CopperString 2.0

Biosecurity

Volume 2 Chapter 8

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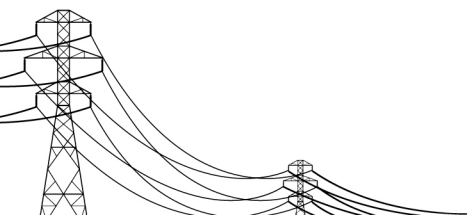

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8. Biosecurity

8.1 Introduction

8.1.1 Project overview

The Project involves the construction and operation of approximately 1,060 km of extra high voltage overhead electricity transmission line that will extend from Mount Isa to the Powerlink transmission network, via a new connection point near Woodstock, south of Townsville.

The Project involves construction of seven new substations at Woodstock, Hughenden, Dajarra Road (Cloncurry), Mount Isa, Selwyn, Cannington Mine and Phosphate Hill Mine.

The CopperString transmission network is divided into the following eight sections as shown in Figure 8-1:

1. Woodstock Substation
2. Renewable Energy Hub
3. CopperString Core
4. Mount Isa Augmentation
5. Southern Connection
6. Cannington Connection
7. Phosphate Hill Connection
8. Kennedy Connection (option).

8.1.2 Objectives

This chapter of the Environmental Impact Statement (EIS) aims to ensure that the construction and operation of the Project achieve the following:

- The spread of invasive plants, animals and diseases are minimised
- Existing invasive plants, animals and disease are controlled
- Compliance with the relevant provisions of the *Biosecurity Act 2014*, Commonwealth weed and pest strategies, biosecurity plans, Weeds of National Significance and designated pests under the *Public Health Act 2005*

8.1.3 Purpose of chapter

This chapter provides an overview of the existing environment, methodology for assessing impacts, and relates directly Sections 12.29, 12.30, 12.31, 12.32 and 12.33 of the Terms of Reference (ToR) relevant to biosecurity. A table cross referencing the ToR is provided in Volume 3 Appendix A Terms of reference.

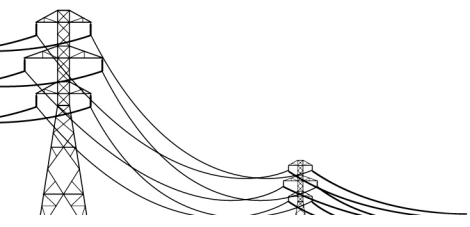
The scope of this chapter is defined by the following:

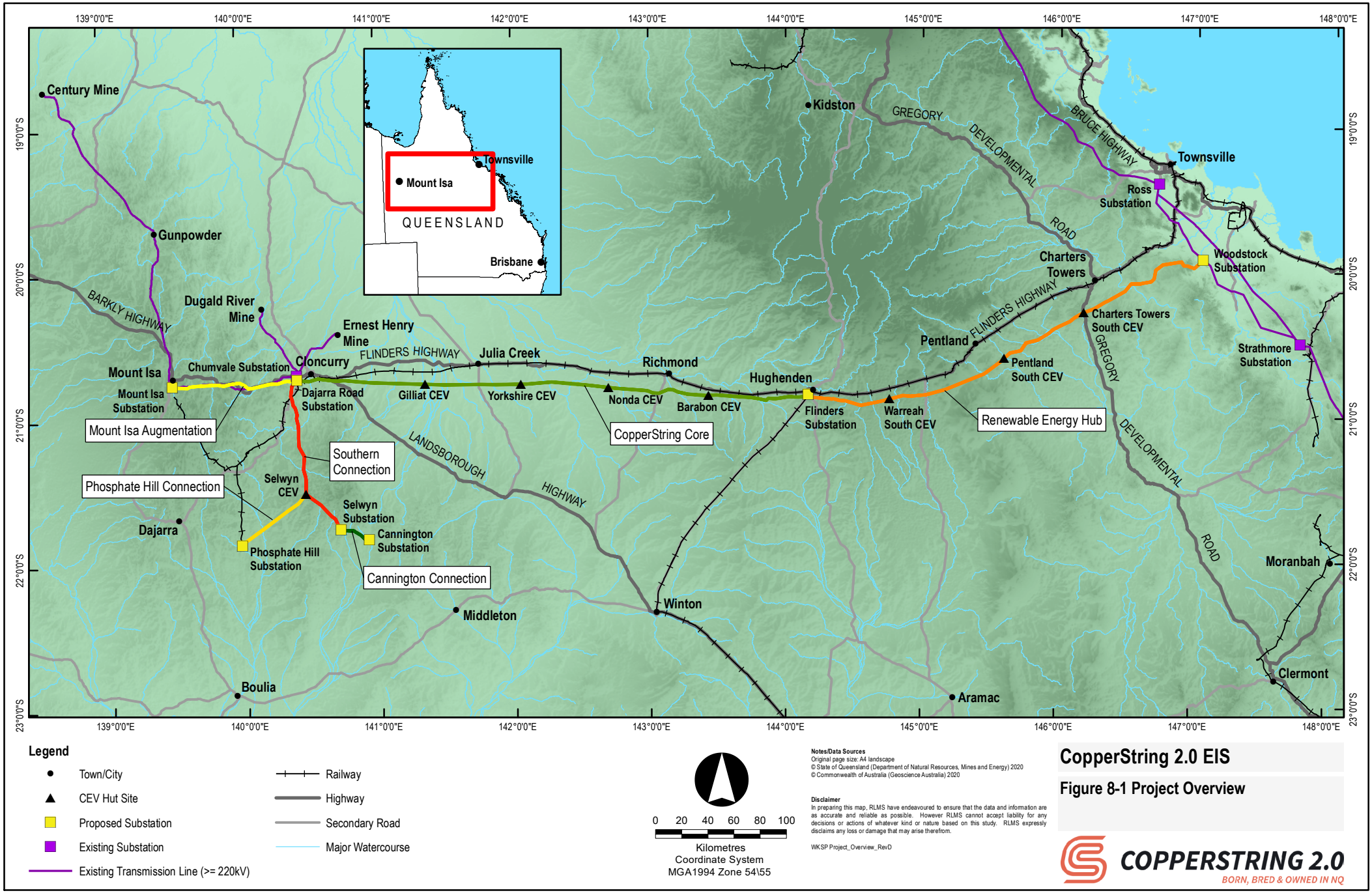
- Describe the existing invasive plants, animals and diseases present in the study area (Section 8.3)
- Describe the potential impacts caused by invasive plants, animals and spreading associated with the Project activities from procurement through to operation (Section 8.4)
- Propose measures to avoid or mitigate Project impacts to the environment and landholders (Section 8.4)

8.1.4 Defined terms

The following are a list of defined terms utilised throughout this chapter.

- ‘Corridor selection’ - means the baseline investigation corridor of the transmission line (a nominal 1,060 km long corridor). The corridor selection is 120 m wide from Woodstock to Dajarra Road, and 60 m wide from Dajarra Road to Mount Isa, Dajarra Road to Selwyn, and Selwyn to Phosphate Hill and Cannington. The 4 km long section of the corridor selection from Dajarra Road Substation to Chumvale Substation is 60 m wide and a 3 km long section from Dajarra Road Substation to the Dugald River 220 kV overhead line is 80 m wide.
- ‘Study area’ - as defined by individual technical studies in the methodology section or by default the 5 km wide study corridor defined in the Initial Advice Statement and referred to in the EIS ToR.
- ‘Project area’ - the 120 m or 60 m wide easement and associated infrastructure (including laydown areas, substations, CEV huts, access tracks, brake and winch sites and construction camps) and works referred to in the EIS ToR (these include off-easement components).





Legend

- Town/City
- CEV Hut Site
- Proposed Substation
- Existing Substation
- Existing Transmission Line (>= 220kV)
- Railway
- Highway
- Secondary Road
- Major Watercourse

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

Notes/Data Sources
Original page size: A4 landscape

Disclaimer
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WKSP Project_Overview_RevD

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Figure 8-1 Project Overview

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BORN, BRED & OWNED IN NQ

8.2 Methodology

8.2.1 Study area

The study area includes the Project area as well as the eight local government areas (LGA's) which are traversed by the Project. Additionally, a per the Volume 3 Appendix P Ecological Assessment, the study area also includes the 5 km corridor which was subject to the field and desktop assessments (up to 2.5 km either side of the corridor selection).

8.2.2 Data sources

The following data sources were used as part of this chapter:

- Burdekin Shire Council Biosecurity Plan 2016-2019 V2.2
- Draft Townsville Local Government Area Biosecurity Plan 2017-2021
- Charters Towers Regional Council Biosecurity Plan 2019-2024
- Flinders Shire Council Local Government Biosecurity Plan 2017-2020 Revision 1
- Richmond Shire Council Biosecurity Plan 2020-2024
- Cloncurry Shire Area Biosecurity Plan 2019-2023
- Mount Isa City Council Biosecurity Plan 2018
- McKinlay Shire Council Biosecurity Plan 2019
- GHD Pty Ltd, 2020. CopperString 2.0 EIS – Volume 3 – Appendix P – Ecological Assessment Report

8.2.3 Legislative context and standards

The following legislative framework and standards are relevant to the biosecurity impacts and mitigations for the Project:

- Queensland *Biosecurity Act 2014* (Biosecurity Act)

  The purpose of the Biosecurity Act is to provide a framework for an effective biosecurity system and manage risks associated with emerging, endemic and exotic species. All individuals and organisations have a General Biosecurity Obligation' (GBO) under Biosecurity Act, which means that they are responsible for managing biosecurity risks that are under their control and that they know about, or should reasonably be expected to know about. Under the GBO, individuals and organisation whose activities pose a biosecurity risk must:

  – Take all reasonable and practical steps to prevent or minimise each biosecurity risk
  – Minimise the likelihood of causing a biosecurity event, and limit the consequences if such an event is caused
  – Prevent or minimise the harmful effects a risk could have, and not do anything that might make any harmful effects worse.

  The Biosecurity Act takes a risk-based approach to biosecurity threats which allows greater flexibility and more responsive approaches to manage each specific circumstance focussing on biosecurity risks that are, or are likely to become, a significant problem for human health, social amenity, the economy or the environment. For example, a biosecurity risk exists where a person or organisation is moving soil, vegetation, machinery and/or equipment that could carry an invasive plant or contaminant. Terms used under the Biosecurity Act are defined under legislation and can also be viewed on the Department of

Agriculture and Fisheries (DAF) website. For the purpose of this CBP, key terminology includes prohibited matter and restricted matter as defined within the Biosecurity Act, as follows:

- Prohibited Matter is biosecurity matter not currently present or known to be present in Queensland. It is prohibited because it may have a significant adverse effect on a biosecurity consideration if it did enter Queensland.
- Restricted Matter is biosecurity matter found in Queensland that may have adverse effects on a biosecurity consideration if conditions or restrictions under the Act were not imposed. Biosecurity Act restricted matter categories and requirements are shown in Table 8-1. Restricted invasive plants and animals may fall into one or a combination of Categories 1 to 7 (listed below in Table 8-1).
- Invasive plants and animals that are not listed as prohibited or restricted matter are biosecurity matter and everyone is obligated to take all reasonable and practical steps to minimise the risks associated with these under their control.

Table 8-1 Relevant Biosecurity Act restricted matter categories and requirements

Category	Requirement
Category 1	The invasive plant/animal must be reported to an inspector within 24 hours Biosecurity Queensland on 13 25 23
Category 2	The invasive plant/animal must be reported to an inspector or authorised person within 24 hours Biosecurity Queensland on 13 25 23
Category 3	Must not be distributed, as gift, sold, traded or released into the environment unless the distribution or disposal is authorised in a regulation or under permit.
Category 4	The invasive plan/animal must not be moved.
Category 5	The invasive plant/animal must not be kept.
Category 6	The invasive animal must not be fed.
Category 7	The noxious fish must be killed and disposed of by burying the whole carcass in the ground above high tide water mark or placing it in a waste disposal receptacle

- Queensland *Biosecurity Regulation 2016* (BS Regulation)

  The BS Regulation sets out specific biosecurity obligations and prevention and control measures, and lists Queensland invasive plants and animals

- Queensland *Agricultural Chemicals Distribution Control Act 1966*

  The purpose of *Agricultural Chemicals Distribution Control Act 1966* is to ensure the use distribution of agricultural chemicals is undertaken responsibly to minimise the risk of harm to agriculture, livestock, the environment, trade or human health.

- Queensland *Public Health Act 2005*

  The purpose of the P*ublic Health Act 2005* protect and promote the health pf the Queensland public by preventing, controlling and reducing public health risk. Public health risks include risks associated with designated pests. Designated pests include mosquitos,

rats and mice. The *Public Health Act 2005* outlines authorised prevention and control programs for designated pests.

- Australian Pest Animal Strategy 2017-2027 (APAS)

  The purposed of the APAS is to provide a national guideline, outlining the principles that underpin pest animal management in Australia. The APAS aims to guide a coordinated effort for all jurisdictions and affected stakeholders, informing plans and actions by state and local governments, industry, landholders and communities (IPAC 2016a).

- Australian Weeds Strategy 2017-2027 (AWS)

  The purposed of the AWS is to provide a national guideline, outlining the principles that underpin weed management in Australia. The AWS aims to guide a coordinated effort for all jurisdictions and affected stakeholders, informing plans and actions by state and local governments, industry, landholders and communities (IPAC 2016b). The Invasive Plants and Animals Committee (IPAC) is responsible for reviewing the list of Weeds of National Significance (WoNS), all of which have individual national strategic management plans.

- Queensland Invasive Plants and Animals Strategy 2019-2024 (QLD IPAS)

  The QLD IPAS is a statewide strategic planning framework that addresses the impacts caused by invasive plants and animals. The QLD IPAS aims to direct and facilitate strategic and targeted actions to reduce the impacts of invasive species and identifies the shared responsibility of state and local government, landholders, industry and community (DAF 2019b).

- Vehicle and machinery cleandown procedures 2019 (QLD)

  The purpose of this procedure is to provide consistent approaches across Queensland to vehicle and machinery cleandown procedures and reduce risk of invasive species spread via transportation of vehicle and machinery across Queensland (DAF 2019a). Suitable Biosecurity Declaration should be developed by the Construction Contractor(s) as appropriate to reflect Project activities and risks (e.g. vehicle inspections, vehicle wash/brush down, etc.).

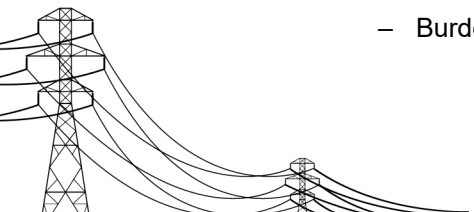
- Mosquito Management Code of Practice 2014

  The Mosquito Management Code of Practice provides a comprehensive guide to mosquito management in Queensland to minimise environmental impacts that may occur as a result of mosquito management methods (LGAQ 2014)

- Local Council Biosecurity Plans

  Seven local government areas are traversed by the current corridor selection with major deliveries and staging also occurring through Townsville. Each of the Local Government Areas (LGA) employs its own biosecurity plan based on the Biosecurity Act. The plans prioritise invasive animal and plant management. The prioritisation is determined by the level of national and local significance, the level of impact on the environment, economy, human health and social amenity and the capacity to manage the invasive animal species. Priorities are determined through a combination of scored risk assessments and consultations. Depending on the LGA, the plans may use differing labels for ‘high’, ‘medium’ and ‘low’ priorities. Higher priority species are primarily targeted with intense and on the ground control strategies, while low priority species will generally have education/awareness programs or no control. Proposed management techniques and control strategies are assessed for each species and include prevention, eradication, reduction, containment, education and impact/asset protection.

  – Burdekin Shire Council Biosecurity Plan 2016-2019 V2.2



Local prioritisation for invasive plants and animals in the Burdekin LGA are scored as 'high', 'medium' or 'low' (Burdekin Shire Council 2016).

– Draft Townsville Local Government Area Biosecurity Plan 2017-2021

  Local prioritisation of known or likely to occur invasive plants and animals in the Townsville LGA are scored as 'high', 'medium' or 'low'. 'Critical' species are high priority species that have either an active eradication program or the impacts are considered to pose a significant risk to human health. 'Alert' species are species that are not currently known in the Townsville LGA (Ecosure 2017).

– Charters Towers Regional Council Biosecurity Plan 2019-2024

  Local prioritisation for invasive plants and animals in the Charters Towers LGA are scored as 'high', 'medium' or 'low'. An additional description, 'public safety' indicates invasive animals, which pose a potential threat to public safety, generally these include large invasive animal species (Charters Towers Regional Council 2019).

– Flinders Shire Council Local Government Biosecurity Plan 2017-2020 Revision 1

  Local prioritisation for invasive plants and animals in the Flinders LGA are scored as 'high', 'moderate' or 'minor', these are comparable with 'high', 'medium' or 'low' of the above local councils. The Flinders LGA have two additional categories. 'Active programs' are high priority species that already have ongoing management programs including high community engagement and established budgets. 'Strategic opportunities' are species which are localised in only some areas of Flinders LGA and have the potential to be contained and progressively reduced.

  The Flinders LGA has also developed a Good Neighbour Program which encourages landholders to assess their land and share data about the invasive animals and plants present. This aids in establishing buffer zones and improves collaborated management (Flinders Shire Council 2018).

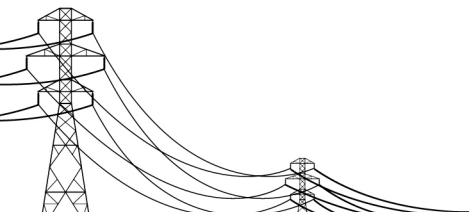
– Richmond Shire Council Biosecurity Plan 2020-2024

  Local prioritisation for invasive plants and animals in the Richmond LGA are scored out of 50 points. Scores range between 32.5 and 12.5. Species with higher scores, generally above 20 will have a range of management strategies including eradication and reduction controls on local government land, encouraging and assisting landholders to carry out controls, education, monitoring and inspection. Lower scored species will have at minimum education and monitoring as control measures. Species not currently in the Richmond LGA, that are of concern are categorised as 'watch list', this is analogous with 'alert' species in other LGA (Richmond Shire Council 2019).

– McKinlay Shire Council Biosecurity Plan 2019

  Local prioritisation for invasive plants and animals in McKinlay LGA are scored as 'A', 'B' and 'C' which are comparable with 'high', 'medium' and 'low' scores, respectively. Additionally some higher priority species are categorised as 'eradication' indicating that these species are managed by targeted eradication methods. Species not present in the LGA but potential biosecurity risks are categorised as 'prevention'. Some species either do not occur in all catchments of the McKinlay LGA or have differing distribution or density between catchments. These species have dual categorisation, for example, red fox is categorised as both 'A' and 'prevention' as it does not occur in al catchments (Gulf Catchments Biosecurity & Agribusiness Innovation 2017).

– Cloncurry Shire Biosecurity Plan 2019-2023



Local prioritisation for invasive plants and animals in the Cloncurry LGA are scored as 'major', 'medium' or 'minor', these are comparable with 'high', 'medium' or 'low' scores of the above local councils (Cloncurry Shire 2019).

– Mount Isa City Council Biosecurity Plan 2018

  Local prioritisation for invasive plants and animals in Mount Isa LGA are scored as 'A', 'B' and 'C' which are comparable with 'high', 'medium' and 'low' scores, respectively. Additionally, some higher priority species are categorised as 'eradication' indicating that these species are managed by targeted eradication method (Gulf Catchments Biosecurity & Agribusiness Innovation 2017).

8.2.4 Assessment method

A desktop assessment was undertaken as part Volume 3 Appendix P Ecological Assessment Report, using Protected Matter Search Tool and Wildlife Online databases. Followed by three field surveys between September 2019 and November 2020. Field surveys for weeds and pests were conducted at all flora quaternary and fauna habitat assessment sites (refer to Volume 3 Appendix P Ecological Assessment). This information has been summarised in Section 8.3.1. A further desktop assessment was undertaken to identify existing local government Biosecurity Plans within the corridor selection and associated invasive plant and animal management priorities in Section 8.3.2. Following this, an impact assessment detailed in Section 8.4 was undertaken in order to inform biosecurity management measures to protect all environmental values.

8.3 Existing environment

8.3.1 Invasive plant and animal presence (desktop and field surveys)

Invasive plants

Desktop assessments were undertaken as part of Volume 3 Appendix P Ecological Assessment. Based on the PMST reports, 16 introduced plant species are predicted to occur within the Project area. Wildlife Online records were retrieved to provide information on confirmed introduced plant species previously recorded within the study area. Wildlife Online records confirmed the presence of 214 introduced flora species, including 14 Weeds of National Significance (WoNS) and 27 species classed as restricted invasive plants under the Biosecurity Act (refer to Table 8-2). One additional restricted invasive plant species, *Bryophyllum delagoense* (Mother of millions) was recorded during the 2011 SEIS surveys. A total of eight restricted invasive plant species were recorded during the field surveys including an additional restricted invasive species, *Sphagneticola trilobata* (Singapore daisy). The recorded invasive plant species were primarily found around river frontages and alluvial flats of major river systems (refer to Table 8-3). An additional 33 species of environmental weed were also identified. Additional species may be identified during future works and shall be managed according to Volume 3 Appendix U Concept Biosecurity Plan and legislative requirements.

Detailed information on identified invasive plants is located within Volume 3 Appendix P Ecological Assessment. Spatial representations of invasive plant risk incorporating the below are shown on Figure 8-2 through Figure 8-25 for species identified as high risk (WoNS or Restricted Invasive Plant species).

Table 8-2 Introduced plants likely to be present (from Volume 3 Appendix P Ecological Assessment)

Scientific name	Common name	Management Level	
		WoNS	Restricted Invasive Plant
Bryophyllum delagoense	Mother of millions	-	Category 3
Cascabela thevetia (previously Thevetia peruviana)	Yellow oleander	-	Category 3
Cabomba caroliniana	Cabomba	-	Category 3
Cenchrus ciliaris	Buffel grass	-	-
Chromolaena odorata	Siam weed	-	Category 3
Cryptostegia grandiflora	Rubber vine	Y	Category 3
Cryptostegia madagascariensis	Ornamental rubber vine	-	Category 3
Cylindropuntia fulgida	Coral cactus	Y	Category 3
Cylindropuntia fulgida var. mamillata	Prickly pear	Y	Category 3
Cyperus brevifolius	Mullumbimby couch	-	-
Eichhornia crassipes	Water hyacinth	Y	Category 3
Harrisia martini	Harrisia cactus	-	Category 3
Hymenachne amplexicaulis	Hymenachne	-	Category 3
Jatropha gossypiifolia	Bellyache bush	Y	Category 3
Lantana camara	Lantana	Y	Category 3
Lycium ferocissimum	African boxthorn	-	-

Scientific name	Common name	Management Level	
		WoNS	Restricted Invasive Plant
Opuntia monacantha	Dropping tree pear	Y	Category 3
Opuntia stricta	Prickly pear	Y	Category 3
Opuntia tomentosa	Velvety tree pear	Y	Category 3
Parkinsonia aculeata	Parkinsonia	Y	Category 3
Parthenium hysterophorus	Parthenium weed	Y	Category 3
Prosopis pallida	Mesquite	Y	Category 3
Salvinia molesta	Salvinia	Y	Category 3
Senna obtusifolia	Sicklepod	-	Category 3
Sphagneticola trilobata	Singapore daisy	-	Category 3
Sporobolus jacquemontii	America rat's tail grass	-	Category 3
Sporobolus pyramidalis	Giant rat's tail grass	-	Category 3
Tamarix aphylla	Athel pine	Y	Category 3
Tecoma stans	Yellow bells	-	Category 3
Thunbergia grandiflora	Thunbergia	-	Category 3
Vachellia nilotica	Prickly acacia	Y	Category 3
Ziziphus mauritiana	Chinee apple	-	Category 3

"-" indicates that the species is not declared a WoNS or restricted matter.

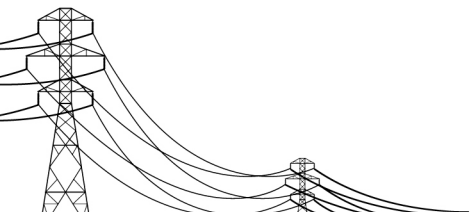
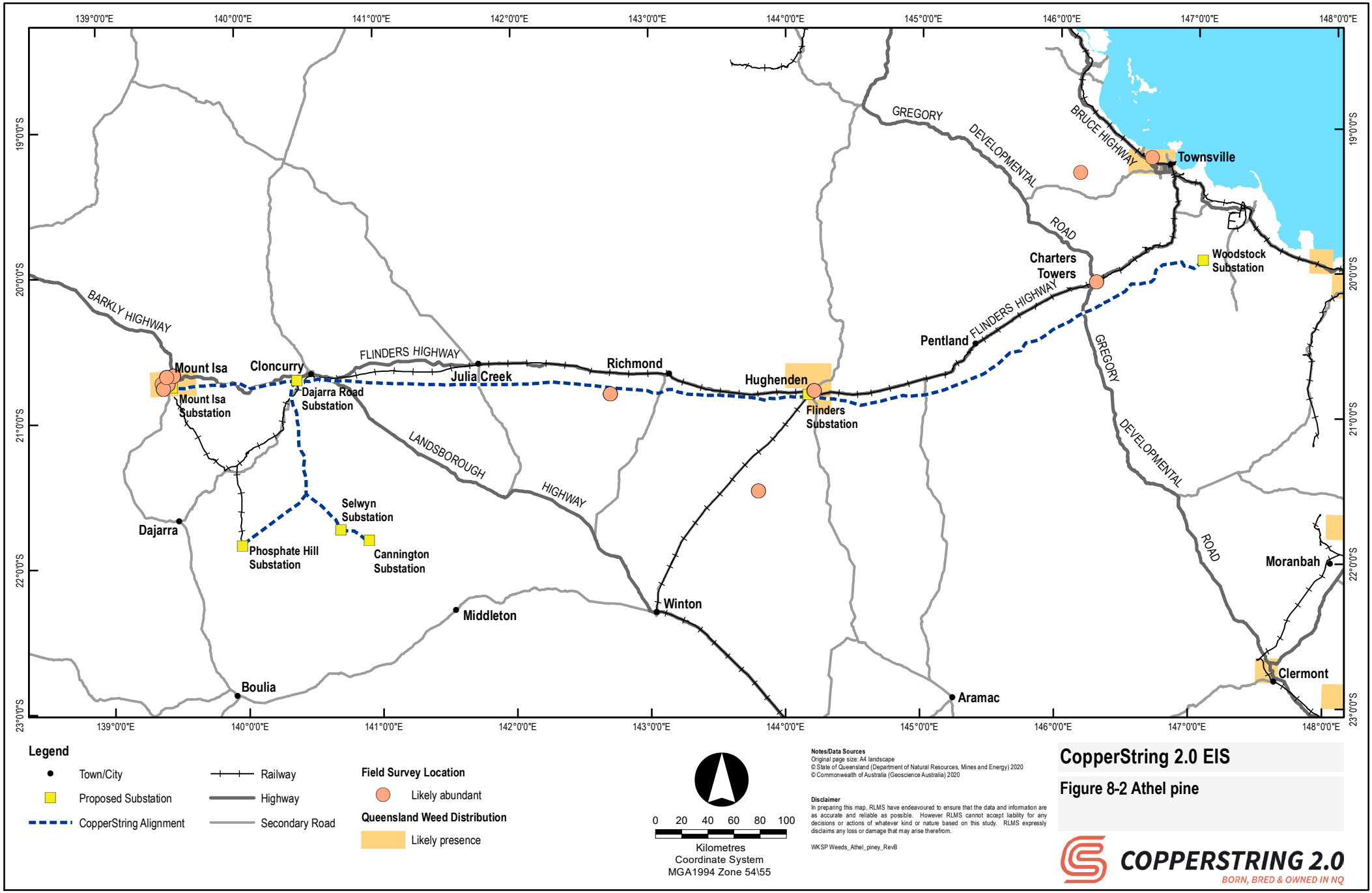


Table 8-3 Restricted invasive plant species recorded during field surveys (from Volume 3 Appendix P Ecological Assessment)

Species		KP	Habitat type
Scientific name	Common name		
Cryptostegia grandiflora	Rubber vine	8WD 105WD	Can be dense in association with watercourses and alluvial plains, can occur sparsely across most other vegetation types. Not usually found on low nutrient soil types.
Parkinsonia aculeata	Parkinsonia	117WD 151WD 380WD 670WD	Recorded primarily in association with riparian zones.
Prosopis pallida	Mesquite	44DM 42DM	Recorded on a dry minor watercourse within the Mount Isa Augmentation.
Vachellia nilotica	Prickly acacia	339WD 348WD 380WD 441WD	Recorded in high densities across the Mitchell Grass Downs but also in association with alluvial soils across other areas.
Ziziphus mauritiana	Chinee apple	66WD 116WD	Recorded primarily in association with riparian zones and alluvial plains within the Renewable Energy Hub
Parthenium hysterophorus	Parthenium	117WD	Recorded primarily in association with riparian zones. Recorded within the Renewable Energy Hub section. This weed is considered likely to be present throughout many drainage lines within pastoral country.
Jatropha gossypiifolia	Bellyache bush	66WD	Recorded primarily in association with riparian zones within the Renewable Energy Hub section.
Sphagneticola trilobata	Singapore daisy	339WD 338WD	Recorded instream of Sloane Creek (previously Eastern creek).



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

Notes/Data Sources
Original page size: A4 landscape
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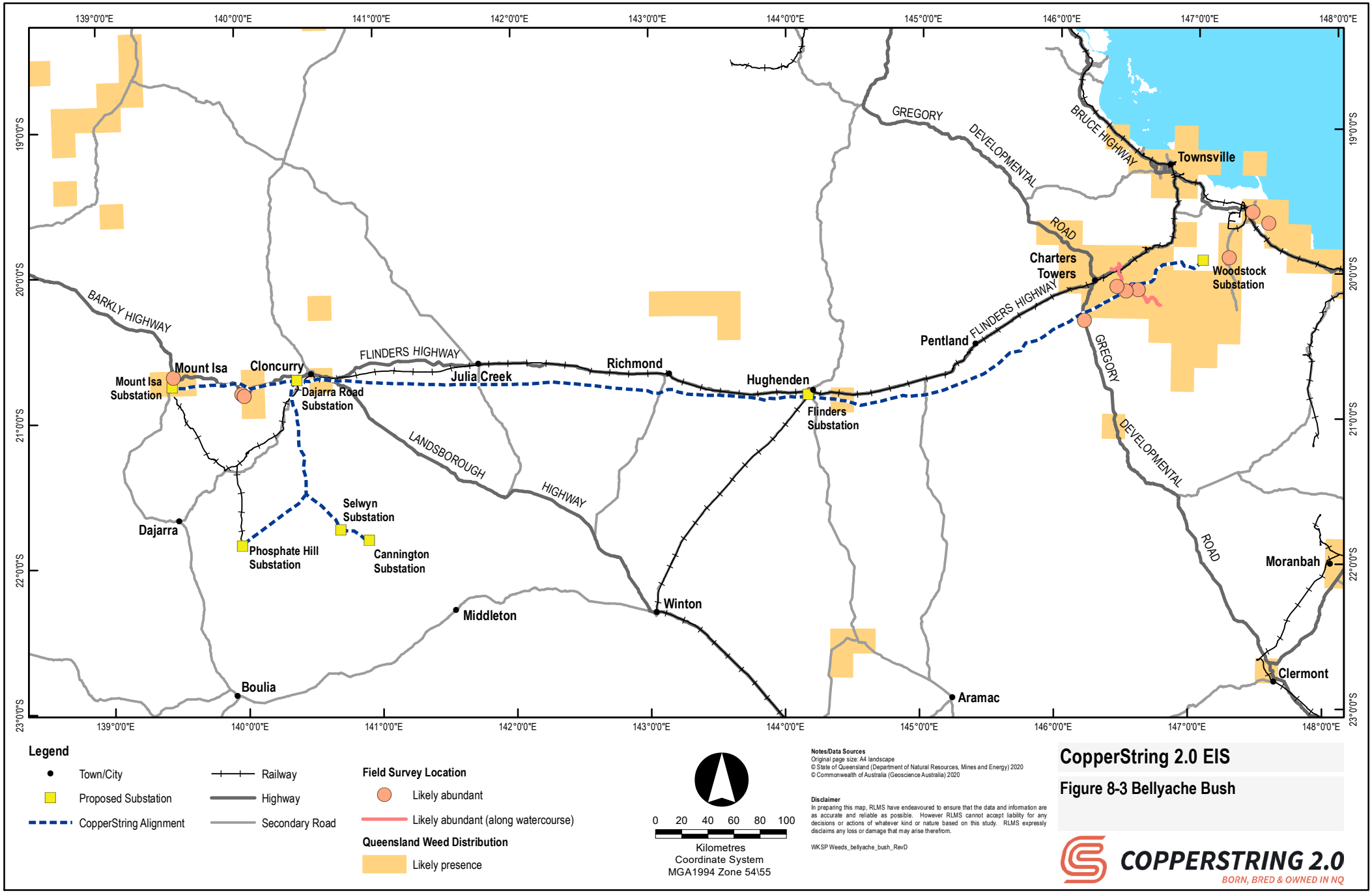
WKSP Weeds_Athel_piney_RevB

CopperString 2.0 EIS

Figure 8-2 Athel pine

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant
- Likely abundant (along watercourse)

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55

Notes/Data Sources
Original page size: A4 landscape
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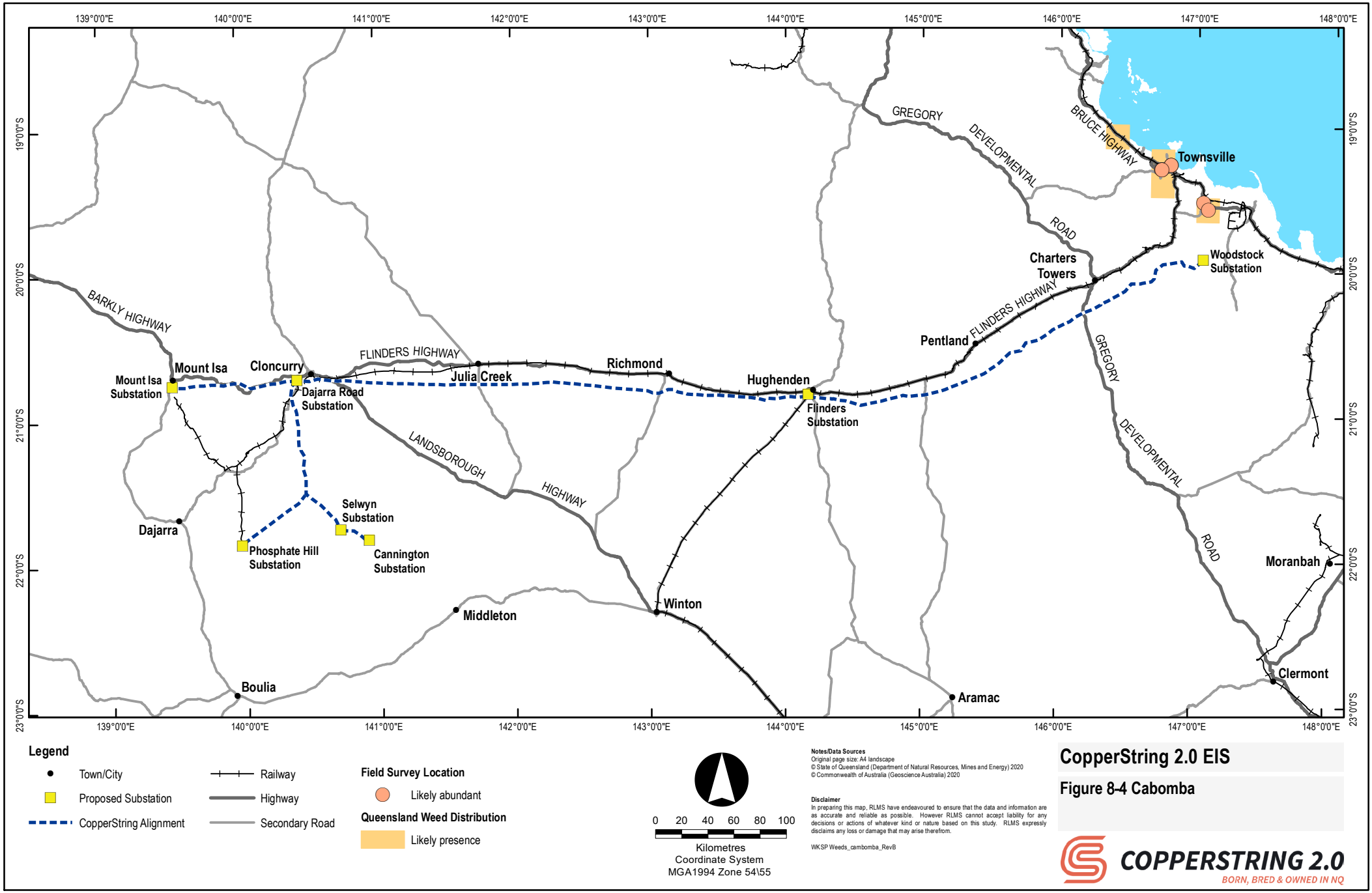
WKSP Weeds_bellyache_bush_RevD

CopperString 2.0 EIS

Figure 8-3 Bellyache Bush

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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20°0'0"S
21°0'0"S
22°0'0"S
23°0'0"S
BARKLY HIGHWAY
FLINDERS HIGHWAY
LANDSBOROUGH HIGHWAY
GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
Mount Isa
Mount Isa Substation
Cloncurry
Dajarra Road Substation
Julia Creek
Richmond
Hughenden
Flinders Substation
Pentland
Charters Towers
Townsville
Woodstock Substation
Dajarra
Phosphate Hill Substation
Selwyn Substation
Cannington Substation
Middleton
Winton
Boulia
Aramac
Moranbah
Clermont
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Queensland Weed Distribution
Likely presence
0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55
Notes/Data Sources
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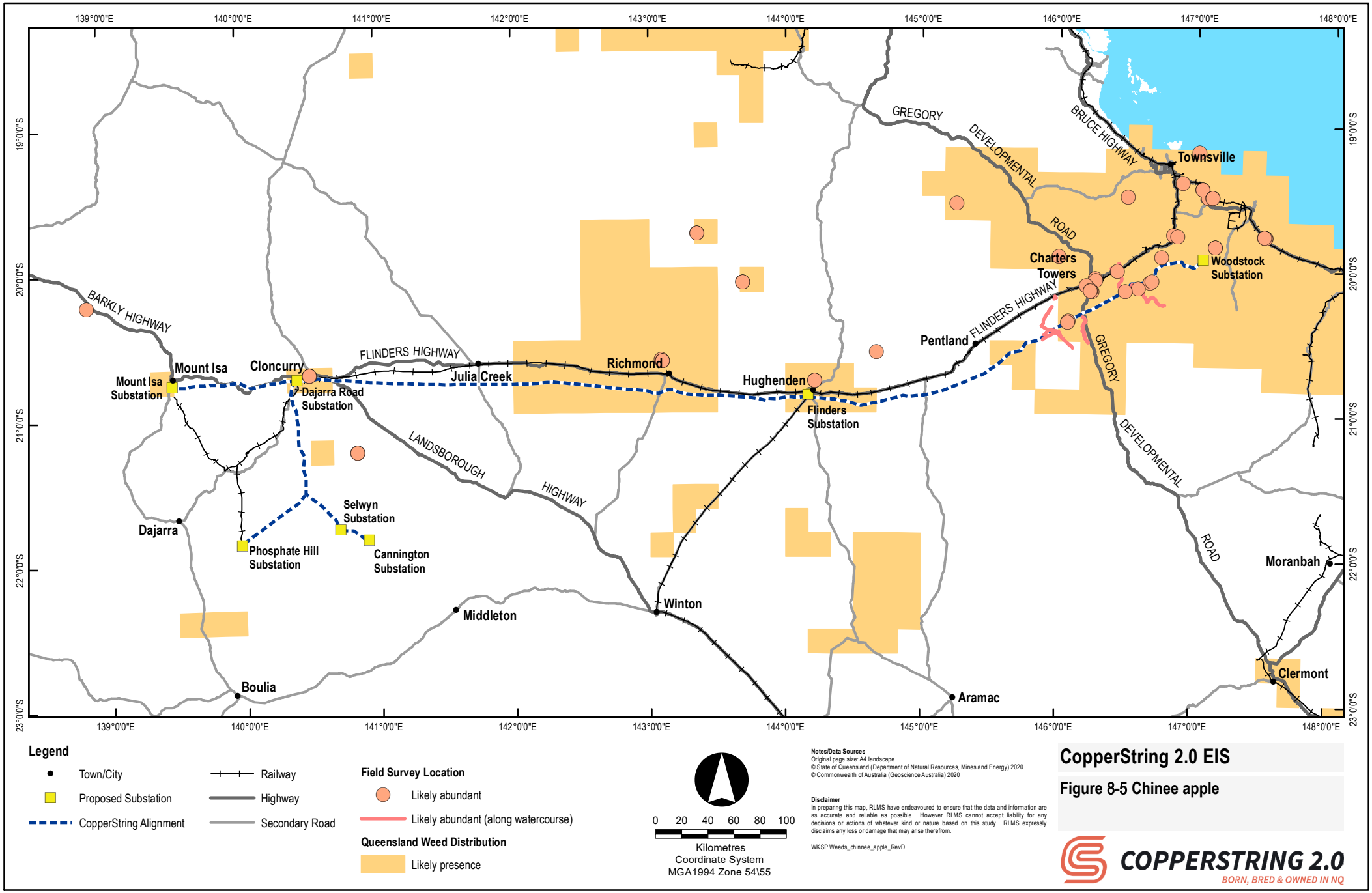
WKSP Weeds_cambomba_RevB
CopperString 2.0 EIS
Figure 8-4 Cabomba
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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22°0'0"S
23°0'0"S
BARKLY HIGHWAY
Mount Isa
Mount Isa Substation
Cloncurry
Dajarra Road Substation
FLINDERS HIGHWAY
Julia Creek
Richmond
Hughenden
Flinders Substation
Pentland
GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
Townsville
Charters Towers
Woodstock Substation
GREGORY DEVELOPMENTAL ROAD
LANDSBOROUGH HIGHWAY
Dajarra
Selwyn Substation
Phosphate Hill Substation
Cannington Substation
Middleton
Winton
Boulia
Aramac
Moranbah
Clermont
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Likely abundant (along watercourse)
Queensland Weed Distribution
Likely presence
0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55
Notes/Data Sources
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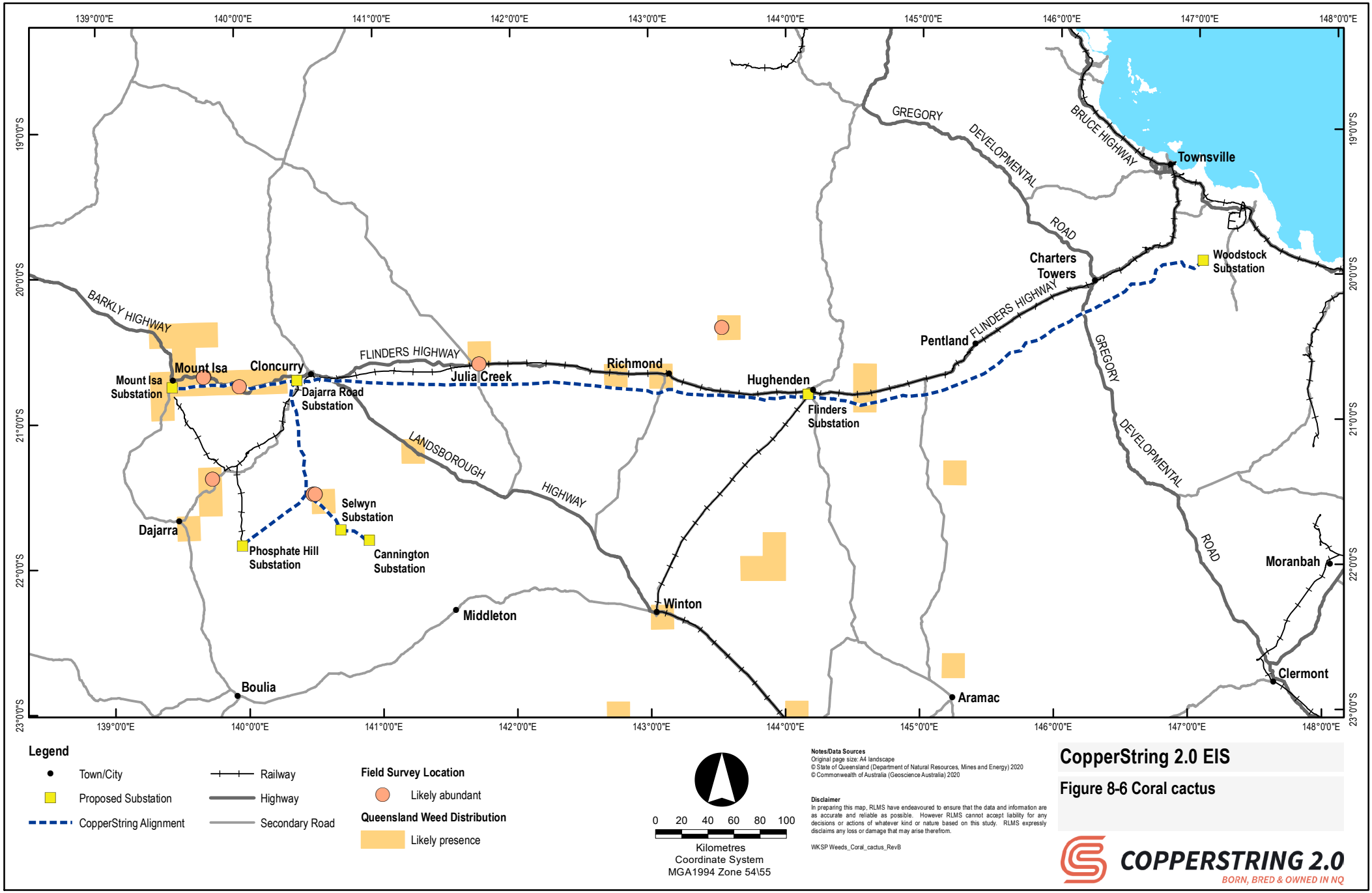
WKSP Weeds_chinnee_apple_RevD
CopperString 2.0 EIS
Figure 8-5 Chinee apple
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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21°0'0"S
22°0'0"S
23°0'0"S
BARKLY HIGHWAY
FLINDERS HIGHWAY
LANDSBOROUGH HIGHWAY
GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
Mount Isa
Mount Isa Substation
Cloncurry
Dajarra Road Substation
Julia Creek
Richmond
Hughenden
Flinders Substation
Pentland
Charters Towers
Townsville
Woodstock Substation
Dajarra
Phosphate Hill Substation
Selwyn Substation
Cannington Substation
Middleton
Winton
Boulia
Aramac
Moranbah
Clermont
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Queensland Weed Distribution
Likely presence
0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55
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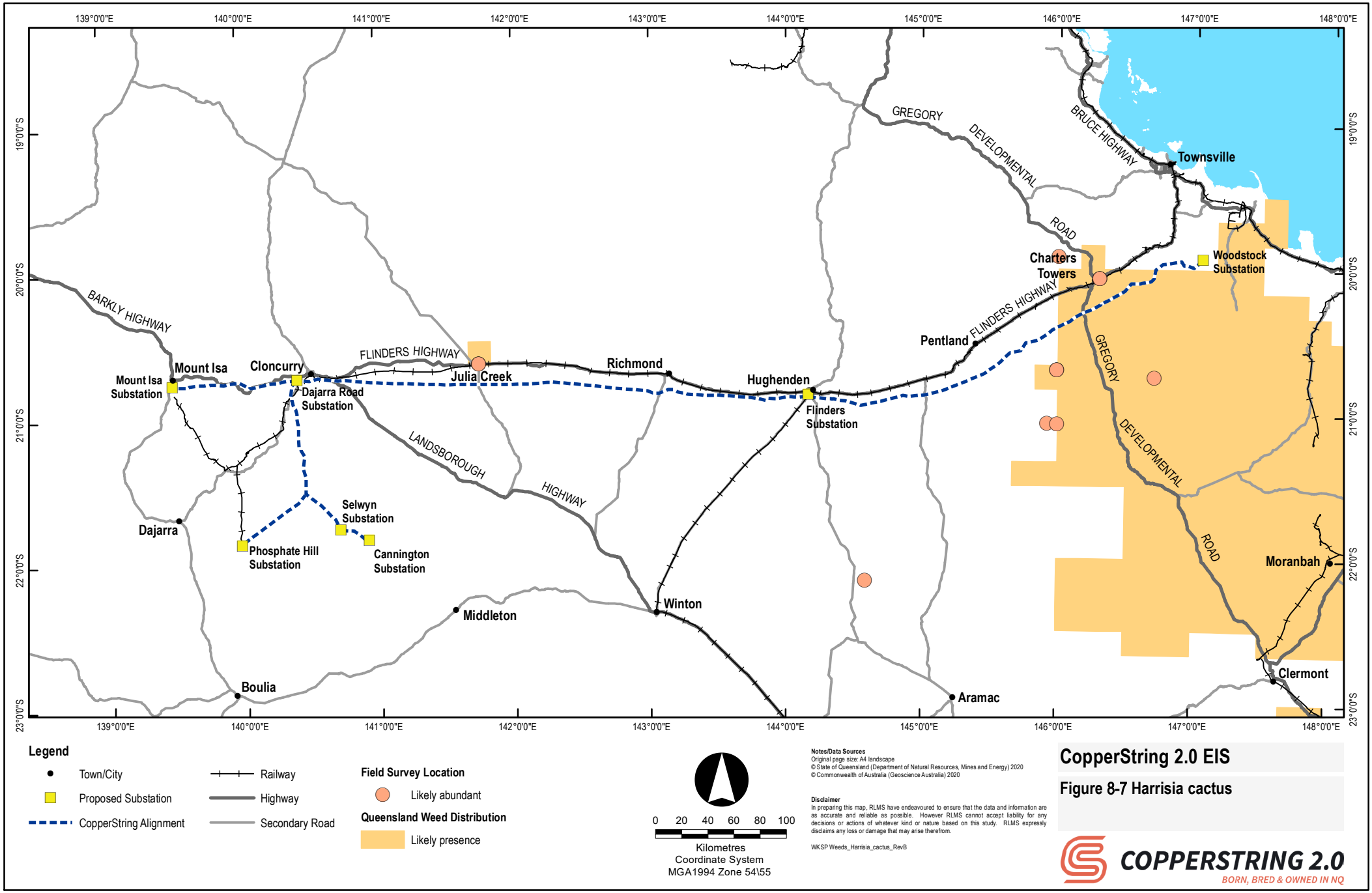
WKSP Weeds_Coral_cactus_RevB
CopperString 2.0 EIS
Figure 8-6 Coral cactus
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

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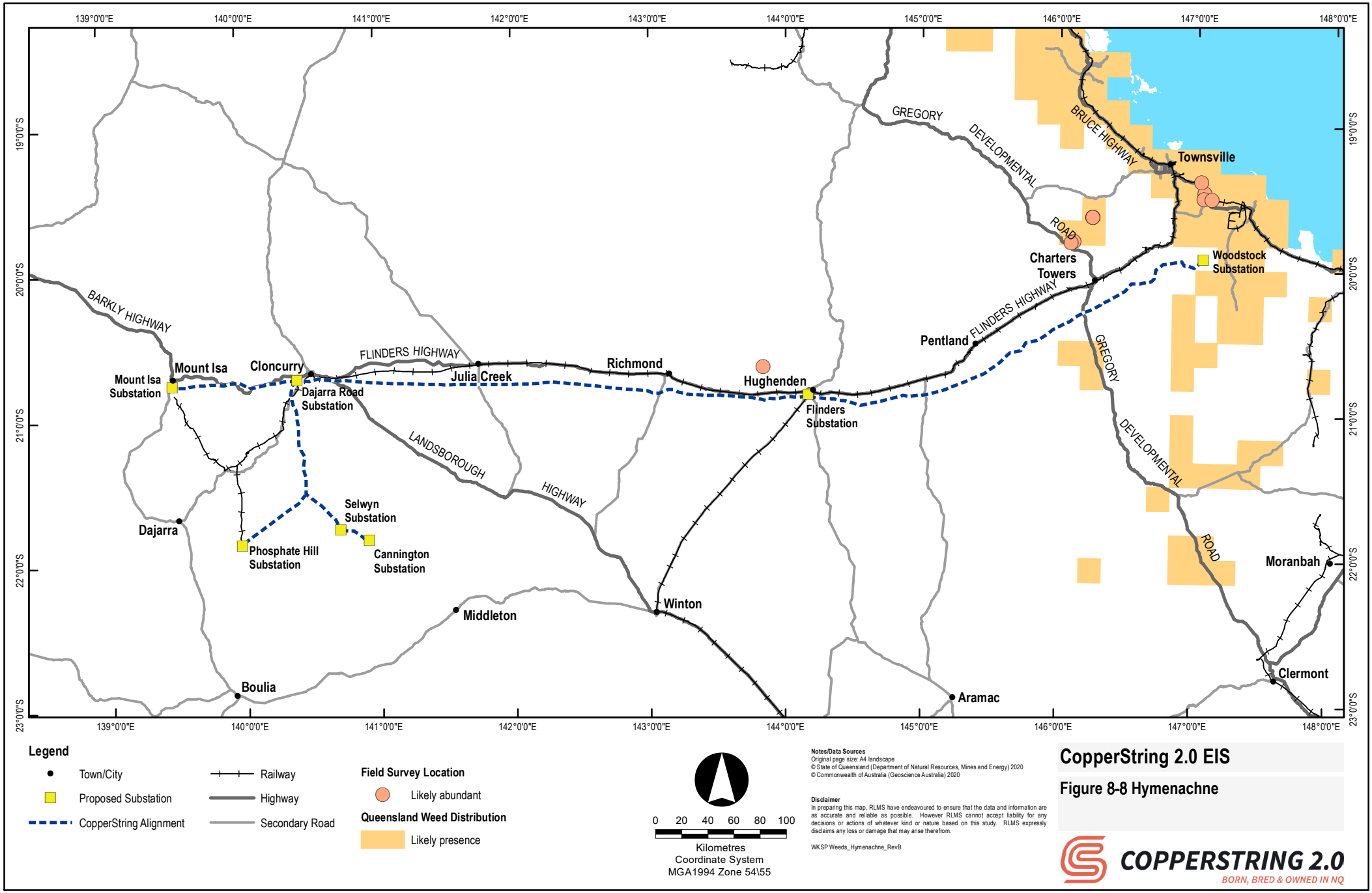
WKSP Weeds_Harrisia_cactus_RevB

CopperString 2.0 EIS

Figure 8-7 Harrisia cactus

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55

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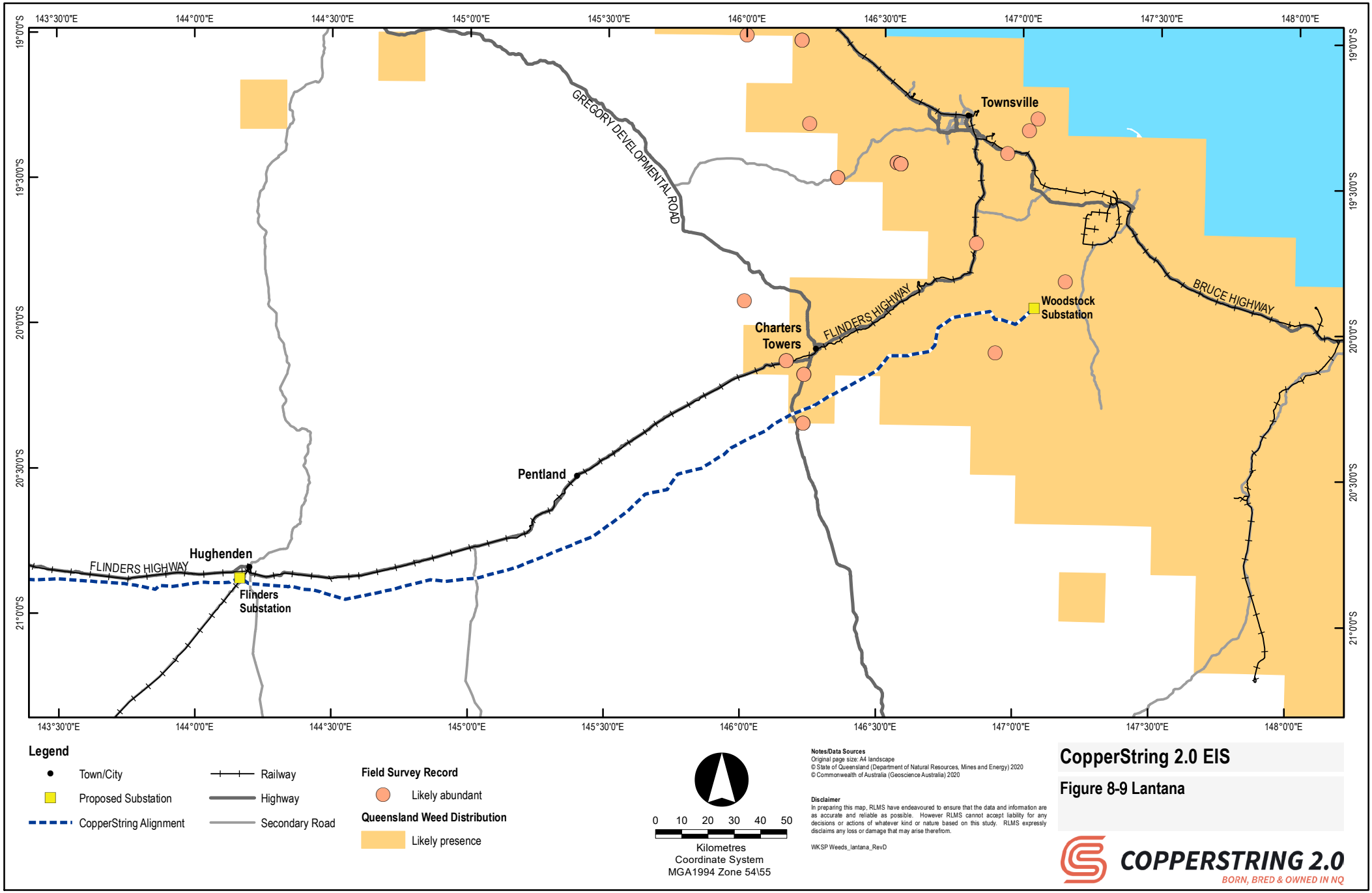
WKSP Weeds_Hymenachne_RevB

CopperString 2.0 EIS

Figure 8-8 Hymenachne

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Record

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 10 20 30 40 50
Kilometres
Coordinate System
MGA1994 Zone 54\55

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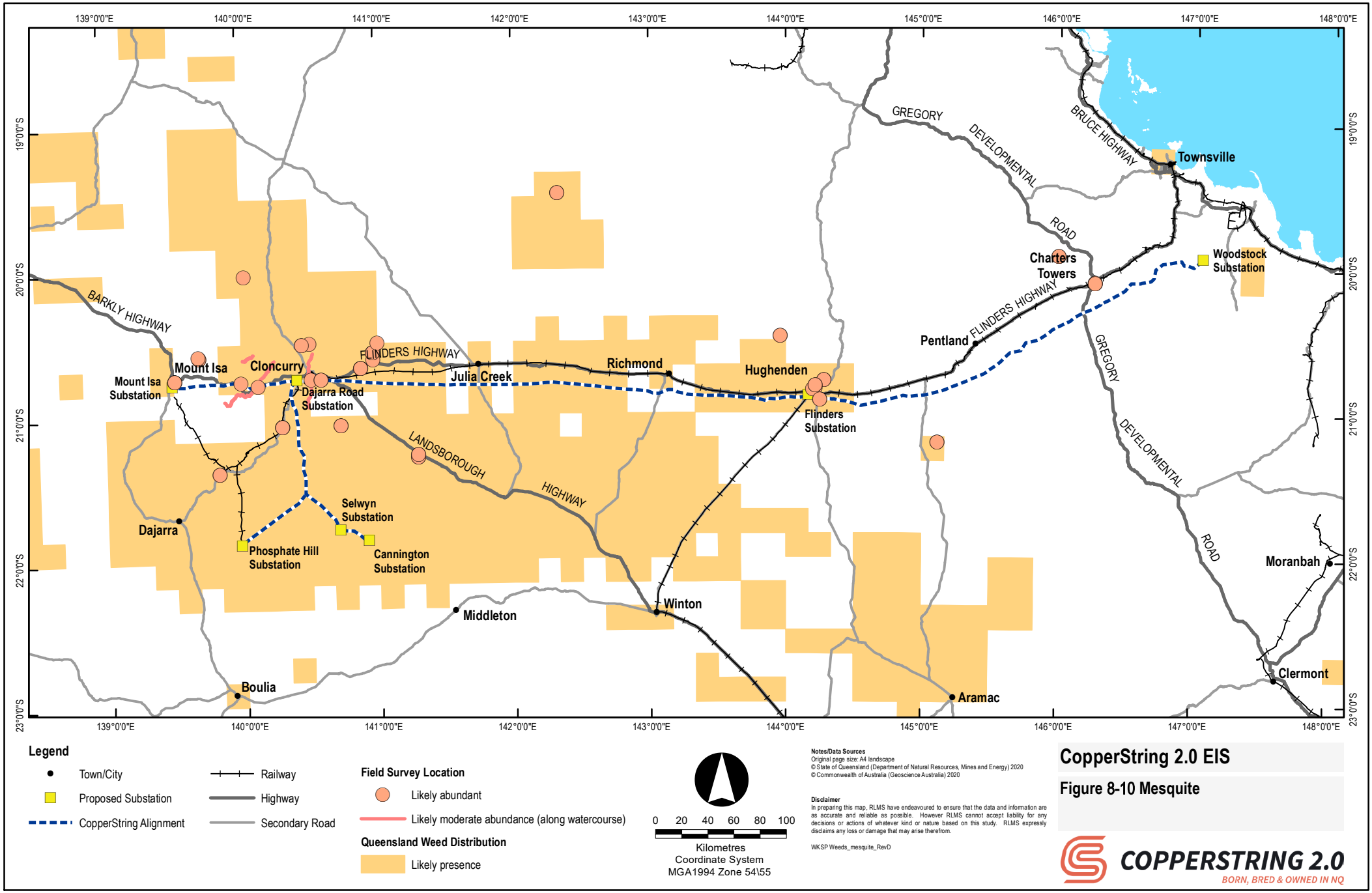
WKSP Weeds_lantana_RevD

CopperString 2.0 EIS

Figure 8-9 Lantana

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant
- Likely moderate abundance (along watercourse)

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

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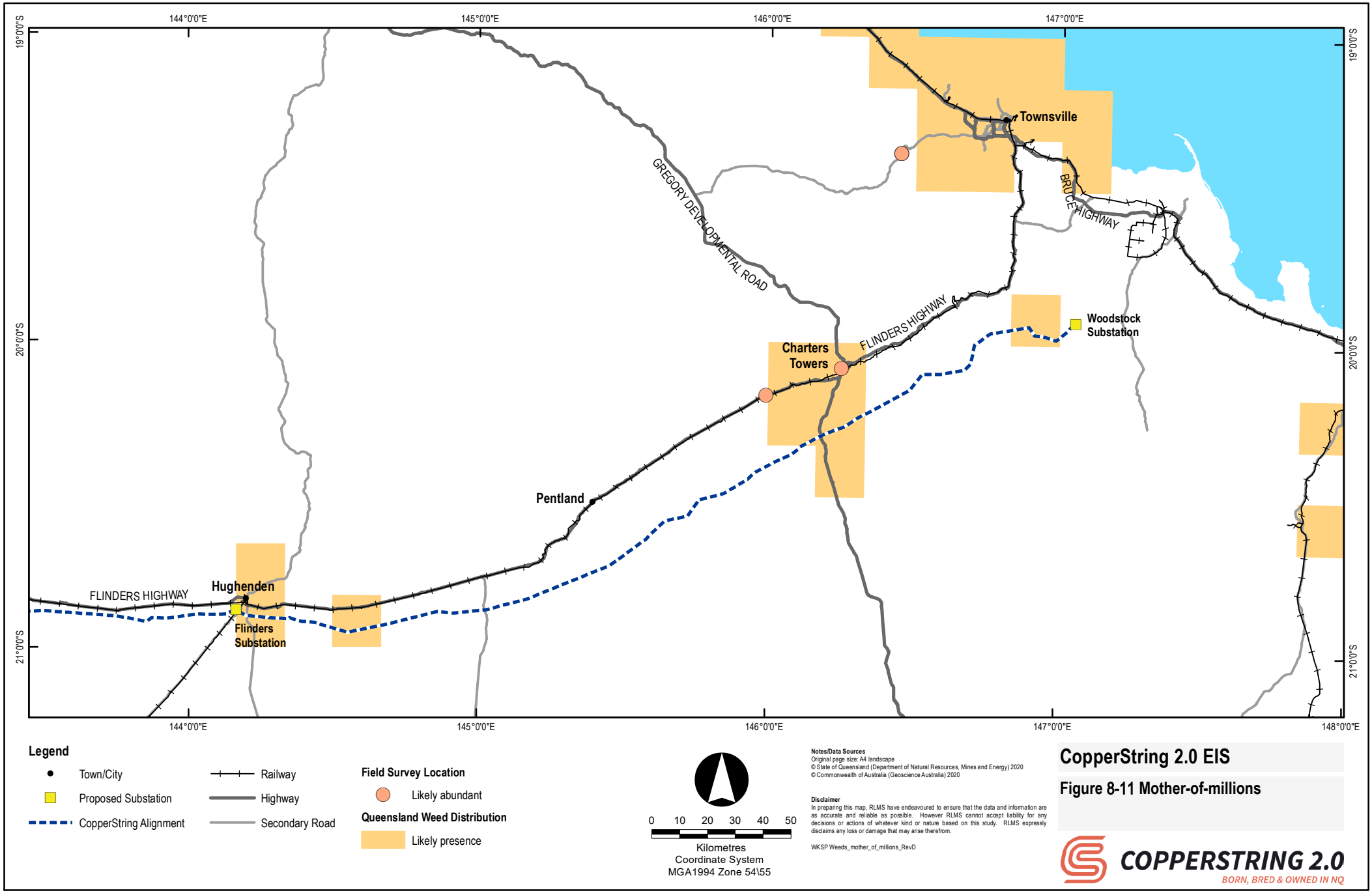
WKSP Weeds_mesquite_RevD

CopperString 2.0 EIS

Figure 8-10 Mesquite

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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Townsville
GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
FLINDERS HIGHWAY
Charters Towers
Woodstock Substation
Pentland
Hughenden
FLINDERS HIGHWAY
Flinders Substation
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Queensland Weed Distribution
Likely presence
0 10 20 30 40 50
Kilometres
Coordinate System
MGA1994 Zone 54\55
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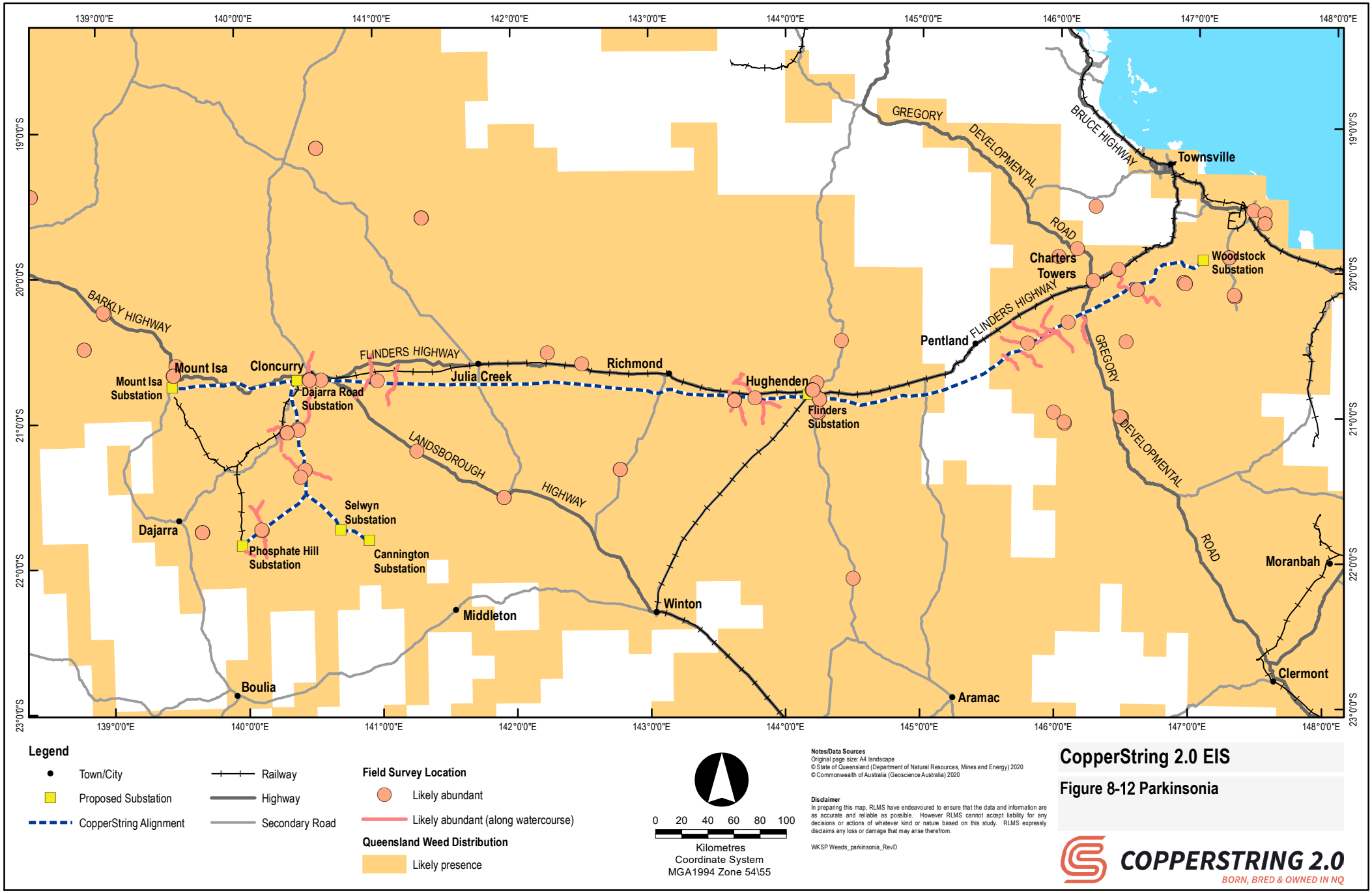
WKSP Weeds_mother_of_millions_RevD
CopperString 2.0 EIS
Figure 8-11 Mother-of-millions
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant
- Likely abundant (along watercourse)

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55

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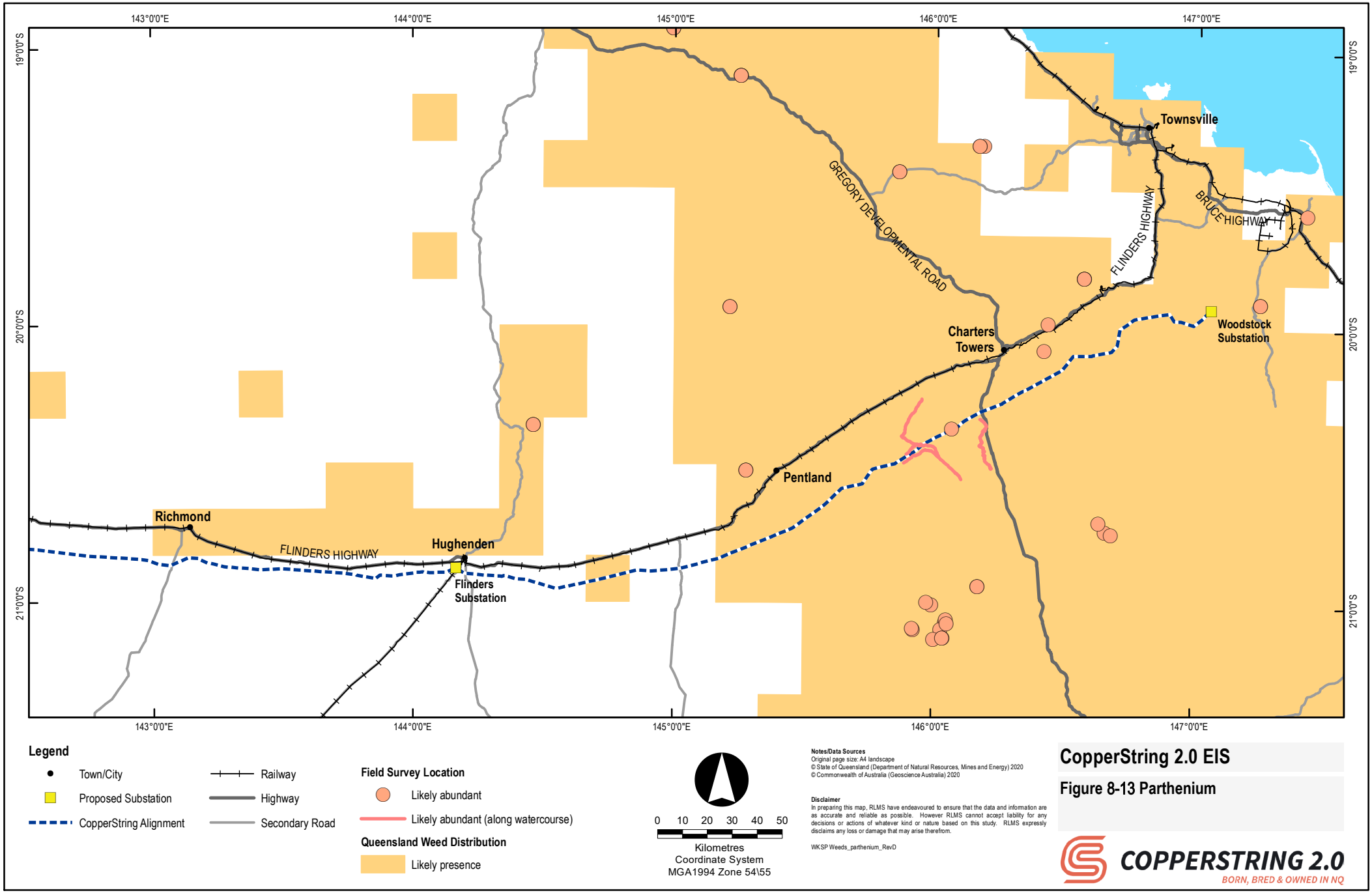
WKSP Weeds_parkinsonia_RevD

CopperString 2.0 EIS

Figure 8-12 Parkinsonia

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant
- Likely abundant (along watercourse)

Queensland Weed Distribution

- Likely presence

0 10 20 30 40 50
Kilometres
Coordinate System
MGA1994 Zone 54\55

Notes/Data Sources
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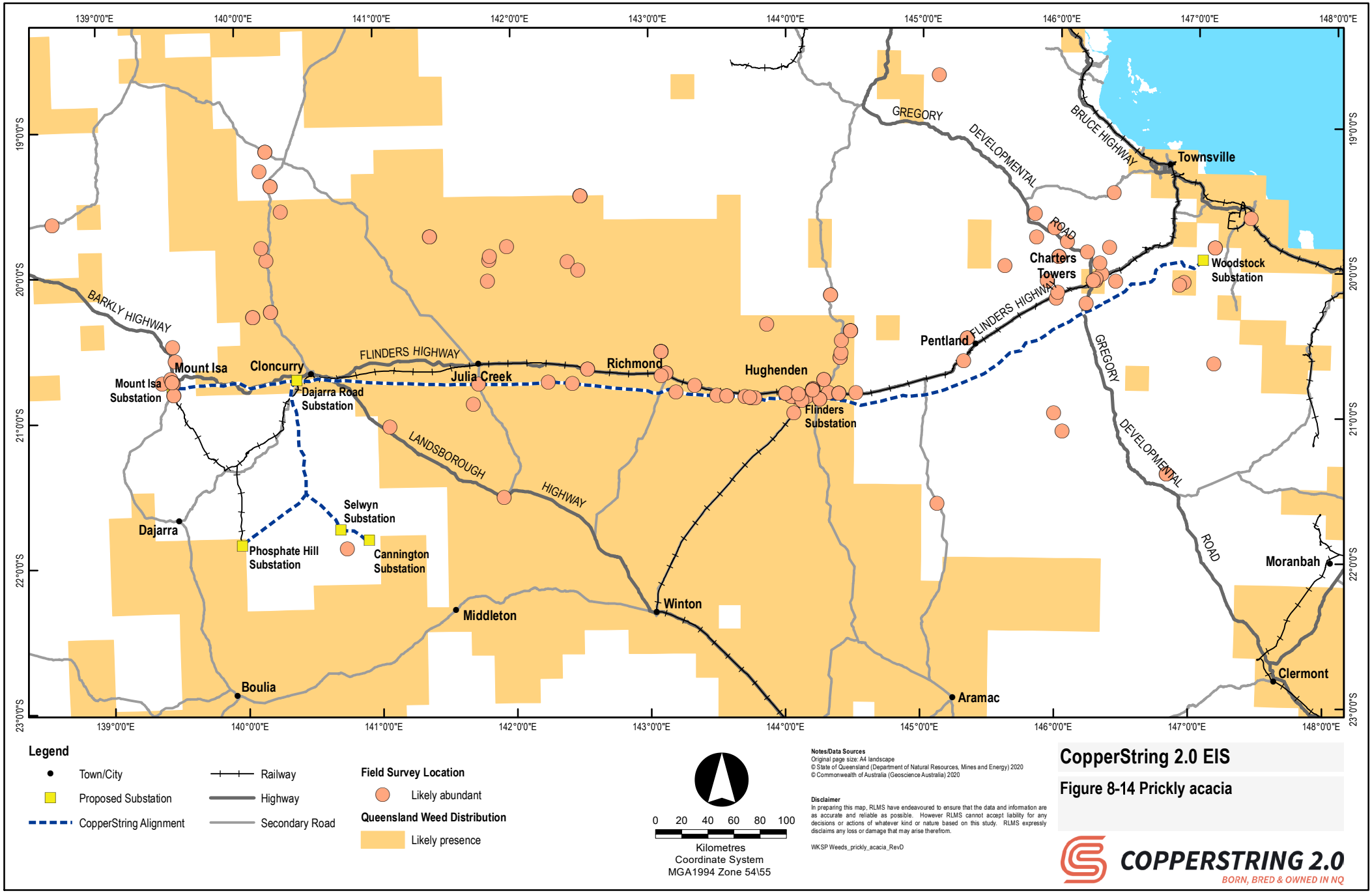
WKSP Weeds_parthenium_RevD

CopperString 2.0 EIS

Figure 8-13 Parthenium

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

Notes/Data Sources
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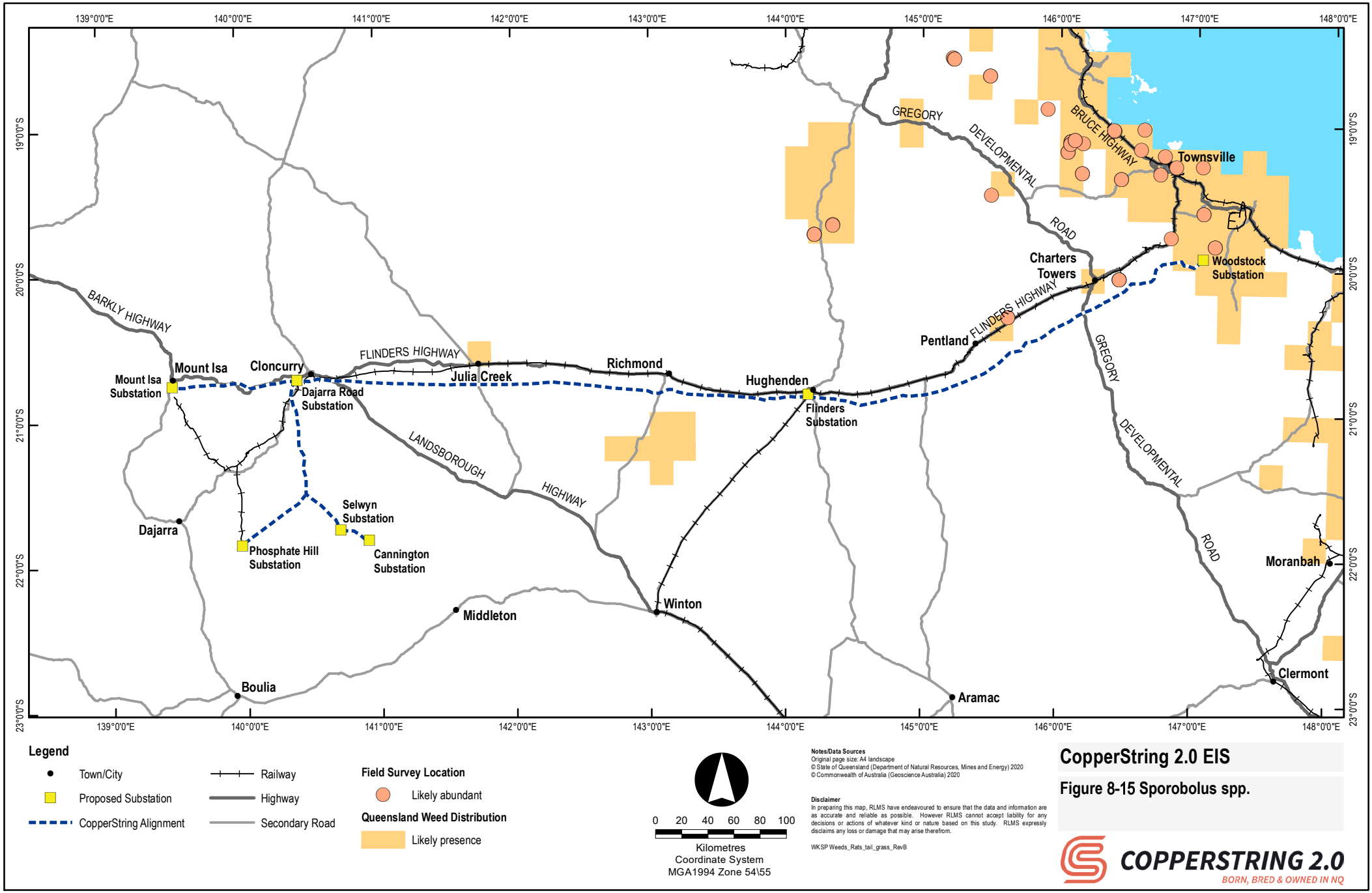
WKSP Weeds_prickly_acacia_RevD

CopperString 2.0 EIS

Figure 8-14 Prickly acacia

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

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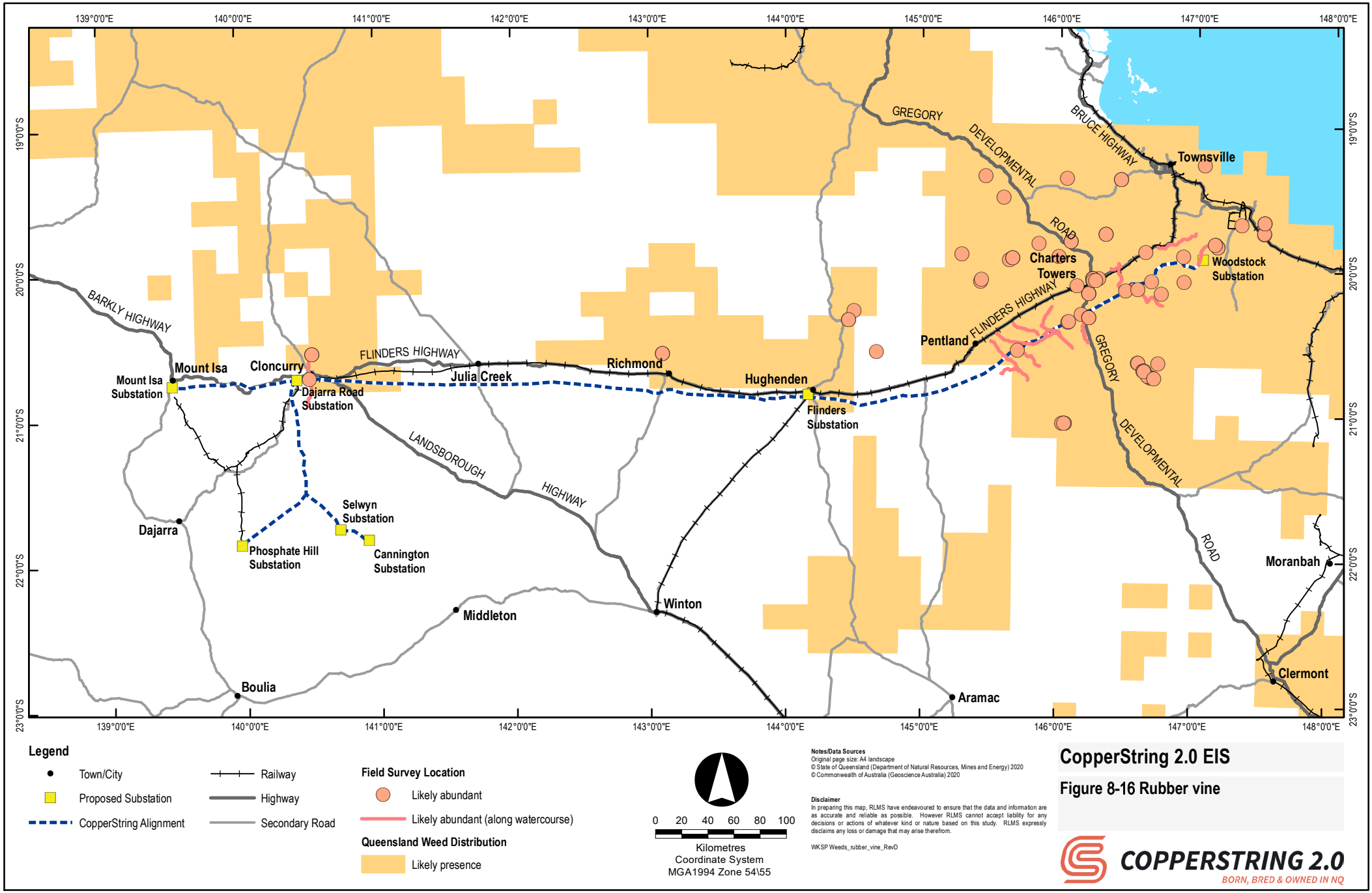
WKSP Weeds_Rats_tail_grass_RevB

CopperString 2.0 EIS

Figure 8-15 Sporobolus spp.

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant
- Likely abundant (along watercourse)

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55

Notes/Data Sources
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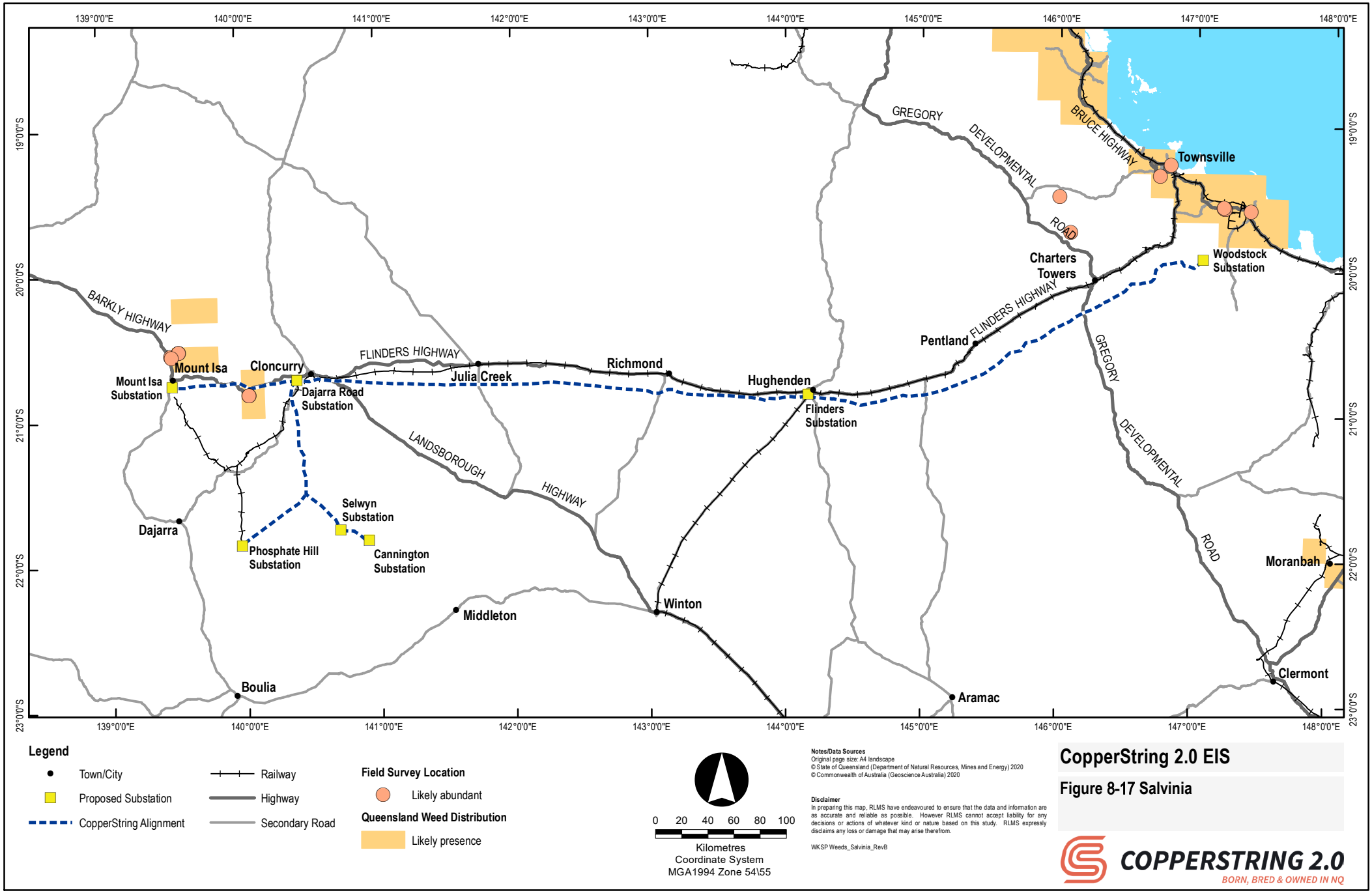
WKSP Weeds_rubber_vine_RevD

CopperString 2.0 EIS

Figure 8-16 Rubber vine

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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BARKLY HIGHWAY
FLINDERS HIGHWAY
LANDSBOROUGH HIGHWAY
GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
Mount Isa
Mount Isa Substation
Cloncurry
Dajarra Road Substation
Julia Creek
Richmond
Hughenden
Flinders Substation
Pentland
Charters Towers
Townsville
Woodstock Substation
Dajarra
Phosphate Hill Substation
Selwyn Substation
Cannington Substation
Middleton
Winton
Boulia
Aramac
Moranbah
Clermont
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Queensland Weed Distribution
Likely presence
0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55
Notes/Data Sources
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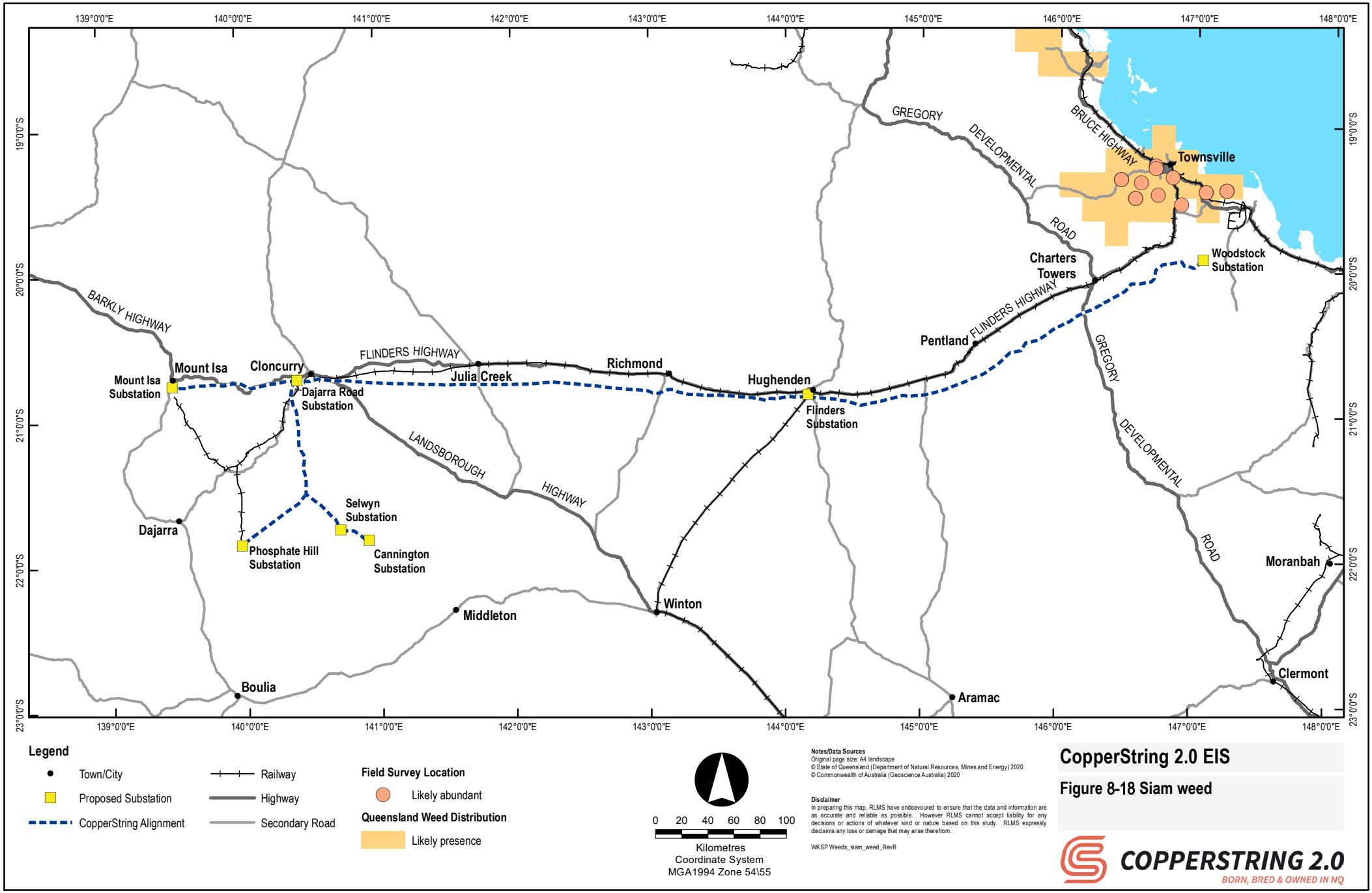
WKSP Weeds_Salvinia_RevB
CopperString 2.0 EIS
Figure 8-17 Salvinia
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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BARKLY HIGHWAY
FLINDERS HIGHWAY
LANDSBOROUGH HIGHWAY
GREGORY DEVELOPMENTAL ROAD
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Mount Isa
Mount Isa Substation
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Woodstock Substation
Dajarra
Phosphate Hill Substation
Selwyn Substation
Cannington Substation
Middleton
Winton
Boulia
Aramac
Moranbah
Clermont
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Queensland Weed Distribution
Likely presence
0 20 40 60 80 100
Kilometres
Coordinate System
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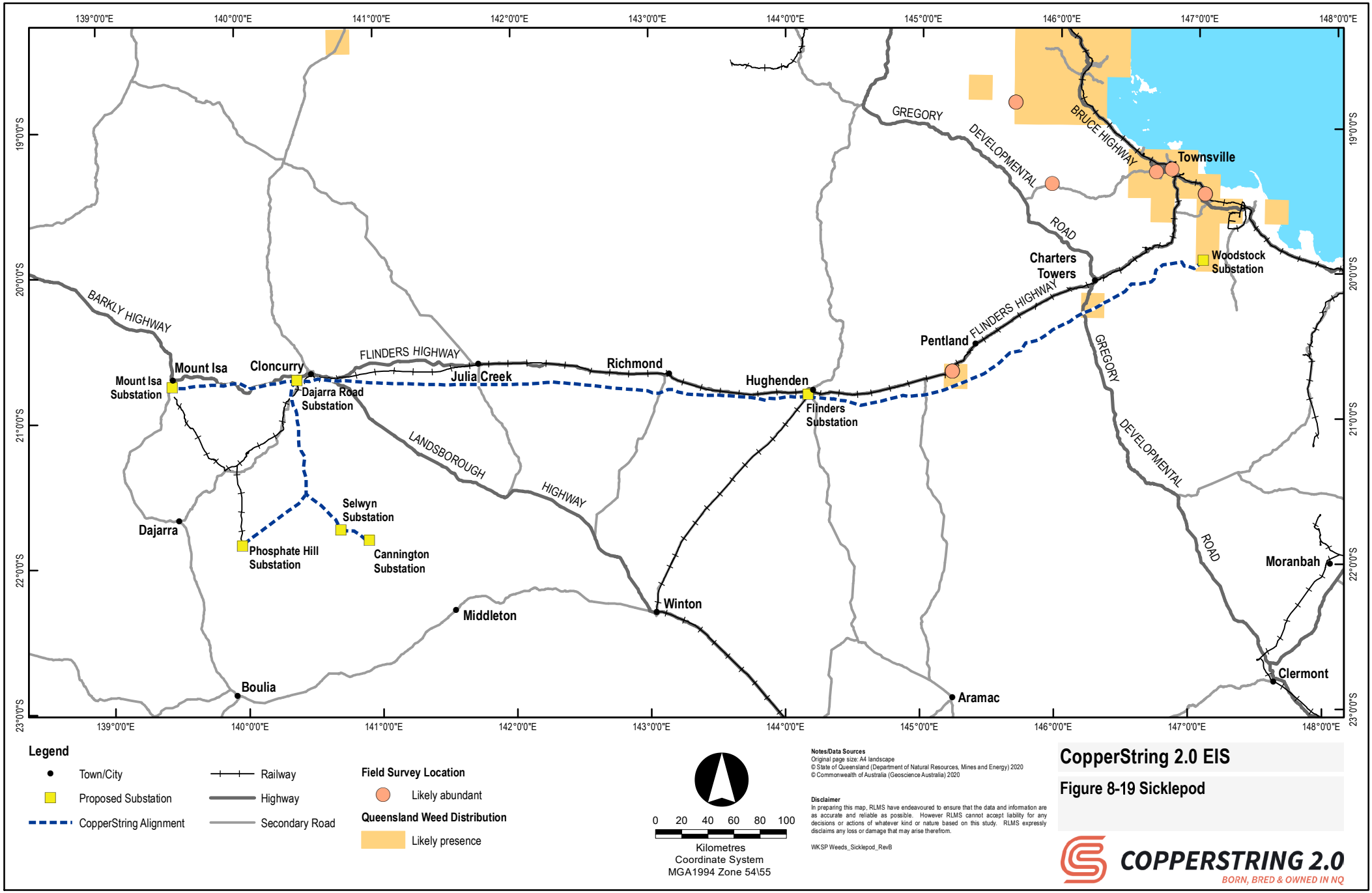
WKSP Weeds_siam_weed_RevB
CopperString 2.0 EIS
Figure 8-18 Siam weed
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

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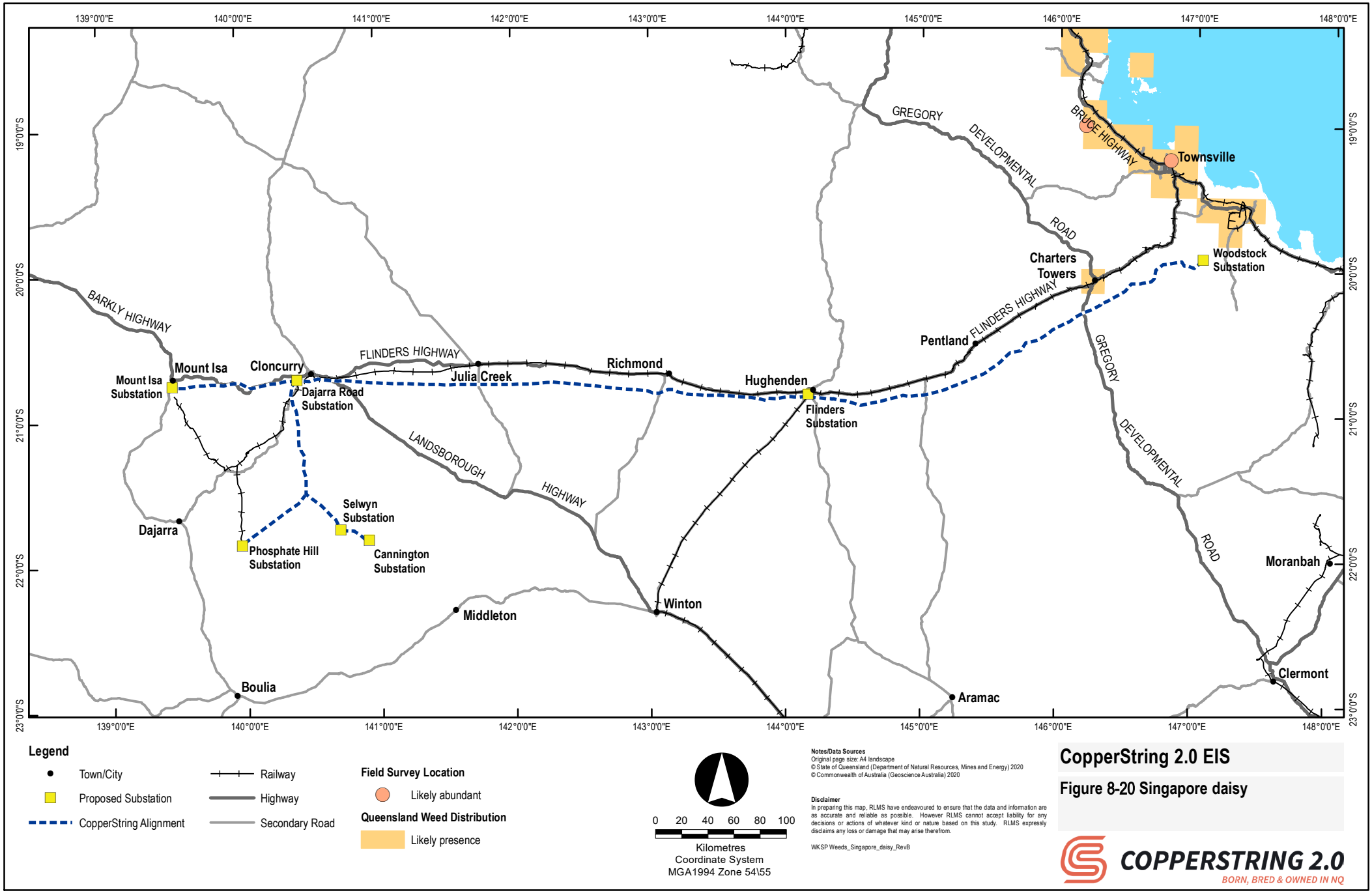
WKSP Weeds_Sicklepod_RevB

CopperString 2.0 EIS

Figure 8-19 Sicklepod

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
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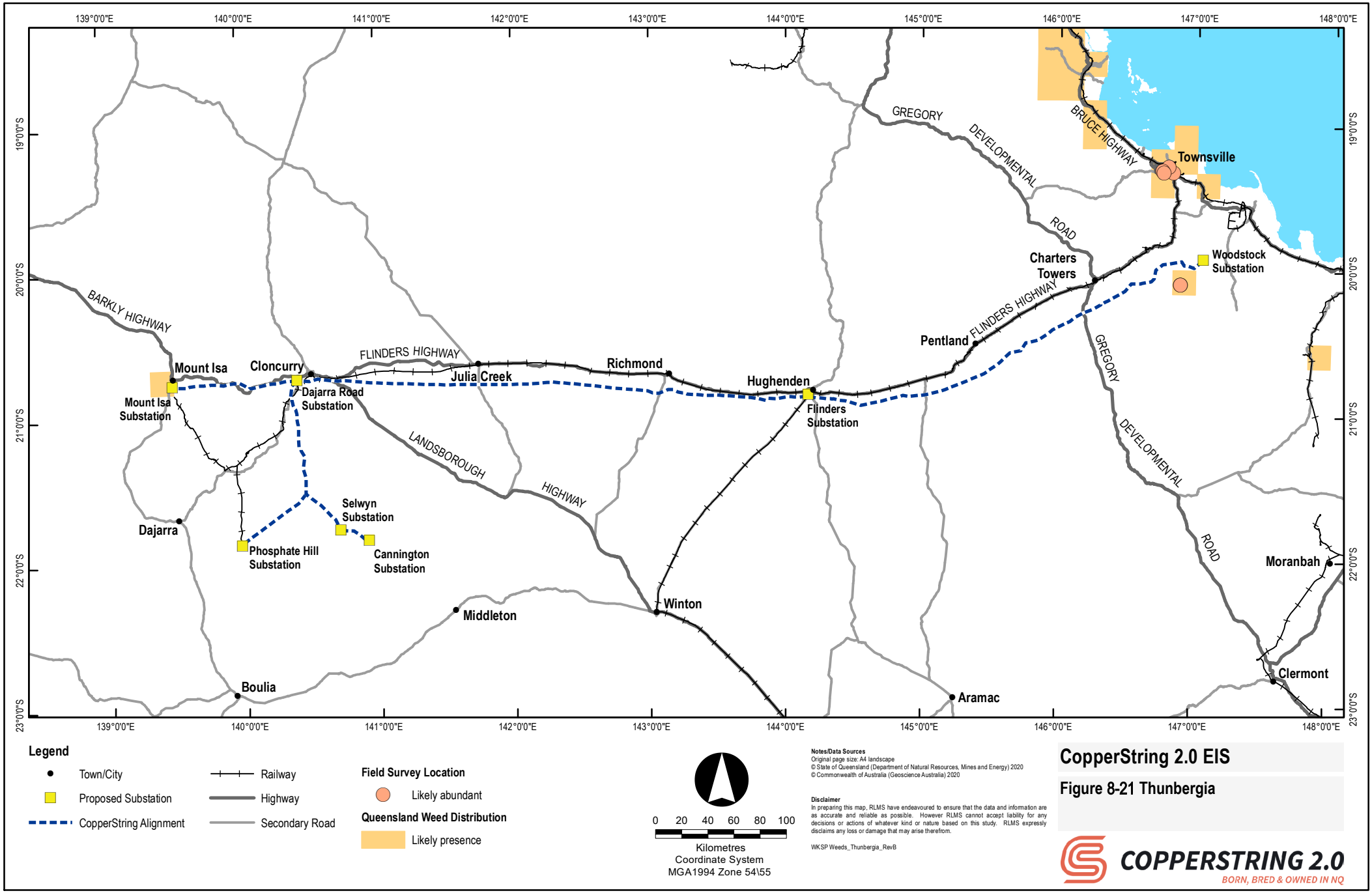
WKSP Weeds_Singapore_daisy_RevB

CopperString 2.0 EIS

Figure 8-20 Singapore daisy

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

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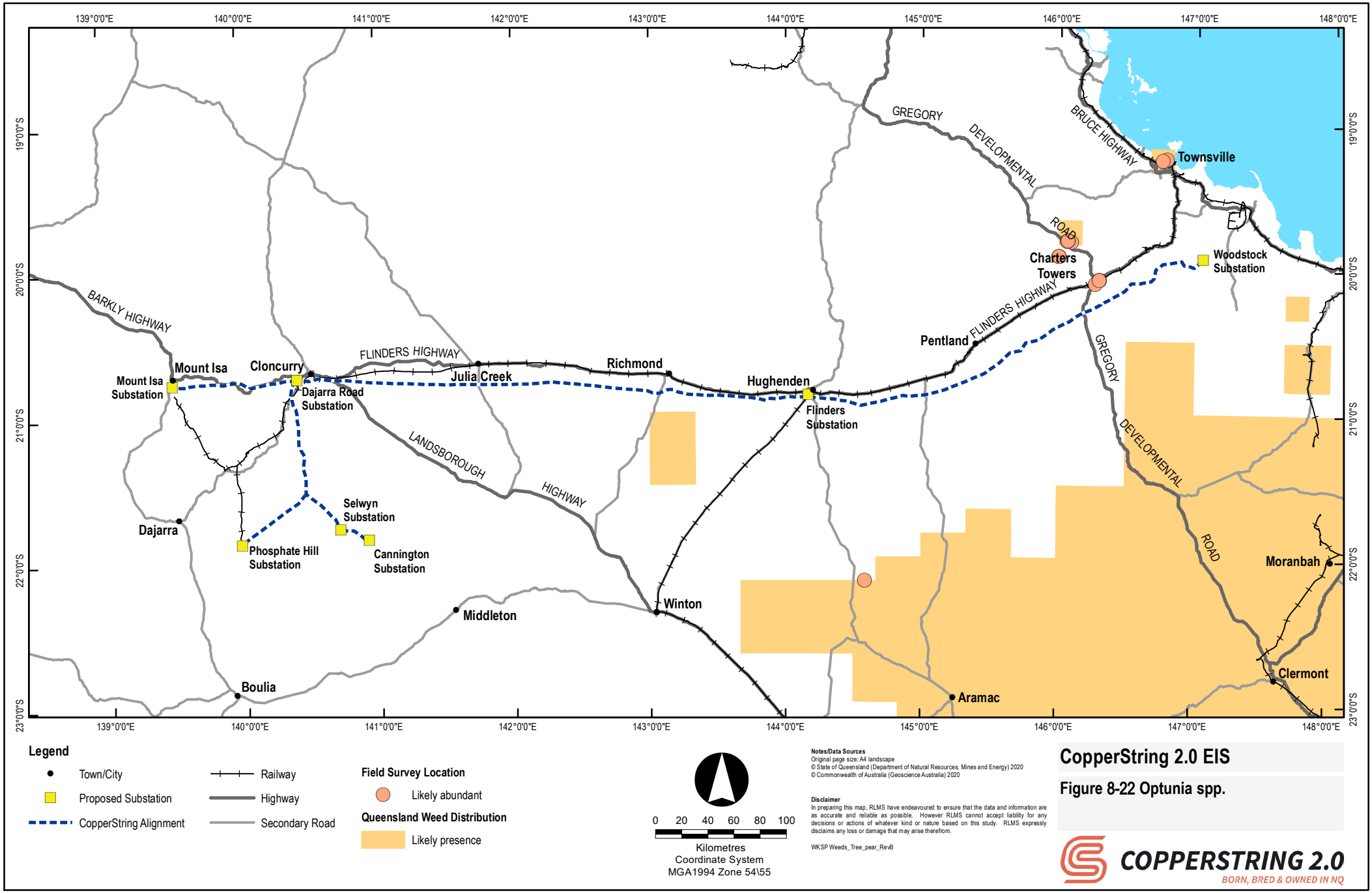
WKSP Weeds_Thunbergia_RevB

CopperString 2.0 EIS

Figure 8-21 Thunbergia

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



Legend

- Town/City
- Proposed Substation
- CopperString Alignment
- Railway
- Highway
- Secondary Road

Field Survey Location

- Likely abundant

Queensland Weed Distribution

- Likely presence

0 20 40 60 80 100

Kilometres

Coordinate System
MGA1994 Zone 54\55

Notes/Data Sources
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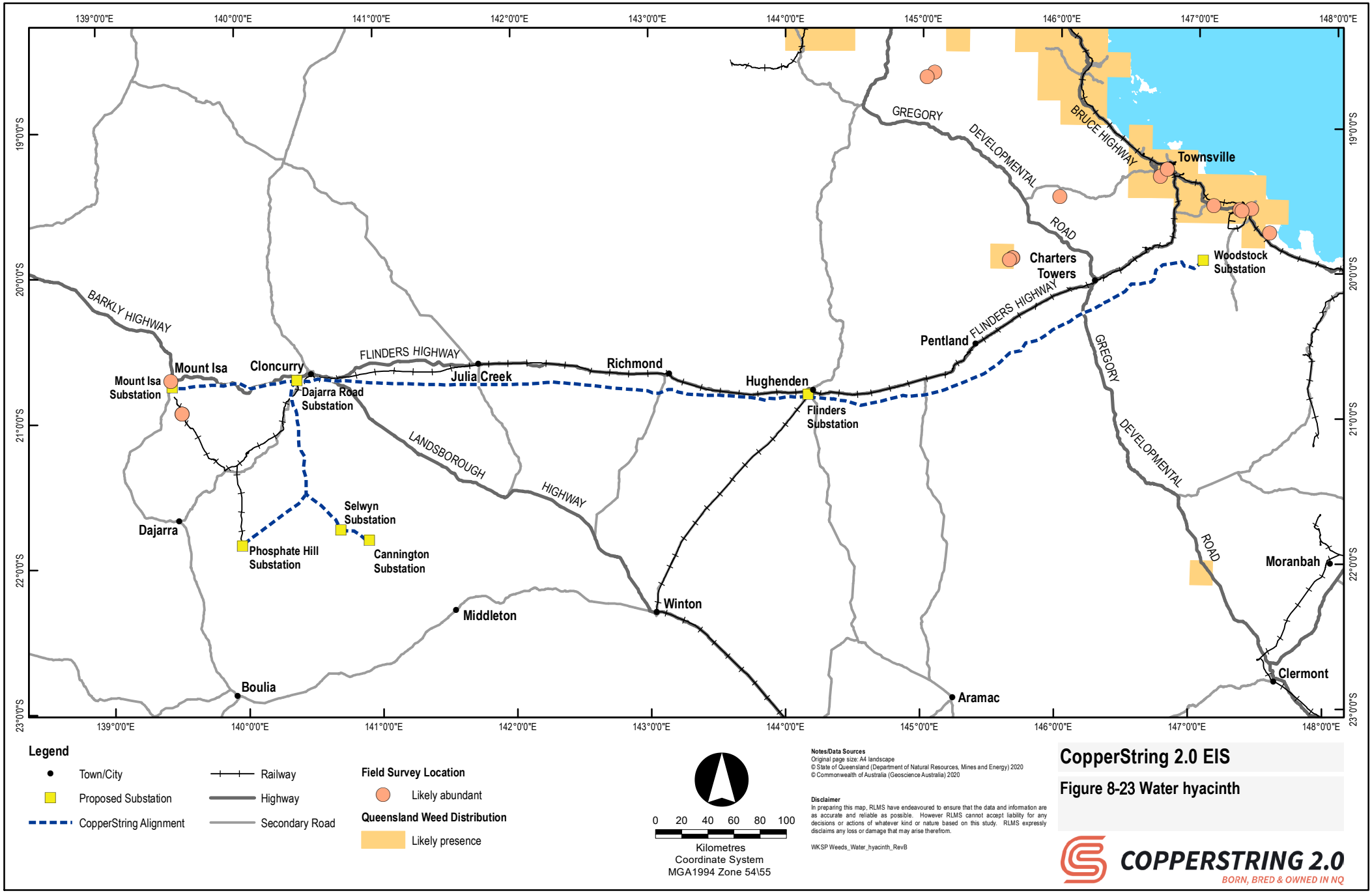
WKSP Weeds_Tree_pear_RevB

CopperString 2.0 EIS

Figure 8-22 Optunia spp.

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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BARKLY HIGHWAY
FLINDERS HIGHWAY
LANDSBOROUGH HIGHWAY
GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
Mount Isa
Mount Isa Substation
Cloncurry
Dajarra Road Substation
Julia Creek
Richmond
Hughenden
Flinders Substation
Pentland
Townsville
Charters Towers
Woodstock Substation
Dajarra
Phosphate Hill Substation
Selwyn Substation
Cannington Substation
Middleton
Winton
Boulia
Aramac
Moranbah
Clermont
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Queensland Weed Distribution
Likely presence
0 20 40 60 80 100
Kilometres
Coordinate System
MGA1994 Zone 54\55
Notes/Data Sources
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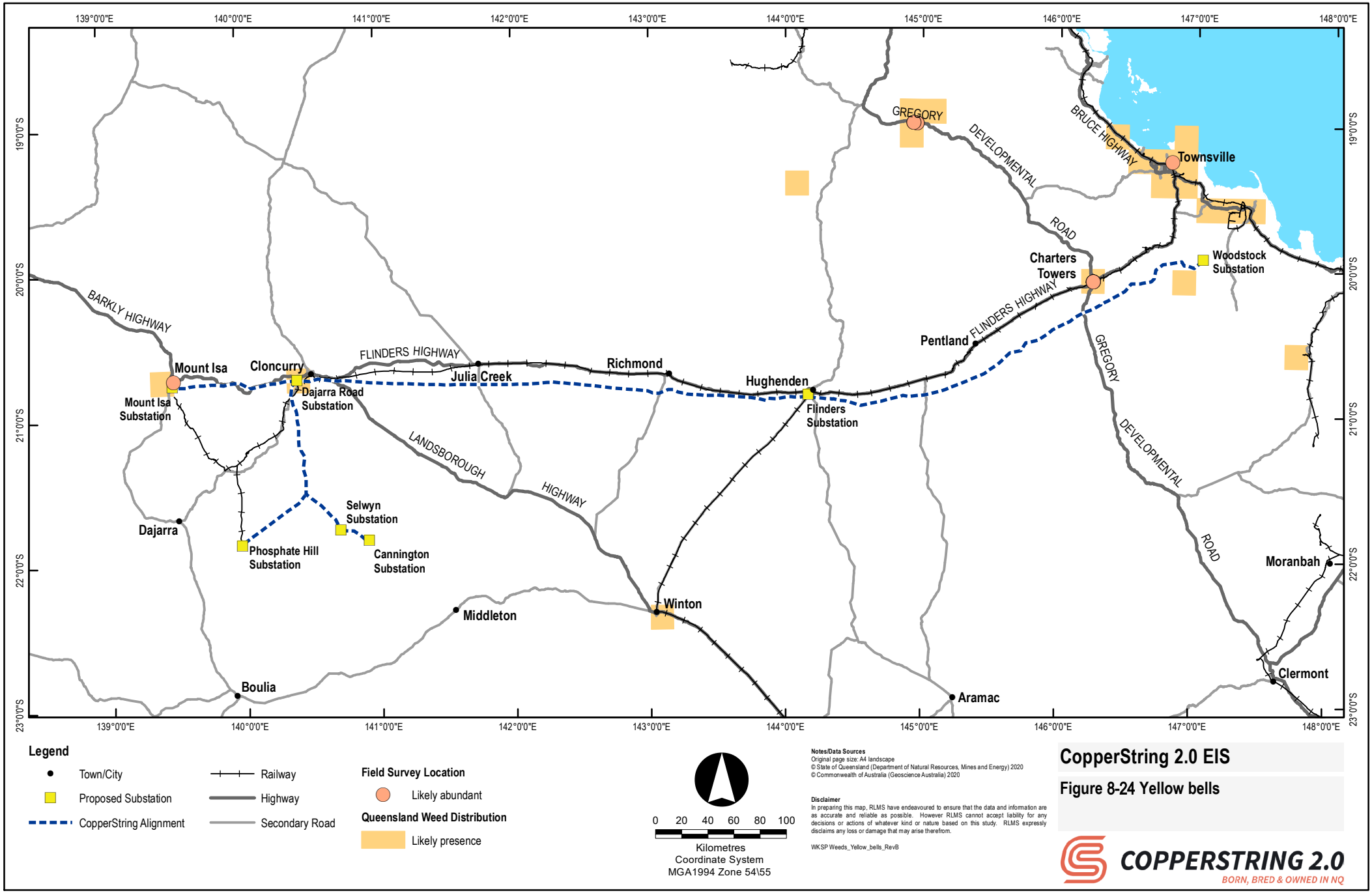
WKSP Weeds_Water_hyacinth_RevB
CopperString 2.0 EIS
Figure 8-23 Water hyacinth
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



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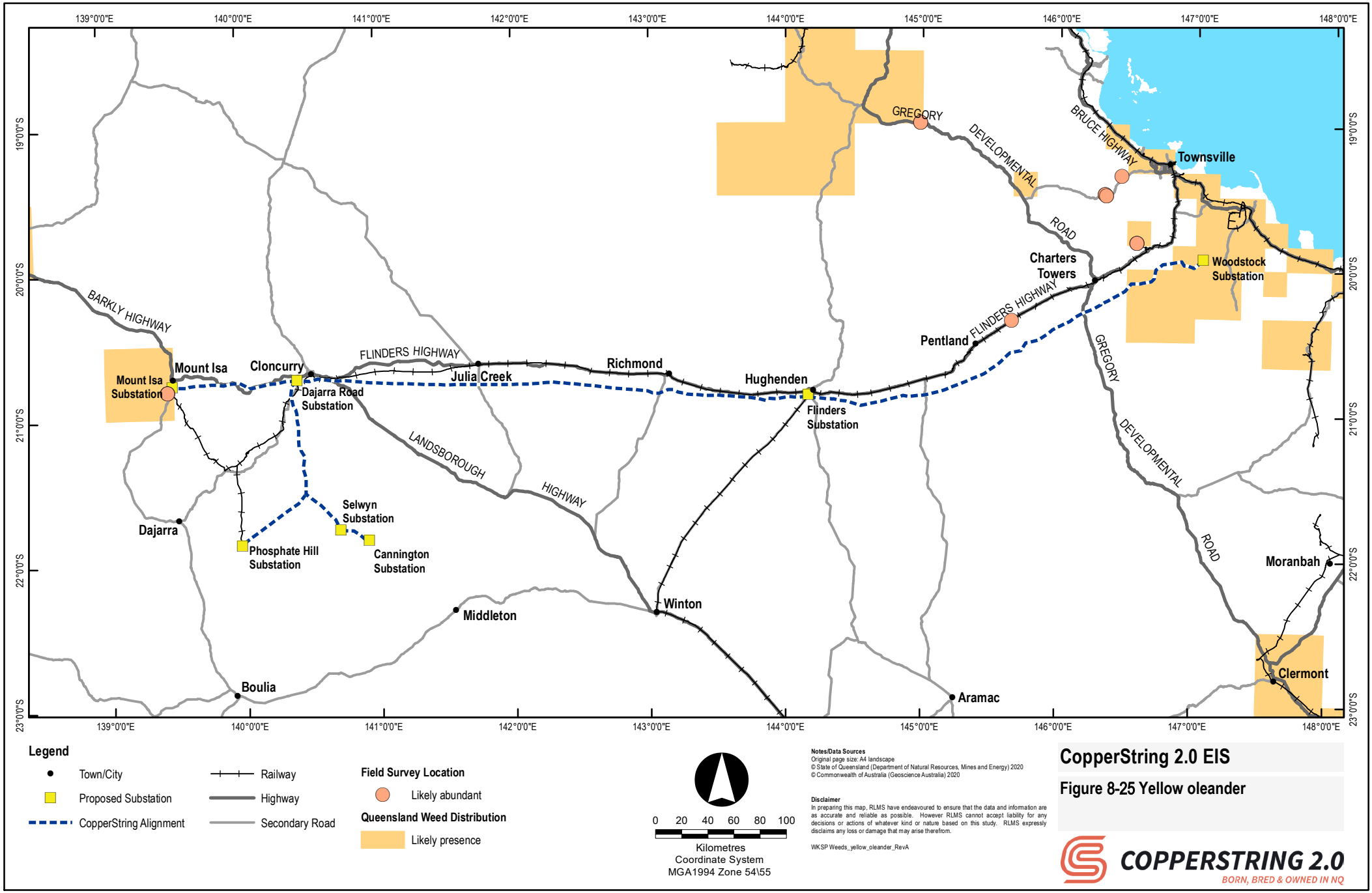
WKSP Weeds_Yellow_bells_RevB

CopperString 2.0 EIS

Figure 8-24 Yellow bells

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ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GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
Townsville
Woodstock Substation
Charters Towers
FLINDERS HIGHWAY
Pentland
GREGORY DEVELOPMENTAL ROAD
BARKLY HIGHWAY
Mount Isa
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Cloncurry
Dajarra Road Substation
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Hughenden
Flinders Substation
LANDSBOROUGH HIGHWAY
Selwyn Substation
Cannington Substation
Phosphate Hill Substation
Dajarra
Middleton
Winton
Boulia
Aramac
Moranbah
Clermont
Legend
Town/City
Proposed Substation
CopperString Alignment
Railway
Highway
Secondary Road
Field Survey Location
Likely abundant
Queensland Weed Distribution
Likely presence
0 20 40 60 80 100
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WKSP Weeds_yellow_oleander_RevA
CopperString 2.0 EIS
Figure 8-25 Yellow oleander
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ

Invasive animals

A total of 24 introduced fauna species were identified in desktop searches within 5 km of the Project (Table 8-4). Of these, 18 species were recorded in both the PMST and Wildlife Online database. Two species, the black rat (*Rattus rattus*) and the feral deer were recorded in the PMST database only, and two species, the goat (*Capra hircus*) and the Indian peafowl (*Pavo cristatus*), were recorded in the Wildlife Online search only. Nine introduced mammal species and one amphibian species were recorded during the 2010 and 2019 field surveys. Two introduced fish species were recorded during the 2010 field surveys. Nine species are listed as restricted matters under the Biosecurity Act however, the GBO still applies to non-restricted invasive animals. Additionally, local governments may have specific control actions for non-restricted invasive animals, which may be required under local law.

Detailed information on the identified invasive animals is located within the Volume 3 Appendix P Ecological Assessment. Spatial representations of invasive animals risk incorporating the below are shown on Figure 8-26. The invasive animals included on Figure 8-26 have restricted distributions and may be a risk of further spreading, other invasive species that a wide spread across the corridor selection include feral dogs, cats and pigs.

Table 8-4 Invasive animal species likely to be present (from Volume 3 Appendix P Ecological Assessment)

Scientific name	Common Name	Restricted matter category	Source
Canis lupus familiaris	Domestic dog	Category 3, 4, 6	PMST, WO
Felis catus	Cat	Category 3, 4, 6	PMST, WO
Oryctolagus cuniculus	European rabbit	Category 3, 4, 5, 6	PMST, WO
Sus scrofa	Pig	Category 3, 4, 6	PMST, WO
Vulpes vulpes	Red fox	Category 3, 4, 5, 6	PMST, WO
Rhinella marina	Cane toad	-	PMST, WO
Acridotheres tristis	Common myna	-	PMST, WO
Anas platyrhynchos	Northern mallard	-	PMST, WO
Bos taurus	Cattle	-	PMST, WO
Camelus dromedarius	One-humped camel	-	PMST, WO
Columba livia	Rock dove	-	PMST, WO
Hemidactylus frenatus	House gecko	-	PMST, WO
Lonchura punctulata	Nutmeg mannikin	-	PMST, WO
Mus musculus	House mouse	-	PMST, WO
Pavo cristatus	Indian peafowl	-	WO
Passer domesticus	House sparrow	-	PMST, WO
Spilopelia chinensis	Spotted dove	-	PMST, WO
Equus caballus	Wild horse	-	PMST, WO
Sturnus vulgaris	Common starling	-	PMST, WO
Rattus rattus	Black rat	-	PMST
Capra hircus	Goat	Category 3, 4, 6	WO
N/A	Feral deer	Category 3, 4, 6	PMST
Gambusia holbrooki	Mosquitofish	Category 6 and 7	WO
Oreochromis mossambica	Tipalia	Category 6 and 7	WO

"-" indicates that the species is not declared restricted matter

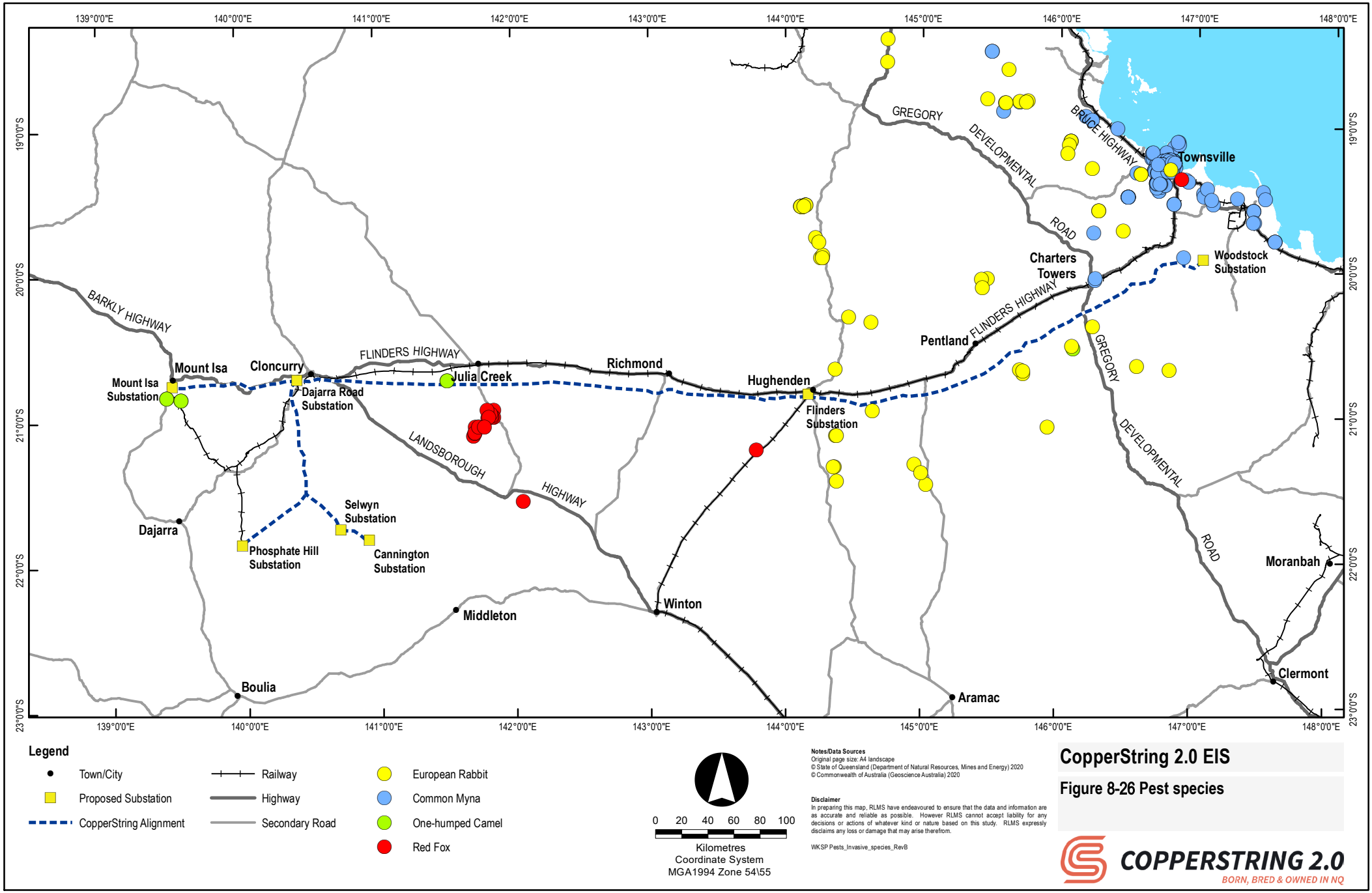
Insects

There are four invasive ant species known within Queensland (refer Table 8-5), which have the potential to spread to the Project area via material or machinery movement. Townsville City Council consider yellow crazy ants as a 'critical priority' species (refer Table 8-7).The Singapore ant is not restricted matter under the Biosecurity Act however is present in the urban districts of the McKinlay LGA and is locally declared. Under local laws a person must not introduce, propagate, breed or provide harbour to locally declared invasive animals. Other insects that are not introduced but considered pests include mosquitoes and biting midges. Spatial representations of invasive ants risk incorporating the below are shown on Figure 8-27. No invasive ant species were recorded along the corridor selection during field surveys (refer Volume 3 Appendix P Ecological Assessment).

Table 8-5 Invasive ants of Queensland

Scientific Name	Common Name	Restricted Matter Category	Location
Wasmannia auropunctata	Electric ant	Category 1	Far North QLD
Solenopsis invicta	Red imported fire ant	Category 1	South-east QLD
Anoplolepis gracilipes	Yellow crazy ant	Category 3	Townsville, Cairns, Brisbane
Monomorium destructor (also known as *Trichomyrmex destructor*)	Singapore ant	-	McKinlay LGA urban districts (Julia Creek, McKinlay, Kynuna and Nelia Townships)

"-" indicates that the species is not declared restricted matter



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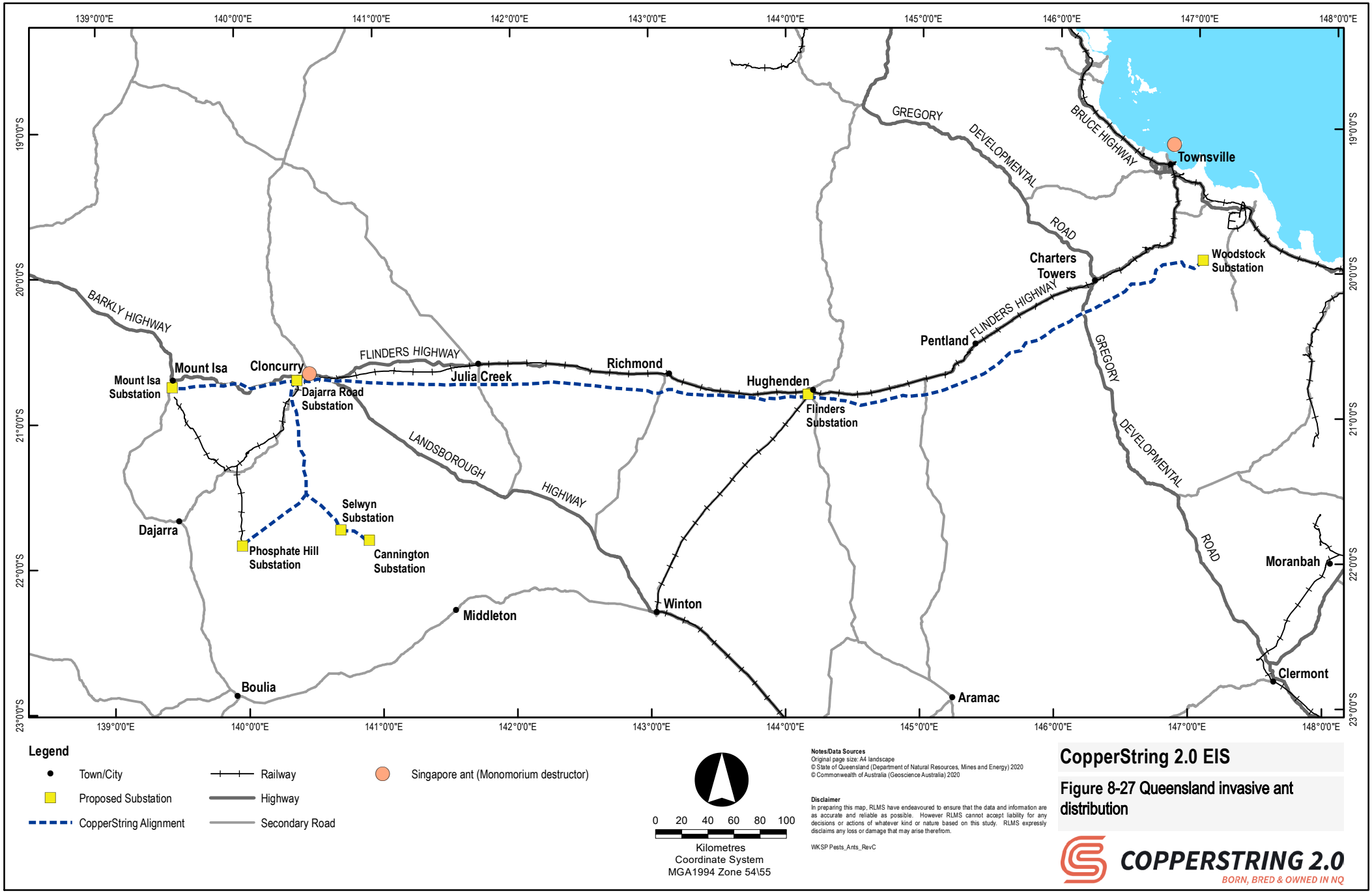
WKSP Pests_Invasive_species_RevB

CopperString 2.0 EIS

Figure 8-26 Pest species

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ



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WKSP Pests_Ants_RevC

CopperString 2.0 EIS

Figure 8-27 Queensland invasive ant distribution

COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ

8.3.2 Local government priorities

Review of local government biosecurity plans identified the management priority for each of the introduced plant and animal species likely or known to occur within the study area (refer Table 8-6 and Table 8-7 respectively). Species considered higher priority are targeted with intensive management often with goals aiming for significant reductions or eradication, however methods are ultimately species specific. Management Methods include eradication, reduction, containment, education and impact/asset protection. Species prioritisation can guide future specific biosecurity management plans.

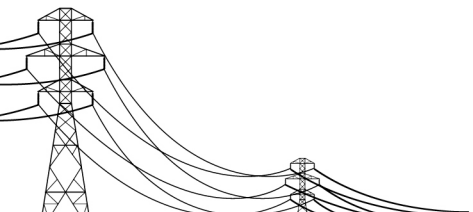


Table 8-6 Local government prioritisation for invasive plant species of significance

Species		Local Government/Council Priority							
Scientific Name	Common Name	Burdekin	Townsville	Charters Towers	Flinders	Richmond	McKinlay	Cloncurry	Mt Isa
Bryophyllum delagoense	Mother of millions	-	Medium	Low/Medium	Moderate	Watch list	-	Minor	B
Cascabela thevetia	Yellow oleander	Medium	Medium	-	-	-	-	-	-
Cabomba caroliniana	Cabomba	Medium	High	-	-	-	-	-	-
Cenchrus ciliaris	Buffel grass	-	Low	-	-	-	-	-	-
Chromolaena odorata	Siam weed	High	High	High	High	-	-	-	Prevention
Cryptostegia grandiflora	Rubber vine	Medium	High	Medium	High	26	A/B/ Prevention	Major	A/B
Cryptostegia madagascariensis	Ornamental rubber vine	-	High	-	-	-	-	-	-
Cylindropuntia fulgida	Coral cactus	-	Medium	-	Strategic opportunities	28	A/ Prevention	Medium	A
Cylindropuntia fulgida var. mamillata	Prickly pear	-	Medium	-	Strategic opportunities	-	-	-	-
Cyperus brevifolius	Mullumbimby couch						-		
Eichhornia crassipes	Water hyacinth	Medium	High	-	-	-	-	-	Prevention
Harrisia martini	Harrisia cactus	High	Alert (all species)	-	-	-	A/Prevention	-	-
Hymenachne amplexicaulis	Hymenachne	Medium	High	Medium	-		-	-	-
Jatropha gossypiifolia	Bellyache bush	Medium	High	High	Strategic opportunities	29.5	Prevention	-	A/B
Lantana camara	Lantana	Medium	High	-	-	-	-	-	Eradication
Lycium ferocissimum	African boxthorn						-		

Species		Local Government/Council Priority							
Scientific Name	Common Name	Burdekin	Townsville	Charters Towers	Flinders	Richmond	McKinlay	Cloncurry	Mt Isa
Opuntia monacantha	Dropping tree pear	-	Medium	Medium	-	-	A/Prevention	-	-
Opuntia stricta	Prickly pear	-	Medium	Medium	Strategic opportunities	-	A/Prevention	-	A
Opuntia tomentosa	Velvety tree pear	-	Medium	Medium		-	A/Prevention	-	-
Parkinsonia aculeata	Parkinsonia	Medium	High	High	High	24	A/B	Medium	B
Parthenium hysterophorus	Parthenium weed	High	High	Medium/ High	High	31.5	A/Prevention	Major	-
Prosopis pallida	Mesquite	-	High	Alert	High	15	A/B/ Prevention	Medium	A
Salvinia molesta	Salvinia	Medium	High	-	-	-	Prevention	-	A
Senna obtusifolia	Sicklepod	High	High	Low/ Medium	-	-	-	-	-
Sphagneticola trilobata	Singapore daisy	-	Medium	Low	-	-	-	-	-
Sporobolus jacquemontii	America rat's tail grass	Medium	Medium		-			-	-
Sporobolus pyramidalis	Giant rat's tail grass	High	High	High	High	Watch list	Prevention	-	Prevention
Tamarix aphylla	Athel pine	-	High	-	-	20	B/Prevention	-	B
Tecoma stans	Yellow bells	-	Low	-	-	-	-	-	B
Thunbergia grandiflora	Thunbergia	-	High	-	-	-	-	-	-
Vachellia nilotica	Prickly acacia	High	High	High	Active program	30.5	B/C	Major	A
Ziziphus mauritiana	Chinee apple	Medium	High	High	High	18	-	Minor	A

"-" indicates that the species was not included in the LGA biosecurity plans.

Table 8-7 Local government prioritisation for invasive animal species of significance

Species		Local Government/Council Priority							
Scientific Name	Common Name	Burdekin	Townsville	Charters Towers	Flinders	Richmond	McKinlay	Cloncurry	Mt Isa
Acridotheres tristis	Common myna	-	-	-	-	-	-	-	-
Anas platyrhynchos	Northern mallard	-	-	-	-	-	-	-	-
Anoplolepis gracilipes	Yellow crazy ant	-	Critical	-	-	-	-	-	-
Bos taurus	Cattle	-	-	Low/ med(public safety)	-	-	-	-	-
Camelus dromedarius	One-humped camel	-	-	Low/ med(public safety)	-	-	-	-	A
Canis lupus familiaris	Feral dog	High	Critical	High	Active program	23	A/C	High	C
Capra hircus	Feral Goat	-	-	Low	Minor	-	-	-	B
Columba livia	Rock dove	-	-	-	-	-	-	-	-
Equus caballus	Wild Horse	-	Critical	Low/ med(public safety	-	-	-	-	B
Felis catus	Feral Cat	-	High	Medium	High	30	C	High	B
Gambusia holbrooki	Mosquitofish	-	Medium	-	-	-	-	-	-
Hemidactylus frenatus	House gecko	-	-	-	-	-	-	-	-
Lonchura punctulata	Nutmeg mannikin	-	-	-	-	-	-	-	-
Monomorium destructor (also known as Trichomyrmex destructor)	Singapore ant	-	-	-	-	-	C	-	-

Species		Local Government/Council Priority							
Scientific Name	Common Name	Burdekin	Townsville	Charters Towers	Flinders	Richmond	McKinlay	Cloncurry	Mt Isa
Mus musculus	House mouse	-	-	-	-	-	-	-	-
N/A	Feral deer	High	High	Med/high	-	18	B/Prevention	-	-
Oreochromis mossambica	Tipalia	-	Medium	Low	-	-	-	-	-
Oryctolagus cuniculus	European rabbit	-	High	Medium	Minor	19	A/Prevention	-	Prevention
Passer domesticus	House sparrow	-	-	-	-	-	-	-	-
Pavo cristatus	Indian peafowl	-	Low	-	-	-	-	-	-
Rattus rattus	Black rat	-	-	-	-	-	-	-	-
Rhinella marina	Cane toad	-	Medium	-	Minor	-	-	-	-
Spilopelia chinensis	Spotted dove	-	-	-	-	-	-	-	-
Sturnus vulgaris	Common starling	-	-	-	-	-	-	-	-
Sus scrofa	Feral Pig	High	High	Medium	High	32.5	A/C	High	A
Vulpes vulpes	Red fox	-	High	High	Moderate	18	A/Prevention	-	Prevention

"-" indicates that the species was not included in the LGA biosecurity plans.

8.4 Impact assessment and mitigation measures

8.4.1 Summary of impacts

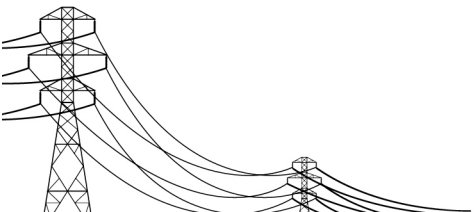
Throughout all of the Projects phases the spread of invasive plants and animals could have a range of adverse impacts on the natural environment and economy. Invasive plants can outcompete native plants for space, nutrients and water. While predatory invasive animals such as feral dogs, feral cats and foxes can cause substantial disruptions to natural ecosystem functioning by altering the balance of inter-species competition and predation.. Inappropriate waste disposal and provision of water has the capacity to attract higher local concentrations of feral predators, increasing the predation pressures on local wildlife. Access tracks created for the Project have the potential to facilitate movement of feral predators such as dogs and foxes, thereby increasing predation pressures on local wildlife. These impacts can result in decreasing biodiversity of native plant and animals within the Project area and within the broader region (including neighbouring threatened ecological communities). Further damage to the ecological integrity of the environment can be caused by direct impacts from feral pigs and goats, these invasive animals can create erosion in riparian and aquatic areas, heavily degrading natural habitats, as well as acting as a vector for the spread of invasive plants. Further details of potential impacts of invasive plants and animals on flora and fauna is provided in Volume 2 Chapter 7 Flora and Fauna and Volume 3 Appendix P Ecological Assessment.

Invasive plants and animals can also have a costly effect on the agricultural industry. Invasive plants have the potential to reduce pasture through competition and dense growths can obstruct movement of livestock. Livestock can be directly harmed by invasive plant infestation, through poisonous or thorny invasive plants. Invasive animals can prey directly on livestock or be a vector for disease. Large invasive animals can damage farm equipment such as fences and over all degrade the profitability of agricultural land. Invasive animal species also have the potential to have adverse impacts on human health via disease transmission. There is potential of injury to personnel from contact with larger invasive animal, such as camels, feral dogs or pigs. Livestock act as a vector for the spread of invasive plants further exacerbating impacts on the agricultural industry.

The above impacts can occur if populations of invasive plants and animals are allowed to spread and grow uncontrolled, the following discussion of high risk activities and associated mitigation and management will outline measures to limit the spread of invasive plants and animals within the study area.

8.4.2 Design response

The management of invasive plants and animals for the corridor selection would not be influenced by general design changes, but rather management of pre-construction activities such as the procurement of materials. A significant portion of construction materials would require transportation to the site from other regions of the state, country or from overseas. Therefore, it is important to ensure the suppliers used for all materials are actively and effectively managing their own biosecurity. It is essential that suppliers of top soil, fill material, equipment / machinery and transportable modules (e.g. demountable) are especially stringent, as this is a high risk invasive plant and invasive insect spreading activity. For example, the majority of materials would be delivered through the Port of Townsville (PoTL), Townsville is a high risk area for yellow crazy ants, therefore, prevention management would be required. With this in mind, where there is a risk of introduction or spread of invasive plants, suppliers should provide a suitable Biosecurity Declaration.



8.4.3 Pre-construction

During pre-construction, the risks and associated impacts from invasive plants and animals spreading or being introduced are minimal. There would be minimal personnel movement to, from and within the study area. However, any movement of vehicles or machinery can spread or introduce invasive plant species. When moving between properties there is the potential to rapidly spread invasive plants if left unmitigated. There is also the potential for personnel and vehicles to come into physical contact with large invasive animals when completing site inspections, this could result in damage to vehicles or injury to staff.

8.4.4 Construction

The risk of spreading or introducing invasive plants and animals is greatest during the construction phase of the Project, due to the large amounts of movement throughout construction. The transportation of vehicles, machinery and materials has a high potential to carry invasive plants and animals between points of origin and work fronts. Notably the potential introduction of yellow crazy ants from Townsville to the Projects work front could have negative effects on the natural environment and agricultural properties.

The construction staging schedule has been developed with reference to the seasonal rainfall anticipated during the summer months. Areas at high risk of flooding and erosion will be targeted for construction during the dry months. For example, construction activities in the Mitchell Grass Downs areas stretching from east of Hughenden to west of Julia Creek will be limited during December-March.

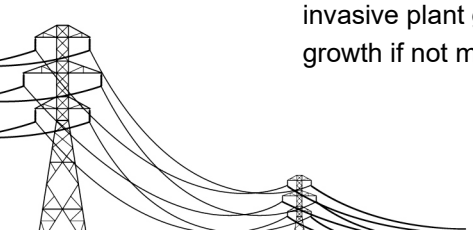
Vegetation clearing could increase the spread of existing invasive plants if slashed during high seed production times. Native vegetation removal could facilitate existing invasive plant growth by creating favourable conditions for invasive plants to outcompete native plants. During clearing and earthworks there is the potential for invasive animals to be disturbed, this could cause them to spread further or pose a potential threat to work continuation and personnel safety.

Construction facilities within the Project area, including permanent access tracks, easements and substations and temporary construction camps, delivery and storage areas can facilitate invasive plant growth and attract invasive animals. Cleared areas have the potential for invasive plant infestation. Project area facilities could increase stormwater runoff facilitating growth of invasive plants, mosquitos and cane toads. Mosquitos are disease vectors and could impact the health of personnel. Cane toads are poisonous and can cause death to native animals. Accommodation camps could attract invasive animals, such as rats, mice, dogs and cats due to increased food waste, this can have impacts to personnel health and safety, as well as the potential to increase invasive animal populations in these areas increasing pressure on local native animals via competition and predation.

The risk of spreading noxious fish during construction is extremely low as the corridor selection avoids waterways and watercourses. Access track may be required across dry waterways and watercourses, however, the construction and use of access tracks would not occur during flow times.

8.4.5 Operation and maintenance

During the operation and maintenance phase of the Project the risk of spreading or introducing invasive plants and animals is minimal. Similar to the pre-construction phase there is limited movement along the corridor selection. There is still the potential that vehicle movement could spread invasive plants between properties. Vegetation maintenance activities could facilitate invasive plant growth if over cleared. Areas for rehabilitation could have increased invasive plant growth if not monitored effectively.

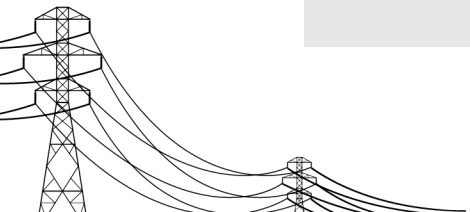


8.4.6 Summary of potential mitigation and management measures

Table 8-8 details a summary of the mitigation and management measures proposed to manage the impacts associated with spread and introduction of invasive plants and animals. The risk rating of potential impacts before and after mitigation is summarised in Table 8-9. Further details of mitigation strategies is provided in Volume 3 Appendix U Concept Biosecurity Plan.

Table 8-8 Summary of mitigation and management measures

Timing	Mitigation and Management Measures
Pre-construction and construction	Establish biosecurity risk
	Management strategies with reference to Biosecurity shall be developed to reflect the level of risk proposed for Project activities and Project work fronts.
	Formal biosecurity surveys shall be conducted within six months of construction commencing to confirm invasive plant presence within the study area and ancillary areas.
	Prior to commencing work, a detailed assessment of biosecurity risks associated with specific work activities and construction methods shall be carried out by the Construction Contractor(s) with biosecurity risk areas defined for the corridor selection. Data collected during landholder discussions shall be used to further inform the biosecurity risk assessment.
	Induction and training
	All personnel working in the field on the Project shall receive an induction regarding biosecurity matters and management requirements relevant to their specific work activities and Project work front.
	Specific training sessions for personnel on invasive plant species identification, invasive plant management and reporting requirements for identified or suspected invasive plants.
	A Project specific significant flora, fauna and biosecurity identification guide shall be developed and be provided and promoted to all Project personnel in general training and awareness sessions (e.g. pre-starts and toolboxes etc.).
	Suitable Biosecurity Declaration should be developed by the Construction Contractor(s) as appropriate to reflect Project activities and risks (e.g. vehicle inspections, vehicle wash/brush down, etc.).
	Personnel required to self-certify or certify vehicles, plant, equipment and machinery as being contaminant free (Biosecurity Declarations) shall have the appropriate competency and experience.
	The biosecurity risk assessment shall define biosecurity risk areas and determine the location, frequency, type and longevity of cleandown facilities (temporary or permanent) and appropriate method of cleandown (i.e. brush and vacuum, high pressure air, high pressure low volume water, low pressure high volume water, disinfection wash or spray). Cleandown procedures shall be developed in consultation with landholders to ensure land access requirements are appropriately addressed.
	Cleandown facilities (type and size selection)
	Temporary or permanent cleandown facilities shall be designed and constructed in with consideration to safety, cost, effectiveness, ease of implementation, risk, flexibility, environmental considerations and compliance.
	Cleandown facility design shall be undertaken by a suitably qualified and experience person and/or reputable manufacturer.
	Temporary invasive plant wash down facilities shall be designed and constructed to ensure adequate separation of vehicle treads with the material being washed down, an adequate drainage system to contain all wash down materials as well as enabling wash down material to be periodically cleaned out and disposed.
	Cleandown facilities shall include a log book to record all movements and cleandowns of all vehicles, plant, equipment and machinery through the facility.



Timing	Mitigation and Management Measures
	Cleandown facility material potentially contaminated with biosecurity matter shall be disposed in accordance with Biosecurity Act requirements.
	A consolidated inventory of all vehicles, plant, equipment and machinery planned to be used in construction of the Project shall be developed and submitted to the Construction Contractor(s) HSE representative (or equivalent).
	The vehicle, plant, equipment and machinery inventory shall identify the access point of origin (including if from a fire ant, yellow crazy ant, electric ant or Singapore ant regions).
	Cleandowns shall be completed for all vehicles, plant, equipment and machinery prior to: • leaving their point of origin for access to the Project site • leaving a Project work front, or moving between Project properties, work fronts or biosecurity risk areas
	All vehicles, plant, equipment and machinery shall maintain a log book to record all movements through cleandown facilities.
	Land access, mobilisation, movements and demobilisation
	Personnel shall comply with any land access requirements (e.g. cleandown before entry, sign-on/off)
	Landholder Biosecurity Management Plans prepared in accordance with Section 94G of the Biosecurity Regulation shall be: • Obtained by the Construction Constractor(s) • Complied with by personnel.
	A movement control plan shall be developed.
	Driving shall only occur on established access roads as far as practicable (bush tracks/off road shall be avoided where possible).
	Vehicle journey planning shall be undertaken, as far as practicable, in order to visit biosecurity free areas first, before travelling to areas affected by biosecurity matters.
	Boots and clothes shall be clean of mud, seed and plant material before entering vehicles.
	Material management
	Biosecurity Declarations shall be provided for all imported material (i.e. sand, soil, mulch etc.), from suppliers of these products. Quantities of soil/gravel obtained from a landholders borrow pit shall have a self-certifying Biosecurity Declaration Form.
	Any loads of plant material or soil (that may contain biosecurity matter) shall be covered during transport.
	Topsoil stockpiles contaminated with invasive plants shall be quarantined from clean topsoil stockpiles, with clear signage, and shall be identified on the Project plan during construction.
	Heavily invasive plant infested vegetation should only be placed within similarly disturbed areas to prevent the further spread of invasive plants or shall be removed from site and destroyed in accordance with legislative requirements.
	Invasive animal management
	Fences may be installed to exclude invasive animals from high risk construction and accommodation sites (if required). This shall be undertaken in consultation with landholders.
	Personnel shall wear appropriate PPE to discourage mosquito and midge bites, long-sleeve shirts and pants and insect sprays (if required).

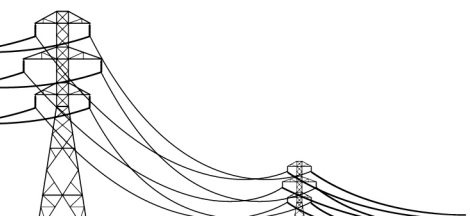
Timing	Mitigation and Management Measures
	All food wastes shall be appropriately managed onsite, with a focus on reducing access to invasive animal species such as feral cats and dogs. Personnel shall not feed animals food scraps.
	Vermin-proof bin lids for all food waste shall be used.
	Vermin traps shall be used in offices and accommodation camps as required. Where there is a threat to local fauna, live traps shall be used.
	Project personnel shall not be permitted pets or animals on site.
	Treatments
	Usable areas (access roads, substations, tower, accommodation and laydown/delivery site) should be kept free from invasive plant infestations.
	Periodic invasive plant spraying shall be undertaken under the direction of the Construction Contractor(s).
	Species specific biosecurity treatment procedures shall be developed in consultation with key stakeholders including landholders, natural resource management groups, local councils and regulatory authorities.
	Landholders should be consulted prior to using herbicide controls.
	Operation of distribution equipment is carried out by (or supervised by) the holder of a commercial operator's license or under the authority of a licenced ground distribution contractor.
	All methods and rates of chemical application must comply with label conditions (or a permit for off label use). Refer to the Australian Pesticides and Veterinary Medicines Authority for more information.
	Records are to be made for each and every ground distribution of chemicals in accordance with section 26 of the *Agricultural Chemicals Distribution Control Act* 1966. Submit records to Custring at the completion of works under contract. Keep records for a period of seven years after such distribution.
	Suspected invasive plant outbreaks or other biosecurity matters and coordinates of their location (in MGA2020) shall be reported to the Construction Contractor(s) HSE representative and investigated and actioned as appropriate.
	Daily and weekly site inspections undertaken by Construction Contractor(s) personnel (e.g. Supervisors and HSE representatives) shall incorporate biosecurity aspects required by the Biosecurity Plan e g. vehicles, plant, equipment and machinery Biosecurity Declaration spot checks, cleandown facility spot checks, etc.
Operation and maintenance	Monitoring and reporting
	Post rehabilitation monitoring in accordance with Volume 3 Appendix T Concept Rehabilitation Plan inclusive of pre and post wet season monitoring for a period of two years.
	Training and inductions
	All personnel working in the field on the Project shall receive an induction regarding biosecurity matters and management requirements relevant to their specific work activities and Project work front.
	Specific training sessions for personnel on invasive plant species identification, invasive plant management and reporting requirements for identified or suspected invasive plants.
	A Project specific significant flora, fauna and biosecurity identification guide shall be developed and be provided and promoted to all Project personnel in general training and awareness sessions (e.g. pre-starts and toolboxes etc.).
	Personnel required to self-certify or certify vehicles, plant, equipment and machinery as being contaminant free (Biosecurity Declaration) shall have the appropriate competency and experience
	Cleandown facilities (type and size selection)

Timing	Mitigation and Management Measures
	A consolidated inventory of all vehicles, plant, equipment and machinery planned to be used in construction of the Project shall be developed and submitted to the Operators HSE representative (or equivalent).
	The vehicle, plant, equipment and machinery inventory shall identify the access point of origin (including if from a fire ant, yellow crazy ant, electric ant or Singapore ant regions).
	Cleandowns shall be completed for all vehicles, plant, equipment and machinery prior to: leaving their point of origin for access to the Project site leaving a Project work front, or moving between Project properties, work fronts or biosecurity risk areas
	All vehicles, plant equipment and machinery shall maintain a log book to record all movements through cleandown facilities.
	Land access, mobilisation, movements and demobilisation
	Personnel shall comply with any land access requirements (e.g. cleandown before entry, sign-on/off) documented within the land access policy. Where a conflict with land access requirements exist with this document, this shall be referred to the relevant Construction Contractor(s)HSE representative for clarification.
	A movement control plan shall be developed.
	Driving shall only occur on established access roads as far as practicable (bush tracks/off road shall be avoided where possible).
	Vehicle journey planning shall be undertaken, as far as practicable, in order to visit biosecurity free areas first, before travelling to areas affected by biosecurity matters.
	Boots and clothes shall be clean of mud, seed and plant material before entering vehicles.

Table 8-9 Risk mitigation summary for potential biosecurity impacts

Activity	Associated Potential Impacts	Unmitigated Risk	Mitigated Risk
Pre-construction and procurement			
Transport of vehicles and machinery (in soil or mud)	Spread of invasive plants	Low	Low
Construction			
Slashing/cutting during high seed production times	Uncontrolled spread of existing invasive plants	Low	Low
Vegetation clearing	Facilitate invasive plant growth	Low	Low
	Disturb invasive animals, causing spread	Moderate	Low
Importation of materials (soil, timber)	Introduce of yellow crazy ants	Moderate	Low
	Introduce of invasive plants	Moderate	Low
Transport of vehicles and machinery (in soil or mud)	Spread of invasive plants	Low	Low
Stormwater runoff from Project area facilities	Facilitate invasive plant, mosquito and cane toad growth	Moderate	Low
Accommodation camp	Attract invasive animals, increase population around accommodation camps	Moderate	Low
Storing of water	Facilitate invasive plant, mosquito and cane toad growth	Moderate	Low
Operation and maintenance			

Activity	Associated Potential Impacts	Unmitigated Risk	Mitigated Risk
Stormwater runoff from Project facilities	Facilitate invasive plant, mosquito and cane toad growth	Moderate	Low
Transport of vehicles and machinery (in soil or mud)	Spread/introduce of invasive plants in mud or soil on vehicle or person	Low	Low
Vegetation clearance maintenance	Facilities infestation of invasive plants	Low	Low



8.5 Conclusion

Overall the greatest risk associated with invasive plants and animals for the Project is the increased opportunity for invasive plant infestation and resultant negative impacts to biodiversity and loss of land productivity. Primarily via the extension of known invasive plant ranges or introduction of new invasive plant or animal species to some areas, notably yellow crazy ants There is also a high risk that increased clearing of vegetation and transport activities could facilitate invasive plant infestations. Invasive plants pose a threat to the biodiversity of the environment (terrestrial and aquatic) and can have costly impacts to native vegetation and agriculture. While growth of invasive animal species populations and potential injuries or disease transfer to personnel from contact with invasive animal species (Refer to Volume 2 Chapter 7 Flora and Fauna.

The construction phase has the greatest potential for impact. Activities associated with the construction phase that have greater potential for impact include the transport of materials and living in accommodation camps. Materials can carry invasive plants and small invasive animals potentially introducing them into new environments, however, all activities involving transport have the capacity to transfer invasive plants, including pre-construction site visit and operating activities. Accommodation camps can attract a range of invasive animals. Management strategies can be general and involve the use of cleandown procedures for all vehicles, plant equipment and materials. Accommodation camps would require specific strategies such as ensuring waste is kept in closed containers. All works phases should be conducted in accordance with Volume 3 Appendix U Concept Biosecurity Plan.

Invasive plant prevention primarily involves following cleandown procedures for vehicles, clothes and boots in conjunction with frequent monitoring. These strategies reduced the risk of primary invasive plant movement and increase the ability to react quickly to invasive plant introductions. Invasive plant treatment is a specialist field requiring trained operators and species specific treatment methods. Volume 3 Appendix U Concept Biosecurity Plan outlines further details on strategies and requirements for treatment applications.

Commitments identified in this chapter for the management of biosecurity risks associated with the Project include:

- Implement the Volume 3 Appendix U Concept Biosecurity Plan
- Conduct a formal biosecurity survey within six months prior to construction commencing
- The Construction Contractor(s) would undertake a detailed assessment of biosecurity risks associated with specific work activities and construction methods
- Prior to leaving their point of origin for access to the Project site, all vehicles, plant, equipment and machinery shall be cleaned down and be accompanied by a current and certified Biosecurity Declaration Form from the entity responsible for the cleandown
- Prior to leaving a Project work front, or moving between Project properties, work fronts or biosecurity risk areas, all vehicles, plant, equipment and machinery shall undergo clean down at designated cleandown facilities and a new Biosecurity Declaration Form completed
- Develop and implement a movement control plan.
- Species specific biosecurity treatment procedures shall be developed and implemented
- Rehabilitation monitoring to be undertaken in accordance with a rehabilitation plan

No cumulative biosecurity impacts are anticipated as a result of the Project.