium sp. Mt Holland (G. Cockerton & G. Grigg 780)	393	11,909	3.30%
Chamelaucium sp. Parker Range (B.H. Smith 1255)		5,092	0.00%
Cryptandra exserta		36	0.00%
Dicrastylis capitellata		8	0.00%
Drummondita wilsonii		7,111	0.00%
Eucalyptus calycogona subsp miraculum		284	0.00%
Eucalyptus sp. Dunbar Road (D. Nicolle & M. French DN 5466)	25	2,838	0.88%
Eutaxia sp. North Ironcap (P. Armstrong PA 06/898)	5	4,366	0.11%
Gastrolobium hians		858	0.00%
Grevillea lissopleura	246	5,529	4.45%
Grevillea marriottii		17,273	0.00%
Hemigenia sp. Newdegate (E. Bishop 75)		101	0.00%
Hibbertia sp. Mt Holland (B. Ellery BE 1437)		1,271	0.00%
Hibbertia tuberculata		12,409	0.00%
Labichea rossii		8,822	0.00%
Lepidosperma sp. ?jacksonense (P1) GC-021		1	0.00%
Melaleuca grieveana		2,613	0.00%
Melichrus sp. Coolgardie (K.R. Newbey 8698)		3,488	0.00%
Microcorys elatoides	3,125	202,847	1.54%
Microcorys sp. Mt Holland broad-leaf (G. Barrett s.n. PERTH 04104927)		28,592	0.00%
Microcorys sp. Parker Range (C. Hancock s.n. PERTH 09215123)	1	161	0.62%
Phebalium sp. Mt Gibbs (G.F. Craig 6658)		640	0.00%
Rinzia fimbriolata		34	0.00%
Rinzia medifila	216	18,742	1.15%
Stylidium validum		1	0.00%

Priority - Taxon	Taken - CPS 10049	Grand Total	Taken % in CPS-10049
Thryptomene salina		1769	0.00%
Thryptomene sp. Hyden (B.J. Lepschi & L.A. Craven 4477)	13,361	40,3235	3.31%
P2			
Acacia asepala	183	24,728	0.74%
Acacia concolorans	17	1,290	1.32%
Balaustion grandibracteatum subsp. juncturum	6,028	69,571	8.66%
Dampiera orchardii	210	13,952	1.51%
Daviesia sarissa subsp. redacta		1,520	0.00%
P2			
Eutaxia hirsuta	27	29	93.10%
Eutaxia lasiocalyx	52	180,752	0.03%
Halgania sp. Peak Eleanora (M.A. Burgman 3547 B)		1	0.00%
Lepidium merrallii		25	0.00%
Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)		54	0.00%
Logania nanophylla		396	0.00%
Melaleuca ochroma		627	0.00%
Olearia laciniifolia		86	0.00%
Orianthera exilis		152	0.00%
Phebalium sp. Yerilgee Sandplain (J. Jackson 223)		1	0.00%
Verticordia multiflora subsp. solox		2,641	0.00%
P3			
Acacia crenulata		3,006	0.00%
Acacia undosa		160,062	0.00%
Balaustion grandibracteatum subsp. grandibracteatum		1,118	0.00%
Boronia ternata var. promiscua	329	46,102	0.71%
Chorizema circinale	717	2,353	30.47%
Cryptandra crispula	1	46	2.17%
Eucalyptus exigua		104	0.00%
Eucalyptus polita		471	0.00%
Eutaxia acanthoclada		430	0.00%
Gompholobium cinereum	10	31	32.26%
Hakea pendens	283	6,811	4.16%
Hibbertia glabriuscula		1	0.00%
Microcorys sp. Forrestania (V. English 2004)		1	0.00%
Mirbelia densiflora		1	0.00%
Notisia intonsa		1	0.00%
Phebalium drummondii	12	4,955	0.24%
Prostanthera nanophylla	584	3,158	18.49%
Rinzia torquata	3	6,260	0.05%
Rinzia triplex		13,882	0.00%
Seringia adenogyna	7	6,570	0.11%
Stylidium sejunctum		6,201	0.00%
Teucrium diabolicum	5	29,733	0.02%
Verticordia gracilis	5,645	33,093	17.06%
Verticordia mitodes	62	2,589	2.39%
Verticordia stenopetala	4,501	46,459	9.69%
P4			
Banksia shanklandiorum		48	0.00%
Calothamnus brevifolius		1	0.00%
Eremophila biserrata		356	0.00%
Eremophila caerulea subsp. merrallii		68	0.00%

Priority - Taxon	Taken - CPS 10049	Grand Total	Taken % in CPS-10049
Eremophila inflata		625	0.00%
Grevillea neodissecta	149	7,468	2.00%
Gyrostemon ditrigynus		2,001	0.00%
Microcorys sp. Forrestania (V. English 2004)	4	107,639	0.00%
Myriophyllum petraeum		2	0.00%
Stenanthemum aff. bremerense		190	0.00%
Wurmbea murchisoniana		52	0.00%

3.3.2. Notes on Interim Impacts to Priority Flora

The counts within the 50m either side of the road alignment for the following species is significantly under-representative of the numbers of plants present. These will need to be addressed in additional field survey in 2023.

P1 *Eucalyptus* sp. Dunbar Road (D. Nicolle & M. French DN 5466)

P3 *Eucalyptus polita*

3.3.3. Interim Impacts to Species of Interest

The following presents information on the proportion of each Species of Interest known at 12th June 2023 that is proposed to be impacted in development of the Moorine Rock to Mt Holland Road within CPS 10049.

Priority - Taxon	*Taken - CPS 10049*	Grand Total	*Taken % in CPS-10049*
SOI			
Acacia intricata Marvel Loch - Southern Cross form (WB40115)		257	*0.00%*
Acacia neurophylla subsp. Resinous veins (G. Cockerton 797)		1,003	*0.00%*
Acacia sp. Moorine Rock (BR Maslin 4474)		27	*0.00%*
Banksia audax		4	*0.00%*
Chamelaucium sp. King Ingram Rd (G. Grigg 035)	*43*	98	*43.88%*
Coopernookia sp. Mt Holland (G. Cockerton 381)	*2,241*	4,387	*51.08%*
Cryptandra sp. ZigZag (G. Cockerton 319)	*2*	2	*100.00%*
Drummondita sp. green flowers (L. Shelton 304)		52,079	*0.00%*
Drummondita sp. hairy sepals (L. Shelton 409)		410	*0.00%*
Eucalyptus aff. salubris (glaucous branchlet form)	*61*	1,655	*3.69%*
Eutaxia sp. Mt Holland (G. Cockerton & G. Grigg 758)		2	*0.00%*
Eutaxia sp. Southern Cross (G. Grigg 010)		10	*0.00%*
Grevillea communis ms Olde		197	*0.00%*
Grevillea comosa ms Olde	*535*	18,486	*2.89%*
Grevillea sp. aff. huegelii Marvel Loch. P.M. Olde 91/44 NSW782729		513	*0.00%*

Priority - Taxon	***Taken - CPS 10049***	**Grand Total**	***Taken % in CPS-10049***
SOI			
Hibbertia sp. Forrestania (H. lateritica ms K.R. Thiele)	*40*	1,439	*2.78%*
Leptospermum aff. spinescens (D. Lievense 164)	*3*	47	*6.38%*
Melaleuca aff. spicigera (G. Cockerton-638, 765)	*64*	294	*21.77%*
Phebalium aff. brachycalyx	*619*	10,520	*5.88%*
Phebalium aff. laevigatum eastern form, pink fls (L. Shelton 492)	*16*	32	*50.00%*
Phebalium aff. microphyllum tuberculate stems (L. Shelton 486)	*15*	15	*100.00%*
Phebalium aff. P. sp. Yerilgee Sandplain (J. Jackson 223) (P1)	*1,068*	16,917	*6.31%*
Phebalium aff. tuberculosum short leaf (G. Cockerton 333)	*13*	13	*100.00%*
Phebalium filifolium (12mm leaf)	*58*	320	*18.13%*
Phebalium filifolium (6mm leaf)		235	*0.00%*
Phebalium filifolium long leaf form		22	*0.00%*
Phebalium filifolium sens. lat. (short leaf form)		1,468	*0.00%*
Phebalium megaphyllum	*1*	700	*0.14%*
Phebalium sp. British Hill (G. Cockerton, S. Cockerton, J. Warden WB41040)	*306*	6,067	*5.04%*
Phebalium sp. Dunbar Road (G. Cockerton 544)		1	*0.00%*
Phebalium sp. mucronate			*0.00%*
Phebalium sp. ovate glossy (G. Cockerton 619, WB40864)		110	*0.00%*
Phebalium sp. Parker Range Rd (broad leaved variant)	*31*	1,665	*1.86%*
Phebalium sp. Parker Range Road sens. strict. (G. Cockerton & B. Loudon WB40838)	*286*	6,913	*4.12%*
Phebalium sp. Retuse tip (G. Cockerton 426)		2,365	*0.00%*
Phebalium sp. supermegawarty (G. Cockerton 396)		38	*0.00%*
Phebalium tuberculosum sens. lat (short leaf form)		15,087	*0.00%*
Prostanthera aff. campbellii (L. Shelton 125)		92	*0.00%*

3.3.4. Notes on Interim Impacts to Species of Interest

Taxon	*% Impact to 12/6/23*	Comments
Chamelaucium sp. King Ingram Rd (G. Grigg-035)	*43.88%*	Diminutive plant, must be assessed when in flower. Also likely occurring on sandplain west of Teddy Bear minesite near white sand quarry.
Coopernookia sp. Mt Holland (G. Cockerton 381)	*51.08%*	Widespread new species, not warranting conservation assessment or further survey.
Cryptandra sp. ZigZag (G. Cockerton 319)	*100.00%*	New species, not well known, readily recognised outside flowering period, however, flowers and fruits are needed for taxonomic description.

3.4. Weeds

Minor weeds were encountered within the Study Area. These are presented in Table 8. No weeds of National Significance (WoNS) or Declared Pests were recorded within the Study Area.

Table 8. Weeds of the CPS 10049 Study Area

Taxon	Common Name	Description	Comment
Avena fatua	Wild Oats	Annual grass to 1m	Minor weed. Common at the Moorine Rock rail siding, occasional in Northern Section of Study Area adjacent to agricultural land
Centaurea meletensis	Maltese Cockspur	Annual low herb with basal rosette and flowering spike to 0.7m tall with spiny thistle-like fruits.	Minor weed. Commonly encountered in patches, particularly in small depressions on roadsides in clay soil. This is the most obvious weed of the alignment and readily be managed.
Brassica tournefortii	Wild Turnip	Annual weed with basal rosette and flowering spike to 0.8m.	Minor weed. Uncommon in low numbers, more common in low lying areas subject to run-on. More abundant on the Parker Range Road between chainage 24 to 28 km, on clay soil adjacent to agricultural land.
Bromus diandrus	Great Brome Grass	Annual grass to 0.5m	Minor weed. Uncommon in low numbers more common in low lying areas subject to run-on.

Taxon	Common Name	Description	Comment
Bromus rubens	Red Brome Grass	Annual grass to 0.5m	Minor weed. Uncommon in low numbers more common in low lying areas subject to run-on.
Carrichtera annua	Ward's Weed	Erect annual, herb, 0.05-0.4 m high	Minor weed. Locally common at the Camel Patch on clay soil, uncommon elsewhere
Cleretum papulosum subsp. papulosum	n/a	Prostrate, succulent annual, herb to 0.1 m	Minor weed. Uncommon in low numbers
Erodium moschatum	Musky Crowfoot	Small annual with basal rosette	Minor weed. Uncommon in low numbers
Hypochaeris glabra	Smooth Cat's Ear	Small soft annual herb to 0.6m	Minor weed. Uncommon in low numbers, mostly in disturbed soil
Mesembryanthemum nodiflorum	Slender Iceplant	Prostrate succulent herb to 0.1m high x 0.4m wide	Minor weed. Widespread on clay soils
Moraea lewisiae		Perennial cormerous herb to 0.3m	Minor weed. Low numbers in soil pockets on granite rocks, larger numbers in low lying wet areas
Moraea setifolia		Perennial cormerous herb to 0.3m	Minor weed. Low numbers in soil pockets on granite rocks, larger numbers in low lying wet areas
Oncosiphon suffruticosum	Calomba Daisy	Annual resinous obnoxiously fragrant herb with prominent head of small yellow flowers	Minor weed. Minor range extension to the south

Taxon	Common Name	Description	Comment
Pentameris airoides subsp. airoides	False Hairgrass	Small annual grass to 0.2m	Minor weed. Widespread in low numbers
Sisymbrium runcinatum		Prostrate to ascending annual, herb, 0.05-0.5 m high. Fl. yellow-white	Minor weed. Uncommon in low numbers
Trifolium arvense	Hare's Foot Clover	Erect or spreading annual, herb, to 0.5 m high. Fl. pink/white/green,	Minor weed. Uncommon in low numbers

4. Assessment Against the 10 Clearing Principles

Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity.

Each vegetation association within the Study area has moderate to low species diversity. The number of Vegetation Associations in total within the Study Area is high and the arithmetic calculation of species richness across the entire study area is therefore high. Communities growing on sandplain and laterite gravel have the highest species richness within the study area. Complete species lists are yet to be calculated and finalized.

The Project is not at variance with this principle.

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

The proposed impacts during the road upgrade are mostly minor widening of the road a realignment of four intersections. These represent relatively minor amounts of clearing over a project area of 113 km and should not represent significant habitat for supporting any native fauna.

The Project is not at variance with this principle.

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

Banksia dolichostyla is known in the southern 2.1 km of the Study Area, from King Ingram Road to the Mt Holland minesite turnoff. No *Banksia dolichostyla* are anticipated to be directly taken in the road upgrade program.

The Project is not at variance with this principle.

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

One Threatened Ecological Community is present within the Study Area: the Eucalypt Woodlands of the Western Australian (WA) Wheatbelt; a Threatened Ecological Community (TEC) listed as Critically Endangered under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and a State Priority Ecological Community (PEC) (Priority 3). Almost all of the northern proportion of the Southern Study Area, the subject of CPS 10049, from chainage 63.0 to approximately 87.5km (24.5 km, 49%) represents vegetation of the Eucalypt Woodlands of the Western Australian (WA) Wheatbelt TEC.

The Project is at variance with this principle.

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

The Study Area lies within the eastern margin of the Merredin subregion of the Avon Wheatbelt IBRA Region. This bio-subregion and region have both been heavily cleared for agriculture. The region encompassing the Study area represents the remaining un-cleared portion of these areas.

However, the public road from Moorine Rock to Mt Holland and southwards to Forrestania already exists and the current program (CPS10049) looks to widen 50 km of road alignment the road by up to 5 m either side of the existing road alignment to cope with increased traffic. This is considered a relatively minor amount of clearing over the length of the Study Area.

Within the estimated 85,600 ha contiguous uncleared native vegetation of the eastern Merredin IBRA sub-region, the proposal looks to directly clear an additional 30 ha, represents 0.03% of this overall.

The Project is at variance with this principle though to a relatively minor extent.

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

There are no significant ephemeral or perennial watercourses traversed by the Study Area. The road alignment does traverse a number of small, minor ephemeral drainage lines and the existing road traverses a narrow portion of a minor drainage area linking a non-saline playa on the west side of the road to the larger salt lake on the eastern side of the road at chainage 70.0 to 70.1 km. Drainage through this minor drainage area can be maintained readily with an adequately engineered culvert.

The Project is not at variance with this principle.

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

A well-designed road should not cause any significant indirect land degradation through either increased erosion, retention of surface waters causing temporary inundation or any significant water starvation through surface water diversion. The soils of the southern half of the Study Area within CPS10049 are free draining and infiltration rates here are expected to be high, meaning the road alignment will have little direct influence on surface flows. Soils of the northern half of the Study Area within CPS10049 are largely clay soils supporting tall eucalypt woodlands and are more likely to exhibit surface flows following rainfall events. The proper planning and installation of culverts should address surface water flow issues.

The Project is not at variance with this principle.

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

The Study Area within CPS10049 lies within an easement within the western margin of the Jilbadgi Nature Reserve. Minor road widening and realignments of the Parker Range Rd x Marvel Loch – Forrestania Road intersection should not impact directly on the Jilbadji NR.

The Project is not at variance with this principle.

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

The soils of the southern half of the Study Area within CPS10049 are free draining and infiltration rates here are expected to be high, meaning the road alignment will have little direct influence on surface flows or sub-surface flows. Soils of the northern half of the Study Area within CPS10049 are largely clay soils supporting tall eucalypt woodlands and are more likely to exhibit surface flows following rainfall events. The proper planning and installation of culverts should address surface water flow issues.

The Project is not at variance with this principle.

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

The soils of the southern half of the Study Area within CPS10049 are free draining and infiltration rates here are expected to be high, meaning the road alignment will have little direct influence on surface flows or sub-surface flows. Soils of the northern half of the Study Area within CPS10049 are largely clay soils supporting tall eucalypt woodlands and are more likely to exhibit surface flows following rainfall events. The proper planning and installation of culverts should address surface water flow issues.

The Project is not at variance with this principle.

5. Limitations

This report presents interim information on the flora and vegetation of the entire Study Area and an impact assessment of the flora and vegetation within CPS 10049. Information is valid to 12th June 2023 and based on field works within and adjacent to the Study Area extending from November 2021 to May 2023.

Table 9. Limitations

Limitation	Discussion
Available sources of contextual information	• Desktop information on the flora and vegetation of the Study Area was limited. The number of vegetation associations at NVIS 5 and the complexity of flora required significant focus of resources on this project. Through use of WA Herbarium and JSTOR Global Plants websites, flora identifications were adequately resourced. This is not a Limitation for the proposal
The Scope of the survey	• The assessment was Scoped as a Detailed Survey meeting EPA Guidance 2016. This is not a Limitation for the proposal
Proportion of flora collected and identified	• All flora encountered were collected and identified using the available resources. • Quadrat establishment occurred in dry summer months in 2021-2022 and revisits of existing quadrats as well establishment of additional quadrats to gain adequate representation is acknowledged as being required and planned for 2023. • It is anticipated that Indet. specimens will be recollected to advance identification and that additional flora will be encountered in Spring 2023 assessments within the Study Area. • A minimum of 3,226 specimens were collected and reviewed using the resources of the WA Herbarium. Of these, 392 specimens (12.2%) remain not fully identified to species level due to lack of suitable material. This is a Limitation for the proposal but will be addressed in 2023
Completeness and further work which may be needed	• A review of vegetation associations is required and will be addressed in 2023.

Limitation	Discussion
	• Quadrat establishment occurred in dry summer months in 2021-2022 and revisits of existing quadrats as well establishment of additional quadrats to gain adequate representation is acknowledged as being required and planned for 2023. • It is anticipated that Indet. specimens will be recollected to advance identification and that additional flora will be encountered in Spring 2023 assessments within the Study Area. • Targeted surveys for most Threatened and Priority Flora are regarded as being complete. Targeted Surveys for the following Priority Flora are not complete, and will be addressed in 2023: o *Eucalyptus* sp. Dunbar Rd (P1) o *Eucalyptus polita* (P3) • Targeted surveys for some Significant Flora (Species of Interest) are acknowledged as being required, particularly *Cryptandra* and *Lepidosperma* species. • Field identification of some *Phebalium* species allied to *Phebalium* aff. *brachycalyx* was difficult and a review of populations of this group is acknowledged as being required in 2023. • Collection of flowering and/or fruiting material of many specimens is required in 2023 to advance the identification process. • Species of many *Lepidosperma* are proving difficult to fully identify given the lack of taxonomic treatment of this group in W.A. • Similarly, Species of many *Phebalium* are proving difficult to adequately identify given the ack of recent taxonomic treatment of this group in W.A. A review of W.A. *Phebalium* species is recommended and planned to be conducted as part of this project. This is a Limitation for the proposal but will be addressed in 2023
Mapping reliability	• Mapping was conducted in a single pass operation and relied on quadrats for representative species profiles. Insufficient quadrats were established in 2021-2022 and additional quadrats plus second-season re-scores of existing quadrats are acknowledged as being required in 2023.

Limitation	Discussion
	This is a Limitation for the proposal but will be addressed in 2023
Timing: weather, season	• Quadrat establishment occurred in dry summer months in 2021-2022 and revisits of existing quadrats as well establishment of additional quadrats to gain adequate representation is acknowledged as being required and planned for 2023. This is a Limitation for the proposal but will be addressed in 2023
Disturbances	• Much of the flora is responsive to fires and many Priority Flora are only able to be noted following fire. Much of the Study Area is represented by long unburnt vegetation, however, many adjacent areas demonstrated a variety of fire ages. This benefited recognition and identification of many short-lived species. • The strategic firebreak that has been established north of King Ingram Road on the western side of the Marvel Loch – Forrestania Rd precludes identification of many resprouted *Eucalyptus* species. This is a Limitation for the proposal and may be addressed in 2023 if conditions are favourable for collection of appropriate material to complete identifications.
Intensity	• Vegetation mapping was undertaken a high intensity throughout most of the alignment. The species variability and turn-over in the sandplain and laterite gravel landscapes is complex and insufficient assessment here means that the S1 and S4 Vegetation Associations are noted as Complexes. • The establishment of additional quadrats in 2023 and revised mapping in these areas will address these gaps. This is a Limitation for the proposal and will be addressed in 2023 • Significant Flora (Threatened, Priority and SOI species) recognised during the field assessments 2021 to 2023 were surveyed at very high intensity, an average of 10m between observers, throughout the Study Area and over appropriate seasonal conditions. This is not a Limitation for the proposal. • Some species have been recognised as potential new species (noted as Species of Interest, SOI within this document) and have

Limitation	Discussion
	not been fully assessed in the field. Examples include *Cryptandra* sp. Zigzag (G. Cockerton-537), *Chamelaucium* sp. King Ingram Road (G. Grigg-035). This is a Limitation for the proposal and will be addressed in appropriate seasonal conditions in 2023
Resources	• Adequate resources and funds were made available by Covalent to address the agreed Scope at all times. This is not a Limitation for the proposal
Access	• Access to the Study Area was excellent in all areas. This is not a Limitation for the proposal
Experience levels	• The team developed and utilised for this project undertook the works in a systematic fashion and was led at all times by at least one senior botanist per team. Years of experience for each team member is addressed in the List of Participants section. • All but two team members have maintained longevity in the project, conducting surveys between Moorine Rock and Forrestania, meaning that knowledge of the flora of the region has been gained and maintained. • The use of a dynamic field herbarium and contemporaneous identification of species while field works were being implemented meant that the field teams were responsive to newly recognised significant flora in appropriate timeframes to allow assessments to be undertaken in appropriate seasonal conditions in most cases. This is not a Limitation for the proposal

5.1. Specific Gaps in Flora Assessments

In addition to the above, specific gaps in knowledge are noted below, and are flagged for addressing in 2023.

- Annuals need to be addressed, particularly known Significant Species. Specifically check crab holes under Gimlets for annuals.
- Complete survey of *Eucalyptus* sp. Dunbar Rd P1, *Eucalyptus polita* P3 need detailed, a length of 27 km x both side of the road.
- Spring Surveys to be done throughout the alignment.

- Re-survey *Eucalyptus calycogona* subsp. *miraculum* P1 on the breakaway north of bitumised rod from Fence Road to the Mt Caudan Minesite turnoff for contextual information.
- Field herbarium updates as required.
- *Lepidosperma* spp. to be reviewed.
- *Phebalium* spp., to be collected in seed / fruit.
- *Balaustion grandibracteatum* subsp. *juncturum* P2, review distribution and data.
- *Balaustion grandibracteatum* subsp. *grandibracteatum* P3, review distribution and data.
- Data Quality matters: Check *Phebalium* aff. *brachycalyx* in the burnt area, east road side, collected by PLdK & DL should be *P. megaphyllum* sens. str.

6. List of Participants

Staff Member	Field Surveys	Specimen Identification	Data Analysis	Report Preparation
Geoff Cockerton B.Sc. (Biology) Senior Botanist and Project Manager FB62000046 33 years' experience	1	1	1	1
Alex Chapman Senior Botanist 30 years' experience	1	1		
Ben Eckermann B.Sc. (Hons) Senior Botanist FB62000262 23 years' experience	1	1	1	1
Bethea Loudon B.Sc. (Biol) Senior Botanist FB62000049-2 20 years' experience	1	1		
Doug Lievense B.Sc. Biology Senior Botanist FB620000351 Recent: 3 years' experience Overall, 34 years' experience	1	1	1	
Pierre-Louis de Kock B.Sc. (Biol) Senior Botanist 20 years' experience	1	1		
Dr. Nicole Dakin Ph.D. Botanist FB62000492 1 years' experience	1	1		
Eliza-Joyce Mellersh B.Sc. (Biol) Botanist 1 years' experience	1	1		
Felicity Keet B.Sc. (Biol) Botanist FB62000530 < 1 years' experience	1	1		
Gemma Grigg B.Sc. Hons. (Biol) Botanist FB62000493 5 years' experience	1	1		
Lindsay Shelton B.Sc. (Botany) Botanist FB62000496 1.5 years' experience	1	1		

Staff Member	Field Surveys	Specimen Identification	Data Analysis	Report Preparation
Melissa Mykytiuk B.Sc. (Biol) Botanist License # < 1 years' experience	**1**			
Peter Smith Dip. Ag. Botanist 20 years' experience	**1**			
Russel Smith B.Sc. License # FB62000500 20 years' experience	**1**			
Dr. Margaret Collins Ph.D. 30 years' experience		**1**		
Mr. Frank Obbens 20 years' experience		**1**		

7. Acknowledgements

- CAD Resources Pty Ltd is thanked for provision of iPads and CAD Services for the entire project.
- Mr Michael Hislop, WA Herbarium for review of multiple specimens.
- Mr. Rob Davis, WA Herbarium for review of multiple specimens.
- Mr Malcolm French, for review of *Eucalyptus* species as required.
- Dr. Margaret Collins, for extensive identification services.
- Dr. Terry McFarlane for commentary and identification of Poaceae and Asparagaceae.
- Dr. Carol Wilkins, for review and guidance on *Seringia* species.
- Mr. Bruce Maslin for commentary and guidance on *Acacia* species.
- Dr. Russell Barrett, Australian National Herbarium Canberra, for commentary and guidance on *Lepidosperma* species.
- Mr. Frank Obbens, for identification services of *Calandrinia* species.
- Dr. Rachel Binks, WA Herbarium, for commentary and guidance on genetics of Seringia species and *Eucalyptus salubris*.
- Mr. Charlie Spencer, Southern Cross for organisation of office space in Southern Cross as required in 2022.
- Shire of Yilgarn, or provision of office space in Southern Cross as required in 2022.
- Palace Hotel, Southern Cross, for provision of accommodation and meals as required in 2021 to 2023.

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Appendix 1. Western Botanical (2023a) Desktop Review of Flora and Vegetation: Moorine Rock to Mount Holland Minesite Road Alignment.

Western Botanical

Desktop Review of Flora and Vegetation: Moorine Rock to Mount Holland minesite

Prepared for: Covalent Lithium Pty. Ltd. and Shire of Yilgarn

Report Ref: WB999

5 Robinson Road Mahogany Creek WA 6072
PO Box 294 MUNDARING WA 6073
T: 0407 193 637 E: info@westernbotanical.com.au

Report No: WB999

Client Address: Covalent Lithium Pty Ltd, Level 18, 109 St Georges Tce PERTH WA 6000

Client: Shire of Yilgarn, 23 Antares Street, Southern Cross WA 6426.

Version	Prepared By	Approved for Issue	Issue Date
1	B. Jeanes, G. Cockerton	29th March 2023	29th March 2023
1.1 Minor Edits, incorporation of ESA map	B. Jeanes, G. Cockerton	24th April 2023	8th May 2023
1.2 Amendments to Introduction and Executive Summary, including Shire of Yilgarn as a Proponent	B. Jeanes, G. Cockerton	6th June 2023	6th June 2023
1.2.1 Amendment to Title of report	B. Jeanes, G. Cockerton	8th June 2023	8th June 2023

This report has been designed for double-sided printing

Contents

Figures

Tables

Appendices

1. Executive Summary

The Shire of Yilgarn is undertaking a road upgrade and maintenance works south and south-west of the townships of Southern Cross and Marvel Loch. This includes realignments and sealing of Stubbs Street and Parker Range Road south of Moorine Rock, the newly constructed Parker Range Road diversion around the Mt Caudan minesite and a section of the Marvel Loch to Forrestania Road from the Parker Range Road intersection to the Mt Holland minesite. The realignment, widening and sealing is required due to anticipated increase in traffic as a result of expanded mining operations within the area.

Covalent commissioned Western Botanical to conduct a Detailed Assessment of the flora and vegetation of the proposed Mt Holland Logistics Haul Road (hereafter referred to as the Study Area). As part of this, a desktop review was implemented to provide contextual information, particularly regarding flora and vegetation of conservation significance, prior to the completion of extensive floristic survey of the route. The Study Area is approximately 115 km in length and 10,914 ha in size. In the area adjacent to freehold land (cleared agricultural area) the Study Area is 200 m wide extending to a 1 km diameter in areas of native vegetation. The Study Area lies entirely within the Shire of Yilgarn.

The Study Area intersects two bioregions (Avon Wheatbelt and Coolgardie) and lies within the Merredin and Southern Cross subregions of these bioregions respectively. The Merredin subregion has been extensively cleared for agricultural use with only ~21% of pre-European vegetation remaining. The Coolgardie subregion currently retains ~96% of its pre-European vegetation. Approximately 46 km of the Study Area along the northern portion of the Parker Range Road is located adjacent to cleared (freehold) agricultural land, with narrow roadside remnants. The remainder of the Study Area is located within the western boundary of the Great Western Woodlands with extensive native vegetation either side of the alignment. The Study Area intersects the Wockallarry Nature Reserve and the Jilbadgi Nature Reserve.

Within the region, monthly rainfall peaks from late autumn throughout winter with an average annual rainfall of 292.8 mm. Thirteen soil landscape zones are intersected by the Study Area with the majority of the area occurring on gently sloping to gently undulating plateau areas, or uplands (on granites, gneisses, and allied rocks) and undulating sandy plains with small salt lakes or clay pans.

Three hydrographic sub-catchments of the Avon River Basin are traversed by the Study Area; Lake Julia (northern end of Study Area), Yellowdine (mid-section) and Lake Eva (southern end). The Department of Water and Environmental Regulation groundwater salinity database indicates groundwater salinities in the area range predominantly from 14,000 mg/L to 35,000 mg/L (highly saline), the exception being where paleochannels are intercepted (>35,000 mg/L; brine) around the Moorine Rock townsite and a section of the Study Area extending approximately 7.8 km south along the Marvel Loch-Forrestania Road (from the Parker Range Road intersection).

The flora of this region is incredibly diverse and subject to continual taxonomic and conservation status review. Database searches (state and national) and a literature review indicate 126 flora taxa of conservation significance have been recorded (or may occur) within a 50 km radius of the Study Area. Twenty taxa of conservation significance (one Threatened, five Priority 1, four Priority 2, nine Priority 3 and one Priority 4) have been recorded within the boundary of the Study Area with an additional 66 taxa (three Threatened, 24 Priority 1, eight Priority 2, 20 Priority 3 and 11 Priority 4) assessed as having the potential to occur within the Study Area.

The Study Area is located within the mapped buffer zones of three ecological communities of conservation significance;

- 'Ironcap Hills vegetation assemblages (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded ironstone formation)' Priority Ecological Community (PEC) (Priority 3);
- 'Plant Assemblages of the Parker Range System' PEC (Priority 3); and
- 'Eucalypt Woodland of the Western Australian Wheatbelt' PEC (Priority 3). This PEC is synonymous with the Commonwealth listed Threatened Ecological Community (TEC) under the *EPBC Act* (DBCA, 2022d).

Three Environmentally Sensitive Areas are present within the Study Area;

- the Jilbadgi Nature Reserve which is listed on the Register of the National Estate.
- the region of roadside vegetation within 50 m of the Threatened flora species *Banksia dolichostyla*. This species is present adjacent to the roadside from about the intersection of King Ingram Road southwards to the turnoff into the Mt Holland minesite.
- the Commonwealth listed 'Eucalypt Woodland of the Western Australian Wheatbelt' TEC under the *EPBC Act.*

2. Introduction

2.1. Project Background

The Shire of Yilgarn is undertaking a road upgrade and maintenance works south and south-west of the townships of Southern Cross and Marvel Loch. This includes realignments and sealing of Stubbs Street and Parker Range Road south of Moorine Rock, the newly constructed Parker Range Road diversion around the Mt Caudan minesite and a section of the Marvel Loch to Forrestania Road from the Parker Range Road intersection to the Mt Holland minesite. The realignment, widening and sealing is required due to anticipated increase in traffic as a result of expanded mining operations within the area.

Covalent Lithium Pty. Ltd. (Covalent) plan to develop the Earl Grey Lithium Project (EGLP) which comprises an open cut mine and concentrator located at the former Mt Holland Gold Mine (previously the Bounty Gold Operation), located approximately 105 km south of Southern Cross (Figure 1) and a refinery within the industrial area of Kwinana. Ore will be transported to the refinery by road, necessitating the realignment, widening and sealing of a section of the existing public road, the Marvel Loch – Forrestania Road and Parker Range Road, to allow haulage access to Great Eastern Highway.

The road design and construction is being managed by the Shire of Yilgarn while Covalent is funding and managing the biological assessments to support Clearing Permits under the Environmental Protection Act (1986) for the road upgrade.

Covalent commissioned Western Botanical to conduct a Detailed Assessment of the flora and vegetation of the proposed Mt Holland Logistics Haul Road (hereafter referred to as the Study Area). As part of this, a desktop review was implemented to provide contextual information, prior to the completion of extensive floristic surveys. The Study Area is approximately 115 km in length and 1 km in width where remnant or uncleared native vegetation is present. Within the cleared agricultural area, the Study Area is restricted to a width of up to 200 m. It total, the Study Area is approximately 10,914 ha in size and extends along the Marvel Loch – Forrestania Road (from the intersection of the Mt Holland mine access road) onto the Parker Range Road, culminating at the intersection of Great Eastern Highway, immediately west of the Moorine Rock townsite (Figure 2). The Moorine Rock Siding load-out area is also included. The Study Area lies entirely within the Shire of Yilgarn (Figure 1).

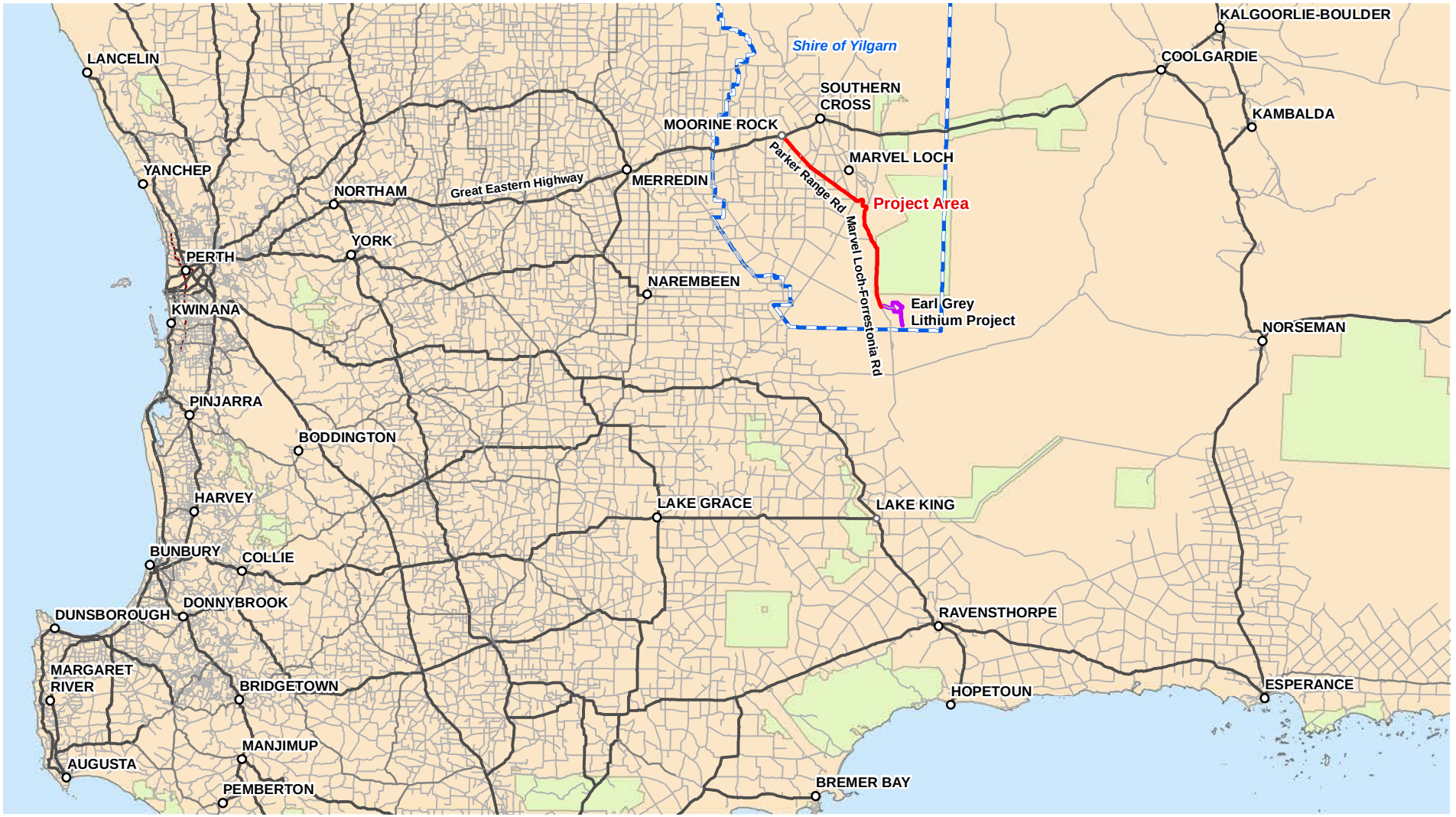
The objective of the desktop review was to provide contextual information on the Study Area prior to completion of field surveys. This was achieved through a literature review of flora and vegetation assessments previously conducted within the vicinity of the Study Area in addition to a search of various State and Commonwealth databases to identify known flora and vegetation of conservation significance.

2.1. Land Use

The Study Area includes the Parker Range Road in its entirety and a section of the Marvel Loch – Forrestania Road, both of which are Crown land. The Study Area extends approximately 500 m either side of these roads into remnant or uncleared native vegetation (where present) in unallocated Crown land or nature reserves (Wockallarry Nature Reserve and Jilbadgi Nature Reserve). In the cleared agricultural area, the Study Area lies adjacent to freehold land and has generally narrow roadside remnants.

Figure 1. Location of the Study Area

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade - Locality



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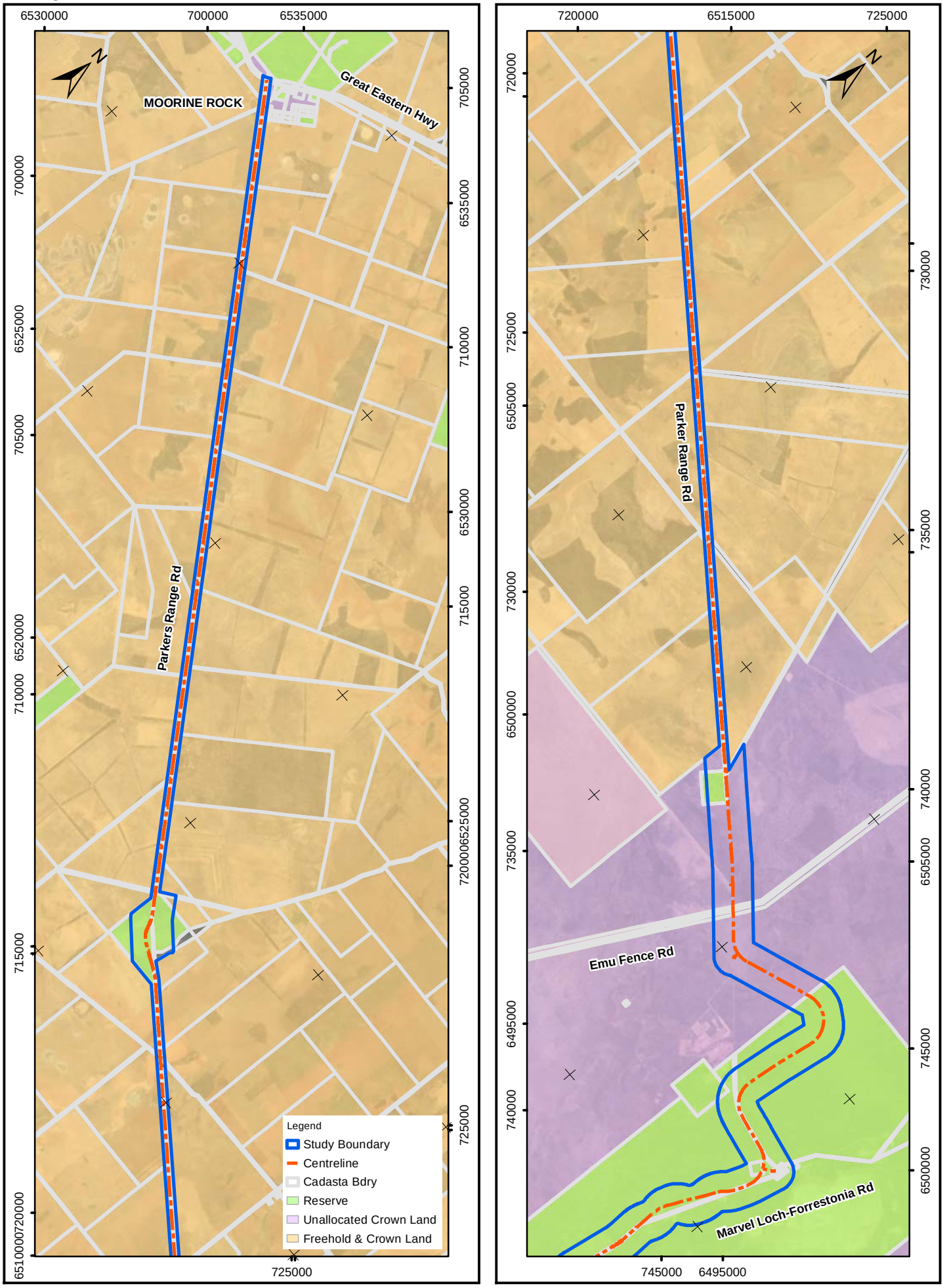
N

0 50 km

Scale: 1:3,000,000
MGA94 (Zone 50)

Figure 2. Study Area with Cadastre

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Study Area - Sheet 1 of 2



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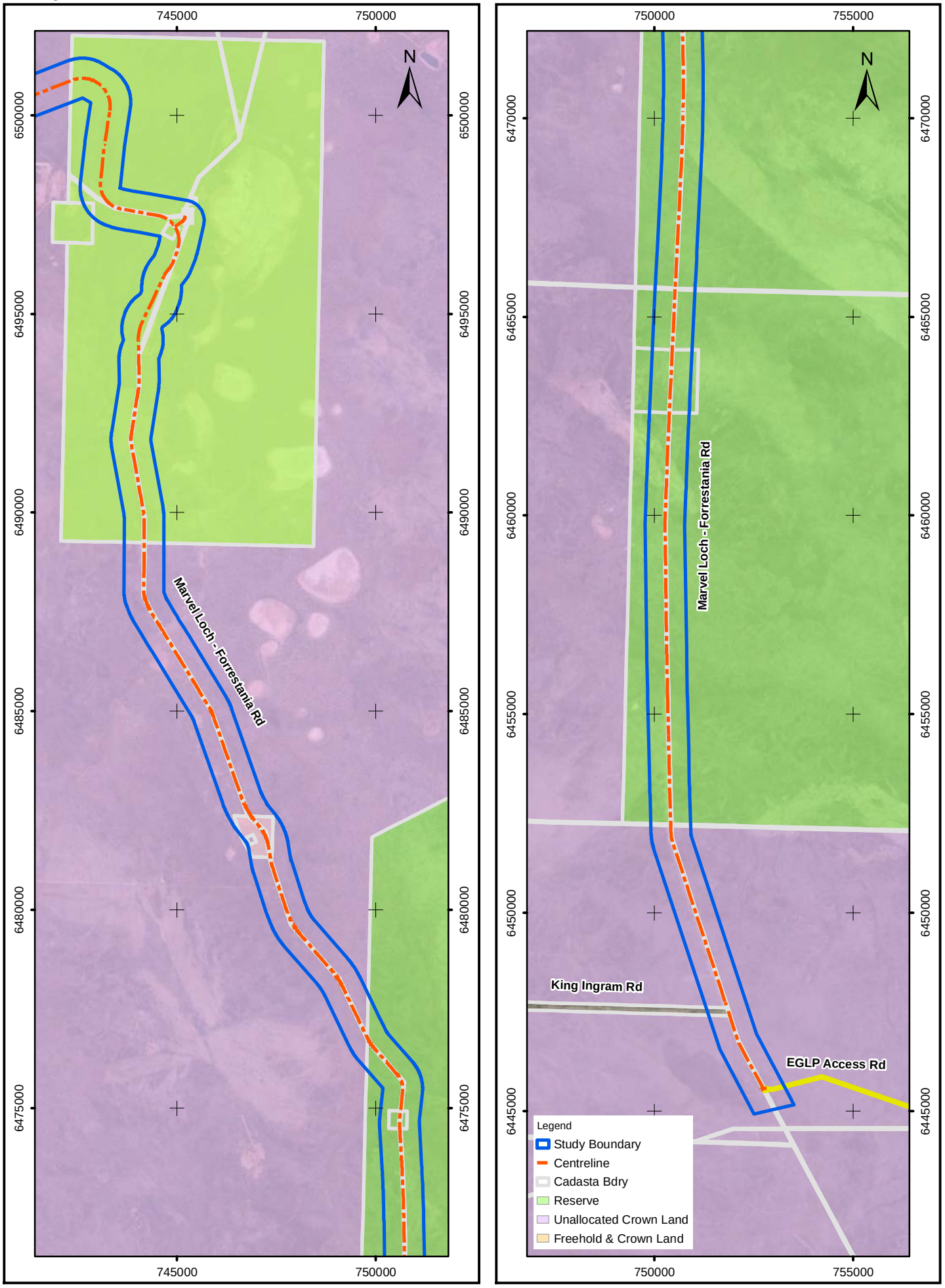
Source: Roads_MRWA, Cadasta: Landgate

0 3km

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Study Area - Sheet 2 of 2



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Scale 1125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate

2.2. Physical Environment

2.2.1. Climate

The Study Area is in a semi-arid (dry) warm Mediterranean climate (Beecham, 2001). Average annual rainfall is 292.8 mm, as recorded at the Bureau of Meteorology (BoM) Southern Cross weather station (number 012074), located approximately 105 km to the north of the Study Area. Although closed in 2007, this weather station provides the largest relevant climate dataset (1889 – 2007) for the Study Area. The Southern Cross Airfield weather station now provides climatic data for the region. Average monthly rainfall peaks from late autumn throughout winter (May–August), with the highest average rainfall occurring in June (40.7 mm). Mean maximum daily temperatures range from 16.3 °C in July to 34.5 °C in January with mean minimum temperatures ranging from 4.4 °C in July to 14.2 °C in January/February (Figure 3) (BoM, 2023a).

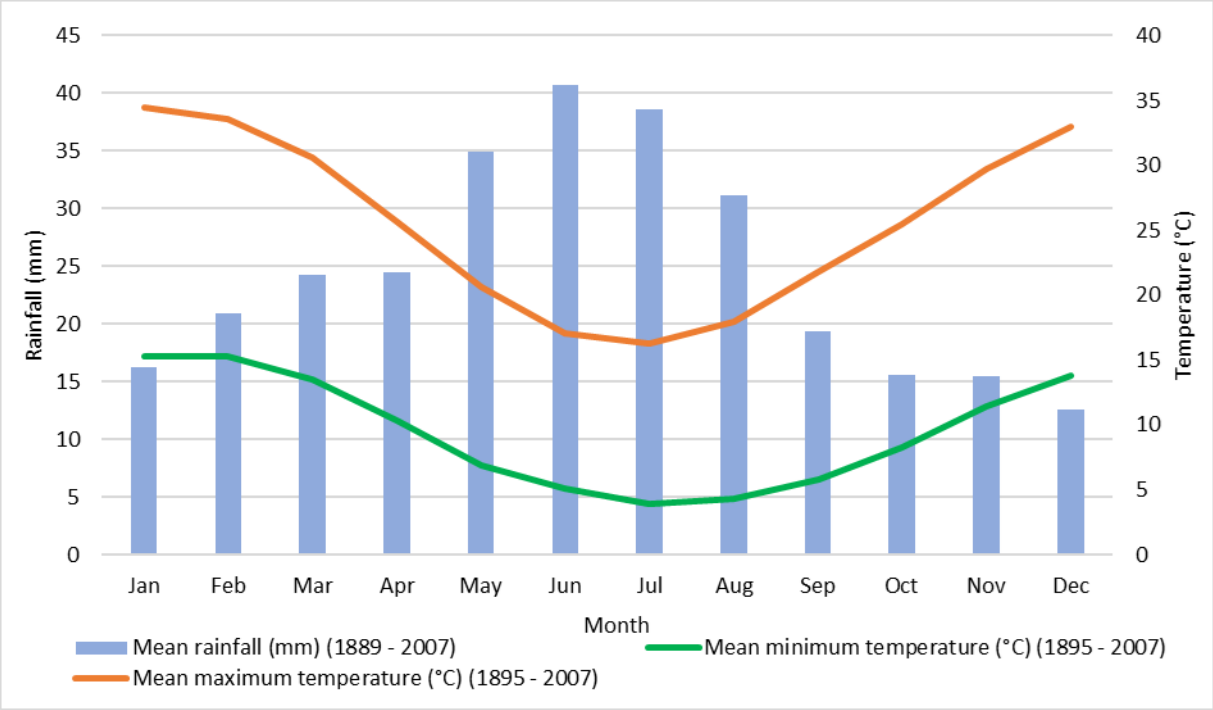


Figure 3. Long-term average climate data for Southern Cross (weather station number 012074) (1889 – 2007) (BoM, 2023a).

2.2.2. Geology

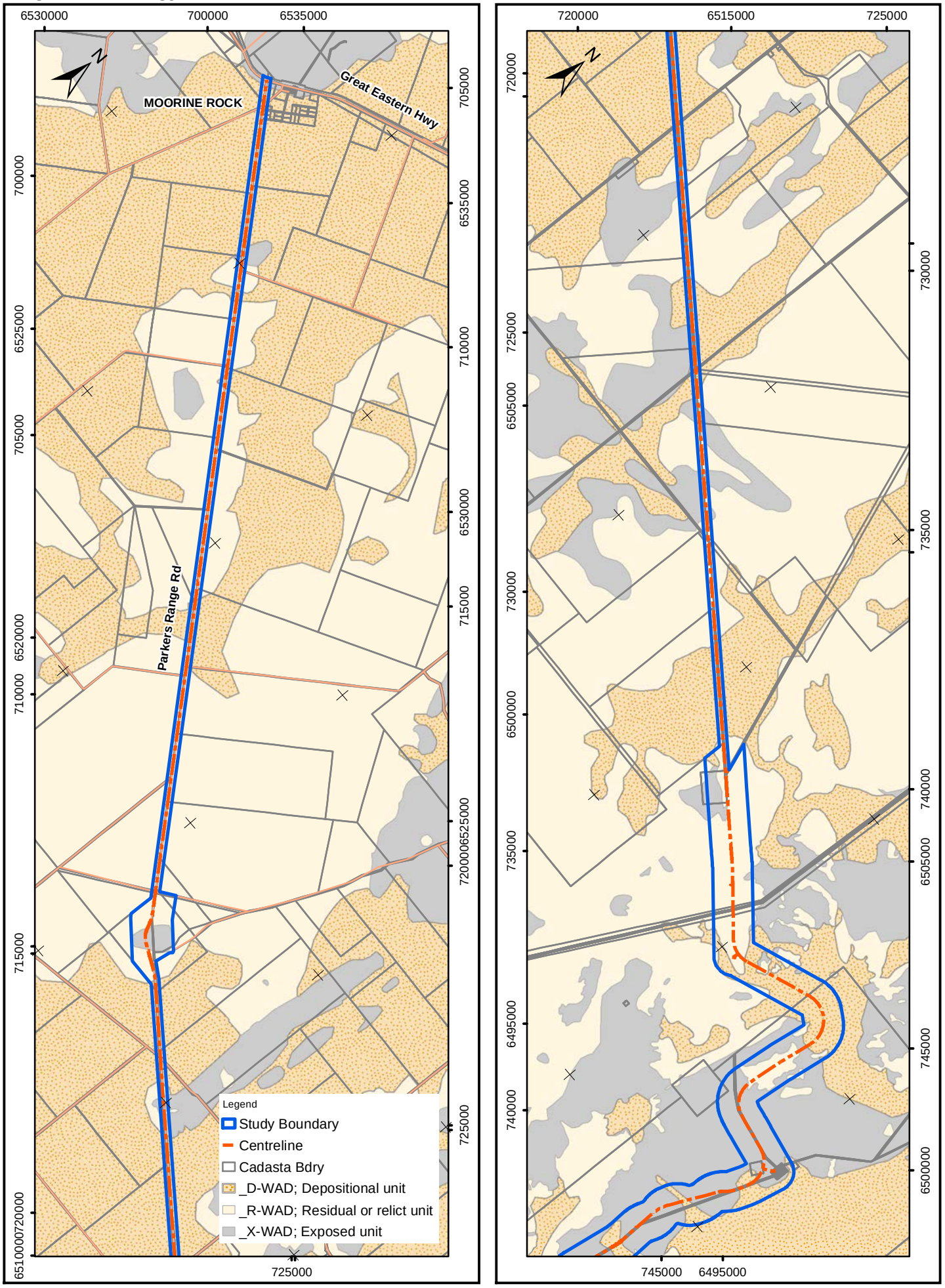
The Study Area lies within the southern section of the Archaean Southern Cross-Forrestania Greenstone Belt, which extends over 300 km in Western Australia (WA). The Study Area traverses seven bedrock and three regolith geological units (Table 1, Figure 4).

Table 1. Geology of the Study Area (DMIRS, 2018a, 2018b)

Code	Name	Description
Bedrock Geology		
A-mgss-Y	Yilgarn Craton granites	Foliated metagranite, locally gneissic; may include amphibolite lenses; includes deeply weathered rock
A-mw-YYO	Youanmi Terrane greenstones	Metamorphosed mafic igneous rock, undivided
A-s-YYO		Clastic sedimentary rock dominant; metamorphosed
A-md-YYO		Metasedimentary rock, undivided; includes metamorphosed sandstone, siltstone, shale, and chert; commonly deeply weathered
A-mu-YYO		Metamorphosed ultramafic rock, undivided; typically deeply weathered
A-xmuk-mi-YYO		Metakomatiite, metachert, and metamorphosed banded iron-formation
A-SDB-mg	Big Bell Suite	Metagranite; commonly foliated; includes granodiorite to monzogranite
Regolith Geology		
D		Sediments derived from residual or erosional landforms, which includes colluvial, sheetwash, alluvial, lacustrine, sandplain, eolian and marine deposits
X		Exposed bedrock outcrops, saprolite, and saprock
R		Residual or relict material; includes ferruginous, siliceous, and calcareous duricrust

Figure 4. Regolith Geology of the Study Area.

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Regolith Geology - Sheet 1 of 2



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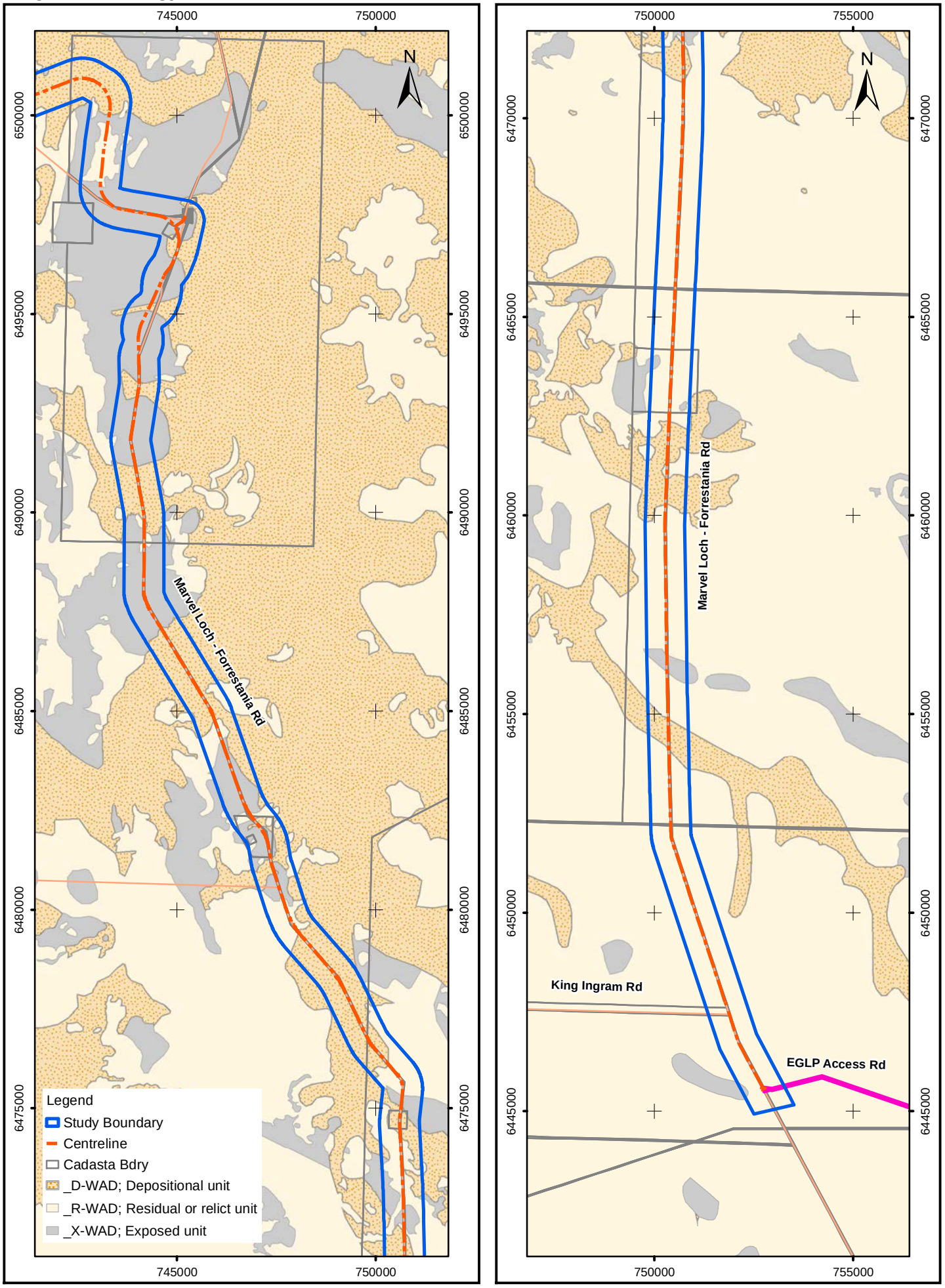
Source: Roads_MRWA, Cadasta: Landgate, Geology: DMIRS

0 3km

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Regolith Geology - Sheet 2 of 2



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Scale 1125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, Geology: DMIRS

2.2.3. Soil Landscape Zones

Soil landscape mapping of WA has been completed by the Department of Primary Industries and Regional Development (DPIRD) through the compilation of various surveys at differing scales (varying from 1:20,000 to 1:3,000,000). The mapping conforms to a nested hierarchy which was established to manage the varying scales and subsequent levels of information evident across the surveys (DPIRD, 2023a). The Study Area is located across 13 soil landscape zones, as presented in Table 2 and Figure 5. Dominant soil landscape zones include the AC1 atlas system (~ 40% of the Study Area), DD15 atlas system (~19%) and the Ya28 atlas system (~15%).

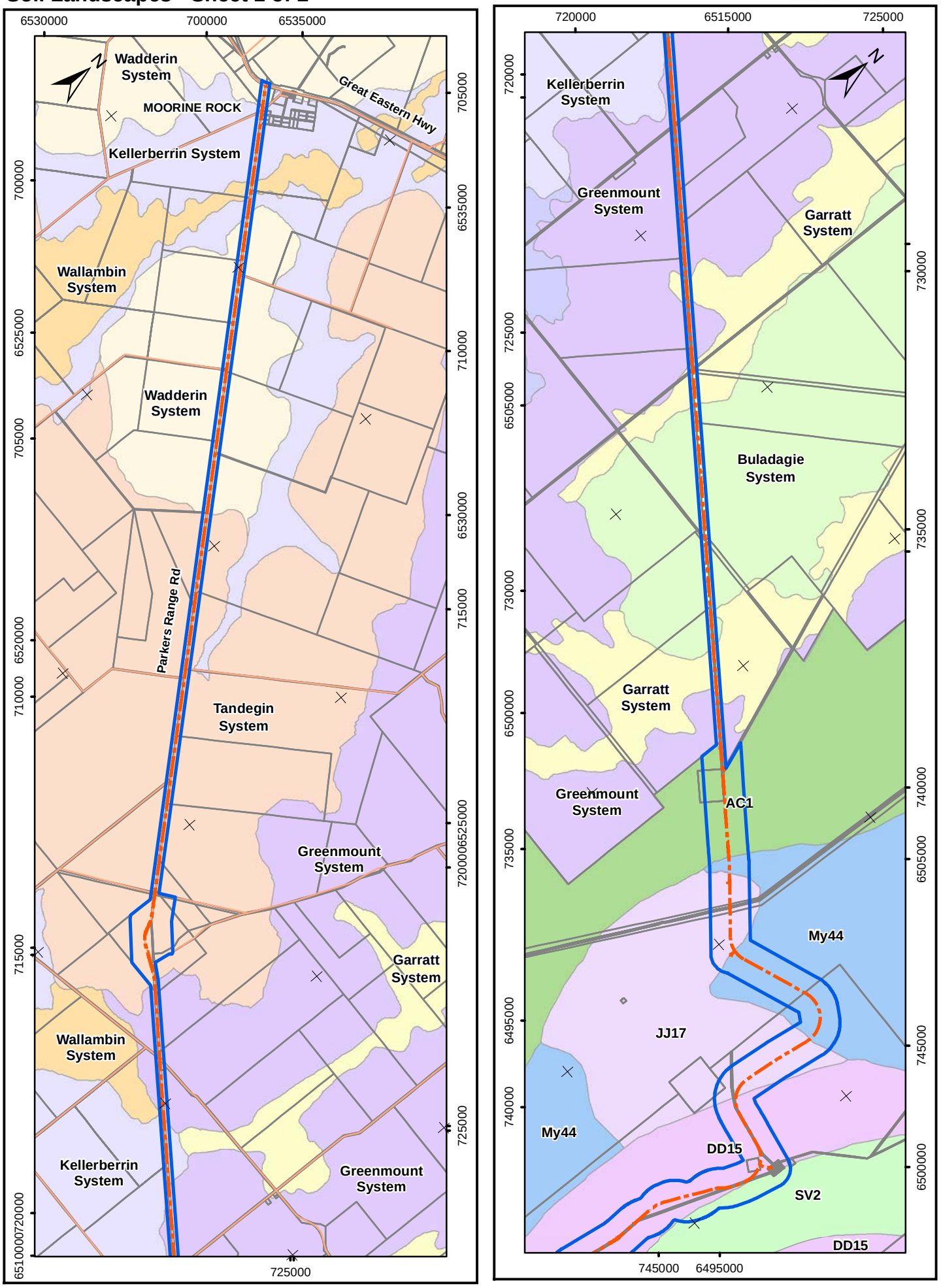
Table 2. Soil landscape zones of the Study Area (DPIRD, 2023a)

Map unit name	Description	Area (ha)	% of Study Area
Buladagie system	Gently undulating upland plains and subdued rises in the Eastern Zone of Ancient Drainage. 'Fresh' red rocky loams, yellow sands and sandy earths and shallow duplexes.	122.50	1.55
Garratt system	Lower slopes and footslopes adjacent to salt lakes in the eaten Zone of Ancient Drainage. Loamy earth (mostly calcareous), hard cracking clay and alkaline shallow duplex.	59.24	0.75
Greenmount system	Gently undulating rises to rolling low hills in the eastern Zone of Ancient Drainage. Loamy earth (mostly red, calcareous and clayey and stoney.	254.64	3.24
Kellerberrin system	Valley floors, in the central Zone of Ancient Drainage, with alkaline red shallow loamy duplex, alkaline grey sandy duplexes mainly in branch valleys (shallow and deep), calcareous loamy earth and hard cracking clay. Salmon Gum-Gimlet-Wandoo Woodlands.	82.32	1.04
Tandegin system	Sandplain dominated interfluves with weakly indurated lateritised crests and upper slopes and long colluvial yellow sandplain upper to lower slopes. Unlateritised surfaces dominated by sodic and alkaline duplex soils.	380.09	4.84
Wadderin system	Gently undulating rises on mixed gniessic terrain largely stripped of lateritic mantles with sandy duplexes and some sands and gravels, vegetated by Mallee and Kwongan heath.	168.11	2.13
Wallambin system	Salt lake chains, in the central Zone of Ancient Drainage, with salt lake soil and calcareous loamy earth. Mallee, Morrel woodland and saltbush-bluebush-samphire flats.	6.89	0.09
AC1 atlas system	Gently sloping to gently undulating plateau areas, or uplands, on granites, gneisses, and allied rocks, with long gentle slopes and, in places, abrupt erosional scarps.	3,173.29	40.33
DD15 atlas system	Undulating plains with some low dunes, seasonal lakes, and clay pans.	1,530.23	19.44
JJ17 atlas system	Small ranges of metasediments (whitestones), some rock outcrops.	442.51	5.62

Map unit name	Description	Area (ha)	% of Study Area
My44 atlas system	Undulating ridge and low hilly terrain with some mesas and buttes and small valley plains.	391.34	4.97
SV2 atlas system	Saline valleys with some dunes including barchan forms--salt lake channels, mostly devoid of true soils, and their fringing areas	106.34	1.35
Ya28 atlas system	Sandy plains with some clay pans and small salt lakes, dunes, and lunettes	1,152.18	14.65
	Total	7,869.68	100

Figure 5. Soil Landscapes of the Study Area.

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Soil Landscapes - Sheet 1 of 2



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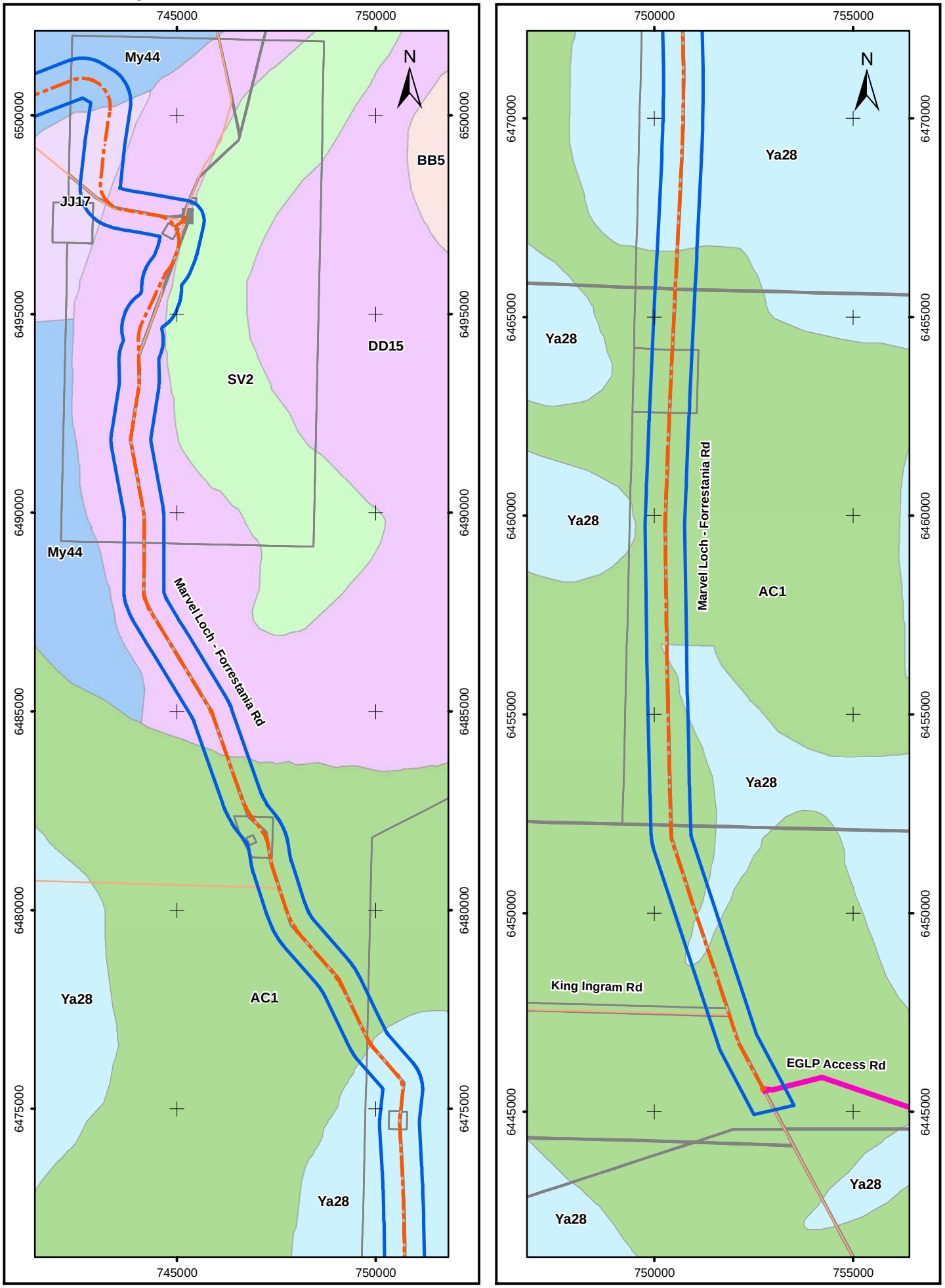
Scale 1:125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, Landsystems: DPIRD

0 3km

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Soil Landscapes - Sheet 2 of 2



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Scale 1125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, Landsystems: DPIRD

2.2.4. Hydrology and Hydrogeology

The Study Area is located across two hydrological zones;

- Northern Zone of Ancient Drainage: an ancient plain of low relief and lateritic uplands on weathered granite. Ranges and stony plains occur in the north-east. No connected drainage is present. The remnant salt lake chains occur in ancient drainage systems which flow only in very wet years (DPIRD, 2023b). The northern end of the Study Area (up to just south of Wockallarry Nature Reserve) falls within this zone.
- Southern Cross Zone: comprises rises and low hills on Archaean greenstones, with broad valleys often containing salt lake chains. Soils are usually red, loamy to clayey and calcareous (DPIRD, 2023b). Majority of Study Area is located within this zone.

The Study Area is located within the Avon River Basin in the Swan Avon/Yilgarn hydrographic catchment. It traverses the Lake Julia, (northern end of Study Area), Yellowdine (mid-section) and Lake Eva (southern end) hydrographic sub-catchments (DPIRD, 2023b).

The Department of Water and Environmental Regulation (DWER) groundwater salinity database (DWER, 2023a) indicates groundwater salinities in the Study Area range predominantly from 14,000 mg/L to 35,000 mg/L (highly saline). Where the Study Area intersects paleochannels associated with salt lake chains, groundwater salinity is >35,000 mg/L (brine). This occurs at two locations; the northern end of the Study Area (3.4 km in length) around the Moorine Rock townsite; and a section of the Study Area extending approximately 7.8 km south along the Marvel Loch-Forrestania Road from the Parker Range Road intersection (DWER, 2023a). Surface flow in these areas occurs only in periods of high rainfall.

2.3. Biological Environment

2.3.1. Interim Biogeographic Regionalisation of Australia (IBRA)

The Study Area intersects the Merredin subregion (AVW-01) of the Avon Wheatbelt bioregion and the Southern Cross subregion (COO-02) of the Coolgardie bioregion;

- Merredin subregion (AVW-01) is 6,566,022 ha in size and occurs within the Avon Wheatbelt bioregion. The bioregion is an area of active drainage dissecting a Tertiary plateau in Yilgarn Craton. The gently undulating landscape of low relief supports proteaceous scrubheaths on residual lateritic uplands and derived sandplains; mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands on Quaternary alluvials and eluvials. The Merredin subregion is characterised as an ancient peneplain with low relief and no connected drainage. The salt lakes present occur as remnants of ancient drainage systems that now only function in very wet years. Lateritic uplands are dominated by yellow sandplain (Beecham, 2001). Approximately 20.96% of pre-European vegetation (see Section 2.3.2) currently remains within this subregion, of which only 1.4% is protected (reserved) for conservation (DBCA, 2018).

- Southern Cross subregion (COO-02) is 7,041,232 ha in size and occurs within the Coolgardie bioregion. The subregion comprises gently undulating uplands dissected by broad valleys with bands of low greenstone hills. It lies on the 'Southern Cross Terrains' of the Yilgarn Craton. The granite strata of Yilgarn Craton are interrupted by parallel intrusions of Archaean Greenstone. Drainage is occluded. Valleys have Quaternary duplex and graduational soils, and include chains of saline playa-lakes. Dominant vegetation includes:
    - diverse *Eucalyptus* woodlands (*Eucalyptus salmonophloia, E. salubris, E transcontinentalis, E. longicornis*) around salt lakes, on the low greenstone hills, valley alluvials and broad plains of calcareous earths;
    - dwarf shrublands of samphire on salt lake surfaces;
    - swards of *Borya constricta*, with stands of *Acacia acuminata* and *Eucalyptus loxophleba* on granite basement outcrops at mid-levels in the landscape; and
    - Mallees (*Eucalyptus leptopoda, E. platycorys* and *E. scyphocalyx*) and scrub-heaths (*Allocasuarina corniculata, Callitris preissii, Melaleuca uncinata* and *Acacia beauverdiana*) on uplands of yellow sandplains, gravelly sandplains and laterite breakaways as well as on sand lunettes associated with playas along the broad valley floors, and sand sheets around the granite outcrops (Cowan *et al*., 2001).

  Approximately 96.06% of pre-European vegetation remains within this subregion, of which 16.21% is protected (reserved) for conservation (DBCA, 2018).

2.3.2. Pre-European Vegetation

The pre-European vegetation mapping of Western Australia dataset maps the original native vegetation presumed to have existed prior to European settlement. It is based predominantly on the published and unpublished mapping of J.S. Beard. The first broad-scale vegetation mapping of Western Australia was conducted by Beard in 1979 with several revisions and updates resulting in the most recent and comprehensive iteration, detailed in Beard *et al*. (2013).

J.S. Beard describes thirteen vegetation system associations across the Study Area (Table 3, Figure 6). Statistics on the pre-European and current extent of the Beard vegetation associations of WA has been jointly developed by the DBCA and DWER. These statistics are used in the assessment of development applications and both conservation and land use planning. Based on the 2018 State-wide Vegetation Statistics (DBCA, 2018), a summary of the regional extent (State and Bioregion) of the pre-European vegetation associations present in the Study Area, is presented in Table 3 . It should be noted that the two vegetation associations that extend across both bioregions (Skeleton Rock_1068 and Skeleton Rock _2048), have not had proportions within each bioregion calculated but rather the total extent of the association in the Study Area is compared against the bioregion extent.

The dominant pre-European vegetation system associations are Eucalypt woodlands or mallee and include Parker_1068 which accounts for approximately 41% of the Study Area vegetation, Skeleton Rock_519 (11%) and Skeleton Rock_1068 (8%). The Parker_1068 vegetation

association has approximately 88% of its pre-European extent remaining (both at a State and Avon Wheatbelt bioregion level). The Skeleton Rock_519 association has approximately 83% of its extent remaining state-wide, and 99% remaining within the Coolgardie Bioregion. The Skeleton Rock_1068 vegetation association has a more restricted distribution across the State and has been subject to land clearing with approximately 54% of it's extent remaining state-wide and only 31% within the heavily cleared Avon Wheatbelt bioregion. Its occurrence within the Coolgardie Bioregion remains relatively undisturbed.

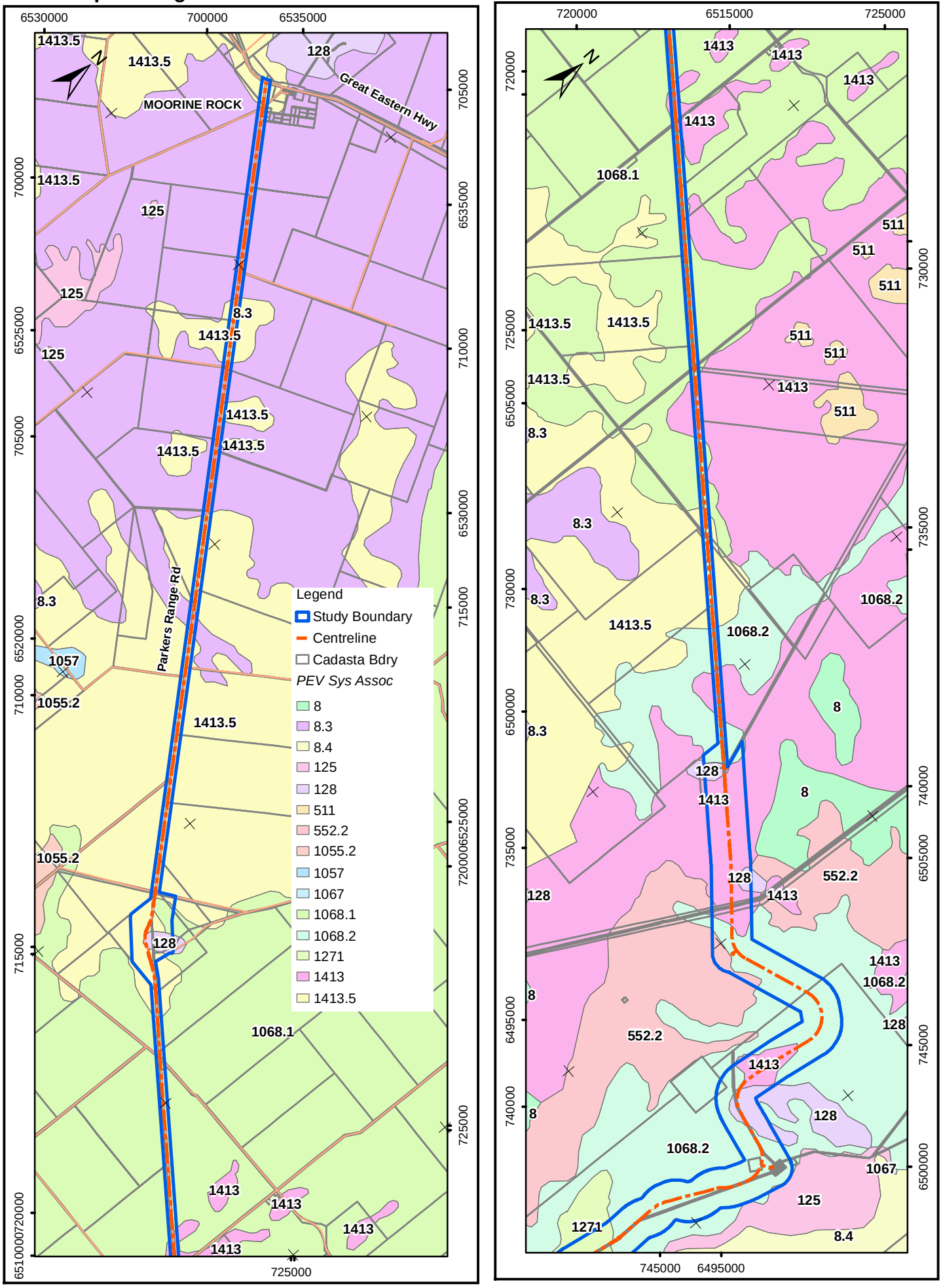
Table 3. Pre-European vegetation system associations of the Study Area.

Veg. System	Veg. Assoc.	SA Code	Description	Scale	Pre-European extent (ha)	Current extent (ha) and % remaining	Extent in Study Area (ha)	% within Study Area
Boorabbin	125	12.0	Salt lake, lagoon, clay pan	State	40,718.13	38,198.82 93.81%	11.12	0.03
				Coolgardie Bioregion	40,607.50	38,088.19 93.80%		0.03
Moorine Rock	8	8.3	Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia.*	State	328.471,35	50,671.62 15.43%	180.84	0.36
				Avon Wheatbelt Bioregion	319,538.96	45,102.86 14.11%		0.40
Moorine Rock	128	128	Bare areas; rock outcrops	State	18,899.94	12,072.08 63.87%	212.25	1.76
				Avon Wheatbelt Bioregion	16, 893.33	10,486.75 62.08%		2.02
Moorine Rock	1413	1413.5	Wattle, casuarina and teatree acacia-allocasuarina-melaleuca alliance.	State	337,732.5	130,897.47 38.76 %	436.37	0.33
				Avon Wheatbelt Bioregion	319,735.46	117,911.42 36.68%		0.37
Parker	552	552.2	Wattle, casuarina and teatree acacia-allocasuarina-melaleuca alliance.	State	11,607.85	11,264.18 97.04%	47.69	0.42
				Avon Wheatbelt Bioregion	9,734.59	9,650.55 99.14%		0.49
Parker	1068	1068.2	Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia.*	State	68,472.57	60,251.74 87.99%	3,212.31	5.33
				Avon Wheatbelt Bioregion	32,713.01	28,704.70 87.75%		11.19
Parker	1271	1271	Salt lake, lagoon, clay pan	State	836.38	834.09 99.73%	147.37	17.66
				Avon Wheatbelt Bioregion	836.38	834.09 99.73%		17.66

Veg. System	Veg. Assoc.	SA Code	Description	Scale	Pre-European extent (ha)	Current extent (ha) and % remaining	Extent in Study Area (ha)	% within Study Area
Parker	1413	1413	Wattle, casuarina and teatree acacia-allocasuarina-melaleuca alliance.	State	11,973.24	6,807.73 56.86%	543.61	7.98
				Avon Wheatbelt Bioregion	8,495.70	4,207.79 49.53%		12.91
Skeleton Rock	519	519.4	Eucalypt shrubland, *Eucalyptus eremophila, E. redunca, E.* spp.	State	156,242.20	129,453.91 82.85%	865.05	0.66
				Coolgardie Bioregion	56,013.48	55,381.93 98.87%		1.56
Skeleton Rock	1068	1068	Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia.* Goldfields; gimlet, redwood etc. *E. salubris, E. oleosa.*	State	30,139.71	16,201.48 53.75%	659.43	4.07
				Avon Wheatbelt Bioregion	20,061.11	6,125.85 30.54%		10.76
				Coolgardie Bioregion	10,041.81	10,040.54 99.99%		6.56
Skeleton Rock	1148	1148.3	Mixed heath with scattered tall shrubs *Acacia* spp., Proteaceae and Myrtaceae.	State	5,276.00	5,274.51 99.97%	630.82	11.95
				Coolgardie Bioregion	5,259.05	5,257.56 99.97%		11.99
Skeleton Rock	2048	2048.2	Mixed heath with scattered tall shrubs *Acacia* spp., Proteaceae and Myrtaceae.	State	82,634.67	65,590.71 79.37%	619.19	0.94
				Coolgardie Bioregion	2017.49	2017.49 100%		30.68
				Avon Wheatbelt Bioregion	158.95	115.88 72.90%		100
Yilgarn	1068	1068.1	Medium Woodland. Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba, E. salmonophloia.*	State	89,909.33	23,811.59 26.48%	303.63	1.27
				Avon Wheatbelt Bioregion	22,044.17	2,399.22 10.88%		12.65
						Total	7,869.68 ha	

Figure 6. Pre-European Vegetation of the Study Area.

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Pre European Vegetation - Sheet 1 of 2



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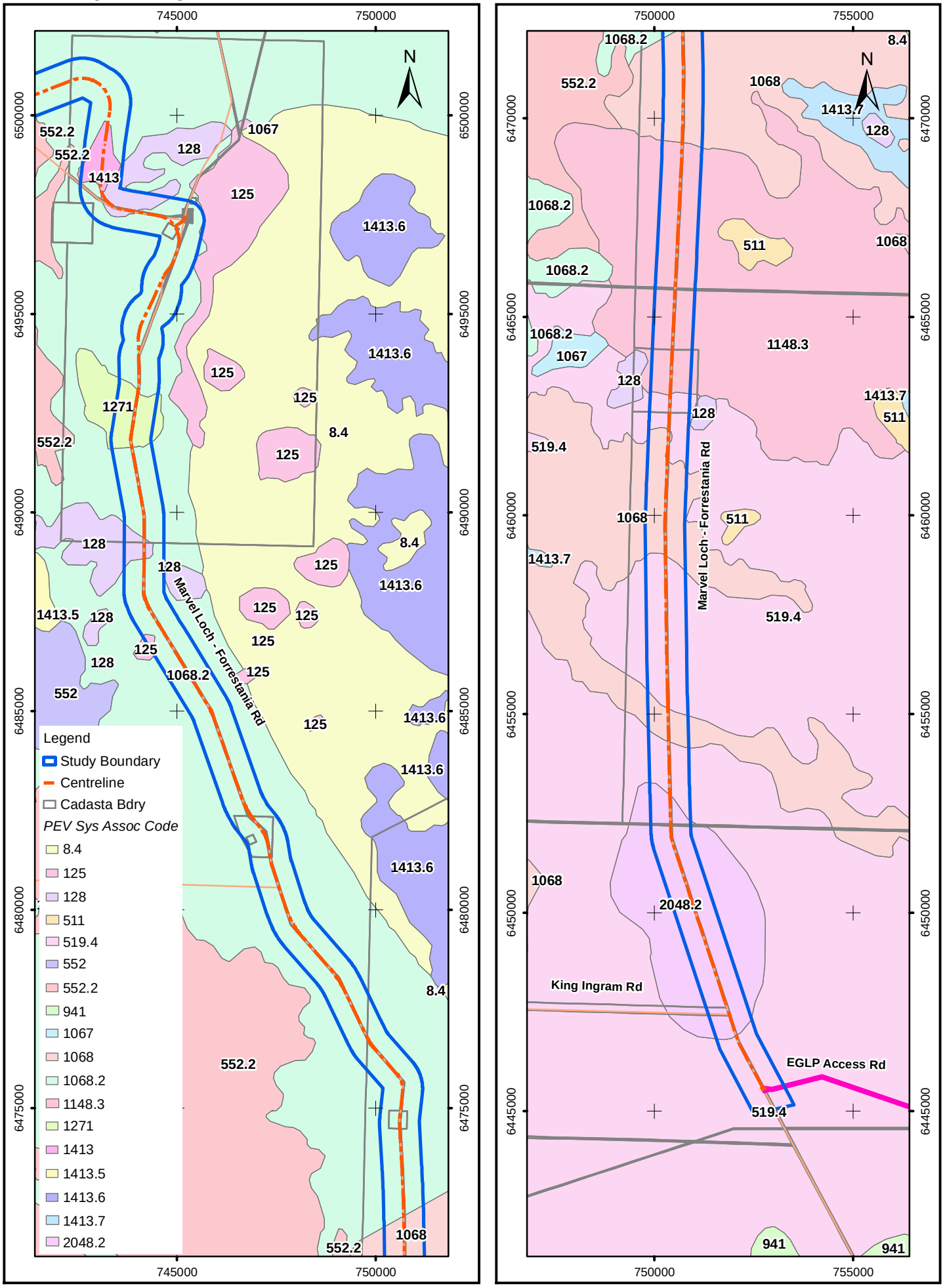
Source: Roads_MRWA, Cadasta: Landgate, PEV: DPIRD

0 3km

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Pre European Vegetation - Sheet 2 of 2



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Scale 1125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, PEV: DPIRD

2.3.3. Groundwater Dependent Ecosystems (Terrestrial)

A Groundwater Dependent Ecosystem (GDE) is defined as an ecosystem that relies on groundwater for some or all its water requirements. The GDE Atlas is a national dataset of Australian GDEs to inform groundwater planning and management. The Atlas contains information about three types of ecosystems (aquatic, terrestrial and subterranean) (BoM, 2023b).

The vegetation of the Study Area that remains intact has been mapped as having a low to moderate potential for supporting a terrestrial GDE (BoM, 2023b). This includes woodland vegetation within the Great Western Woodlands (low to moderate) (as described in Section 2.3.7) and Wockallarry Nature Reserve (moderate). The only section of the Study Area mapped as having a high potential is the northern most end (1 km section) at the junction with Great Eastern Highway where vegetation remains intact surrounding the Moorine Rock townsite and the granite outcrop located on the northern side of Great Eastern Highway. Immediately adjacent (but outside of) the Study Area along the Marvel Loch – Forrestania Road, the chain of salt lakes present has resulted in the area being mapped as having a high potential for supporting a terrestrial GDE (BoM, 2023b).

Groundwater in the vicinity of the Early Grey deposit (located adjacent the southern end of the Study Area) is approximately 60 to 70m below surface (10m below surface in the area associated with the borefield) and is saline to hypersaline and therefore unlikely to support GDEs (Blueprint Environmental Strategies, 2017a).

2.3.4. Significant Wetlands

The are no wetlands of international (Ramsar) significance within 50 km of the Study Area (DBCA, 2023a). The nearest significant wetland, as listed under the Directory of Important Wetlands in Australia (DIWA) (DBCA, 2023b) is Lake Cronin, located approximately 32 km south of the Study Area. This small lake is the best example of a *Melaleuca*-dominated freshwater lake/marsh in the bioregion (DCCEEW, 2023a). Other significant wetlands in the greater region include: Lake Grace System located 157 km south west of the Study Area; Lake Barlee located 198 km north and Yealering Lakes System located 200 km west-south-west.

2.3.5. Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are classes or areas of native vegetation where the exemptions for clearing vegetation under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations) do not apply. They include the following:

- a declared World Heritage property as defined in sections 13 of the *Environment Protection and Biodiversity Conservation Act 1999* of the Commonwealth;
- an area that is included on the Register of the National Estate, because of its natural heritage value, under the *Australian Heritage Council Act 2003* of the Commonwealth;

- a defined wetland and the area within 50 m of the wetland;
- the area covered by vegetation within 50 m of rare flora, to the extent to which the vegetation is continuous with the vegetation in which the rare flora is located;
- the area covered by a threatened ecological community;
- a Bush Forever site listed in "Bush Forever" Volumes 1 and 2 (2000), published by the Western Australia Planning Commission, except to the extent to which the site is approved to be developed by the Western Australia Planning Commission, as described in subclause (3);
- the areas covered by the following policies —
    - (i) the Environmental Protection (Gnangara Mound Crown Land) Policy 1992;
    - (ii) the Environmental Protection (Western Swamp Tortoise) Policy 2002;
- the areas covered by the lakes to which the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 applies;
    - (i) protected wetlands as defined in the Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998;
    - (j) areas of fringing native vegetation in the policy area as defined in the Environmental Protection (Swan and Canning Rivers) Policy 1998.

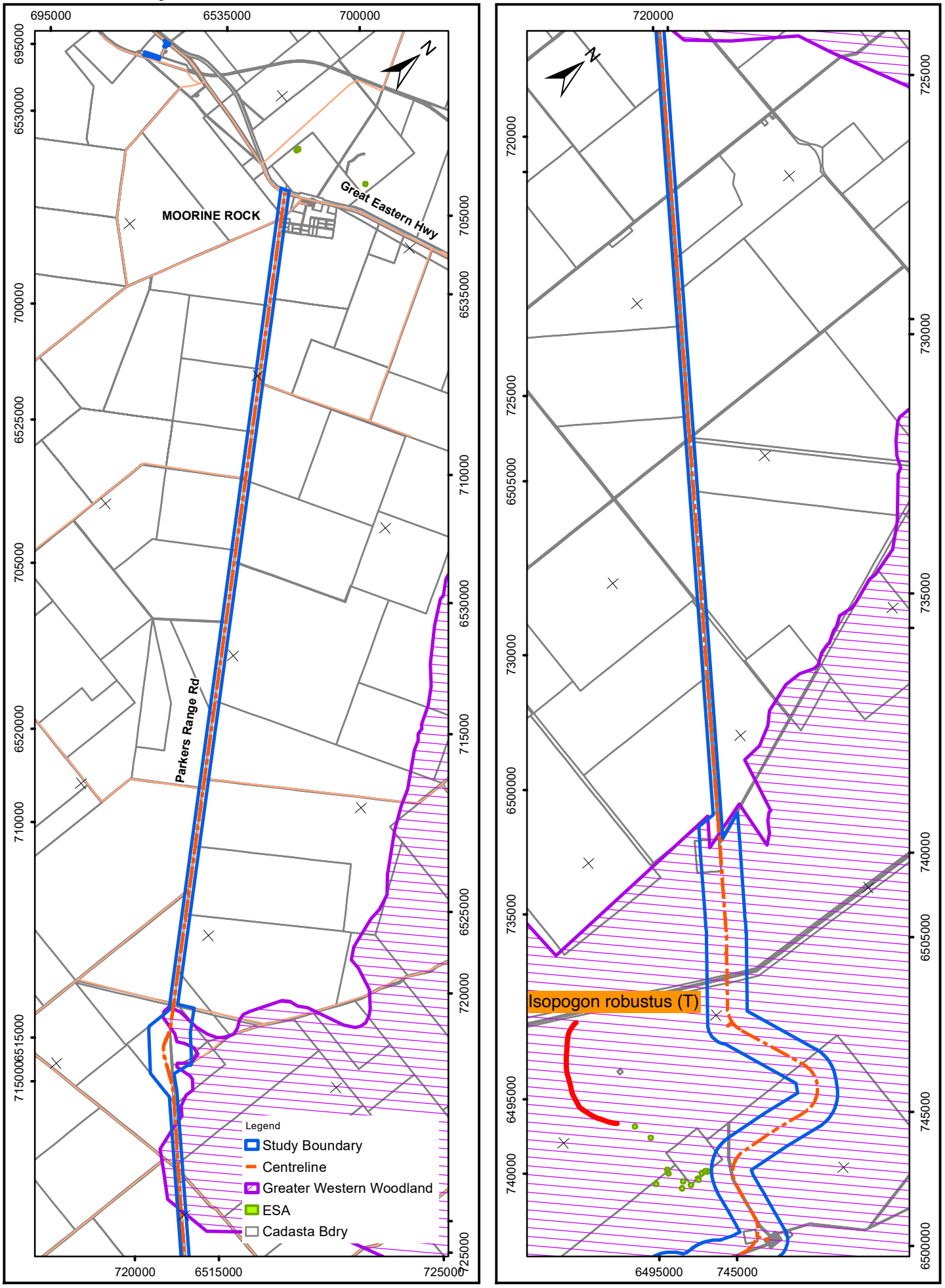
Three ESAs are present within the Study Area (Figure 7):

- The Study Area intersects the Jilbadgi Nature Reserve which is listed on the Register of the National Estate and therefore meets the criterion as an ESA.
- *Banksia dolichostyla* is listed as Threatened Flora by the DBCA. This species is present adjacent to the roadside from about the intersection of King Ingram Road southwards to the turnoff into the Mt Holland minesite. This region of roadside within 50m of *Banksia dolichostyla* plants therefore meets the criterion as an ESA.
- The Commonwealth listed 'Eucalypt Woodland of the Western Australian Wheatbelt' Threatened Ecological Community (TEC) under the *EPBC Act*, which is synonymous with the State listed Priority 3 PEC of the same name. The area covered by a TEC is classified as an ESA.

Beyond Jilbadgi Nature Reserve, nearby ESAs include (i) the Yellowdine Nature Reserve, located approximately 29 km north-west of the Study Area; and (ii) the Lake Cronin Nature Reserve, 32 km to the south (locations presented in Figure 8). Both are listed on the Register of the National Estate with the latter also containing a defined wetland (DWER, 2023b). Further, *Isopogon robustus* (T) is known from Mt Caudan in the Parker Range which lies to the south of the Study Area where the road diverts around the Mt Caudan minesite (Figure 7) and vegetation within 50m of this species also meets the criterion as an ESA.

Figure 7. Environmentally Sensitive Areas of the Immediate Region

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Environmentally Sensitive Areas - Sheet 1 of 2



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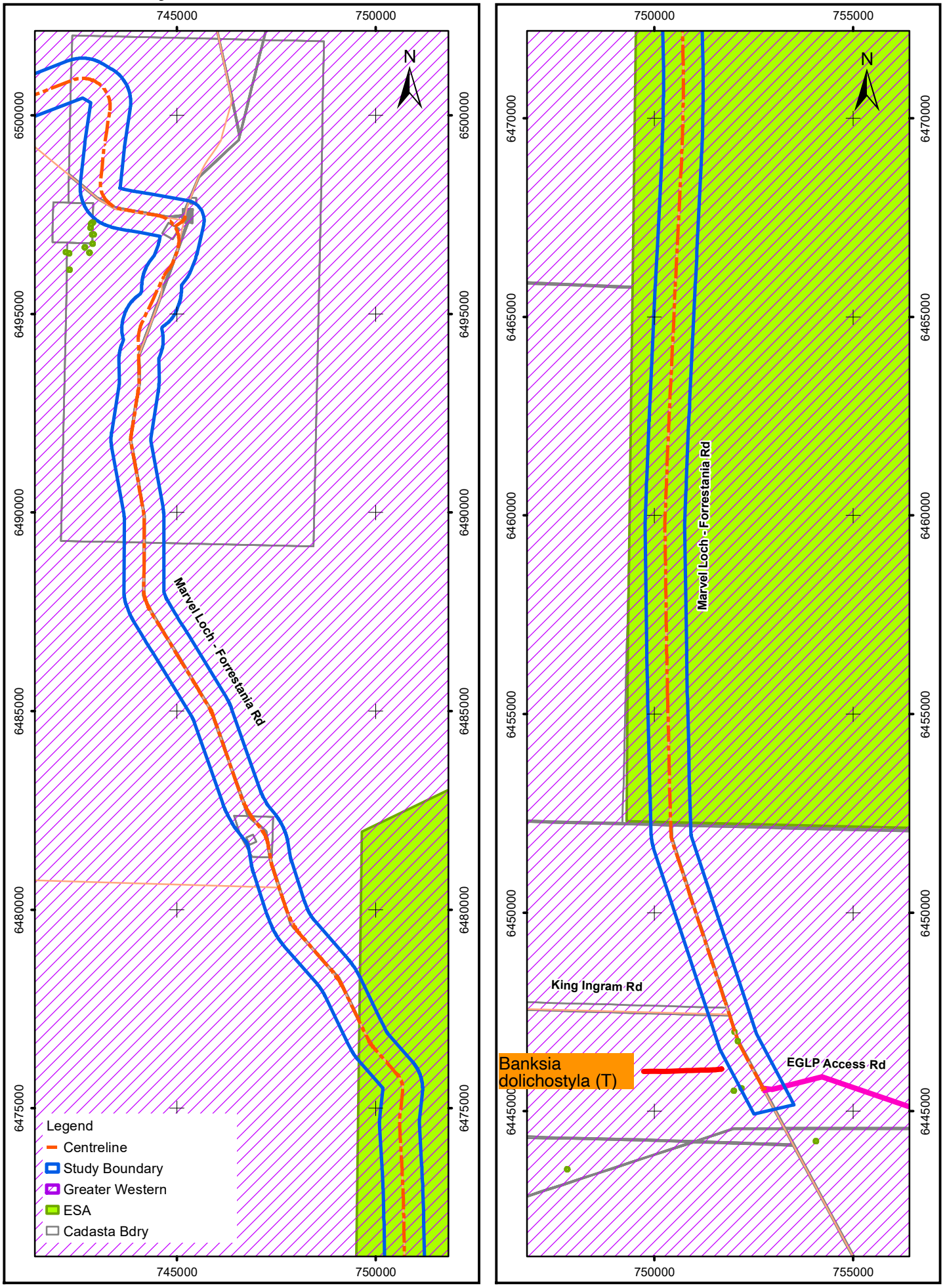
Scale 1:125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, ESA: DBCA

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Environmentally Sensitive Areas - Sheet 2 of 2



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Scale 1125,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgatem ESA: DBCA

2.3.6. Conservation Reserves in the Region

There are 34 conservation reserves (DBCA- Legislated Lands) within approximately 50 km of the Study Area (Table 4) (DBCA, 2022a; DAWE, 2023a). The Study Area intersects two reserves; Jilbadji Nature Reserve and Wockallarry Nature Reserve with the Frog Rock Nature Reserve located approximately 2.5 km from the Study Area (Figure 8).

The Jilbadgi Nature Reserve is 207,213 ha in size and is substantially larger than the average reserve size (114 ha) in the Wheatbelt. It serves as an important fauna refugia site and contains a high diversity of fauna species and flora species endemism (DCCEEW, 2023b). As described in Section 2.5.5, this nature reserve is classified as an ESA. The Wockallarry Nature Reserve is an A Class reserve that is 209 ha in size and is dissected by the Parker Range Road.

Table 4. DBCA legislated land within the vicinity of the Study Area (DBCA, 2022a; DAWE, 2023a).

Name	Reserve No.	Reserve Class	~Distance from Study Area
Jilbadji Nature Reserve	24049		Intersects
Wockallarry Nature Reserve	29537	A	Intersects
Frog Rock Nature Reserve	20262	A	2.5 km SW
Un-named	40460		18 km W
Un-named	25801		23 km NE
Unnamed	43219	A	29 km N
Yellowdine Nature Reserve	41936		29 km NW
Unnamed	16000		29 km W
Unnamed	34197	A	30 km WSW
Unnamed	18584		31 km W
Lake Cronin Nature Reserve	36526	A	32 km S
Condarnin Rock Nature Reserve	29823		33 km NNW
Sandford Rocks Nature Reserve	1432	A	34 km ENE
Unnamed	30430	A	34 km NW
Unnamed	28562		35 km W
Unnamed	18583		37 km W
Biljahnie Rock Nature Reserve	29920		41 km NE
Unnamed	27146	A	41 km NW
Baladgie Lake Nature Reserve	42720		42 km NW
Carrabin Nature Reserve	16235	A	42 km W
Un-named	28323	A	43 km W
Unnamed	28940	A	43 km WSW
Un-named	28047	A	44 km SW

Name	Reserve No.	Reserve Class	~Distance from Study Area
Neendojer Rock Nature Reserve	34776		46 km W
Welsh Nature Reserve	30305		47 km W
Welsh Nature Reserve	30305		47 km W
Bushfire Rock Nature Reserve	29535		48 km SW
Bushfire Rock Nature Reserve	29535		48 km SW
Mount Hampton Nature Reserve	20526	A	48 km W
Duladgin Nature Reserve	2179		48 km NNW
Unnamed	36918	A	50 km NE
Marble Rocks Nature Reserve	20528		50 km SW
Lake Hurlston Nature Reserve	27837	A	52 km SW
Unnamed	9927		54 km SSW

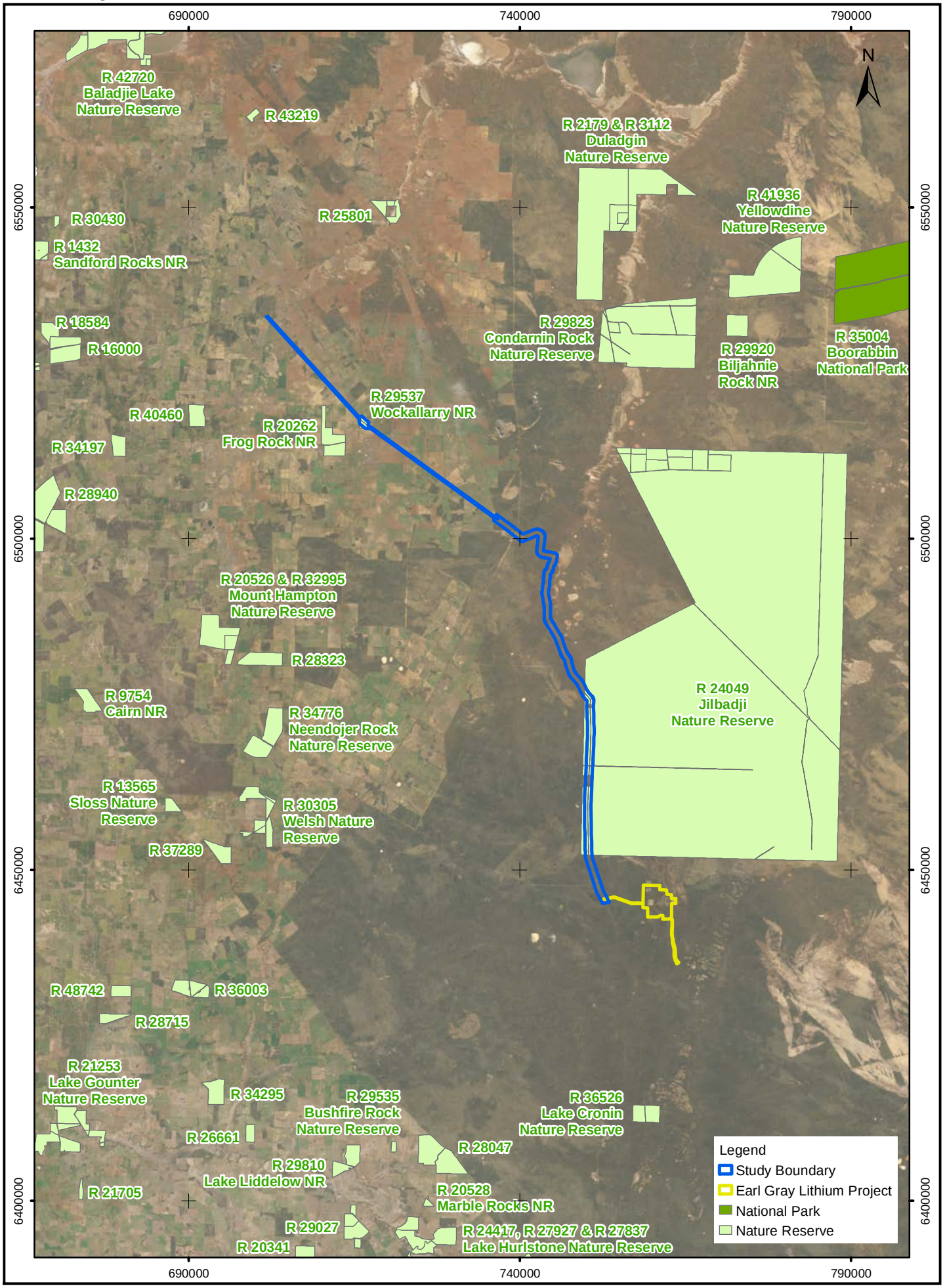
2.3.7. Great Western Woodlands

The Great Western Woodlands is an area of 16 million hectares of temperate woodland laying within the central and eastern Coolgardie biogeographic region, east of the extensively cleared agricultural region. It is the largest remaining area of intact Mediterranean climate woodland on Earth and is recognised as having high degrees of endemism and conservation value. Approximately 20% of Australia's known flora occurs within this area. There is almost no permanent water within the region, with surface water draining into, and evaporating from, numerous salt lakes. The Great Western Woodlands is located predominantly on unallocated Crown land, with significant areas of pastoral lease and conservation reserve also present (DEC, 2010).

The Study Area is located within the western boundary of the Great Western Woodlands until it enters the extensively cleared agricultural zone along Parker Range Road (Figure 7).

Figure 8. Regional DBCA Legislated Land

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
DBCA Legislated Land



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Scale 1:250,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, Legislated Land: DBCA

0 15 km

3. Methods

3.1. Desktop Assessment

3.1.1. Literature Review

A review of available literature relevant to the Study Area was undertaken, utilising (but not limited to) the Index of Biodiversity Surveys for Assessment search portal. A total of 19 reports were reviewed, pertaining to the Earl Grey (Mt Holland) Lithium Project area and the Parker Range Iron Ore Project.

Extensive botanical survey has been conducted across the adjacent Earl Grey/Mt Holland Lithium Project area between 2017 – 2021 and 16 reports were reviewed from this project. Previous surveys conducted along the mine access road overlap the current Study Area at the intersection of the Marvel Loch – Forrestania Road.

The Parker Range Iron Ore Project is located approximately 50 km north-west of the Earl Grey Lithium Project. The Marvel Loch – Forrestania Road borders the northern edge of the project, having been redirected to allow for the construction of the minesite. The Study Area lies immediately adjacent the project and within the area surveyed to encompass the current bypass route. Two reports were reviewed from the Parker Range Iron Ore Project, including the Public Environmental Review document (from 2010) which summarised botanical surveys conducted from 2007 – 2010, and the recent (2021) Parker Range Haul Road Project report.

3.1.2. Database Searches

Database searches were conducted to identify potential Threatened and Priority Flora species, Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs), or other areas of conservation significance that may be encountered during field surveys (Table 5). The DBCA Framework for Conservation Significant Flora; and the Definitions of TECs and PECs are presented in Appendix 1and Appendix 2.

Subsequent to the database searches, a desktop assessment of the likelihood of each Threatened and Priority flora species, TEC or PEC occurring within the Study Area was performed by considering (a) the proximity of known Conservation Significant flora and communities to the Study Area; and (b) the similarities between supporting habitats for each species and those of the Study Area.

A search of DPIRD's Western Australian Organism List (WAOL) for the Shire of Yilgarn was completed to identify plant species declared under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) that are known to occur in WA, for the local government area.

Table 5. Details of database searches conducted.

Provider	Reference	Database	Search parameters
Department of Biodiversity, Conservation and Attractions (DBCA)	DBCA, (2022b)	Threatened and Priority Flora database	50 km radius of Study Area polygon.
	DBCA (2022c)	Western Australian Herbarium Specimen database	
	DBCA (2022d)	Threatened and Priority Ecological Communities database	50 km radius of Study Area polygon.
Department of Agriculture, Water and the Environment (DAWE)	DAWE (2023a)	Protected Matters Search Tool (PMST)	50 km radius of Study Area, based on polygon the length of Study Area and 1km wide.
Department of Primary Industries and Regional Development (DPIRD)	DPIRD (2023c)	Western Australian Organism List	Shire of Yilgarn

4. Results

4.1. Literature Review

A summary of the key findings, in relation to flora and vegetation, of the 19 reports identified from the literature review are presented in Table 6. Extensive botanical survey work has been conducted across the Earl Grey Mt Holland project area (including the water pipeline route) from 2016 to 2020. Areas previously surveyed intersect the Study Area at two locations; along the Marvel-Loch Forrestania Road (near mine access intersection) and along Parker Range Road from north-west of Wockallarry Nature Reserve to Great Eastern Highway. A total of 47 Threatened and Priority flora have been located during surveys associated with the Earl Grey Mt Holland project area. This included 29 conservation significant taxa within the project's development envelope and a further 18 taxa outside of the envelope that were located in the course of regional targeted flora surveys (Mattiske Consulting, 2021a). The flora of this region is incredibly diverse and subject to continual taxonomic and conservation status review.

Although mapped (within the DBCA TEC/PEC database) as occurring within the 'Ironcap Hills vegetation assemblages' PEC (Priority 3) buffer, the vegetation of the Earl Grey Mt Holland project displayed poor correlation with the PEC and was deemed non-representative (Mattiske Consulting, 2018). A small section of the Study Area intersects this mapped PEC along the Marvel Loch – Forrestania Road (Figure 9) and will therefore require assessment to determine if the vegetation is representative of the PEC. The Earl Grey Mt Holland water pipeline route botanical survey encountered vegetation that was assessed for compatibility with the 'Eucalypt Woodland of the Western Australian Wheatbelt' PEC (Priority 3)/TEC as the latter is mapped as having a scattered occurrence, particularly around the Parker Range Road/Moorine Rock area. Although some areas received a tentative assessment as the PEC/TEC, the majority of the relevant *Eucalyptus* trees occurred outside the road verge on private agricultural land and were therefore inaccessible (for further assessment) but also outside of any possible (direct) impact zone (Mattiske Consulting, 2020b, 2020c).

Biological assessments have been conducted for the Parker Range (Mt Caudan) Iron Ore Project, with the most recent (publicly available) flora and vegetation survey conducted in 2019 – 2020 for a haul road (to the Koolyanobbing Iron Ore mine site). The area surveyed for the proposed Parker Range project haul road intersects the Study Area along Parker Range Road. Twenty five Priority flora species were located within this ~80 km long survey corridor. Earlier survey work conducted from 2007 – 2010 for the Parker Range Iron Ore Project site identified seven Priority Flora species and one Threatened Flora species (*Isopogon robustus*). The Parker Range Iron Ore Project site lies wholly within the 'Plant Assemblages of the Parker Range System 'PEC' (P3).

It should be noted that the Threatened species *Banksia sphaerocarpa* var. *dolichostyla* (as referred to in Table 6) underwent taxonomic review in 2022 and is now known as *Banksia dolichostyla.* The conservation status of this species remains unchanged.

Table 6. Summary of available reports relevant to the Study Area.

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Mt Holland/Earl Grey Lithium Project				
Threatened and Priority Flora Assessment Earl Grey Lithium Project Pre-Clearance Surveys. Report prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, April 2021a.	Targeted survey for all potential conservation significant flora taxa present within the infrastructure footprint of the mine development envelope. 18 surveys conducted from 2019 – 2020.	29 conservation significant taxa recorded within the project's development envelope. A further 18 conservation significant taxa were recorded outside of the development envelope in the course of regional targeted flora surveys (conducted by various consultancies).	The results of the direct and indirect (total) impacts assessment determined that the total regional population impacts to all conservation significant taxa recorded within the project's development envelope were below the respective thresholds.	Survey area overlaps the Study Area along Marvel-Loch Forrestania Road (near mine access intersection) and along Parker Range Road from north-west of Wockallarry Nature Reserve to Great Eastern Highway
Earl Grey Lithium Project Field Survey 14th – 21st March, 2021. Memorandum; vegetation health monitoring transects. Report prepared by Mattiske Consulting Pty Ltd, March 2021b.	Re-monitoring of vegetation health monitoring transects established in 2019 and 2020. Focusing on *Hibbertia glabriuscula* (P3), *Thryptomene salina* (P1), and *Thryptomene* sp. Hyden (B.J. Lepschi & L.A. Craven 4477) (P1)		*Hibbertia glabriuscula* (P3) was not recorded at any new locations during this survey, but is likely restricted to open S2 vegetation. The *Thryptomene salina* (P1) population recorded in November 2020 appeared very restricted and was not present in large numbers. *Thryptomene* sp. Hyden (B.J. Lepschi & L.A. Craven 4477) (P1) was observed growing in large numbers in open areas of S2 vegetation on pale brown – yellow sand.	Survey area overlaps the Study Area along Marvel-Loch Forrestania Road, just north of mine access road intersection.

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Targeted Flora Survey – Mt Holland Lithium Project Report prepared for Covalent Lithium Pty Ltd by 360 Environmental, November 2020.	Targeted flora survey of eight conservation significant flora taxa outside of the project disturbance envelope to quantify regional populations.		Four of the targeted species were located with a total of 63,736 individuals recorded outside the project disturbance envelope: • *Acacia undosa* (P3); 59,302 individuals • *Microcorys* sp. Mt Holland (P1); 3,968 • *Microcorys* sp. Mt Holland – broad leaf; 394 • *Chamelaucium* sp. Parker Range (P1); 52 • *Eutaxia lasiocalyx* (P2): 20	1 km west of Study Area between minesite and Marvel Loch – Forrestania Road.
Earl Grey Lithium Project Introduced Flora (Weed) Survey Report prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, October 2020a.	Targeted survey for weed species within areas of disturbance	16 weed species representing 7 families and 14 genera	No WoNS or Declared Weeds present	Survey area overlaps the Study Area along Marvel-Loch Forrestania Road (near mine access intersection).
Earl Grey Lithium Project Field Survey 25th October 2020. (Water Pipeline TEC Assessment) Memorandum prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, October 2020b.	Field assessment for the Wheatbelt Woodland TEC along the water pipeline corridor. Five areas assessed.		Comment made that trees along the section of Parker Range Road that was assessed occurred in farmland and not road verge.	Overlaps the Study Area along the Parker Range Road (NW of Wockallarry Nature Reserve)

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Flora and Vegetation Assessment Earl Grey Lithium Project Water Pipeline Alignment Supplementary Report Report prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, September 2020c.	Reconnaissance of two locations (<1.5 ha in total)	No Threatened or Priority flora present. Vegetation in poor to degraded condition.		Immediately adjacent northern end of Study Area near Great Eastern Highway.
Flora and Vegetation Assessment Earl Grey Lithium Project Water Pipeline Corridor Report prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, May 2020d.	Reconnaissance	270 flora taxa from 40 families and 117 genera. Three introduced species.	*Verticordia mitodes* (P3) recorded. 'Eucalypt Woodlands of the Western Australian Wheatbelt' PEC/TEC present.	Survey area overlaps the Study Area along Marvel-Loch Forrestania Road (near mine access intersection) and along Parker Range Road from north-west of Wockallarry Nature Reserve to Great Eastern Highway
Flora Survey Mt Holland Report prepared Covalent Lithium Pty Ltd by GHD, March 2020.	Targeted of two potential airstrip locations		Six conservation significant flora taxa located: *Banksia sphaerocarpa* var. *dolichostyla* (T), *Microcorys* sp. Mt Holland (D. Angus DA 2397) (P1), *Eutaxia lasiocalyx* (P2), *Hakea pendens* (P3), *Verticordia stenopetala* (P3) and *Verticordia gracilis* (P3).	1 km from southern end of Study Area.

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Earl Grey Lithium Project Threatened and Priority Flora Assessment Pre-Clearance Surveys. Report prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, December 2019a.	Targeted survey of development envelope for all potential conservation significant taxa		29 flora taxa of conservation significance recorded within development envelope including two Threatened taxa *Eremophila verticillata* and *Banksia sphaerocarpa* var. *dolichostyla*, 26 Priority flora and one undescribed species (*Hibbertia* sp. nov.). The latter is now the Priority 1 species *Hibbertia* sp. Mt Holland (B. Ellery BE 1437) (Mattiske Consulting, 2021a).	Survey area overlaps the Study Area along Marvel-Loch Forrestania Road (near mine access intersection).
Earl Grey Lithium Mine Regional Flora Survey Report prepared for Covalent Lithium Pty Ltd by Strategen – JBS & G, July 2019.	Targeted survey of multiple locations within the Eastern Wheatbelt for *Banksia sphaerocarpa* var. *dolichostyla* (T) and *Microcorys* sp. Mt Holland (D. Angus DA 2397) (P1)		*Banksia sphaerocarpa* var. *dolichostyla* (T); located 490 individuals across four sites. *Microcorys* sp. Mt Holland (D. Angus DA 2397) (P1); no individuals located.	Nearest surveyed site is 8 km west of Study Area along Marvel Loch – Forrestania Road.
Threatened and Priority Flora Assessment Tenement M77/215 Proposed Tracks and Drill Hole Locations. Report prepared for Kidman Resources Ltd, by Mattiske Consulting Pty. Ltd., April 2019b.	Targeted survey		No Threatened or Priority flora, TECs or PECs located.	13 km south-west of southern end of Study Area

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Earl Grey Lithium Project Targeted Survey: *Banksia sphaerocarpa* var. *dolichostyla* (T) Report prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, January 2019c.	Targeted survey of Earl Grey Lithium Project area and broader region for *Banksia sphaerocarpa* var. *dolichostyla* (T)	18 populations located with 16,503 plants recorded.	Total estimated population of 22,586 plants.	Two locations within Study Area (southern end along Marvel Loch – Forrestania Road).
Earl Grey Lithium Project Conservation Significant Flora Targeted Survey Report prepared for Covalent Lithium Pty Ltd by Mattiske Consulting Pty Ltd, January 2019d.	Targeted survey for 21 species of significance within areas of potential clearing (in excess of 10% of their mapped extent)	Seven significant flora taxa located within the proposed infrastructure footprint.	The majority of the targeted taxa will not experience large impacts as a result of vegetation clearing. The taxa which have the greatest potential to be impacted by mine development include (in decreasing order of potential impacts): *Eutaxia lasiocalyx* (P2), *Microcorys* sp. Mt Holland (D. Angus DA2397) (P1), *Acacia undosa* (P3), *Labichea rossii* (P1), *Hakea pendens* (P3) and *Acacia* sp. Mt Holland (B. Ellery BE1147), now *Acacia lachnocarpa* (P1).	Nearest location is immediately adjacent southern end of Study Area near the intersection of the mine access road and Marvel Loch – Forrestania Road.

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Statistical Comparison of Vegetation within the Earl Grey Lithium Project with the Ironcap Hills Vegetation Complex. Memorandum prepared for Kidman Resources Ltd, by Mattiske Consulting Pty Ltd, October 2018a.	Statistical comparison of flora survey data from 'Ironcap Hills vegetation assemblages (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded ironstone formation)' PEC (P3) (Gibson, 2004) with that of the Earl Grey Lithium Project, as recorded by Mattiske Consulting Pty Ltd.		Based on statistical comparison of the available data, there was poor correlation between the vegetation of the "Ironcap Hills vegetation assemblages" PEC and vegetation recorded within the Earl Grey Lithium Project.	Survey data included area of overlap with Study Area (near intersection of mine access road and Marvel loch – Forrestania Road).
Flora and Vegetation Assessment Early Grey Lithium Project Report prepared for Kidman Resources Ltd, by Mattiske Consulting Pty Ltd, March 2018b.	Detailed	369 flora taxa from 49 families and 140 genera. One introduced species. 26 vegetation communities.	*Banksia sphaerocarpa* var. *dolichostyla* (T), 11 Priority flora and several undescribed species located. Survey area fell within the buffer of the 'Ironcap Hills vegetation assemblages' (P3) PEC, but none of the landforms or corresponding species communities associated with the PEC were recorded.	Survey area included the mine access road to Marvel-Loch Forrestania Road which overlaps the southern end of the Study Area.

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Targeted Surveys for Threatened Flora Species *Banksia sphaerocarpa* var. *dolichostyla.* Summary Report Earl Grey Lithium Project. Report prepared for Kidman Resources Ltd by Blueprint Environmental Strategies, May 2017b.	Summary of previous targeted surveys between 2014 – 2017 within development envelope.	Surveys recorded 521 specimens of *Banksia sphaerocarpa* var. *dolichostyla* from a number of locations including adjacent to the existing landfill, various roads, the accommodation camp and a borrow pit.	No specimens of *Banksia sphaerocarpa* var. *dolichostyla* located in the proposed Project disturbance footprint.	Survey area overlaps the Study Area along Marvel-Loch Forrestania Road (near mine access intersection).
Flora and Vegetation of the Earl Grey, Irish Breakfast and Prince of Wales Prospects Mt Holland Project Report prepared for Kidman Resources Ltd, by Mattiske Consulting Pty Ltd, April 2017.	Detailed	184 flora taxa from 35 families and 86 genera	*Eutaxia lasiocalyx* (P2), *Acacia undosa* (P3), *Hakea pendens* (P3), and *Calamphoreus inflatus* (P4) recorded within the prospects. *Banksia sphaerocarpa* var. *dolichostyla* (T) located just outside of survey area at Earl Grey.	5 km east
Parker Range (Mt Caudan) Iron Ore Project				

Study details	Survey type	Summary of results	Significant findings	~Distance from Study Area
Baseline flora, vegetation and fauna surveys for the Parker Range Haul Road Project Report prepared for mineral Resources Ltd by Phoenix Environmental Sciences, May 2021.	Detailed surveys conducted Nov 2019 and July 2020. Targeted surveys between Sept – Oct 2020. Haul road extends from the Parker Range Iron Ore mine to the Koolyanobbing Operations.	423 flora taxa from 52 families and 161 genera. Nine introduced species present (no WoNS or Declared Weeds) 23 vegetation types identified.	25 Priority flora species located. One new undescribed species recorded: *Microcorys* sp. nov. (GBW 22/11/2019) (unable to verify if this species has since been identified). A significant (200 km) range extension recorded for *Rhagodia ulicina.* No Threatened flora located. 'Plant Assemblages of the Parker Range System' PEC (P3) present. The first recorded instance of **Centaurea benedicta* within WA is of potential significance to the State. Location within area surveyed (and proximity to Study Area) not provided in report, no specimen vouchered at WA Herbarium, identity cannot be verified.	Small area overlaps the Study Area at the intersection of Parker Range Road and the proposed haul road for the Parker Range Iron Ore mine.
Summary of survey work undertaken by Botanica Consulting from 2007 to 2010 for the Parker Range Iron Ore Project, as presented in the Parker Range (Mt Caudan) Iron Ore Project Public Environmental Review. Report prepared by Keith Lindbeck and Associates for Cazaly Resources Limited, November 2010.	Level 1 and Level 2 surveys conducted over four areas between 2007 and 2010. Included the Marvel Loch – Forrestania bypass route to the north of the (then proposed) minesite.	268 flora taxa from 48 families and 120 genera. Four introduced species. 43 vegetation types identified across the various survey areas.	Seven Priority flora species located. In addition to the *Isopogon robustus* (T) population (470 plants) previously found near the Parker Range Project area, a further 790 plants were located in the southern parts of the project area. 'Plant Assemblages of the Parker Range System' PEC (P3) present.	Study Area overlaps the survey area along the bypass route to the north of the mine.

4.1. Database Searches

4.1.1. Significant Flora

A total of 104 flora taxa of conservation significance were identified by the DBCA database searches as having been recorded within approximately 50 km of the Study Area (Table 7). This included seven Threatened; 33 Priority 1; 12 Priority 2; 39 Priority 3 and 12 Priority 4 taxa. In addition, the species *Thomasia gardneri*, has been recorded within the search radius near Mt Holland. Commonly referred to as Mt Holland *Thomasia*, this small shrub species has been sampled only once (in 1929) near Mt Holland and is now Presumed Extinct (X) (DCCEEW, 2023c). The P1 taxon *Thryptomene salina* was recorded in November 2020 during a vegetation mapping survey of the Earl Grey Lithium Project by Mattiske Consulting and was re-visited and confirmed in March 2021 (outside its flowering period). This species did not appear in the DBCA database searches however is included in Table 7. The PMST database search returned an additional 21 Threatened flora species that were not identified within the DBCA database searches (Table 7).

In total, 126 flora taxa of conservation significance were identified as a result of database searches and the literature review. A summary of these taxa in regard to description/habitat, nearest known location to the Study Area and an assessment of likelihood of occurrence within the Study Area is presented in Table 7. The latter is based on known distribution and habitat preferences, as sourced from information available from the WA Herbarium (unless otherwise referenced).

A total of 20 species of conservation significance (one Threatened, five Priority 1, four Priority 2, nine Priority 3 and one Priority 4) have been previously recorded within the Study Area (Figure 9). Nine species of conservation significance have been located within 1 km of the Study Area and an additional ten species within 5 km. Of the 106 species not previously recorded within the boundary of the Study Area, 66 species were assessed as having the potential to occur (three Threatened, 24 Priority 1, eight Priority 2, 20 Priority 3 and 11 Priority 4) while 40 species were considered unlikely to occur (Table 7).

Table 7. Summary of conservation significant flora database search results for the vicinity of the Study Area (sorted by conservation rank) and their likelihood of occurrence within the Study Area (DBCA, 2022b, 2022c; DAWE, 2023a).

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Thomasia gardneri	X	EX	EX	x		Erect, multi-stemmed shrub, to 0.5 m high. Fl. pink-purple, Sept. Yilgarn. Recorded 8.5 km south-east of southern end of Study Area.	Unlikely
Acacia lanuginophylla	T	VU	EN	x	x	Dense shrub, 0.5-1.2 m high. Fl. yellow, Jul to Oct. White/grey sand, clayey sand, gravelly soils. Flats, along drainage lines. Lake Grace, Yilgarn. Recorded 8.5 km south-east of southern end of Study Area.	Possible
Banksia mimica	T	VU	EN		x	Prostrate, lignotuberous shrub, 0.15-0.4 m high. Fl. yellow-brown, Dec or Jan to Feb. White or grey sand over laterite, sandy loam. Augusta Margaret River, Busselton, Gingin, Gosnells, Kalamunda, Nannup, Victoria Plains. Inclusion in database search results appear to be an anomaly.	Unlikely
Banksia dolichostyla (formerly *Banksia sphaerocarpa* var. *dolichostyla*)	T	VU	VU	x	x	Lignotuberous shrub, 1-3 m high. Fl. yellow-orange, Mar to May. Lateritic gravel, grey sand. Esperance, Kondinin, Narembeen, Yilgarn. Recorded within Study Area.	Recorded
Boronia adamsiana	T	VU	VU		x	Erect shrub, 0.3-1 m high. Fl. pink-white, Jul to Oct. Yellow sand/loam over laterite. Flats, road verges. Dalwallinu, Kellerberrin, Merredin, Mount Marshall, Mukinbudin, Nungarin, Trayning, Westonia. Recorded 40 km west of northern end of Study Area (near Westonia).	Unlikely
Boronia revoluta	T	VU	EN		x	Shrub, 0.4-0.8 m high. Fl. pink, Jul to Aug. Stony sandy loam or sand. Plains, hillsides and summits. Kondinin, Kulin, Lake Grace. Record 60 km south of southern end of Study Area.	Unlikely

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Caladenia hoffmanii	T	EN	EN		x	Tuberous, perennial, herb, 0.13-0.3 m high. Fl. green & yellow & red, Aug to Oct. Clay, loam, laterite, granite. Rocky outcrops and hillsides, ridges, swamps and gullies. Chapman Valley, Greater Geraldton, Northampton. Inclusion in database search results appear to be an anomaly.	Unlikely
Caladenia graniticola	T	EN	EN		x	Tuberous, perennial, herb, to 0.21 m high, plant usually single flowered. Fl. green-yellow, Oct. Gritty sandy clay, granite. Near low exposed rock outcrops. Albany, Kulin, Lake Grace. Recorded 95 km south west of southern end of Study Area.	Unlikely
Calectasia pignattiana	T	VU	VU		x	Rhizomatous, prickly herb, to 0.5 m high. Fl. blue-purple, Aug to Oct. Sand to sandy clay over granite or laterite, gravel. Plains and gentle slopes. Dowerin, Dumbleyung, Kent, Kondinin, Kulin, Lake Grace, Narrogin, Quairading, Wagin, West Arthur, Wickepin. Recorded 38 km south east of southern end of Study Area.	Unlikely
Dasymalla axillaris	T	EN	CE		x	Dalwallinu, Perenjori, Wongan-Ballidu, Yalgoo. Inclusion in database search results appear to be an anomaly.	Unlikely
Daviesia microcarpa	T	EN	EN		x	Sprawling, tangled shrub, to 0.4 m high, ca 1 m wide. Fl. orange & red, Sep. Weathered gravel. Eastern Goldfield, Southern Cross. Recorded 21 km east-north-east of northern end of Study Area (near Southern Cross).	Unlikely

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Eremophila resinosa	T	EN	EN		x	Shrub, 1.2-4 m high. Fl. green-white-yellow, Sep to Nov. Granitic soils, sandy loam. Stony gullies, sandplains. Dalwallinu, Greater Geraldton, Kellerberrin, Koorda, Mukinbudin, Nungarin, Perenjori, Trayning, Westonia, Wongan-Ballidu, Yilgarn. Recorded 40 km east of northern end of Study Area (near Westonia).	Unlikely
Eremophila verticillata	T	CE	EN	x	x	Low spreading shrub, up to 0.8 m high, to 1 m wide. Fl. purple-violet, Nov to Dec. Clay loam, loam over limestone. Kulin, Lake Grace, Yilgarn. Recorded 8 km south-east of southern end of Study Area.	Possible
Eremophila virens	T	EN	EN		x	Erect, slender shrub, 1.5-5 m high. Fl. green, Aug to Oct. Red/brown sand. Granite hillsides. Coolgardie, Mukinbudin, Nungarin, Westonia. Recorded 60 km north-west of northern end of Study Area.	Unlikely
Eremophila viscida	T	EN	EN		x	Shrub, 1.2-4 m high. Fl. green-white-yellow, Sep to Nov. Granitic soils, sandy loam. Stony gullies, sandplains. Dalwallinu, Greater Geraldton, Kellerberrin, Koorda, Mukinbudin, Nungarin, Perenjori, Trayning, Westonia, Wongan-Ballidu, Yilgarn. Recorded 40 km west of northern end of Study Area (near Westonia).	Unlikely
Eucalyptus brevipes	T	EN	EN		x	(Mallee), 3-5(-6) m high, bark rough. Fl. white-cream, Oct. White or yellow sand, sandy loam. Granite outcrops. Mount Marshall, Mukinbudin, Nungarin, Westonia. Recorded 57 km north-west of northern end of Study Area.	Unlikely

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Eucalyptus crucis subsp. *crucis*	T	EN	VU	x	x	(Mallee), 2-8 m high, bark rough, 'minni-ritchi'. Fl. white, Oct or Dec or Jan to Mar. Sand, loam. Granite outcrops. Menzies, Merredin, Mount Marshall, Westonia, Yilgarn. Recorded 1 km north of northern end of Study Area (near Moorine Rock granite outcrop).	Unlikely
Eucalyptus steedmanii	T	VU	VU	x	x	Tree, 2-8(-12) m high, bark smooth. Fl. white, Jan to Mar. Gravelly loam over ironstone, sand. Low hills, undulating plains. Kondinin, Ravensthorpe. Recorded 23 km south-west of southern end of Study Area.	Unlikely
Frankenia parvula	T	EN	EN		x	Procumbent to ascending small shrub. Bruce Rock, Cunderdin, Kellerberrin, Yilgarn. Recorded 53 km north-east of the northern end of the Study Area.	Unlikely
Gastrolobium diabolophyllum	T	CE	CE		x	Erect, open, robust shrub, to 1.5 m high. Fl. Orange, yellow, pink, red, Sep. Yellow-brown sand over laterite. Broadly undulating dunes. Merredin, Yilgarn. Recorded 30 km west-north-west of northern end of Study Area.	Unlikely
Gastrolobium graniticum	T	VU	EN		x	Erect, open shrub, to 2.5 m high. Fl. Yellow, orange, red, Aug to Sep. Sand, sandy loam, granite. Margins of rock outcrops, along drainage lines. Coolgardie, Narembeen, Yilgarn. Known as Bodallin Poison. Recorded 52 km north-east of mid section of Study Area.	Unlikely
Isopogon robustus	T	CE	CE	x	x	Shrub, to 1.5 m high. Fl. pink, Oct. Skeletal grey sandy loam, laterite. Ridges. Yilgarn. Recorded 100 m from Study Area (in Parker Range minesite)	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Melaleuca sciotostyla	T	EN	EN		x	Spreading shrub, 0.6-1.5 m high. Fl. Aug. Orange clayey sand with lateritic pebbles. Scree slopes. Bruce Rock, Cunderdin, Dowerin, Kellerberrin, Mount Marshall, Quairading, Tammin, Victoria Plains, Westonia, Wongan-Ballidu, Yilgarn. Recorded 61 km north-west of northern end of Study Area.	Unlikely
Paragoodia crenulata	T	VU	CE		x	Small herbaceous plant with perennial underground parts, and stems to 8 cm long. The leaves are trifoliate and the leaflets have crenulated margins. Fl. Brown and yellow, Jul to Aug. (DSEWPC, 2013). Formerly known as *Muelleranthus crenulatus.* Kondinin. Recorded 28 km south of southern end of Study Area.	Unlikely
Philotheca falcata	T	EN	CE	x	x	Small, much-branched shrub, 0.15-0.25 m high. Fl. white, Oct. Yilgarn. Recorded 49 km east of northern end of Study Area.	Unlikely
Ricinocarpos brevis	T	EN	EN		x	Shrub, to 1.8 m high. Fl. white, Jun to Jul. Rocky hillslopes, rock outcrops. Menzies, Yilgarn. Recorded 145 km north of northern end of Study Area (listed as occurring in Yilgarn, but no specimens appear on database).	Unlikely
Roycea pycnophylloides	T	VU	EN		x	Perennial, herb, forming densely branched, silvery mats to 1 m wide. Fl. Sep. Sandy soils, clay. Saline flats. Bruce Rock, Cunderdin, Dalwallinu, Kellerberrin, Kent, Kondinin, Kulin, Lake Grace, Quairading, Westonia. Recorded 55 km west-north-west of northern end of Study Area.	Unlikely
Tecticornia flabelliformis	T	VU	VU		x	Erect shrub, to 0.2 m high. Clay. Saline flats. Coolgardie, Kalgoorlie-Boulder, Westonia. Recorded 46 km north of northern end of Study Area.	Unlikely

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Verticordia staminosa var. *cylindracea*	T	VU	EN		x	Erect, compact shrub, 0.15-1 m high. Fl. green-yellow/yellow-brown, Jul to Oct. Soil pockets. Granite outcrops. Lake Grace. Recorded 117 km south-west of the southern end of the Study Area.	Unlikely
Acacia lachnocarpa (formerly *Acacia* sp. Mt Holland (B. Ellery BE 1147))	P1			x		Tall dense shrub growing 1 m tall and 0.8 m wide. Branchlets and pods densely woolly. Recorded on clay with large white quartz rocks. (GHD, 2020). Yilgarn Recorded 4 km east of southern end of Study Area.	Possible
Acacia sp. Forrestania (D. Angus DA 3001)	P1			x		Low spinescent shrub growing to 0.2 m high and 0.2 m wide. Recorded on lateritic orange-red clay soils on flats and lower slopes (GHD, 2020). Yilgarn Recorded 8.5 km south-east of southern end of Study Area.	Possible
Beyeria opaca	P1			x		Erect, compact shrub, to 1 m high. Red sandy clay. Dunes, slopes. Dundas, Kondinin. Recorded approximately 15 km south of the Study Area.	Possible
Brachyloma stenolobum	P1			x		Shrub to 1.5 m high and 1.2 m wide, single-stemmed at ground level from a fire-sensitive rootstock. Occurs in mixed heath and *Eucalyptus eremophila* over *Melaleuca* on yellow sandplain. (GHD, 2020). Dundas, Yilgarn. Recorded within Study Area.	Recorded

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Chamelaucium sp. Parker Range (B.H. Smith 1255)[1]	P1			x		In open mallee over open shrubs or in mixed heaths. Associated with *Acacia yorkrakinensis, Grevillea pterosperma, Melaleuca hamata, Thryptomene kochii,* and *Persoonia saundersiana.* Yellow sand over laterite. Plains and gentle slopes (Phoenix Environmental Sciences, 2021). Coolgardie, Kondinin, Yilgarn. Recorded within Study Area.	Recorded
Dicrastylis capitellata	P1			x		Low spreading shrub, 0.2-0.25 m high. Fl. blue-purple, May. Loamy sand, sandy loam. Esperance, Kondinin, Yilgarn. Recorded 9 km east of southern end of Study Area.	Possible
Drummondita wilsonii	P1			x		Erect shrub, 0.4-1 m high. Fl. red; green; pink, Jun to Aug. Sand with gravel; pebbles. Yilgarn. Recorded 2.6 km west of Study Area.	Possible
Eremophila adenotricha	P1			x		Erect, bushy, viscid shrub, 0.6-1.2 m high. Fl. blue, Sep. Red/brown earth, clay. Narembeen, Westonia, Yilgarn. Recorded 55 km west of southern end of Study Area.	Unlikely
Eucalyptus retusa	P1			x		Mallee or shrub up to 4 m tall. Forming a lignotuber (CANBR, 2020). Jerramungup, Ravensthorpe, Yilgarn (predominantly near south coast) Recorded 12 km south-west of southern end of Study Area.	Unlikely
Eucalyptus sp. Dunbar Road (D. Nicolle & M. French DN 5466)	P1			x		Mallet to 12m, white smooth bark and glossy green leaves. Fruit and buds similar to E. urna but significantly smaller. Yilgarn Recorded within Study Area.	Recorded

[1] The WA Herbarium collections of *Chamelaucium* sp. Parker Range (B.H. Smith 1255) P1contain multiple species and taxonomy of this group is under revision.

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Eutaxia sp. North Ironcap (P. Armstrong PA 06/898)	P1			x		Erect spindly shrub, broom-like, growing to 0.2m tall and 0.2m wide. Recorded in shrub mallee over *Melaleuca brophyi* on undulating plain of red sandy clay loam. Kondinin. Recorded 17 km south of southern end of Study Area.	Unlikely
Glossostigma trichodes	P1			x		Aquatic annual, herb. Pools in granite. Recorded 10 km north-west of Study Area.	Possible
Goodenia heatheriana	P1			x		Annual, herb, to 0.15 m high. Fl. yellow, Sep to Oct. Red crumbly clay, greenstone gravel and cobbles. Lower slopes, moderately exposed gently undulating plain, roadsides. Yilgarn. Recorded 6.5 km north-east of Parker Range Road and Marvel Loch – Forrestania Road intersection.	Possible
Grevillea lissopleura	P1			x		Erect shrub, 0.5-1.2 m high. Fl. Aug. Stony loam on banded ironstone. On ridges. Dundas, Yilgarn. Recorded within Study Area.	Recorded
Grevillea marriottii	P1			x		Open, multi-stemmed, lignotuberous shrub, 0.8-1.2 m high. Fl. green-cream-white, Aug to Oct. Yellow or white sand over laterite. On rises or on tops of lateritic cappings. Kondinin, Yilgarn. Recorded 11 km south of southern end of Study Area.	Unlikely
Grevillea phillipsiana	P1			x		Prickly shrub, 0.8-1.5 m high. Fl. red/red & orange, Jul to Sep. Red sand, stony loam. Granite hills. Recorded 12 km north-east of Study Area.	Possible
Hemigenia sp. Newdegate (E. Bishop 75)	P1			x		Spindly, erect to spreading shrub, 0.2-0.45 m high, to 0.5 m wide. Fl. blue/purple, Sep to Oct. Clay loam. Disturbed sites. Coolgardie, Kondinin, Kulin, Lake Grace, Yilgarn. Recorded 18 km east of northern end of Study Area.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Hibbertia sp. Mt Holland (B. Ellery BE 1437)	P1			x		Shrub to 0.4 m high x 0.8 m wide, flowers solid yellow, leaves blue-grey-green, soft, hairy. Plants may establish after soil disturbance. Cunderdin, Yilgarn. Recorded 5 km west of Study Area (southern end).	Possible
Hibbertia tuberculata	P1			x		Shrub to 0.45 m high, flowers dull yellow. Kondinin, Yilgarn. Recorded 8.4 km east-south-east of southern end of Study Area.	Possible
Hydrocotyle corynophora	P1			x		Erect, glabrous annual, herb, to about 0.25 m high, basal leaves small, conspicuously stalked, orbicular to rhomboid. Dundas, Yilgarn. Recorded 5.6 km north of Study Area (near Great Victoria Mine).	Possible
Labichea rossii	P1			x		Sub-shrub recorded growing 0.4 m high, stems sparingly branched and semi-erect. Recorded on small ironstone ridge dominated by *Allocasuarina* - Proteaceae and Myrtaceae with some eucalpyts. Grows out of cracks in large outcrops od banded ironstone, often in shade of larger shrubs (GHD, 2020). Found in the Mt Holland region on yellow sand over laterite. Yilgarn. Recorded 11.3 km south-east of southern end of Study Area.	Possible
Lepidosperma sp. Mt Caudan (N. Gibson & M. Lyons 2081)	P1			x		Perennial sedge. Recorded in the Mt Caudan area in *Eucalyptus capillosa* subsp. *polyclada* low forest over *Melaleuca uncinata*. Orange -brown sandy loam, with ironstone gravel, gentle slopes (Phoenix Environmental Sciences, 2021). Yilgarn Recorded 1 km south of Study Area within Parker Range minesite area.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Lepidosperma sp. Parker Range (N. Gibson & M. Lyons 2094)	P1			x		Coolgardie, Menzies, Yilgarn. Recorded 250 m west of Study Area (within Parker Range minesite area).	Possible
Leucopogon validus	P1			x		Robust, lignotuberous shrub, to about 1.2 m high. Dry, brown, rocky sandy loam, brown-orange sandy clay, gravel, ironstone, sandstone. Low ranges, on and around exposed breakaways. Yilgarn. Recorded 60 m from Study Area within Parker Range minesite area.	Possible
Melaleuca grieveana	P1			x		Compact shrub, to 0.75 m high. Fl. yellow, Jul. Well-drained orange-brown loam, brown clay. Plains, gentle slopes, edge of crop paddocks. Kulin, Narembeen, Wyalkatchem, Yilgarn. Recorded 1.2 km west of Study Area (Marvel Loch – Forrestania Road section). Readily confused with the more common *Melaleuca johnsonii*.	Possible
Melichrus sp. Coolgardie (K.R. Newbey 8698)	P1			x		Compact shrub, 30 cm high x 30 cm wide. Corolla cream, sepals pale pink. Plants branching close to ground level but probably single stemmed and fire sensitive. Main populations disjunct, 120 to 150 km ENE of Study Area. Note: *Melichrus* aff. sp. Coolgardie (G. Cockerton WB40869), a shrub 0.8 m x 1.5 m, flowers white, has been recorded within the Study Area (Mt Caudan mine, Parker Range diversion road section).	Possible
Microcorys elatoides Formerly *Microcorys* sp. Mt Holland (D. Angus DA 2397)	P1			x		Perennial shrub growing 1.5 m tall and 1.2 m wide. Plant multi-stemmed at ground level from fire-tolerant rootstock. Occurs in disturbed areas on brown sandy loam, grey-brown sandy clay, orange clay and ironstone (GHD, 2020). Yilgarn. Recorded within Study Area.	Recorded

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Millotia newbeyi	P1			x		Slender, upright annual, herb, 0.05-0.1 m high. Fl. cream-yellow, Sep. Red/brown loam, red clay. Undulating plains. Yilgarn. Recorded 5.6 km north of t Study Area near Great Victoria Mine).	Possible
Philotheca apiculata	P1			x		Erect shrub, 0.5-1.5 m high. Fl. white-pink, Aug to Nov. Stony clay loam. Rocky outcrops, hillsides. Coolgardie, Dundas, Esperance, Yilgarn. Recorded 57 km west of Study Area (Marvel Loch - Forrestania Road section).	Unlikely
Rinzia fimbriolata	P1			x		Perennial woody shrub. Found around Bulfinch, Southern Cross and Mt Hampton (ALA, 2023). Yilgarn. Recorded 13 km south-west of Study Area (Parker Range Road midsection).	Possible
Rinzia medifila	P1			x		Occurs in yellow-red sandy soils, occasionally laterite or greenstone, in Eucalyptus woodlands, often with Melaleuca. Known only from Parker Range (GHD, 2020). Small shrub to 1m. Yilgarn. Recorded near boundary of Study Area (west side of Marvel Loch – Forrestania Road).	Possible
Stylidium validum	P1			x		Caespitose perennial, herb, 0.06-0.3 m high, Leaves tufted, oblanceolate, 1.5-10 cm long, 2.2-6 mm wide, apex acute to acuminate, margin entire, glabrous, glaucous. Scape glabrous. Inflorescence paniculate. Fl. white/pink, Sep to Oct. Clayey sand or loam, ironstone, greenstone gravel. Hillslopes and hilltops. Eucalypt woodland, mallee shrubland. Dundas, Kondinin, Yilgarn. Recorded 9 km south-east of southern end of Study Area.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Thryptomene salina	P1					Spreading, moderately dense shrub, to 1.1 m high. Fl. white-pink, Oct. Deep alluvial sand. On a flat along a saline creek. Kondinin. Recorded 44 km south-west of Study Area. This species was found growing in thick S2 vegetation with tall dense *Melaleuca ?scalena* immediately north of the Earl Grey mine access road (Mattiske Consulting, 2021a). Specimen not lodged or confirmed from Earl Grey area, as it did not appear in the DBCA database searches.	Possible
Thryptomene sp. Hyden (B.J. Lepschi & L.A. Craven 4477)	P1			x		Domed shrub to about 1.2 5m high that has been observed growing in large numbers on pale brown – yellow sand along the Earl Grey Project access road and the Marvel Loch – Forrestania Road (Mattiske Consulting, 2021a). Specimens do not currently appear on DBCA database for the Earl Grey location. Nearest DBCA recorded location is 54 km west of southern end of Study Area within Narembeen LGA.	Possible
Acacia asepala	P2			x		Diffuse, much-branched shrub, 0.5-1.5 m high. Fl. yellow, Aug. Red-brown sandy loam. Undulating plains, along drainage lines. Dundas, Kondinin, Lake Grace, Yilgarn. Recorded 7.5 km north-east of the Study Area (intersection of Parker Range Road and Marvel Loch – Forrestania Road).	Possible
Acacia concolorans	P2			x		Intricate, sprawling or compact, pungent shrub, 0.1-0.5 m high. Fl. yellow, Jul to Aug. Red/brown loam, clay. Low lateritic hills, flats. Kondinin, Yilgarn. Recorded 0.9 km west of the Study Area (within Parke Range minesite area).	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Balaustion grandibracteatum subsp. *juncturum* Rye (formerly both *Baeckea* sp. Blue Haze Mine (P. Armstrong 06/910) and *Baeckea* sp. Forrestania (K.R. Newbey 1105)	P2			x		Kondinin, Yilgarn. Large flowered shrub growing to 1.2 m tall. Occurs on yellow-orange lateritic sandy clay loam on undulating plains with open mallee, low to tall shrub heath (GHD, 2020). Recorded within Study Area.	Recorded
Conospermum sigmoideum	P2			x		Erect shrub, 0.2-0.5 m high. Fl. blue, Aug to Sep. Yellow sand. Dundas, Esperance, Kondinin, Lake Grace, Yilgarn. Recorded 13 km south-east of southern end of Study Area.	Possible
Dampiera orchardii	P2			x		Erect perennial, herb, 0.2-0.4 m high. Sand. Dundas, Kent, Lake Grace, Ravensthorpe, Yilgarn. Recorded within Study Area.	Recorded
Eutaxia lasiocalyx	P2			x		Low, spreading, multi-stemmed shrub, to 0.15 m high. Fl. yellow, Nov. Red sandy loam, laterite and quartz gravel. Gentle lower slopes. Coolgardie, Kondinin, Yilgarn. Recorded 1.1 km south of Study Area (within Parker Range minesite area).	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Leucopogon sp. Yellowdine (M. Hislop & F. Hort MH 3194)	P2			x		Coolgardie, Dundas, Yilgarn. In open tall shrubland of *Allocasuarina spinosissima, Allocasuarina campestris* and *Grevillea didymobotrya* subsp. *didymobotrya* over open sedge of *Ecdeiocolea monostachya* and *Melaleuca cordata* over open hummock grassland and rushland of *Triodia rigidissima, Lepidobolus preissianus* subsp. *volubilis* and *Borya constricta*. Yellow-orange sandplain, laterite, sandy loam soil (Phoenix Environmental Sciences, 2021). Previously recorded 56 km west of the Study Area according to the DBCA WA Herbarium database search. However, Florabase indicates this species has been recorded within the Study Area (in Jilbadgi Nature Reserve).	Possible
Lissanthe scabra	P2			x		Rigid, erect, fairly densely branched shrub, to 1 m high, leaf apex aristate, upper leaf surface scabrous; flowers pedicellate above bracteoles. Fl. white, Aug. Dry, white to orange-brown clay, sandy gravel loams, granite. Breakaways, uplands. Coolgardie, Yilgarn. Recorded 5.3 km south-west of the Study Area within Frog Rock Nature Reserve.	Possible
Logania nanophylla	P2			x		Low spreading shrub, 0.1-0.25 m high, to 0.5 m wide. Fl. white, Aug. White sand, pebbly calcareous sandy clay. Sand dunes. Dundas, Yilgarn. Recorded within Study Area.	Recorded
Orianthera exilis	P2			x		Perennial herb. Fl. White. Dundas, Kondinin, Yilgarn. Recorded 8.6 km south-east of the southern end of the Study Area.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Verticordia multiflora subsp. *solox*	P2			x		Erect to spreading shrub, 0.2-0.6 m high. Fl. yellow, Oct to Dec or Jan. Yellow sand over gravel, sand over granite. Kondinin, Merredin, Narembeen, Yilgarn. Previously recorded within Study Area.	Recorded
Verticordia pulchella	P2			x		Spreading shrub, 0.1-0.45 m high, to 0.7 m wide. Fl. red & pink/yellow/orange, Oct to Nov. Sandy soils over granite. Massive granite areas. Bruce Rock, Yilgarn. Recorded 16.5 km west of Study Area (Marvel Loch – Forrestania Road).	Possible
Acacia crenulata	P3			x		Bushy shrub or tree, 0.7-3 m high. Fl. yellow. Clay, sandy clay, yellow sand. Rocky rises, granite outcrops, breakaways. Coolgardie, Mukinbudin, Westonia, Yilgarn. Recorded 9 km west of northern end of Study Area.	Possible
Acacia desertorum var. *nudipes*	P3			x		Dense or open shrub or tree (rarely), 0.6-2 m high, phyllodes 16-nerved. Fl. yellow, Aug to Oct. Yellow sand, lateritic gravel. Sandplains, flats. Coolgardie, Yilgarn. Recorded 10 km north-east of Study Area (at Marvel Loch minesite).	Possible
Acacia filifolia	P3			x		Wispy, spindly, single-stemmed shrub or tree, 1.2-3 m high. Fl. yellow, May to Sep. Yellow sand, gravelly lateritic sand. Sandplains. Coorow, Merredin, Mount Marshall, Westonia, Wongan-Ballidu, Yilgarn. Recorded 11.5 km north-east of northern end of Study Area.	Possible
Acacia undosa	P3			x		Dense, spreading shrub, 0.3-1.5 m high. Fl. yellow, Jul to Sep. Sandy clay loam, clayey sand. Undulating plains, low-lying areas. Bruce Rock, Kent, Kondinin, Kulin, Lake Grace, Ravensthorpe, Tammin, Yilgarn. Recorded 5.5 km east of southern end of Study Area.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Alyogyne sp. Great Victoria Desert (D.J. Edinger 6212)	P3			x		Chapman Valley, Coolgardie, Dumbleyung, Esperance, Kalgoorlie-Boulder, Menzies, Northampton, Swan, Yilgarn. Recorded at Mt Holland in 1929 with the next nearest recorded location being Lake Barker Reserve (in 1971), approximately 80 km east of the Study Area. Taxonomy of *Alyogyne* is in need of serious revision.	Unlikely
Angianthus micropodioides	P3			x		Erect or decumbent annual, herb, 0.03-0.15 m high. Fl. yellow-white, Nov to Dec or Jan to Feb. Saline sandy soils. River edges, saline depressions, claypans. Canning, Cunderdin, Dalwallinu, Dandaragan, East Fremantle, Greater Geraldton, Kellerberrin, Koorda, Melville, Morawa, Perenjori, Perth, South Perth, Wongan-Ballidu, Yilgarn. Recorded 7.5 km east of Study Area (within Jilbadgi Nature Reserve).	Possible
Austrostipa turbinata	P3			x		Grass to 20cm. Coolgardie, Dundas, Esperance, Kalgoorlie-Boulder, Kellerberrin, Kondinin, Ravensthorpe. Recorded approximately 25 km south of the Study Area.	Possible
Balaustion grandibracteatum (E.Pritz.) Rye subsp. *grandibracteatum* (formerly *Baeckea grandibracteata* subsp. Parker Range (K. Newbey 9270))	P3			x		West of Southern Cross – Yellowdine (Rye, 2022). Yilgarn *Eucalyptus* scattered mallees over *Allocasuarina* high shrubland over *Melaleuca* sp., over low open heath over *Ecdeiocolea monostachya* sedgeland over *Schoenus* low open sedgeland. Yellow sand over laterite, midslopes (Phoenix Environmental Sciences, 2021). Recorded near boundary (10 m north) of Study Area (on edge of remaining uncleared vegetation) and within Parker Range minesite.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Banksia viscida	P3			x		Densely branched, non-lignotuberous shrub, 0.4-1 m high. Fl. yellow-orange, Jul to Oct. Gravelly soils. Lateritic rises. Kondinin, Lake Grace. Recorded approximately 19 km south of southern end of Study Area.	Unlikely
Boronia ternata var. *promiscua*	P3			x		Shrub, 0.3-2 m high. Fl. white-pink, Apr to Nov. Sand, clay, loam, gravel, laterite, limestone. Undulating plains & rises, stony cliffs, breakaways. Bruce Rock, Carnamah, Coolgardie, Dalwallinu, Dumbleyung, Dundas, Esperance, Gnowangerup, Jerramungup, Kent, Kondinin, Koorda, Kulin, Lake Grace, Merredin, Mukinbudin, Narembeen, Nungarin, Perenjori, Ravensthorpe, Three Springs, Westonia, Yilgarn. Recorded 1.2 km west of Study Area (southern section, north of King Ingram Road)	Possible
Bossiaea concinna	P3			x		Erect, prickly shrub, 0.4-1.5 m high. Fl. yellow & red/brown, Jun to Sep. White or red sand, gravel. Coolgardie, Cunderdin, Dalwallinu, Jerramungup, Tammin, Williams, Yilgarn. Recorded 58 km west of southern section of Study Area.	Possible
Chorizema circinale	P3			x		Prostrate, scrambling, wiry shrub, to 0.4 m high. Fl. yellow & orange & red, Sep to Dec. Yellow sand, sandy clay with gravel. Flats, margin of gravel pit. Esperance, Kent, Ravensthorpe, Yilgarn. Recorded within Study Area.	Recorded
Daviesia newbeyi	P3			x		Bushy, multi-stemmed, broom-like shrub, 0.25-1.5 m high. Fl. orange/yellow & red, Aug to Oct. Sand or sandy clay over granite. Rocky slopes. Esperance, Lake Grace, Ravensthorpe. Recorded 91 km south of southern end of Study Area. Inclusion in results appears to be an anomaly.	Unlikely

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Daviesia uncinata	P3			x		Intricate, many-stemmed shrub, 0.2-0.7 m high. Fl. yellow & brown, Dec or Jan. Gravelly lateritic sand, loamy sand. Undulating plains. Brookton, Bruce Rock, Corrigin, Dumbleyung, Kent, Kulin, Lake Grace, Narrogin, Pingelly, Quairading, Tammin, West Arthur, Yilgarn. Recorded 40 km west of southern end of Study Area.	Unlikely
Eucalyptus exigua	P3			x		(Mallee), 2-5 m high, bark smooth. Fl. white-cream, Mar. Sandy loam, white sand. Sandplains. Coolgardie, Dundas, Kondinin, Lake Grace, Narembeen, Yilgarn. Recorded within Study Area.	Recorded
Eucalyptus ornata	P3			x		Tree, 6-10 m high, bark smooth, grey. Fl. white. Laterite. Ridges. Kondinin, Kulin, Lake Grace, Narembeen. Recorded 54 km west of southern end of Study Area.	Unlikely
Eucalyptus polita	P3			x		Tree or (rarely mallee), 3-10 m high, bark smooth, glossy green leaves. Loam, sand. Around salt lakes, flats. Coolgardie, Dundas, Esperance, Kondinin, Yilgarn. Recorded within Study Area.	Recorded
Gompholobium cinereum	P3			x		Shrub, to 0.3 m high. Yellow sand, clayey sand, brown loam, sandy gravel, laterite. Well-drained open sites, slopes, plains, roadsides. Coolgardie, Dalwallinu, Greater Geraldton, Mount Marshall, Northampton, Perenjori, Yilgarn. Recorded 25 km south-west of Study Area.	Possible
Grevillea insignis subsp. *elliotii*	P3			x		Erect, bushy, non-lignotuberous shrub, 1-2 m high. Fl. red/pink & cream & white, Oct. Gravelly sand or loam over ironstone. Hilltops or rises. Kondinin, Lake Grace, Narembeen. Recorded 54 km west of southern end of Study Area.	Unlikely

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Grevillea pilosa subsp. *redacta*	P3			x		Spreading to prostrate, non-lignotuberous shrub, 0.4-1.2 m high. Fl. red, Feb or Oct or Dec. Sand, laterite. Kondinin, Kulin, Lake Grace, Yilgarn. Recorded 1.4 km south-east of the southern end of the Study Area.	Possible
Hakea pendens	P3			x		Shrub, 2-3 m high, 2.5-3.1 m wide. Fl. pink-white, Sep. Stony loam. Ironstone ridges. Dundas, Yilgarn. Recorded within Study Area.	Recorded
Lepidium genistoides	P3			x		Spreading, dense shrub, 0.25-0.6 m high. Fl. white, Sep to Oct. Sandy loam. Dalwallinu, Koorda, Merredin, Mount Marshall, Mukinbudin, Westonia, Wyalkatchem, Yilgarn. Recorded 7.3 km north-east of Study Area.	Possible
Lepidosperma sp. Pigeon Rocks (H. Pringle 30237)	P3			x		Perennial sedge. Granite rock, granitic sandy loam. Coolgardie, Lake Grace, Menzies, Yilgarn. Recorded 16.5 km north-west of northern end of Study Area.	Unlikely
Styphelia subglauca (previously *Leucopogon* sp. Ironcaps (N. Gibson & K. Brown 3070))	P3			x		Erect shrub to 0.8m high with white flowers. Sand over laterite. Kondinin, Merredin, Narembeen, Yilgarn. Recorded 47 km west of Study Area in Welsh Nature Reserve.	Unlikely
Melaleuca ochroma	P3			x		Kondinin, Lake Grace, Yilgarn. Shrub growing 0.7 to 2.5 m tall. Bark is hard and fibrous. Occurs within *Melaleuca* shrubland, containing emergent mallee eucalypts and Wandoo, *Grevillea huegelii* over brown clay, whitish sandy-clay, brown clay loam and sandy loam (GHD, 2020). Recorded 900 m west of Study Area, adjacent Jilbadgi Nature Reserve.	Possible

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	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Notisia intonsa	P3			x		Herbaceous annual to 4cm. Coolgardie, Dundas, Kalgoorlie-Boulder, Kondinin, Menzies, Ravensthorpe, Yilgarn. Recorded within Study Area.	Recorded
Oxymyrrhine plicata	P3			x		Spreading shrub to 0.4m tall with white flowers. Esperance, Kondinin, Kulin, Lake Grace. Recorded 22 km south-east of southern end of Study Area.	Possible
Persoonia cymbifolia	P3			x		Erect, spreading shrub, 0.2-0.6(-1) m high. Fl. yellow, Dec or Jan. Sandy soils. On flats or in rock crevices. Esperance, Lake Grace, Yilgarn. Recorded 9.3 km south-west of southern end of Study Area.	Unlikely
Pultenaea daena	P3			x		Dense, prostrate, domed shrub, to 0.07 m high. Fl. yellow, Mar. White to yellow sand or sandy loam, sandy or loamy clay, gravel, limestone, dolomite, laterite. Gently undulating plains, adjacent to salt lakes, in disturbed areas. Recorded 32 km south of southern end of Study Area.	Unlikely
Phlegmatospermum eremaeum	P3			x		Prostrate to spreading annual, herb, 0.02-0.1(-0.2) m high. Fl. white-cream, Jun or Aug to Oct. Stony loam. Coolgardie, Dundas, Esperance, Kalgoorlie-Boulder, Narembeen, Ravensthorpe, Yilgarn. Recorded 16 km east of Study Area (within Battler Mine tenement, south-east of Southern Cross).	Possible
Rinzia torquata	P3			x		Shrub 1.4 m tall and 1.5 m across Kondinin, Kulin, Lake Grace, Merredin, Narembeen, Yilgarn. Recorded within Mt Parker Range minesite, approximately 500 m from Study Area.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Rinzia triplex	P3			x		Coolgardie, Menzies, Yilgarn. Perennial shrub growing to 1 m high and 0.6 m wide. Occurs on flat and undulating plains of yellow sandy clay loam with lateritic gravel (GHD, 2020). Previously recorded on boundary of Study Area (within privately owned agricultural land).	Recorded
Seringia adenogyna	P3			x		Low shrub. Albany, Dundas, Esperance, Gnowangerup, Jerramungup, Kondinin, Lake Grace, Yilgarn. Recorded 6.4 km south-east of southern end of Study Area.	Possible
Stylidium choreanthum	P3			x		Creeping perennial, herb, 0.01-0.03 m high, to 0.3 m wide. Fl. pink/white, Sep to Nov. White/yellow or red sand. Plains. Coolgardie, Menzies, Yilgarn. Recorded 10.5 km west of Study Area (near Moorine South Road).	Possible
Stylidium sejunctum	P3			x		Caespitose perennial, herb, 0.25-0.45 m high, Leaves tufted, linear to narrowly oblanceolate, 10-30 cm long, 0.8-4 mm wide, apex acute to mucronate, margin involute, glabrous to scabrous. Membranous scale leaves present at base of mature leaves. Scape glandular throughout. Inflorescence paniculate. Fl. white/pink-purple, Sep to Nov. Clayey sand or loam, laterite. Outcrops, upper slopes, breakaways. Mallee and Allocasuarina shrubland. Dundas, Esperance, Kondinin, Kulin, Lake Grace, Yilgarn. Recorded 8.7 km south-east of southern end of Study Area.	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Teucrium diabolicum	P3			x		Dundas, Esperance, Kondinin, Yilgarn. Virgate, perennial subshrub, c. 10–20 cm high, suckering from a thick woody rootstock. Fl. white in Autumn and Spring. Known from a small number of locations in Western Australia's Coolgardie bioregion, mostly between Hyden and Norseman but with one record from near Southern Cross. It grows in red cracking clay or clay loam, usually in shallow depressions or on low undulating plains that support low scrub or heath, or in association with low open woodland (Wege and Davis, 2020). Recorded 22 km east of northern end of Study Area.	Possible
Verticordia gracilis	P3			x		Low, slender shrub, 0.15-0.6 m high. Fl. pink, Oct to Nov. Yellow sand, gravelly sand, sandy loam. Kondinin, Lake Grace, Merredin, Yilgarn. Recorded within Study Area.	Recorded
Verticordia mitodes	P3			x		Spreading shrub, 0.15-0.7 m high. Fl. pink-purple, Oct to Dec or Jan. Yellow sand. Undulating plains. Coolgardie, Merredin, Narembeen, Nungarin, Westonia, Yilgarn. Previously recorded within Study Area.	Recorded
Verticordia stenopetala	P3			x		Shrub, 0.2-0.6(-1.3) m high. Fl. pink/pink-purple-red, Oct to Dec or Jan. Yellow sand, sometimes with gravel. Undulating plains. Previously recorded within Study Area.	Recorded
Banksia shanklandiorum	P4			x		Upright, non-lignotuberous shrub, 0.4-2.5 m high, to 3 m wide. Fl. Jun to Aug. White/yellow sand with lateritic gravel. Dowerin, Merredin, Narembeen, Westonia, Wongan-Ballidu, Yilgarn. Recorded 1.4 km west of Study Area (on the track to Parker Rang South).	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Eremophila biserrata	P4			x		Prostrate shrub, to 3 m wide. Fl. green/yellow-green, Sep to Nov or Mar. Sandy or sandy clay soils. Alluvial flats, salt flats and lakes. Esperance, Kondinin, Lake Grace. Recorded 18 km south-east of southern end of Study Area.	Possible
Eremophila caerulea subsp. *merrallii*	P4			x		Spreading or sprawling shrub, to 0.35 m high, to 0.8 m wide. Fl. blue-purple, Oct to Dec. Sand, clay or loam. Undulating plains. Bruce Rock, Coolgardie, Kulin, Yilgarn. Recorded 2.3 km west of Study Area within Jilbadgi Nature Reserve.	Possible
Eremophila inflata (formerly *Calamphoreus inflatus*)	P4			x		Kondinin, Lake Grace, Yilgarn. Erect shrub 0.5 – 3 m tall, occurs in light brown clay loam often with a stony surface, in *Eucalyptus* woodland (Gimlet and *E. longicornis*). Occurs in open areas and on disturbed soils (GHD, 2020). Previously recorded 2.1 km east of the Study Area.	Possible
Eremophila racemosa	P4			x		Erect shrub, 0.5-1.7 m high. Fl. purple-pink-red/white, Mar or Aug to Dec. Sandy or stony loam, clay loam. Undulating plains, roadsides. Dundas, Esperance, Kondinin, Yilgarn. Recorded 7 km south-west of southern end of Study Area.	Possible
Eremophila serpens	P4			x		Prostrate, creeping, forming large patches shrub, 0.03-0.4 m high, forming large patches to 2 m wide. Fl. green/yellow-green, Sep to Dec or Mar to May. White/grey sand, alluvium, loam. Winter-wet depressions, sub-saline flats, drainage lines, salt lakes. Dundas, Esperance, Jerramungup, Kent, Kondinin, Lake Grace, Yilgarn. Recorded 36.4 km west of Study Area (near boundary of cleared agricultural area)	Possible

Taxon	Conservation rank			Database source		Description, habitat and current known distribution (local government areas) (WAH, 1998-; DBCA, 2022f)	Likelihood within Study Area
	DBCA	BC Act	EPBC Act	TPFL/ WAH	PMST		
Eucalyptus georgei subsp. *fulgida*	P4			x		Tree, 4-20 m high, bark smooth, often hanging in ribbons. Fl. cream-white. Sandy loam, clayey sand. Slight depressions. Dundas, Kondinin, Lake Grace, Yilgarn. Recorded 8.6 km south-east of southern end of Study Area.	Possible
Grevillea neodissecta	P4			x		Coolgardie, Dundas, Kondinin, Yilgarn. Low, rounded prickly shrub growing to 0.3 – 1 m tall. Occurring on sand over laterite, and clay loam (GHD, 2020). Recorded 5.9 km east of Study Area within Jilbadgi Nature Reserve.	Possible
Gyrostemon ditrigynus	P4			x		Shrub, 0.4-1.5 m high. Sand, sandy clay, loam. Plains, low ironstone ridges. Dundas, Esperance, Kondinin, Kulin, Lake Grace, Ravensthorpe, Yilgarn. Recorded 9.3 km south-east of southern end of Study Area.	Possible
Microcorys sp. Forrestania (V. English 2004)	P4			x		Prostrate or erect shrub, 0.35-0.4 m high. Fl. white/purple, Jan or Apr. Yellow sandy clay or red-brown clay. Open woodland or cleared areas. Kondinin, Yilgarn. Recorded 9 km south-east of southern end of Study Area.	Possible
Myriophyllum petraeum	P4			x		Aquatic annual, herb, stems 0.15-0.3 m long. Fl. white, Aug to Dec. Strictly confined to ephemeral rock pools on granite outcrops. Coolgardie, Dundas, Esperance, Kondinin, Lake Grace, Narembeen, Westonia, Yilgarn. Recorded within Study Area.	Recorded
Stenanthemum bremerense	P4			x		Erect or low and spreading shrub, (0.2-)0.3-0.6(-1.4) m high. Orange-brown sandy loam, orange-red gravelly loam, skeletal red loam, laterite, ironstone. Top or sides of outcrops and breakaways. Dundas, Esperance, Yilgarn. Recorded 6.8 km south-east of southern end of Study Area.	Possible

4.1.2. Threatened and Priority Ecological Communities

The Study Area intersects the mapped buffer zones of three ecological communities of conservation significance (DBCA, 2022d) (Figure 9):

- 'Ironcap Hills vegetation assemblages (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded ironstone formation)' PEC (Priority 3);
- 'Plant Assemblages of the Parker Range System' PEC (Priority 3); and
- 'Eucalypt Woodland of the Western Australian Wheatbelt' PEC (Priority 3). This PEC is synonymous with the Commonwealth listed TEC under the *EPBC Act*.

A fourth PEC is located approximately 2.7 km west of the Study Area within the Frog Rock Nature Reserve (Figure 9); 'Granite outcrop pools with endemic aquatic fauna' PEC (Priority 3).

A section of the Study Area (~160 ha) along the Marvel Loch Road -Forrestania Road falls within the mapped buffer zone of the 'Ironcap Hills vegetation assemblages' PEC (Figure 9). The Mt Holland/Earl Grey mine is located within the buffer of this PEC however flora and vegetation surveys conducted by Mattiske Consulting (2018) across the site found that none of the landforms or corresponding species communities associated with the PEC were present.

The 'Ironcap Hills vegetation assemblages' PEC is characterised as assemblages on skeletal soils derived from banded ironstone and massive laterites on deeper soils derived from greenstone or decomposing laterites and includes the following vegetation units as described in Gibson (2004):

- species-rich shrublands and mallee shrubland on massive outcrops;
- mallee shrublands and *Allocasuarina* thickets on massive laterite;
- Eucalypt woodlands of *Eucalyptus urna* and *E. salubris* on colluvial flats beneath outcrops or on broad flat ridges, with understorey of *Melaleuca* spp;
- species-poor mallee community dominated by *Eucalyptus calycogona* with emergent *E. salmonophloia* (or occasionally *E. longicornis*) on small colluvial flats in the ranges (DBCA, 2022e).

Approximately 3,760 ha of the Study Area lies within the 'Plant Assemblages of the Parker Range System' PEC buffer (Figure 9). This PEC includes all the vegetation units of the Parker Range, as originally described in Beard (1979), including:

- *Eucalyptus sheathiana* with *E. transcontinentalis* and/or *E. eremophila* (now *E. tenera* or *E. tephroclada* in this region) woodland on sandy soils at the base of ridges and low rises;
- *E. longicornis with E. corrugata* and *E. salubris* or *E. myriadena* woodland on broad flats;
- *E. salmonophloia* and *E. salubris* woodland on broad flats;
- *Allocasuarina acutivalvis* and *A. corniculata* on deeper sandy soils of lateritic ridges;

- *E. capillosa* (formerly subsp. *polyclada*) and/or *E. loxophleba* (now subsp. *lissophloia*) over *Hakea pendens* thicket on skeletal soils on ridges (laterites, breakaways and massive gossanous caps); and
- *Callitris glaucophylla* low open woodland on massive greenstone ridges (vegetation units as described in Gibson and Lyons, 1998) (DBCA, 2022e).

Within the boundary of the Jilbadgi Nature Reserve, approximately 202 ha of the Study Area intersects the buffer of the 'Eucalypt Woodland of the Western Australian Wheatbelt' PEC/TEC (Figure 9). This PEC/TEC occurs in the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions. It also includes outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt, that are off the Darling Range, and receive less than 600 mm mean annual rainfall (DBCA, 2022e).

The PEC/TEC is a woodland in which the minimum mature crown cover of the tree canopy is 10%. The key dominant or co-dominant species of the tree canopy are species of *Eucalyptus* trees that typically have a single trunk - most commonly Salmon Gum (*Eucalyptus salmonophloia*), York Gum (*Eucalyptus loxophleba*), Red Morrel (*Eucalyptus longicornis*) or Gimlet (*Eucalyptus salubris*). Several of the other emergent eucalypt species which may be present as a defining species (e.g. Kondinin Blackbutt (*E. kondininensis*), *E. myriadena*, Salt River Gum (*E. sargentii*), Silver Mallet (*E. ornata*) and Mallet (*E. singularis*) are found only in the WA Wheatbelt. Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs (DoE, 2015).

The mapping of this PEC/TEC within WA represents the indicative present distribution of the ecological community. Ground-truthing is required to verify if a particular site meets the required diagnostic characteristics and minimum condition and size thresholds to be deemed to be the described PEC/TEC (DBCA, 2022e).

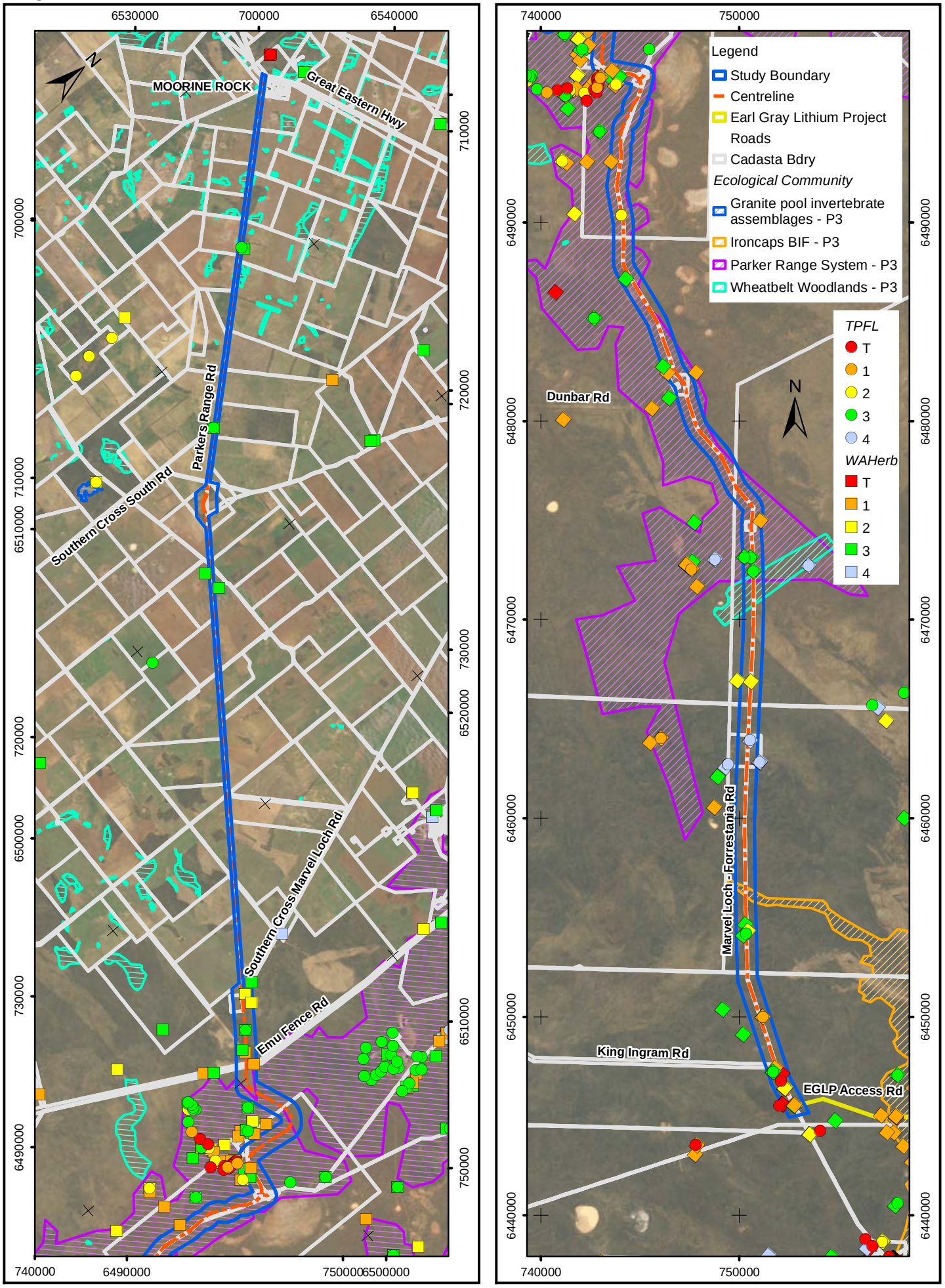
The 'Granite outcrop pools with endemic aquatic fauna' PEC, located approximately 2.7 km from the Study Area within the Frog Rock Nature Reserve, relates to the freshwater pool that may form on the granite outcrop (Frog Rock). Such pools may persist for several months and house a variety of aquatic invertebrates, some of which are endemic to south-west WA (DBCA, 2022e). This landform occurs within the Wockallarry Nature Reserve, bisected by the Parker Range Road, within the Study Area.

4.1.3. Invasive Species

Within the Shire of Yilgarn there are currently 48 flora taxa listed as Declared Pests under Section 22(2) of the BAM Act (DPIRD, 2023c). This includes 29 taxa which are listed as Weeds of National Significance (WoNS) (DAWE, 2023b) (Appendix 5). The literature review of botanical surveys conducted in the area (Table 6) indicated no Declared Pests or WoNS to have been recorded. A weed survey of areas of disturbance within the Earl Grey Lithium Project development envelope, conducted by Mattiske Consulting between 2019 – 2020, recorded 16 weed species across the site, of which **Carrichtera annua* (Wards Weed) was the most widespread.

Figure 9. Regional Threatened and Priority Flora and Priority Ecological Communities

Earl Grey Lithium Project
Parkers Range Rd and Marvel Loch-Forrestonia Rd Upgrade
Regional TPFL, WAHerb and PEC



Drawn: CAD Resources (08 9246 3242), Date: Mar 2023, CAD Ref: a2765_MR_MTH_31_05, Rev: A
Scale 1:250,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, Flora: DBCA

5. Summary

The information collated from the desktop assessment of the Study Area can be summarised as follows:

- The Study Area intersects the Merredin subregion (AVW-01) of the Avon Wheatbelt bioregion and the Southern Cross subregion (COO-02) of the Coolgardie bioregion. Average annual rainfall is 292.8 mm with monthly rainfall peaking from late autumn throughout winter (BoM, 2023a).

- Located across three regolith and seven bedrock geological units (DMIRS, 2018a; 2018b). The Study Area intersects 13 soil landscape zones (DPIRD, 2023a), which are dominated by the AC1 atlas system (~40% of the Study Area), DD15 atlas system (~19%) and the Ya28 atlas system (~15%).

- Groundwater salinities in the Study Area range predominantly from 14,000 mg/L to 35,000 mg/L (highly saline). Where the Study Area intersects paleochannels (associated with salt lakes) around the Moorine Rock townsite and a section extending approximately 7.8 km south along the Marvel Loch-Forrestania Road from the Parker Range Road intersection, groundwater salinity is >35,000 mg/L (brine) (DWER, 2023a).

- The Study Area is located across two hydrological zones; Northern Zone of Ancient Drainage and Southern Cross Zone (majority of Study Area). It is located entirely within the Avon River Basin in the Swan Avon/Yilgarn hydrographic catchment and traverses the Lake Julia (northern end of Study Area), Yellowdine (mid-section) and Lake Eva (southern end) hydrographic sub-catchments (DPIRD, 2023b).

- Thirteen pre-European vegetation system associations occur across the Study Area (where vegetation remains) with the majority pertaining to Eucalypt woodlands or mallee. The dominant pre-European vegetation associations include Parker_1068 (41% of the Study Area vegetation), Skeleton Rock_519 (11%) and Skeleton Rock_1068 (8%).

- The majority of the Study Area has been mapped as having a low to moderate potential for supporting a terrestrial GDE. The northern end of the Study Area (1 km section at the junction with Great Eastern Highway) is mapped as having a high potential where vegetation remains intact surrounding the Moorine Rock townsite and the granite outcrop located on the northern side of Great Eastern Highway (BoM, 2023b).

- The nearest significant wetland, as listed under the Directory of Important Wetlands in Australia (DBCA, 2023b) is Lake Cronin, located approximately 32 km south of the Study Area.

- The Study Area intersects three ESAs: (i) Jilbadgi Nature Reserve which is listed on the Register of the National Estate; and (ii) Marvel Loch – Forrestania road, roadside vegetation supporting *Banksia dolichostyla* (T) between the intersection of Kind Ingram Road and the turnoff to the minesite; and (iii) the Commonwealth listed 'Eucalypt Woodland of the Western Australian Wheatbelt' TEC under the *EPBC Act* (which is synonymous with the State listed PEC of the same name).

- Database searches (state and national) and the literature review indicate 126 flora taxa of conservation significance have been recorded (or may occur) within a 50 km radius of the Study Area. A total of 20 taxa of conservation significance (one Threatened, five Priority 1, four Priority 2, nine Priority 3 and one Priority 4) have been recorded within the boundary of the Study Area with an additional 66 taxa (three Threatened, 24 Priority 1, eight Priority 2, 20 Priority 3 and 11 Priority 4) assessed as having the potential to occur within the Study Area.

- The Study Area intersects the mapped buffer zones of three ecological communities of conservation significance (DBCA, 2022d);
    - 'Ironcap Hills vegetation assemblages (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded ironstone formation)' PEC (Priority 3);
    - 'Plant Assemblages of the Parker Range System' PEC (Priority 3); and
    - 'Eucalypt Woodland of the Western Australian Wheatbelt' PEC (Priority 3). This PEC is synonymous with the Commonwealth listed TEC (of the same name) under the *EPBC Act*.

  The 'Granite outcrop pools with endemic aquatic fauna' PEC (Priority 3) is located within the Frog Rock Nature Reserve, approximately 2.7 km from the Study Area. This may also occur on the granite outcrop at the Wockallarry Nature Reserve, within the Study Area.

- The Study Area is located within the western boundary of the Great Western Woodlands until it enters the extensively cleared agricultural zone along Parker Range Road.

- Within the Shire of Yilgarn there are 48 flora taxa listed as Declared Pests, including 29 taxa which are listed as Weeds of National Significance (DAWE, 2023b). The literature review of botanical surveys conducted in the area indicated no Declared Pests or WoNS to have been recorded.

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Appendix 1. Department of Biodiversity Conservation and Attractions (DBCA) Framework for Conservation Significant Flora

DBCA Conservation Codes for Western Australian Flora

Under the Wildlife Conservation Act 1950, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection.

Specially protected flora are species which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such.
Categories of specially protected flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the Biodiversity Conservation Act 2016 (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.

EN Endangered species

Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.

VU Vulnerable species

Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "there is no reasonable doubt that the last member of the species has died", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for extinct fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for extinct flora.

EW Extinct in the wild species

Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.

(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.

(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Last updated 3 January 2019

Appendix 2. DBCA Definitions of Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs)

DEFINITIONS, CATEGORIES AND CRITERIA FOR THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

1. GENERAL DEFINITIONS

Ecological Community

A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; "presumed totally destroyed", "critically endangered", "endangered" or "vulnerable".

Possible threatened ecological communities that do not meet survey criteria are added to DEC's Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

An **assemblage** is a defined group of biological entities.

Habitat is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (e.g. substrate and topography), and the biotic factors.

Occurrence: a discrete example of an ecological community, separated from other examples of the same community by more than 20 meters of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

Adequately Surveyed is defined as follows:

"An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts."

Community structure is defined as follows:

"The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage" (e.g. Eucalyptus salmonophloia woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, e.g. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of Modification and Destruction of an ecological community:

Modification: "changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a direct or indirect result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

Destruction: "modification such that reestablishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention."

Note: Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgment. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be bought back to a semblance of the original state by redirecting saline runoff and pumping waters of the rising water table away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels.

Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

Threatening processes are defined as follows:

"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced microorganisms; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

2. DEFINITIONS AND CRITERIA FOR PRESUMED TOTALLY DESTROYED, CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE ECOLOGICAL COMMUNITIES

Presumed Totally Destroyed (PD)

An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats or

B) All occurrences recorded within the last 50 years have since been destroyed

Critically Endangered (CR)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and s found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)

An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting any one or more of the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement and either or both of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, and one or more of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are

small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)

An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting **any one or more** of the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes

3. DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:

(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;

(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

(Department of Environment and Conservation January 2013)

Appendix 3. Protected Matters Search Tool Results

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 15-Nov-2022

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	37
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	14
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	36
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	17
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Historic			
Goldfields Water Supply Scheme, Western Australia	WA	Listed place	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
MAMMAL			
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
Phascogale calura Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
PLANT			
Acacia lanuginophylla Woolly Wattle [55575]	Endangered	Species or species habitat known to occur within area	In feature area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat may occur within area	In buffer area only
Banksia sphaerocarpa var. dolichostyla Ironcaps Banksia, Ironcap Banksia [10518]	Vulnerable	Species or species habitat known to occur within area	In feature area
Boronia adamsiana Barbalin Boronia [16935]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Boronia revoluta Ironcap Boronia [9167]	Endangered	Species or species habitat may occur within area	In buffer area only
Caladenia graniticola Pingaring Spider-orchid, Granite Spider-orchid [84996]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Caladenia hoffmanii Hoffman's Spider-orchid [56719]	Endangered	Species or species habitat may occur within area	In buffer area only
Calectasia pignattiana Stilted Tinsel Lily [82018]	Vulnerable	Species or species habitat known to occur within area	In feature area
Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Daviesia microcarpa Norseman Pea [56766]	Endangered	Species or species habitat known to occur within area	In feature area
Eremophila resinosa Resinous Eremophila [11735]	Endangered	Species or species habitat known to occur within area	In feature area
Eremophila verticillata Whorled Eremophila [7032]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Eremophila virens Campion Eremophila, Green-flowered Emu bush [21433]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat known to occur within area	In feature area
Eucalyptus brevipes Mukinbudin Mallee [7495]	Endangered	Species or species habitat may occur within area	In buffer area only
Eucalyptus crucis subsp. crucis Silver Mallee [4474]	Vulnerable	Species or species habitat known to occur within area	In feature area
Eucalyptus steedmanii Steedmans Gum [15393]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Frankenia parvula Short-leaved Frankenia [20872]	Endangered	Species or species habitat known to occur within area	In buffer area only
Gastrolobium diabolophyllum Bodallin Poison [78384]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Gastrolobium graniticum Granite Poison [14872]	Endangered	Species or species habitat known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Isopogon robustus Robust Coneflower [82646]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Melaleuca sciotostyla Wongan Melaleuca [24324]	Endangered	Species or species habitat may occur within area	In buffer area only
Paragoodia crenulata [86387]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Philotheca falcata Sickle-leaved Waxflower [64943]	Critically Endangered	Species or species habitat likely to occur within area	In buffer area only
Ricinocarpos brevis [82879]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area	In feature area
Tecticornia flabelliformis Bead Glasswort [82664]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Verticordia staminosa var. cylindracea Granite Featherflower [55823]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat may occur within area	In buffer area only
SPIDER			
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat known to occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [52086]	WA	In buffer area only
Commonwealth Land - [52087]	WA	In buffer area only
Commonwealth Land - [52171]	WA	In buffer area only
Commonwealth Land - [52179]	WA	In buffer area only
Commonwealth Land - [51405]	WA	In buffer area only
Commonwealth Land - [51057]	WA	In buffer area only

Commonwealth Land Name	State	Buffer Status
Commonwealth Land - [51725]	WA	In buffer area only
Commonwealth Land - [51726]	WA	In buffer area only
Commonwealth Land - [51727]	WA	In buffer area only
Commonwealth Land - [52181]	WA	In buffer area only
Commonwealth Land - [51729]	WA	In buffer area only
Commonwealth Land - [51728]	WA	In buffer area only
Commonwealth Land - [52176]	WA	In feature area
Commonwealth Land - [51723]	WA	In buffer area only

Listed Marine Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Merops ornatus			
Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Thinornis cucullatus as Thinornis rubricollis			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Baladjie Lake	Nature Reserve	WA	In buffer area only
Biljahnie Rock	Nature Reserve	WA	In buffer area only
Bushfire Rock	Nature Reserve	WA	In buffer area only
Carrabin	Nature Reserve	WA	In buffer area only
Condarnin Rock	Nature Reserve	WA	In buffer area only
Duladgin	Nature Reserve	WA	In buffer area only
Frog Rock	Nature Reserve	WA	In feature area
Jilbadji	Nature Reserve	WA	In feature area
Lake Cronin	Nature Reserve	WA	In buffer area only
Lake Hurlstone	Nature Reserve	WA	In buffer area only
Marble Rocks	Nature Reserve	WA	In buffer area only
Mount Hampton	Nature Reserve	WA	In buffer area only
Neendojer Rock	Nature Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
NTWA Bushland covenant (0009)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0079)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0093)	Conservation Covenant	WA	In buffer area only
NTWA Bushland covenant (0118)	Conservation Covenant	WA	In buffer area only
Sandford Rocks	Nature Reserve	WA	In buffer area only
Unnamed WA09927	Nature Reserve	WA	In buffer area only
Unnamed WA16000	Nature Reserve	WA	In buffer area only
Unnamed WA18583	Nature Reserve	WA	In buffer area only
Unnamed WA18584	Nature Reserve	WA	In buffer area only
Unnamed WA25801	Nature Reserve	WA	In buffer area only
Unnamed WA27146	Nature Reserve	WA	In buffer area only
Unnamed WA28047	Nature Reserve	WA	In buffer area only
Unnamed WA28323	Nature Reserve	WA	In buffer area only
Unnamed WA28562	Nature Reserve	WA	In buffer area only
Unnamed WA28940	Nature Reserve	WA	In buffer area only
Unnamed WA30430	Nature Reserve	WA	In buffer area only
Unnamed WA34197	Nature Reserve	WA	In buffer area only
Unnamed WA36918	Nature Reserve	WA	In buffer area only
Unnamed WA40460	Nature Reserve	WA	In buffer area only
Unnamed WA43219	Nature Reserve	WA	In buffer area only
Welsh	Nature Reserve	WA	In buffer area only
Wockallarry	Nature Reserve	WA	In feature area
Yellowdine	Nature Reserve	WA	In buffer area only

Nationally Important Wetlands [Resource Information]

Wetland Name	State	Buffer Status
Lake Cronin	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Develop a Nickel Sulphide Open Cut Mine, Underground Mine, and Associated Infra	2008/4443	Controlled Action	Post-Approval	In buffer area only
Earl Grey Lithium Project	2017/7950	Controlled Action	Post-Approval	In feature area
Edna May Gold Project expansion - Greenfinch Pit, Westonia, WA	2018/8213	Controlled Action	Final PD	In buffer area only
Forrestania Nickel Project - Spotted Quoll-Cosmic Boy Haul Road	2011/6003	Controlled Action	Post-Approval	In buffer area only
Goldfields Water Supply Scheme Project	2019/8547	Controlled Action	Post-Approval	In feature area
Iron Ore Project	2010/5435	Controlled Action	Post-Approval	In feature area
Nava-1 Cable System	2001/510	Controlled Action	Completed	In feature area
New Morning Underground Nickel Deposit Project	2021/8971	Controlled Action	Referral Decision	In buffer area only
Parker Range Mt Caudan Iron Ore Haul Road Proposal	2021/8955	Controlled Action	Assessment Approach	In feature area
Not controlled action				
Edna May Gold Project Pit Cutback	2012/6333	Not Controlled Action	Completed	In buffer area only
Forrestania Nickel Project Flying Fox T5 and water pipeline	2006/2904	Not Controlled Action	Completed	In buffer area only
Great Eastern Highway Safety Improvements SLK 3118 to SLK 327	2020/8746	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In buffer area only
Recommencement of operations, Westonia Mine	2003/1111	Not Controlled Action	Completed	In buffer area only
Tenement M77/1245, Norseman Road, Sand Pit (North Pit), WA	2014/7167	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Appendix 4. Declared Pests -s22(2) of the Yilgarn Local Government Area

Declared Pests - s22(2) of the Yilgarn Local Government Area (DPIRD, 2022c).

Taxon	Control categories	WoNS	Common name
**Alhagi maurorum* Medik.	C3 Management		camelthorn
**Asparagus asparagoides* (L.) Druce		Y	bridal creeper
**Austrocylindropuntia cylindrica* (Juss. ex Lam.) Backeb.	C3 Management	Y	coral cactus, cane cactus
**Austrocylindropuntia subulata* (Muehlenpf.) Backeb.	C3 Management	Y	Eve's pin, Eve's needle
**Calotropis procera* (Aiton) W.T.Aiton			rubber bush, calotropis
**Chondrilla juncea* L.	C3 Management		skeleton weed, rush skeleton weed, naked weed, hogbite, gum succory
**Cryptostegia madagascariensis* Bojer ex Decne.			Rubbervine, Madagascar rubbervine
**Cylindropuntia fulgida* (Engelm.) F.M.Knuth	C3 Management	Y	coral cactus, boxing glove cactus
**Cylindropuntia imbricata* (Haw.) F.M.Knuth	C3 Management	Y	rope pear, devil's rope
**Cylindropuntia kleiniae* (DC.) F.M.Knuth	C3 Management	Y	candle cholla, Klein's pencil cactus, Klein's cholla
**Cylindropuntia pallida* (Rose) F.M.Knuth	C3 Management	Y	white-spined Hudson pear, Hudson pear (white-spined)
**Cylindropuntia tunicata* (Lehm.) F.M.Knuth	C3 Management	Y	thistle cholla, brown-spined Hudson pear, Hudson pear (brown-spined)
**Echium plantagineum* L.			salvation Jane, Paterson's curse
**Hydrocotyle ranunculoides* L. f.	C3 Management		water pennywort, spaghetti weed, hydrocotyle, grote waternavel, floating marsh pennywort
**Jatropha gossypiifolia* L.	C3 Management	Y	cotton-leaf physic-nut, bellyache bush
**Lantana camara* L.	C3 Management	Y	wild sage, white sage, red-flowered sage, largeleaf lantana, common lantana
**Moraea flaccida* (Sweet) Steud.			one-leaf cape tulip
**Moraea miniata* Andrews			two-leaf cape tulip
**Onopordum acaulon* L.			stemless thistle
**Opuntia elata* Salm-Dyck	C3 Management	Y	Riverina pear
**Opuntia elatior* Mill.	C3 Management	Y	red-flower prickly pear

Taxon	Control categories	WoNS	Common name
**Opuntia engelmannii* Salm-Dyck ex Engelm.	C3 Management	Y	Engelmann's prickly pear, Engelmann's pear
**Opuntia ficus-indica* (L.) Mill.	C3 Management		tuna cactus, sweet pricklypear, spiny pest pear, spineless cactus, prickly pear, mission pricklypear, grootdoringturksvy, Indian fig, Boereturksvy
**Opuntia microdasys* (Lehm.) Pfeiff.	C3 Management	Y	teddy bear cactus, golden bristle cactus, bunny ears
**Opuntia monacantha* Haw.	C3 Management	Y	drooping tree pear
**Opuntia polyacantha* Haw.	C3 Management	Y	plains prickly pear
**Opuntia puberula* Hort. Vindob. ex Pfeiff.	C3 Management	Y	nopal de tortuga, nopal de culebra
**Opuntia stricta* (Haw.) Haw.	C3 Management	Y	erect prickly pear, common prickly pear
**Opuntia tomentosa* Salm-Dyck	C3 Management	Y	velvet tree pear, velvet pear
**Parkinsonia aculeata* L.	C3 Management	Y	parkinsonia
**Pistia stratiotes* L.	C2 Eradication		water lettuce
**Prosopis glandulosa* Torr. x **Prosopis velutina* Wooton	C2 Eradication, C3 Management	Y	mesquite
**Rubus anglocandicans* A.Newton	C3 Management	Y	Blackberry
**Rubus laudatus* A.Berger	C3 Management	Y	early blackberry
**Rubus rugosus* Sm.	C3 Management	Y	keriberry, Himalayan blackberry
**Rubus ulmifolius* Schott	C3 Management	Y	elmleaf blackberry, Thornfree, Loch Ness, Blacksatin
**Sagittaria platyphylla* (Engelm.) J.G.Sm.	C3 Management	Y	sagittaria, delta arrowhead
**Senna alata* (L.) Roxb.			seven-golden-candlesticks, ringwormshrub, ringwormbush, ringworm senna, empress-candle-plant, emperor's candlesticks, candlestick senna, candle bush, Christmas-candle
**Senna obtusifolia* (L.) H.S.Irwin & Barneby			sicklepod senna, sicklepod, coffeeweed, Javabean, Chinese Senna
**Silybum marianum* (L.) Gaertn.			variegated thistle, milkthistle, blessed milkthistle

Taxon	Control categories	WoNS	Common name
**Solanum elaeagnifolium* Cav.		Y	white horsenettle, silverleaf nightshade
**Solanum linnaeanum* Hepper & P.-M.L.Jaeger			apple of Sodom
**Tamarix aphylla* (L.) H.Karst.		Y	tamarisk, flowering cypress, athel tree, athel tamarisk, athel pine, athel
**Ulex europaeus* L.	C2 Eradication C3 Management	Y	gorse, furze
**Xanthium spinosum* L.	C2 Eradication C3 Management		thorny burweed, spiny cocklebur, spiny clotbur, prickly burweed, piikkisappiruoho, dagger weed, dagger cocklebur, burweed, boetebos, Bathurst burr
**Xanthium strumarium* L.	C2 Eradication C3 Management		Sheepbur, sea burdock ,rough cocklebur, kra chap, karheasappiruoho, kankerroos ,hedgehog burweed, heartleaf cocklebur, ditchbur, common cocklebur,cocklebur,clotbur,buttonbur,burweed,abrojillo,Noogoora burr, Bathurst burr
**Zantedeschia aethiopica* (L.) Spreng.			calla lily,arum lily
**Ziziphus mauritiana* Lam.	C3 Management		Saucunazi, macaniqueira, m'sau, Indian jujube, Chinese apple

Control categories as listed under the Biosecurity and Agriculture Management Regulations 2013 (DPIRD, 2022c)

Category	Description
C1	Organisms which should be excluded from part or all of Western Australia.
C2	Organisms which should be eradicated from part or all of Western Australia.
C3	Organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
Unassigned	Unassigned: Declared pests that are recognised as having a harmful impact under certain circumstances, where their subsequent control requirements are determined by a Plan or other legislative arrangements under the Act.

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Appendix 2. Vegetation Condition Scale (EPA, 2016)

Table 2: Vegetation Condition Scale (adapted from Keighery 1994 and Trudgen 1988)

Vegetation Condition	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor		Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

10 **Technical Guidance** – Flora and Vegetation Surveys for Environmental Impact Assessment

Appendix 3. Conservation Codes for Western Australian Flora and Fauna

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

CONSERVATION CODES

For Western Australian Flora and Fauna

Threatened, Extinct and Specially Protected fauna or flora[1] are species[2] which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2018* and the *Wildlife Conservation (Rare Flora) Notice 2018* have been transitioned under regulations 170, 171 and 172 of the *Biodiversity Conservation Regulations 2018* to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016.*

Categories of Threatened, Extinct and Specially Protected fauna and flora are:

T Threatened species

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the *Wildlife Conservation (Rare Flora) Notice 2018* for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

CR Critically endangered species

Threatened species considered to be "*facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for critically endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for critically endangered flora.

EN Endangered species

Threatened species considered to be "*facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for endangered fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for endangered flora.

VU Vulnerable species

Threatened species considered to be "*facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines*".

Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for vulnerable fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild.

EX Extinct species

Species where "*there is no reasonable doubt that the last member of the species has died*", and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).

Published as presumed extinct under schedule 4 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018* for extinct fauna or the *Wildlife Conservation (Rare Flora) Notice 2018* for extinct flora.

EW Extinct in the wild species

Species that *"is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form*", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act).

Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

MI Migratory species

Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act).

Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.

Published as migratory birds protected under an international agreement under schedule 5 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

CD Species of special conservation interest (conservation dependent fauna)

Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act).

Published as conservation dependent fauna under schedule 6 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

OS Other specially protected species

Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act).

Published as other specially protected fauna under schedule 7 of the *Wildlife Conservation (Specially Protected Fauna) Notice 2018*.

P Priority species

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1 Priority 1: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2 Priority 2: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3 Priority 3: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4 Priority 4: Rare, Near Threatened and other species in need of monitoring

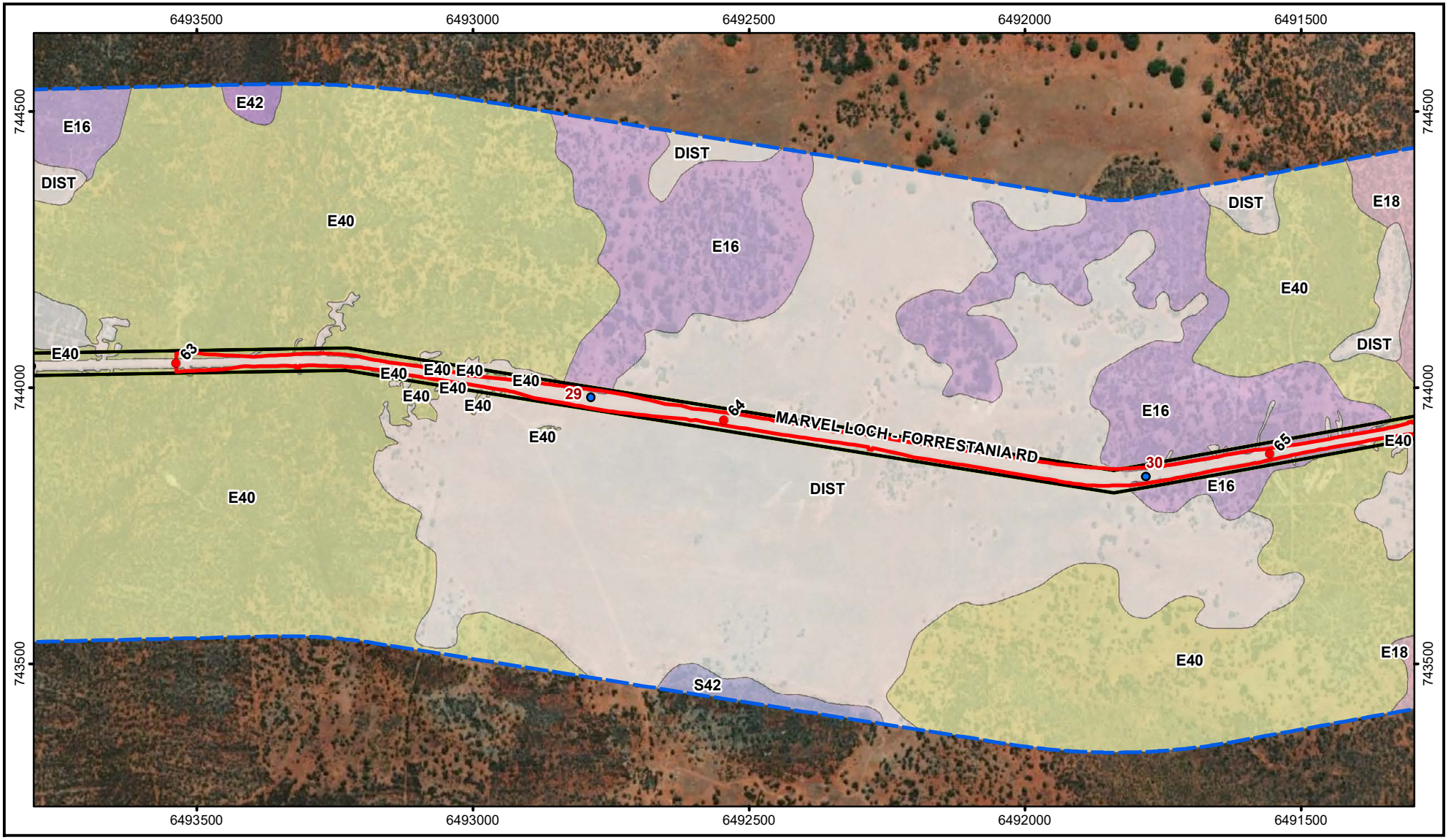
(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.
(b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent.
(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

[1] The definition of flora includes algae, fungi and lichens
[2]Species includes all taxa (plural of taxon - a classificatory group of any taxonomic rank, e.g. a family, genus, species or any infraspecific category i.e. subspecies or variety, or a distinct population).

Appendix 4. Interim Vegetation Maps of the Study Area

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 63 km to 65 km - Vegetation

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_02_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

- DIST
- E16
- E18
- E40
- E42
- S42

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 65 km to 67 km - Vegetation

DRAFT

Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_02_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

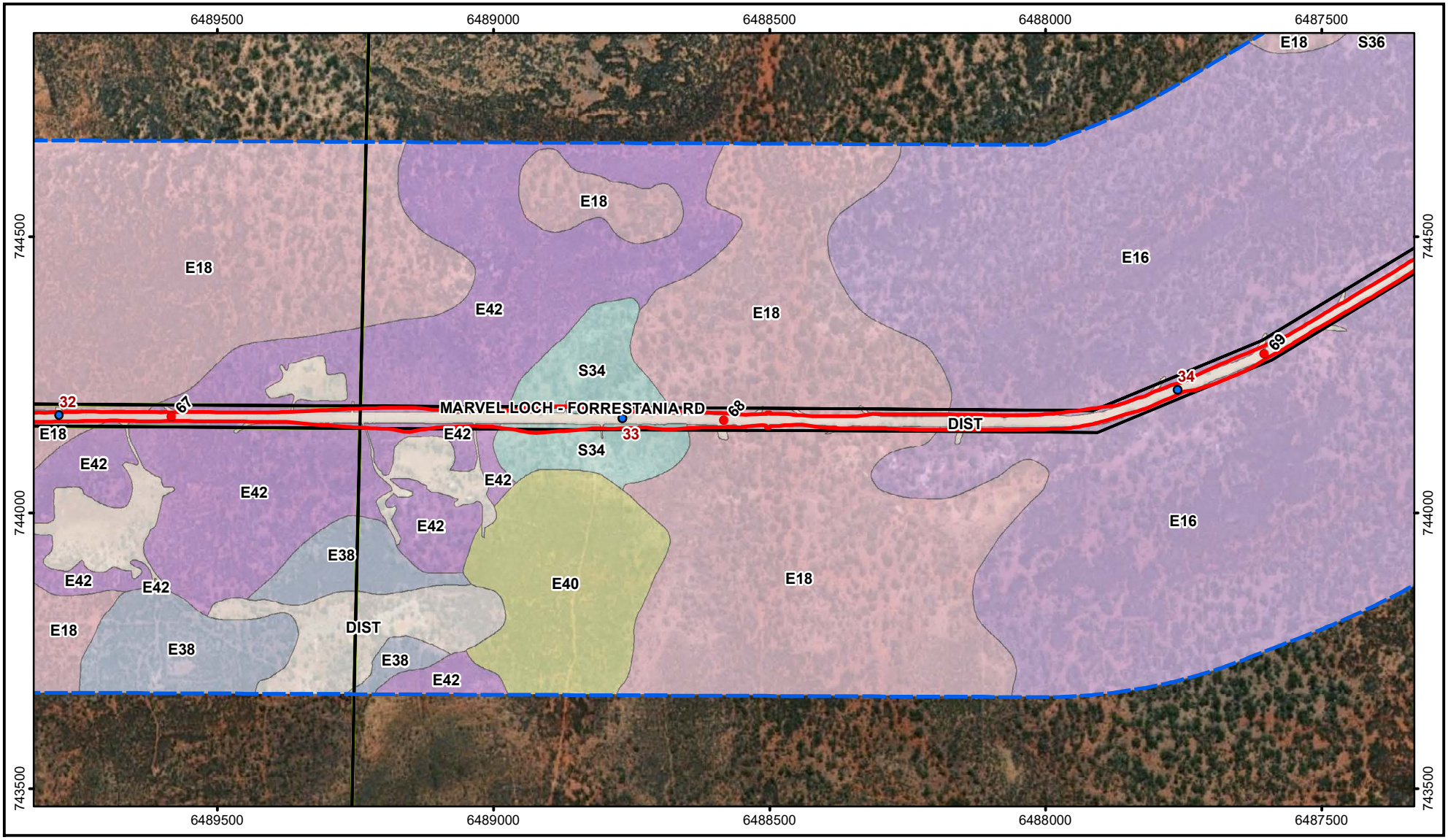
- DIST
- E16
- E18
- E38
- E40
- E42

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 67 km to 69 km - Vegetation

DRAFT



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Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

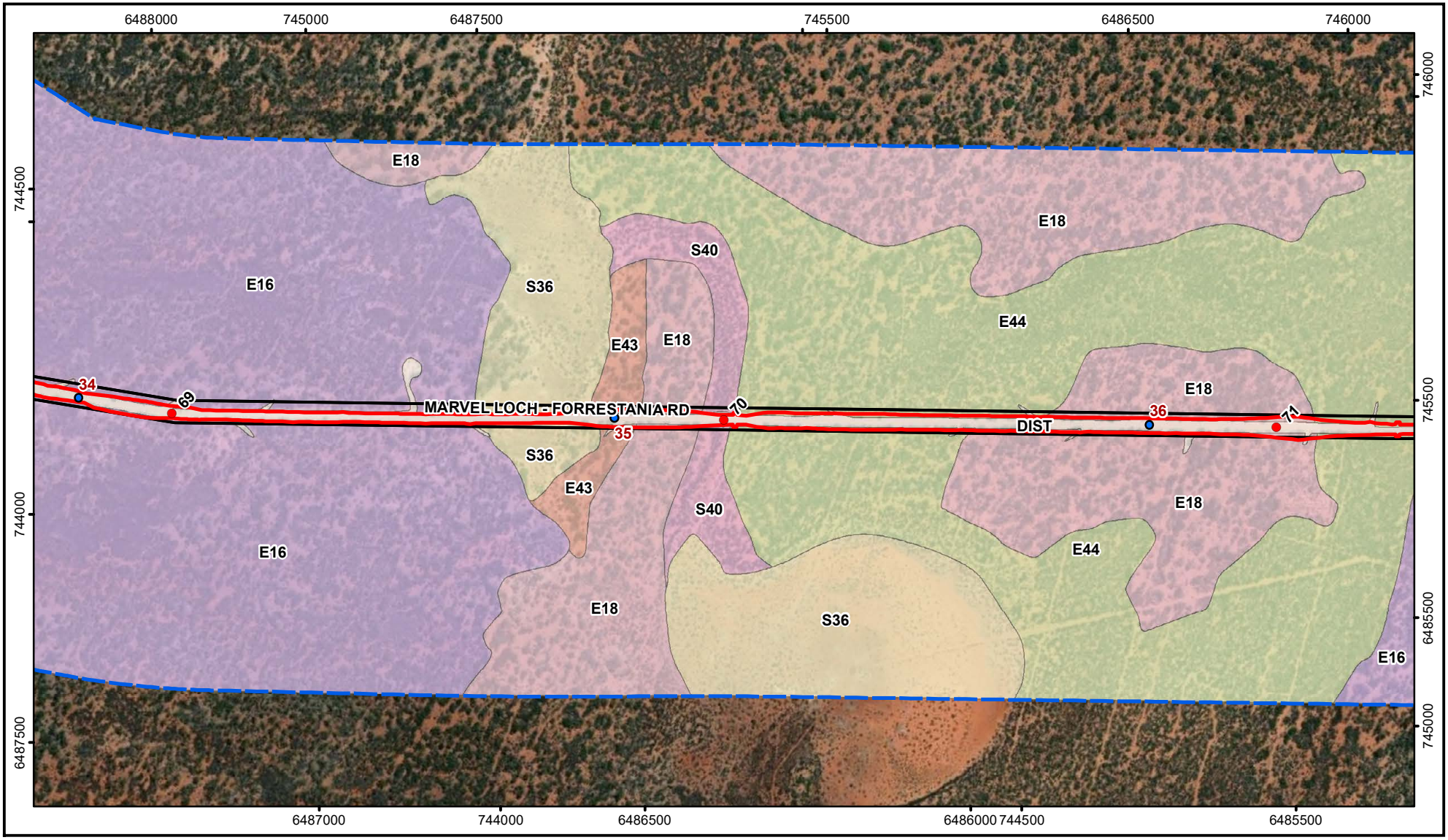
- E18
- E42
- DIST
- E38
- S34
- E16
- E40
- S36

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 69 km to 71 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Veg Code

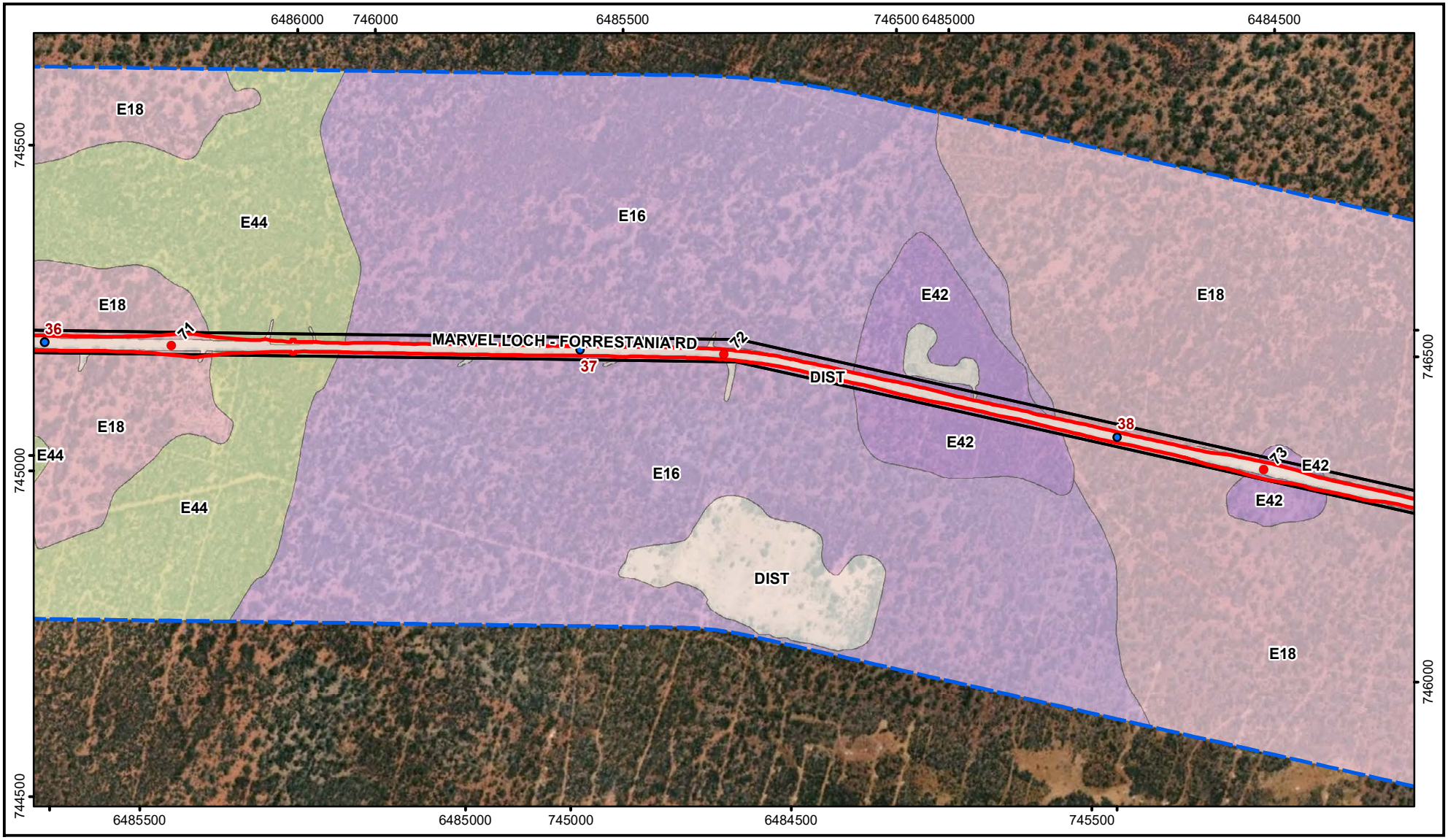
- DIST
- E16
- E18
- E43
- E44
- S36
- S40

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 71 km to 73 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

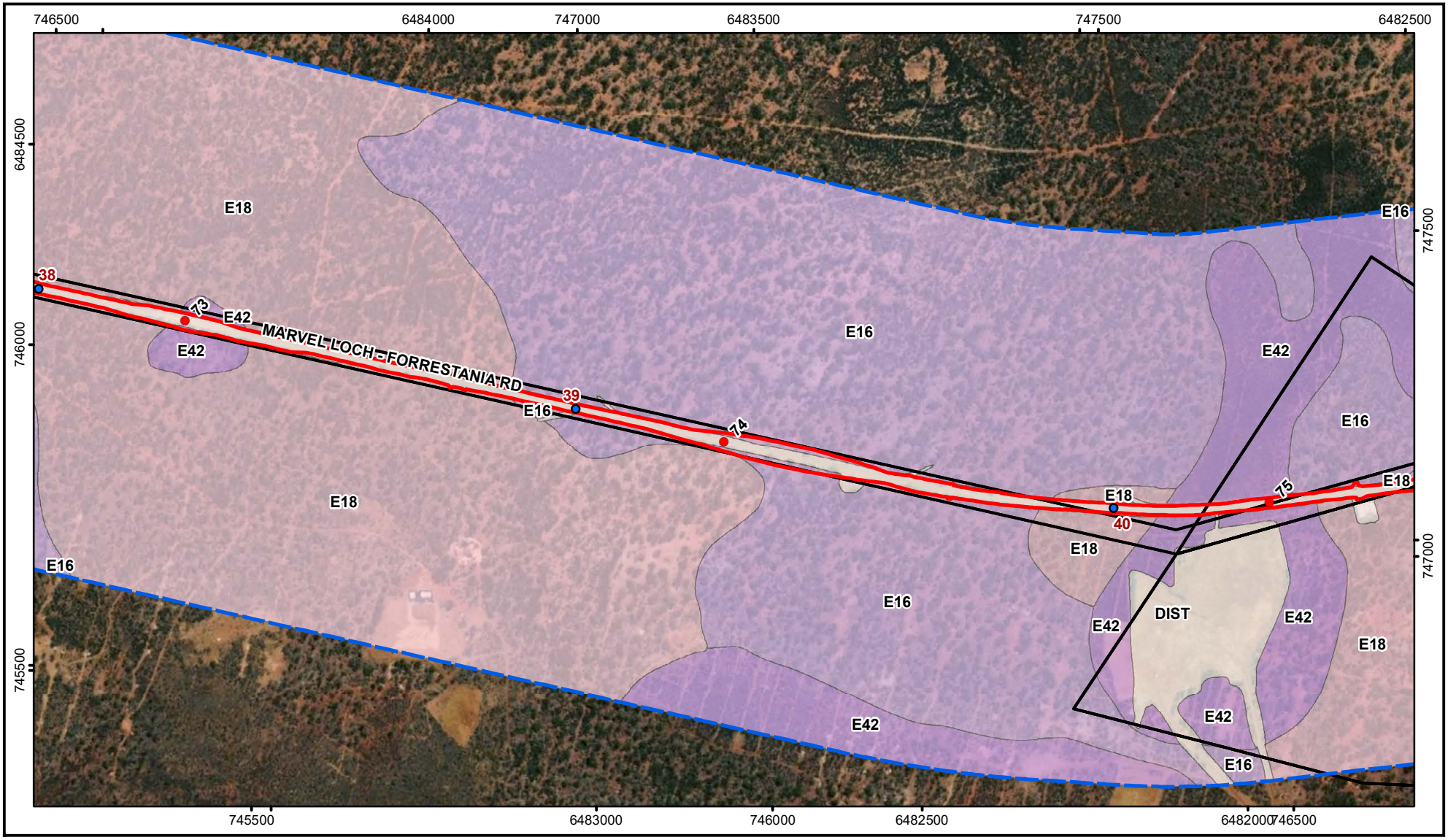
Veg Code
- E16
- E42
- DIST
- E18
- E44

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 73 km to 75 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

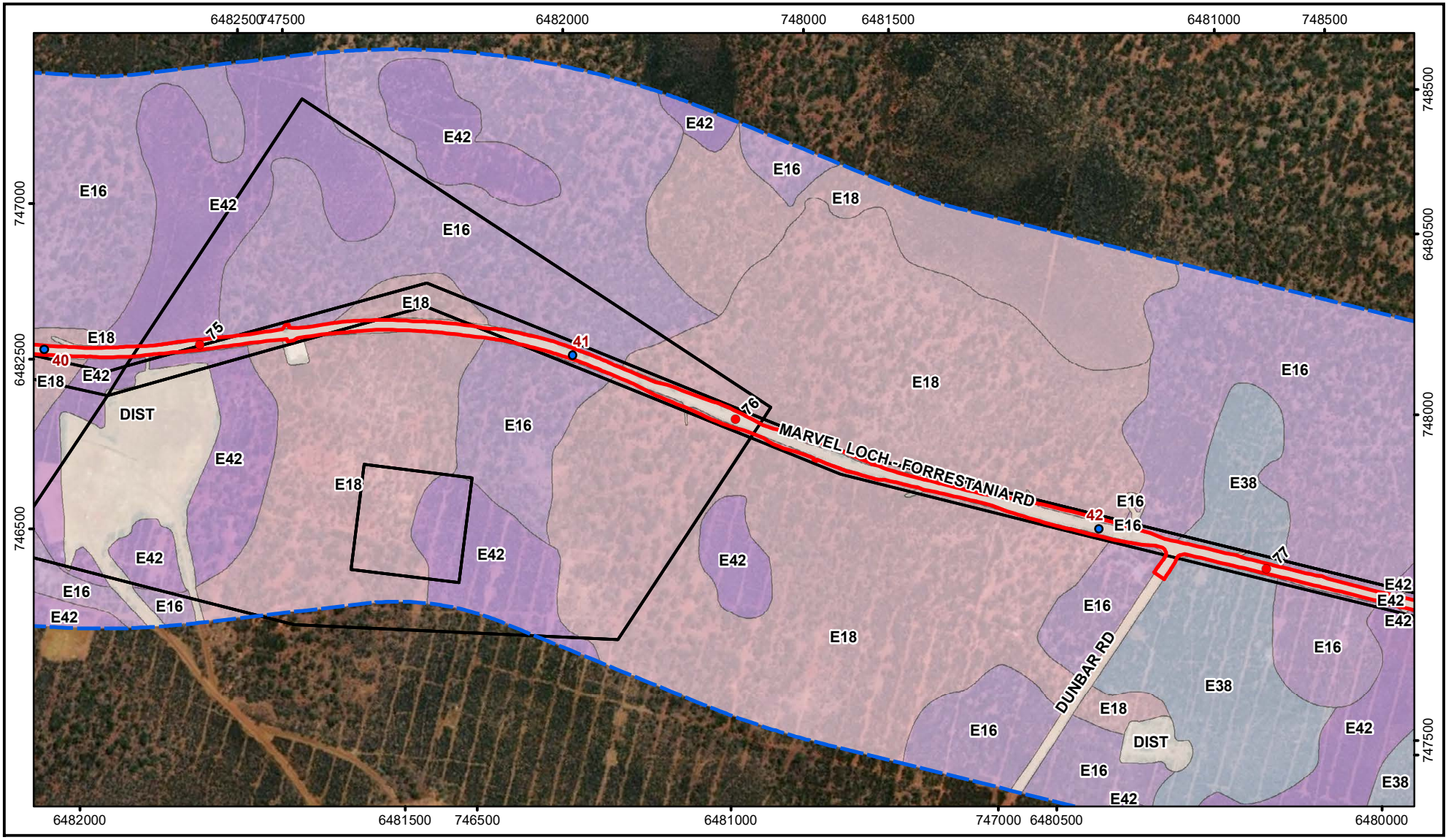
Veg Code
- E16
- E42
- DIST
- E18

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 75 km to 77 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

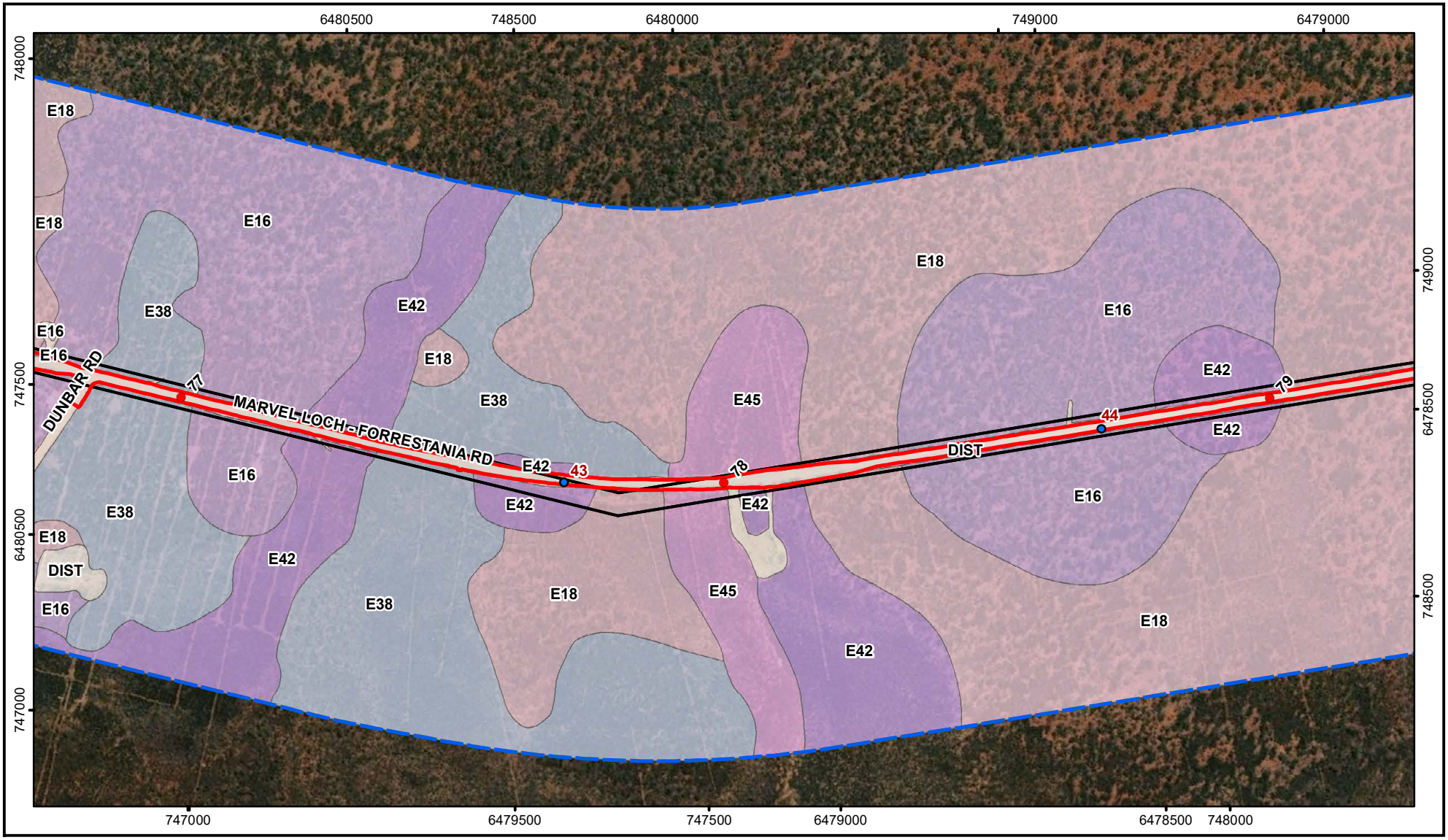
Veg Code
- E16
- E18
- E38
- E42
- DIST

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 77 km to 79 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Veg Code

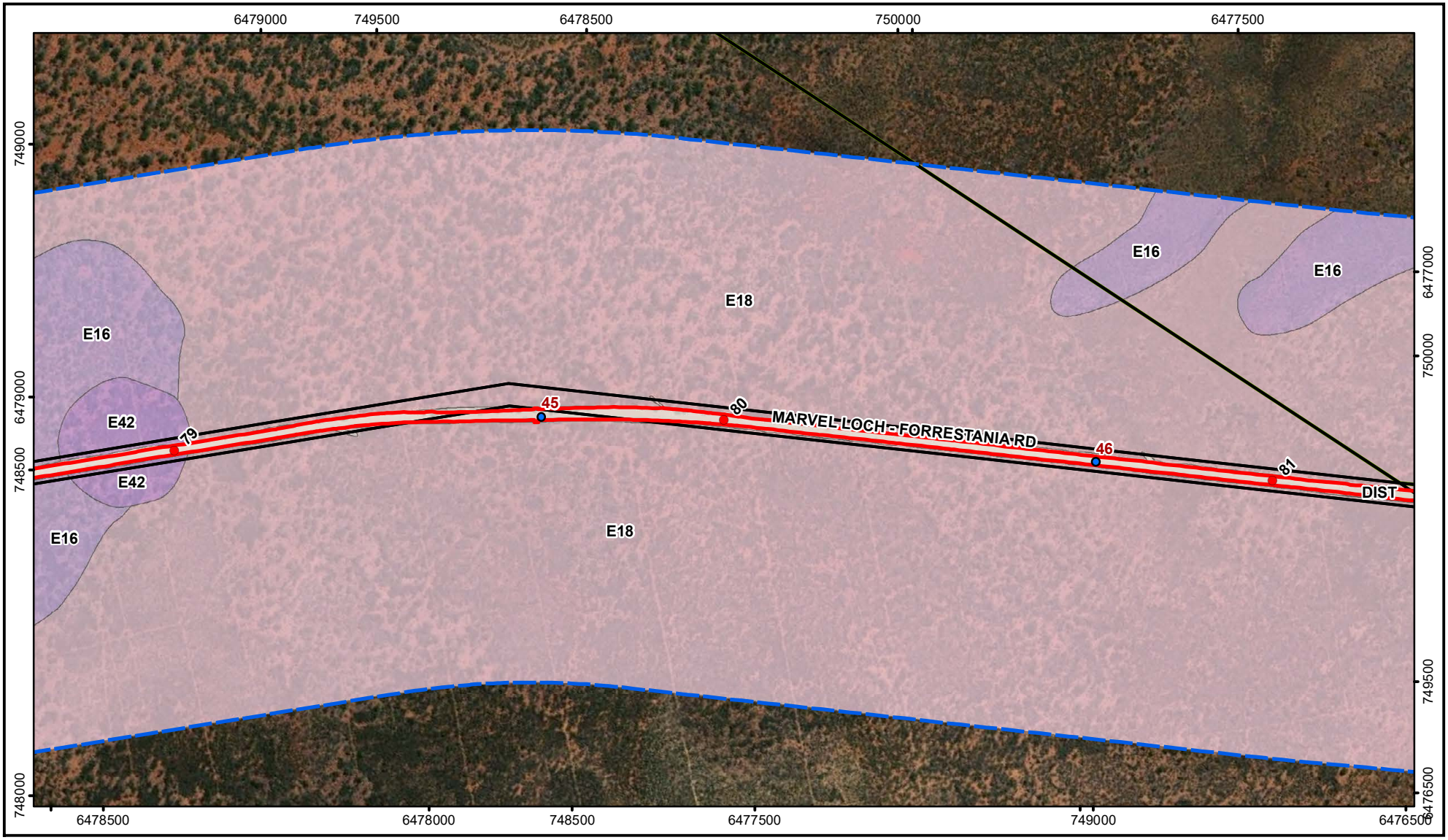
- E16
- E18
- DIST
- E38
- E42
- E45

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 79 km to 81 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

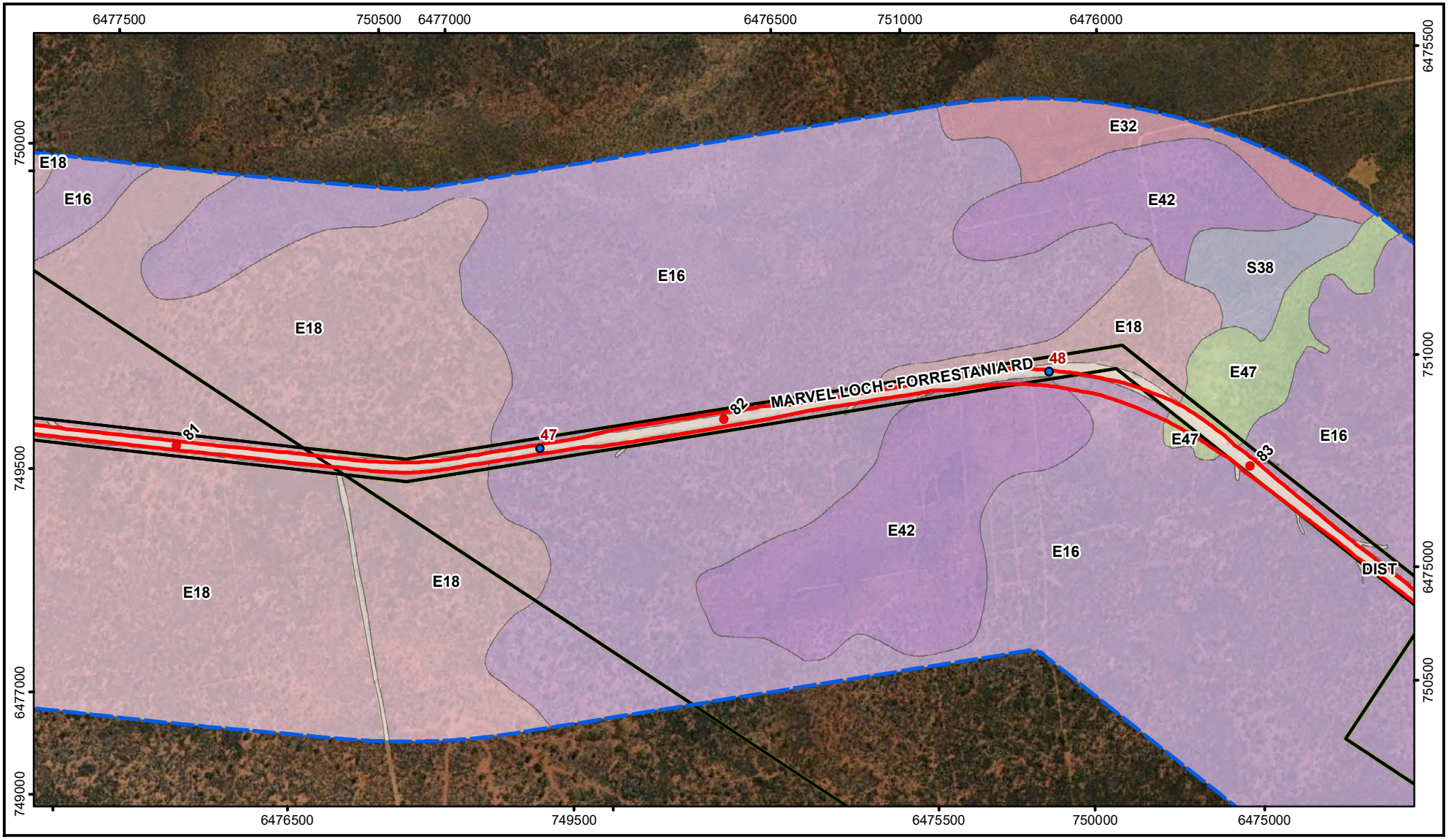
Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves
- **Veg Code** E16 E42 DIST E18

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 81 km to 83 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

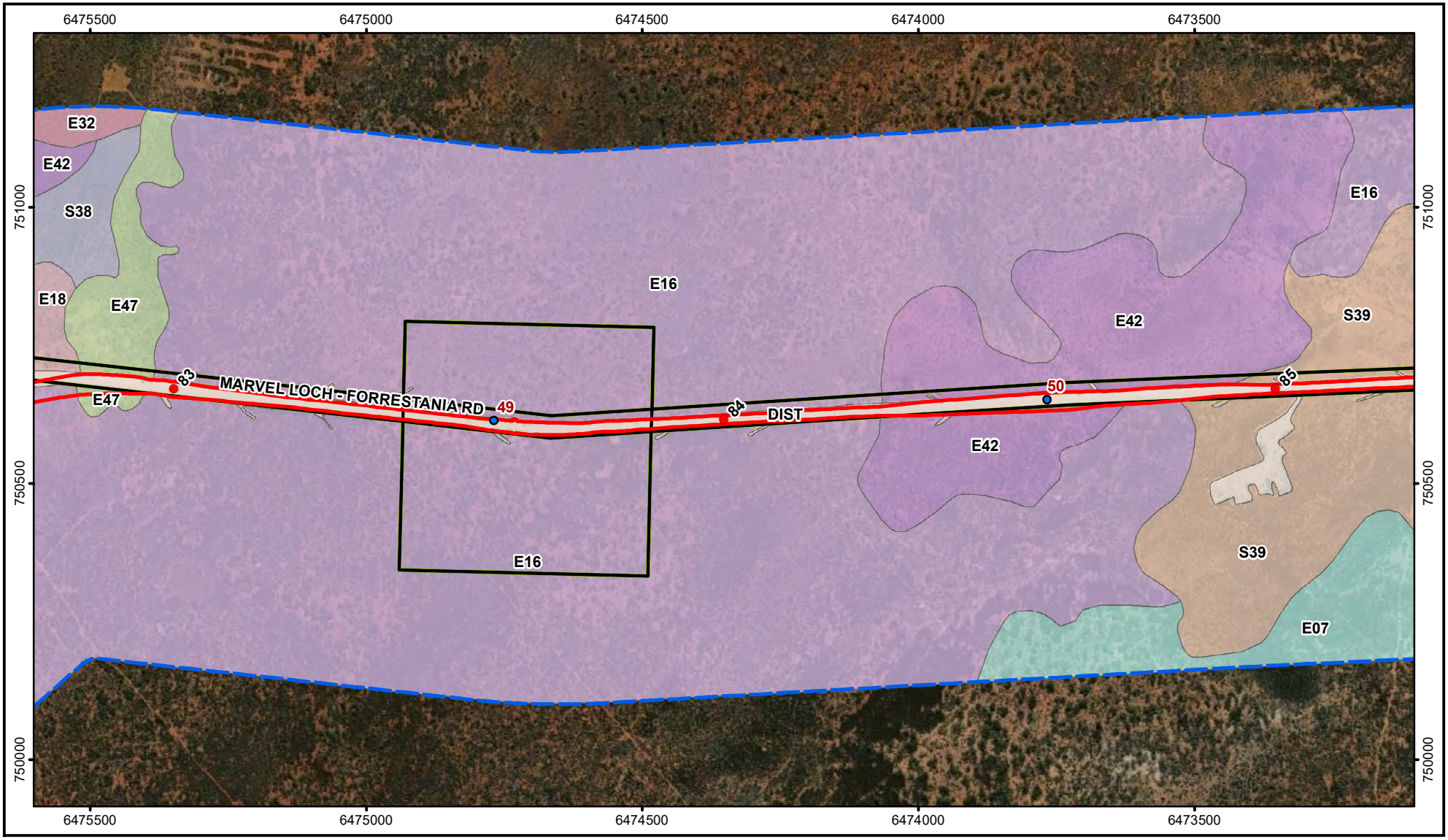
- DIST
- E16
- E18
- E32
- E42
- E47
- S38

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 83 km to 85 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

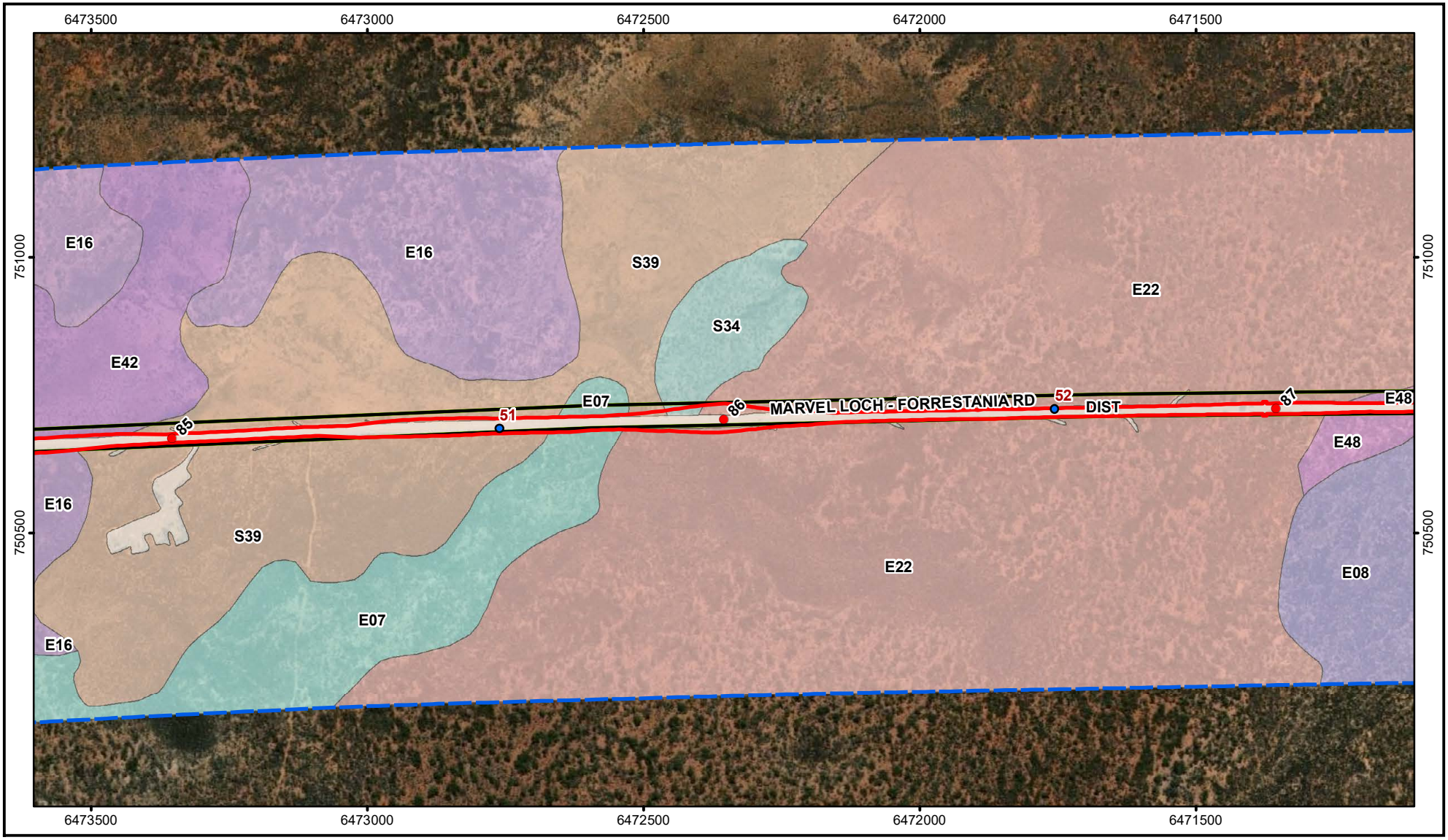
- DIST
- E07
- E16
- E18
- E32
- E42
- E47
- S38
- S39

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 85 km to 87 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
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For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

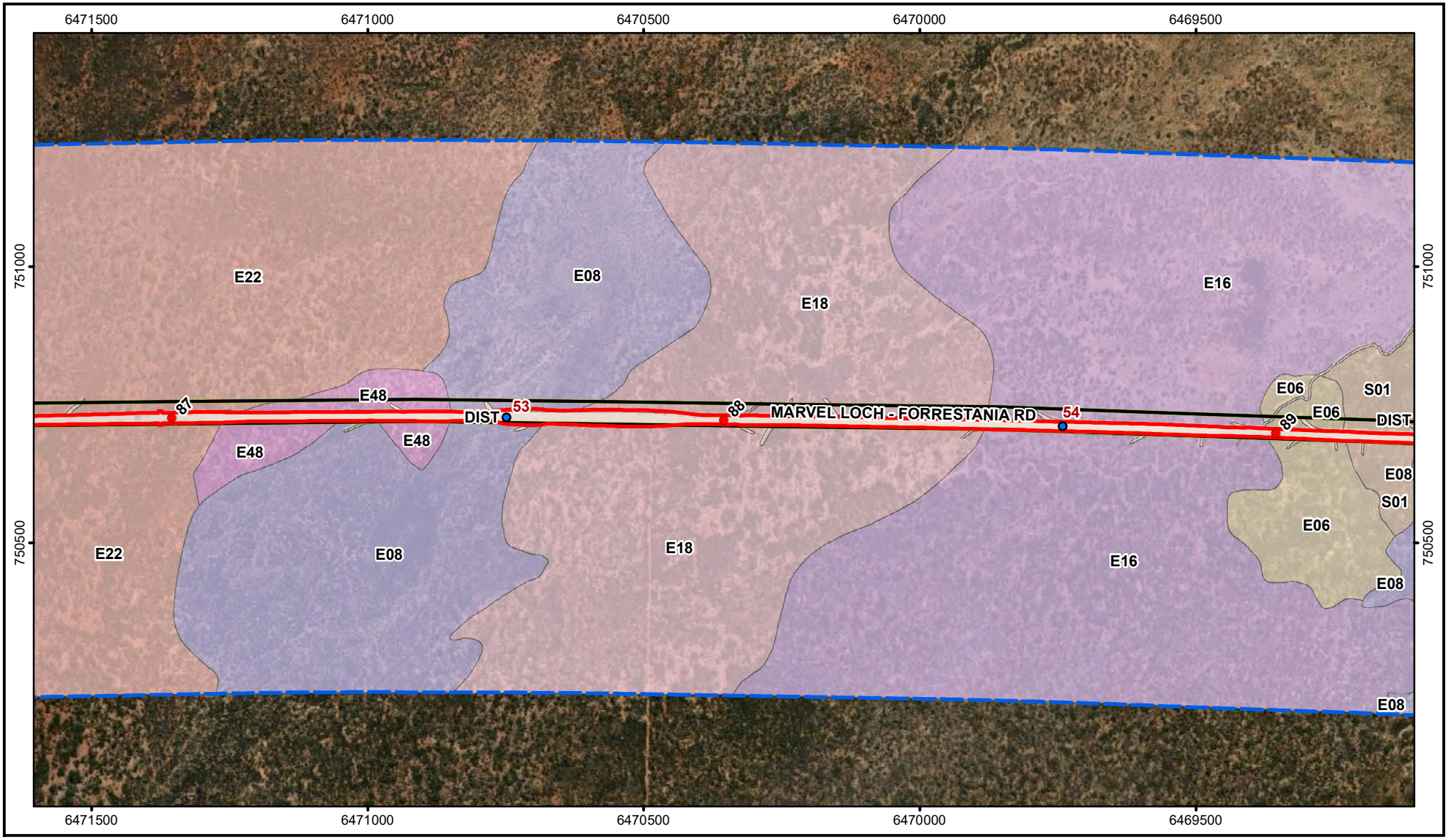
- DIST
- E07
- E08
- E16
- E22
- E42
- E48
- S34
- S39

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 87 km to 89 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
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For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

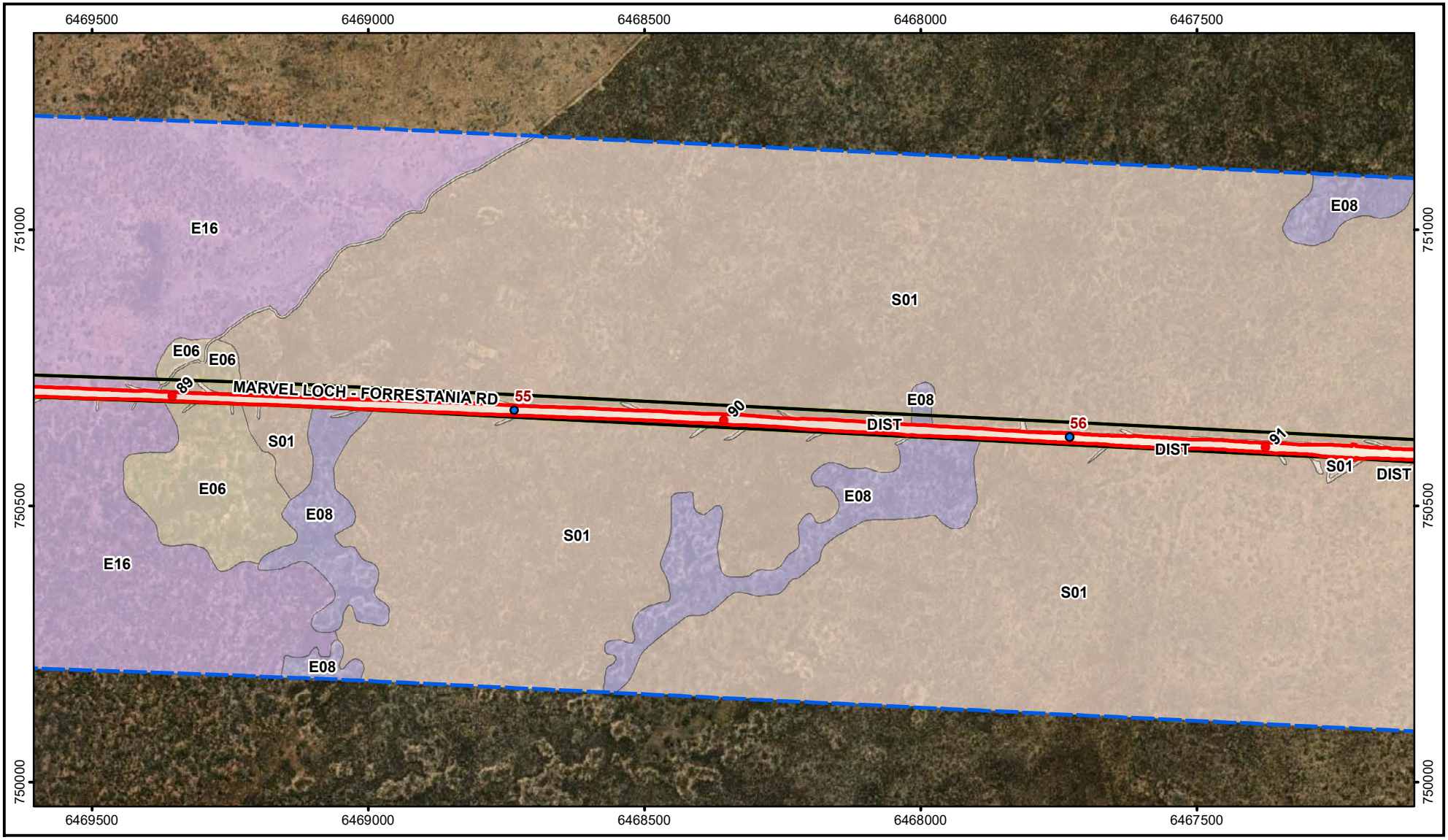
- DIST
- E06
- E08
- E16
- E18
- E22
- E48
- S01

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 89 km to 91 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
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For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

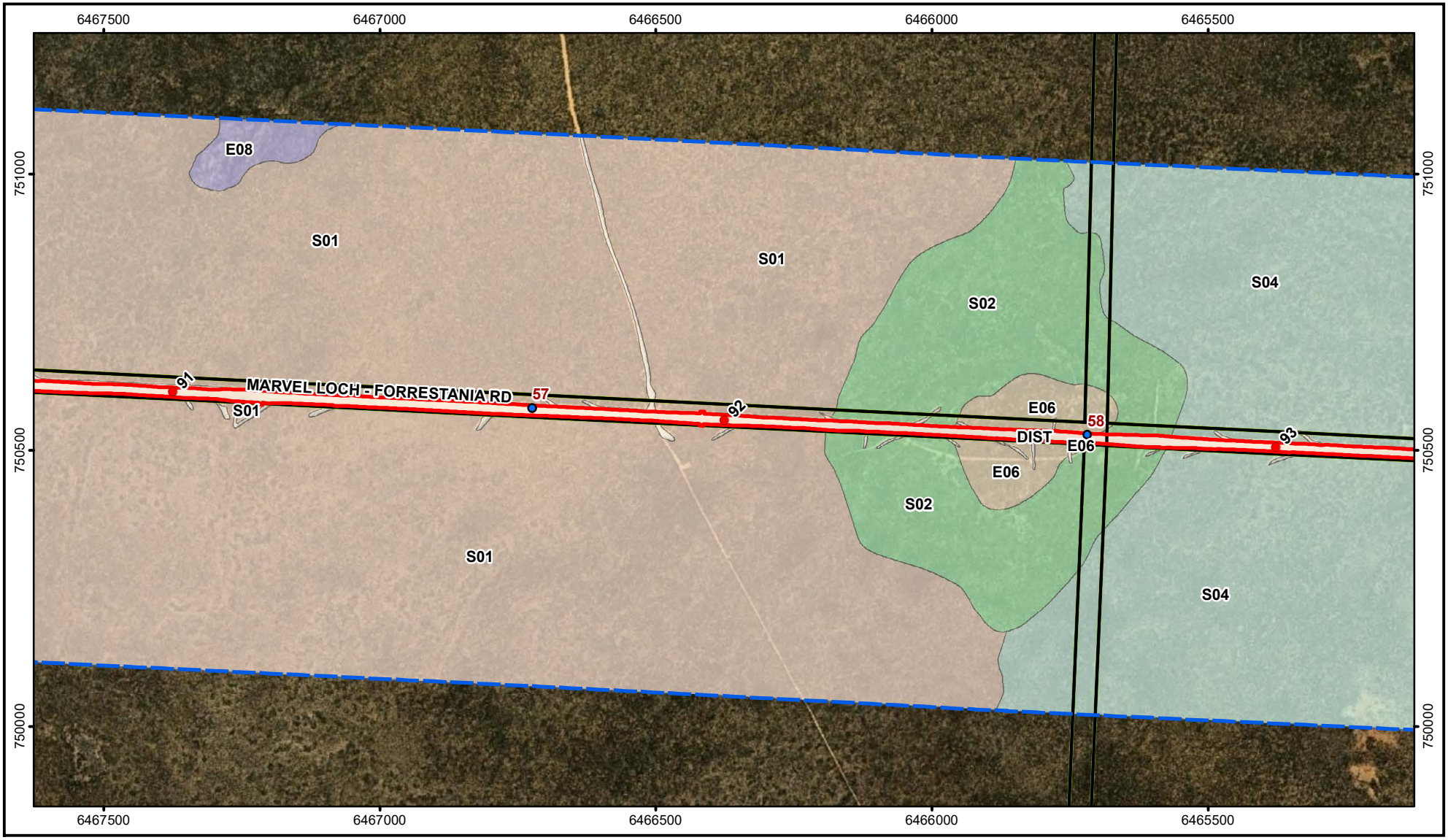
Veg Code E06 E16 DIST E08 S01

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 91 km to 93 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
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Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

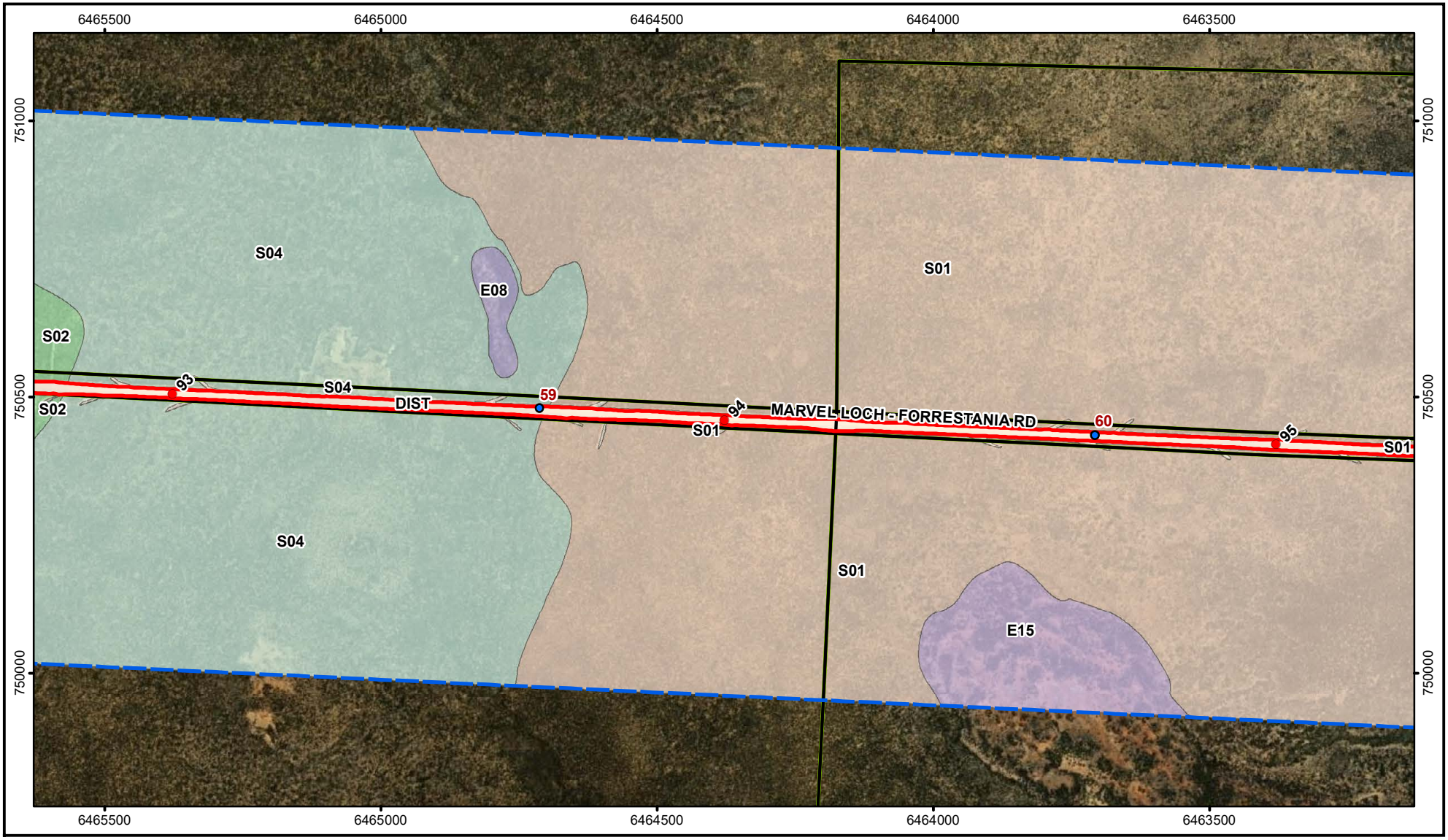
- E06
- DIST
- E08
- S01
- S02
- S04

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 93 km to 95 km - Vegetation

DRAFT



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Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
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Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

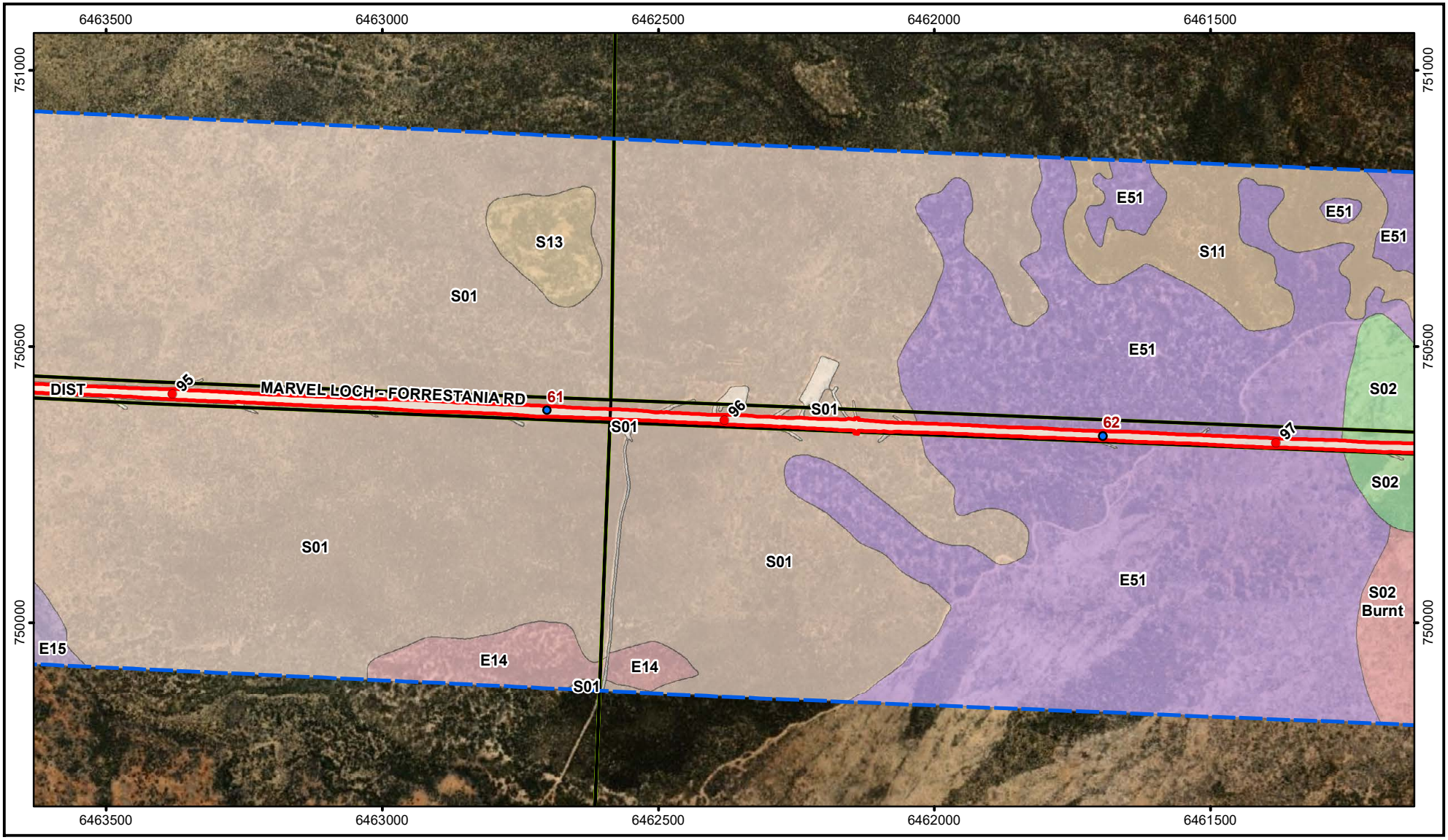
- E08
- S01
- DIST
- E15
- S02
- S04

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 95 km to 97 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

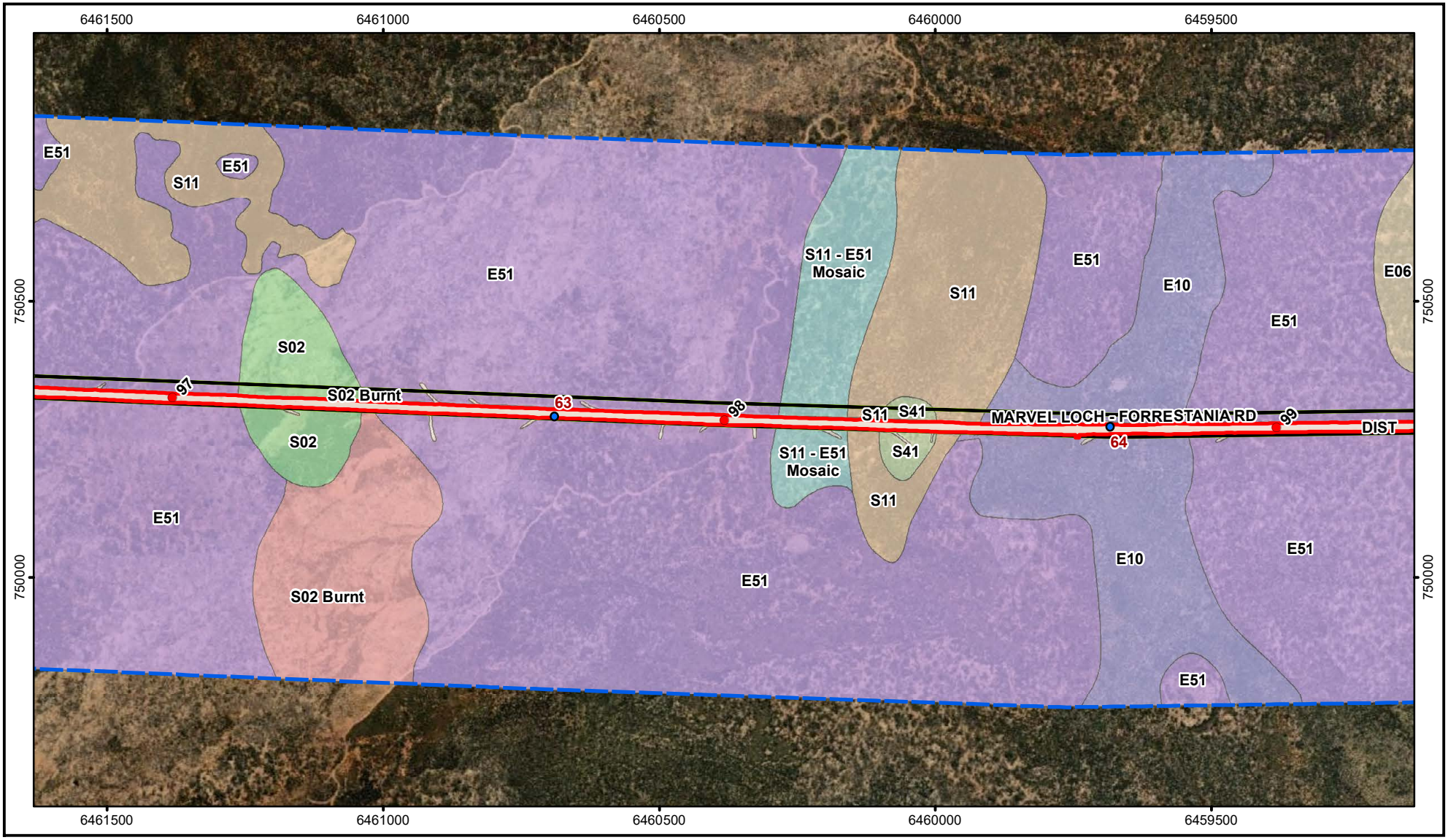
- DIST
- E14
- E15
- E51
- S01
- S02
- S02 Burnt
- S11
- S13

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 97 km to 99 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

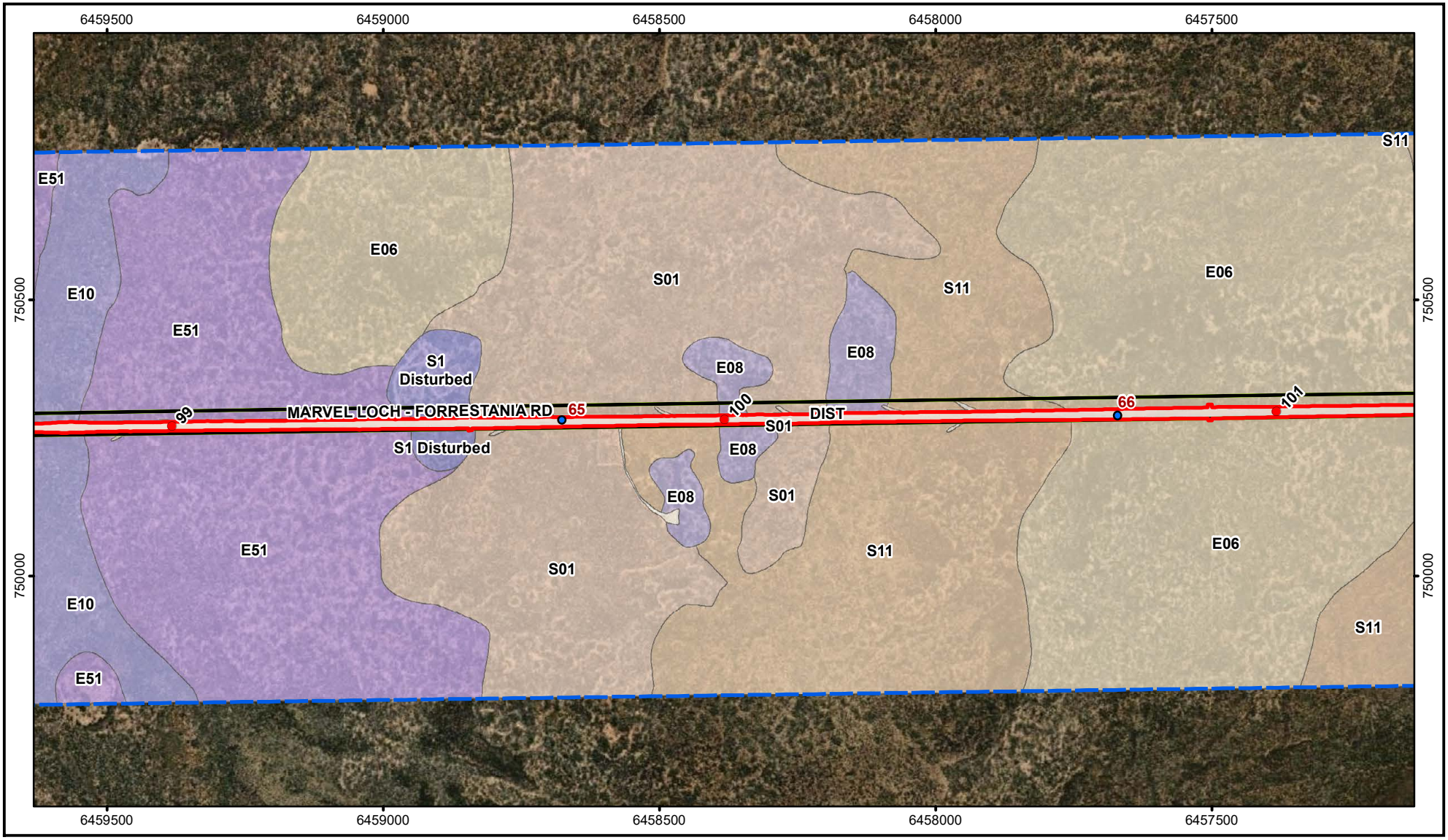
- DIST
- E06
- E10
- E51
- S02
- S02 Burnt
- S11
- S11 - E51 Mosaic
- S41

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 99 km to 101 km - Vegetation

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_02_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

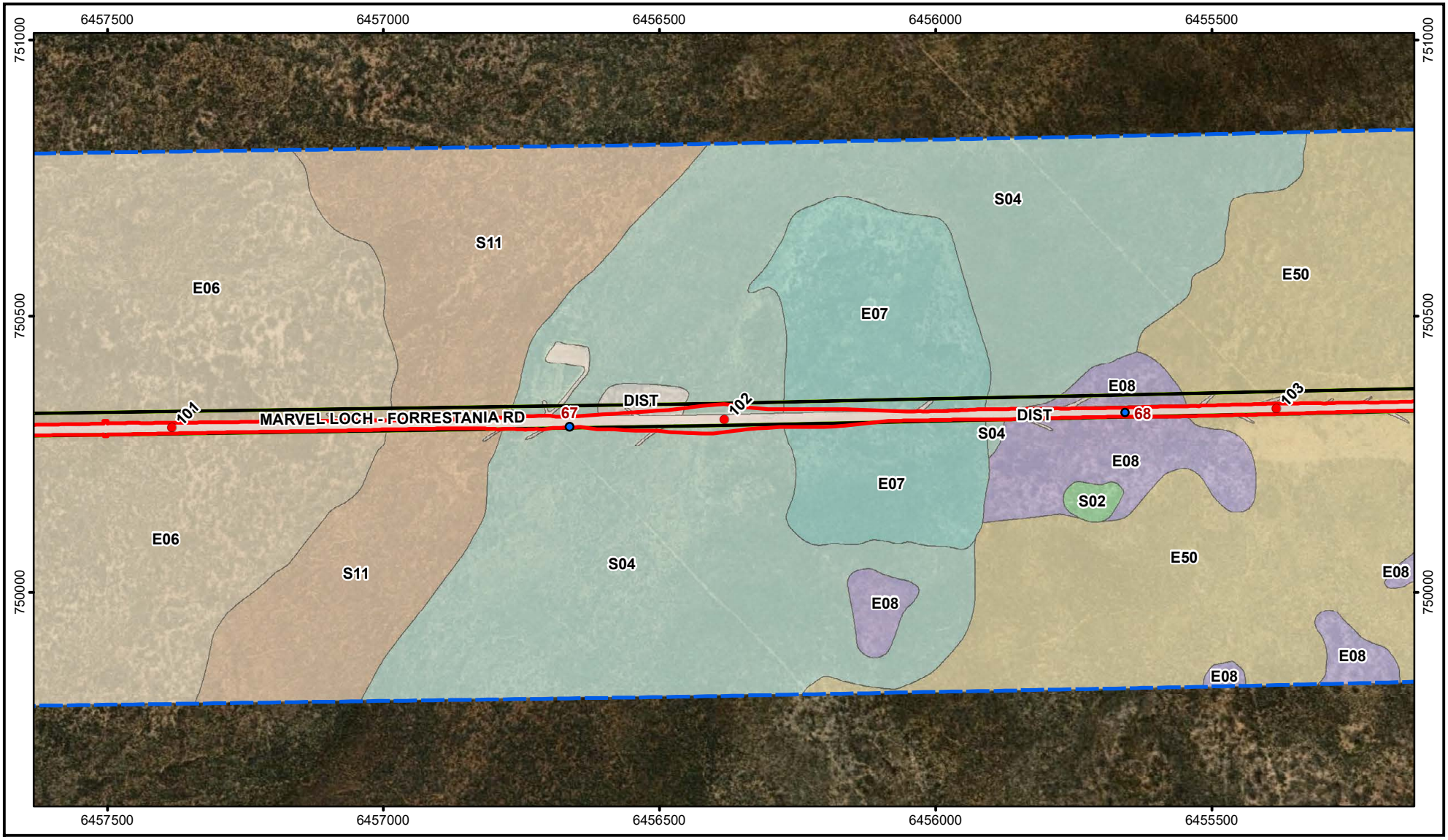
- DIST
- E06
- E08
- E10
- E51
- S01
- S1 Disturbed
- S11

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 101 km to 103 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

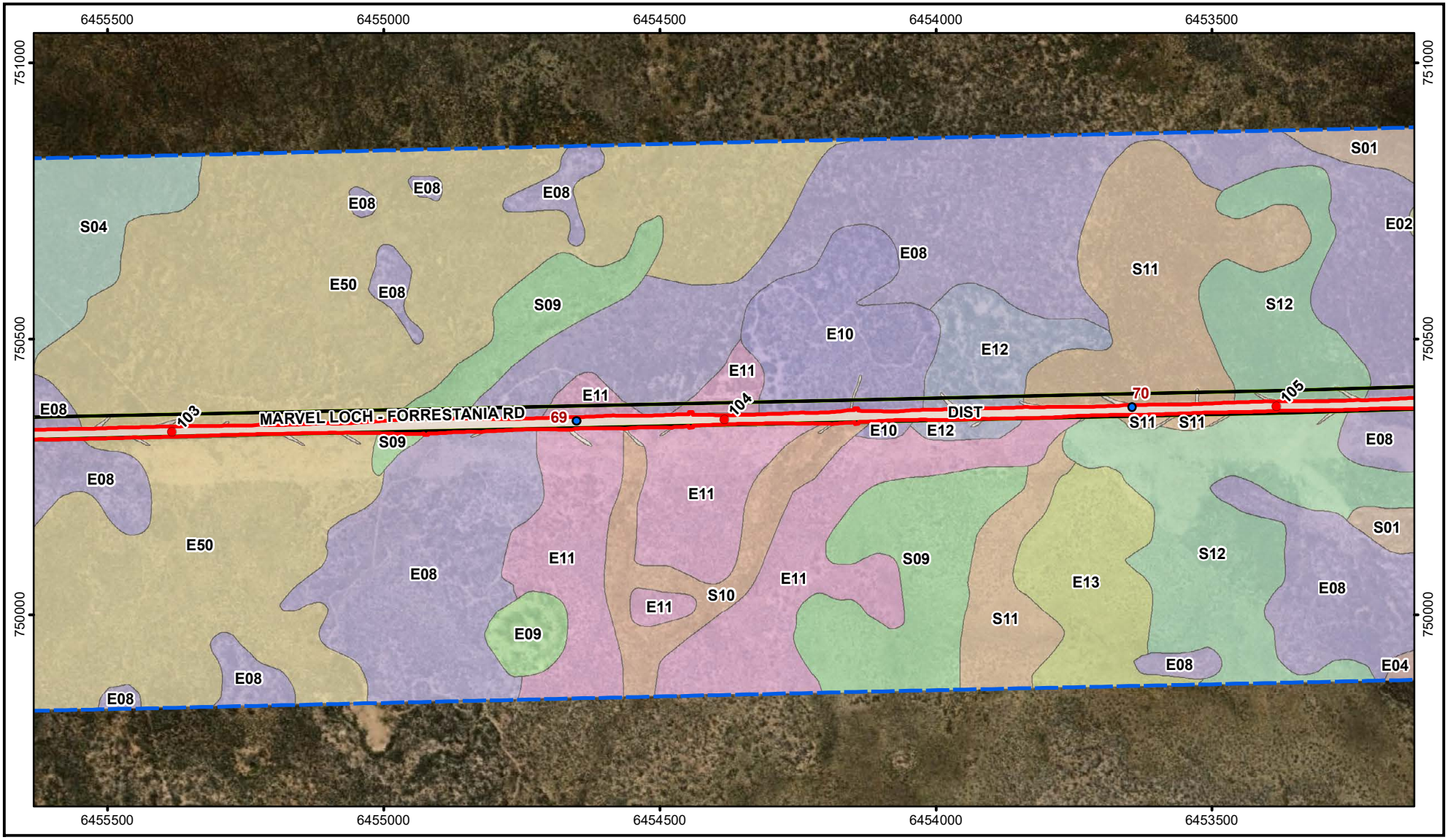
DIST, E06, E07, E08, E50, S02, S04, S11

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 103 km to 105 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

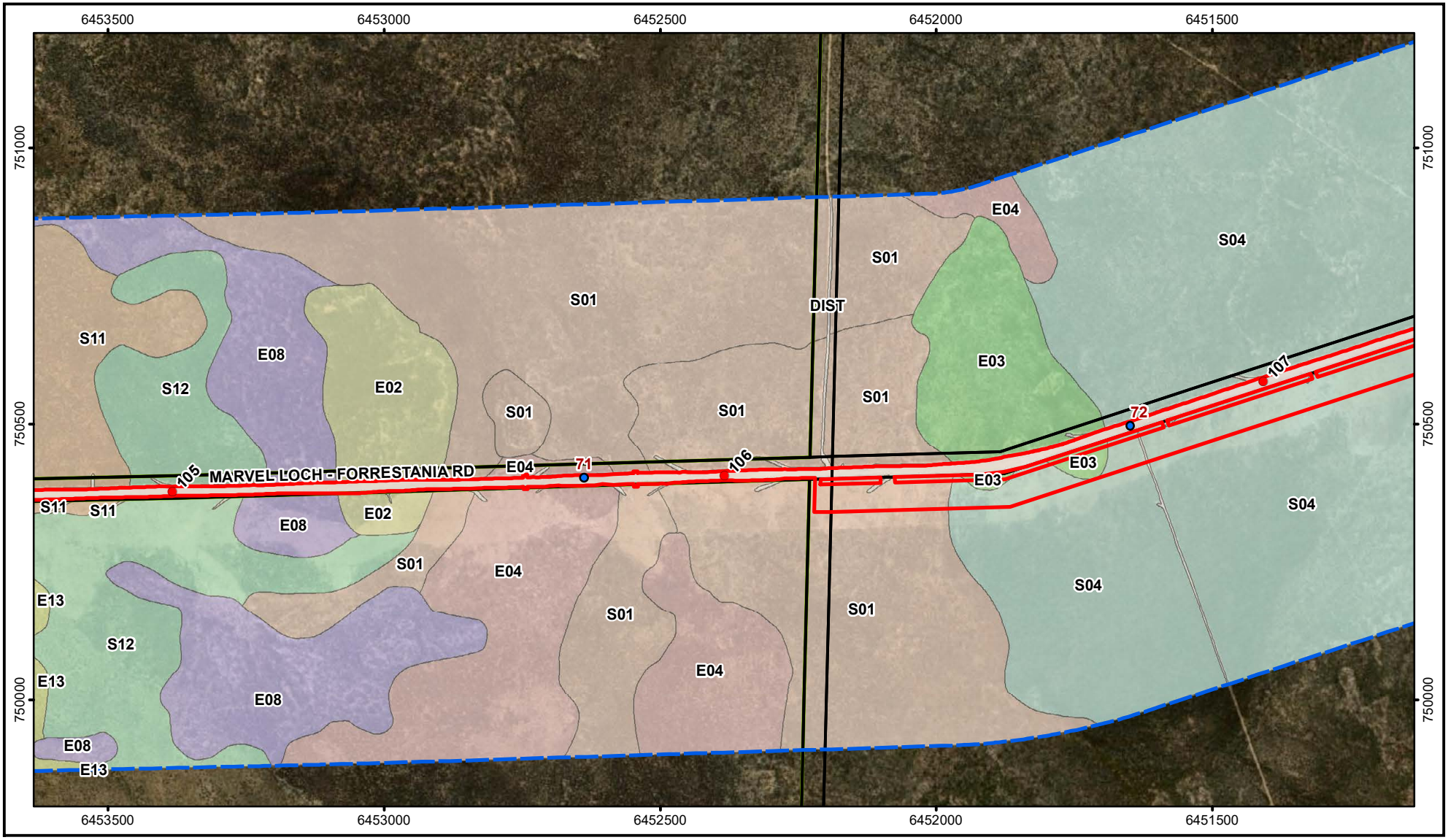
DIST, E02, E04, E08, E09, E10, E11, E12, E13, E50, S01, S04, S09, S10, S11, S12

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 105 km to 107 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- Cadastral Reserves

Veg Code

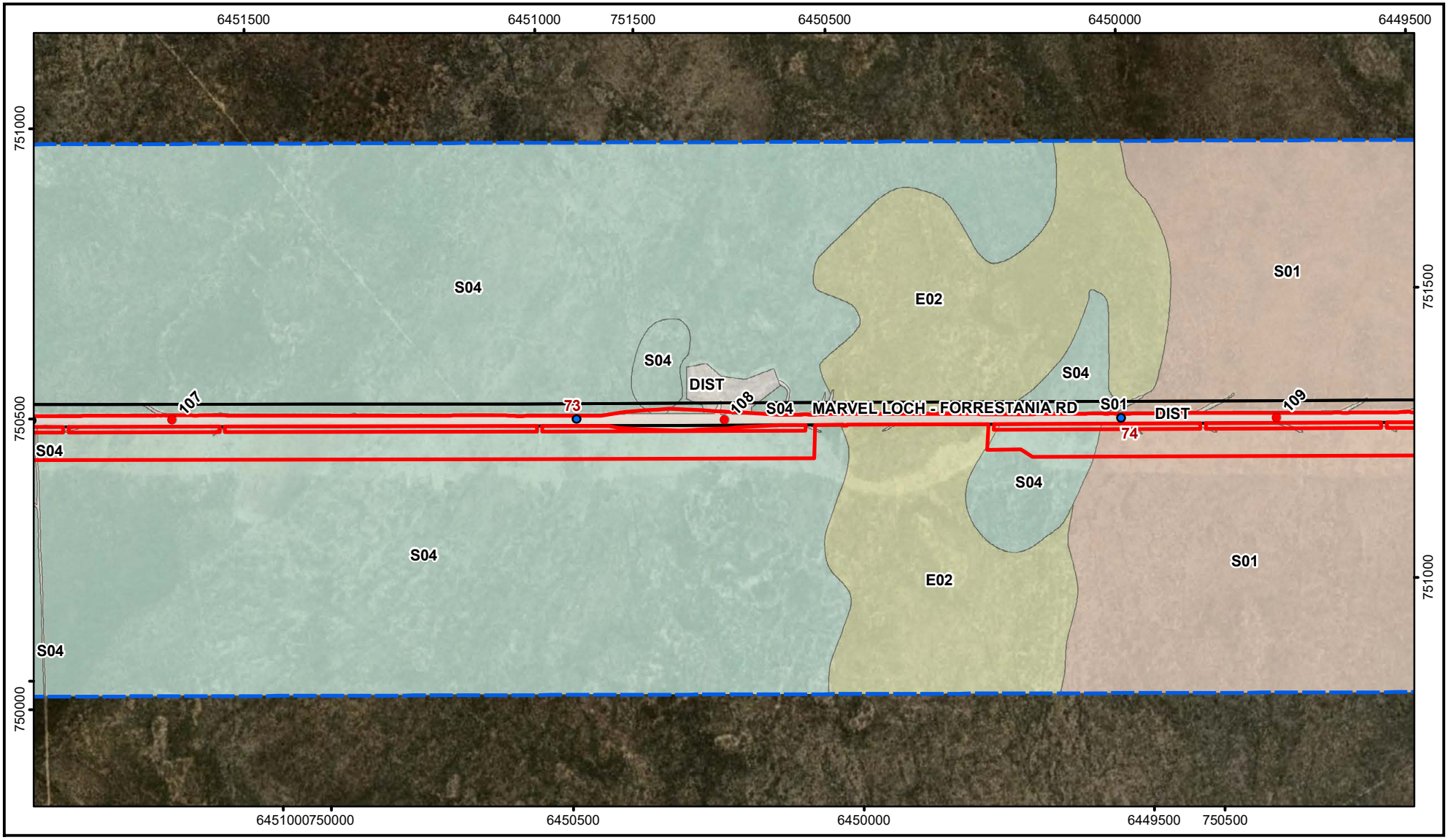
DIST, E02, E03, E04, E08, E13, S01, S04, S11, S12

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 107 km to 109 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

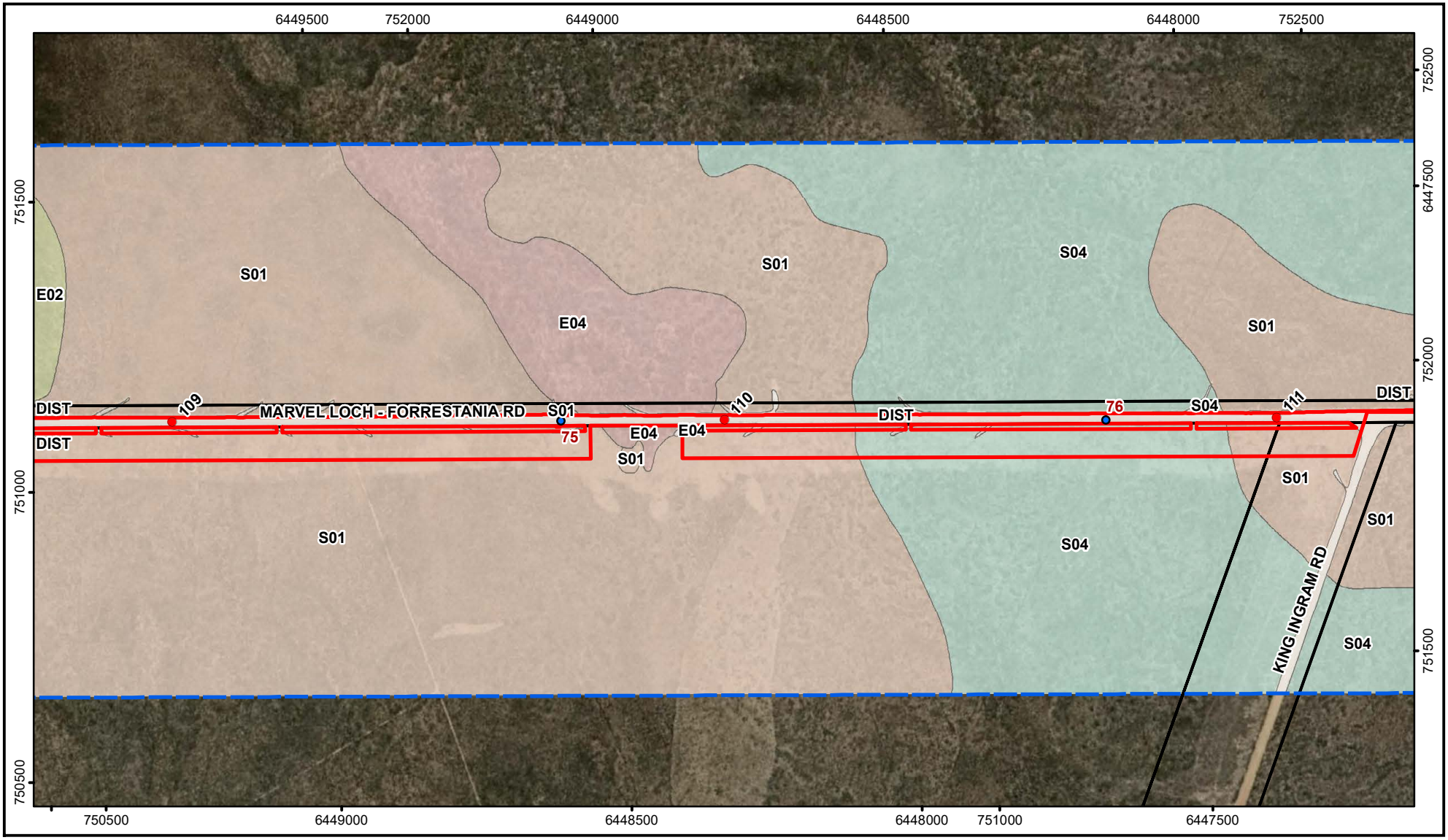
Veg Code
- E02
- S04
- DIST
- S01

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 109 km to 111 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Veg Code

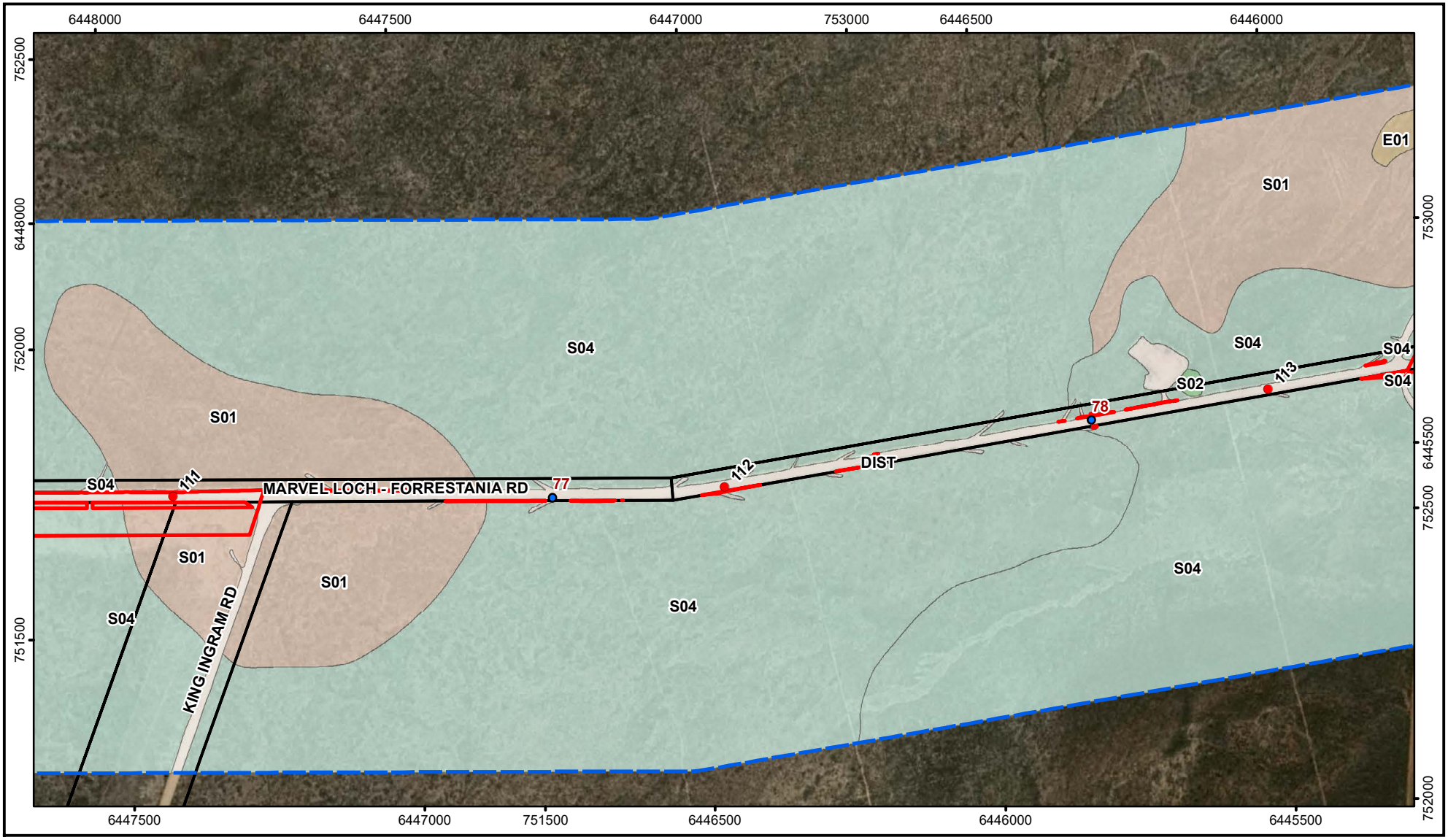
- E02
- S01
- DIST
- E04
- S04

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 111 km to 113 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

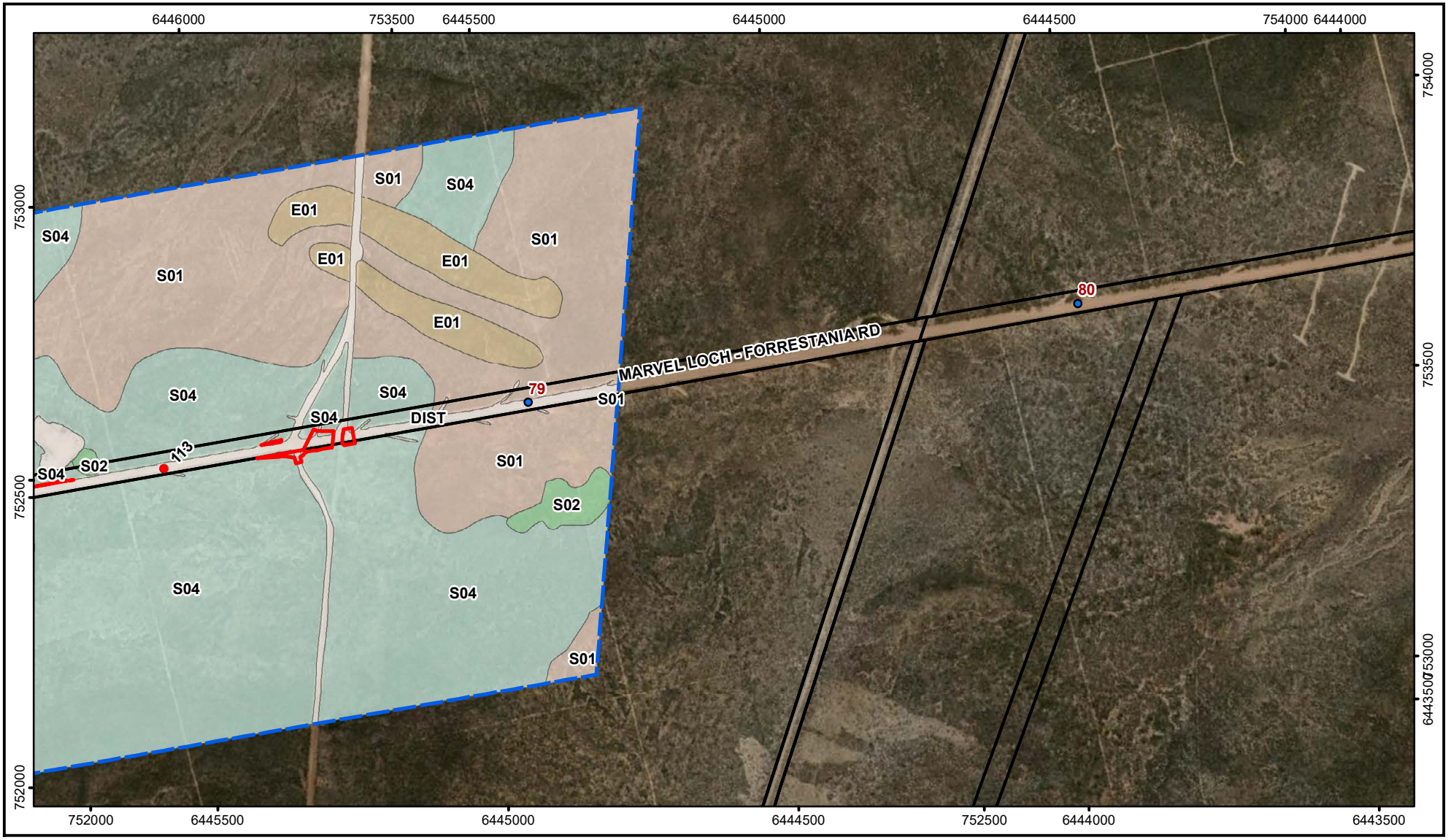
Veg Code
- E01
- S01
- S02
- S04
- DIST

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 113 km to 115 km - Vegetation

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within CPS 10049/1 - Cleared Land 88.86 ha, Land to be Cleared 30.57 ha
For detailed legend refer to report

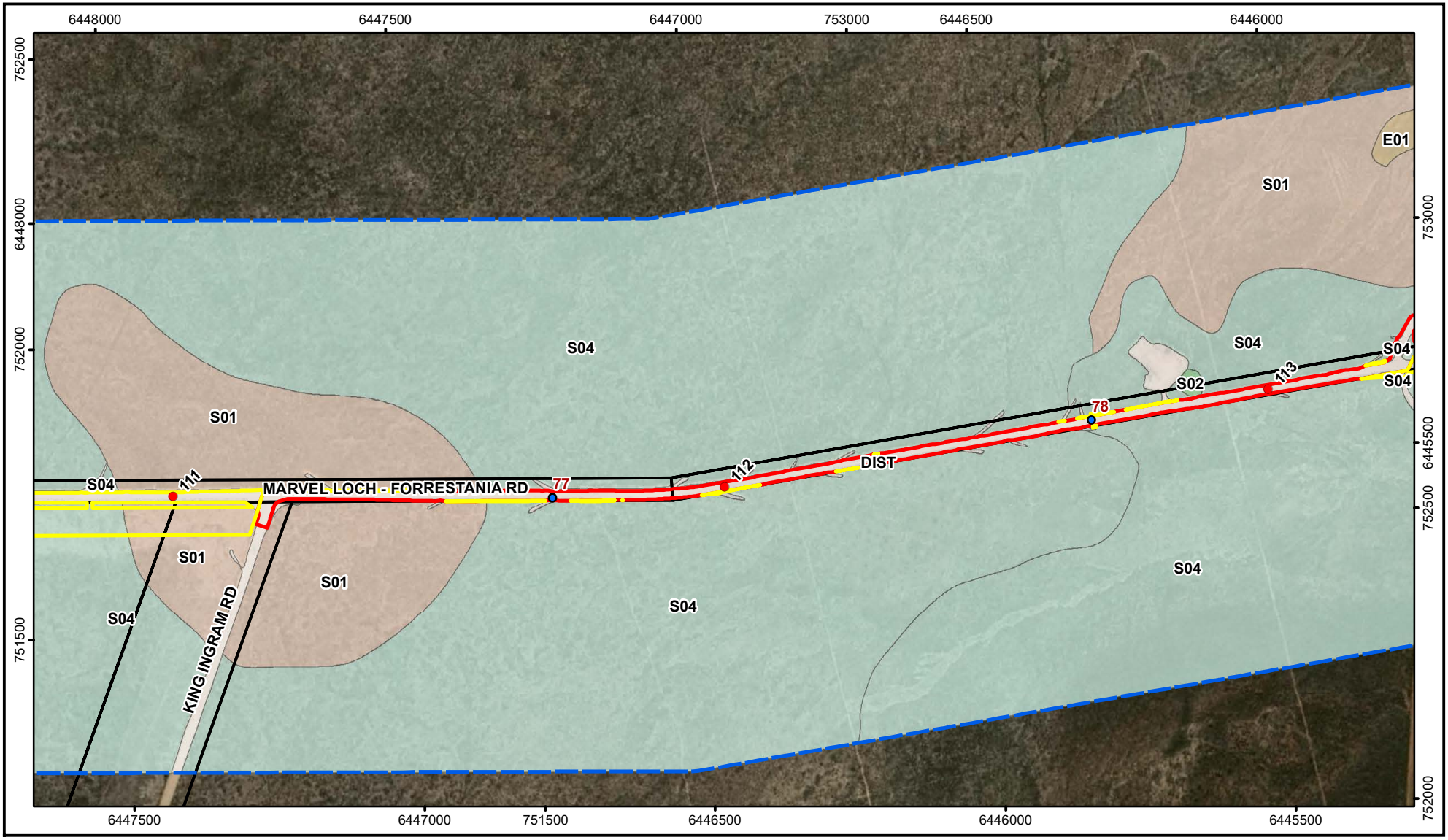
Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- **Veg Code**
- E01
- S01
- S02
- S04
- DIST

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
Ministerial Statement 1118 Interface - Chn 111 km to 113 km - Vegetation

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_02_03, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within Ministerial Statement - Cleared Land 3.84 ha, Land to be Cleared 0.17 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- MS 1118
- Survey Limit
- Cadasta Bdry

Veg Code

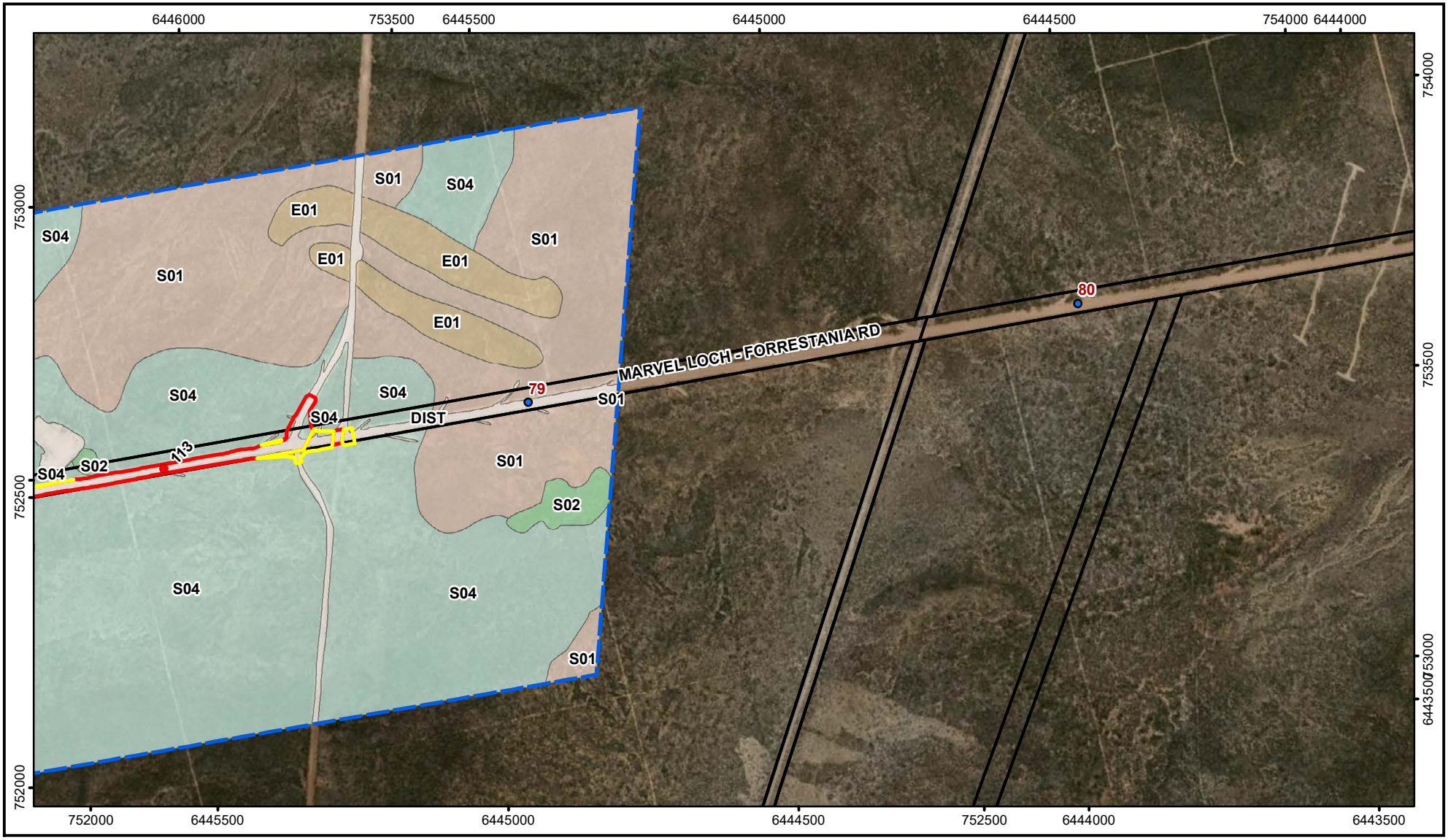
- S01
- DIST
- E01
- S02
- S04

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
Ministerial Statement 1118 Interface - Chn 113 km to 115 km - Vegetation

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_02_03, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
Total areas within Ministerial Statement - Cleared Land 3.84 ha, Land to be Cleared 0.17 ha
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- MS 1118
- Survey Limit
- Cadasta Bdry

Veg Code

- S01
- DIST
- S02
- E01
- S04

0 0.2 km

N

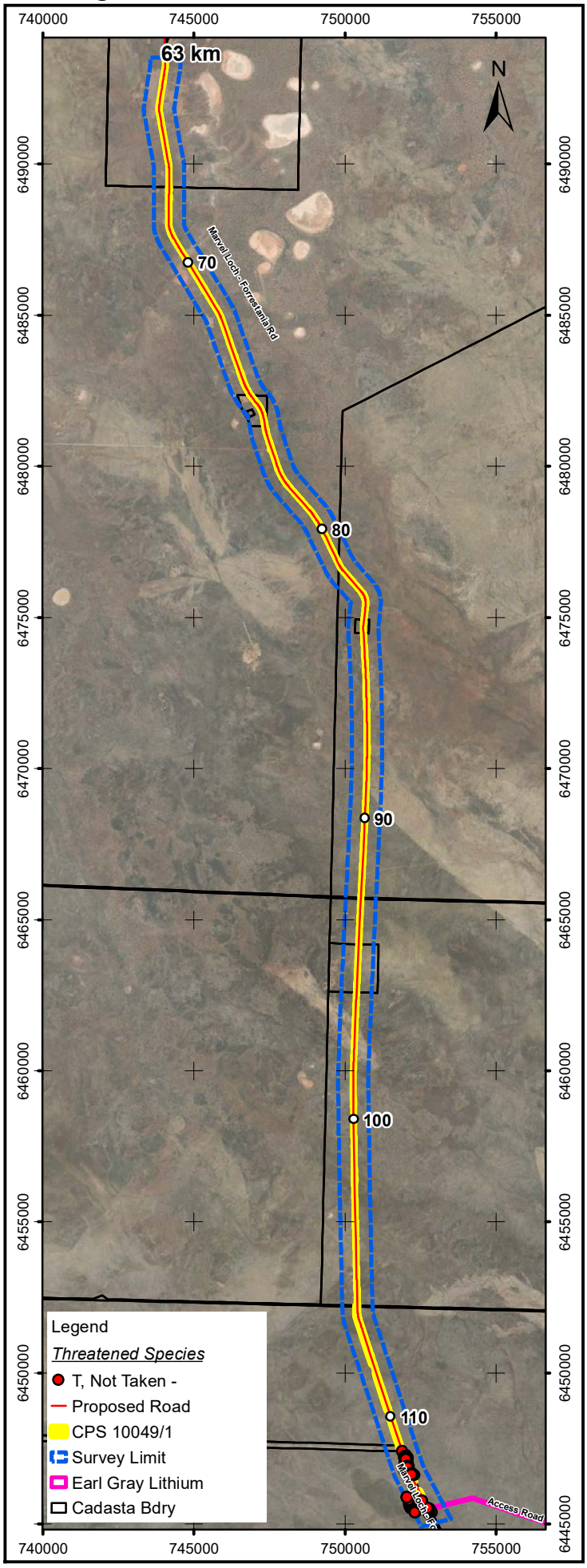
Appendix 5. Threatened Flora Maps of the Study Area

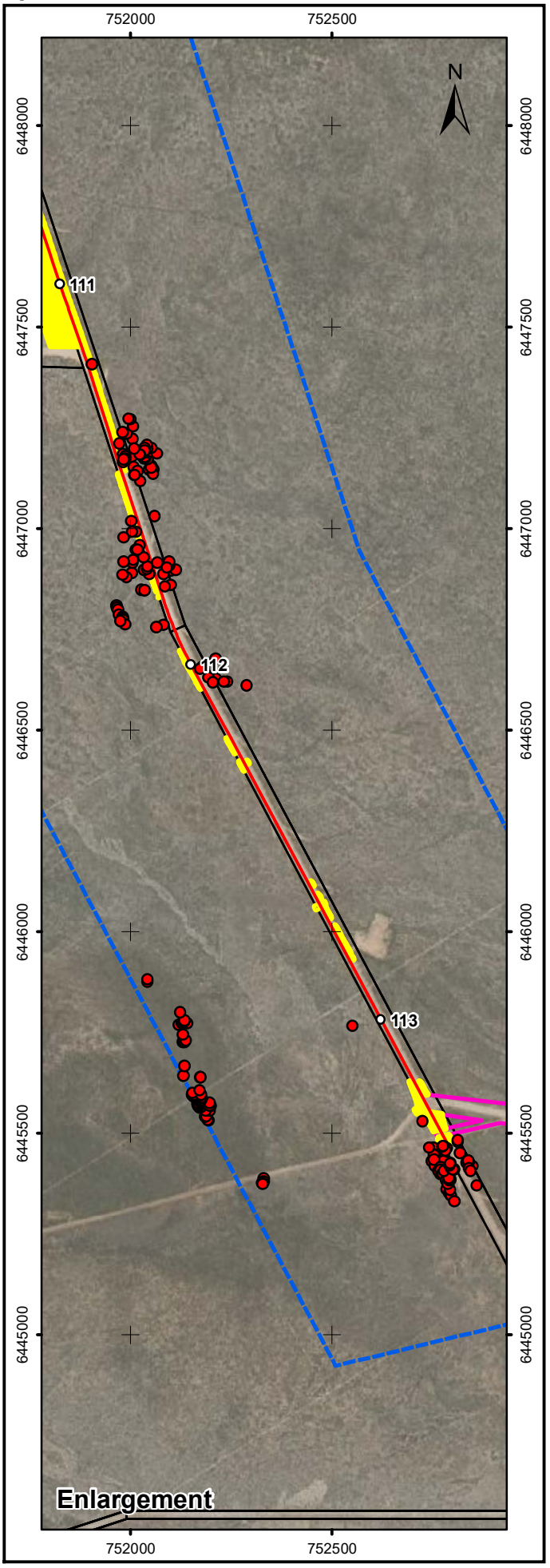
Legend – Threatened Flora

WA Cons Status	Abbreviation	Taxon Name
T	Bdo	*Banksia dolichostyla*
T	Eve	*Eremophila verticillata*
T	Est	*Eucalyptus steedmanii*

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
Clearing Permit CPS 10049/1 - Flora - Theatened Species

DRAFT





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Scale 1:200,000 (left panel), 1:15,000 (right panel), A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER

Appendix 6. Priority Flora maps of the Study Area

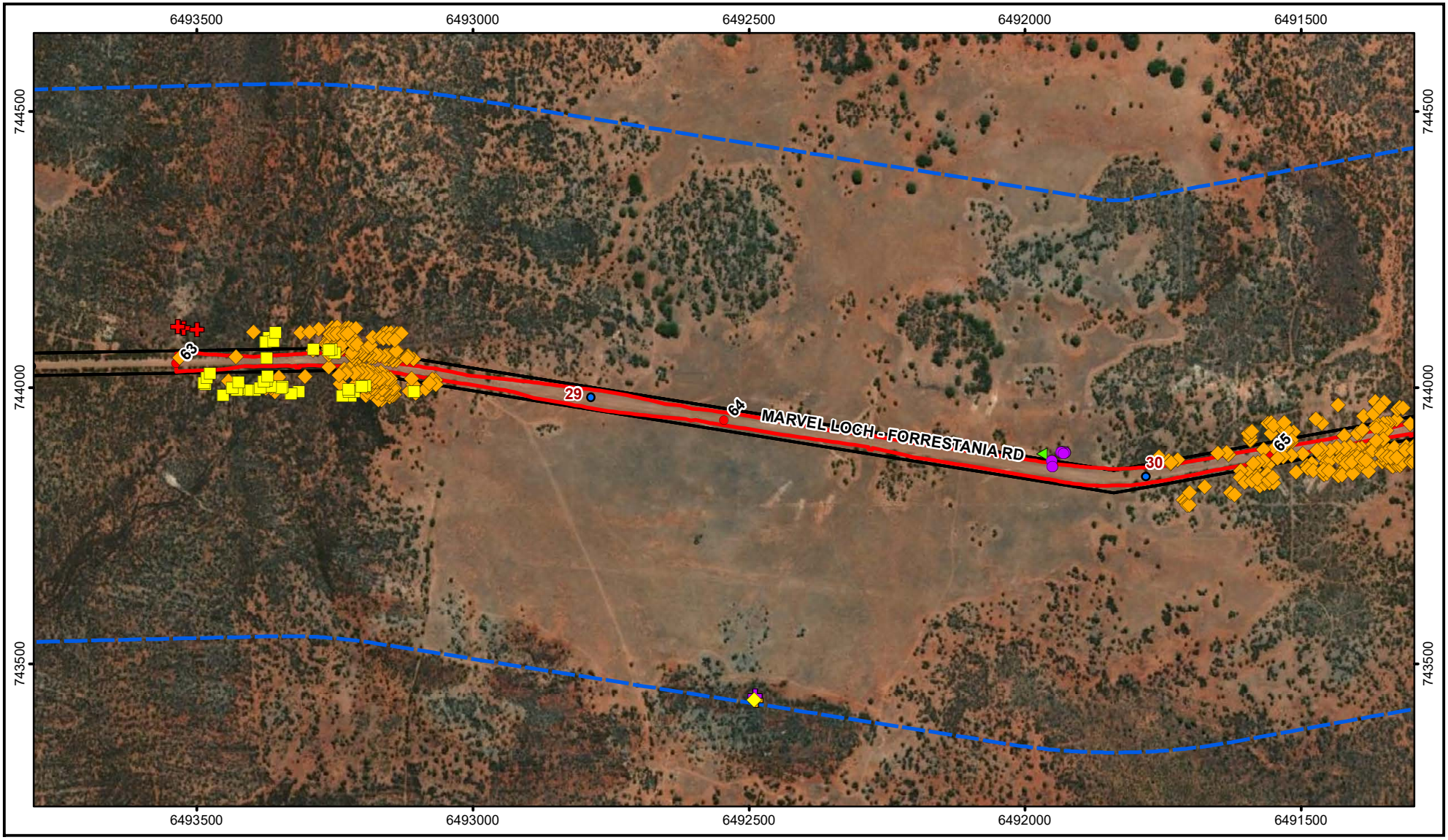
Legend – Priority Flora

WA Cons Status	Abbreviation	Taxon Name
P1	Ala	*Acacia lachnocarpa*
P1	Afo	*Acacia* sp. Forrestania (D. Angus DA 3001)
P1	Ahy	*Alyogyne* sp. Hyden (G. Durell 127)
P1	Bcr	*Balaustion grandibracteaum* subsp. *juncturum* P2 (formerly *Baeckea* sp. *Crossroads* (B.L. Rye & M.E. Trudgen 241186) P1)
P1	Bst	*Brachyloma stenolobum*
P1	Cmh	*Chamelaucium* sp. Mt Holland (G. Cockerton & G. Grigg 780) currently curated within *Chamelaucium* sp. Parker Range ((B.H. Smith 1255) P1
P1	Cpr	*Chamelaucium* sp. Parker Range (B.H. Smith 1255)
P1	Cye	*Cryptandra exserta*
P1	Dca	*Dicrastylis capitellata*
P1	Dwi	*Drummondita wilsonii*
P1	Euc	*Eucalyptus calycogona* subsp *miraculum*
P1	Edr	*Eucalyptus* sp. Dunbar Road (D. Nicolle & M. French DN 5466)
P1	Eni	*Eutaxia* sp. North Ironcap (P. Armstrong PA 06/898)
P1	Gha	*Gastrolobium hians*
P1	Gli	*Grevillea lissopleura*
P1	Gma	*Grevillea marriottii*
P1	Hen	*Hemigenia* sp. Newdegate (E. Bishop 75)
P1	Hmh	*Hibbertia* sp. Mt Holland (B. Ellery BE 1437)
P1	Htu	*Hibbertia tuberculata*
P1	Lro	*Labichea rossii*
P1	Lja	*Lepidosperma* sp. ?*jacksonense* (P1) GC-021
P1	Meg	*Melaleuca grieveana*
P1	Mec	*Melichrus* sp. Coolgardie (K.R. Newbey 8698)
P1	Mie	*Microcorys elatoides*
P1	Mih	*Microcorys* sp. Mt Holland broad-leaf (G. Barrett s.n. PERTH 04104927)
P1	Mip	*Microcorys* sp. Parker Range (C. Hancock s.n. PERTH 09215123)
P1	Pmt	*Phebalium* sp. Mt Gibbs (G.F. Craig 6658)
P1	Rfb	*Rinzia fimbriolata*
P1	Rmd	*Rinzia medifila*
P1	Sva	*Stylidium validum*
P1	Tsa	*Thryptomene salina*
P1	Thy	*Thryptomene* sp. Hyden (B.J. Lepschi & L.A. Craven 4477)
P2	Aas	*Acacia asepala*
P2	Aco	*Acacia concolorans*
P2	Bgj	*Balaustion grandibracteatum* subsp. *juncturum*
P2	Dor	*Dampiera orchardii*
P2	Dsr	*Daviesia sarissa* subsp. *redacta*
P2	Euh	*Eutaxia hirsuta*
P2	Eul	Eutaxia lasiocalyx

WA Cons Status	Abbreviation	Taxon Name
P2	Hpe	*Halgania* sp. Peak Eleanora (M.A. Burgman 3547 B)
P2	Lme	*Lepidium merrallii*
P2	Lyl	*Leucopogon* sp. Yellowdine (M. Hislop & F. Hort MH 3194)
P2	Lna	*Logania nanophylla*
P2	Meo	*Melaleuca ochroma*
P2	Oll	*Olearia laciniifolia*
P2	Ore	*Orianthera exilis*
P2	Pys	*Phebalium* sp. Yerilgee Sandplain (J. Jackson 223)
P2	Vms	*Verticordia multiflora* subsp. solox
P2 or P3	Bgi	*Balaustion grandibracteatum* subsp. INDET
P3	Acr	*Acacia crenulata*
P3	Aun	*Acacia undosa*
P3	Bgg	*Balaustion grandibracteatum subsp. grandibracteatum*
P3	Btp	*Boronia ternata var. promiscua*
P3	Cci	*Chorizema circinale*
P3	Cyc	*Cryptandra crispula*
P3	Eex	*Eucalyptus exigua*
P3	Epo	*Eucalyptus polita*
P3	Eus	*Eutaxia acanthoclada*
P3	Gci	*Gompholobium cinereum*
P3	Hap	*Hakea pendens*
P3	Hib	*Hibbertia glabriuscula*
P3	Mid	*Mirbelia densiflora*
P3	Noi	*Notisia intonsa*
P3	Phd	*Phebalium drummondii*
P3	Prn	*Prostanthera nanophylla*
P3	Rto	*Rinzia torquata*
P3	Rtr	*Rinzia triplex*
P3	Sad	*Seringia adenogyna*
P3	Sse	*Stylidium sejunctum*
P3	Tdi	*Teucrium diabolicum*
P3	Vgr	*Verticordia gracilis*
P3	Vmi	*Verticordia mitodes*
P3	Vst	*Verticordia stenopetala*
P4	Bsh	*Banksia shanklandiorum*
P4	Ebi	*Eremophila biserrata*
P4	Ecm	*Eremophila caerulea subsp. merrallii*
P4	Ein	*Eremophila inflata*
P4	Gne	*Grevillea neodissecta*
P4	Gyd	*Gyrostemon ditrigynus*
P4	Mif	*Microcorys* sp. Forrestania (V. English 2004)
P4	Myp	*Myriophyllum petraeum*
P4	Sbr	*Stenanthemum* aff. *bremerense* (WB40845)
P4	Wb	*Wurmbea murchisoniana*

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 63 km to 65 km - Flora - Priority Species

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

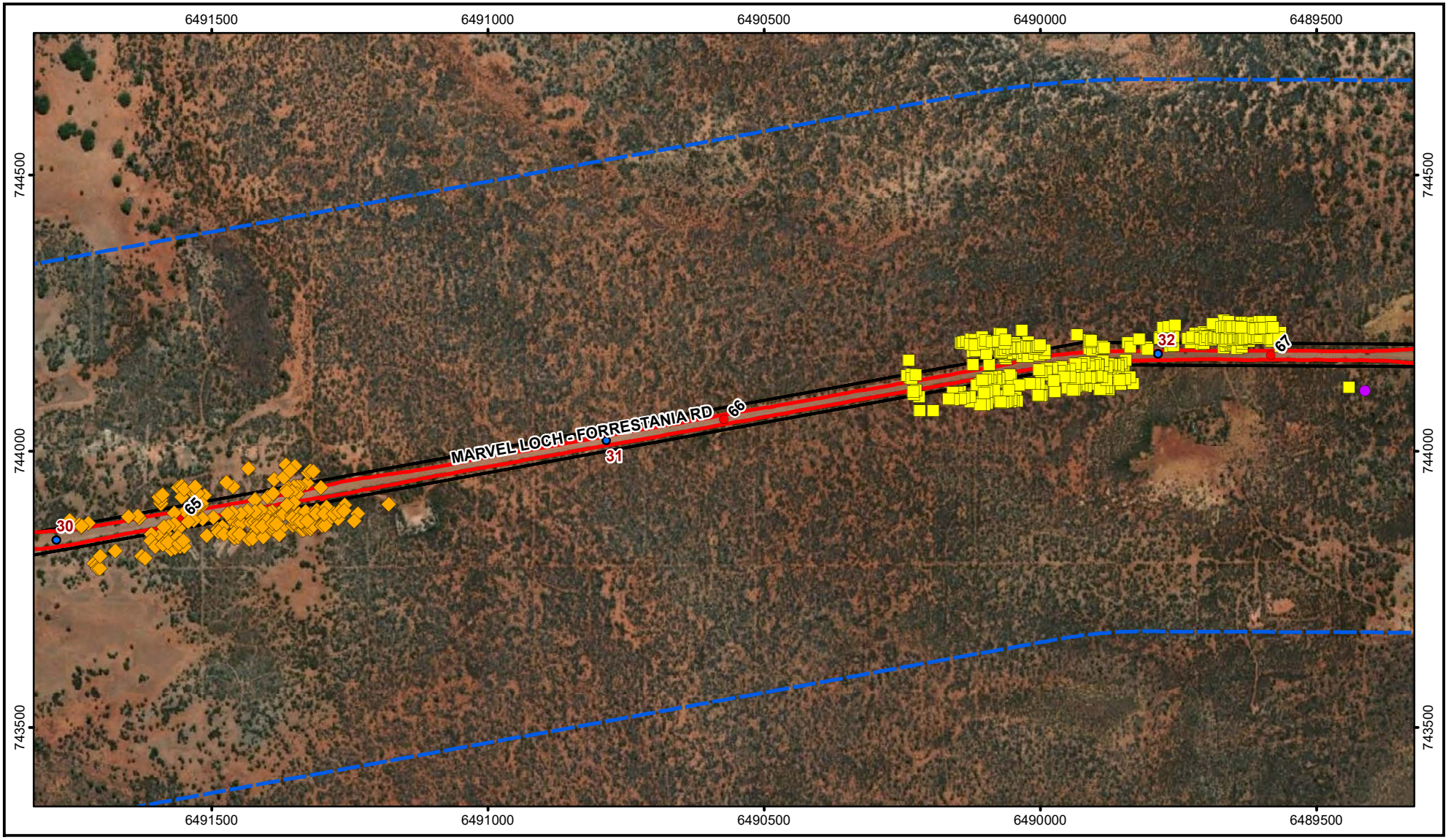
- P1, Edr
- P1, Hen
- P1, Meg
- P1, Rmd
- P2, Aas
- P2, Aco
- P2, Eul
- P3, Epo

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 65 km to 67 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

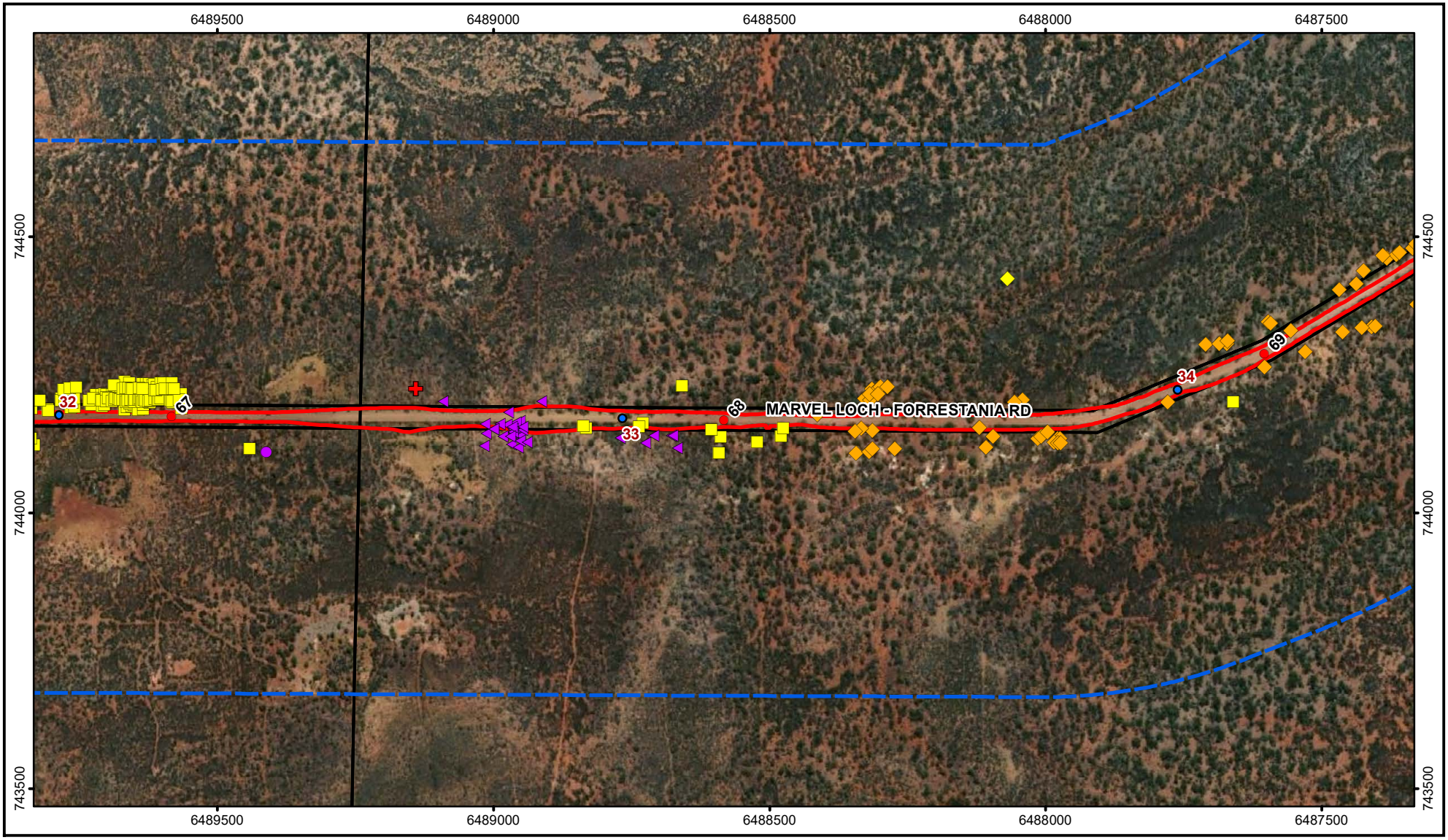
Legend
- Centreline Chainage
- *Priority Species*
- P1, Edr
- P2, Aas
- P2, Eul
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 67 km to 69 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

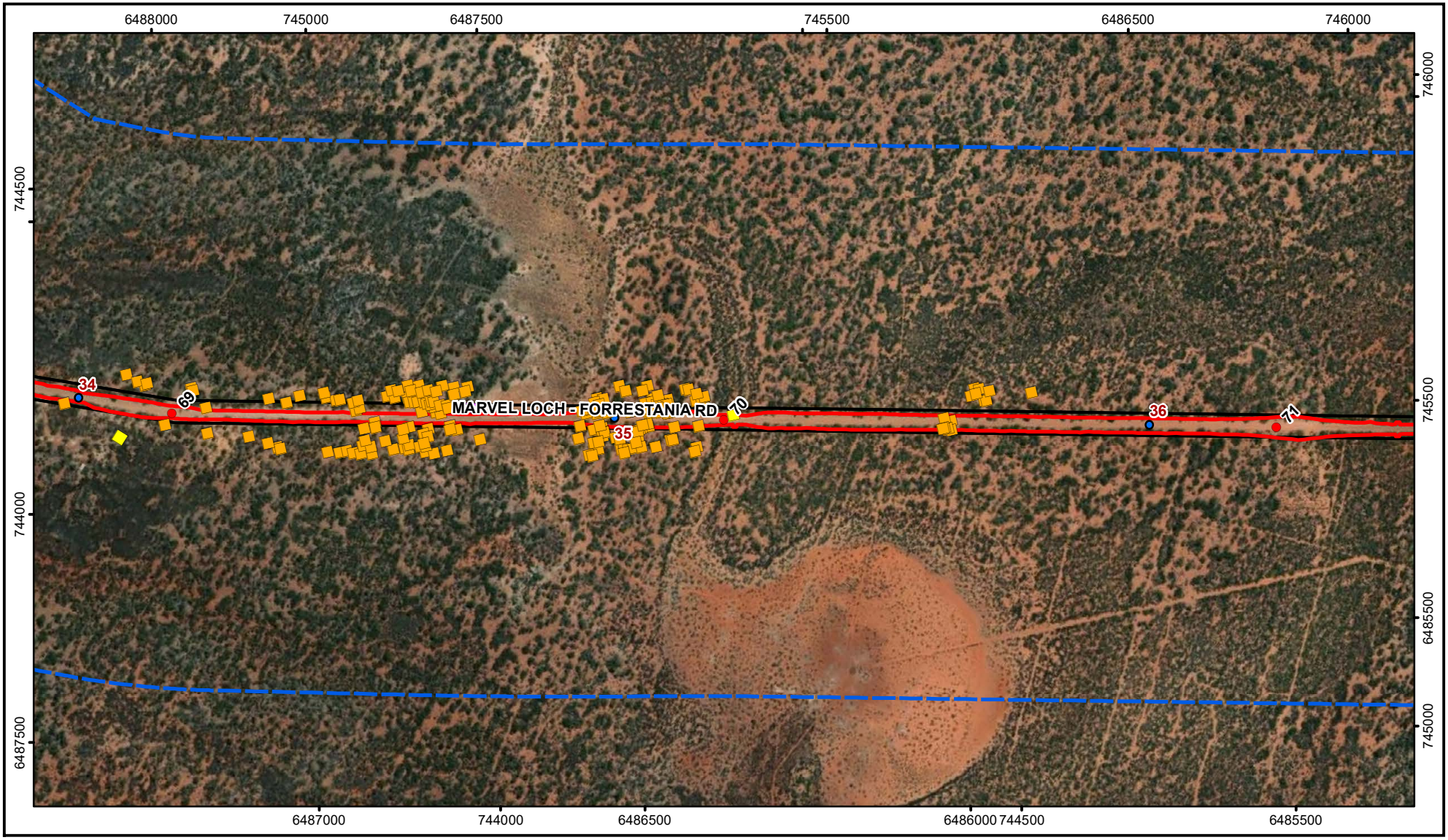
Priority Species
- P1, Meg
- P1, Edr
- P2, Aco
- P2, Aas
- P3, Hap
- P2, Eul

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 69 km to 71 km - Flora - Priority Species

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

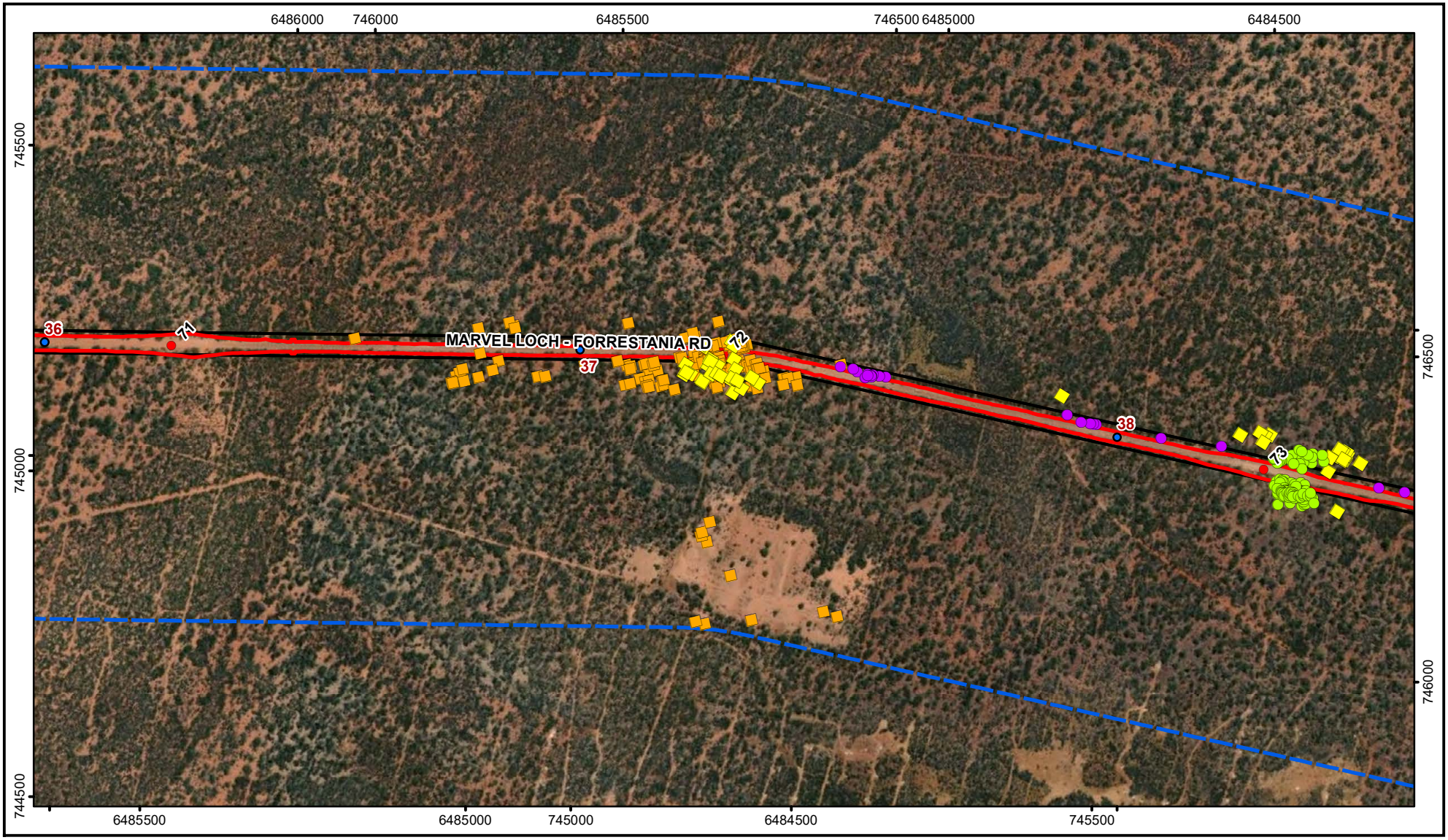
Priority Species
- P2, Aas
- P2, Aco
- P2, Eul
- P3, Hap

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 71 km to 73 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

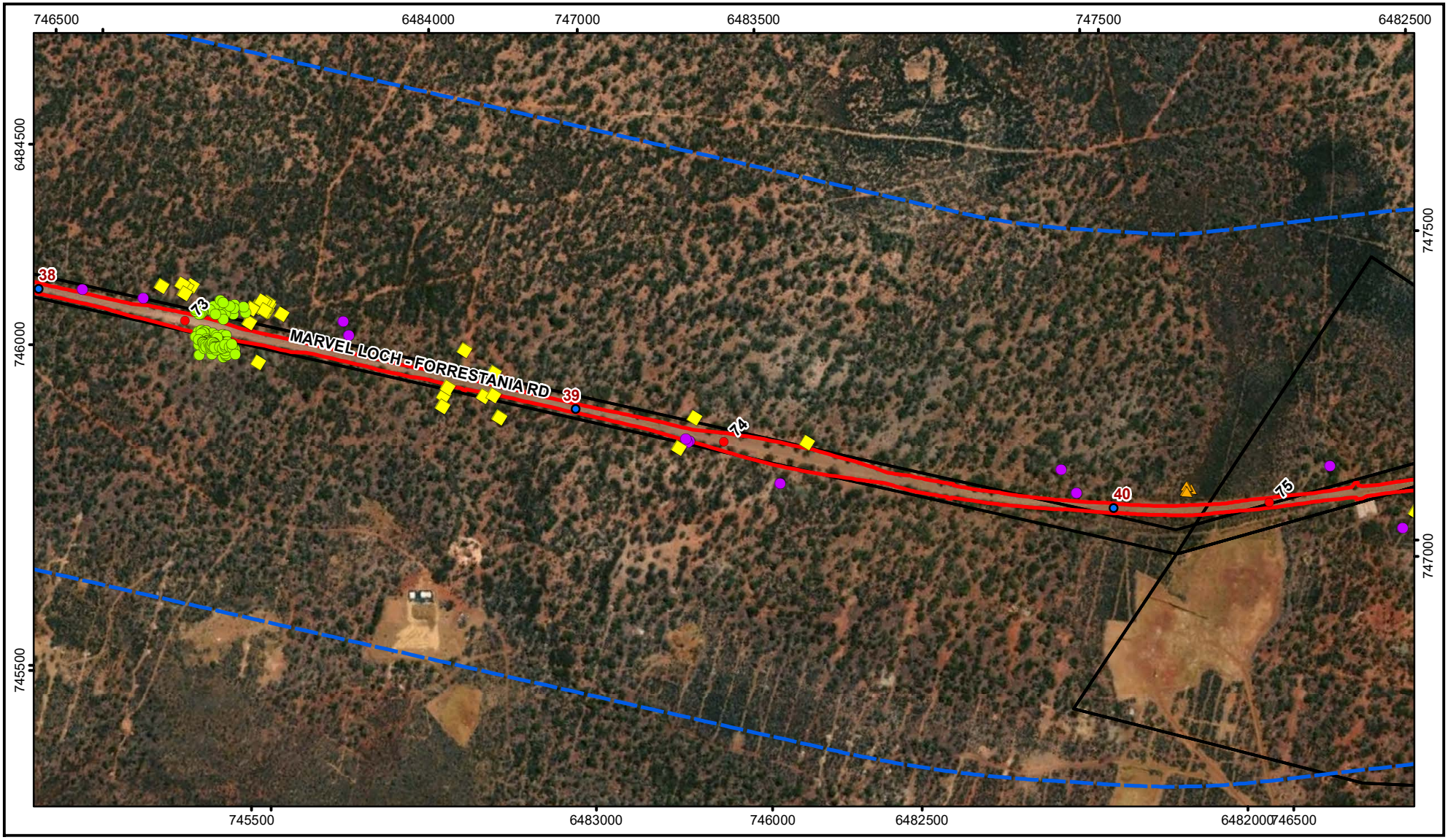
Priority Species
- P1, Edr
- P1, Gli
- P2, Aas
- P2, Eul

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 73 km to 75 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

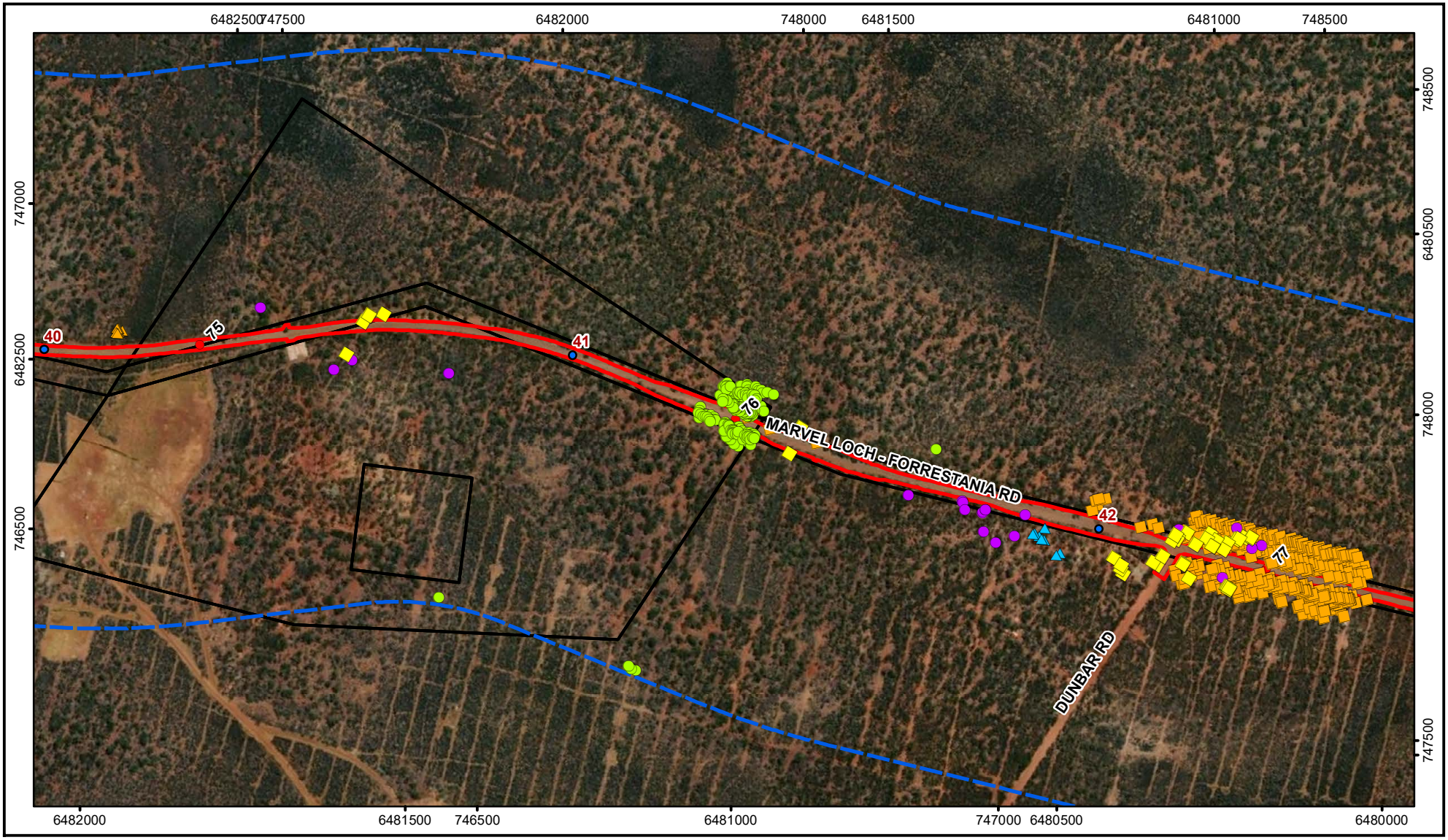
Priority Species
- P1, Edr
- P1, Gli
- P2, Eul
- P3, Rto

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 75 km to 77 km - Flora - Priority Species

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

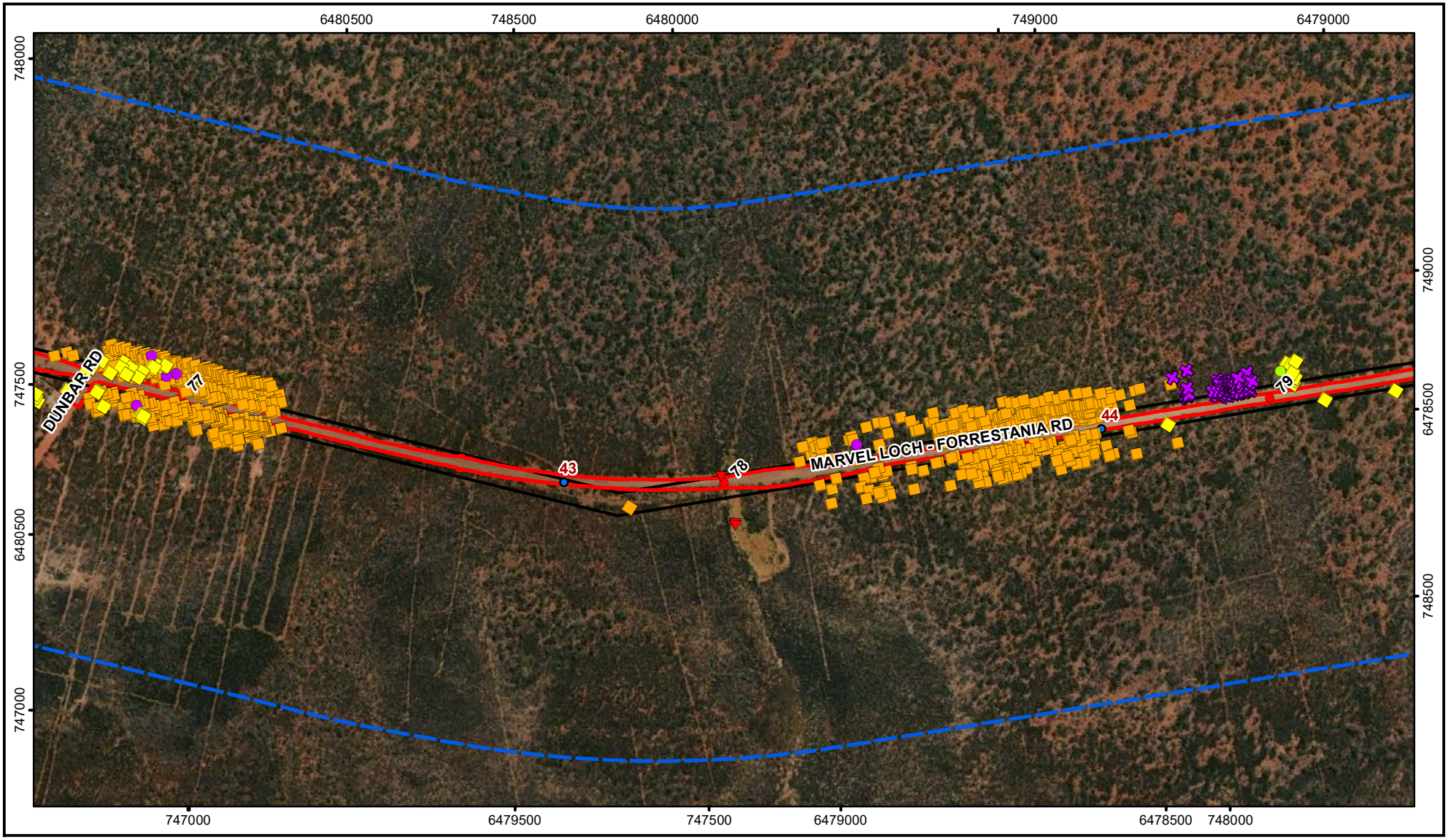
- P1, Gli
- P1, Edr
- P2, Eul
- P2, Aas
- P3, Tdi
- P3, Rto

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 77 km to 79 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

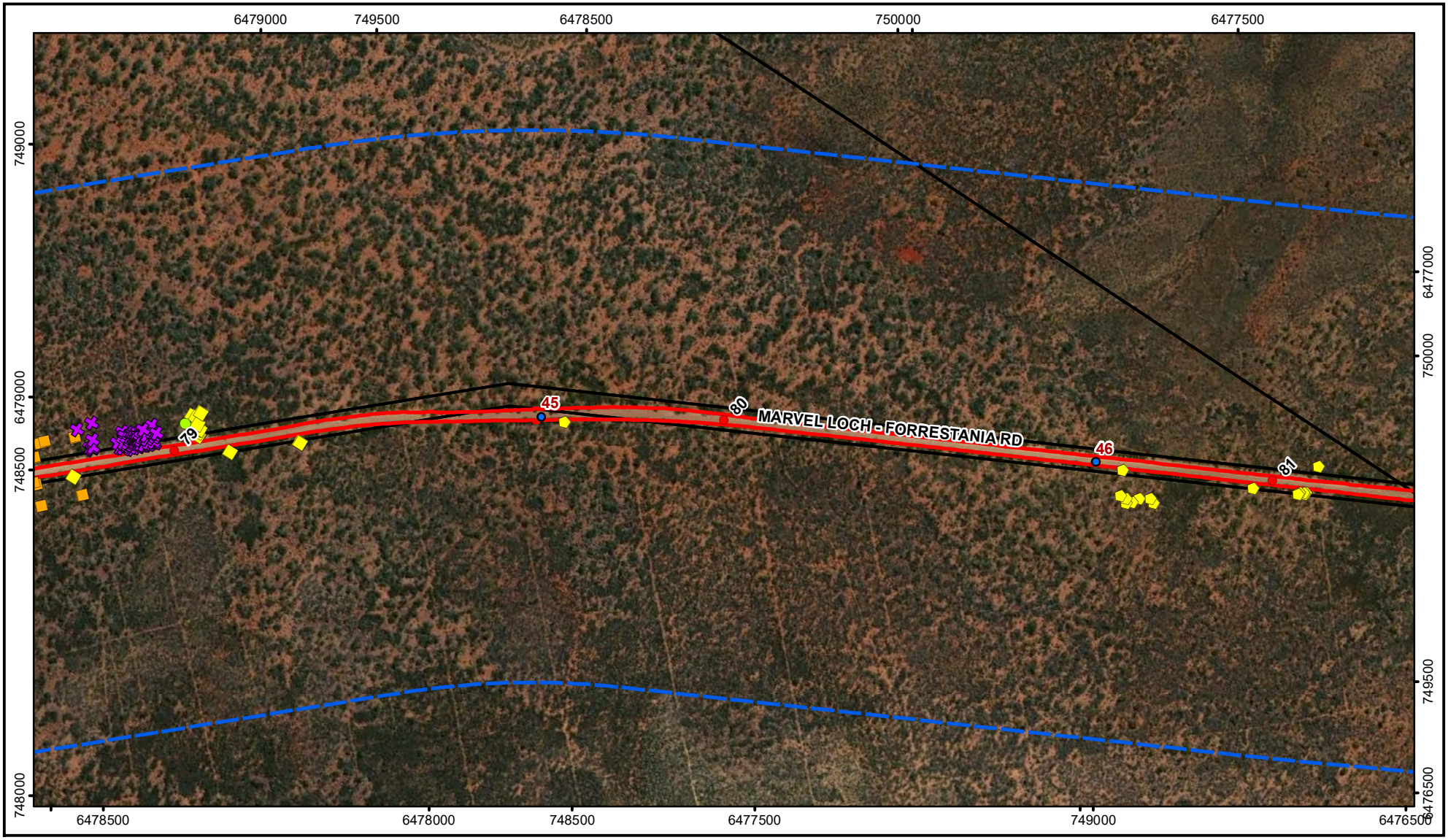
- P1, Gli
- P1, Edr
- P1, Rmd
- P2, Aas
- P2, Eul
- P2, Lme
- P3, Btp

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 79 km to 81 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

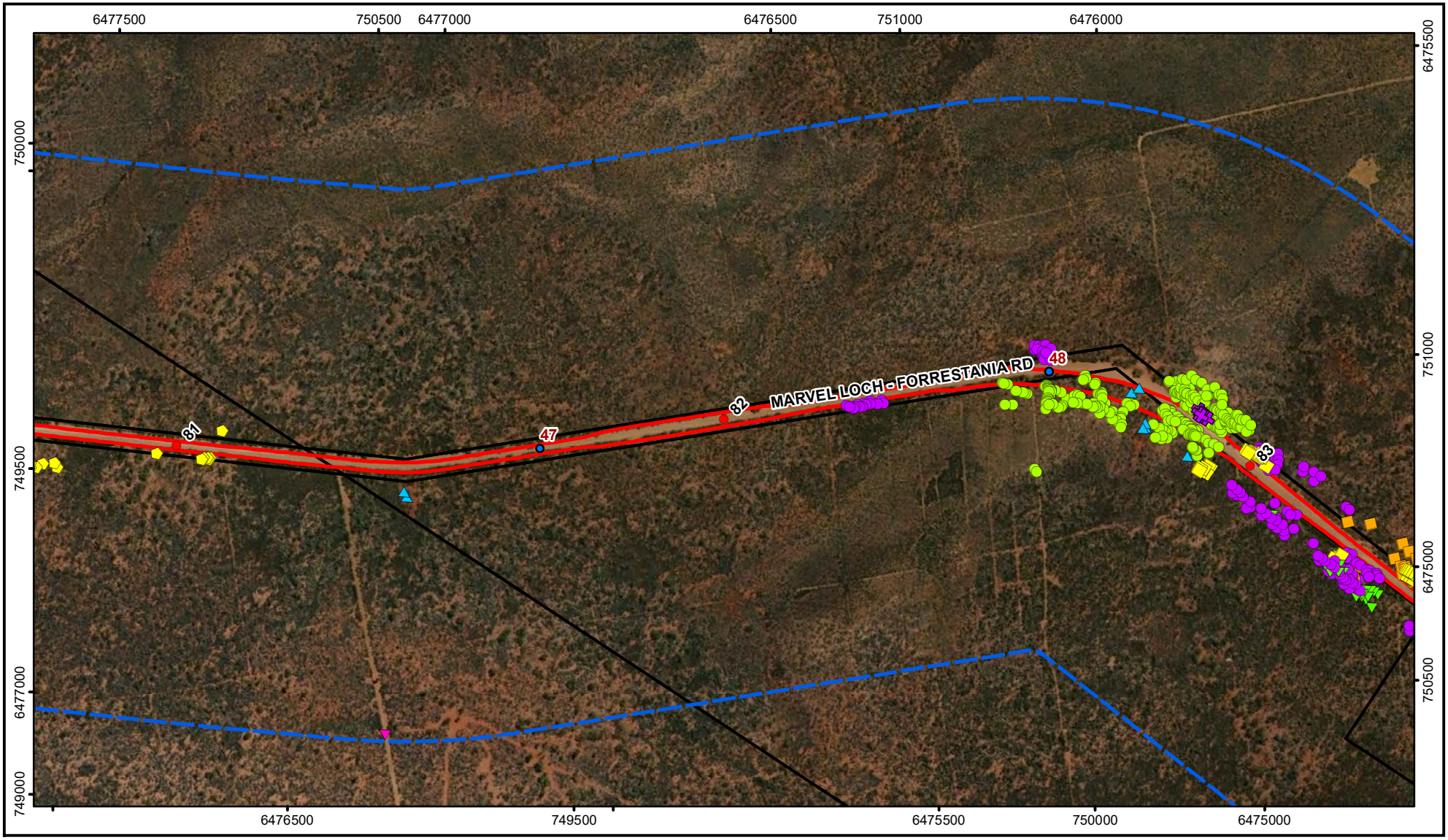
Priority Species
- P1, Gli
- P1, Rmd
- P2, Aas
- P2, Eul
- P4, Mif

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 81 km to 83 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

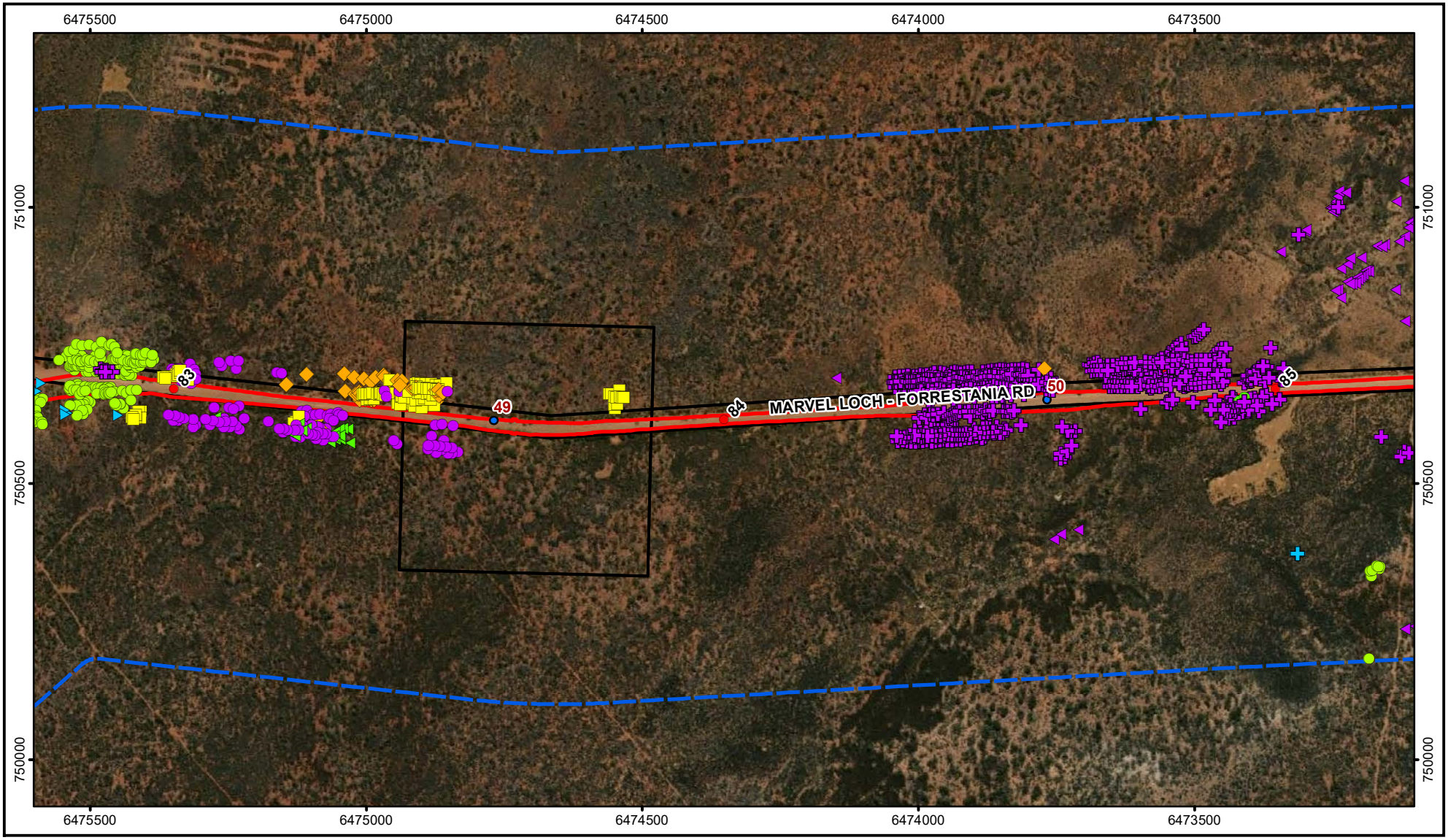
- P1, Edr
- P1, Gli
- P1, Rmd
- P2, Aas
- P2, Eul
- P3, Epo
- P3, Mif
- P3, Tdi
- P4, Mif

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 83 km to 85 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

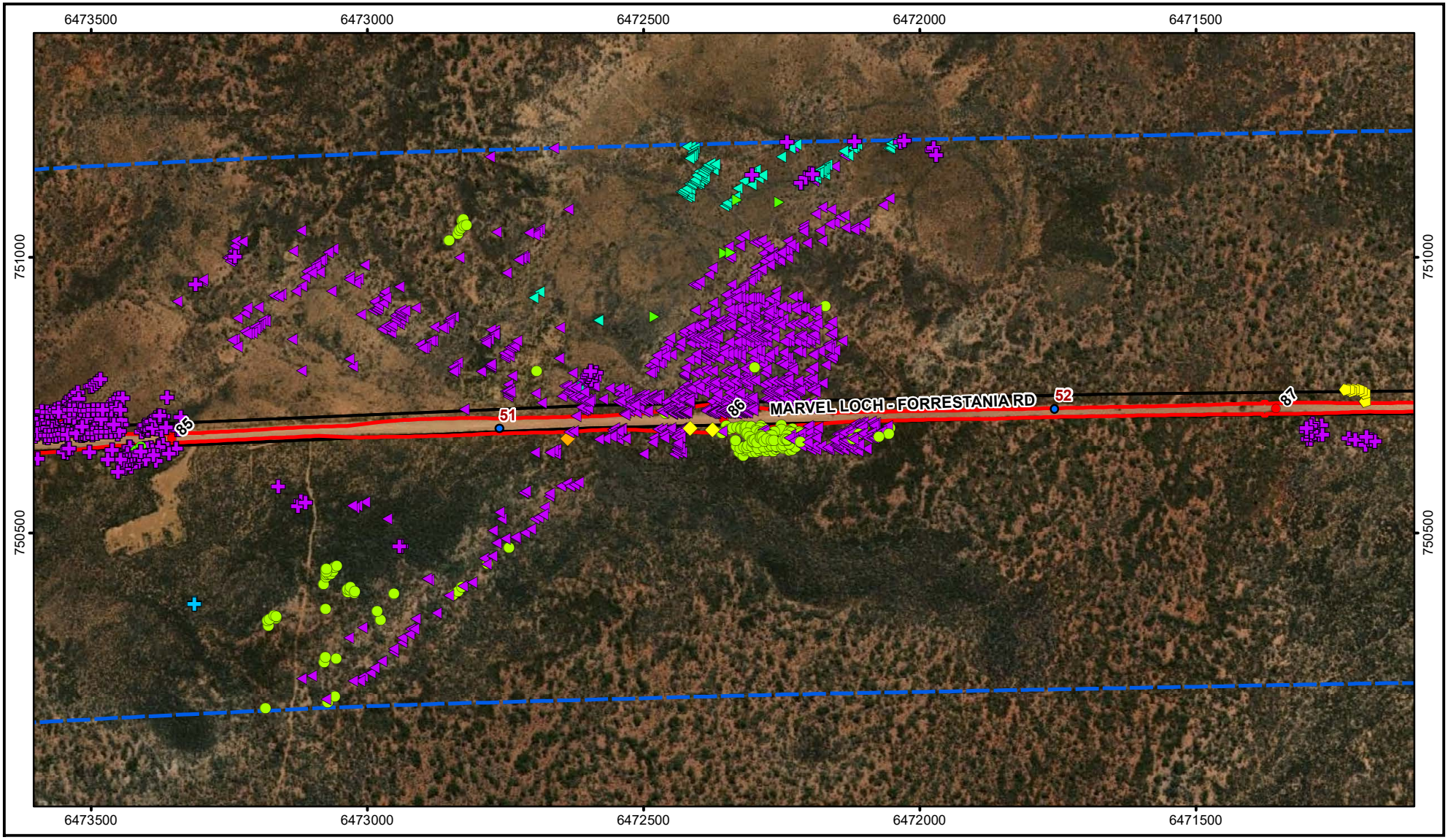
- P1, Cye
- P1, Edr
- P1, Gli
- P1, Rfb
- P1, Rmd
- P2, Aas
- P2, Eul
- P3, Epo
- P3, Hap
- P3, Prn
- P3, Tdi

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 85 km to 87 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

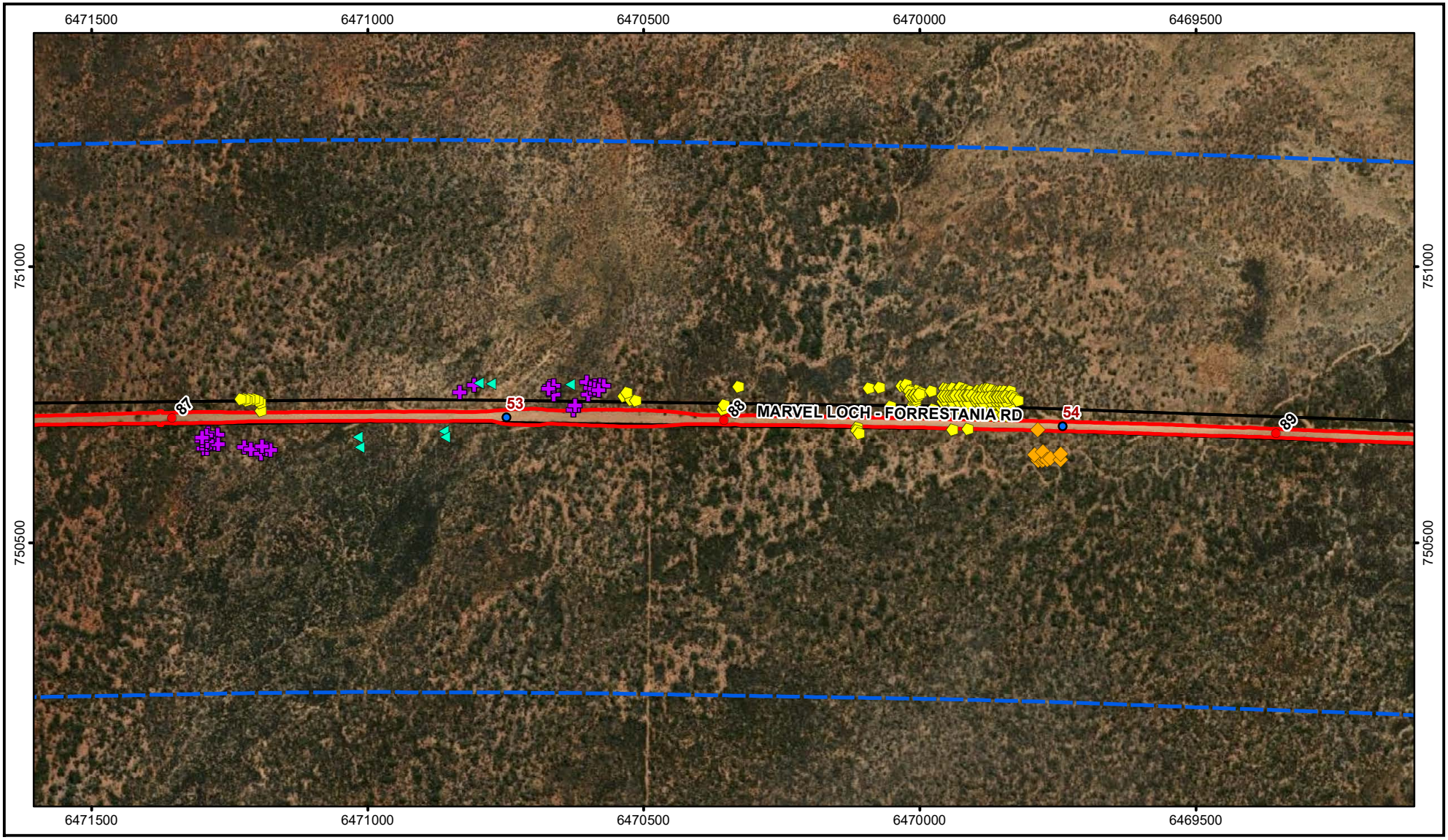
- P1, Cye
- P1, Gli
- P1, Rfb
- P1, Rmd
- P2, Aas
- P2, Aco
- P3, Hap
- P3, Phd
- P3, Prn
- P3, Rto
- P3, Sse
- P4, Mif

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 87 km to 89 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

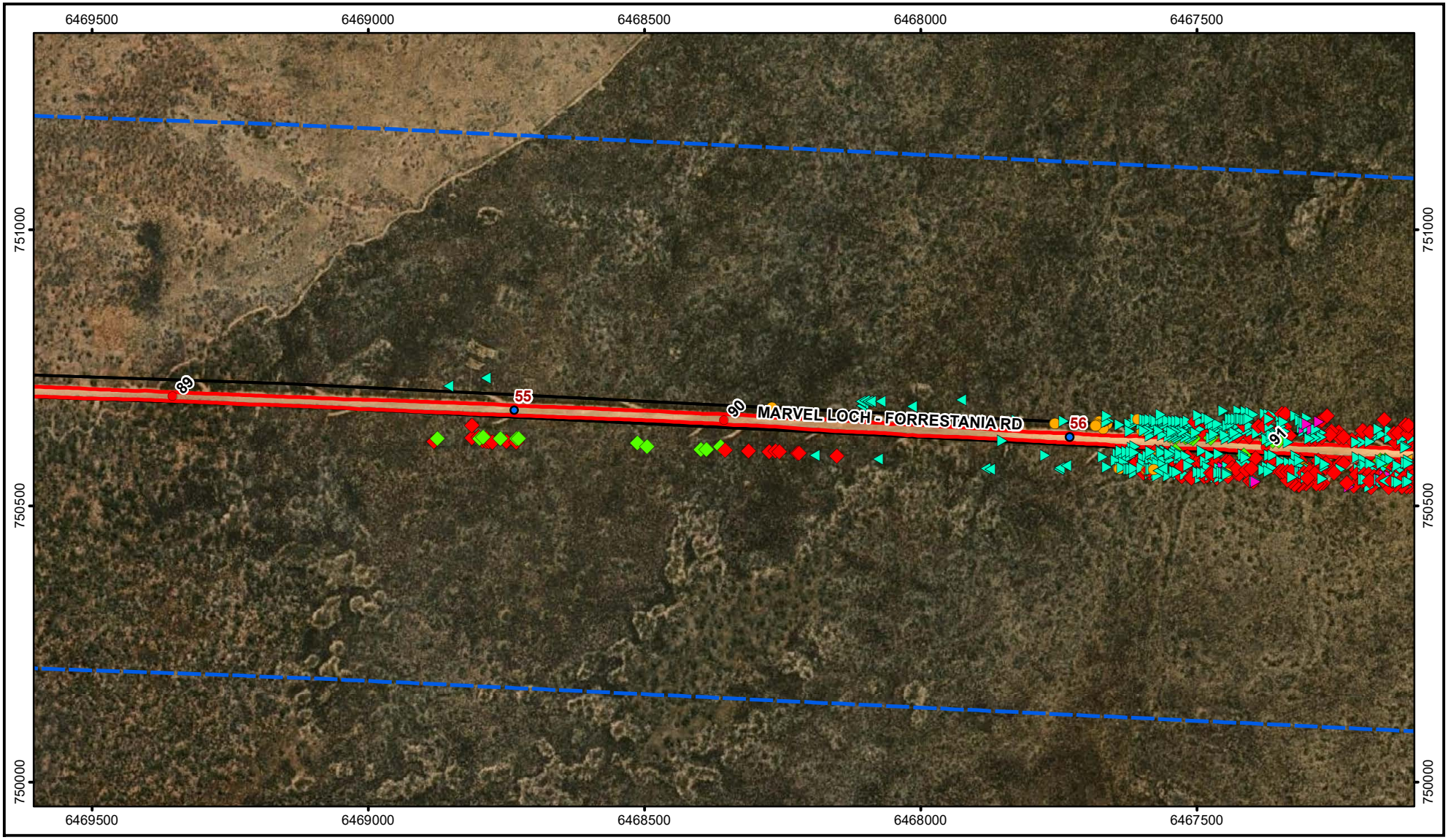
Priority Species
- P1, Rmd
- P2, Aas
- P3, Phd
- P4, Mif

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 89 km to 91 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

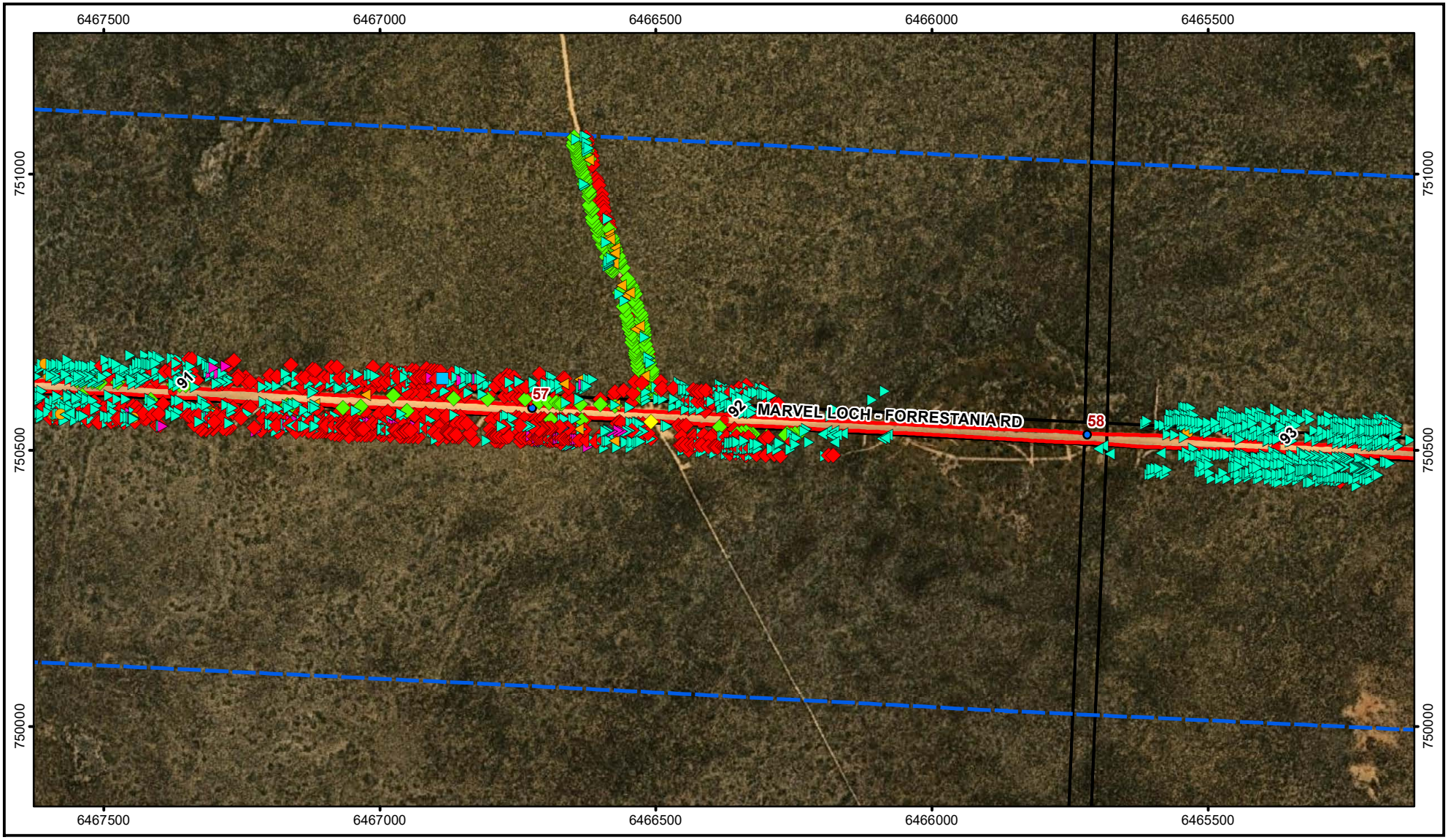
Priority Species
- P1, Bst
- P2 or P3, Bgi
- P2, Bgj
- P3, Cci
- P3, Phd
- P3, Vmi
- P3, Vst

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 91 km to 93 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

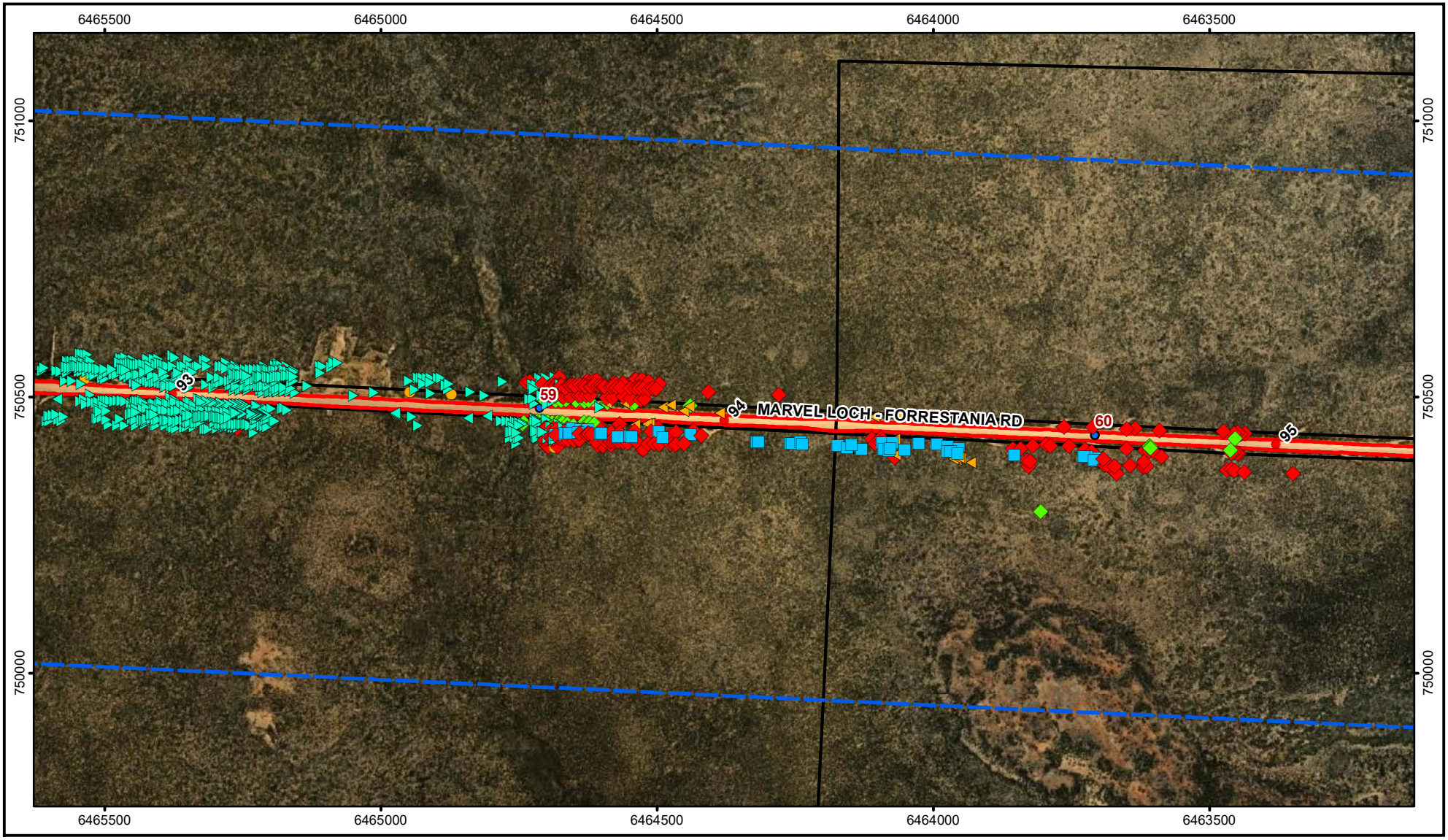
Priority Species
- P1, Bst
- P2 or P3, Bgi
- P2, Aco
- P2, Bgj
- P2, Lyl
- P3, Cci
- P3, Phd
- P3, Prn
- P3, Vgr
- P3, Vmi
- P3, Vst

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 93 km to 95 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

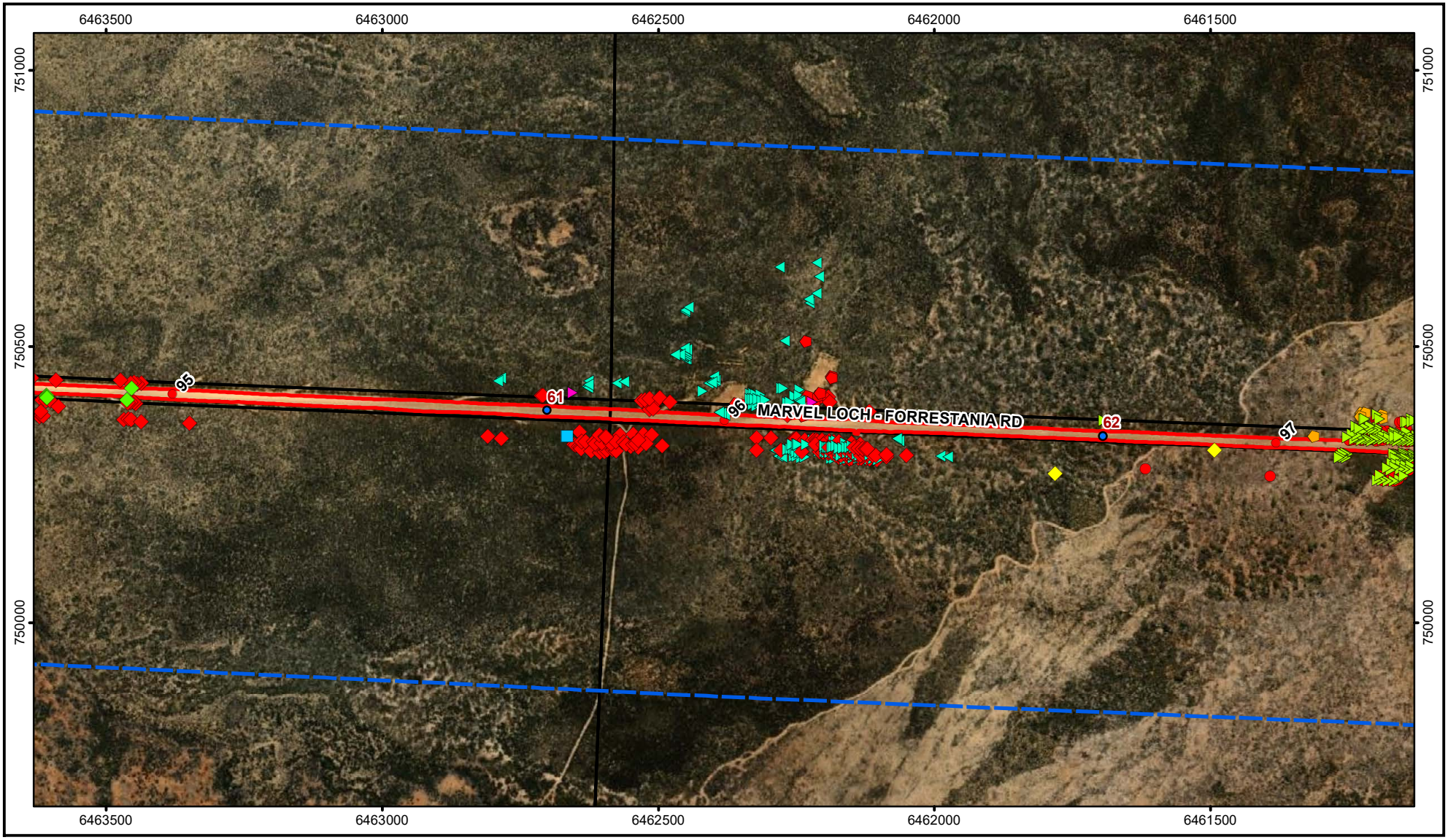
- P1, Bst
- P2 or P3, Bgi
- P2, Bgj
- P2, Lyl
- P3, Cci
- P3, Phd
- P3, Prn
- P3, Vgr
- P3, Vst

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 95 km to 97 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

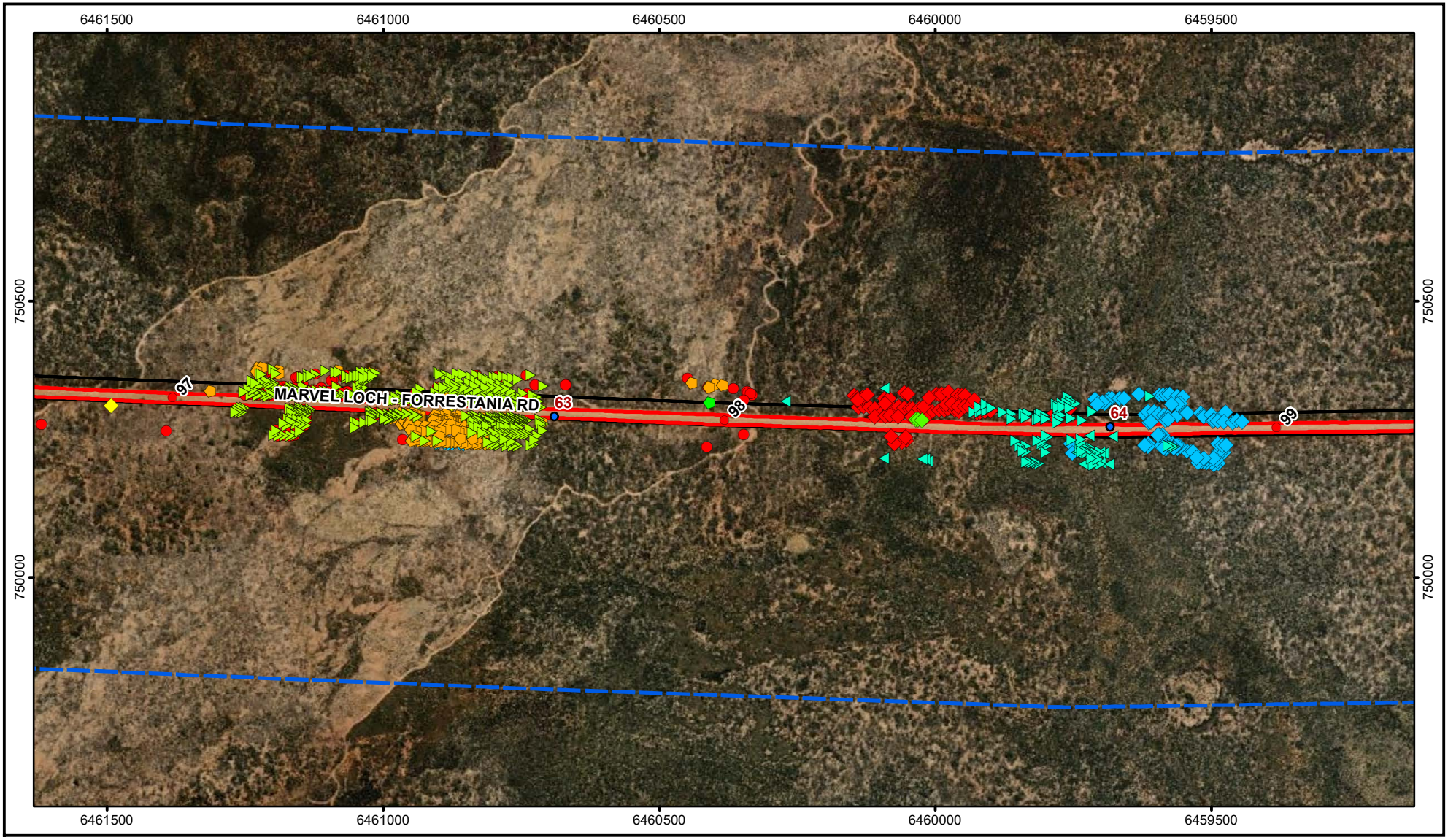
- P1, Ahy
- P2 or P3, Bgi
- P2, Aco
- P2, Bgj
- P2, Lyl
- P3, Phd
- P3, Sad
- P3, Vmi
- P3, Vst
- P4, Gne
- P4, Gyd

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 97 km to 99 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

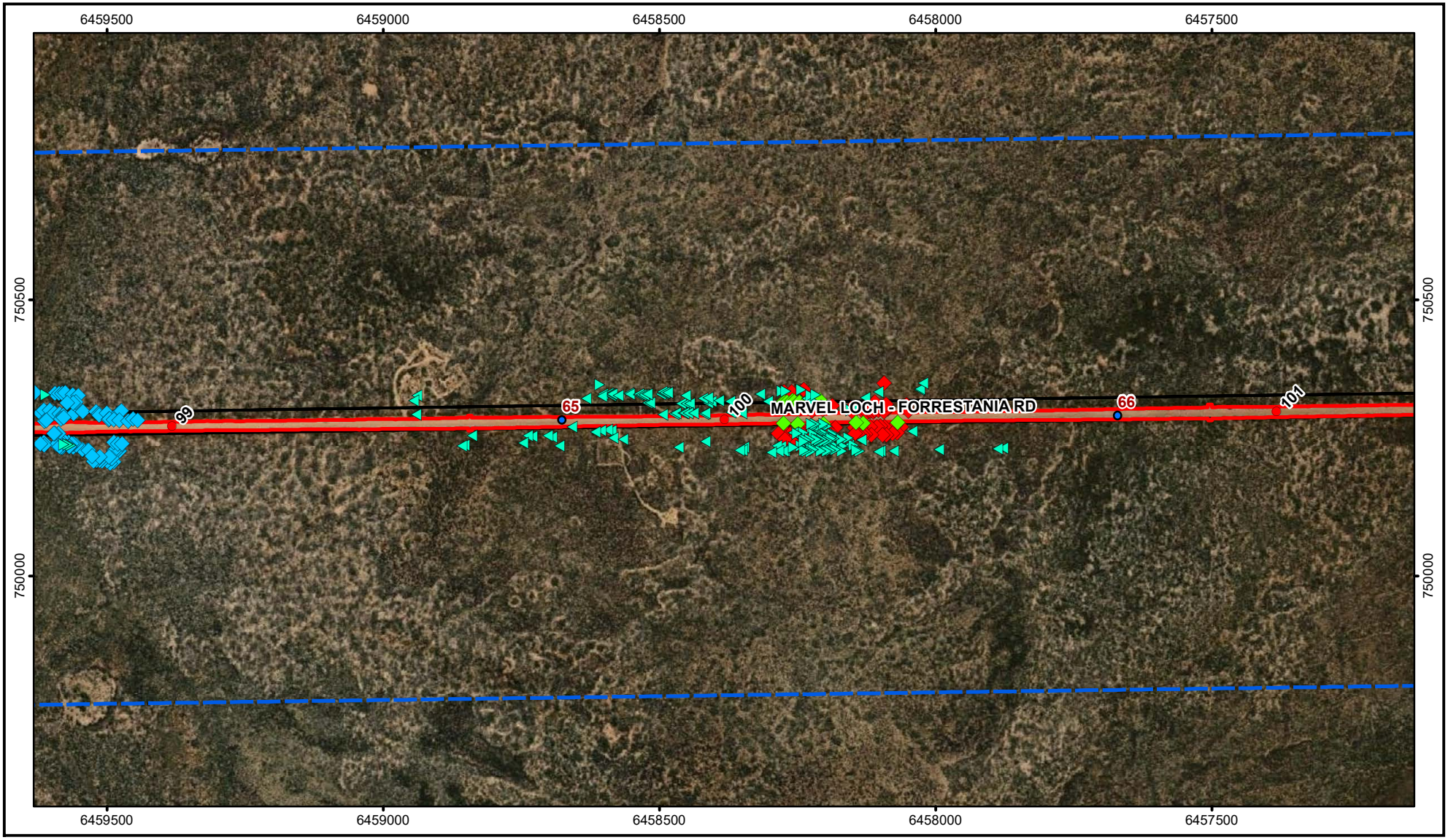
- P1, Ahy
- P2 or P3, Bgi
- P2, Aco
- P2, Bgj
- P2, Dor
- P3, Phd
- P3, Sad
- P3, Vst
- P4, Gyd
- P4, Wb

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 99 km to 101 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

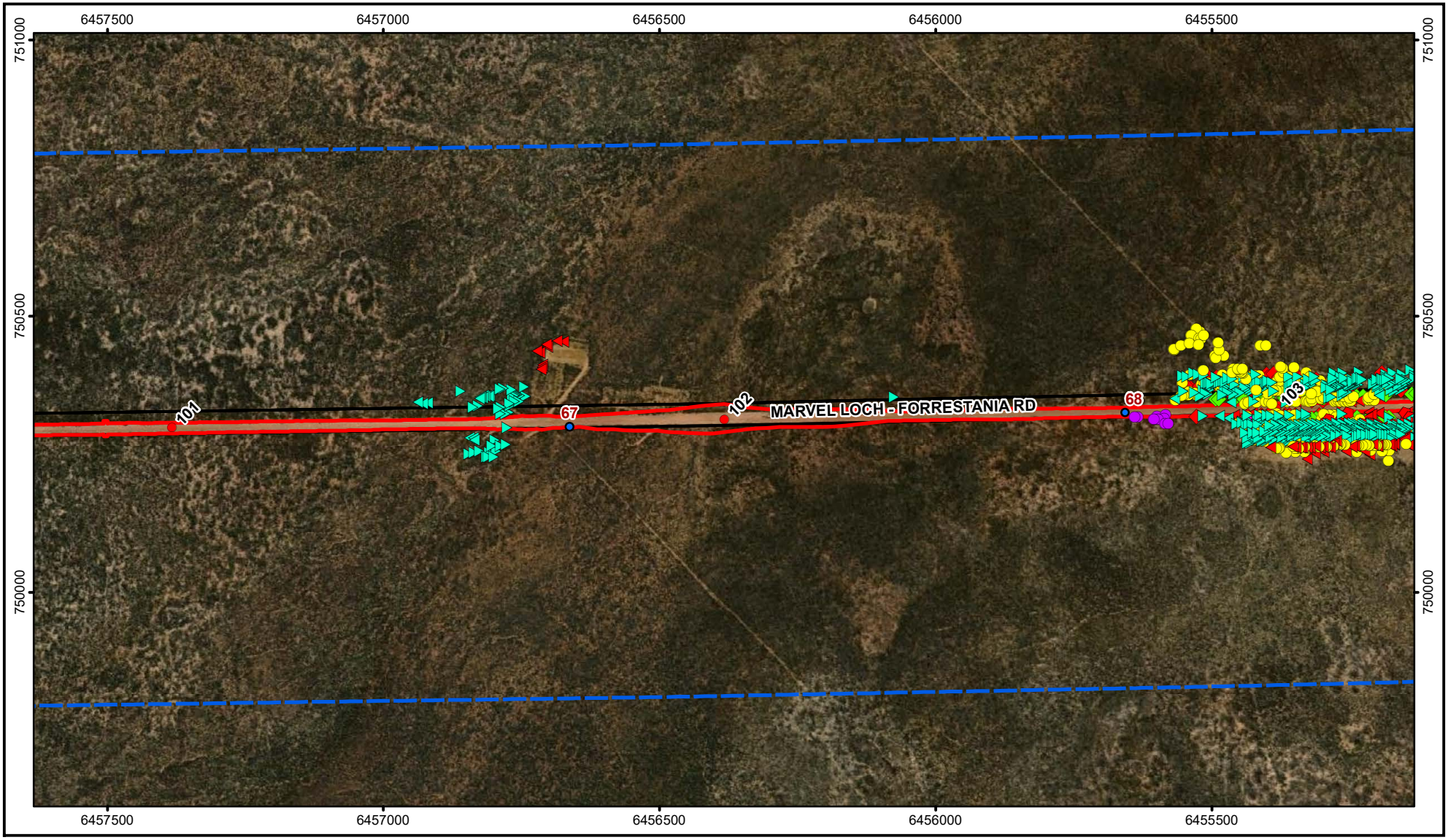
Priority Species
- P2 or P3, Bgi
- P2, Bgj
- P2, Dor
- P3, Phd
- P3, Vst

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 101 km to 103 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

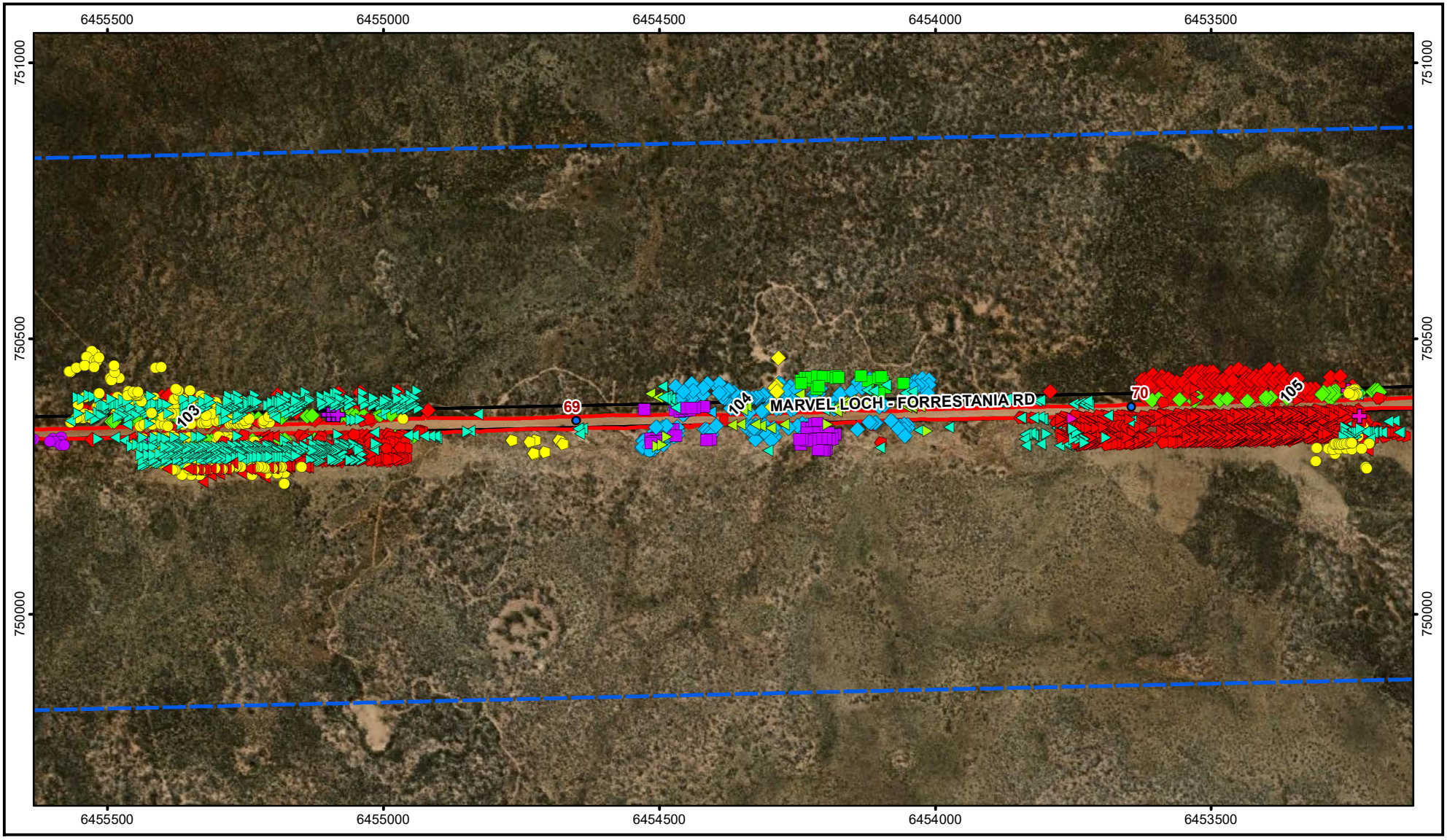
- P1, Cmh
- P1, Edr
- P1, Thy
- P2 or P3, Bgi
- P2, Bgj
- P3, Btp
- P3, Phd
- P3, Prn
- P3, Vst
- P4, Gne

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 103 km to 105 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

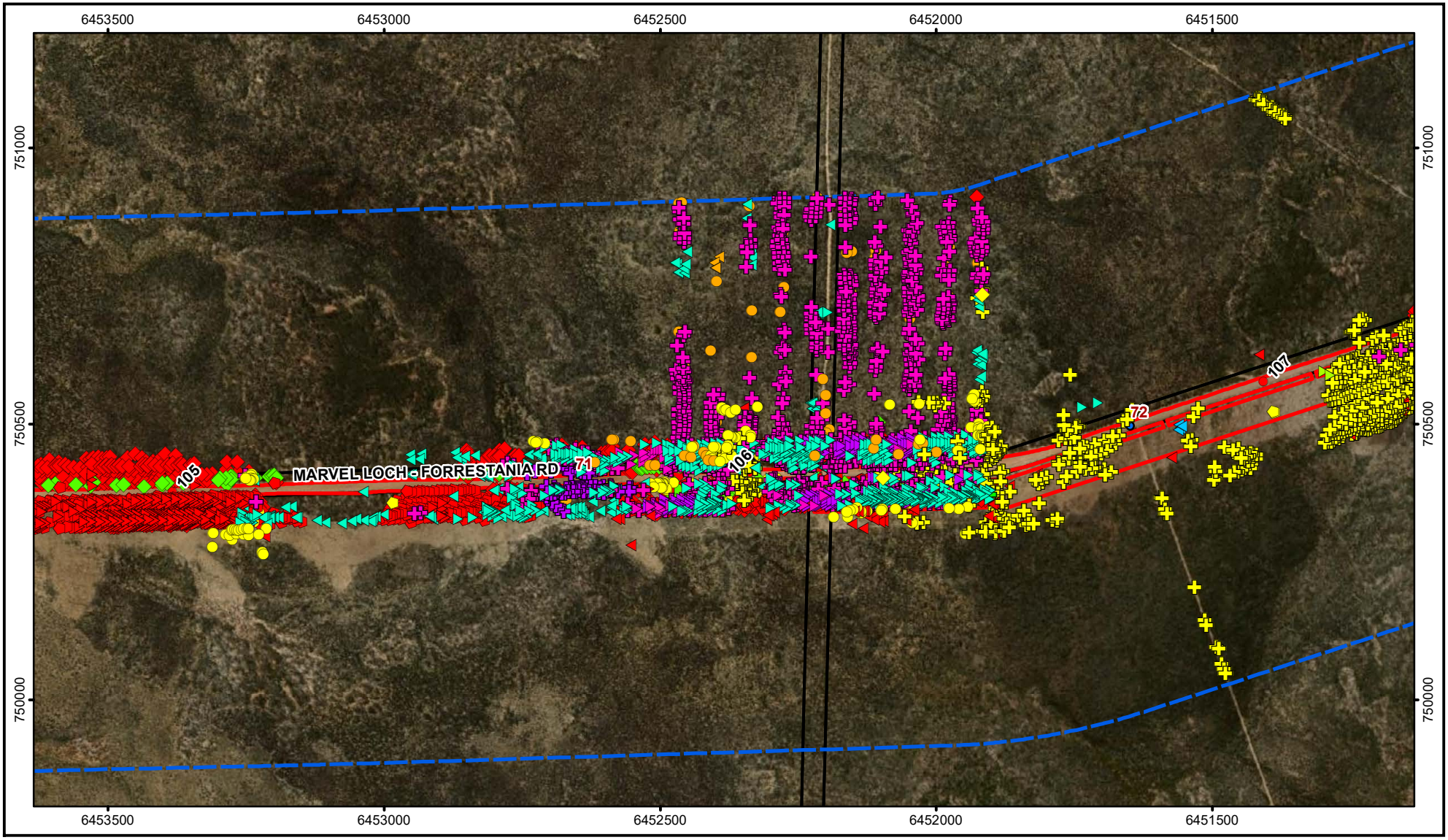
- P1, Ahy
- P1, Cmh
- P1, Dca
- P1, Edr
- P1, Rmd
- P1, Thy
- P2 or P3, Bgi
- P2, Aco
- P2, Bgj
- P2, Dor
- P2, Lna
- P2, Meo
- P3, Btp
- P3, Eex
- P3, Gci
- P3, Phd
- P3, Prn
- P3, Sad
- P3, Vmi
- P3, Vst
- P4, Gne
- P4, Mif

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 105 km to 107 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

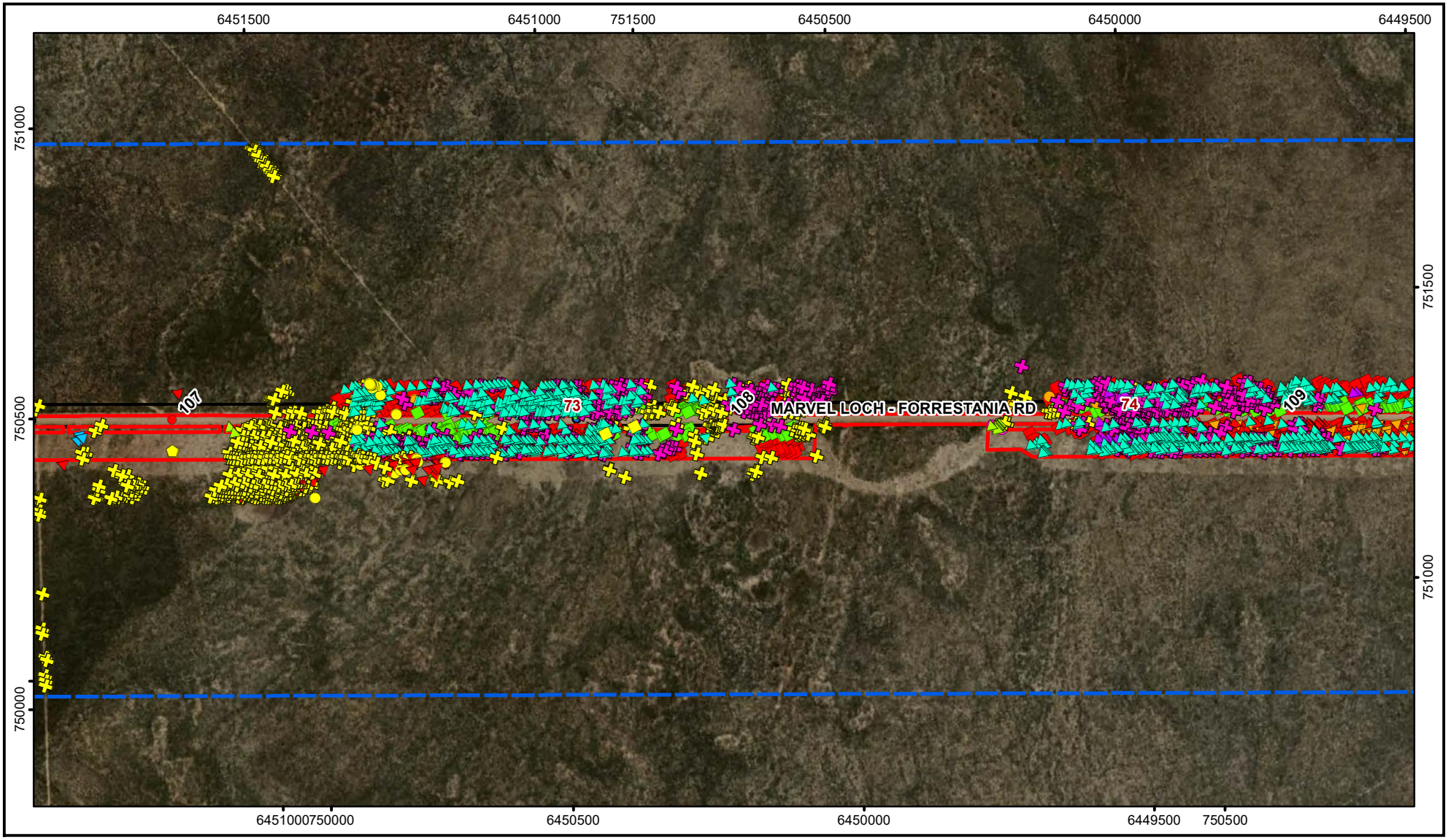
- P1, Bst
- P1, Cmh
- P1, Mie
- P1, Mip
- P1, Rmd
- P1, Thy
- P2 or P3, Bgi
- P2, Aco
- P2, Bgj
- P3, Btp
- P3, Cci
- P3, Gci
- P3, Phd
- P3, Prn
- P3, Sad
- P3, Vgr
- P3, Vmi
- P3, Vst
- P4, Gne
- P4, Mif

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 107 km to 109 km - Flora - Priority Species

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

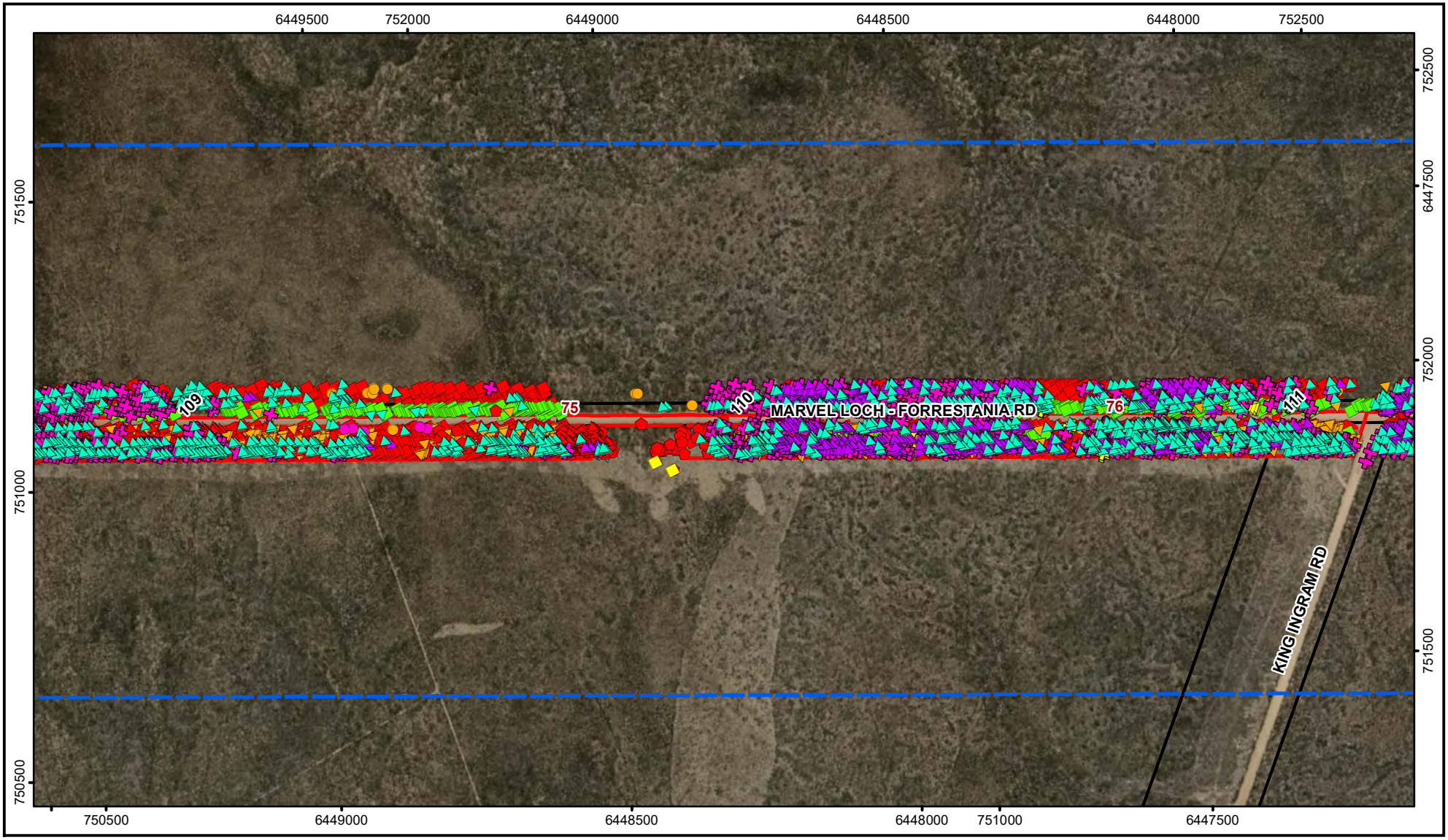
- P1, Bst
- P1, Cmh
- P1, Eni
- P1, Mie
- P1, Thy
- P2 or P3, Bgi
- P2, Aco
- P2, Bgj
- P3, Btp
- P3, Cci
- P3, Gci
- P3, Phd
- P3, Prn
- P3, Sad
- P3, Vgr
- P3, Vmi
- P3, Vst
- P4, Mif

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 109 km to 111 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

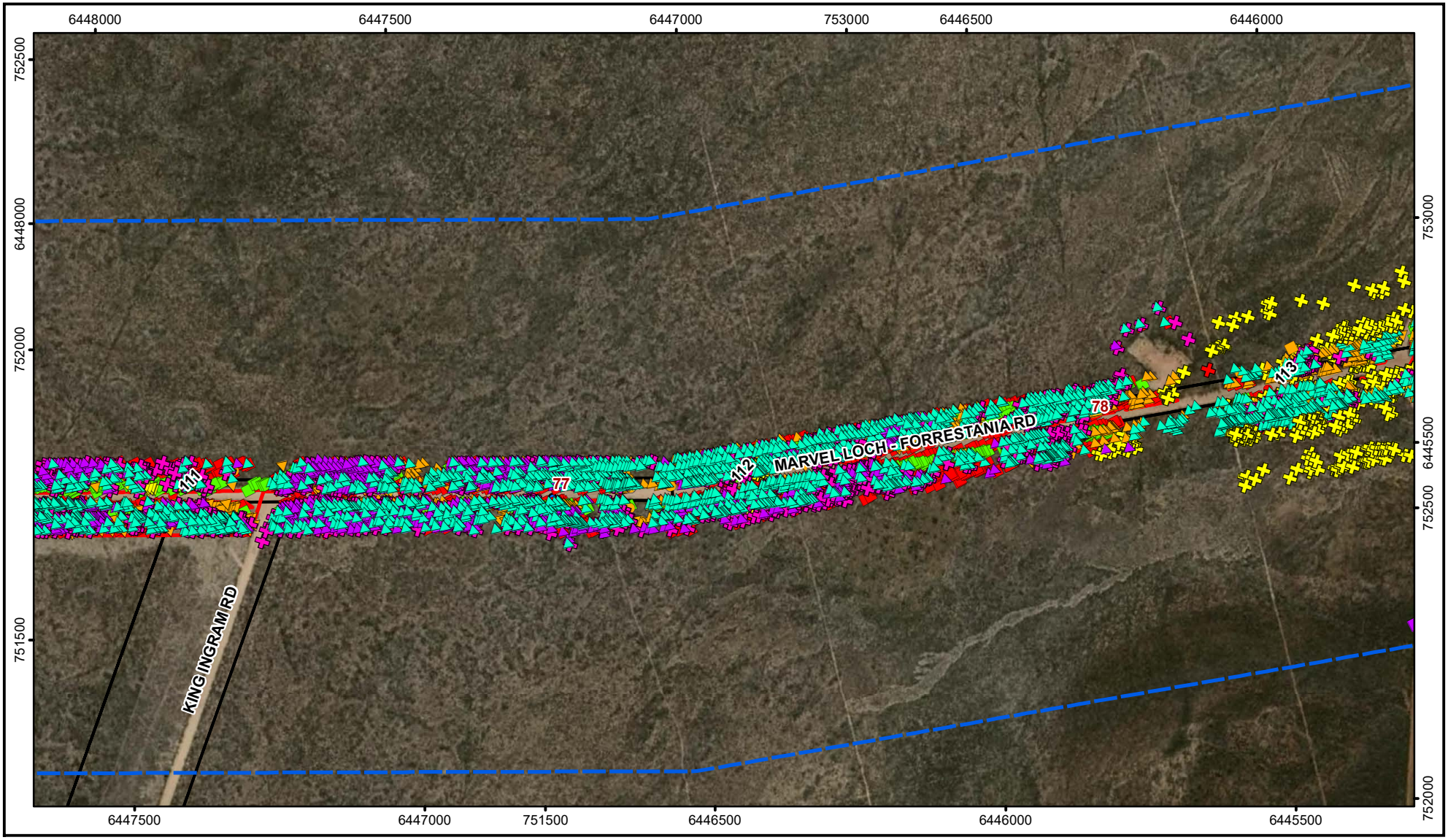
- P1, Bst
- P1, Eni
- P1, Mie
- P1, Thy
- P2 or P3, Bgi
- P2, Aco
- P2, Bgj
- P2, Euh
- P3, Cci
- P3, Cyc
- P3, Gci
- P3, Phd
- P3, Prn
- P3, Rto
- P3, Vgr
- P3, Vmi
- P3, Vst
- P4, Gne

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 111 km to 113 km - Flora - Priority Species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

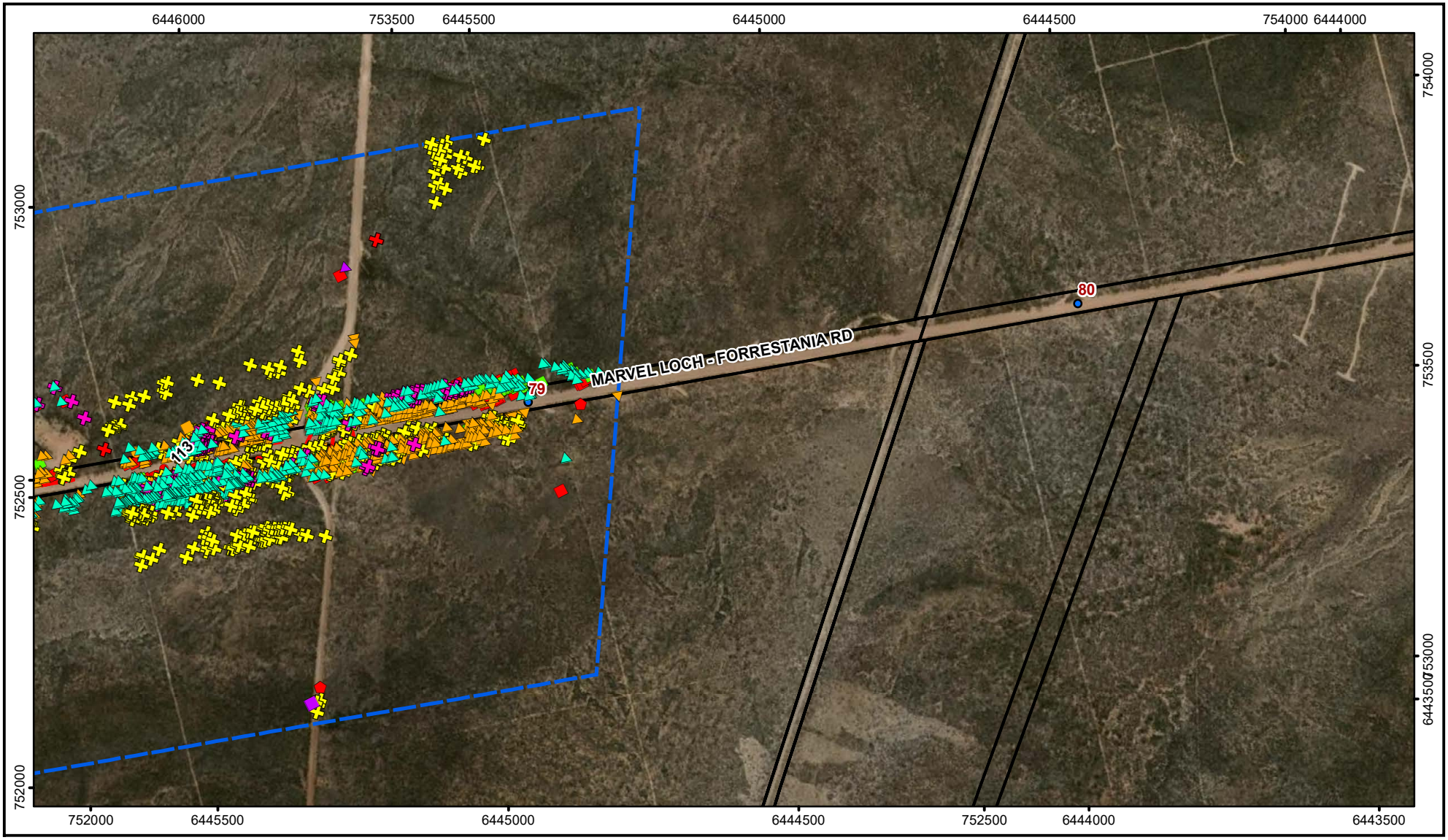
- P1, Bst
- P1, Meg
- P1, Mie
- P1, Thy
- P2 or P3, Bgi
- P2, Aas
- P2, Bgj
- P2, Dsr
- P2, Euh
- P2, Lyl
- P3, Cci
- P3, Cyc
- P3, Rto
- P3, Rtr
- P3, Vgr
- P3, Vst

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 113 km to 115 km - Flora - Priority Species

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_02, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Priority Species

- P1, Bst
- P1, Meg
- P1, Mie
- P1, Thy
- P2 or P3, Bgi
- P2, Aas
- P2, Bgj
- P2, Dsr
- P3, Cci
- P3, Rto
- P3, Vgr
- P3, Vst
- P4, Gne

0 0.2 km

N

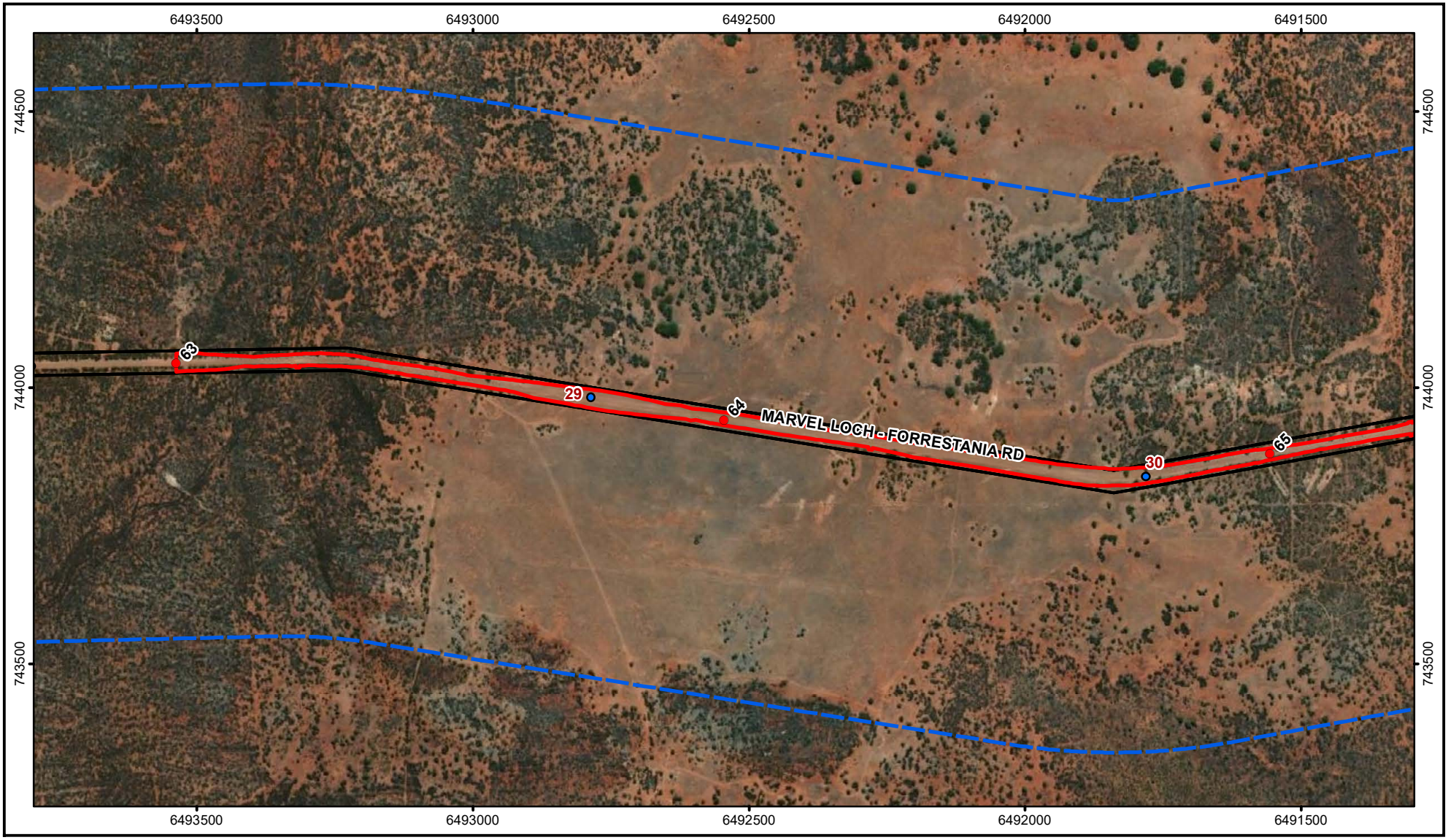
Appendix 7. Species of Interest (SOI) of the Study Area

Legend – Species of Interest (SOI)

WA Cons Status	Abbreviation	Taxon Name
SOI	Aml	*Acacia intricata* Marvel Loch - Southern Cross form (WB40115)
SOI	Anr	*Acacia neurophylla* subsp. Resinous veins (GC-797)
SOI	Amr	*Acacia* sp. Moorine Rock (BR Maslin 4474)
SOI	Bau	*Banksia audax*
SOI	Cki	*Chamelaucium* sp. King Ingram Rd (MHGG-035)
SOI	Com	*Coopernookia* sp. Mt Holland (G. Cockerton-381)
SOI	Cyz	*Cryptandra* sp. Zigzag (G. Cockerton-319)
SOI	Dgf	*Drummondita* sp. green flowers (L. Shelton-304)
SOI	Dhs	*Drummondita* sp. hairy sepals (L. Shelton-409)
SOI	Esg	*Eucalyptus* aff. *salubris* pruinose branchlet form (G. Cockerton & J. Warden WB40196)
SOI	Emh	*Eutaxia* sp. Mt Holland (G. Cockerton & G. Grigg-758)
SOI	Esc	*Eutaxia* sp. Southern Cross (G. Grigg-010)
SOI	Gcu	*Grevillea communis* ms (P.M. Olde)
SOI	Gco	*Grevillea comosa* ms (P.M. Olde 91/14, 7 Sep 1991)
SOI	Ghm	*Grevillea* sp. aff. *huegelii* Marvel Loch. P.M. Olde 91/44 NSW782729
SOI	Hil	*Hibbertia* sp. Forrestania (*H. lateritica* ms, K.R. Thiele)
SOI	Lsp	*Leptospermum* aff. *spinescens* (DL-164)
SOI	Msp	*Melaleuca* aff. *spicigera* GC-638, 765
SOI	Pab	*Phebalium* aff. *brachycalyx*
SOI	Pal	*Phebalium* aff. *laevigatum* eastern form, pink fls (L. Shelton-492)
SOI	Pam	*Phebalium* aff. *microphyllum* tuberculate stems (LS-486)
SOI	Pay	*Phebalium* aff. P. sp. Yerilgee Sandplain (J. Jackson 223) (P!)
SOI	Pat	*Phebalium* aff. *tuberculosum* short leaf (G. Cockerton 333)
SOI	P12	*Phebalium filifolium* (12mm leaf)
SOI	Pf6	*Phebalium filifolium* (6mm leaf)
SOI	Pfl	*Phebalium filifolium* long leaf form
SOI	Pfs	*Phebalium filifolium* sens. lat. (short leaf form)
SOI	Pmg	*Phebalium megaphyllum*
SOI	Pbh	*Phebalium* sp. British Hill (G. Cockerton, S. Cockerton, J. Warden WB41040)
SOI	Pdr	*Phebalium* sp. Dunbar Road GC-544
SOI	Pmu	*Phebalium* sp. mucronate
SOI	Pov	*Phebalium* sp. ovate (WB40864)
SOI	Pog	*Phebalium* sp. Ovate glossy (GC-619)
SOI	Prb	*Phebalium* sp. Parker Range Rd (broad leaved variant)
SOI	Prr	*Phebalium* sp. Parker Range Rd (WB40838)
SOI	Prs	*Phebalium* sp. Parker Range Road sens. strict. (G. Cockerton & B. Loudon WB40838)
SOI	Prt	*Phebalium* sp. Retuse tip (GC-426)
SOI	Psp	*Phebalium* sp. supermegawarty (GC-396)
SOI	Pts	*Phebalium tuberculosum* sens. lat. (short leaf form)
SOI	Prc	*Prostanthera* aff. *campbellii* (LS-125)

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 63 km to 65 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 65 km to 67 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT

Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_03, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

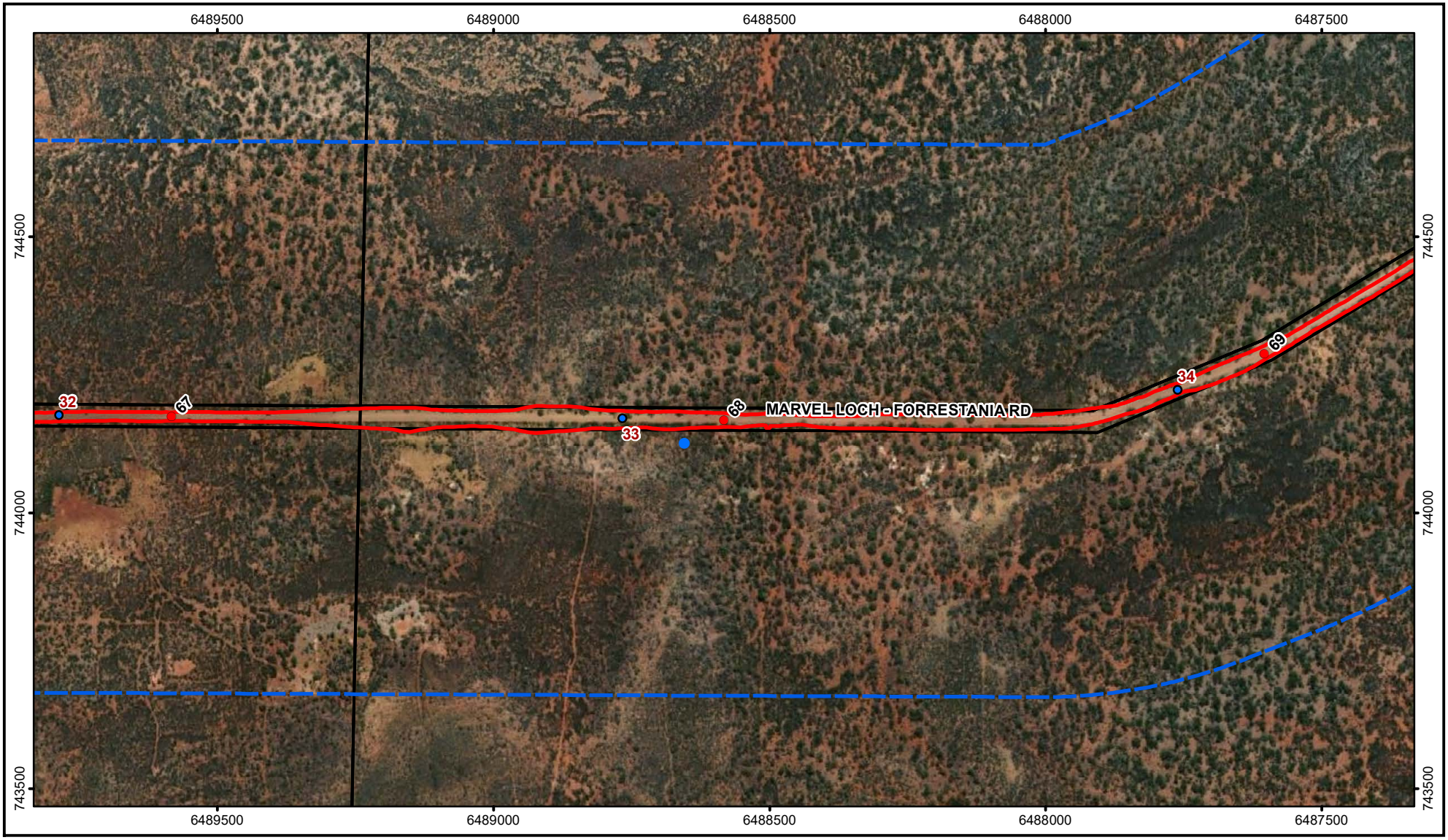
Legend
- Centreline Chainage *Flora SOI* Gco - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 67 km to 69 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage *Flora SOI* Gco - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 69 km to 71 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT

Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_03, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

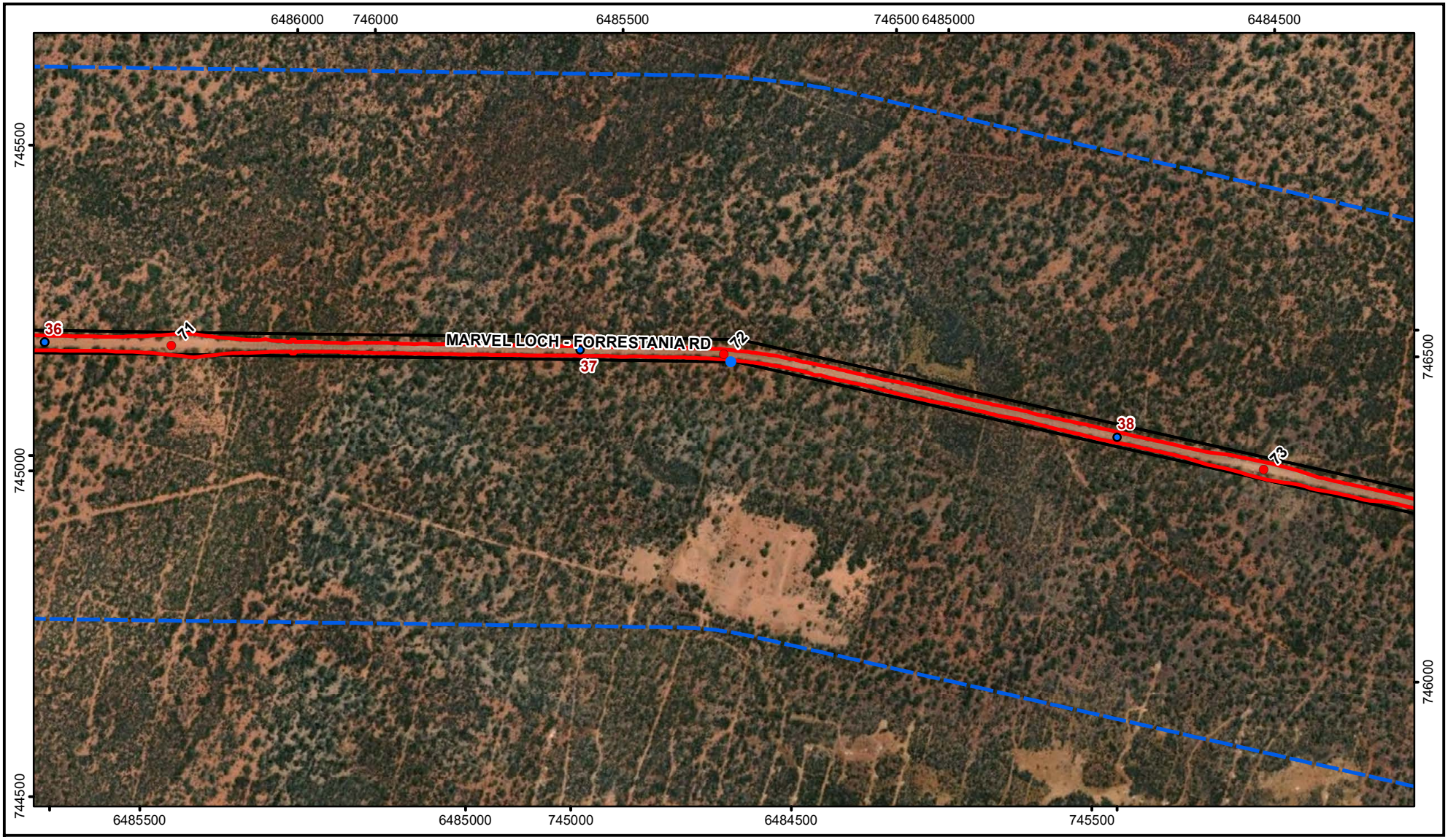
Legend
- Centreline Chainage *Flora SOI*
- Gco - Not Taken
- Gco - Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 71 km to 73 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

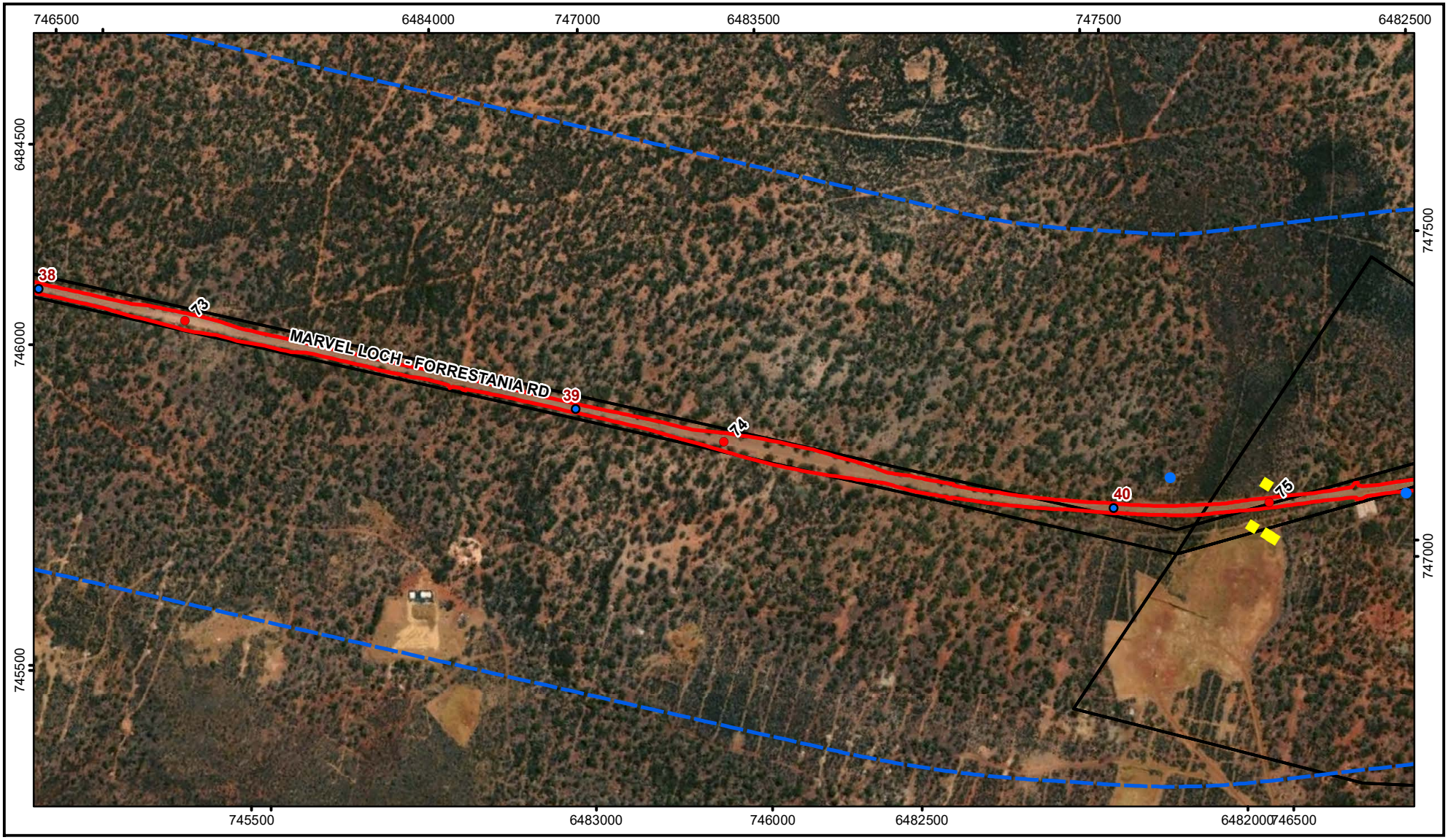
Legend
- Centreline Chainage *Flora SOI* Gco - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 73 km to 75 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

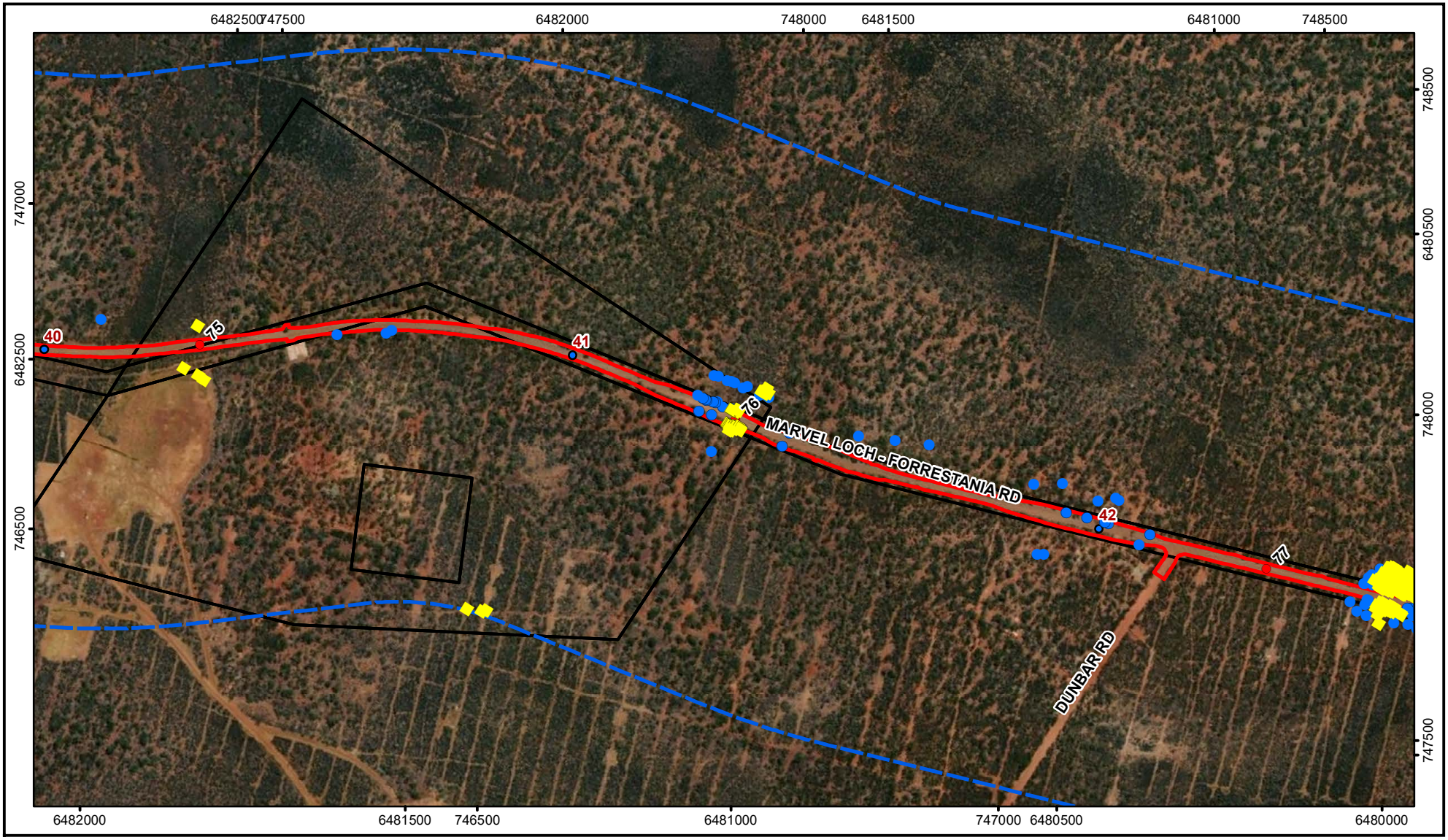
Legend
- Centreline Chainage *Flora SOI*
- Gco - Not Taken
- Hil - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 75 km to 77 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Flora SOI

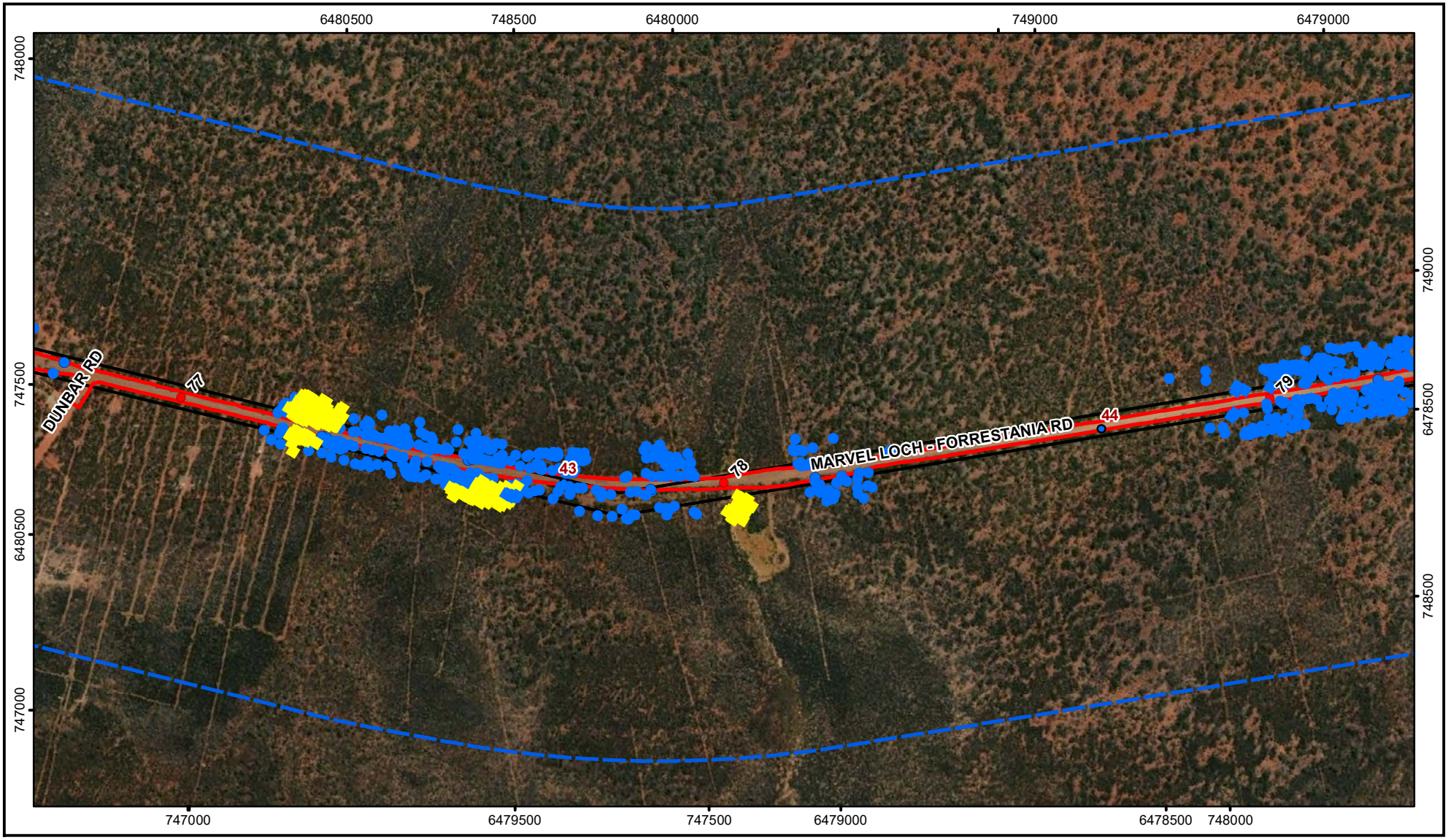
- Gco - Taken
- Gco - Not Taken
- Hil, Taken - CPS 10049
- Hil - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 77 km to 79 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

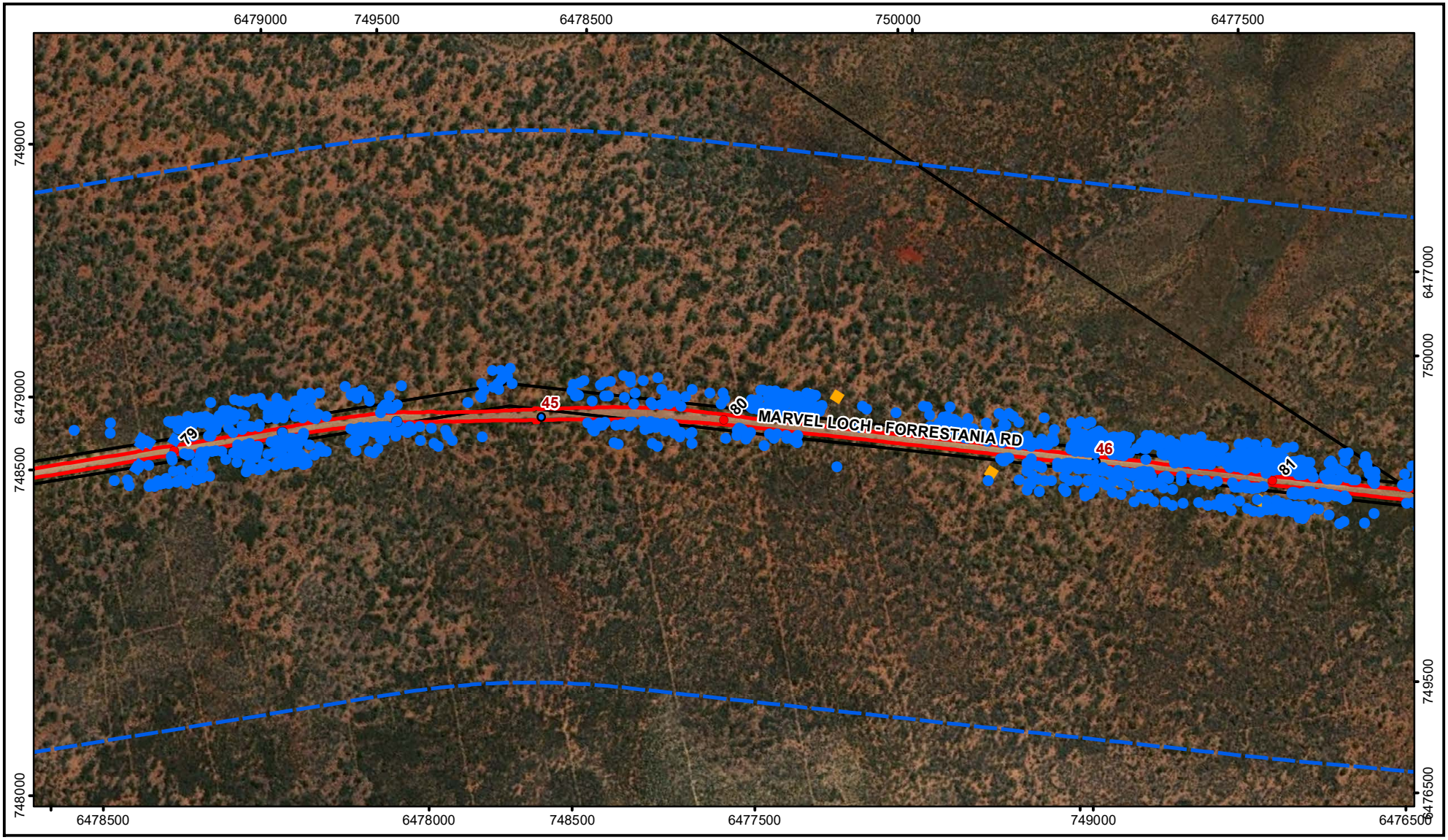
Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- *Flora SOI*
- Gco - Taken
- Gco - Not Taken
- Hil - Not Taken
- Prc - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 79 km to 81 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

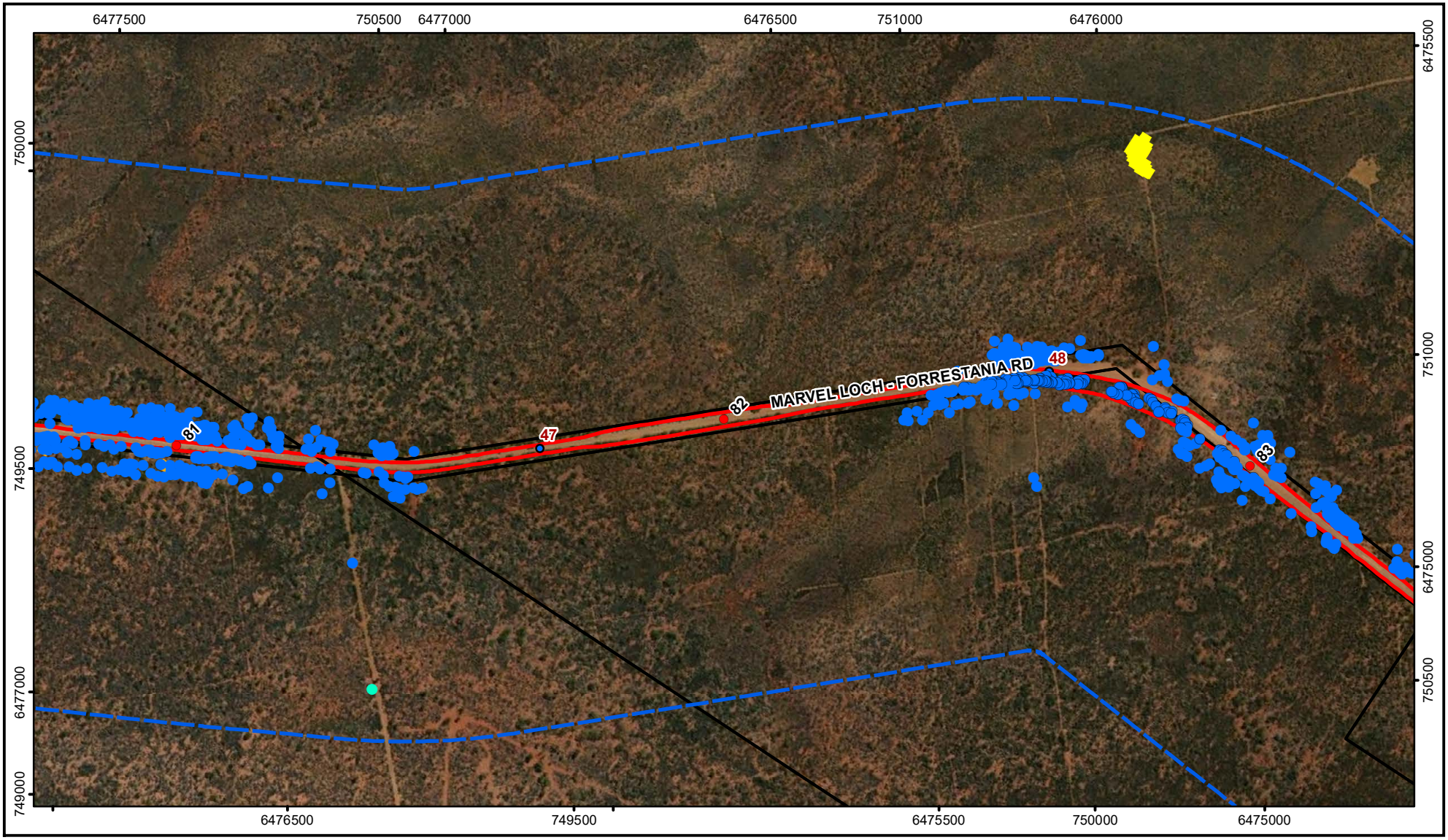
Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry
- *Flora SOI*
- Gco - Taken
- Gco - Not Taken
- Prc - Not Taken
- Grh - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 81 km to 83 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Flora SOI

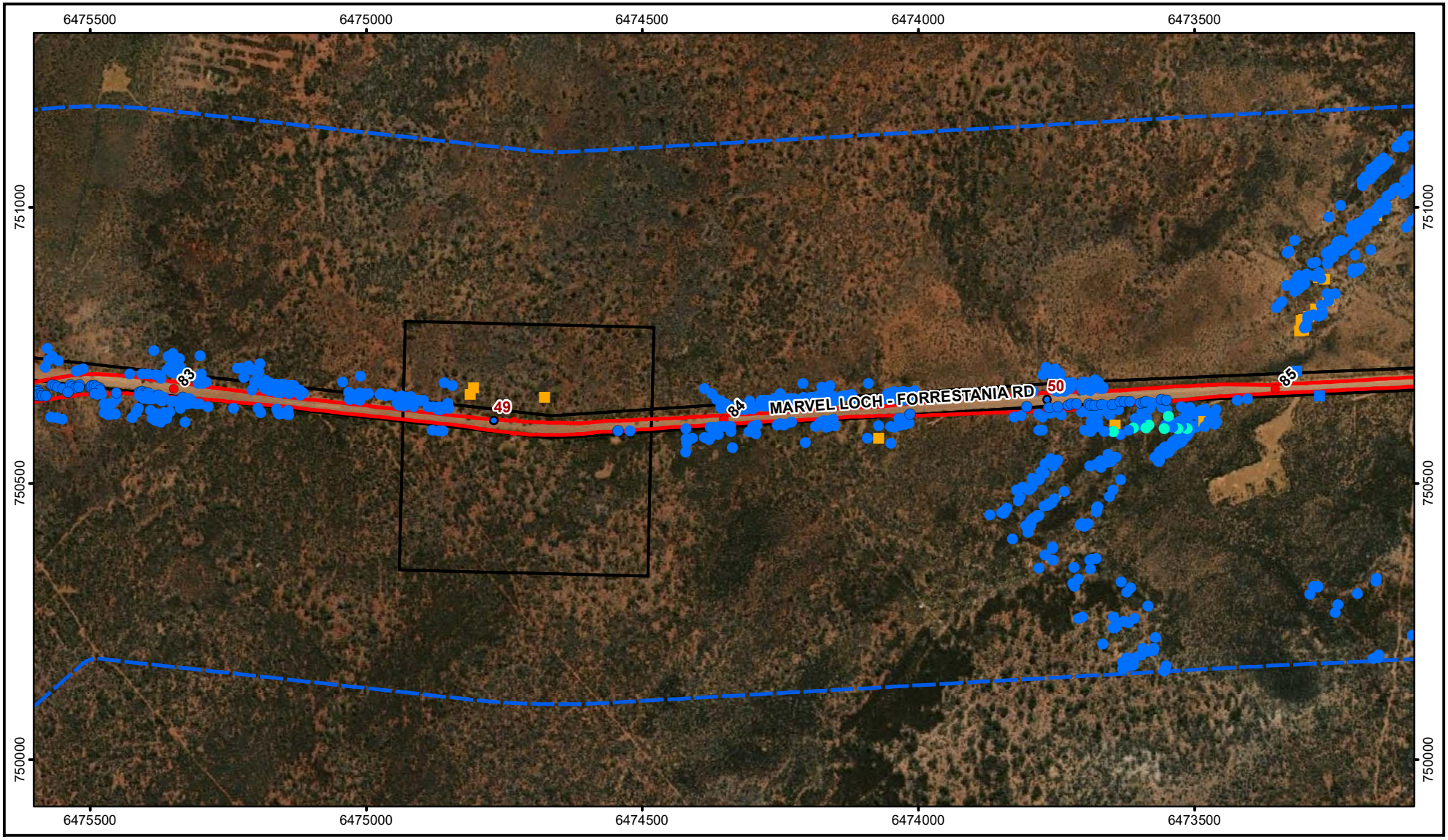
- Esg - Not Taken
- Gco - Not Taken
- Gco - Taken
- Grh - Not Taken
- Hil - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 83 km to 85 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

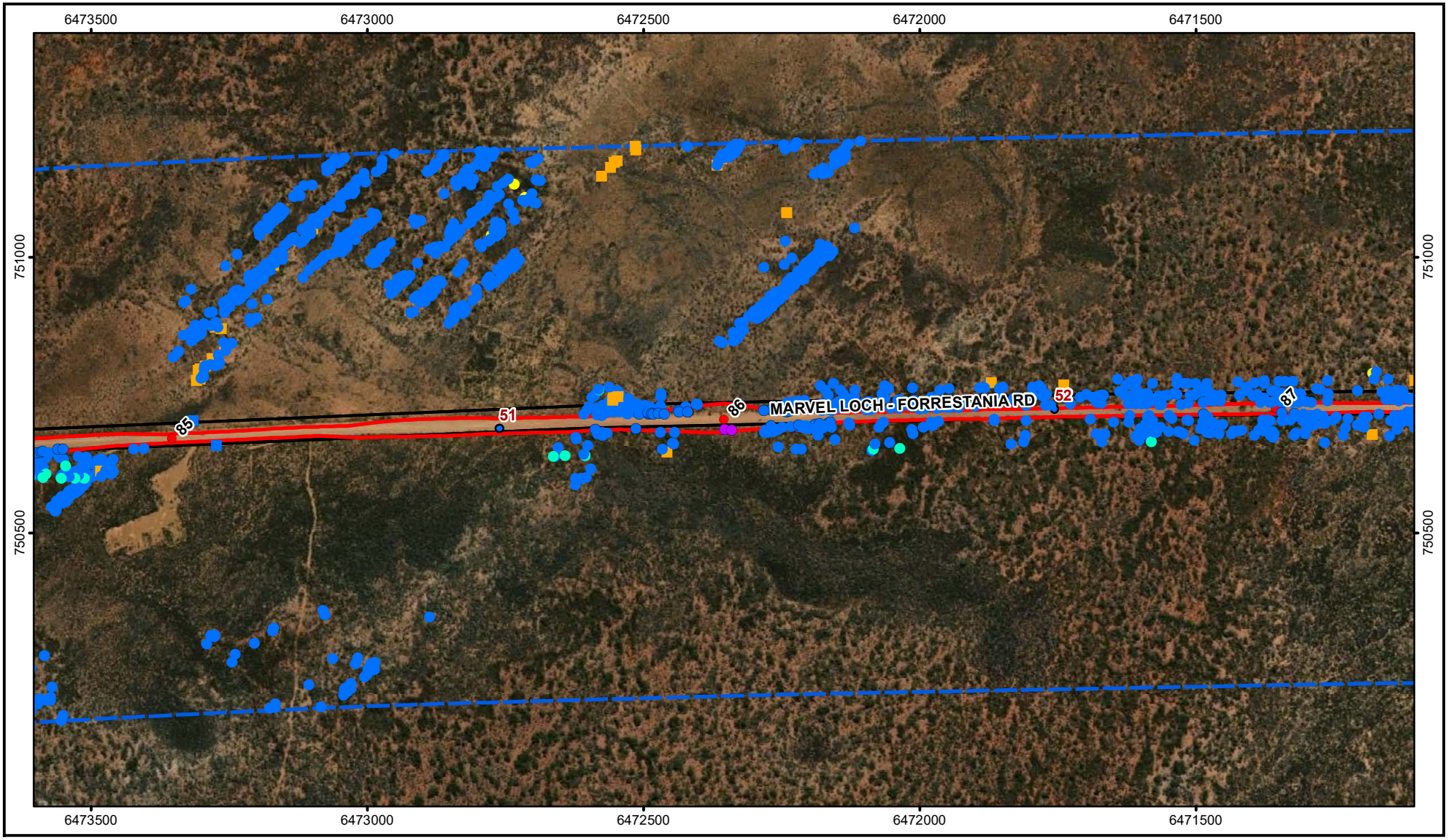
Flora SOI
- Esg - Not Taken
- Gco - Not Taken
- Gco - Taken
- Grh - Not Taken
- Prc - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 85 km to 87 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

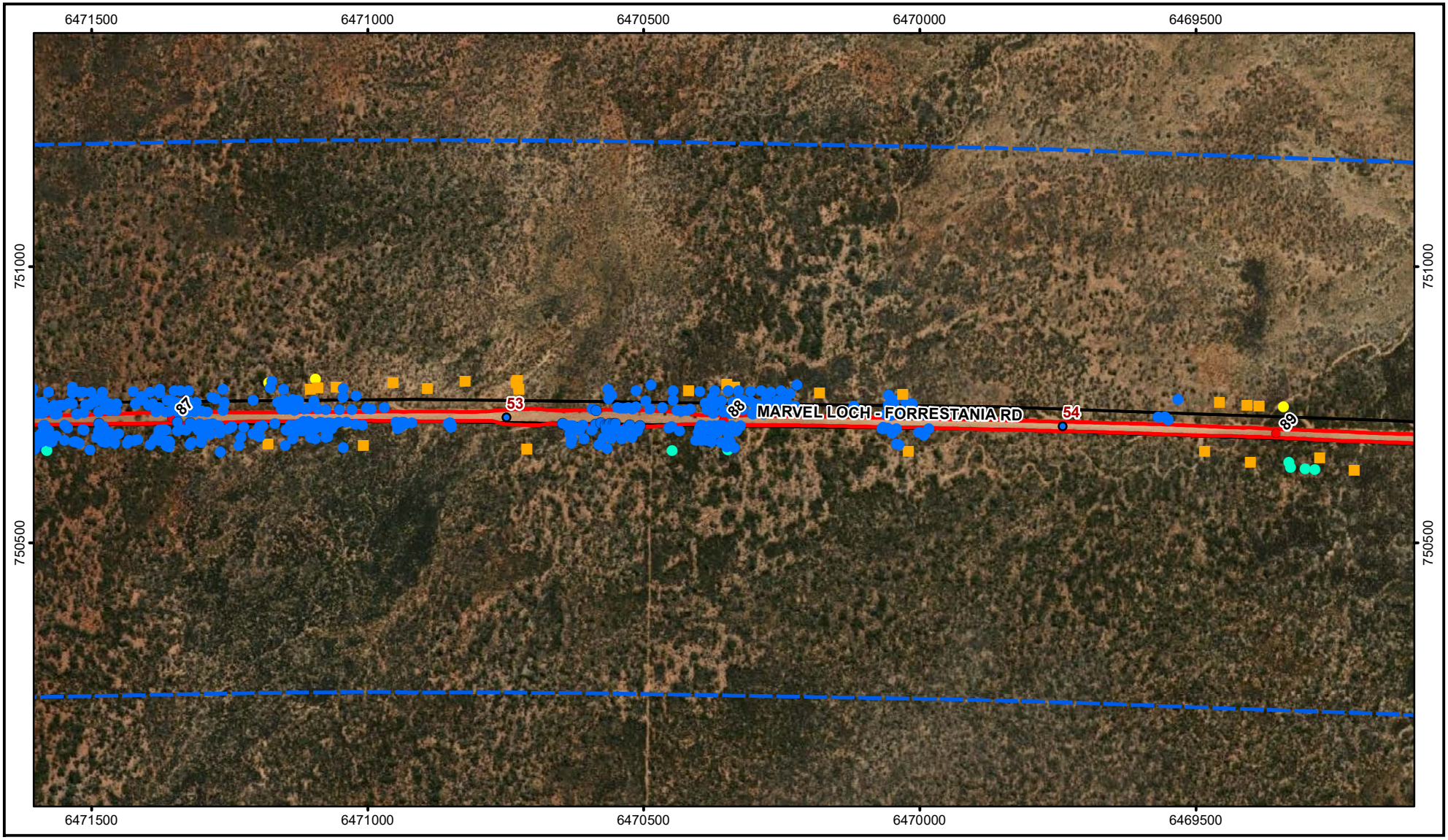
Flora SOI
- Com - Not Taken
- Cyz - Taken
- Esg - Not Taken
- Gco - Not Taken
- Gco - Taken
- Grh - Not Taken
- Prc - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 87 km to 89 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Flora SOI
- Esg - Not Taken
- Gco - Taken
- Com - Not Taken
- Gco - Not Taken
- Grh - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 89 km to 91 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT

Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_03, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

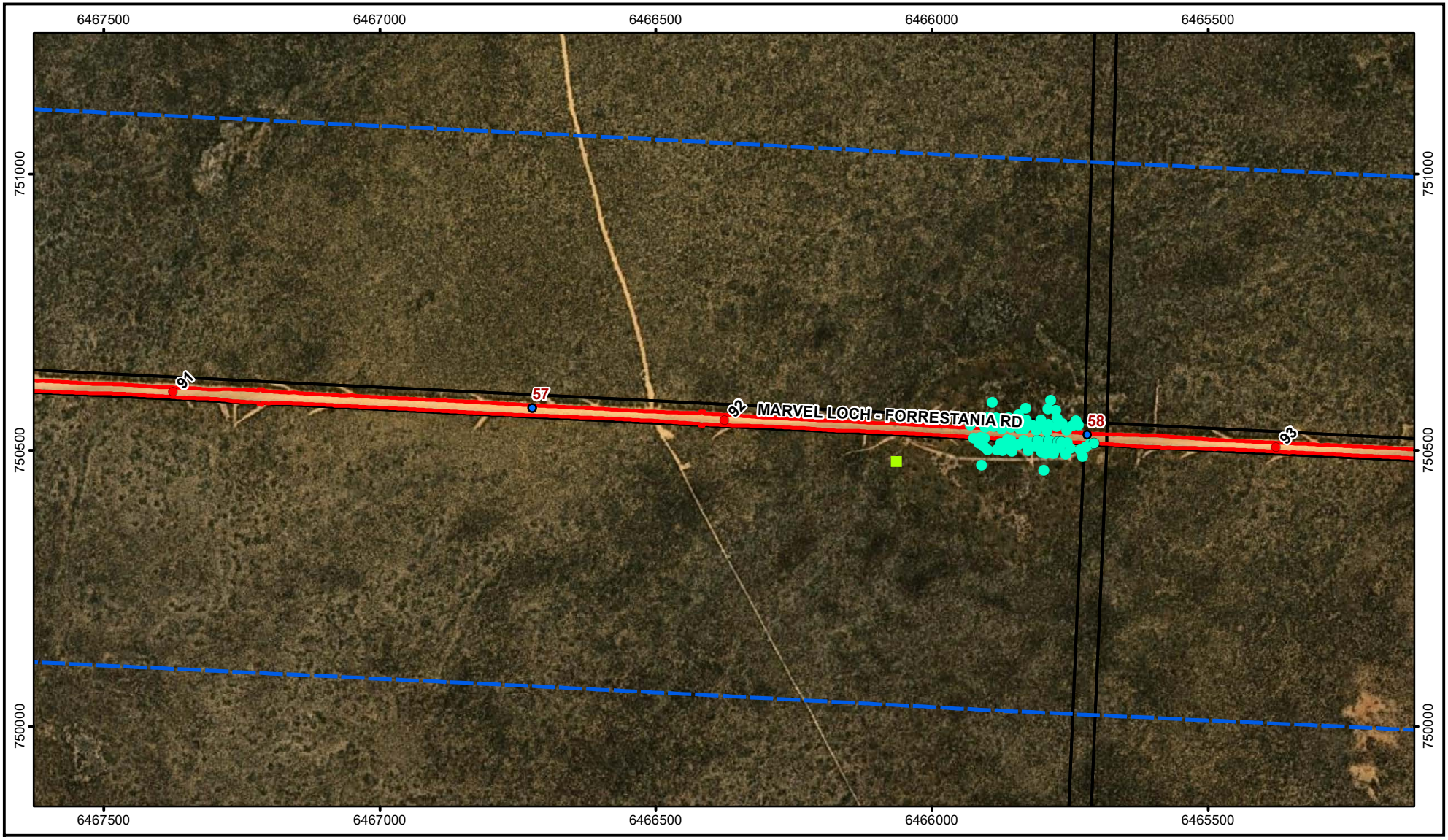
Flora SOI
- Esg - Not Taken
- Grh - Not Taken
- Com - Not Taken
- Gco - Not Taken
- Rsc - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 91 km to 93 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

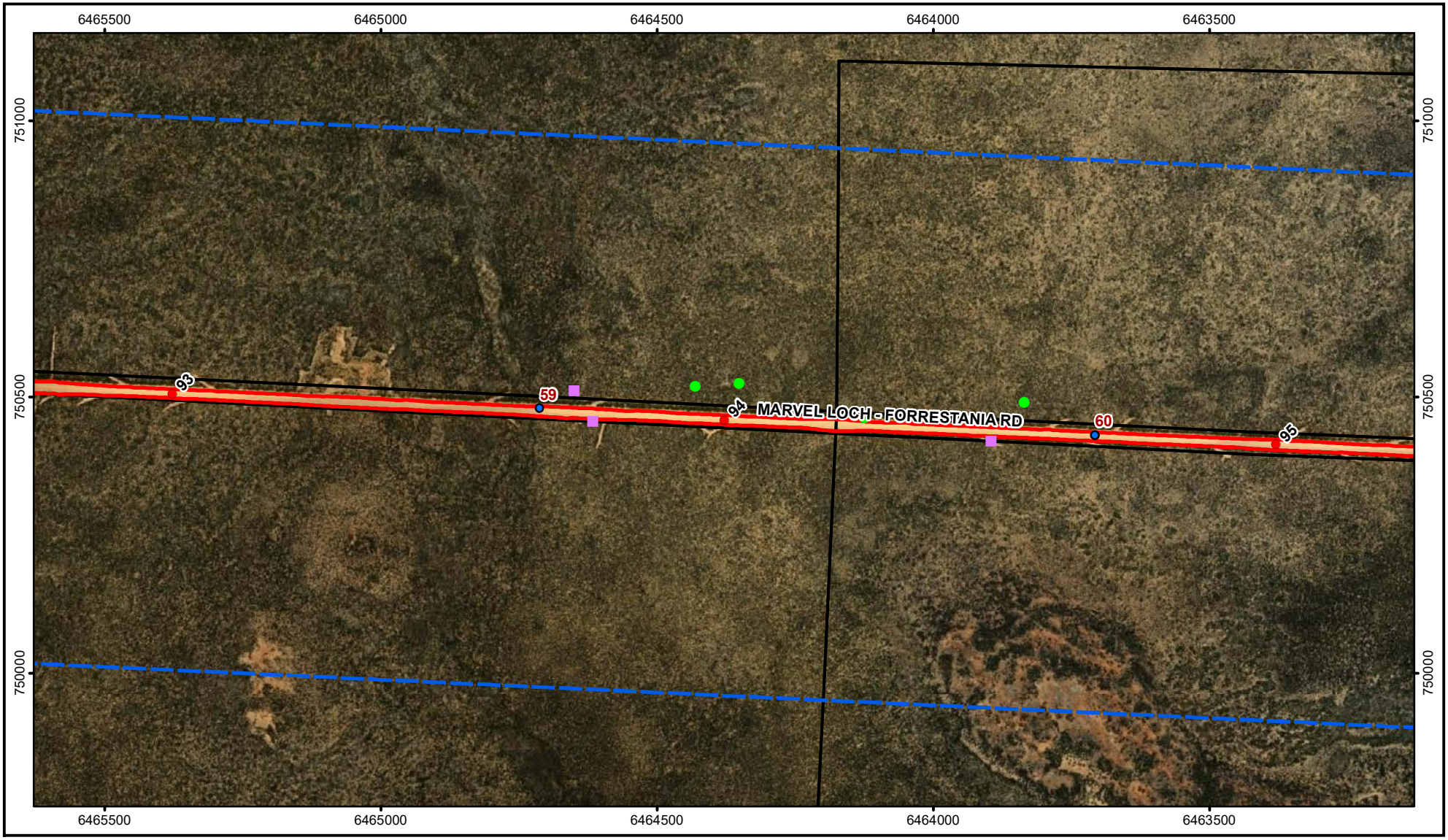
Legend
- Centreline Chainage
- *Flora SOI*
- Esg - Not Taken
- Esg - Taken
- SLK Marker
- Srm - Not Taken
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 93 km to 95 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

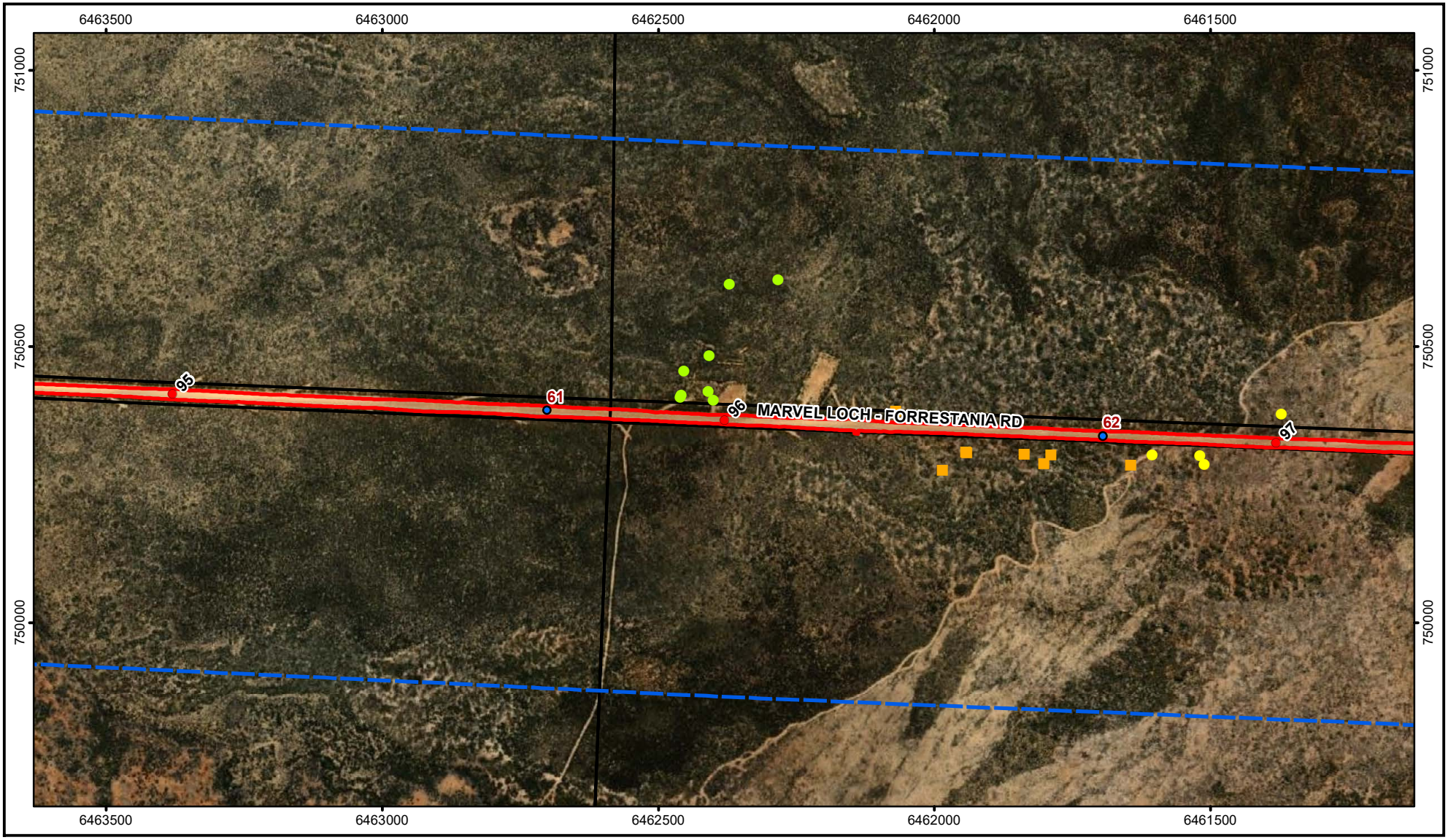
Legend
- Centreline Chainage
- *Flora SOI*
- Bau - Not Taken
- Lsp - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 95 km to 97 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

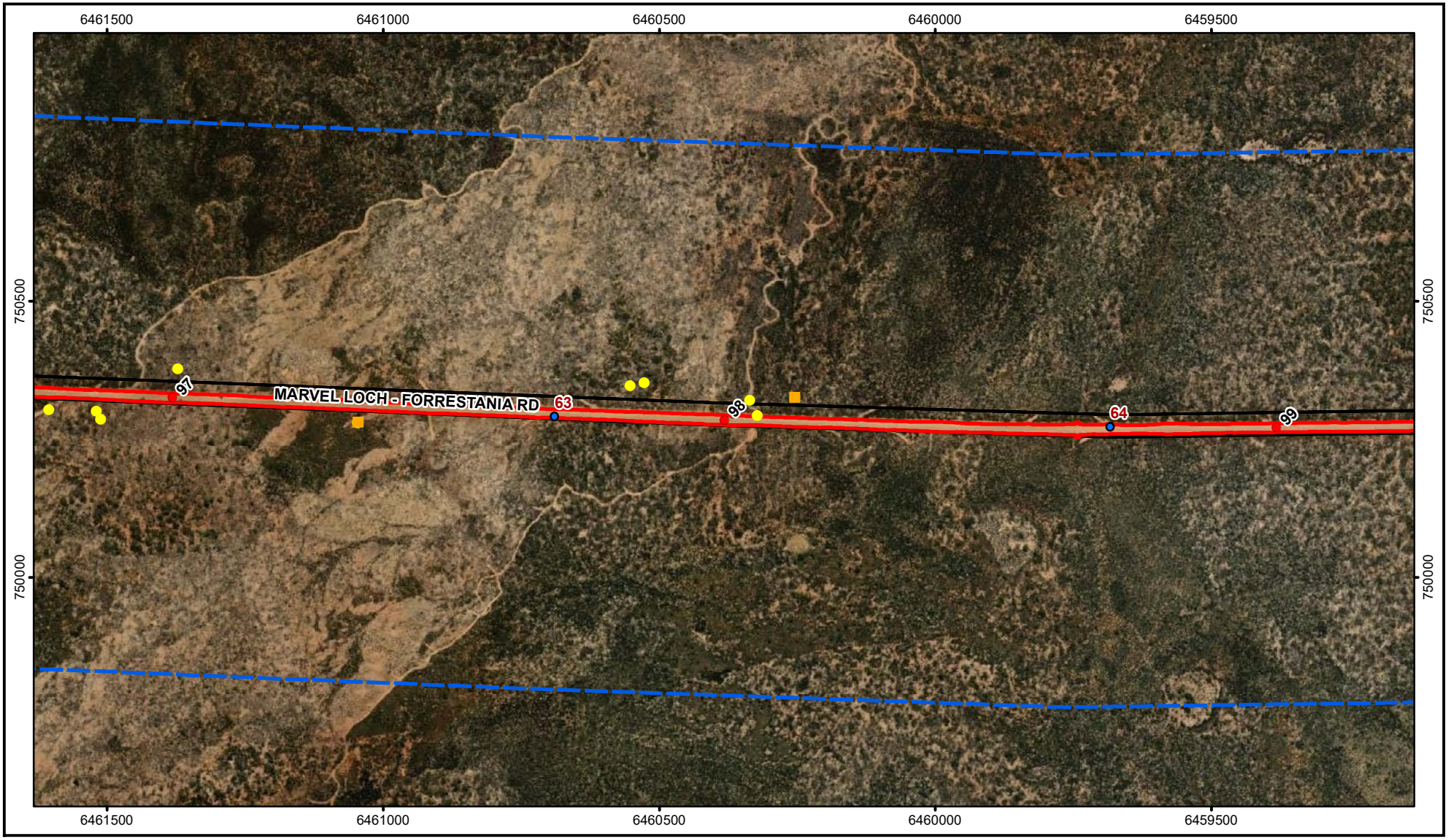
Flora SOI
- Com - Not Taken
- Gcu - Not Taken
- Grh - Not Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 97 km to 99 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

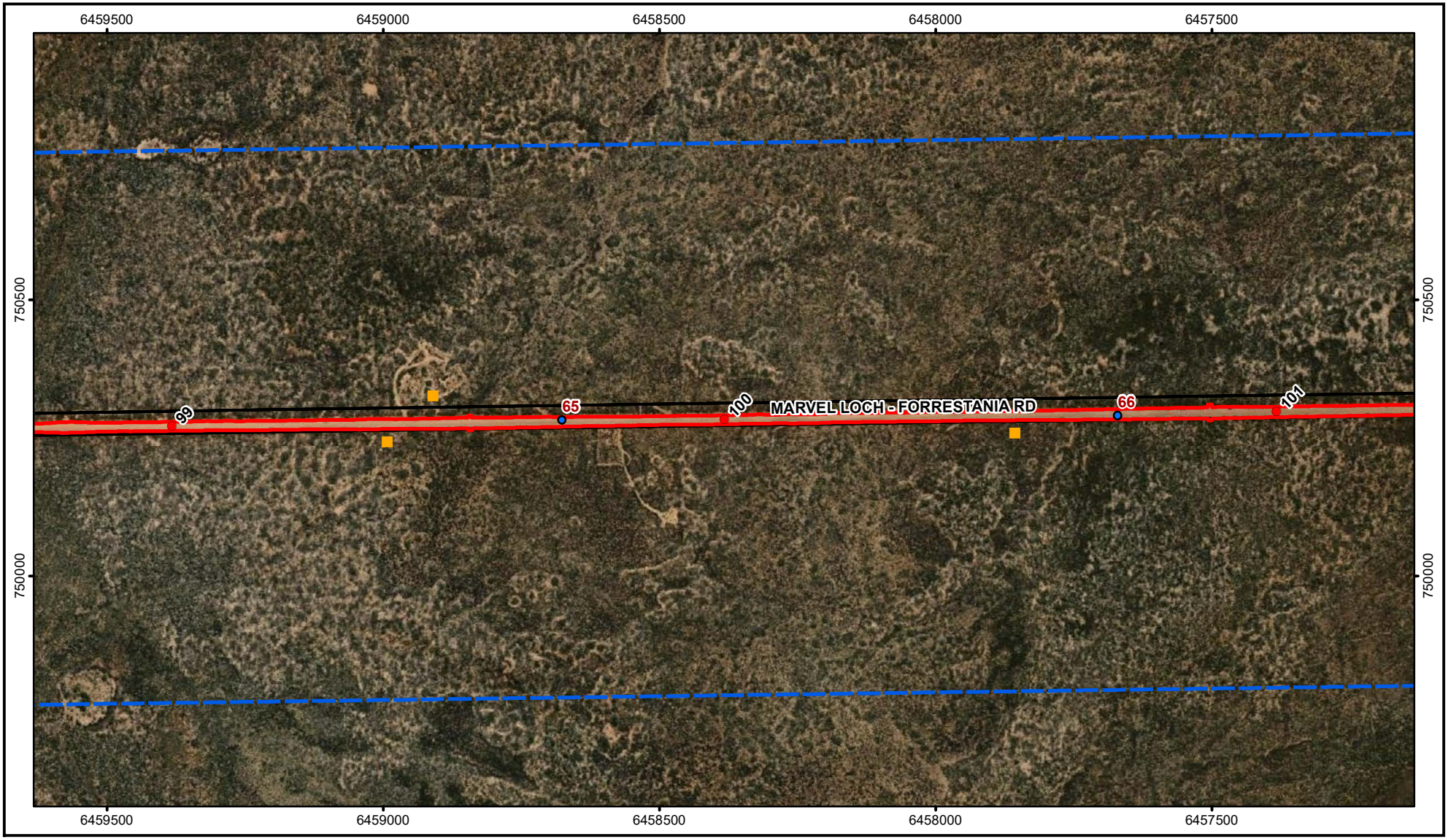
Legend
- Centreline Chainage *Flora SOI*
- Com - Not Taken
- Grh - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 99 km to 101 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

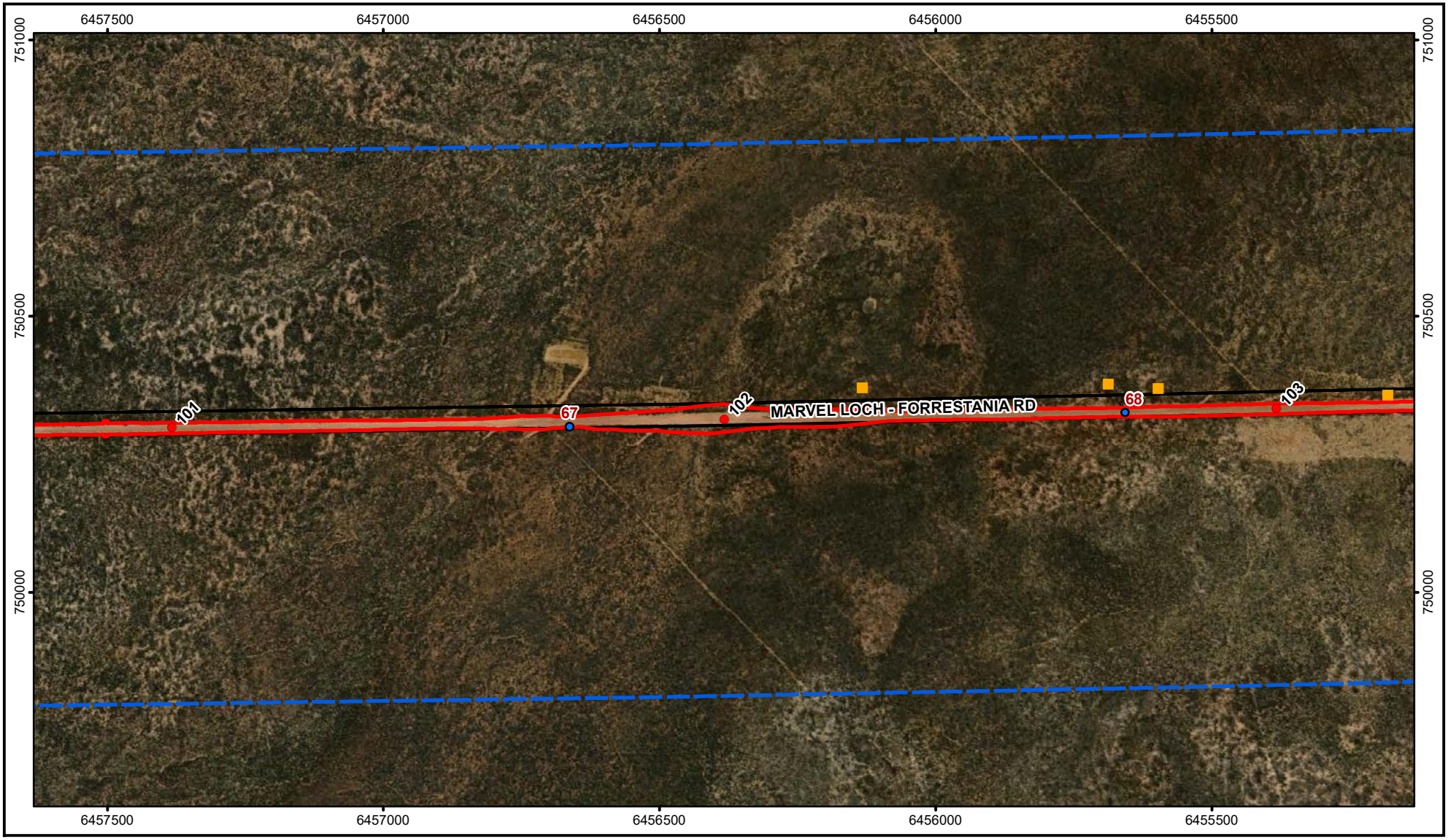
Legend
- Centreline Chainage *Flora SOI* Grh - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 101 km to 103 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

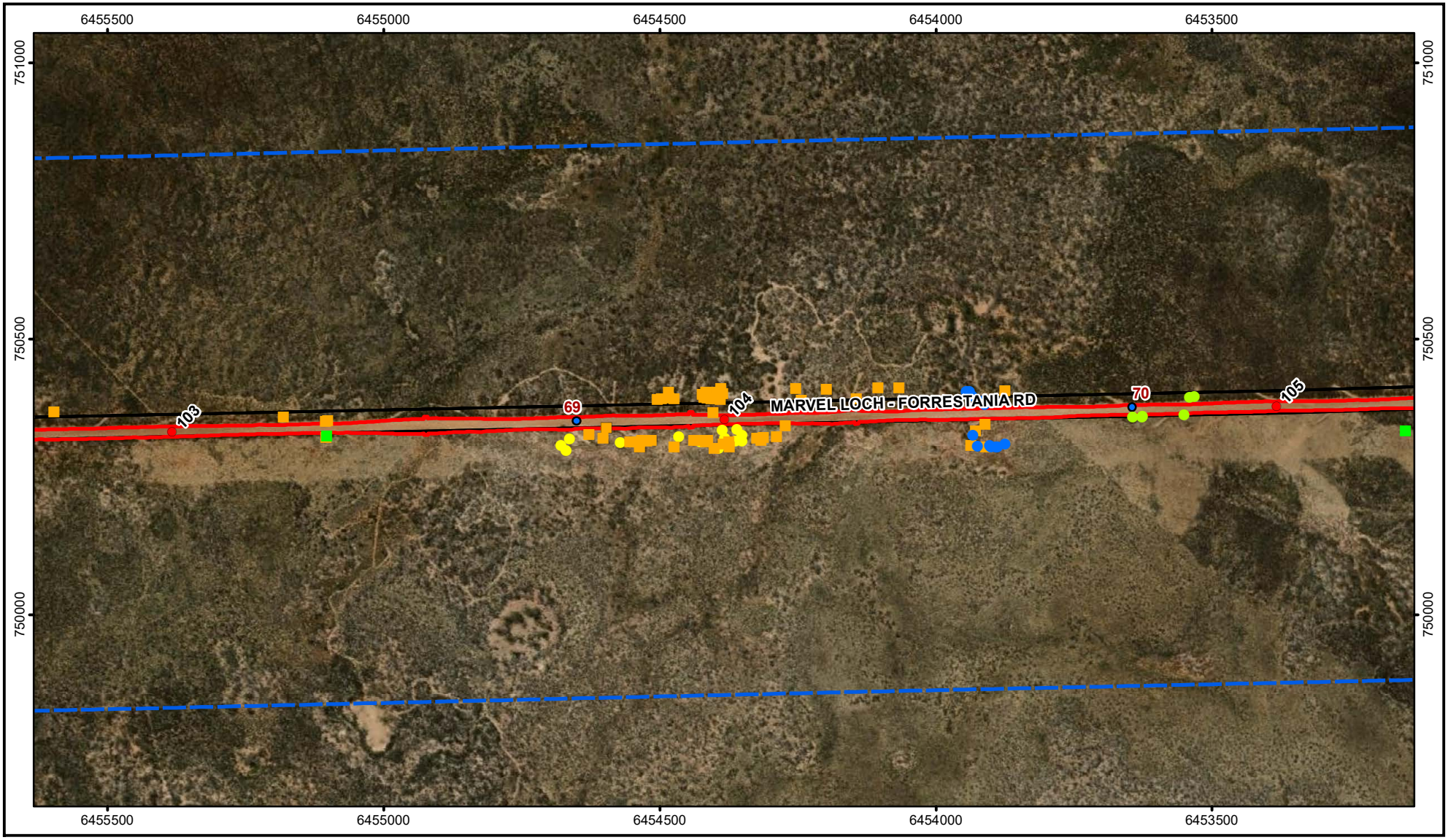
Legend
- Centreline Chainage
- *Flora SOI*
- Grh - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 103 km to 105 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

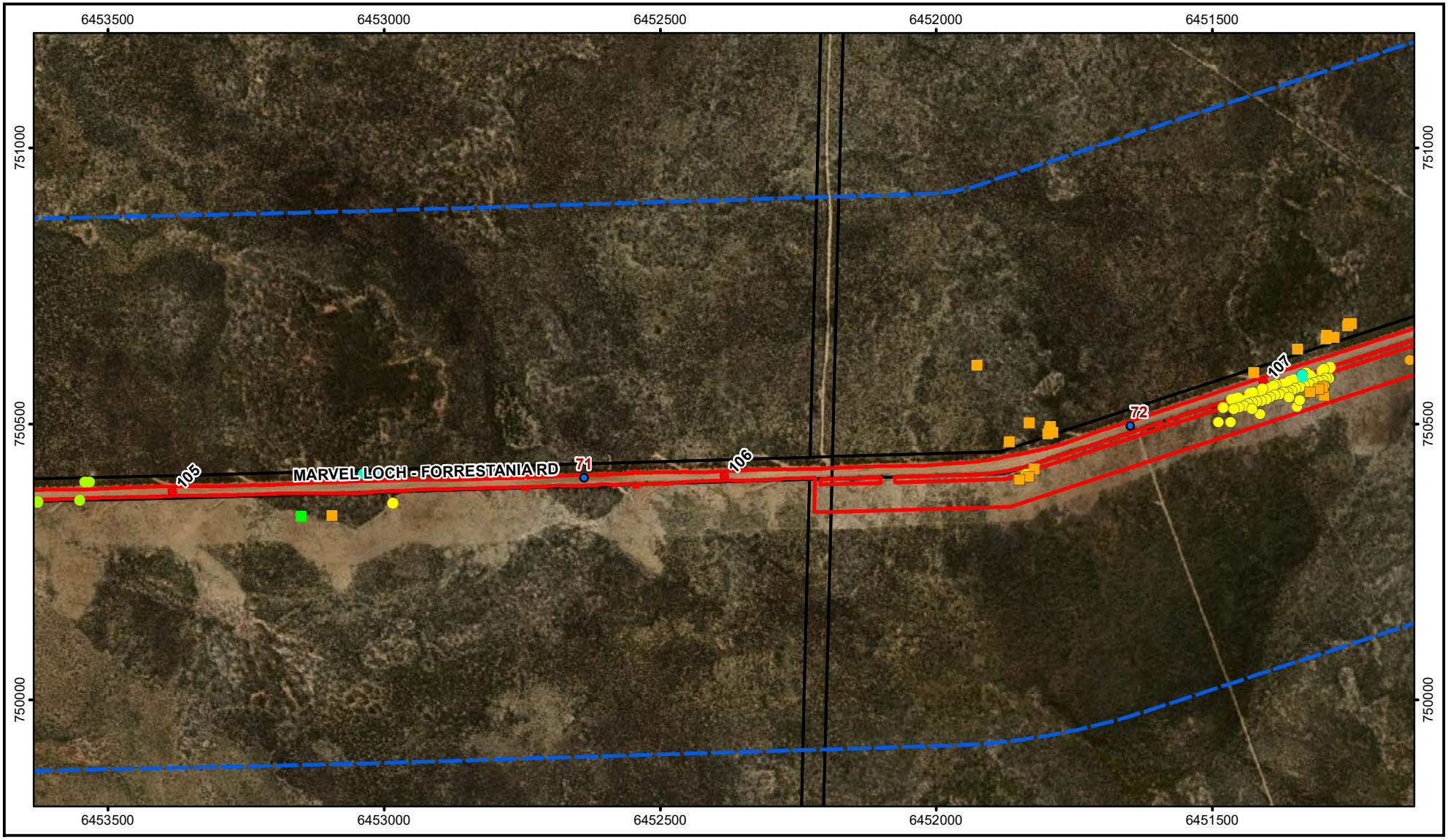
Flora SOI
- Com - Not Taken
- Gco - Not Taken
- Gcu - Not Taken
- Ghm - Not Taken
- Grh - Not Taken
- Grh - Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 105 km to 107 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



Drawn: CAD Resources (08 9246 3242), Date: Jun 2023, CAD Ref: a2765_MR_MTH_38_03_03, Rev: A
Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Flora SOI

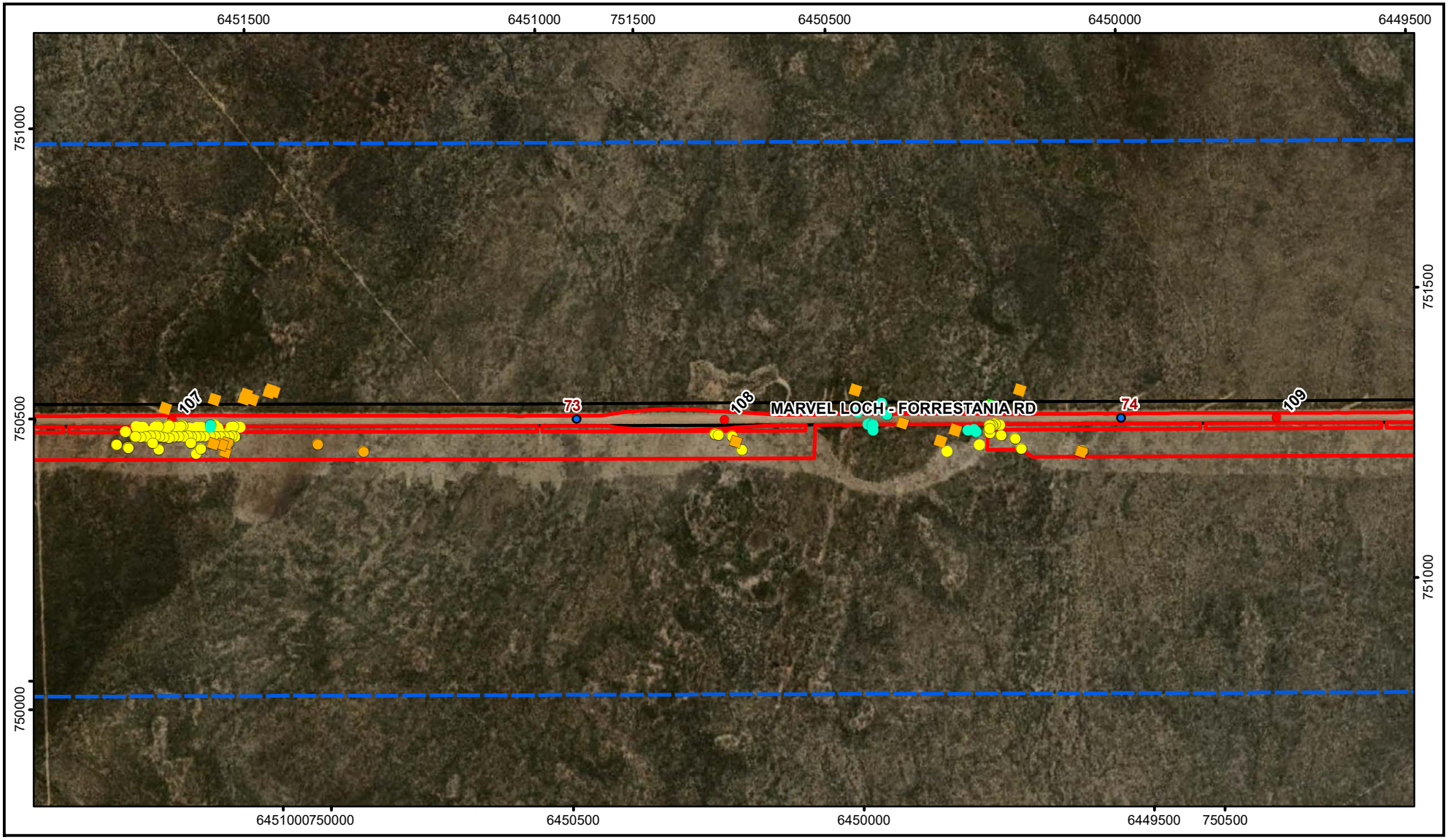
- Cki - Taken
- Com - Not Taken
- Com - Taken
- Esg - Not Taken
- Esg - Taken
- Gcu - Not Taken
- Ghm - Not Taken
- Grh - Not Taken
- Grh - Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 107 km to 109 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Flora SOI

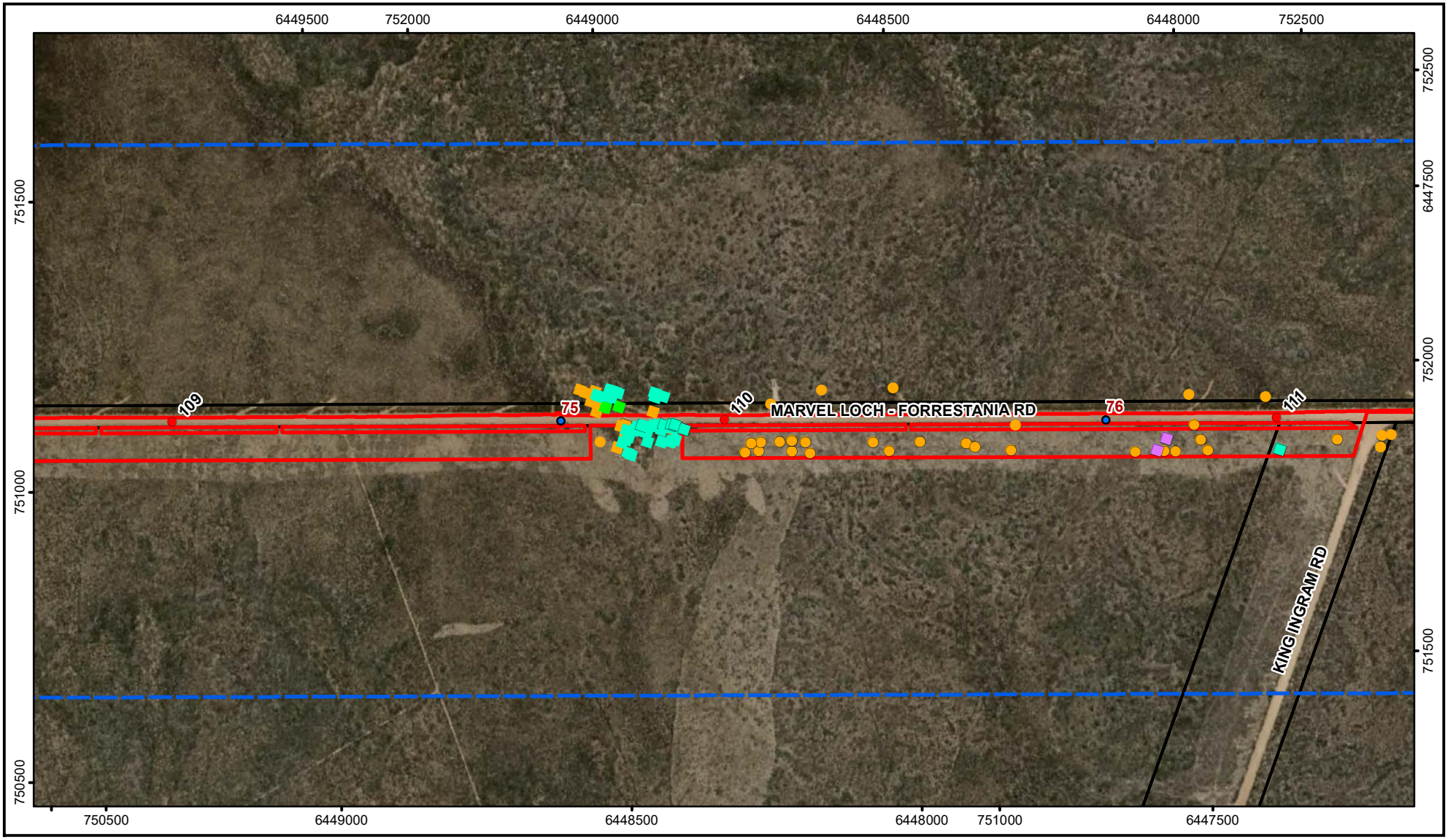
- Cki - Taken
- Com - Not Taken
- Com - Taken
- Esg - Not Taken
- Esg - Taken
- Ghm - Not Taken
- Grh - Not Taken
- Grh - Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 109 km to 111 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Flora SOI

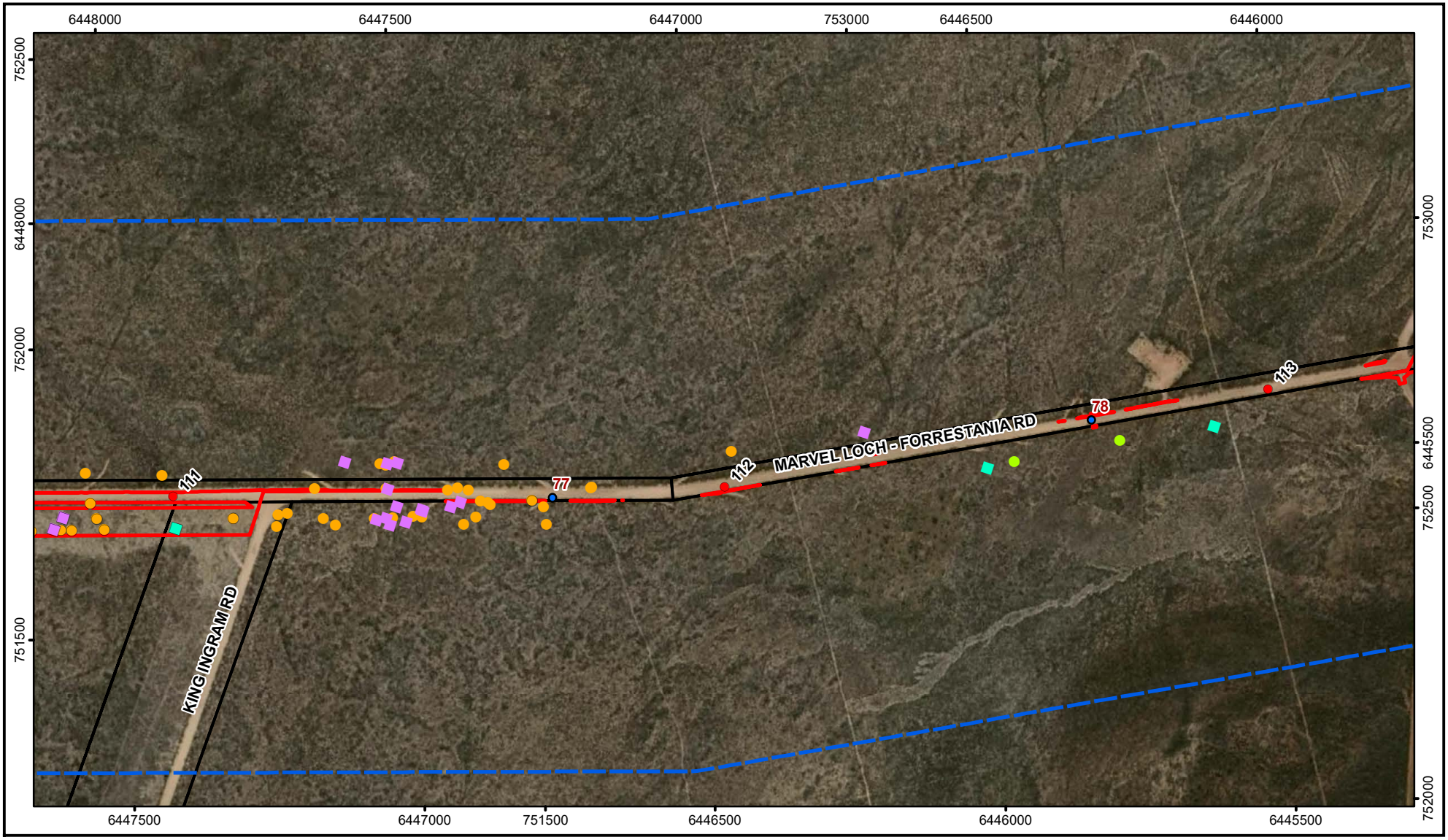
- Cki - Not Taken
- Cki - Taken
- Ghm - Not Taken
- Grh - Not Taken
- Grh - Taken
- Lsp - Taken
- Msp - Not Taken
- Msp - Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 111 km to 113 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend

- Centreline Chainage
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

Flora SOI

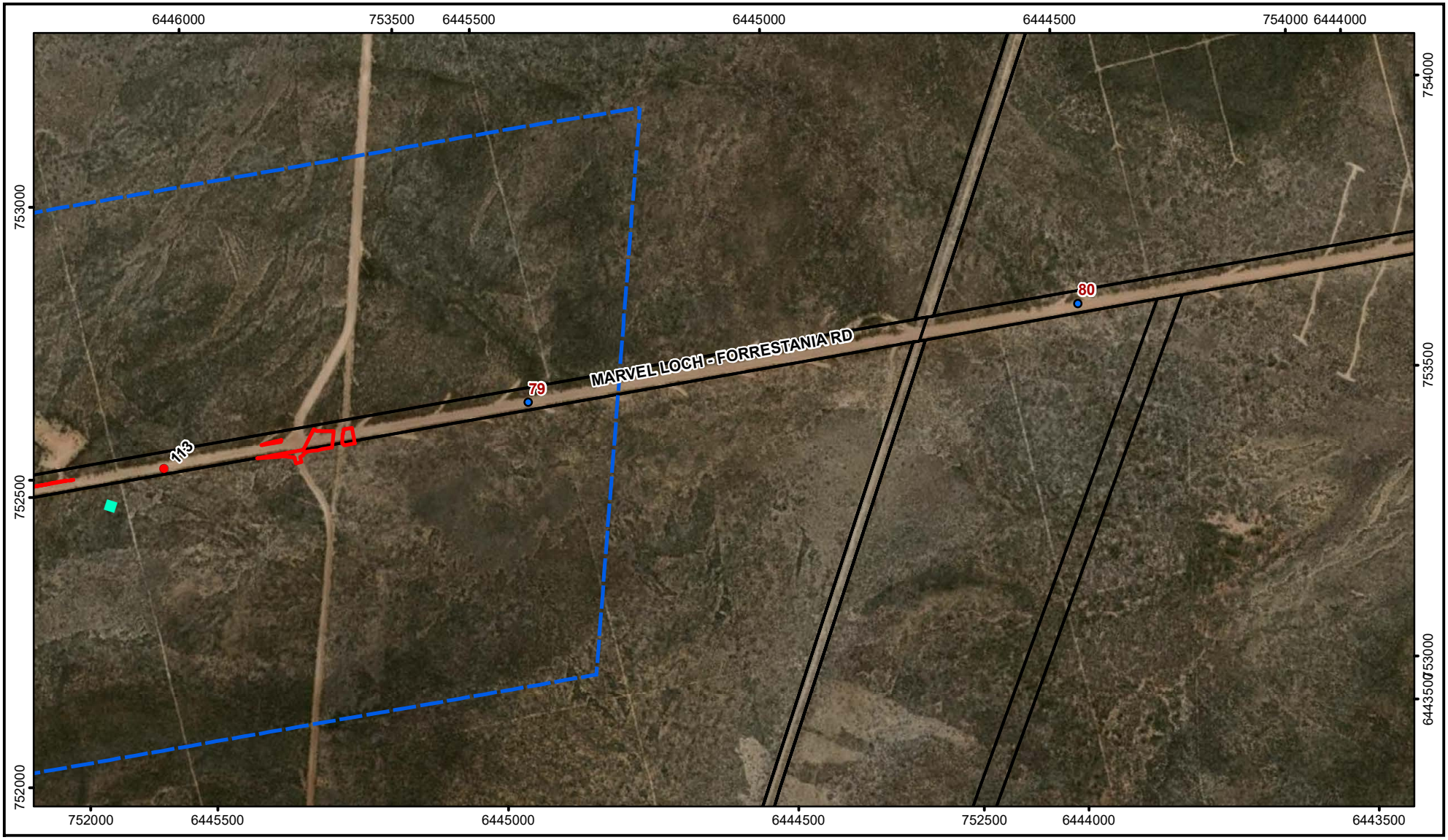
- Cki - Not Taken
- Cki - Taken
- Gcu - Not Taken
- Lsp - Not Taken
- Lsp - Taken
- Msp - Not Taken
- Msp - Taken

0 0.2 km

N

Earl Grey Lithium Project
Marvel Loch-Forrestonia Rd Upgrade
CPS 10049/1 - Chn 113 km to 115 km - Flora - Species of Interest - excluding *Phebalium* species

DRAFT



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Scale 10,000, A4, Projection MGA94 zone 50
Source: Roads_MRWA, Cadasta: Landgate, CPS: DWER
For detailed legend refer to report

Legend
- Centreline Chainage *Flora SOI*
- Msp - Not Taken
- SLK Marker
- CPS 10049/1
- Survey Limit
- Cadasta Bdry

0 0.2 km

N

Appendix 8. Descriptions of Priority Flora (Interim)

Table of Contents

Common name: N/A
Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/17452
Reference: George, Alexander S. 1981. 'The Genus Banksia L.f. (Proteaceae)'. *Nuytsia: journal of the Western Australian Herbarium* 3(3): 239–473.

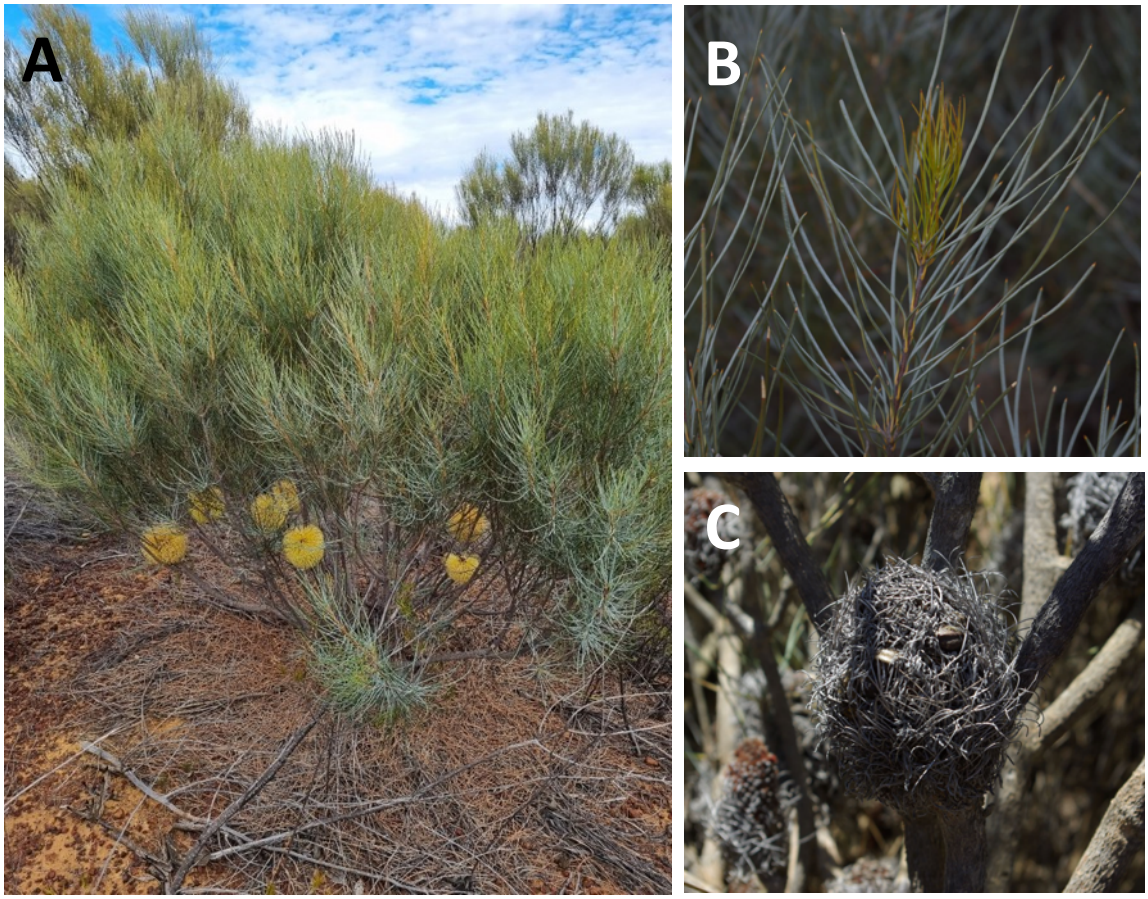

Figure 1 A; A *Banksia dolichostyla* shrub in flower. (Photograph credit: Eliza-Joyce Mellersh) B; *Banksia dolichostyla* foliage, showing soft new growth and blue subterminal leaves. C; *Banksia dolichostyla* fruit. (Photograph credit: Geoff Cockerton)

Description:
Banksia dolichostyla is a perennial shrub reaching 2-3 m in height, with many stems arising from a lignotuber. (A. S. George 1981). Leaves are linear, straight to slightly incurved, 2.5-10 cm long, and bluish-green in colour. (Figure 1A; 1B). Flowering occurs in March to May, and flowers are golden (Figure 1A). The fruit is spherical and 4-8 cm wide (Figure 1C).

Banksia dolichostyla was originally described as *Banksia sphaerocarpa* var. *dolichostyla* (A. S. George 1981), but was elevated to species rank by Dr. Kevin Thiele in 2023. A closely related *Banksia* species, *B. sphaerocarpa* var. *caesia*, may be confused with *B. dolichostyla*. When comparing the two species, *B. dolichostyla* has a significantly longer perianth (49-55 mm) and style (50 – 65 mm) and somewhat longer follicles (15-22 mm long, 5-8 mm high, 10-15 mm wide; George 1981).

Habitat:
Banksia dolichostyla grows in lateritic gravel, in low open woodland and low shrubland (A. S. George 1981). Near Mount Holland, *Banksia dolichostyla* grows on low gravely laterite and ironstone hills overlying greenstones (Mattiske, 2019).

Distribution:
The distribution of *B. dolichostyla* is limited, extending from Mt. Holland to South Ironcap, east of Hyden (Western Botanical, 2020; George 1981). The current records display a more extensive range, but a recent review of specimens housed at the WA Herbarium found that many had been misidentified. The distribution of *B. dolichostyla* is more limited than what the current records show (Western Botanical, 2020; Figure 2).

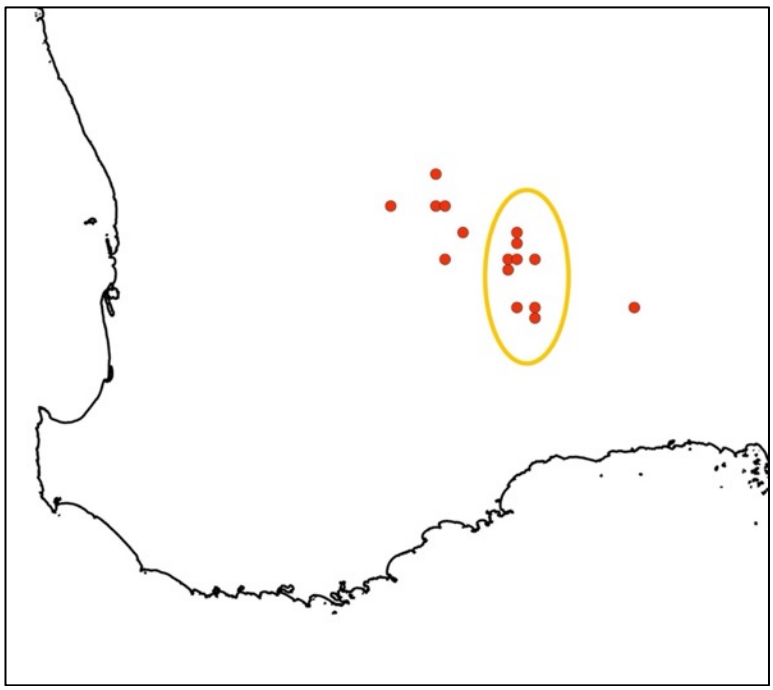

Figure 2 Distribution of *Banksia dolichostyla* in Western Australia. (Data from Florabase/Australian Virtual Herbarium.) Close studies of specimens at the WA Herbarium determined that some of these has been misidentified. Specimens confirmed as *Banksia dolichostyla* are circled in yellow.

***Brachyloma stenolobum* Priority 1** **Ericaceae**

Common name: N/A
Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/44681
Reference: Hislop, Michael, and Raymond Cranfield. 2014. '*Brachyloma stenolobum* (Ericaceae: Styphelioideae: Styphelieae), a new, white-flowered species for Western Australia'. *Nuytsia* 24: 255–61.

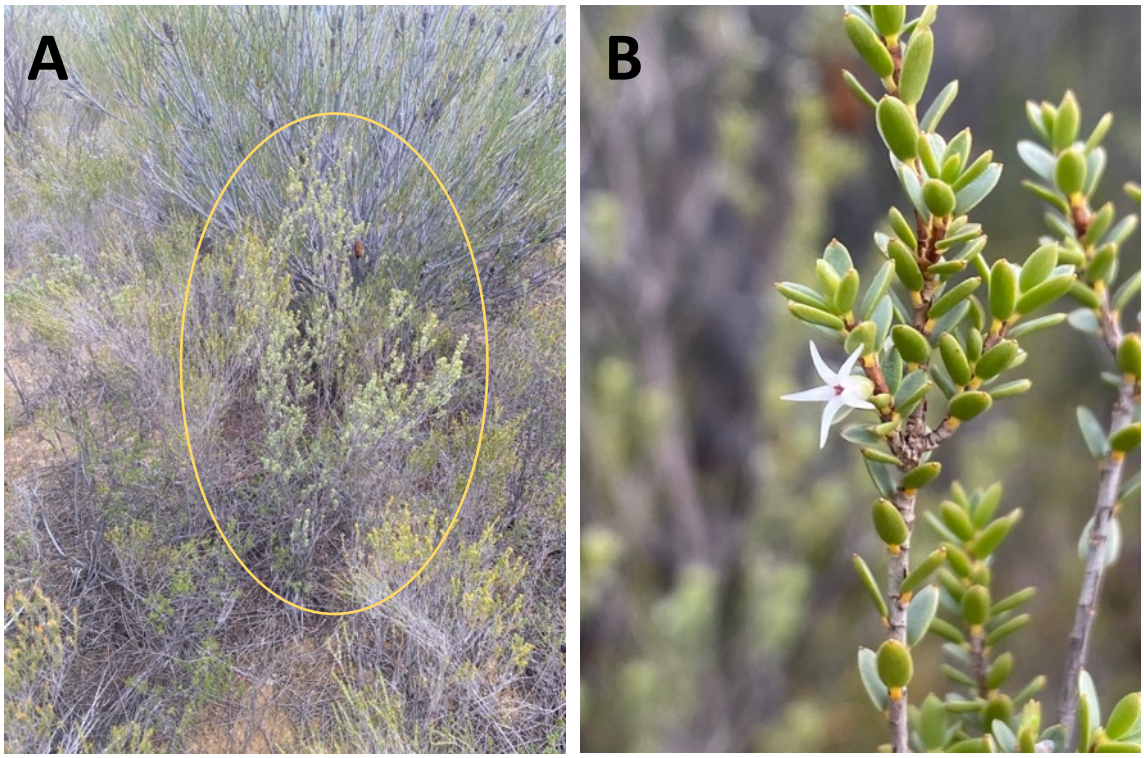

Figure 3 A; *Brachyloma stenolobum* shrub (circled in yellow). B; *Brachyloma stenolobum* flower and leaves. (Photograph credit: Geoff Cockerton)

Description:
Brachyloma stenolobum is a shrub of approximately 1.5m high and 1.2 m wide (Figure 3A; Hislop and Cranfield 2014). It is single-stemmed at ground level. Leaves are 3.0-4.8mm long and narrowly elliptic to elliptic (Figure 3B). The leaves have a blunt callus tip, and the base is rounded. Petioles are distinct and approximately 0.6-1.0 mm long. The abaxial surface has 5-7 raised primary veins with broad, shallow grooved between them. Flowers are white with narrowly triangular corolla lobes (Figure 3B), and this feature is unique among *Brachyloma* species (Hislop and Cranfield 2014).

When not in flower, *Brachyloma stenolobum* may be confused with other Ericaceae species, including *Conostephium drummondii*, *Styphelia coelophylla*, *Leucopogon* sp. Boorabbin and *Leucopogon* sp. Forrestania. Key features of *B. stenolobum* leaves include an apex with a blunt callus tip (not pungent), and an absence of translucent margins.

Habitat:
Brachyloma stenolobum grows on yellow sandplain. Associated species include *Allocasuarina spinosissima, Acacia heteroneura, Melaleuca cordata* and *M. calyptroides* (Hislop and Cranfield 2014).

Distribution:
The current known distribution of *Brachyloma stenolobum* is limited to the Forrestania area and east of Lake Hope in the south-west corner of the Coolgardie bioregion Figure 4; Hislop and Cranfield 2014).

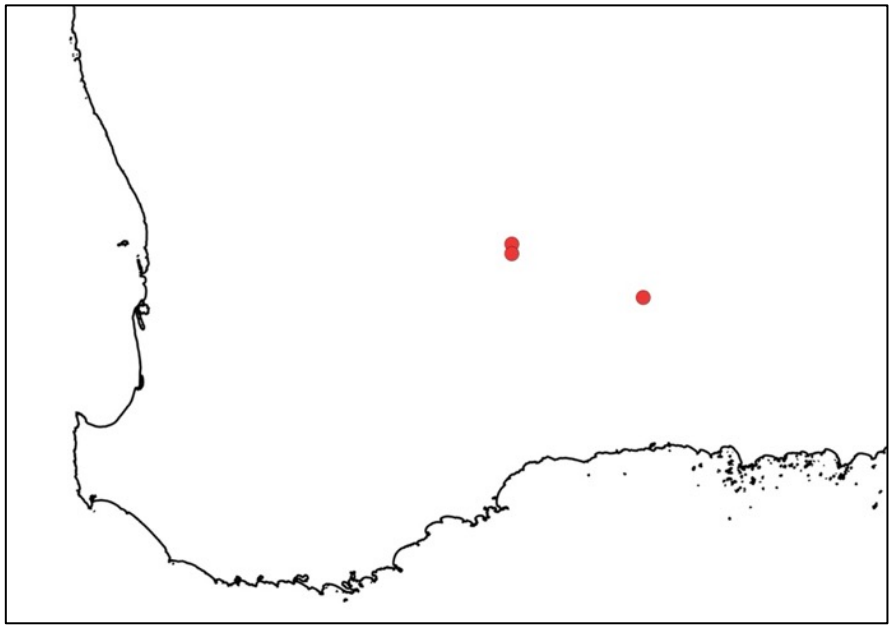

Figure 4. Distribution of *Brachyloma stenolobum* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Cryptandra exserta* Priority 1** **Rhamnaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/31615

Reference: Rye, Barbara. 2007. 'New Species and Keys for *Cryptandr*a and *Stenanthemum* (Rhamnaceae) in Western Australia'. *Nuytsia* 16: 325–82.

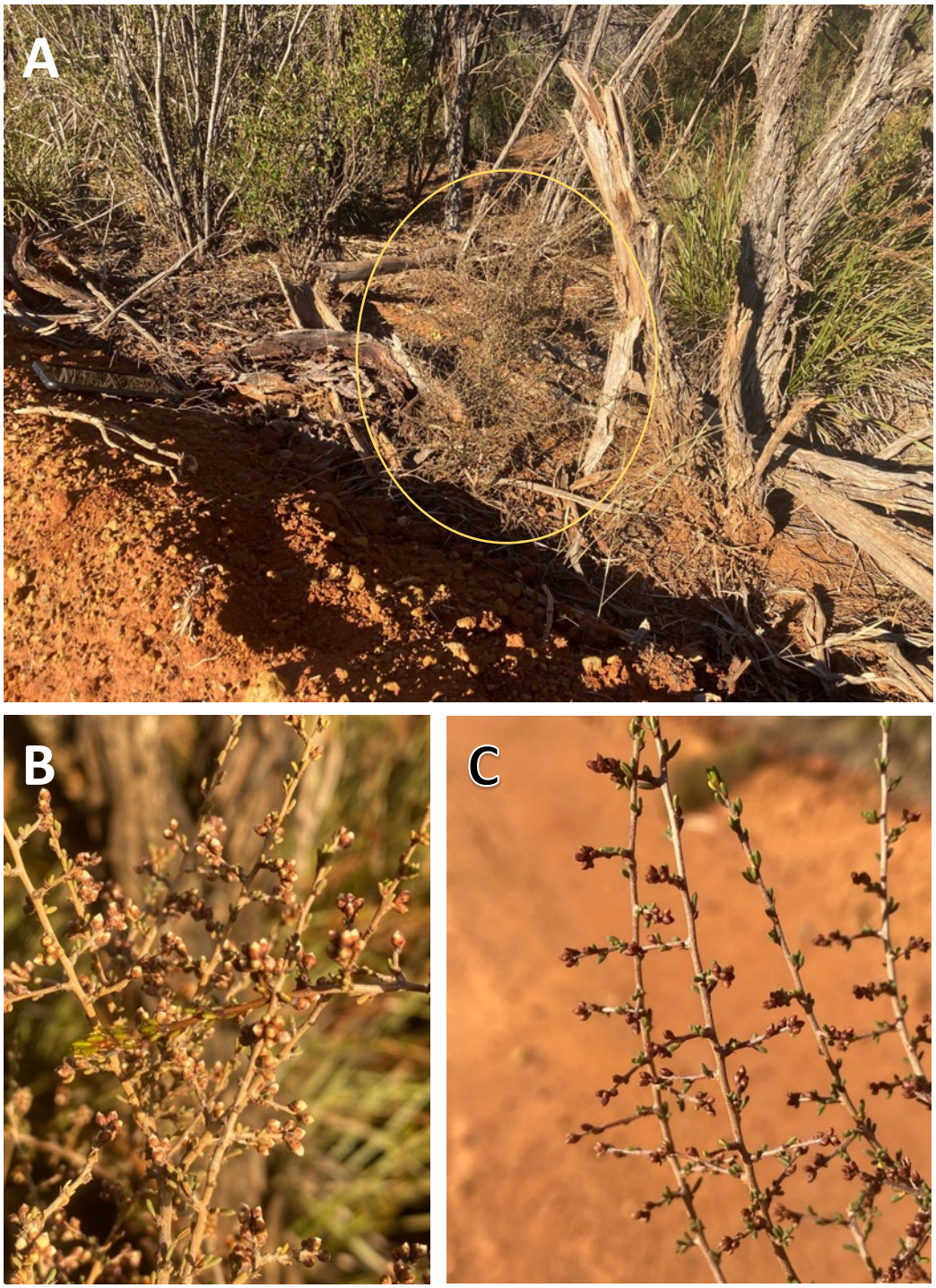

Figure 5 A; *Cryptandra exserta* shrub, circled in yellow. B; *Cryptandra exserta* leaves and buds C; *Cryptandra exserta* leaves and immature buds. (Photograph credit: Geoff Cockerton)

Description:
Cryptandra exserta is a shrub reaching approximately 0.5m high (Figure 5A; Rye 2007). Branchlets are not obviously spinescent, and young branches have a covering of long fine white hairs while older branchlets are glabrous. Leaves are narrowly oblong, 2.3-2.5 mm long, with recurved margins that almost completely conceal the lower surface (Figure 5B, C). The concealed surface is white and hairy. Flowers are white, and there are generally 2-5 per branchlet in a terminal cluster (Figure 5B). Flowers protrude far out of a whorl of approximately 10 bracts.

Cryptandra exserta is closely related to *C. wilsonii*, but is distinguished by larger flowers, and petioles tending to be hidden within the stipule pair (Rye 2007).

Habitat:
Collections have been recorded in sandy soil with lateritic gravel and rocks in mallee-dominated vegetation and red sand over clay in vegetation with *Acacia, Allocasuarina* and *Santalum* (Rye 2007).

Distribution:
The current known distribution is within the region of Hatter Hill east to between Norseman and Kumarl (Figure 6; Rye 2007). The distance between the two recorded locations is approximately 160 km, and additional populations are likely to be discovered by future surveys.

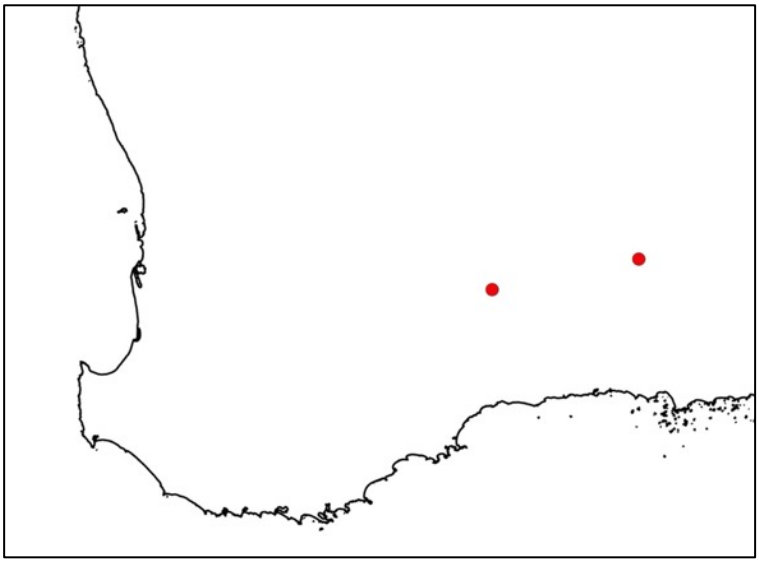

Figure 6. Distribution of *Cryptandra exserta* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/12860

Reference: Munir, Ahmad Abid. 1991. 'Two New Species of *Dicrastylis* J.Drumm. Ex Harvey (Chloanthaceae) from Western Australia'. *Journal of the Adelaide Botanic Garden* 14(1): 85–92. http://www.jstor.org/stable/23874432.

Figure 7 A; A *Dicrastylis capitellata* shrub (IMG_7205). B; *Dicrastylis capitellata* leaves and buds (IMG_7207). (Photograph credit: Geoff Cockerton) C; *Dicrastylis capitellata* buds beginning to open, showing blue-purple petals. (Photograph credit: Nicole Dakin)

Description:

Dicrastylis capitellata is a low shrub, reaching 20-25 cm high and spreading to about 100 cm in diameter (Figure 7A; Munir 1991). Branches are erect, woody and have greyish hairs. Leaves are sessile, linear to narrow linear with recurved margins, and are approximately 6-15 mm long. They have dense grey hairs on the lower surface (Figure 7B, C). Flowers are clustered in cymes of usually 7 flowers and are 5-7 mm in diameter. Each flower is subtended by a bract, and is light purplish-blue or pale mauve in colour (Figure 7B, C). There are usually 4 stamens in each flower.

A closely related species, *Dicrastylis lewellinii*, is similar to *D. capitellata*, but does not occur in Western Australia (Munir 1991). *Dicrastylis flexuosa* is another similar species, but its range

begins further north. It also has larger flowers and flower-bracts, very woolly flower clusters which are always opposite, and 5 stamens in each flower. *Dicrastylis nicholasii* has similar sized leaves and flower clusters when compared to *Dicrastylis capitellata*, but does not overlap in range. Flower clusters are also always on a distinct peduncle 15-25 mm long, flowers are larger, and have 5 stamens.

Habitat:
Records indicate that *D. capitellata* grows on loamy sand or sandy loam (Florabase). It has been recorded in low woodland, mallee and heath, growing with *Eucalyptus* species and *Melaleuca* species. It has also been recorded growing in low-lying, well-drained areas near open areas and salt lakes (Florabase).

Within the project, *Dicrastylis capitellata* has been recorded as growing in one location along the haul road alignment, approximately 7 km north of King Ingram Road. An individual has also been recorded east of the mine development envelope. *Dicrastylis capitellata* seems to be associated with *Melaleuca ochroma*.

Distribution:
Dicrastylis capitellata is endemic to the south-west of Western Australia, and has been recorded between north and north-east of Mt Heywood, 100 km north-east of Esperance, (Munir 1991) and near Mt Holland and Hyden (Figure 8; Florabase)

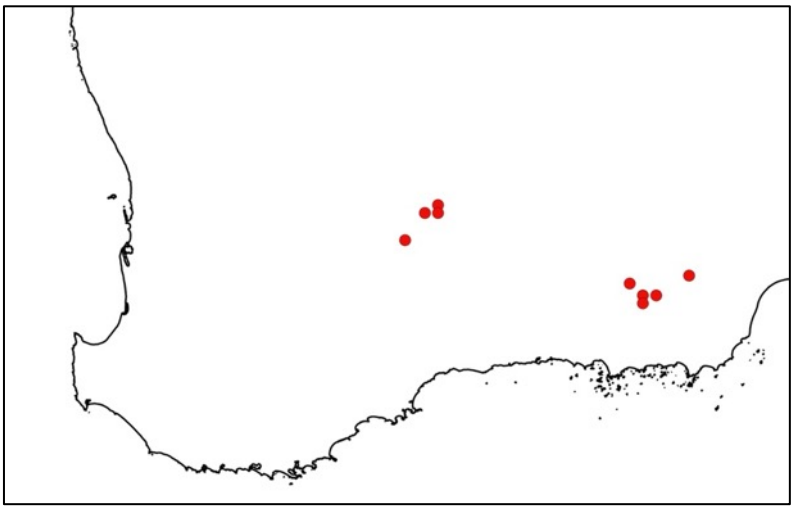

Figure 8. Distribution of *Dicrastylis capitellata* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: Marvel Mallee

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/46476

Reference: Nicolle, Dean, and Malcolm French. 2009. '*Eucalyptus calycogona* subsp. *miracula* (Myrtaceae), a new subspecies from the central wheatbelt of Western Australia'. *Nuytsia* 19: 99–105.

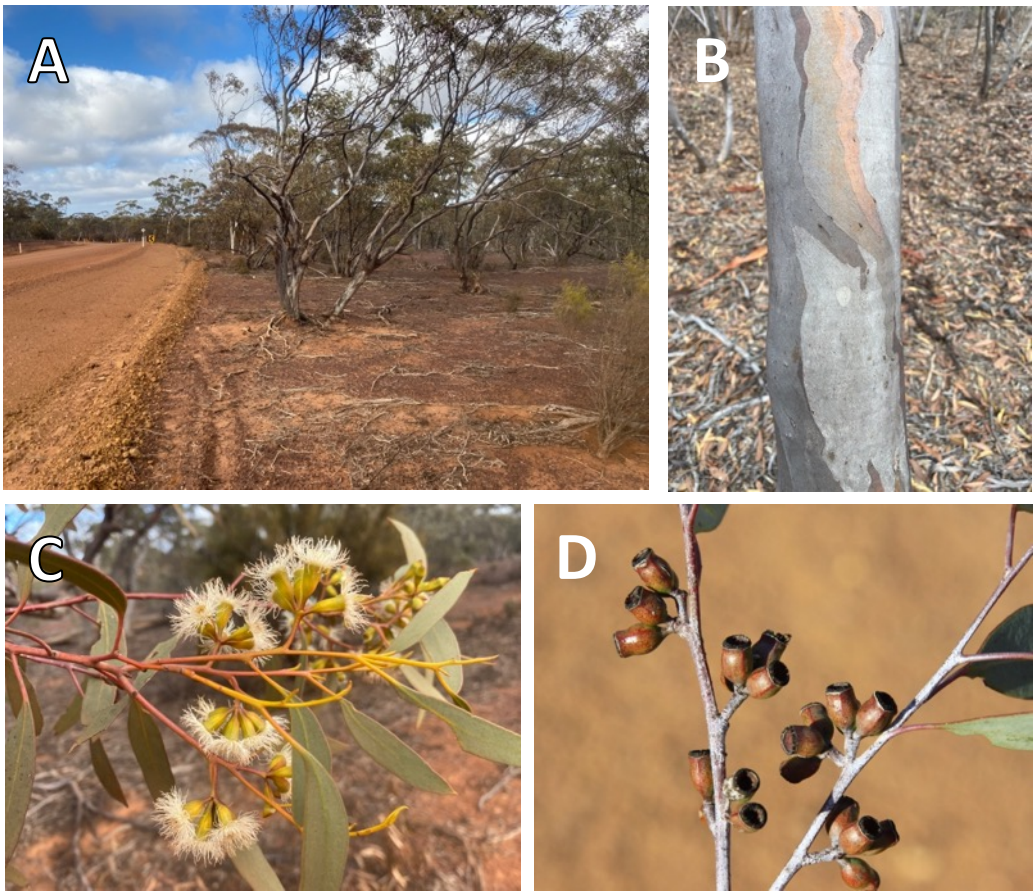

Figure 9 A; *Eucalyptus calycogona* subsp. *miraculum* mallee on a roadside. (IMG_6402) B; *Eucalyptus calycogona* subsp. *miraculum* trunk, showing a range of bark colours. (IMG_3142) C; *Eucalyptus calycogona* subsp. *miraculum* flowers and leaves. (IMG_6398) D; *Eucalyptus calycogona* subsp. *miraculum* fruits and leaves. Note the waxy branchlets. (Photograph credit: Geoff Cockerton)

Description:

Eucalyptus calycogona subsp. *miraculum* is a mallee growing 3-5 m tall, with a lignotuber (Figure 9A; Nicolle and French 2009). The bark is smooth throughout, cream to grey over pale grey to reddish-tan, and peels in strips (Figure 9B). Branchlets are waxy, and adult leaves are 55–90(–110) mm long by 8–18(–22) mm wide (Figure 9C, D). Leaves are dull, bluish and waxy at first, and mature to dull to slightly glossy and blue-green to dark green. They have a petiole which reaches 11-18 mm long, and moderate vein reticulation with scattered island oil glands. Flowers occur in inflorescences of 7, and flower buds are waxy, quadrangular, 9-11 mm long and 4-5 mm wide (Figure 9C). The hypanthia are obconical with four longitudinal ribs, and stamens are white. Fruits are waxy when young, oblong-cylindrical to slightly urceolate (shaped like a pitcher), and square in cross-section with four longitudinal ribs (Figure 9D).

Eucalyptus calycogona subsp. *miraculum* may be distinguished from other subspecies of *E. calycogona* by its waxy branchlets, buds and fruits, generally broader dull adult leaves, elliptical to ovate seedling leaves, and generally larger flower buds and fruits (Nicolle and French 2009).

Habitat:
This subspecies occurs in mallee and mixed mallee-mallet vegetation on pale orange to red clay-loams, to thin stony loams with ironstone gravel (Nicolle and French 2009). Associated *Eucalyptus* species include *E. capillosa*, *E. celastroides* subsp. *celastroides*, *E. flocktoniae* subsp. *flocktoniae, E. moderata*, *E. neutra*, *E. salmonophloia*, *E. salubris*, *E. sheathiana*, *E. subangusta* subsp. *subangusta*, *E. tenera*, *E. tephroclada* and *E. yilgarnensis*.

Within the project area, *Eucalyptus calycogona* subsp. *miraculum* has been recorded at the Parker Range Road bypass, approximately 2 km from the intersection of Parker Range Road and Marvel Loch-Forrestania Road.

Distribution:
The distribution of *Eucalyptus calycogona* subsp. *miraculum* is on the eastern edge of the central wheatbelt in south-west Western Australia (Figure 10; Nicolle and French 2009). The area is bounded by Burracoppin in the north-west, the Parker Range area (south of Southern Cross) in the east and Holleton (east of Narembeen) in the south.

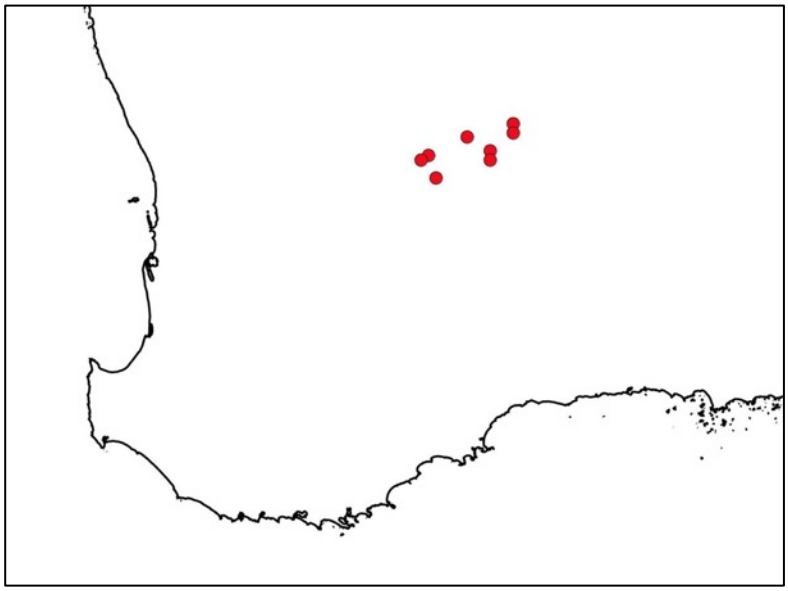

Figure 10. Distribution of *Eucalyptus calycogona* subsp. *miraculum* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Grevillea lissopleura* Priority 1** **Proteaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/2033

Reference: McGillivray 1935-, D J (Donald John). 1986. *New Names in Grevillea (Proteaceae) / D.J. McGillivray*. Castle Hill, N.S.W: D.J. McGillivray.

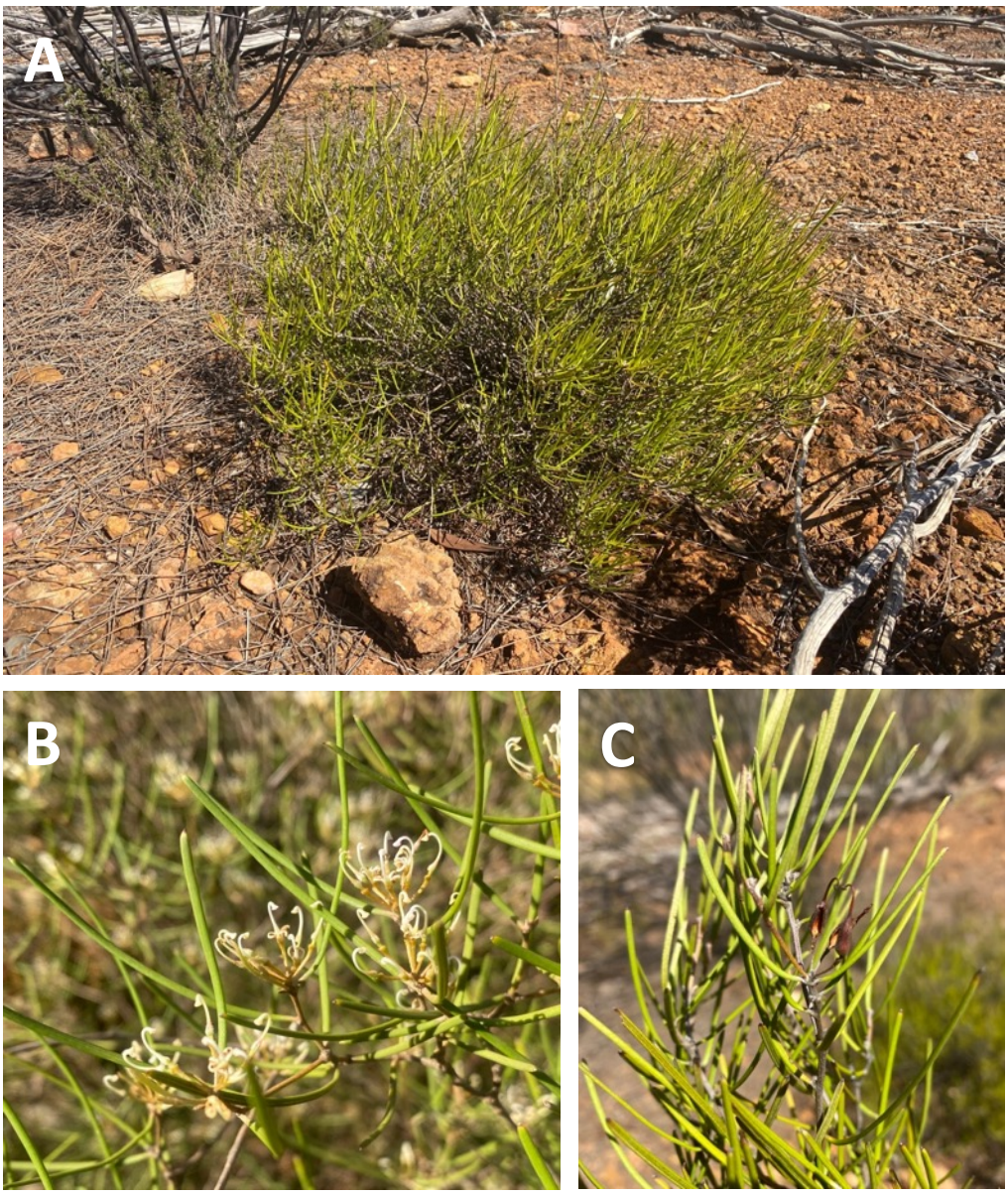

Figure 11 A; *Grevillea lissopleura* shrub growing on rocky soil. IMG_3544 B; *Grevillea lissopleura* flowers. IMG_5493 C; *Grevillea lissopleura* leaves and follicles. IMG_5493 (Photograph credit: Geoff Cockerton)

Description:

Grevillea lissopleura is a shrub growing up to 1.2 m tall. (Figure 11; Makinson 2000; McGillivray 1935- 1986). Leaves are straight to slightly curved, 1-3.5 (-7) cm long and 1.0-1.2 mm wide (Figure 11B, C). The upper surface has 3-7 smooth, prominent longitudinal ridges, and margins are angularly revolute to the midvein. The lower surface is 2-grooved and

glabrous. Flowers have been recorded in August and are white to cream in colour (Figure 1C; Makinson 2000). The perianth is loosely subsericeous outside and bearded inside, and the tepals are independently recoiled after anthesis. The pistil is 7-8 mm long. Follicles are erect, ovoid and 6-9 mm long.

Grevillea lissopleura is similar to *G. scabrida*, but differs in having terete branchlets and an absence of scabrid leaf veins.

Habitat:
This species grows in open scrub on rocky loam (Makinson 2000). Within the project area, *Grevillea lissopleura* has been recorded approximately 2 km north and approximately 9 km south of the intersection of Dunbar road and Marvel Loch-Forrestania road.

Distribution:
Grevillea lissopleura has a limited distribution, growing between Southern Cross and Mount Holland (Figure 12; Makinson 2000). A collection has also been recorded south of Mount Holland, towards Hatter Hill.

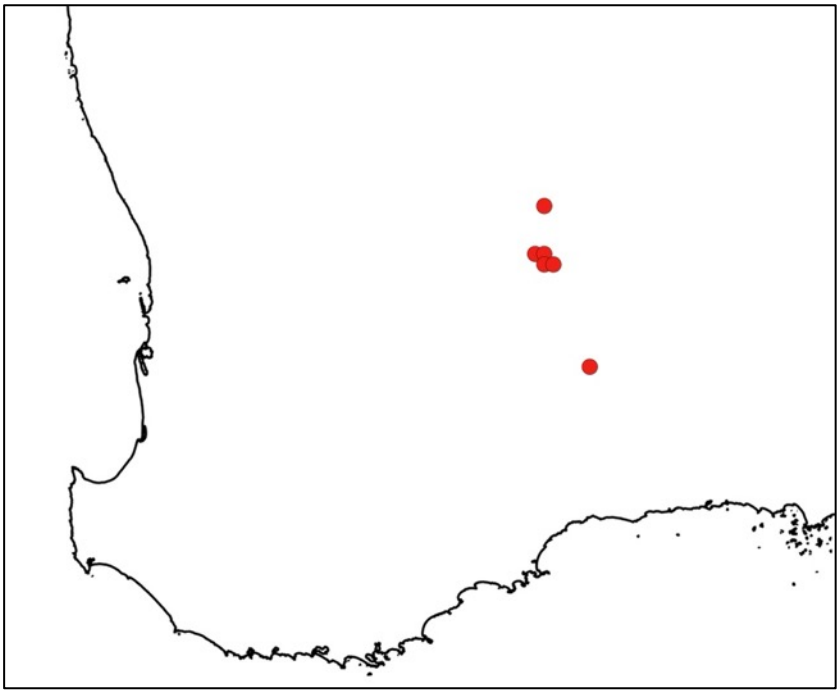

Figure 12. Distribution of *Grevillea lissopleura* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Labichea rossii* Priority 1** **Fabaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/40918

Reference: Gibson, Neil. 2011. '*Labichea rossii* (Fabaceae: Caesalpinioideae), a new species from the Yilgarn Ranges, Western Australia'. *Nuytsia: journal of the Western Australian Herbarium* 21(3): 91–95.

Figure 13 A; *Labichea rossii* subshrub. IMG_8799 B; *Labichea rossii* flowers. IMG_7605 (Photograph credit: Geoff Cockerton)

Description:

Labichea rossii is a semi-erect subshrub growing up to 40 cm high, with sparingly branched stems (Gibson 2011). The leaves are 25-35(-45) mm long, 5-7 mm wide, narrowly elliptic with a pungent apex. Leaves are reticulate with scattered hairs above and below. Stipules are narrowly triangular or subulate. It has unusual flowers for a *Labichea*, with a 2-3mm long pedicel, 5 sepals and 4 yellow petals. The petals are dissimilar, with wing petals 4-5 x 3-4mm,

standard 2.5-3 x 1.8-2 mm, and keel 2.5-2.8 x 0.7-1mm. Flowers have two stamens which are equal in length.

Habitat:
Labichea rossii grows on ironstone ridges, dominated by Allocasurarina, Myrtaceae and Proteaceae shrubland with occasional eucalypts (Gibson 2011). It grows out of cracks, and is often found in the shade of larger shrubs. Associated species include *Eucalyptus horistes*, *Allocasuarina acutivalvis* subsp. *acutivalvis*, *A. campestris*, *Banksia* purdieana, *Calothamnus quadrifidus* subsp. *seminudus*, *Hakea subsulcata*, *Melaleuca cordata*, and *Hibbertia exasperata*.

Within the project area, *Labichea rossii* has been found at two locations south of the minesite, close to Mount Holland.

Distribution:
Labichea rossii has an extremely limited distribution, with only one population officially recorded at a small ironstone ridge near Mount Holland (Figure 14; Gibson 2011). This is the type location.

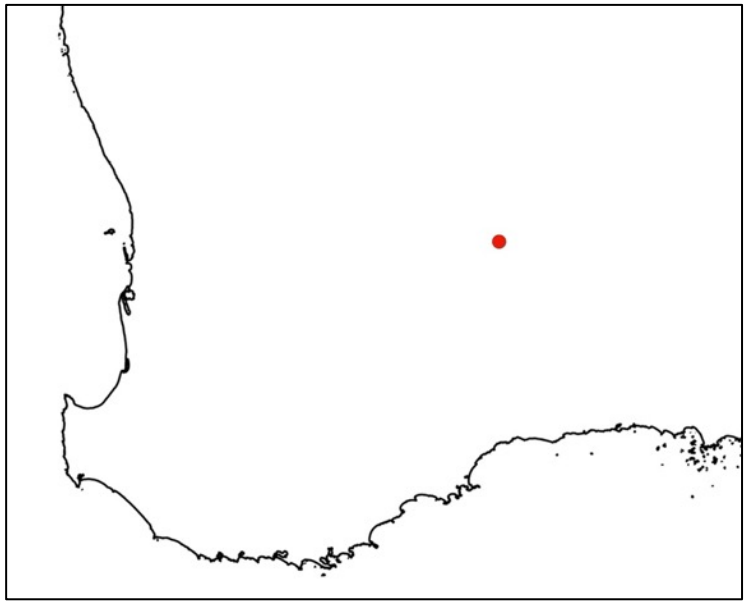

Figure 14. Distribution of *Labichea rossii* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Melaleuca grieveana* Priority 1** **Myrtaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/19450

Reference: Craven, L A, and B J Lepschi. 1999. 'Enumeration of the Species and Infraspecific Taxa of *Melaleuca* (Myrtaceae) Occurring in Australia and Tasmania'. *Australian Systematic Botany* 12(6): 819–928. https://doi.org/10.1071/SB98019.

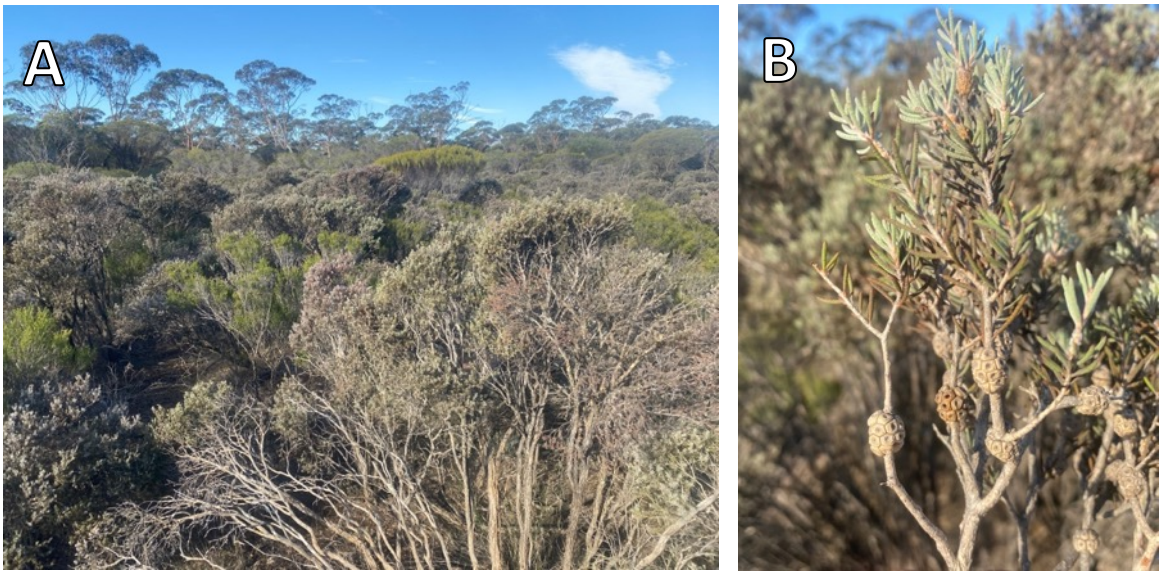

Figure 15 A; *Melaleuca grieveana* shrubs (foreground and background). IMG_3705 B; *Melaleuca grieveana* leaves and infrutescences. (Photograph credit: Geoff Cockerton)

Description:

Melaleuca grieveana is a shrub growing up to 1.2 m tall (Figure 15A; Brophy, Craven, and Doran 2013; Craven and Lepschi 1999). Branchlets are glabrescent to hairy. Leaves are alternate, 5-19.5 mm long, 0.8-1.6 mm wide, and may be short-petiolate or subsessile (Figure 15B). The leaf blades are glabresecent or hairy, very narrowly obovate or linear-obovate, and are flattened transversely semielliptic in a transverse section. The apex is acuminate or acute to obtuse, and there are three longitudinal veins. Inflorescences are 4-8 triads and up to 14 mm wide, recorded in September and October. Hairs are present on the hypanthium, and stamens have creamy white filaments. Stamens are 4.3-6(-7) mm long and the style is 6 mm long. Infrutescences are globose and fruits are 2-2.5 mm long (Figure 15C).

Melaleuca brophyi is a related species that looks similar to *M. grieveana*. A key feature for distinguishing *M. grieveana* is the presence of hairs on the leaf blades.

Habitat:

Melaleuca grieveana has been recorded growing in sand-plain vegetation, open mallee, open heath and mallee shrubland, on loamy clay soil, laterite-derived sandy loams, and brown sad over clay (Brophy, Craven, and Doran 2013).

Distribution:
The distribution of *M. grieveana* is restricted to Western Australia and includes the Cowcowing Lakes, Narembeen and Parker Range district (Figure 16). The specimen collected east of Bunbury is unlikely to be *M. grieveana* based on distribution. Within the project area, *M. grieveana* has been recorded near Moorine Rock, near the Parker Range bypass, and near the turn-off from Marvel Loch-Forrestania Road towards the minesite.

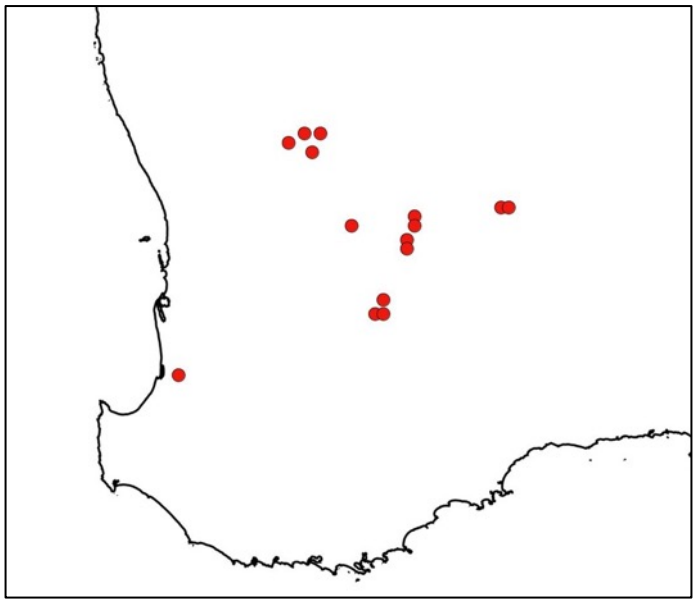

Figure 16. Distribution of *Melaleuca grieveana* in Western Australia. Note that the specimen collected near Bunbury is unlikely to be correct. Data from Florabase/Australian Virtual Herbarium.

***Microcorys elatoides* Priority 1** **Lamiaceae**

Common name: Mount Holland Microcorys

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/50147

Reference: Wilson, Trevor, and Michael Hislop. 2020. '*Microcorys elatoides* (Lamiaceae), a new species from the Coolgardie bioregion of Western Australia'. *Nuytsia* 31: 243–48.

Figure 17 A; *Microcorys elatoides* shrub in flower. IMG_5110 B; *Microcorys elatoides* leaves and flowers. IMG_5111 (Photograph credit: Geoff Cockerton)

Description:

Microcorys elatoides is a compact shrub reaching approximately 1.5 m tall and 1.5 m in diameter (Figure 17A; Wilson and Hislop 2020). It is multi-stemmed at ground level and branchlets have long trichomes in three narrow channels between nodes. Leaves are arranged in whorls of three, have a petiole approximately 1.0 mm long, and are densely hairy on the adaxial surface. Lamina are 5-22 mm long, (0.8-)1.0-1.4 wide, terete to sub-terete, and linear to very narrowly obovate in outline. They are dark green, usually becoming yellowish towards the tip. Flowering occurs in the winter-spring months (August to October), and flowers have a 9-12 mm long corolla that is mostly pale mauve or white with a very pale wash of mauve (Figure 17). The internal surface of adaxial median lobe pair have purple or dark speckling. Each flower has two adaxial stamens and two abaxial staminodes, and the style is 3.8-7.0 mm long.

This species is most similar to *Microcorys macredieana*, but differs in having generally broader, more wrinkled leaves, lacking an adaxial groove, calyx lobes that are up to half the length of the tube, a longer corolla, papillose mericarps and a spathulate abaxial median corolla lobe. *Microcorys elatoides* also has a dark green colour compared to the bright green colour of the other species.

Habitat:
Microcorys elatoides has been recorded in open mallee woodlands over dense shrubs in sandy loam soils, sometimes with lateritic pebbles on the surface (Wilson and Hislop 2020). Associated species include *Eucalyptus burracoppinensis, E. incrassata, Allocasuarina acutivalvis, A. spinosissima, Grevillea cagiana, Hakea erecta, Phebalium megaphyllum, Melaleuca pungens, M. laxiflora* and *Gompholobium hendersonii.*

Distribution:
Records of *M. elatoides* are restricted to the Mt. Holland area in the Coolgardie bioregion (Figure 18; Wilson and Hislop 2020). Within the project area, *M. elatoides* has been recorded from 5 km north of King Ingram Road to east and west of the minesite.

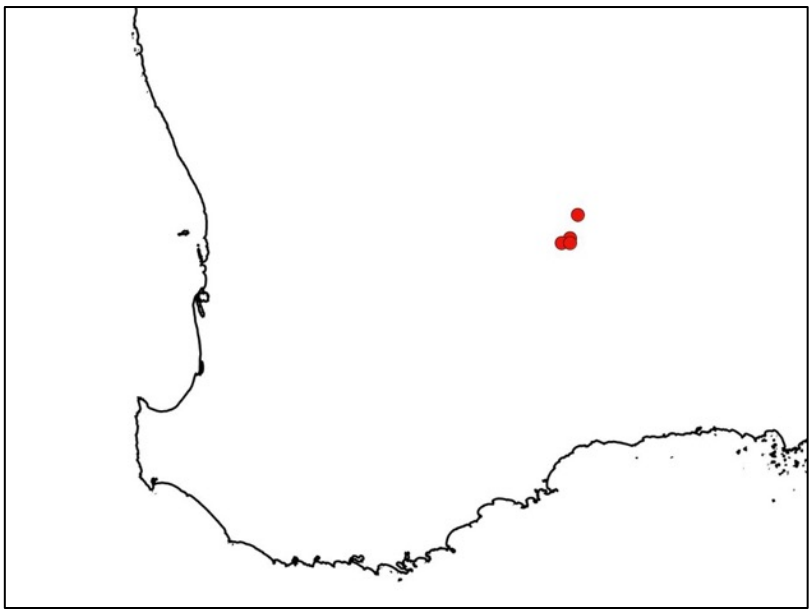

Figure 18. Distribution of *Microcorys elatoides* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/29096

Reference: Halford, David A, and Rodney J F Henderson. 2005. 'Studies in Euphorbiaceae s.Lat. 6. A Revision of the Genus *Poranthera* Rudge (Antidesmeae, Porantherinae) in Australia'. *Austrobaileya* 7(1): 1–27.

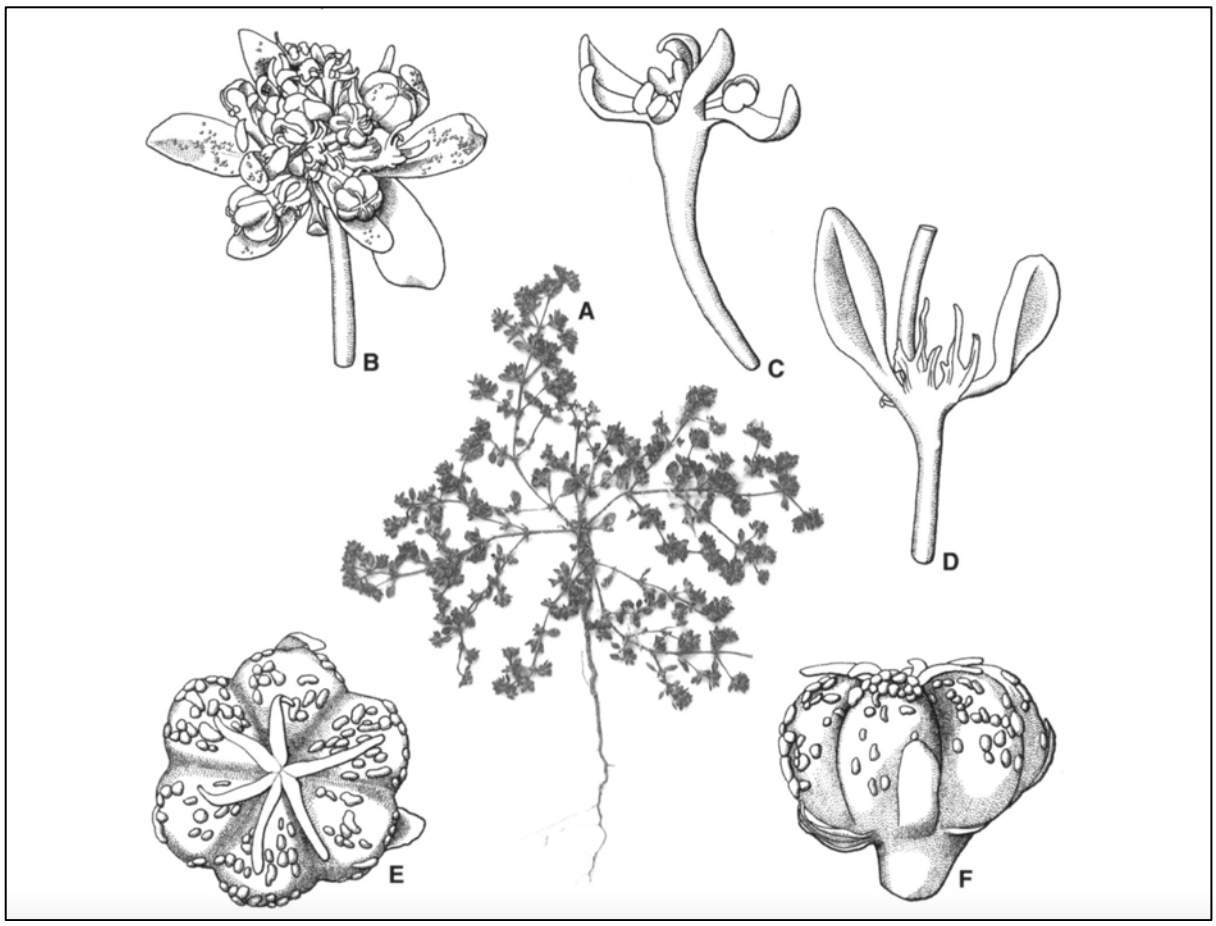

Figure 19. A; *Poranthera dissecta* plant. B; Inflorescence x8. C; Male flower x32. D; Branchlet with leaf and stipules x12. E; fruit from above x32. F; fruit from the side x32. A from Wilson 6892 (PERTH); B-F from Eichler 20286 (CANB). (Figure from Halford and Henderson 2005)

Description:

Poranthera dissecta is a prostrate annual with many-branched stems (Figure 19A; Halford and Henderson 2005). Branchlets are smooth and glabrous, and leaves are sessile and widely spaced (Figure 19D). The leaves are narrow-obovate or elliptic, concolorous, 2-3.6 mm long and 0.9-1.5 mm wide. A key feature are stipules which are white, narrow-triangular, 0.8-1.1 mm long, and deeply lobed (Figure 19D). Flowering occurs in August to October, and flowers are in short, dense terminal racemes (Figure 19B). *Poranthera dissecta* is monoecious. Male flowers have 5 calyx lobes, and 5 petals with toothed margins and 3 stamens (Figure 19C). Female flowers have 5 calyx lobes, obscure petals, and a 6-lobed ovary. Colour is unknown for both type of flowers. Fruit is 6-lobed. The seeds are wedge-shaped, approximately 0.4 mm long, 0.3 mm wide and 0.3 mm across, and the testa is striate with translucent ridges.

Poranthera dissecta has a close resemblance to *P. microphylla* and *P. triandra* (Halford and Henderson 2005). Key features of *P. dissecta* include narrow-ovate to oblong leaves, deeply dissected stipules, a 5-lobed calyx and minutely striate seed surface. *Poranthera dissecta* also has smaller flowers and capsules compared to *P. microphylla*.

Habitat:
Poranthera dissecta grows on well-drained granitic loamy sand near granite outcrops (Halford and Henderson 2005).

Distribution:
Populations of *P. dissecta* are scattered in southern Western Australia, in an area approximately bounded by Norseman, Ravensthorpe and Karlgarin (Figure 20; Halford and Henderson 2005). This species has only been collected once within the project area, on the Marvel Loch-Forrestania Road, approximately 13.5 km north of the intersection of King Ingram Road.

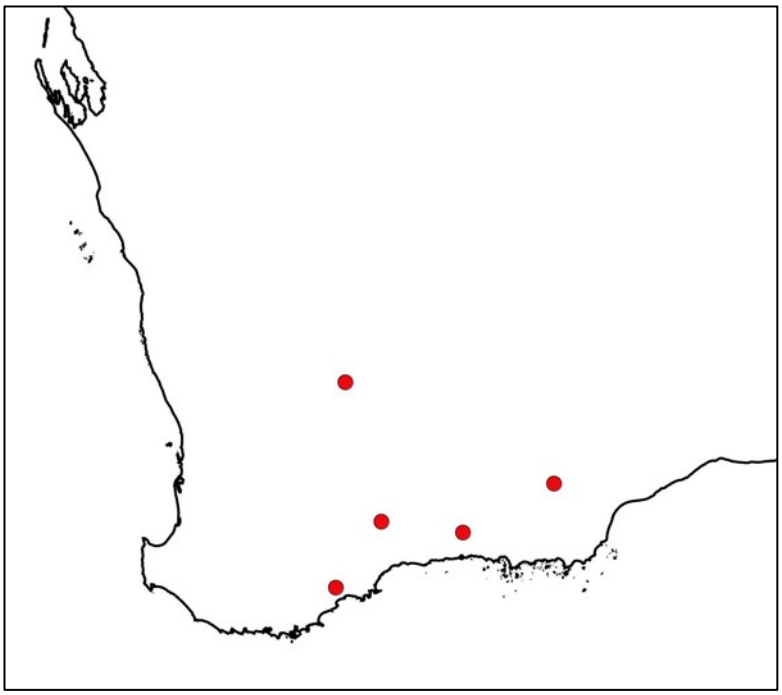

Figure 20. Distribution of *Poranthera dissecta* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: Wheatbelt Rinzia

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/48265

Reference: Rye, Barbara. 2017. 'An Expanded Circumscription and New Infrageneric Classification of *Rinzia* (Myrtaceae: Chamelaucieae)'. *Nuytsia* 28: 39–93.

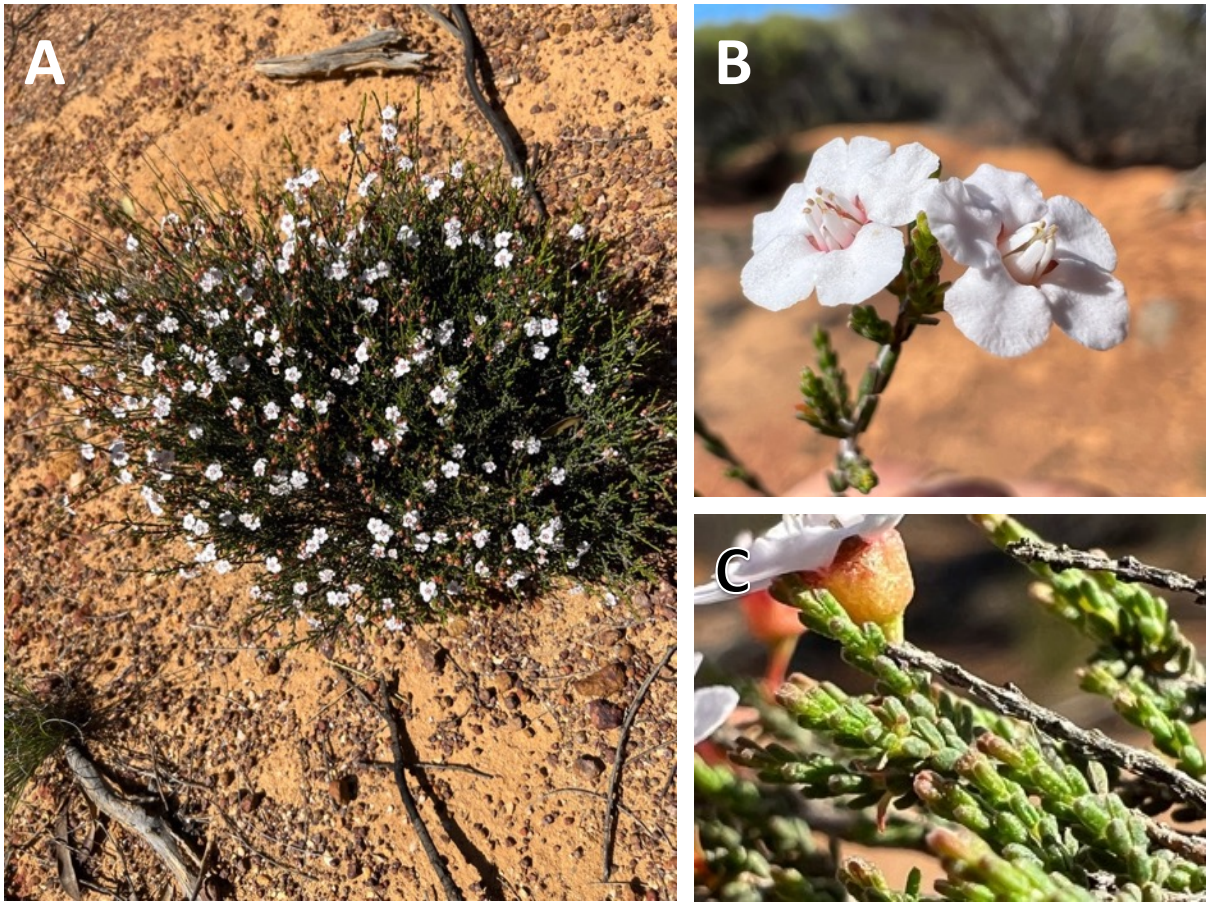

Figure 21 A; A *Rinzia fimbriolata* shrub in flower. B; *Rinzia fimbriolata* flowers, showing ten filaments of a medium width. Note the absence of staminodes. C; *Rinzia fimbriolata* leaves. Fringed margins are not visible at this magnification. (Photograph credit: Douglas Lievense)

Description:

Rinzia fimbriolata is a shrub, reaching 0.4 – 0.7 m in height (Figure 21A; Rye 2017). Leaves ae small (2-2.8 mm long), are narrowly oblong to narrowly ovate, and are minutely fringed. These leaves are densely clustered on young branches, but may be absent or less dense on older branches. The leaves are angled on one surface, with a flat portion along the margin and one row of oil glands on each sloping side. Flowers occur in September, are 7-8 mm in diameter, and have white petals. Key features of these flowers are 10 stamens and an absence of staminodes (Figure 21B). The filaments of these stamens are 0.3-0.4 mm wide, which is a medium width when compared to other *Rinzia* species, and are not fused. Bracteoles and sepals are also minutely fringed.

Rinzia fimbriolata may be confused with other *Rinzia* species, in the area, including *R. medifila, R. torquata*, *R. carnosa*, and *R. sessilis*. *Euryomyrtes maidenii* is another species that resembles a *Rinzia* and may be mistaken for one. The key characteristics of *R. fimbriolata* include free

filaments of a medium width, an absence of staminodes, and minutely fringed margins on leaves and sepals.

Habitat:
Rinzia fimbriolata is recorded as growing on sandy soils in mallee shrubland or woodland, but may also grow on clay soils with quartz pieces (Rye 2017).

Distribution:
The distribution of *R. fimbriolata* is estimated from few records, and the species is only found in the south-west of Western Australia. Its range extends from between Bullfinch and Southern Cross, to approximately 40 km south-west of Southern Cross (Figure 22).

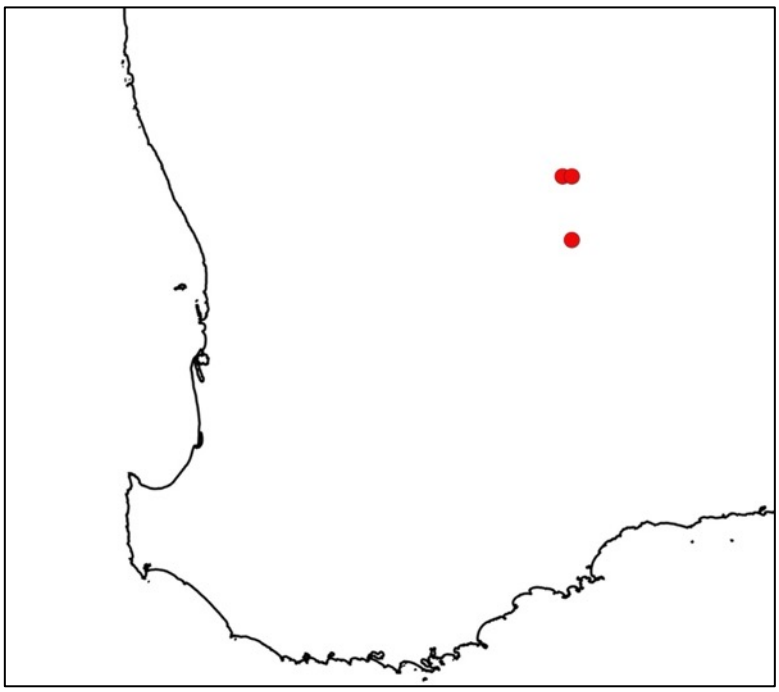

Figure 22. Distribution of *Rinzia fimbriolata* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Rinzia medifila* Priority 1** **Myrtaceae**

Common name: Parker Range Rinzia

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/48264

Reference: Rye, Barbara. 2017. 'An Expanded Circumscription and New Infrageneric Classification of *Rinzia* (Myrtaceae: Chamelaucieae)'. *Nuytsia* 28: 39–93.

Figure 23. A; *Rinzia medifila* leaves, buds and flowers. Note the flattened leaf shape. Ciliolate margins are not visible at this magnification. C; *Rinzia medifila* flowers, showing stamens and petals. There are ten stamens and no staminodes. The stamens are free and are of a medium width. C; Two *Rinzia medifila* shrubs. One is in the foreground on the left, and one is in the background on the right. (Photograph credit: Geoff Cockerton)

Description:

Rinzia medifila is a shrub up to 1 m tall (Figure 23B; Rye 2017). This species has flattened, oblong-elliptic leaves with a ciliolate margin. Leaves are 1.8–3 mm long, 0.6–1.2 mm wide, up to 0.4 mm thick (Figure 23A). Petioles are 2–4 mm long. Flowering from September to October, the flowers are 6-7 mm in diameter and petals are pale pink to white (Figure 23 A,C). Flowering branchlets have one or rarely two flowers. Bracteoles and sepals are also minutely denticulate to ciliolate. The flowers have ten free stamens, with filaments that are 0.5-0.8 mm long and 0.15-0.2 mm wide (Figure 23C; Rye 2017).

A number of related *Rinzia* species may be confused with *R. medifila*, including *R. fimbriolata*, *R. carnosa*, *R. torquata*, *R. triplex*, and *R. sessilis*. *Euryomyrtes maidenii* is another species which may be misidentified as a *Rinzia* species. *Rinzia medifila* may be distingusished from

other species by its flattened leaves with a ciliolate margin, ten free stamens and an absence of staminodes (B. Rye 2017). The filaments are of a medium width when compared to other *Rinzia* species.

Habitat:
Rinzia medifila has been recorded in yellowish or reddish sandy soils, sometimes with laterite or greenstone, in Eucalyptus woodlands and often with Melaleuca (B. Rye 2017).

Distribution:
Records of *R. medifila* are limited to Parker Range, south-east of Southern Cross. It is only known from two or three localities, with a range that is approximately 35 km long (Figure 24; Rye 2017).

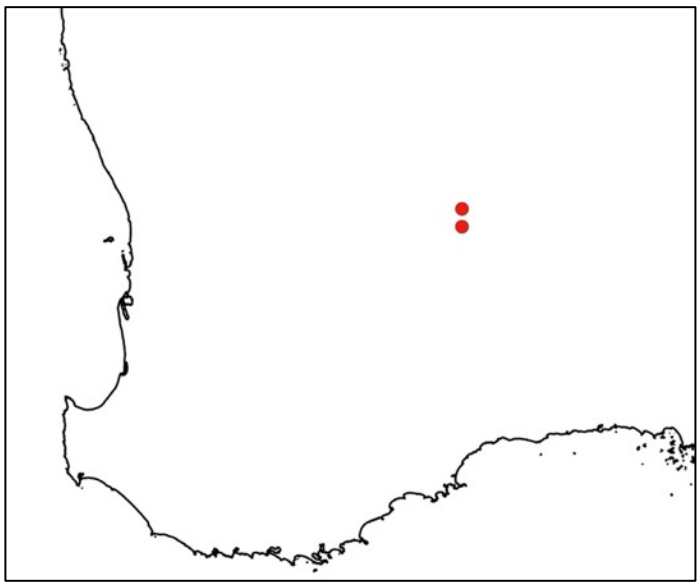

Figure 24. Distribution of *Rinzia medifila* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Thryptomene sp. Hyden (B.J. Lepschi & L.A. Craven 4477) **Priority 1** **Myrtaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/46953

Reference: N/A

Figure 27 A; *Thryptomene* sp. Hyden shrub. IMG_8819 B; *Thryptomene* sp. Hyden flowers and leaves. IMG_8739 (Photograph credit: Geoff Cockerton)

Description:

Thryptomene sp. Hyden is a shrub approximately 0.45 m tall (Figure 27A; Florabase), and up to 1.25 m tall (Mattiske Consulting Pty Ltd 2021). Flowers are white with prominent stipules (Figure 27B). The yellowish-green colour and curved mucro (tip) of the leaves are distinct features which distinguish it from other small-leafed Myrtaceae species.

Habitat:

This species has been recorded growing on yellowish-brown sand, sometimes on road verges (Florabase), among *Acacia*, Proteacae and Myrtaceae species.

Distribution:

A single record of *Thryptomene* sp. Hyden was collected 50 km north-north east of Hyden (Figure 28; Florabase). Within the project area, the species has been recorded in high numbers along the Marvel Loch-Forrestania Road, from 10 km north of the minesite tun-off to the minesite itself. Populations have also been recorded north and west of the minesite.

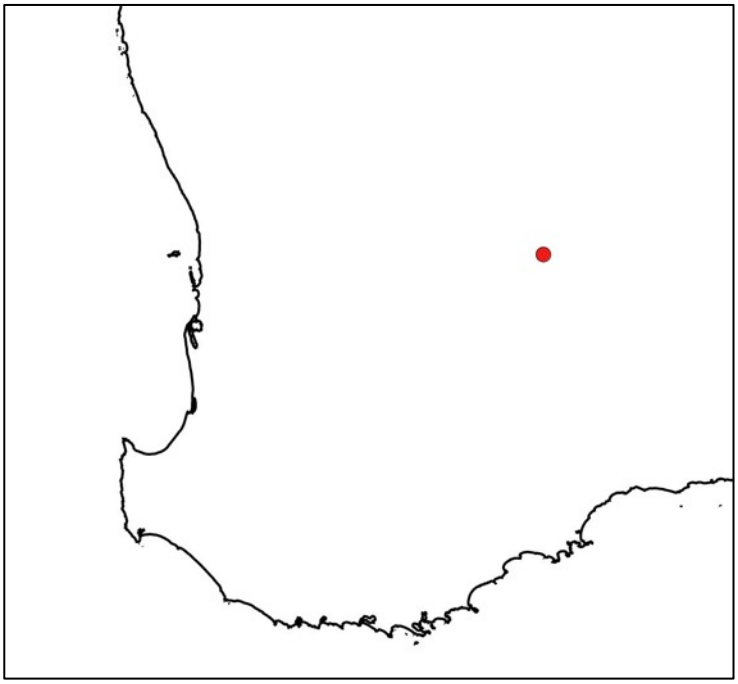

Figure 28. Distribution of *Thryptomene* sp. Hyden in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/12455

Reference: George, Alexander S. 1991. 'New Taxa, Combinations and Typifications in *Verticordia* (Myrtaceae : Chamelaucieae)'. *Nuytsia: journal of the Western Australian Herbarium* 7(3): 231–394.

Figure 29 A; *Verticordia roei* subsp. *meiogona* shrub (LS-475). B; *Verticordia roei* subsp. *meiogona* leaves and flowers, showing peduncles (LS-475). C; *Verticordia roei* subsp. *meiogona* flowers, showing petals, stamens and staminodes (LS-475). (Photograph credit: Lindsay Shelton)

Description:

Verticordia roei subsp. *meiogona* is a small shrub growing 30-60 cm tall and 30-45 cm wide, corymbosely branched with one basal stem (Figure 29A, E. George 2002). Stem leaves and floral leaves are linear to elliptic, deeply triquetrous, and obtuse (Figure 29B). Flowering occurs from September to November. Flowers are creamish-white to pale pink, and are scented (Figure 29C). Stamens are 1.2-2.5 mm long, and staminodes are 0.5 mm wide towards the base and are obtuse. The margins of the staminodes are either entire or one-lobed on either side. Peduncles are 12-20 mm long, and the hypanthium is about 1.5 mm long and 10-ribbed. Sepals are 6-7mm long and are deeply fimbriate. Petals are 4-5 mm long, broadly elliptic and shortly fimbriate.

The two subspecies of *Verticordia roei*, subsp. *roei* and subsp. *meiogona*, are very similar. *Verticordia roei* subsp. *roei* is much more common, and occurs throughout the project area. *Verticordia roei* subsp. *meiogona* differs in having shorter stamens (1.8-2.5 mm long), broader staminodes (0.5 mm wide towards the base) and a shorter style (1.4-1.9 mm long; George 1991).

Habitat:
Verticordia roei subsp. *meiogona* grows in white and yellow sand, usually with or over loam and sometimes lateritic gravel (E. George 2002). It often grows in association with *V. chrysantha*, *V. picta*, and *V. eriocephala* in heath and open shrubland.

Distribution:
This subspecies occurs in scattered populations from east of Dalwallinu to near Mukinbudin (Figure 30). One collection has been made further south and east of these populations, just north of Marvel Loch. Within the project area, *V. roei* subsp. *meiogona* has been collected approximately 1 km south and 19 k north of King Ingram Road on Marvel Loch-Forrestania Road. The two subspecies of *V. roei* are challenging to differentiate without flowering material, and some specimens have not been identified to the subspecies level.

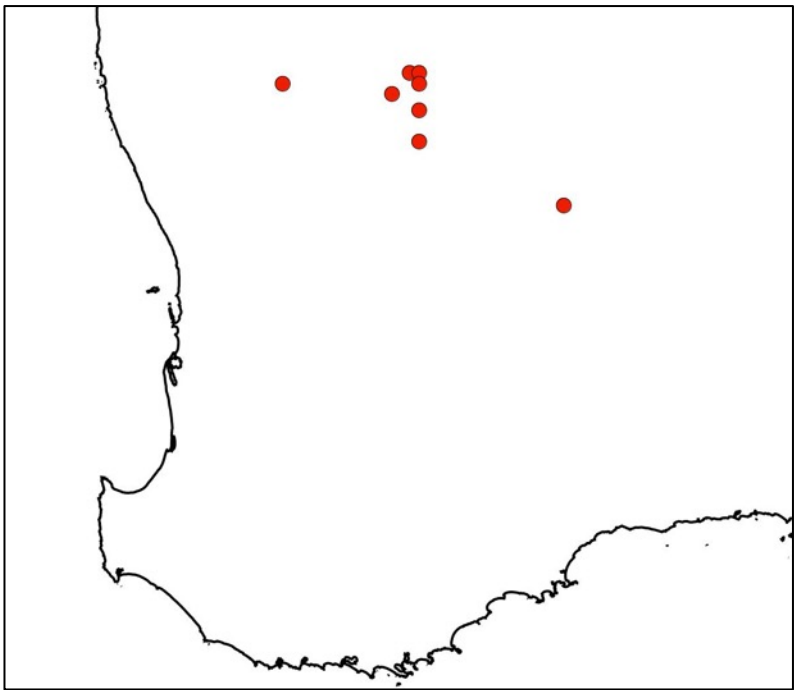

Figure 30. Distribution of *Verticordia roei* subsp. *meigona* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/14052

Reference: Maslin, B R (Bruce Roger). 1999. '*Acacia* Miscellany. 16, the Taxonomy of Fifty-Five Species of *Acacia*, Primarily Western Australian, in Section Phyllodineae (Leguminosae: Mimosoideae)'. *Nuytsia: journal of the Western Australian Herbarium* 12(3): 311–411.

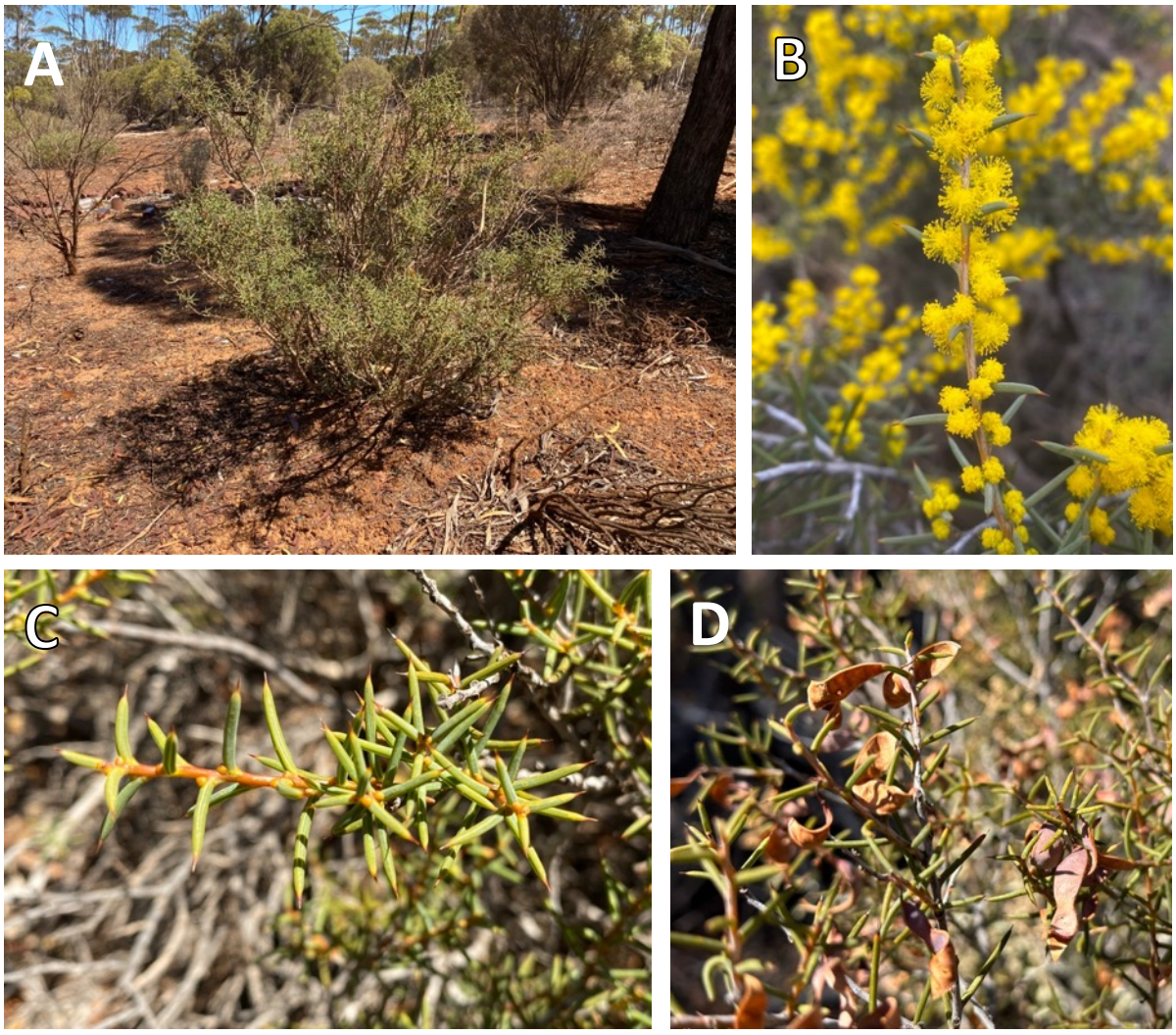

Figure 31 A; *Acacia asepala* shrub. IMG_3187 B; *Acacia asepala* flowers. IMG_6069 C; *Acacia asepala* leaves. IMG_3191 D; *Acacia asepala* pods. IMG_9926 (Photograph credit: Geoff Cockerton)

Description:

Acacia asepala is a diffuse, much-branched shrub, reaching 0.5-1.5m tall and 1-1.7 m across (Figure 31A; Maslin 1999). The bark is light grey. Branchlets are terete, glabrous, and red-brown at extremities, with prominent projections where phyllodes have fallen (Figure 31C). Stipules are minute; approximately 0.2 mm long. The phyllodes are thick, needle-shaped, terete-pentagonal, slightly compressed at the base, 10-25 mm long and 1 mm wide (Figure 31C). Most are straight, but some are slightly recurved. There are 5 nerves which are yellow

and spaced 0.6 mm apart. The apex is narrowed to a straight, brown cusp, 1.5-2 mm long. Flowering commences around early August, and inflorescences are a reduced raceme with 2 heads (Figure 31B). Peduncles are 2 mm long. Heads are globular, 4 mm in diameter, bright, golden, and approximately 10-flowered. Flowers are 5-merous and glabrous, with free petals and no calyx. The pods are narrowly oblong, 1-4 cm long, 5-8 mm wide, flat, shallowly sigmoid, curved or circinate, glabrous and greyish (Figure 31C). Seeds are oblique, obovoid, 3 mm long, 1.5 mm wide, and brown in colour.

Acacia species which may be confused with *A. asepala* include *A. calcarata* and *A. colletioides* (Maslin 1999). *Acacia calcarata* can be distinguished by its spinescent stipules which are 1.5-3 mm long, heads which have 16-22 flowers, 3.5-7 mm long peduncles, and blackish pods which are about 1 cm wide. This species also has bracteoles and a calyx. *Acacia calcarata* has similar phyllodes when compared to *A. asepala*, but they have 8 nerves instead of 5. Additionally, sepals are present, the pods are coiled, and seeds have conspicuous orange arils.

Habitat:
The species has been recorded growing in well-drained loam or sandy loam in eucalypt low woodland(Maslin 1999). The type specimen was collected near a salt lake.

Distribution:
Acacia asepala occurs only in south-west Western Australia, and has been collected from three disjunct populations: south-east of Marvel Loch, near Forrestania, and east of Lake King in Frank Hann National Park (Maslin 1999). It has also been collected east of Lake Hope (Florabase). Within the project area, *A. asepala* extends from the intersection of Parker Range Road and Marvel Loch-Forrestania Road to approximately 11 km north of Dunbar Road. Collections have also been made around the Mount Holland mine site, and a population has been found 12 km east of the mine site.

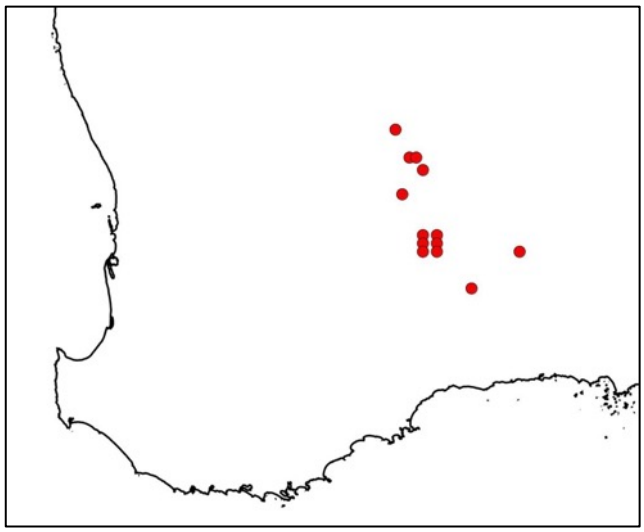

Figure 32. Distribution of *Acacia asepala* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/14618

Reference: Maslin, B R (Bruce Roger). 1999. '*Acacia* Miscellany. 16, the Taxonomy of Fifty-Five Species of *Acacia*, Primarily Western Australian, in Section Phyllodineae (Leguminosae: Mimosoideae)'. *Nuytsia: journal of the Western Australian Herbarium* 12(3): 311–411.

Figure 33 A; *Acacia concolorans* shrub (in foreground). IMG_4994 B; *Acacia concolorans* stem, showing phyllodes and stipules. IMG_6483 C; *Acacia concolorans* branchlets, flowers and phyllodes. IMG_6475 (Photograph credit: Geoff Cockerton)

Description:

Acacia concolorans is a sprawling, harsh, intricate shrub growing 0.4 m tall and 1-2 m wide (Figure 33A; Maslin 1999). It has many slender, medium to dark green stems arising from ground level, sometimes tinged purplish. Branchlets are terete and slightly flexuose, with yellowish or light brown fine nerves (Figure 33B, C). Stipules are spinescent, approximately 2 mm long, 0.6-0.7 mm in diameter, green at the base and brown distally and widely spreading. Phyllodes are oblong to narrowly oblong, 4-10 mm long and 1.5-2 mm wide, straight, rigid, compressed and thickened. There is a pronounced midrib on each side of each phyllode, and 5 nerves (Figure 33B). The abaxial margin has a single nerve while the adaxial margin has 2. The phyllodes are a similar colour to the branchlets. Flowering has been recorded in June to September. The inflorescences are extremely reduced, generally a 2-headed raceme, and are confined to the extremities of branchlets. Peduncles are 1.5-3 mm long and heads are globular, 6 mm in diameter, mid-golden and 7-8 flowered. Flowers are 5-merous, sepals are free and minutely fimbriate, and petals are 1.5-1.7 mm long. Pods are

narrowly oblong, compressed, 5 cm long and 4-5 mm wide. Seeds are oblique, 2.5-3 mm long, 2 mm wide, and somewhat shiny, dark brown.

Similarities can be seen between *A. concolorans* and another *Acacia* species, *A. inamabilis* (Maslin 1999). The distinguishing features of *Acacia concolorans* include scabridulous branchlets, shorter phyllodes and pods, smaller, fewer-flowered heads, and free sepals. In contrast, *A. inamabalis* has glabrous branchlets, phyllodes 15-45 mm long, pods up to 8.5 cm long, heads with about 25 flowers, and a gamosepalous calyx.

Habitat:
Acacia concolorans grows in rocky clay or loam in eucalypt woodland or mallee shrubland(Maslin 1999). Up to half of collected specimens were found in disturbed areas such as road verges, cleared areas or old diggings.

Distribution:
Acacia concolorans has been found in two populations: one in a small area south of Southern Cross, near Marvel Loch to Parker Range, and another near Karlgarin and Hyden (Maslin 1999, Florabase). Within the project area, *A. concolorans* has been recorded 1.4 km north west of the intersection of Marvel Loch-Forrestania Road and Emu Fence Road, and on the eastern side of the Parker Range diversion.

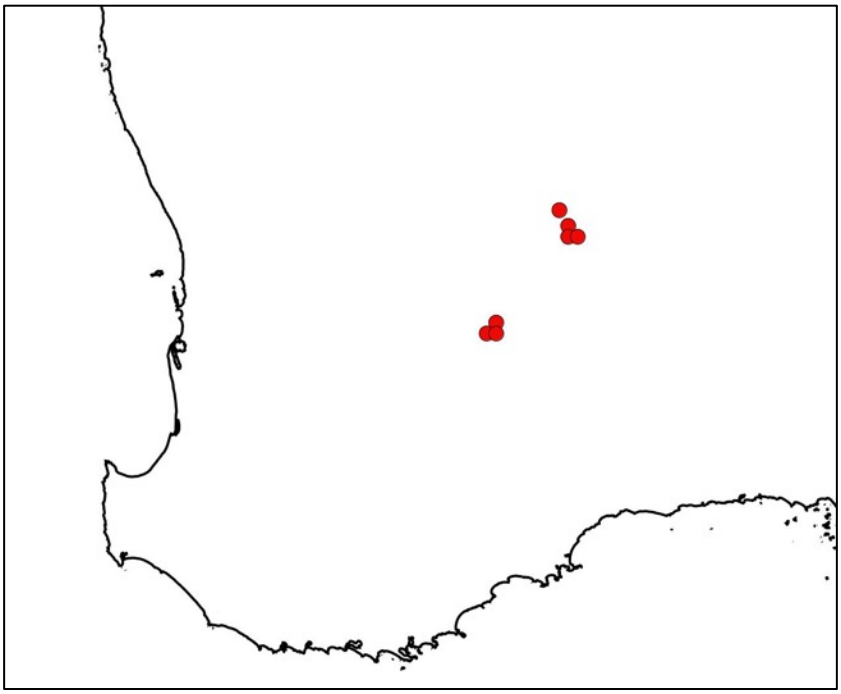

Figure 34. Distribution of *Acacia concolorans* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Balaustion grandibracteatum subsp. juncturum* Priority 2**
***Balaustion grandibracteatum subsp. grandibracteatum* Priority 3** **Myrtaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/51265
https://florabase.dpaw.wa.gov.au/browse/profile/51264

Reference: Rye, Barbara. 2022. 'An Expanded Circumscription and Revision of the Western Australian Genus *Balaustion* (Myrtaceae: Chamelaucieae: Hysterobaeckeinae)'. *Nuytsia* 33: 149–204.

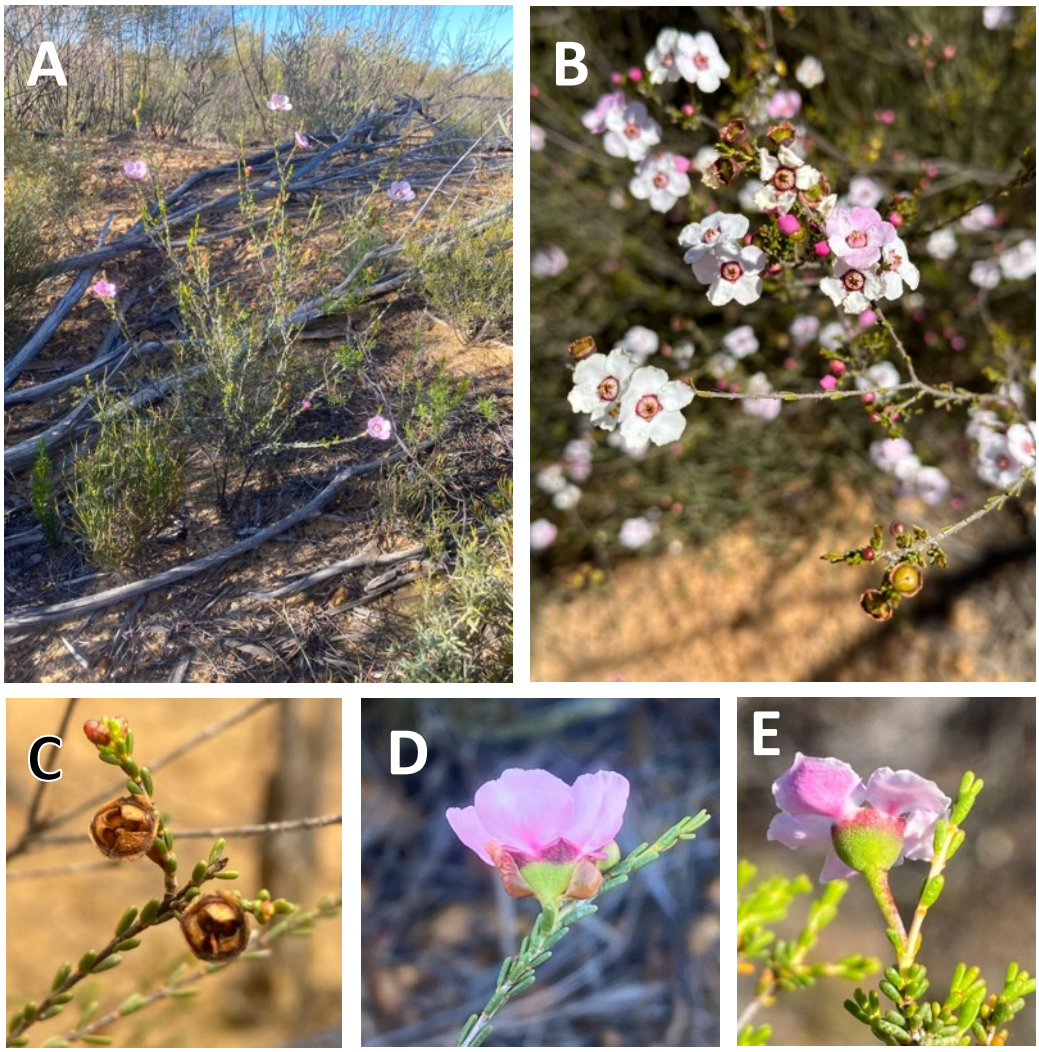

Figure 35 A; *Balaustion grandibracteatum* shrub. IMG_7110 B; *Balaustion grandibracteatum* flowers and leaves. IMG_7573 C; *Balaustion grandibracteatum* fruits. D; *Balaustion grandibracteatum* subsp. *grandibracteatum* flower, showing persistent bracteoles. IMG_7114 E; *Balaustion grandibracteatum* subsp. *juncturum* showing an absence of bracteoles. IMG_2069 (Photograph credit: Geoff Cockerton)

Description:

Balaustion grandibracteatum is a shrub ranging 0.2-0.8 m high and 0.3-0.8 m wide (Figure 35A; Rye 2022). Leaves are widely antrorse to appressed, and commonly appressed along unbranched sections of stem. Petioles are 0.1-0.6 mm long, and leaf blades are usually narrowly oblong-elliptic in outline, 2-5 mm long, 0.7-1(-1.5) mm wide, and 0.4-0.7 mm

thick. Leaves may have no mucro, or a mucro less than 0.1 mm long, and younger leaves have a denticulate margin. The keel is distally rounded, and there are large oil glands in 1-3 rows on either side of the midvein. Peduncles are 1-6 mm long and have prominent, often reddish, lateral ridges. Bracteoles are 2-6 mm long (Figure 35D), and pedicels tend to be absent or very short. The flowers are 10-15 mm in diameter, and the hypanthium is 1.7-3 mm in length, green and rugose-pitted. Sepals are 0.6-0.2 mm long, minutely laciniate, reddish on the outer surface, and often have a white margin. Petals are white or pink, and each flower has 14-27 stamens. Fruits are 3-3.5 mm long and 4.5-5 mm in diameter , and seeds are medium brown and colliculate.

The major difference between the two subspecies of *B. grandibracteatum* is the persistence of the bracteoles (B. Rye 2022). *Balaustion grandibracteatum* subsp. *grandibracteatum* has persistent bracteoles (Figure 35D) while subsp. *juncturum* has deciduous bracteoles, being shed prior to antithesis (Figure 35E).

Balaustion grandibracteatum subspecies are also similar to *B. multicaule*, which is distinguished by its particularly narrow leaves and its multi-stemmed habit.

Habitat:
Balaustion grandibracteatum subsp. *grandibracteatum* often grows on yellow sand (B. Rye 2022). The dominant vegetation often includes *Allocasuarina* and/or *Grevillea*, *Callitris* and mallee species. *Balaustion grandibracteatum* subsp. *juncturum* occurs on sandy soils, sometimes with lateritic gravel or granite cobbles. It grows in shrublands commonly dominated by *Acacia*, *Allocasuarina* or *Eucalyptus* species.

Distribution:
According to Rye (2001), subsp. *grandibracteatum* is distributed from west of Southern Cross to Yellowdine and south to near Mt Hampton and the Parker Range area. *Balaustion grandibracteatum* subsp. *juncturum* extends from the Mt. Holland area south to the Forrestania crossroads area (Figure 36).

Within the project area, the majority of *B. grandibracteatum* collections have been identified as “subsp. indeterminate”, due to the lack of suitable floral material or ambiguity in bract presence. The species has been recorded to the west of the Parker Range bypass, and 3 km west along Dunbar Road from Marvel Loch-Forrestania Road (presumably subsp. *grandibracteatum*). It has also been recorded along Marvel Loch-Forrestania road, from 16 km south of Dunbar Road to the turn-off to the Mt. Holland minesite (presumably subsp. *juncturum*).

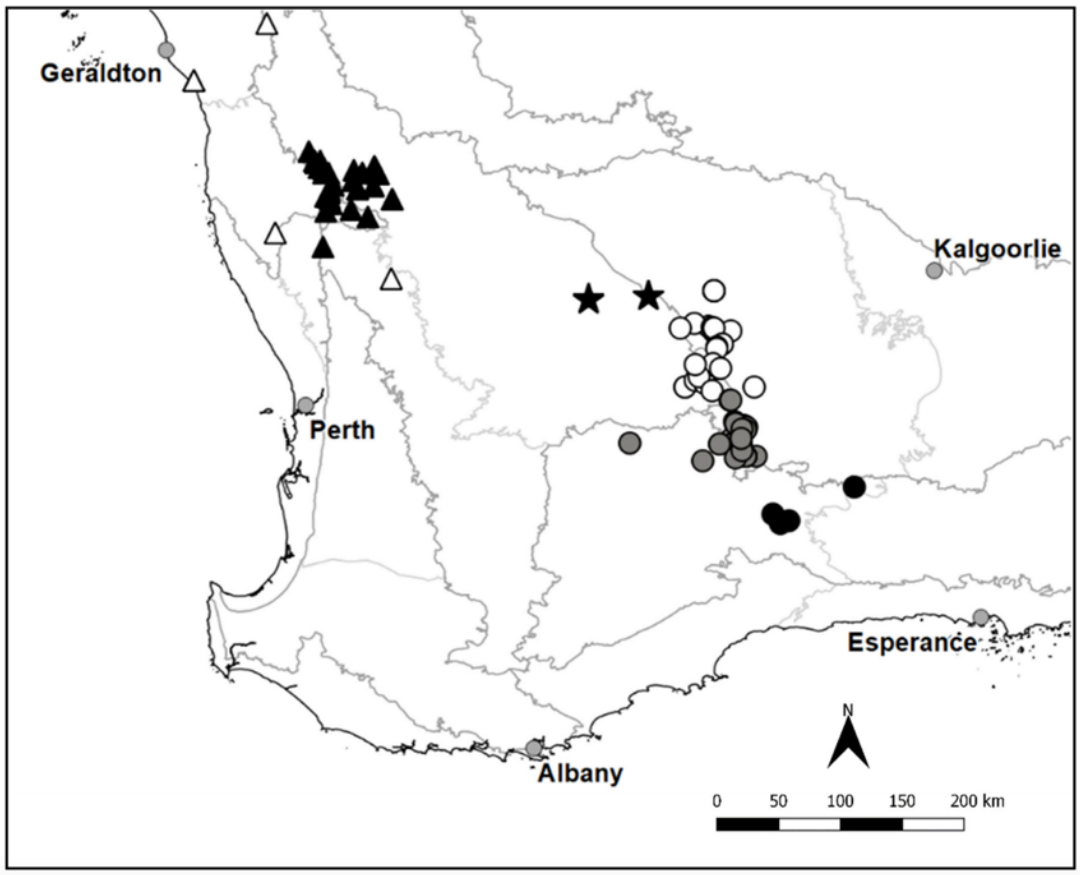

Figure 36. Distribution of selected Balaustion species in Western Australia. Distribution *of B. grandibracteatum* subsp. *grandibracteatum* (◯) and *B. grandibracteatum* subsp. *juncturum* are shown (●). Figure from Rye, 2022.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/7460

Reference: Rajput, Muhammad Tahir, and Roger Carolin. 1988. 'The Genus *Dampiera* (Goodeniaceae): Systematic Arrangement, Nomenclatural Notes and New Taxa'. *Telopea* 3(2): 183.

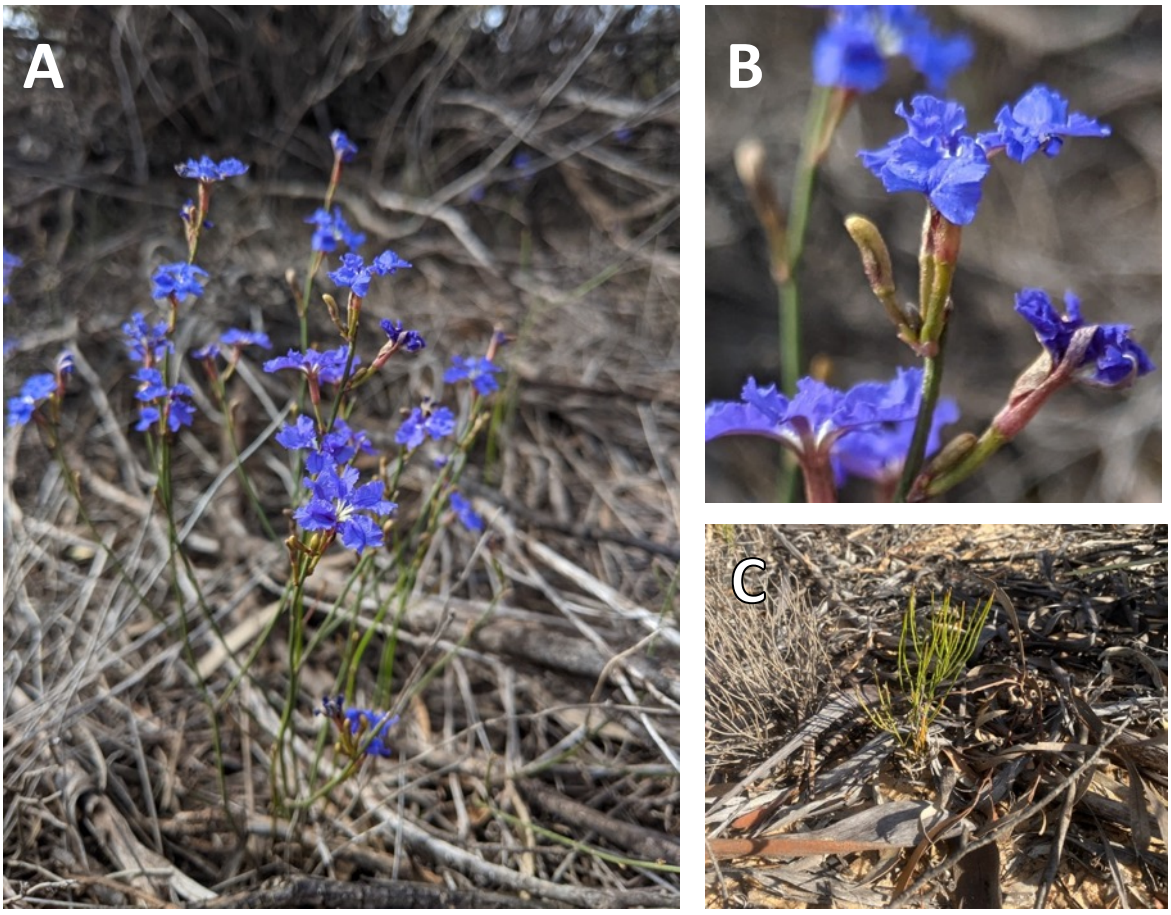

Figure 37 A; *Dampiera orchardii* plant in flower. B; *Dampiera orchardii* flower detail, showing distinctive hairs on flower. (Photograph credit: Nicole Dakin) C; *Dampiera orchardii* plant without flowers. IMG_2567 (Photograph credit: Geoff Cockerton)

Description:

Dampiera orchardii is an erect perennial herb with stems that are ribbed, branched and glabrous. The stems are golden-yellowish tomentose when young, and whitish tomentose on the nodes (Figure 37A, C; Rajput and Carolin 1988). Leaves are sessile, oblong-elliptic, 0.5-1.5 mm long, and are pale yellowish tomentose or glabrescent with entire margins. Flowers are solitary or in cymes (Figure 37A, B). Peduncles, pedicels, bracteoles, sepals and corolla lobes all have golden-yellow hairs (Figure 37B). Pedicels are 0.5-1 mm long and bracts are leaf-like. Inferior lobes are oblong-lanceolate and 3-4 mm long, and superior lobes are falcate and 4-5 mm long. Corolla colour is usually purple, but is rarely white (personal observation). The auricle is brown, the wing is 1.5-2 mm wide, and there are 5-9 calli in each row.

There are species of *Dampiera* that look superficially similar to *D. orchardii*. *Dampiera orchardii* is distinguished by the tuft of whitish tomentum at the nodes, and the almost golden-yellow hairs on the flowers (Figure 37B).

Habitat:
This species has been recorded in sandy soils, and associated with tall mallees and *Melaleuca* species (Florabase). Some specimens have been collected near salt lakes.

Distribution:
Dampiera orchardii occurs in the Roe and Eyre regions of Western Australia. It has been collected in the Mount Holland area and near Lake Johnston, further south towards Lake Grace and Newdegate, and as far south as the coast between Hopetoun and Esperance (Figure 38). Within the project area, *D. orchardii* has been recorded in distinct populations along Marvel Loch-Forrestania Road: 7 km, 12 km and 14 km north of King Ingram Road.

Figure 38. Distribution of *Dampiera orchardii* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Eutaxia hirsuta* Priority 2** **Fabaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/37722

Reference: Wilkins, Carolyn, Jennifer Chappill, and Gemma Henderson. 2010. 'An Account of *Eutaxia* (Leguminosae: Mirbelieae) with a Focus on the Western Australian Species'. *Nuytsia* 20: 109–67.

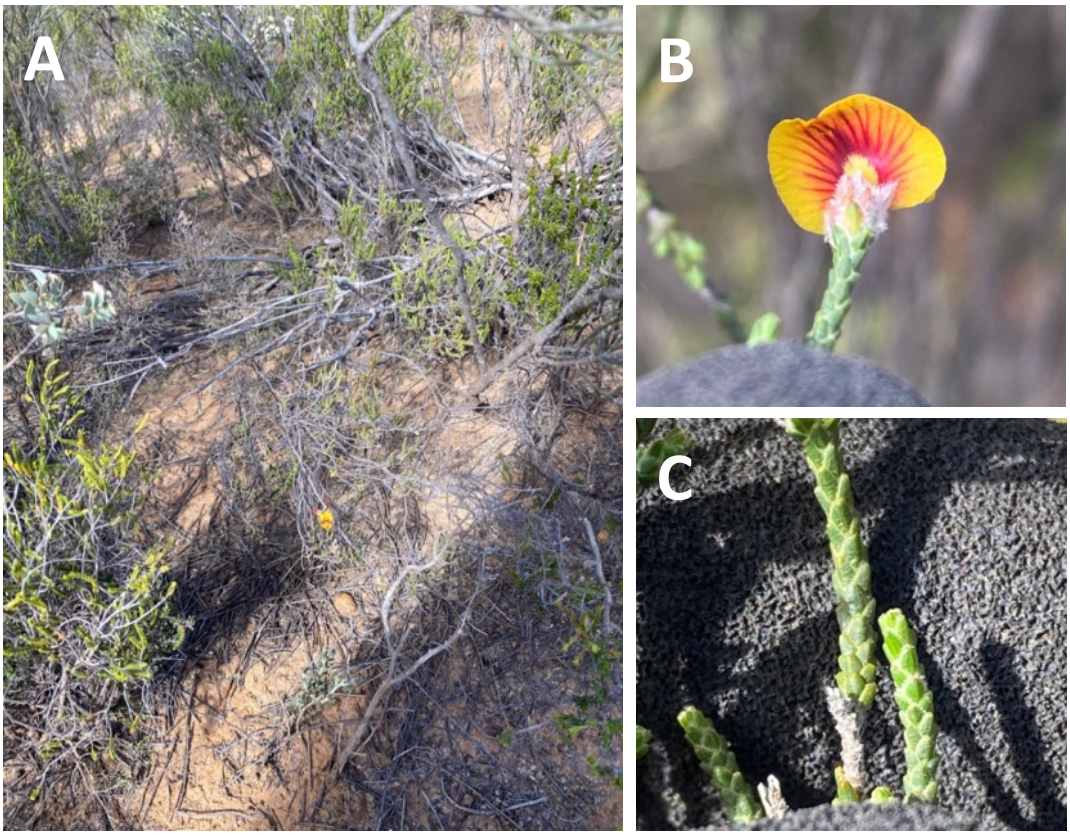

Figure 39 A; *Eutaxia hirsuta* shrub, in centre of photograph, with a single yellow flower visible. (LS-481) B; *Eutaxia hirsuta* flower, showing hairy calyx. (LS-481) C; *Eutaxia hirsuta* leaves. (LS-481; Photograph credit: Lindsay Shelton)

Description:

Eutaxia hirsuta is an erect shrub, sparsely branched and reaching approximately 0.45 high (Figure 39A; Wilkins, Chappill, and Henderson 2010). Stems are red-brown, smooth and not spinescent, with dense, spreading straight hairs. Stipules are absent. The leaves are closely appressed, alternate, and the internode length is shorter than the leaf length (Figure 39C). The petiole is 0.1-0.15 cm and the leaf blade is grey-green, ovate and 0.7-3 x 0.8-1.2 mm. The margins and abaxial surface have dense, spreading, straight hairs (Figure 39C) and the adaxial surface is glabrescent. Flowering occurs from September to November, and flowers are mostly axillary in groups of 2-5. Bracts are clustered on a 1-2 mm long, leafless, densely hairy stem section (Figure 39B). Bracteoles and buds are covered in dense, spreading, straight hairs. The calyx is prominently 25-ribbed, red-brown with cream ribs, and is 4.5-5.5 mm long. The standard is obovate, yellow-orange with red markings around yellow eye, with a claw 2.5-4.5 mm long (Figure 39B).

The most distinguishing feature of *E. hirsuta* among *Eutaxia* species is its densely hairy calyx, bracts and bracteoles (Figure 39B; Wilkins, Chappill, and Henderson 2010). *Eutaxia hirsuta* is similar to *E. neurocalyx*, but also differs in having an obovate standard (rather than ovate) with a longer claw (2.5-4 mm long rather than <2 mm long), and a longer calyx (5.5-7 mm long rather than 4-5.5 mm long).

Habitat:
Eutaxia hirsuta occurs on sandy, gravelly sand plains in open heath(Wilkins, Chappill, and Henderson 2010).

Distribution:
Eutaxia hirsuta has been recorded from Muntadgin to north of Hyden (Figure 40; Florabase). Note that the point on the south coast near Albany is a geospatial error. Within the project area, *E. hirsuta* has been recorded between 1.5 km north and 0.5 km south of the intersection of King Ingram Road and Marvel Loch-Forrestania Road.

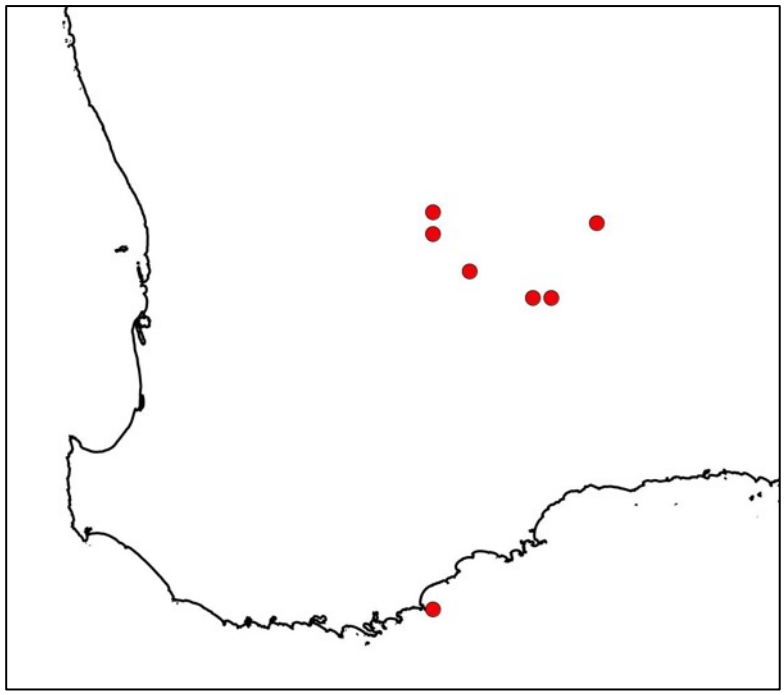

Figure 40. Distribution of *Eutaxia hirsuta* in Western Australia. Note that the point near Albany is a geospatial error and should be ignored. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/20741

Reference: Chappill, Jennifer, and Carolyn Wilkins. 2007. 'Five New Species of *Eutaxia* (Leguminosae: Mirbelieae) from South-Western Australia'. *Nuytsia* 17: 469–82.

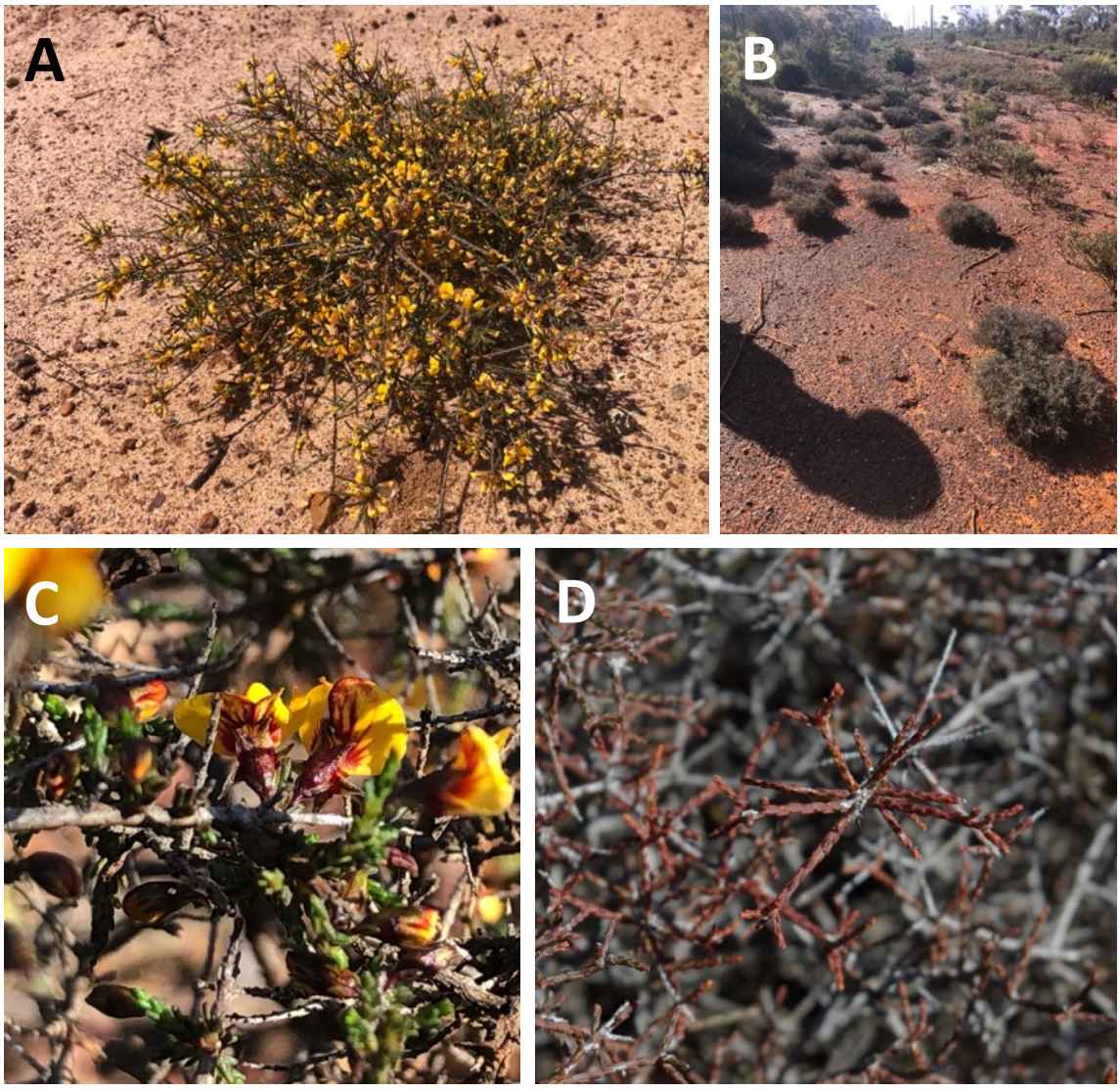

Figure 41 A; *Eutaxia lasiocalyx* shrub, in healthy condition and with flowers IMG_8844 B; *Eutaxia lasiocalyx* shrubs, in foreground and background, in poor condition. IMG_7341 C; *Eutaxia lasiocalyx* flowers and leaves, in healthy condition. IMG_8275 D; *Eutaxia lasiocalyx* leaves, in poor condition. IMGP6267 (Photograph credit: Geoff Cockerton)

Description:

Eutaxia lasiocalyx is a low spreading shrub, approximately 0.15 x 0.6 m, with dense, ascending branches (Figure 41A, B; Chappill and Wilkins 2007). The stems are grey-brown with pale tan ribs, sometimes spinescent, and may be glabrescent or have hairs. Stipules are absent, and leaves are spreading and alternate (Figure 41D). The petiole is 0.05-0.15 mm long, and the blade is 0.5-2 x 0.35-0.9 mm, concave, oblong to ovate, and slightly discolorous. The abaxial

surface is verrucose with 1 prominent rib. Flowering occurs from September to November, and flowers are axillary and solitary. Bracts are absent, replaced by a smaller leaf at the base of the pedicel. Bracteoles are persistent, red-green or green, lanceolate, and have straight hairs on the abaxial surface and margin. The hypanthium is approximately 0.6 mm long, and the calyx is 10-ribbed, reddish to brownish-red, without markings, imbricate, and has hairs.

Eutaxia lasiocalyx differs from *E. lasiophylla* in having a hairy calyx Chappill and Wilkins 2007). It is distinguished from *E. andocada* and *E. acanthoclada* by its hairy leaves and calyx, and from *E. rubricarina* by having a yellow keel and a standard lamina without markings.

Habitat:
This species grows on red sandy loam on lateritic or quartzitic substrates, in woodland or mallee (Chappill and Wilkins 2007).

Distribution:
Eutaxia lasiocalyx has been recorded in Parker Range, Mount Holland, Forrestania, and Lake Barker (Figure 2; Chappill and Wilkins 2007). Note that the collection north of Kalgoorlie has not been confirmed as *E. lasiocalyx*, and should be disregarded. Within the project area, *E. lasiocalyx* has been observed along Marvel Loch-Forrestania Road, from east of the Parker Range bypass to approximately 7 km south of Dunbar Road. Populations have also been recorded east and south-west of the minesite area.

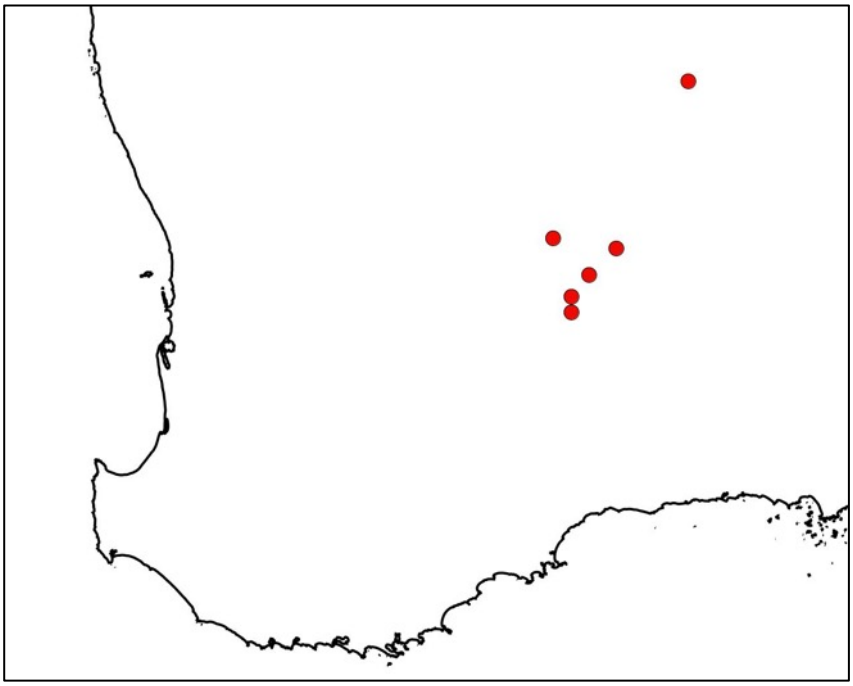

Figure 42. Distribution of *Eutaxia lasiocalyx* in Western Australia. Note that the specimen collected north of Kalgoorlie has not been confirmed as E. lasiocalyx, so should be disregarded. Data from Florabase/Australian Virtual Herbarium.

***Lepidium merrallii* Priority 2** **Brassicaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/3031

Reference: Von Mueller, Baron. 1890. 'Descriptions of New Australian Plants with Occasional Other Annotations'. *The Victorian Naturalist* 7: 114–114.

Figure 43. Pressed specimen of *Lepidium merrallii* (MH-PL089).

Description:

Lepidium merralli is an erect to spreading annual herb, possibly ephemeral, growing 0.03-0.15m high (Von Mueller 1890). The leaves are linear, and either entire or with a few narrow lobes. Flowers are extremely small, without petals and have four anthers and a sessile stigma. The fruits are small, rhomboid-orbicular and reticular-venulated. Seeds are yellowish-brown and smooth.

Habitat:

Lepidium merrallii is recorded as growing on clay loam (Florabase). Within the project area, *Lepidium merrallii* has been recorded in one location, among mallee and *Melaleuca*, approximately 1 km south of the intersection of Dunbar Road and Marvel Loch-Forrestania Road.

Distribution:
Few collections have been made of this species, and locations range from north at Burnerbinmah Station to south near Coolgardie and Koolyanobbing (Figure 44; Florabase).

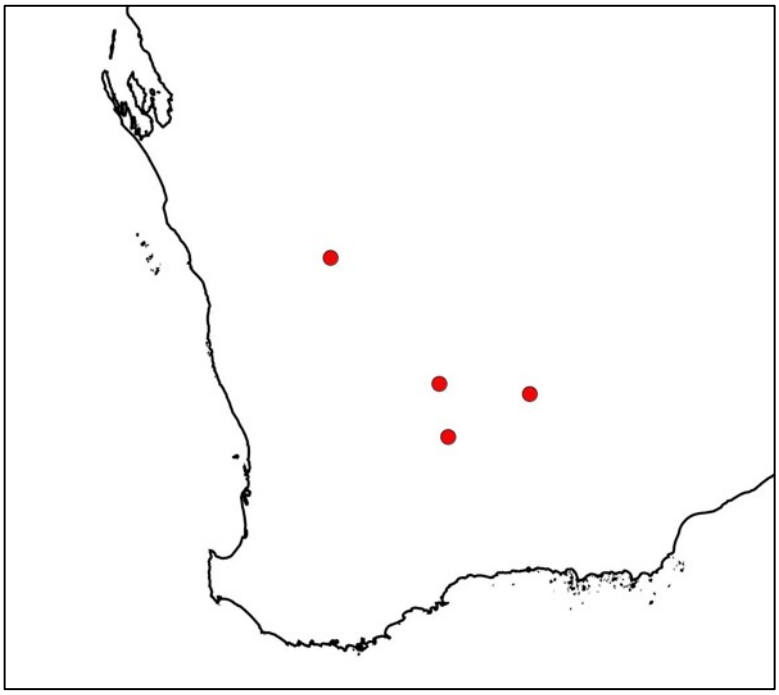

Figure 44. Distribution of *Lepidium merrallii* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Logania nanophylla* Priority 2** **Loganiaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/16727

Reference: Conn, B J. 1995. 'Taxonomic Revision of *Logania* Section *Logania* (Loganiaceae)'. *Australian Systematic Botany* 8(4): 585–665. https://doi.org/10.1071/SB9950585.

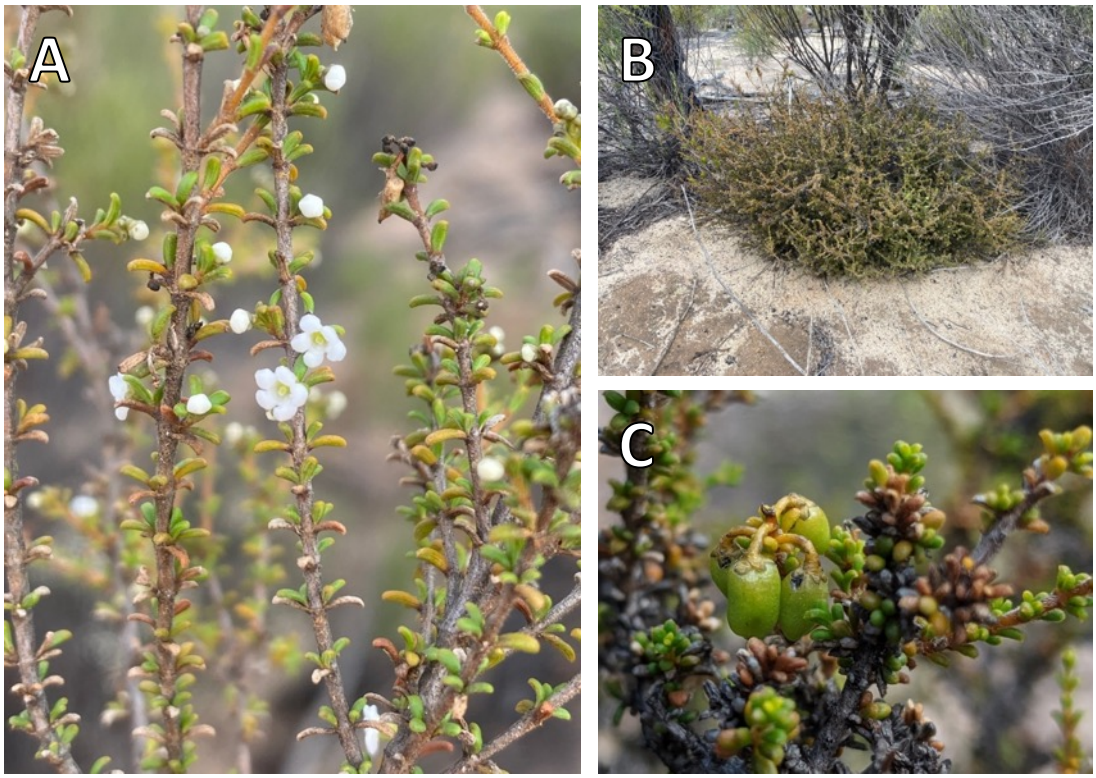

Figure 45 A; *Logania nanophylla* leaves and flowers. (LS-195, IMG_5212) B; *Logania nanophylla* shrub. (LS-195, IMG_5210) (Photograph credit: Geoff Cockerton) C; *Logania nanophylla* fruits. (Photograph credit: Nicole Dakin)

Description:

Logania nanophylla is a small dioecious spreading shrub up to 0.45 m tall (Figure 45B; Conn 1995; Florabase). The branches are subterete, sparsely to moderately hairy, and slightly curved. Leaves are subsessile, with a petiole 0.1-0.2 mm long and an elliptic lamina 1.2-2.1 mm long (Figure 45A). The abaxial surface is densely hairy and papillose, except for the midrib which is glabrous. This surface is mostly covered by a revolute margin, so that the thickened midrib is visible. The inflorescence is terminal on short lateral branches, 3-7 flowered, and the peduncles are absent or greatly reduced (Figure 45). Flowers are unisexual and have a glabrous propodium. The corollas are white, 1.5-2 mm long, have broadly ovate lobes, and may be glabrous or papillose. Fruit hangs downwards and is oblong (Figure 45C).

Logania nanophylla is morphologically most similar to *L. insularis*, but is distinguished by shorter leaves (Conn 1995). *Logania insularis* is endemic to Kangaroo Island, South Australia.

Habitat:
The species has been recorded growing on sand dune in white sand over brown soil (Conn 1995), in pebbly brown sandy clay, in deep aeolian sand, and in grey-brown clayey-sand (Florabase).

Distribution:
Logania nanophylla has been recorded from the Mount Holland area to north-east of Norseman (Florabasel; Figure 46). Within the project area, *L. nanophylla* has been recorded in a dense population 1.2 km south-east of the intersection of Emu Fence Road and Parker Range Road. Another population has been recorded 7 km north of the intersection of King Ingram Road and Marvel Loch-Forrestania Road.

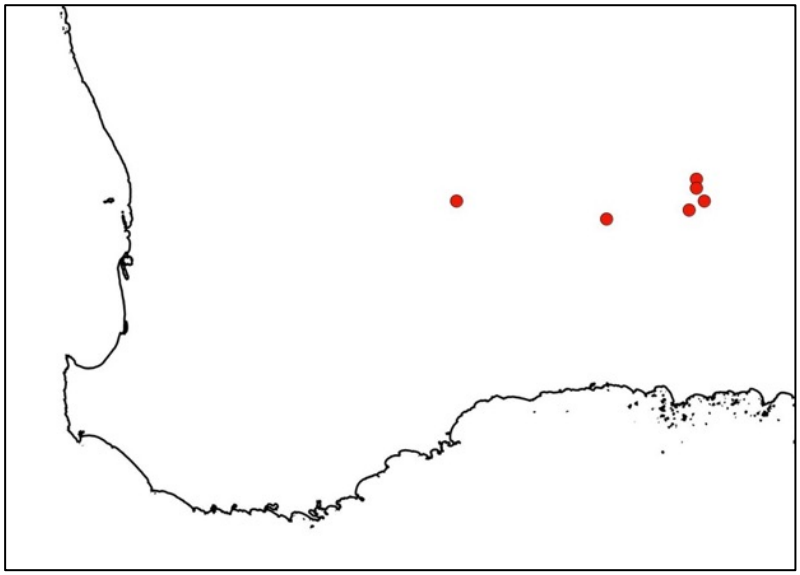

Figure 46. Distribution of *Logania nanophylla* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/12445

Reference: George, Alexander S. 1991. 'New Taxa, Combinations and Typifications in *Verticordia* (Myrtaceae : Chamelaucieae)'. *Nuytsia: journal of the Western Australian Herbarium* 7(3): 231–394.

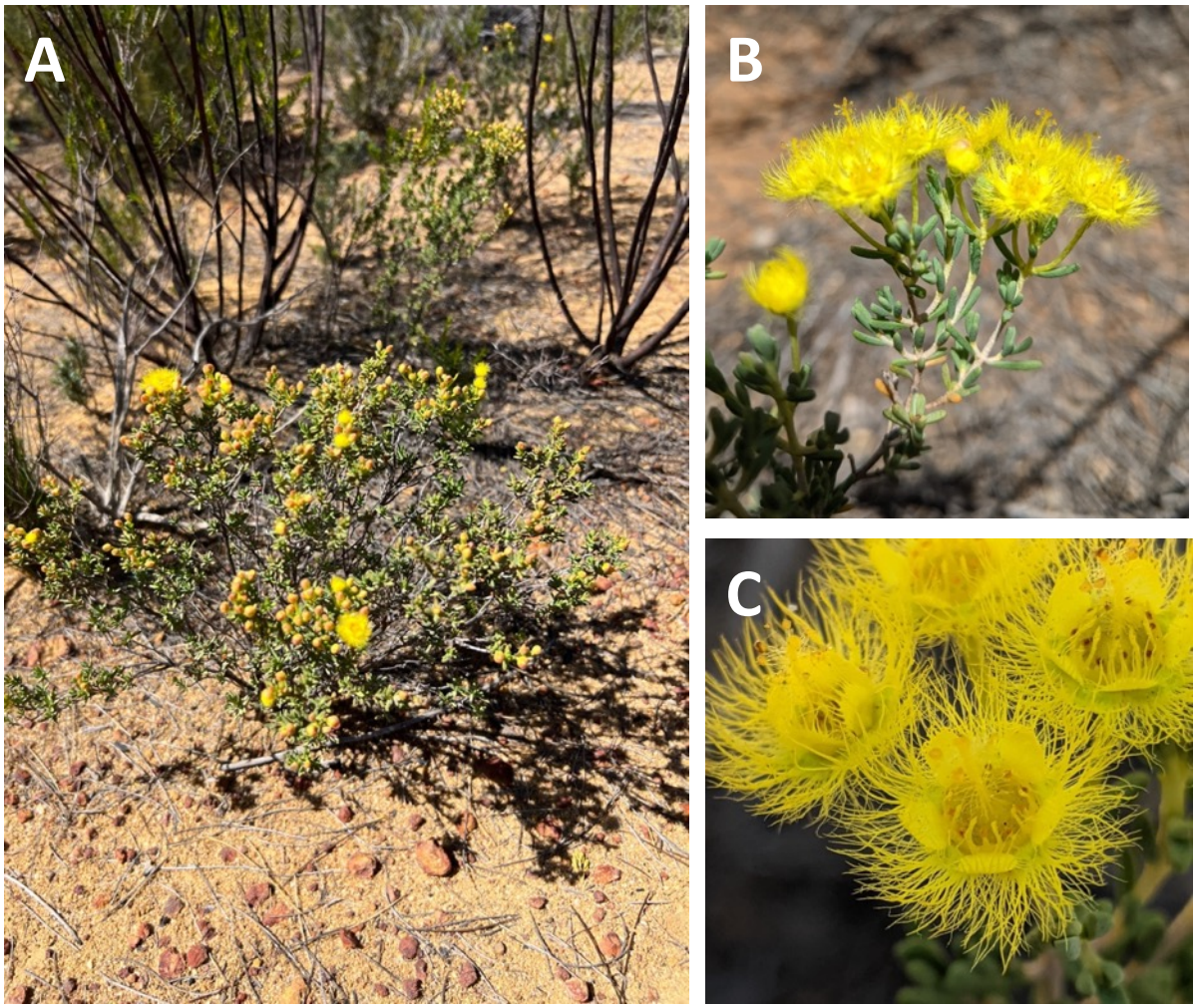

Figure 47 A; *Verticordia multiflora* subsp. *solox* shrub. MHDL-132 (Photograph credit: Douglas Lievense) B; *Verticordia multiflora* subsp. *solox* flowers, showing leaves and pedicels. C; *Verticordia multiflora* subsp. *solox* flowers, showing petals, stamens and staminodes. (Photograph credit: Nicole Dakin)

Description:

Verticordia multiflora subsp. *solox* is a shrub with spreading stems, growing up to 50 cm tall(Figure 47A; A. S. George 1991). The stems may have a straggly appearance. Leaves are linear, semiterete, obtuse, 2-7 mm long and sessile (Figure 47B). The hypanthium is turbinate, 1.8-2 mm long, densely comose at the base, and the 10 ribs are covered in hairs. Flowers are yellow, petals are fimbriate, and sepals are deeply fimbriate (Figure 47B, C). Stamens are 0.6-0.8 mm and staminodes are 1.8-2.5 mm long and subulate.

This subspecies may be confused with *V. multiflora* subsp. *multiflora*, but has larger flowers. The sepals are 5-6 mm long (compared to 4-4.5 mm), petals are 3.5-5 mm long (compared to 2.5-3 mm long), and the style is 4-5.3 mm long (compared to 3-3.5 mm long; A. S. George 1991)). The flowers have a more shaggy appearance compared to the other subspecies, and do not turn red in the centre as do *V. multiflora subsp. multiflora* flowers (E. George 2002). Other similar species include *V. brachypoda* and *V. huegelii* (A. S. George 1991). *Verticordia multiflora* subsp. *solox* may be distinguished by its bright yellow flowers, subulate entire staminodes, and scarcely enlarged stigma.

Habitat:
Verticordia multiflora subsp. *solox* grows in pale yellow sand, gravelly sand, and sand over granite (A. S. George 1991). It grows in tall open shrubland, mallee shrubland, and heath, frequently in association with other *Verticordia* species (E. George 2002).

Distribution:
Records of *V. multiflora* subsp. *solox* have been made from south-east of Merredin to Marvel Loch, and east of Hyden (A. S. George 1991; Australian Virtual Herbarium). Within the project area, *V. multiflora* subsp. *solox* has been recorded 1.6 km east and 1.3 km north-west of the intersection of Grace Road and Parker Range Road.

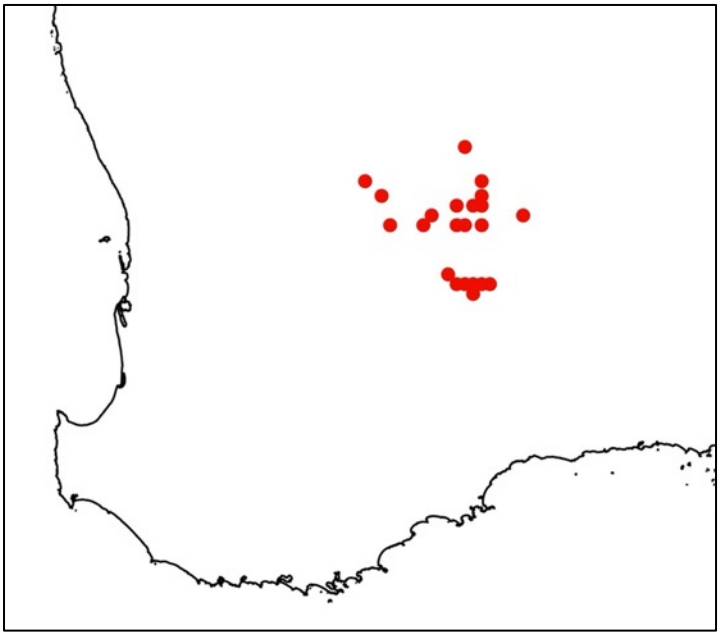

Figure 48. Distribution of *Verticordia multiflora* subsp. *solox* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/14623

Reference: Cowan, Richard S, and B R (Bruce Roger) Maslin. 1999. 'Acacia Miscellany. 17, Miscellaneous New Taxa and Lectotypifications in Western Australian Acacia, Mostly Section Plurinerves (Leguminosae: Mimosoideae)'. *Nuytsia: journal of the Western Australian Herbarium* 12(3): 413–52.

Figure 49 A; *Acacia crenulata* shrub. IMG_5332 B; *Acacia crenulata* branchlets and leaves. IMG_5334 (Photograph credit: Geoff Cockerton)

Description:

Acacia crenulata is a obconic or rounded shrub, reaching 1-3 m tall (Figure 49A; Cowan and Maslin 1999). It may be single stemmed, but is more commonly branched at ground level. The bark is dark grey, finely longitudinally fissured on main stems and smooth on branches. New shoots are slightly resinous, and the phyllodes are green with brownish margins (Figure 49B). Branchlets are flattened angular at their extremities but soon become terete, and are crenulate resin-ribbed. The mature phyllodes are narrowly elliptic to linear-elliptic, (20)30-60 mm long, (2)3-6 mm wide, coriaceous, straight or sometimes shallowly recurved. They may be glabrous or with minute resin hairs, particularly the nerves. The longitudinal nerves are numerous, closely parallel, and are indistinct except for the central nerve. Margins are resinous, often crenulate, and usually yellow or yellow-brown.

Inflorescences are simple and solitary at the base of a vegetative bud, or paired with a vegetative bud (Cowan and Maslin 1999). Peduncles are 1-2 mm long, and heads are globular, 4 mm in diameter and 20-25 flowered. Sepals are 1/3 as long as the basally united petals. Pods are linear, 20-45 mm wide, 3-3.5 mm wide, and have valve margins that are slightly raised vertically, so that the pods appear slightly quadrangular. The seeds have an aril that is yellow when dry.

Acacia crenulata has an affinity with *A. duriuscula* (Cowan and Maslin 1999). *Acacia duriuscula* may be distinguished by its grey-green, commonly obtuse to subacute phyllodes which have uniform, fine nerves and non-resinous margins. It also has longer peduncles (2-5 mm., and up to 8 mm), a longer calyx relative to the corolla, papery pods without raised margins, and white seed arils.

Habitat:
This species occurs mostly on rocky outcrops in heavy soil and sandy clay-loam, in open eucalypt woodland (Cowan and Maslin 1999).

Distribution:
Acacia crenulata ranges from Mukinbudin in the west to Kalgoorlie in the east, and from Walyahmoning Nature reserve to Marvel Loch in the south (Figure 50; Florabase). Within the project area, it has been recorded on Parker Range Road, approximately 10 km north of Wockallary Nature Reserve.

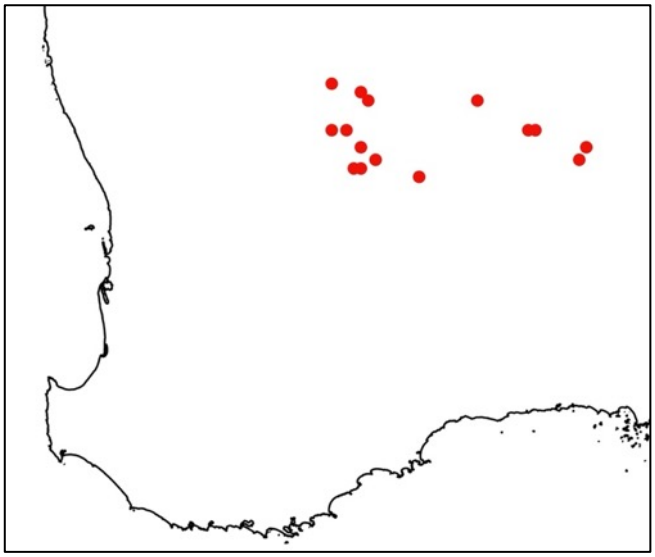

Figure 50. Distribution of *Acacia crenulata* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

***Acacia undosa* Priority 3** **Fabaceae**

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/14152

Reference: Cowan, Richard S, and B R (Bruce Roger) Maslin. 1995. 'Acacia Miscellany 15. Five Groups of Microneurous Species of Acacia (Leguminosae : Mimosoideae : Section Plurinerves), Mostly from Western Australia'. *Nuytsia: journal of the Western Australian Herbarium* 10(2): 205–54.

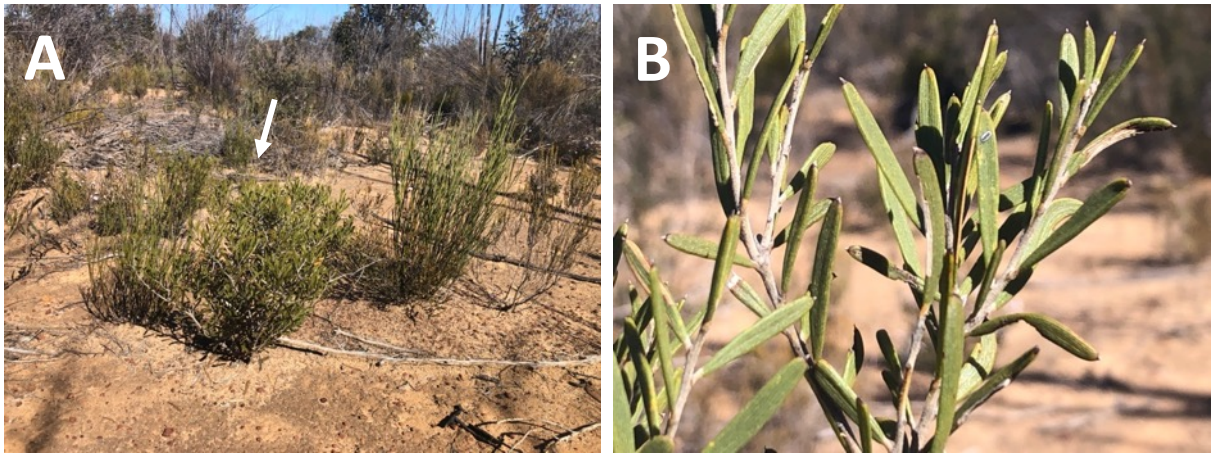

Figure 51 A; *Acacia undosa* shrub, shown by arrow. IMG_7061 B; *Acacia undosa* leaves. IMG_7064 (Photograph credit: Geoff Cockerton)

Description:

Acacia undosa is a dense domed or obconic shrub, 0.3-1.5 m tall (Figure 51A; Cowan and Maslin 1995). Branchlets are tomentose, and stipules are persistent. Phyllodes are linear to linear-oblanceolate, 20-45 mm long, 1-4 mm wide, rigid, spreading and glabrous. They have an obliquely mucronate to sub-uncinate apex, with a hard, innocuous to pungent point (Figure 51B). The phyllodes have approximately 9 nerves per face, 20 in all, that are closely parallel. Glands are not prominent, and there may be 1 or 2. Peduncles are 1-2 mm long, and flower heads are globular, golden, 3-3.5 mm in diameter, and 18-20 flowered. Pods are linear, strongly undulate, 10-40 mm long, 2.5 mm wide, papillate, with a distinct marginal nerve which is lighter in colour.

Acacia undosa is similar to *Acacia hadrophylla*. Both species have flat phyllodes, but *A. hadrophylla* has generally longer, thinner phyllodes which have 2 glands. *Acacia undosa* also has undulate pods.

Habitat:

This species occurs in patches of open mallee scrubland in well-drained clayey sand or in moist brown loam (Cowan and Maslin 1995).

Distribution:

Acacia undosa has been recorded in scattered populations from near Tammin and Bruce Rock, south to Lake Magenta, and south-east to Frank Hann National Park (Florabase). Within the project area, it has been recorded approximately 12 km north and 14 km east of the Mount Holland minesite.

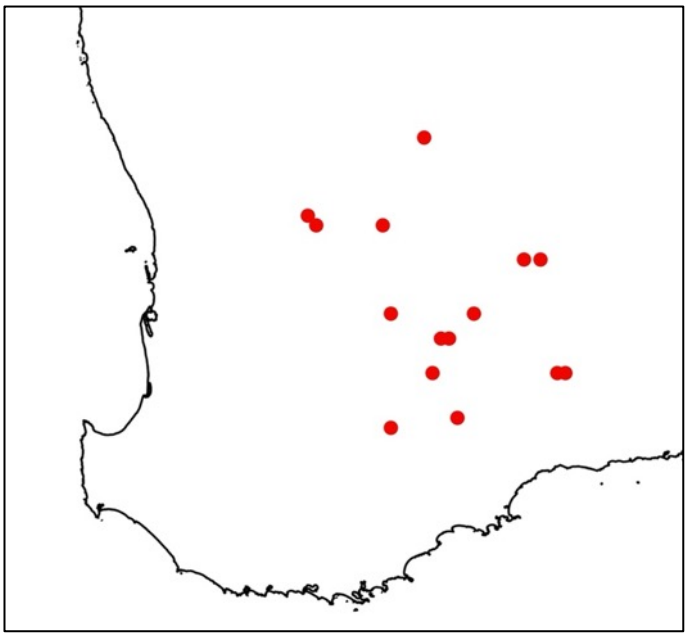

Figure 52. Distribution of *Acacia undosa* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/17968

Reference: Duretto, Marco F. 1999. 'Systematics of Boronia Section Valvatae Sensu Lato (Rutaceae)'. *Muelleria: An Australian Journal of Botany* 12(1): 1–131.

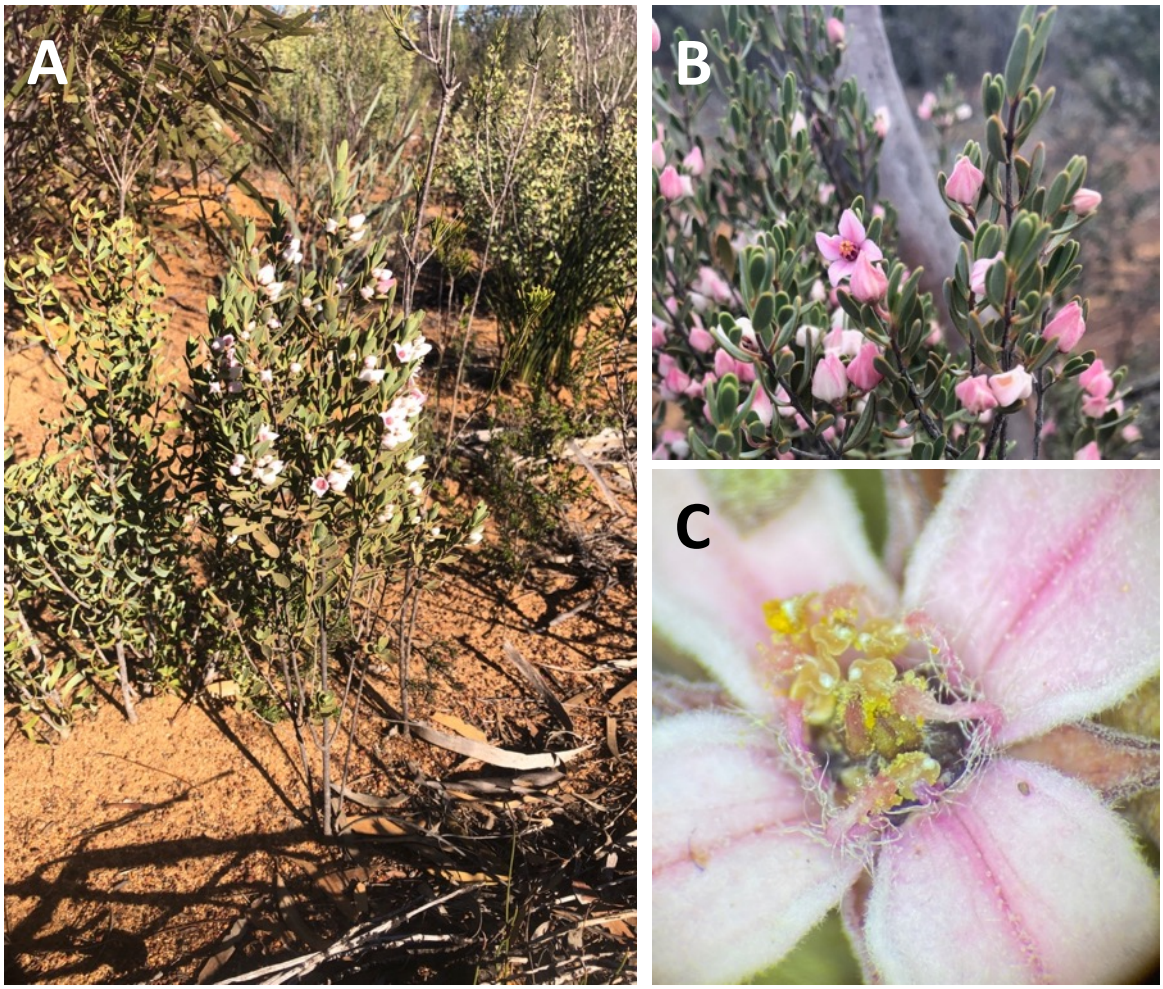

Figure 53 A; *Boronia ternata* var. *promiscua* shrub. IMG_7145 B; *Boronia ternata* var. *promiscua* flowers and leaves. IMG_7600 (Photograph credit: Geoff Cockerton) C; *Boronia ternata* var. *promiscua* stamens and style. Note the simple hairs on the filaments, and the (somewhat obscured) hairs on the style. IMG_3029 (Photograph credit: Lindsay Shelton)

Description:

Boronia ternata var. *promiscua* is a shrub up to 1.5 m tall, with a dense tomentum of stellate hairs on branches and leaves (Figure 53A; Duretto 1999). Branches are terete to slightly quadrangular, and leaves are oblanceolate, obtuse, sessile, 5-14 mm wide and 2-3 mm wide (Figure 53B). The inflorescences are 1-flowered, and peduncles are up to 1 mm long. Sepals are lanceolate, 2-3.5 mm long, and the abaxial surface has a dense indumentum of stellate hairs. Petals are 5-6 mm long and 2.5-3 mm wide, with a sparse to dense indumentum on both surfaces. The filaments have simple hairs, and are prominently glandular on the distal 0.5 mm (Figure 53C). The style is hirsute for the whole length.

This variety may be confused with other varieties of *Boronia ternata.* Key features include leaves that are obviously hirsute and hirsute leaf margins (Duretto 1999). The flowers have filaments with simple hairs, and there are also hairs on the style.

Habitat:
Boronia ternata var. *promiscua* occurs on sand and laterites in disturbed areas in woodlands (Duretto 1999).

Distribution:
Boronia ternata subsp. *promiscua* has a limited distribution, and occurs south of Southern Cross, near Mount Holland (Florabase). There is one record further west towards Hyden, but this may be erroneous. Within the project area, this variety has been recorded at the intersection of Parker Range Road and Emu Fence Road, along Dunbar Road, and from 9 km north of King Ingram Road along Marvel Loch-Forrestania Road. There are major populations east, west and south of the Mount Holland minesite.

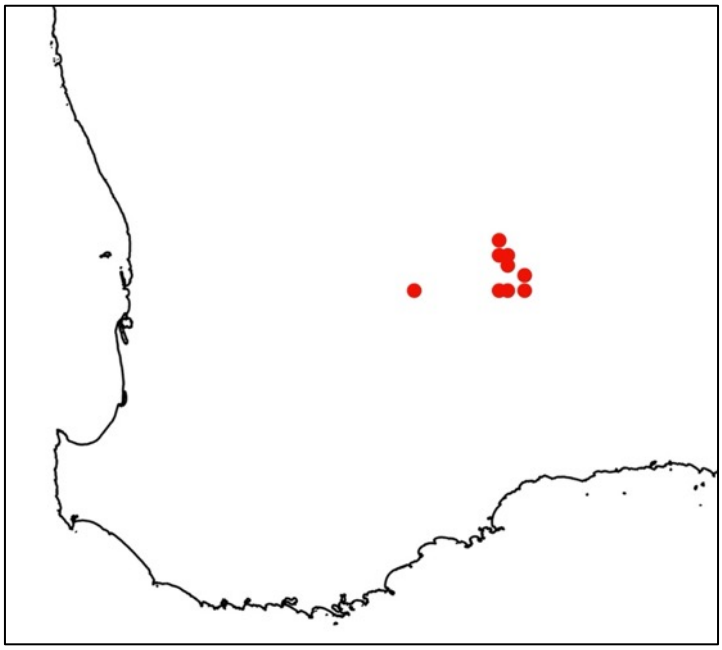

Figure 54. Distribution of *Boronia ternata* var. *promiscua* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/13110

Reference: Taylor, J M, and M D Crisp. 1992. 'A Revision of Chorizema (Leguminosae: Mirbelieae)'. *Australian Systematic Botany* 5(3): 249–335.

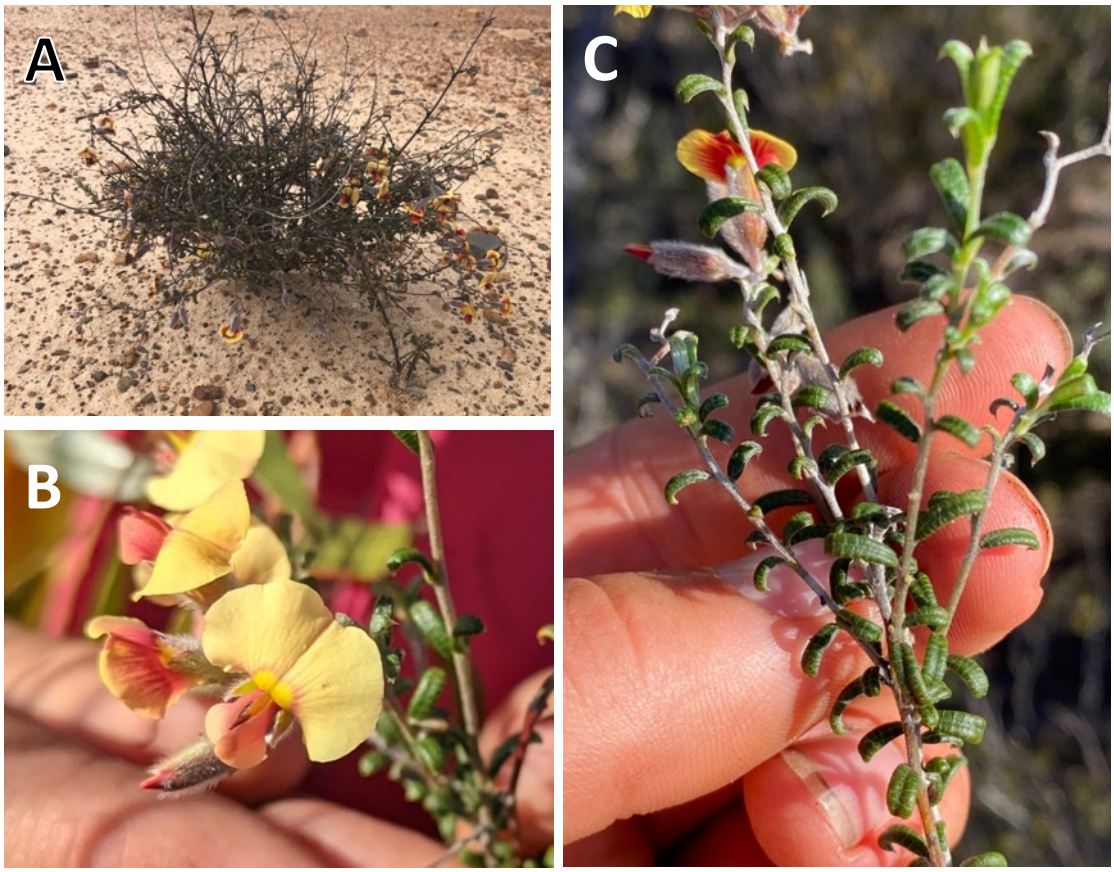

Figure 55 A; *Chorizema circinale* shrub. IMG_7232 (Photograph credit: Geoff Cockerton) B; *Chorizema circinale* flower 073711812 (Photograph credit: Nicole Dakin) C; *Chorizema circinale* leaves and stems IMG_ (Photograph credit: Lindsay Shelton)

Description:

Chorizema circinale is a prostrate, scrambling shrub, growing up to 0.4 m high (Figure 55A; Taylor and Crisp 1992). It grows from a thick, woody rootstock. Stems and branches are wiry with appressed, short pale hairs or almost glabrous. The leaves are sparse, strongly recurved to somewhat circinate, linear-ovate or -oblong, acute at the apex and mucronate (Figure 55C). Leaves are (4-)5-12 mm long and 1.5-3.5 mm wide, coriaceous, and margins are revolute. Venation is reticulate, and the midrib is impressed on the upper side. Petioles are approximately 0.1 mm long, and stipules are lacking. Racemes are terminal, 4-6 cm long, with 1-4 flowers and loosely appressed silvery hairs present (Figure 55B).

Habitat:

Chorizema circinale has been recorded growing on brown sandy loam, yellow loamy sand, white sand, and gravelly sand (Florabase). It grows in heath, shrubland, eucalypt woodland, on flats, and at the margins of gravel pits. Individuals often grow underneath larger shrubs and mallees (personal observation).

Distribution:
This species has been recorded in scattered populations, including the Mount Holland area, east of Lake Hope, east of Katanning, and further south in Fitzgerald River National Park and near Hopetoun (Figure 56). Within the project area, large numbers have been recorded 3 km north and south of King Ingram along Marvel Loch-Forrestania Road. A population has also been recorded 20 km north of King Ingram Road.

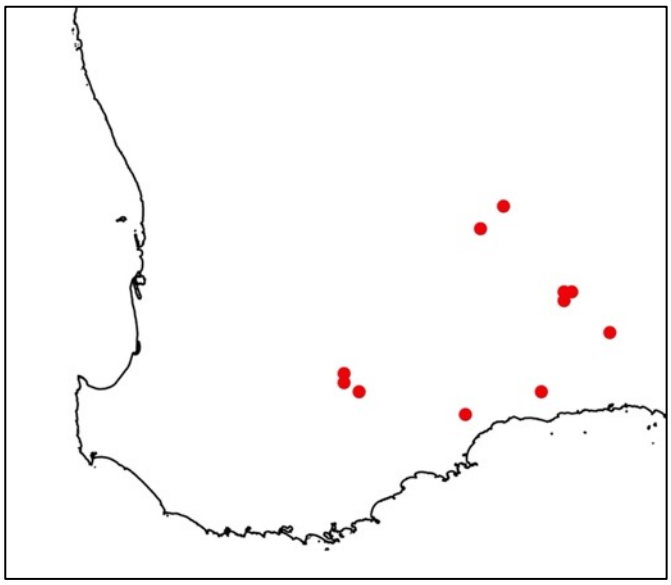

Figure 56. Distribution of *Chorizema circinale* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/31591

Reference: Rye, Barbara. 2007. 'New Species and Keys for *Cryptandra* and *Stenanthemum* (Rhamnaceae) in Western Australia'. *Nuytsia* 16: 325–82.

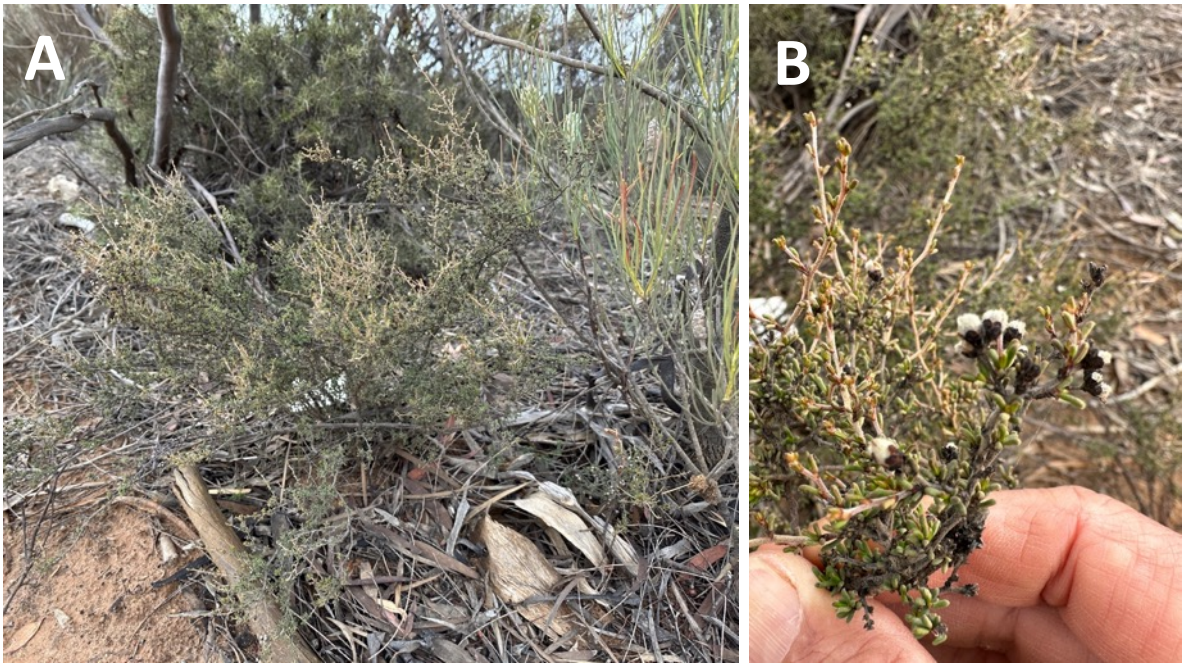

Figure 57 A; *Cryptandra crispula* shrub. GC-696, IMG_8119 B; *Cryptandra crispula* leaves and buds. Note the long, dense hairs on the sepals. GC-696, IMG_8120 (Photograph credit: Geoff Cockerton)

Description:

Cryptandra crispula is a shrub reaching 0.25-0.9 m high (Figure 57A; Rye 2007). It has Branchlets which are not spinescent, and young stems are covered with long fine hairs, becoming glabrous with age. Stipules are 1.5-2.5 mm long and ciliate. Petioles are approximately 0.2 mm long, and leaf blades are narrowly oblong, 2.5-4 x 0.6-0.8 mm, with recurved to revolute margins completely or almost completely concealing the lower surface. The leaves have a recurved whitish mucro 0.2-0.4 mm long, and the lower surface is white-hairy.

There are 11-12 bracts that are broadly ovate to oblong-elliptic (Figure 57B; Rye 2007). The inner surface of the outer bracts has long hairs along the midvein, and the inner bracts are obtuse, long-ciliate. The outer surface is glabrous around the margin, and minutely hairy inside. Flowers are white, and there are usually 2-5 per branchlet in a cluster. Sepals are 2-2.2 mm long, very densely hairy with stellate and crisped/tangled simple hairs. The apex is hidden by a tuft of hairs. The floral tube is 2-2.3 mm long, and the petals are 0.9-1.1 mm long.

Cryptandra crispula has affinities with *C. minutifolia* subsp. *brevistyla*, *C. aridicola*, *C. leucopogon*. The most distinctive feature of *C. crispula* is the tendency to have the hair tufts on the sepals crisped.

Habitat:
This species has been recorded mainly in sandy soils (B. Rye 2007).

Distribution:
Crytandra crispula has a distribution that extends from Mount Manning Range Nature Reserve in the north, south to Lake Hope (Florabase). It ranges from Marvel Loch in the west to Karonie in the east. Within the project area, it has been recorded at the intersection of King Ingram Road and Marvel Loch-Forrestania Road.

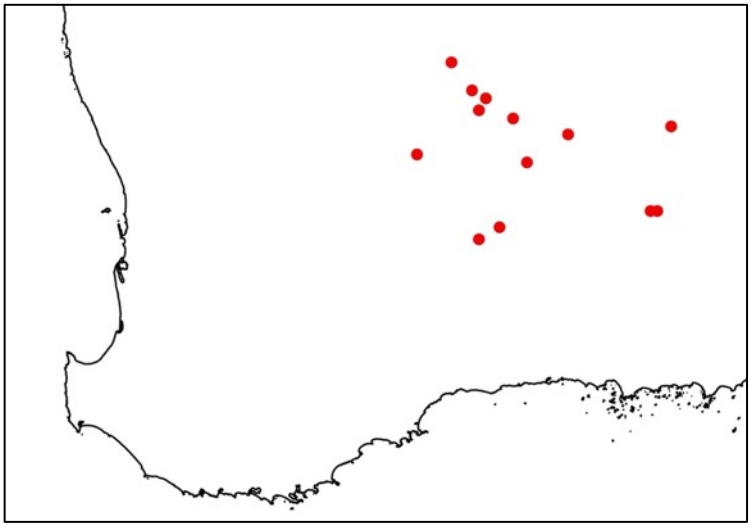

Figure 58. Distribution of *Cryptandra crispula* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/16590

Reference: Crisp, M D. 1995. 'Contributions towards a Revision of *Daviesia* (Fabaceae: Mirbelieae). III.* A Synopsis of the Genus'. *Australian Systematic Botany* 8(6): 1155–1249.

Figure 59 A; *Daviesia sarissa* subsp. *redacta* shrub. IMG_*7395* B; *Daviesia sarissa* subsp. *redacta* flowers. Note the small bracts that do not cover the flower. IMG_*7401* C; *Daviesia sarissa* subsp. *redacta* phyllodes. IMG_*7396* (Photograph credit: Geoff Cockerton)

Description:

Daviesia sarissa subsp. *redacta* is a spreading or sprawling shrub growing up to 0.5 m high and 0.8 m wide (Figure 59A; M D Crisp 1995). Branchlets and phyllodes are very rigid and smooth. Phyllodes are scattered, widely spreading, terete, and tapered gently from base to apex (Figure 59C). They are fiercely pungent, continuous with and resembling branchlets, and are 10-80 mm long and 1-2 mm diameter at the base. Inflorescences are 1 per axil, and are 3-6 flowered. Pedicels are 1.5-3 mm long, and the bracts subtending the pedicels are 1.5-2 mm long and 0.75-1 mm wide, and inconspicuously striate with a few ribs (Figure 59B). The calyx is 3-3.5 mm long, standard is 7×6.5 mm, wings are 5×2.5mm, and the keel is 4.5×1.75 mm.

The standard is orange-yellow towards margins with a central dark red flare, and the keel and wings are red.

This subspecies may be confused with other *D. sarissa* subspecies. It may be distinguished by the bracts subtending the pedicels, which are neither imbricate nor concealing the inflorescence (Figure 59C; Michael D Crisp et al. 2017). They are not prominently striate, and are longer when compared to subsp. *sarissa* (0.5-1.5 mm long in subsp. *sarissa*). The flowers of subsp. *sarissa* are also generally smaller.

Habitat:
Daviesia sarissa subsp. redacta grows on yellow, sometimes gravelly, sand on flats or undulating terrain in heath communities (Michael D Crisp et al. 2017).

Distribution:
The records of this subspecies are clustered in and near Boorabbin National Park (Figure 60). There is a record further east and one further west, but these collections may be erroneous (Florabase). Within the project area, it has only been recorded near the turn-off to the old Teddy Bear Mine site.

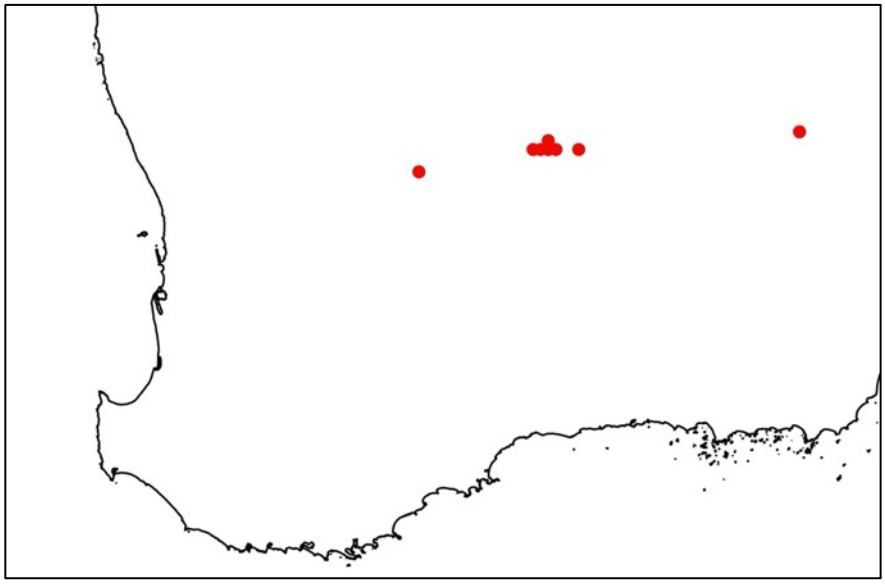

Figure 60. Distribution of *Daviesia sarissa* subsp. *redacta* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: Necklace Rinzia

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/48266

Reference: Rye, Barbara. 2017. 'An Expanded Circumscription and New Infrageneric Classification of *Rinzia* (Myrtaceae: Chamelaucieae)'. *Nuytsia* 28: 39–93.

Figure 61 A; *Rinzia torquata* shrub in flower. (Photograph credit: Geoff Cockerton) B; *Rinzia torquata* flower, showing numerous stamens and staminodes. (Photograph credit: Lindsay Shelton) C; *Rinzia torquata* flowers and leaves. (Photograph credit: Geoff Cockerton)

Description:

Rinzia torquata is a shrub reaching 0.5-1.7 m in height, at least 0.5 m wide and often branched at ground level (Figure 61A, Rye 2017). Leaves are narrowly obovate to oblong-elliptic, and are 1.4-2.5 mm long, 0.8-1.2 mm wide, and 0.4-0.8 mm thick (Figure 61C). The leaves have oil glands on sloping sides that extend outwards from the midrib. Flowering occurs from July to October, and flowers are 6.5-8.5 mm in diameter with pink to pale pink petals (Figure 61B, C). Each flower has 15-20 stamens which occur in triads. Filaments are free, 0.8-1.3 mm long, and narrow (less than 2.5 mm wide). Flowers have 10-21 staminodes, with 2-5 staminodes between each triad.

Rinzia torquata is closely related to *R. triplex* and the two species may be confused. Both species have staminodes, which distinguishes them from other *Rinzia* species (B. Rye 2017). *Rinzia torquata* has 10-21 staminodes, while *R. triplex* has 5-11 of them. The species also differ

in the shape and features of their leaves. *Rinzia torquata* has leaves that are distinctly wider than they are thick, while *R. triplex* has leaves with a similar width and thickness. The leaves of *Rinzia torquata* have sloping sides, and *R. triplex* has almost vertical sides (See Figure …).

Habitat:
Rinzia torquata occurs in yellow sand or lateritic soil, sometimes with some clay (B. Rye 2017). It often grows in vegetation dominated by mallees, *Acacia*, *Allocasuarina* and *Melaleuca*.

Distribution:
The distribution of *R. torquata* extends from near Merredin, east to Parker Range and south-east to near Hatter Hill (Figure 2; Rye 2017). The total known range is approximately 220 km.

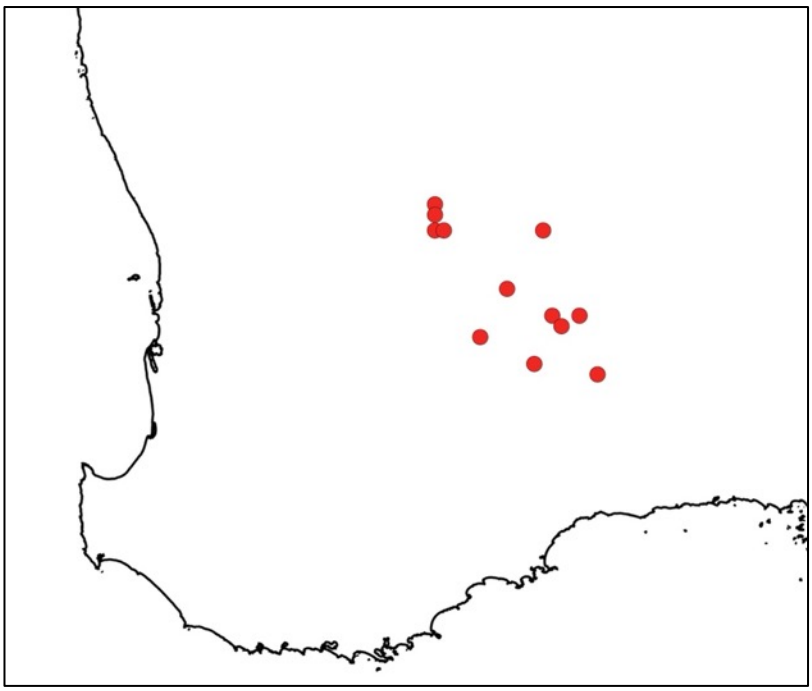

Figure 62. Distribution of *Rinzia torquata* in Western Australia.
Data from Florabase/Australian Virtual Herbarium.

Common name: Triad Rinzia

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/48267

Reference: Rye, Barbara. 2017. 'An Expanded Circumscription and New Infrageneric Classification of *Rinzia* (Myrtaceae: Chamelaucieae)'. *Nuytsia* 28: 39–93.

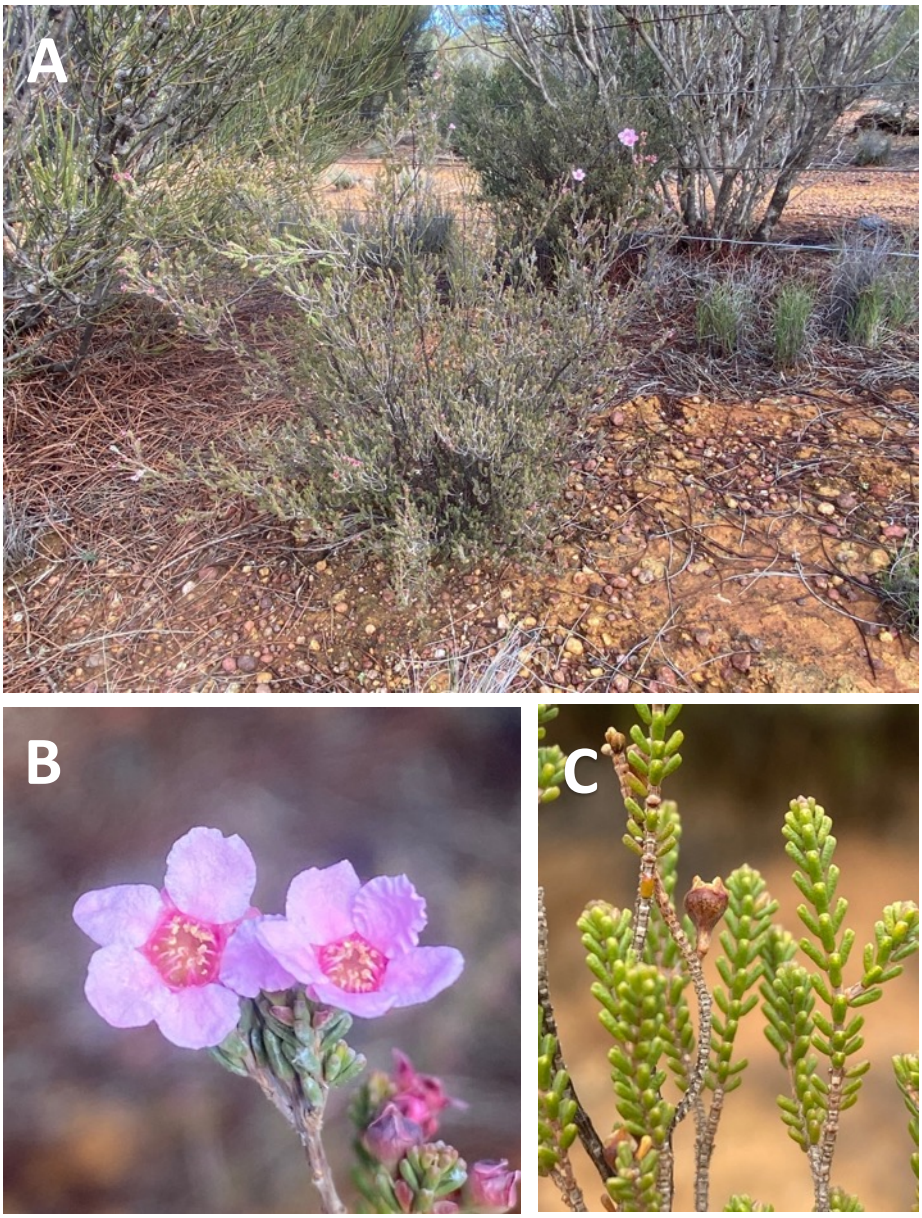

Figure 63 A; *Rinzia triplex* shrub, in flower. B; *Rinzia triplex* flowers. Note the stamens arranged in triads, and the narrow, pink filaments, Staminodes can be seen between triads. C; *Rinzia triplex* leaves. Note that the width is similar to the thickness, and the sides are almost vertical, giving the leaves a rectangular prism-like appearance. (Photograph credit: Geoff Cockerton)

Description:

Rinzia triplex is a shrub reaching 0.3-1.5 m in height and at least 1.2 m in width (Figure 63A, Rye 2017). Leaves are densely 4-ranked on young branchlets (Figure 63C) and have a small or absent petiole. Leaves are 1.5-2.2 mm long and 0.5–0.6 mm wide, and are about as thick as

wide. Oil glands can be seen on each more or less vertical side of midrib. These leaves appear "blocky"; somewhat similar in shape to a rectangular prism (Figure 63C). Flowering occurs from Late June to September. Flowers are 6-10mm in diameter with bright pink petals that become paler with age (Figure 63B). Stamens occur in triads, and have narrow, bright pink filaments. 5-11 staminodes are present, positioned between triads.

Rinzia triplex is very closely related to *R. torquata*, and may be confused. Both species have staminodes, distinguishing them from other species in the genus. *Rinzia triplex* has 5-11 staminodes, while *Rinzia torquata* has 10-21. The species also differ in the shape and features of their leaves. *Rinzia torquata* has leaves that are distinctly wider than they are thick, while *R. triplex* has leaves with a similar width and thickness (Figure 63C). The leaves of *Rinzia torquata* have sloping sides, and *R. triplex* has almost vertical sides (See Figure 61).

Habitat:
Rinzia triplex has been recorded growing on sandy plains in yellow to red, often gravelly or lateritic soils. One record mentions fragments of banded ironstone. Habitats are dominated by *Acacia*, *Eucalyptus* or *Allocasuarina*, and *Baeckea elderiana* is often present.

Distribution:
Rinzia triplex extends from the Die Hardy Range area, north of Koolyanobbing, south to the Sourthern Cross area (Figure 64). The distribution of this species is at least 230 km long.

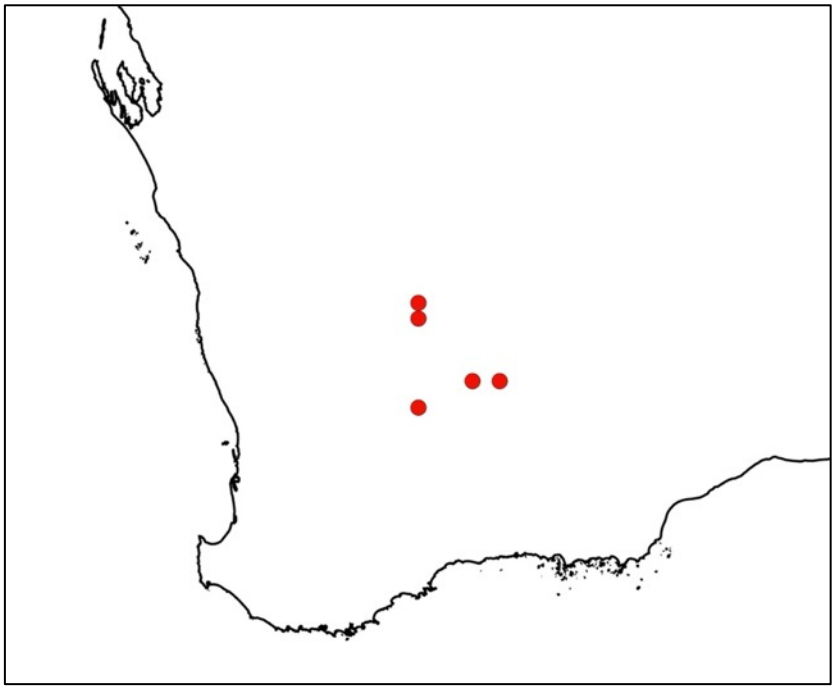

Figure 64. Distribution of *Rinzia triplex* in Western Australia.
Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/12427

Reference: George, Alexander S. 1991. 'New Taxa, Combinations and Typifications in Verticordia (Myrtaceae : Chamelaucieae)'. *Nuytsia: journal of the Western Australian Herbarium* 7(3): 231–394.

Figure 65 A; *Verticordia gracilis* shrubs, in foreground and background. IMG_8908 B; *Verticordia gracilis* flowers and buds. Note the orbicular petals and hairs on the hypanthium. IMG_8846 C; *Verticordia gracilis* leaves. Note the triquetrous shape. IMG_8853 (Photograph credit: Geoff Cockerton)

Description:

Verticordia gracilis is a spindly to bushy shrub, growing 15-45 cm x 20-60 cm, with one to several basal stems (Figure 65A; A. S. George 1991). Leaves are oblong, semiterete to

triquetrous, and 2-4 mm long (Figure 65C). The flowers are pale to deep pink, and in rounded corymb-like groups (Figure 65B). Peduncles are 9-12 mm long, and the hypanthium is 1.5-2 mm long, broadly turbinate, 10-ribbed, and more or less verrucose. The ribs are hirsute and pubescent in between, and the hypanthium is densely long-hirsute towards the base (Figure 65B). Sepals are spreading, deeply fimbriate without lobes, and auricles are absent. Petals are 2 mm long, orbicular, and erose to dentate. Anthers are globose but compressed, and staminodes are linear with a genticulate apex.

Verticordia gracilis is similar to *V. pritzelii*, but differs in having more slender branchlets and peduncles, a more pilose hypanthium, and shorter more divided sepals that lack auricles (A. S. George 1991). Other important features include orbicular petals with irregularly toothed edges, compressed anthers and a deeply inserted ovary. *Verticordia pritzelii* has a more rounded hypanthium, longer sepals with reflexed auricles, and petals with fringed margins (E. George 2002).

Habitat:
This species grows in yellow sand, usually with or over loam and gravel (A. S. George 1991). It grows in heath and open mallee shrubland, often in association with other *Verticordia* species (E. George 2002).

Distribution:
Verticordia gracilis occurs between Bruce Rock and Newdegate, and east to the Mount Holland area (Figure 2; A. S. George 1991, Florabase). Within the project area, it has been recorded growing from 5 km north of the intersection of King Ingram Road and Marvel Loch-Forrestania Road, to the entrance to the Mount Holland mine site. Scattered records have been made further north along Marvel-Loch Forrestania Road, as far north as the intersection of Grace Road and Parker Range Road.

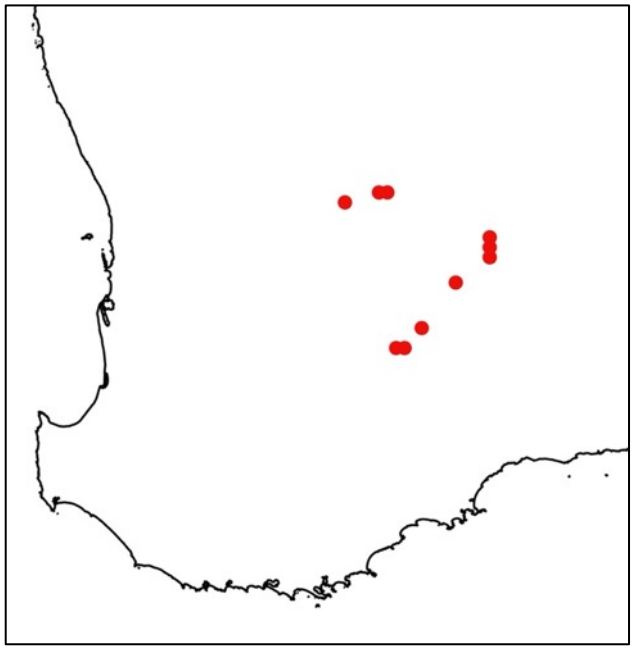

Figure 66. Distribution of *Verticordia gracilis* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/12442

Reference: George, Alexander S. 1991. 'New Taxa, Combinations and Typifications in *Verticordia* (Myrtaceae : Chamelaucieae)'. *Nuytsia: journal of the Western Australian Herbarium* 7(3): 231–394.

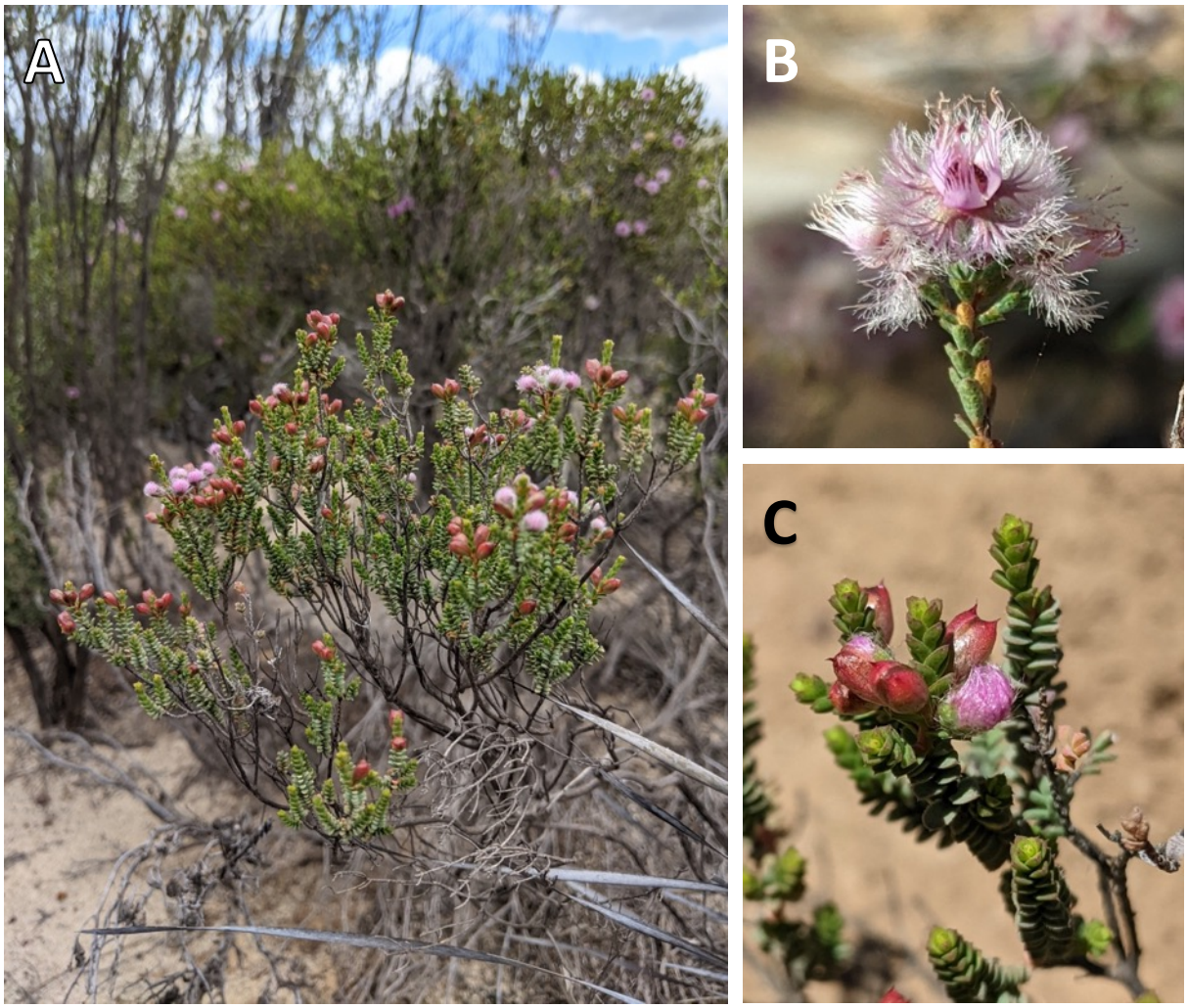

Figure 67 A; *Verticordia mitodes* shrub in flower. 041248003 B; *Verticordia mitodes* flowers. Note the petals with a long fringe, and the fimbriate, lobed sepals. 235735370 C; *Verticordia mitodes* buds and leaves. Note the cuspidate (pointed) bracetoles. 31843668 (Photograph credit: Nicole Dakin)

Description:

Verticordia mitodes is a much-branched shrub, growing 15-45 cm x 20-60 cm (Figure 67A; E. George 2002). It has greyish leaves that are somewhat spreading, broadly elliptic-obovate, shortly ciliate, 1-2 mm long and 0.5-1 mm wide (Figure 67C). Flowers are pale pink to magenta, spreading, and arranged in spike-like groups. The peduncles are 2-3.5 mm long and the bracteoles are cuspidate (Figure 67C). The hypanthium is turbinate, 2.2 mm long, prominently 5-ribbed and glabrous. Sepals are 3-4 mm long, fimbriate, with 5-7 lobes and slender auricles (Figure 67B). Petals are 4-5 mm long, erect to spreading, with a long terminal

fringe reaching 2.5 -3 mm long. The style is 5-6 mm long, and bearded with a short tuft of hairs up to 0.4 mm long.

Verticordia mitodes is most closely related to *V. auriculata* and *V. centipeda*. Distinguishing features of *V. mitodes* include smaller grey leaves, petals that have a long terminal fringe but no lateral fringe, and a longer style that is bearded with shorter hairs (A. S. George 1991; E. George 2002).

Habitat:
This species grows in white to grey, yellow and red sand, sometimes with or over lateritic gravel and loam (E. George 2002). It usually grows in association with other *Verticordia* species in heath and open shrubland.

Distribution:
Verticordia mitodes is distributed across a relatively large area of the eastern wheatbelt, but populations are small, scattered and some are confined to road verges (E. George 2002). The range extends from Merredin to west of Kalgoorlie, and from north of Lake Seabrook to Mount Holland (Figure 68). Within the project area, the species has been recorded near the intersection of Parker Range Road and Grace Road. Scattered populations have been recorded approximately 13 km south of the intersection of Dunbar Road and Marvel Loch-Forrestania Road, and extending south towards King Ingram Road.

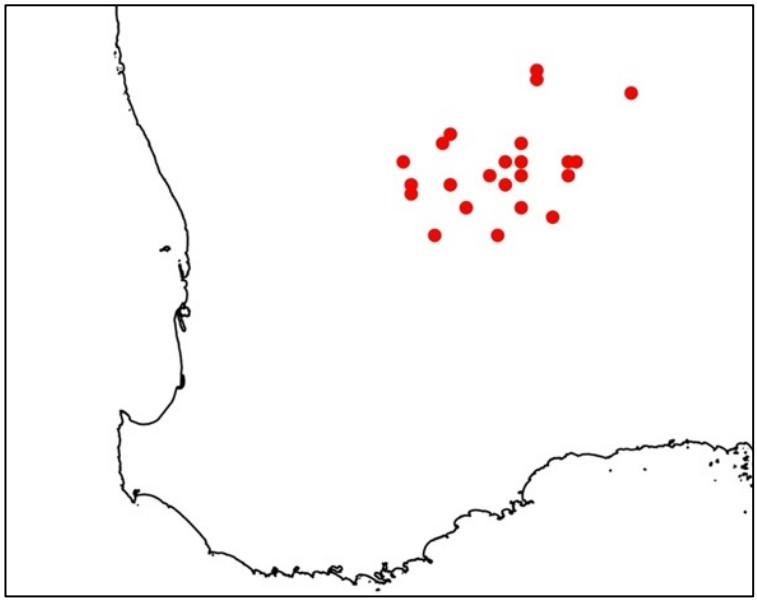

Figure 68. Distribution of *Verticordia mitodes* in Western Australia. Data from Florabase/Australian Virtual Herbarium.

Common name: N/A

Link to Florabase: https://florabase.dpaw.wa.gov.au/browse/profile/6121

Reference: Diels, Ludwig, and E Pritzel. 1905. 'Fragmenta Phytographiae Australiae Occidentalis'. *Botanische Jahrbücher fur Systematik, Pflanzengeschichte und Pflanzengeographie* Bd.35 (1905): 402–402.

Figure 69 A; *Verticordia stenopetala* shrub in flower. IMG_8813 B; *Verticordia stenopetala* flowers, buds and leaves. Note the semiterete leaves, narrow petals, hirsute (hairy) hypanthium and long style. IMG_8107 C; Top view of *Verticordia stenopetala* flower and buds. Note the narrow petals. IMG_8110 (Photograph credit: Geoff Cockerton)

Description:

Verticordia stenopetala is a small shrub 20-50 cm tall, much branched and spreading to 50 cm wide (Figure 69A; Diels and Pritzel 1905; George 2002). The leaves are 3-5 mm long, semiterete, and linear-clavate (Figure 69B). Flowers are pink to magenta, and are arranged in rounded or corymb-like groups. Peduncles are clavate and 4-8 mm long, and the hypanthium is hemispherical, 2 mm long, smooth and hirsute (Figure 69B). Sepals are 3-3.8 mm long and plumose, with 6-8 lobes and no auricles. Petals are 3-3.5 mm long, ovate, and fimbriate-dentate. The stamens and staminodes hirsute at the base, and the style is 6-7.5 mm long and curved (Figure 69B).

Verticordia stenopetala is closely related to *Verticordia sieberi* and *Verticordia plumosa*, both of which were also observed in the project area (E. George 2002). Distinguishing features of *V. stenopetala* include distinctly narrowed petals, flowers that are deep magenta-pink to almost purple, hairs at the base of stamens and staminodes, and a distinctly long style (Figure 69B). *Verticordia sieberi* has shorter, usually orbicular petals, a shorter style and no hairs at the base of stamens and staminodes. *Verticordia plumosa* has broader entire petals, more feathery sepal lobes, and no hairs at the base of stamens and staminodes.

Habitat:
This species grows in white to grey sand and yellow sand, with or over loam and gravel (E. George 2002). It often grows in association with other *Verticordia* species in heath and open mallee shrubland.

Distribution:
Verticordia stenopelata ranges from between Burracoppin and Bullabulling, and from north of Lake Deborah south to the Forrestania area (Florabase). Within the project area, *V. stenopetala* has been recorded approximately 2 km in either direction from the intersection of Fence Road and Parker Range Road, and along the Marvel Loch-Forrestania Road from Mount Holland minesite to 24 km north of the minesite.

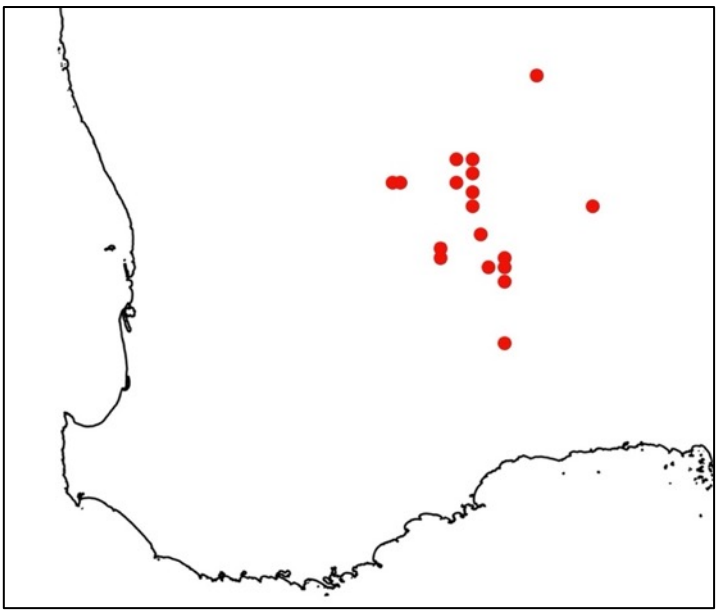

Figure 70. Distribution of Verticordia stenopetala in Western Australia. Data from Florabase.

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Species to be added in final version

1. *Alyogyne* sp. Hyden (G.S. Durell GD 127) P1
2. *Chamelaucium* sp. Mt Holland (GC & GG-780) P1 (currently in the C. sp. Parker Range P1 complex) – (also in the SOI list)
3. *Chamelaucium* sp. Parker Range (B.H. Smith 1255) sens. str. P1
4. *Eucalyptus* sp. Dunbar Road (D. Nicolle & M. French DN 5466) P1
5. *Eutaxia* sp. North Ironcap (P. Armstrong PA 06/898) P1
6. *Hemigenia s*p. Newdegate (E. Bishop 75) P1
7. *Lepidosperma* ?jacksonense P1
8. *Lepidosperma* aff. amantiferrum P1
9. *Lepidosperma* aff. lyonsii P1
10. *Lepidosperma* ferriculmen P1
11. *Leucopogon* sp. Yellowdine (M. Hislop & F. Hort MH 3194) P1
12. *Melichrus* sp. Coolgardie (KR Newbey 8698) P1
13. *Microcorys* sp. Mt Holland broad leaf (G. Barrett s.n. PERTH 04104927) P1
14. *Microcorys* sp. Parker Range (C. Hancock s.n. PERTH 09215123) P2
15. *Eucalyptus exigua* P3
16. *Eucalyptus polita* P3
17. *Gompholobium cinereum* P3 (also in the SOI list)
18. *Hakea pendens* P3
19. *Hibbertia glabriuscula* P3
20. *Lepidosperma ferricola* P3
21. *Melaleuca ochroma* P3
22. *Notisia intonsa* P3
23. *Prostanthera nanophylla* P3
24. *Seringia adenogyna* P3
25. *Stylidium sejunctum* P3
26. *Teucrium diabolicum* P3
27. *Banksia shanklandiorum* P4
28. *Eremophila caerulea* subsp. *merrallii* P4
29. *Eremophila inflata* P4
30. *Grevillea marriottii* P4 (unsure if this in the road alignment)
31. *Grevillea neodissecta* P4
32. *Gyrostemon ditrigynus* P4
33. *Microcorys* sp. Forrestania (V. English 2004) P4
34. *Myriophyllum petraeum* P4
35. *Stenanthemum bremerense* P4
36. *Wurmbea murchisoniana* P4
37. *Cyathostemon verrucosus* P1

Appendix 9. Species of Interest (SOI) of the Study Area

Insert To be populated

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