



COPPERSTRING 2.0

CopperString 2.0

Field development plan

Volume 3 Appendix R

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1. Introduction

1.1 Purpose

The purpose of this Field Development Plan (FDP) is to set out the framework for systematically identifying, assessing and managing potential impacts to environmentally sensitive areas. This includes matters of national and state environmental significance (MNES and MSES) associated with the development of the CopperString 2.0 Project (the Project). The aim of the FDP is to provide guidance to the design and development teams, outline how regulatory requirements are considered and incorporated in to the design.

1.2 Aims of the plan

This FDP aims to ensure that vegetation clearing and disturbance of habitats required within the Project area is undertaken in a manner that is compliant with the impact assessment mitigation measures detailed in the EIS. In this regard, the FDP will:

- Limit vegetation clearing for certain habitat types (e.g. vegetation with MSES and MNES habitat value) to within the disturbance calculations / footprints outlined in Volume 1 Chapter 2 Project Description of the EIS.
- Minimise impacts to environmentally sensitive areas including MSES and MNES.
- Avoid additional significant impacts to MSES and MNES relating to associated temporary development (e.g. construction camps, laydown areas, access tracks) not specifically identified on drawings as part of the EIS.
- Provide clarification to the engineering team for the detailed design elements to meet the Project environmental commitments and mitigation measures.
- Provide clarification to the Construction Contractor during the logistics planning, mobilisation and construction phase to guide the site selection and manage vegetation clearing in accordance with the EIS.
- Ensure that activities are undertaken to achieve compliance with the Project environmental commitments and mitigation measures as stated in the EIS and any subsequent Project environmental approval conditions.

1.3 Structure of the plan

This plan is intended to provide guidance to the design and field preparation team regarding which areas along the corridor selection should be avoided, or have limited disturbance. To achieve this the plan is set out as follows:

Section 2 – Project details: Contains background information on the Project relevant to the development of this plan.

Section 3 – Environment and Planning Constraints: Details of the environmental site conditions which may place restraints on the design and development of the site and regulatory planning constraints which may result in requirements for development approvals or permits if triggered.

Section 4 – Disturbance assumptions: Details the assumptions made regarding vegetation clearing of the Project area including areas to be avoided, typical tree heights and densities, habitat features and associated mapped BVGs.

Section 5 – Requirements for clearing: Outlines the design requirements, mitigation measures and procedures required to implemented as part of this plan.

Section 6 – Reporting requirements: Outlines the reporting requirements and procedures for reporting on disturbance undertaken as part of the Project.

1.4 Defined terms

The following are a list of defined terms utilised throughout the FDP:

Corridor selection : The baseline investigation corridor being a nominal 1,000 km long corridor transmission line alignment including a 120 m wide easement for the 330 kV transmission line from Woodstock to Dajarra Road, and 60 m wide easement for the 220 kV transmission lines from Dajarra Road to Mount Isa, Dajarra Road to Chumvale Substation, Dajarra Road to Selwyn, and Selwyn to Phosphate Hill and Cannington.

Study area – The 5 km wide study corridor defined in the Initial Advice Statement and referred to in the EIS Terms of Reference (ToR) or as defined by individual technical studies.

Project area - The 120 m or 60 m wide easement and associated infrastructure and works (including laydown areas, substations, CEV huts, access tracks, brake and winch sites and construction camps) referred to in the EIS ToR (these include off-easement components).

Environmentally sensitive areas – areas of environmental significance or have sensitivities due to their ability to provide habitat for threatened flora and fauna species or the role they play in maintaining ecosystem health and functionality.

Disturbance footprints – estimated areas required to be disturbed for the development of infrastructure and activities associated with the Project.

Environmental constraint classes – a classification of environmental values and constraints into categories to guide the development of the Project in the field. Development in some classes should be avoided or minimised as much as practical, while others should consider mitigation and rehabilitation measures be incorporated into the design.

1.5 Development of the plan

The steps in the development of this plan are outlined in Figure 1-1..

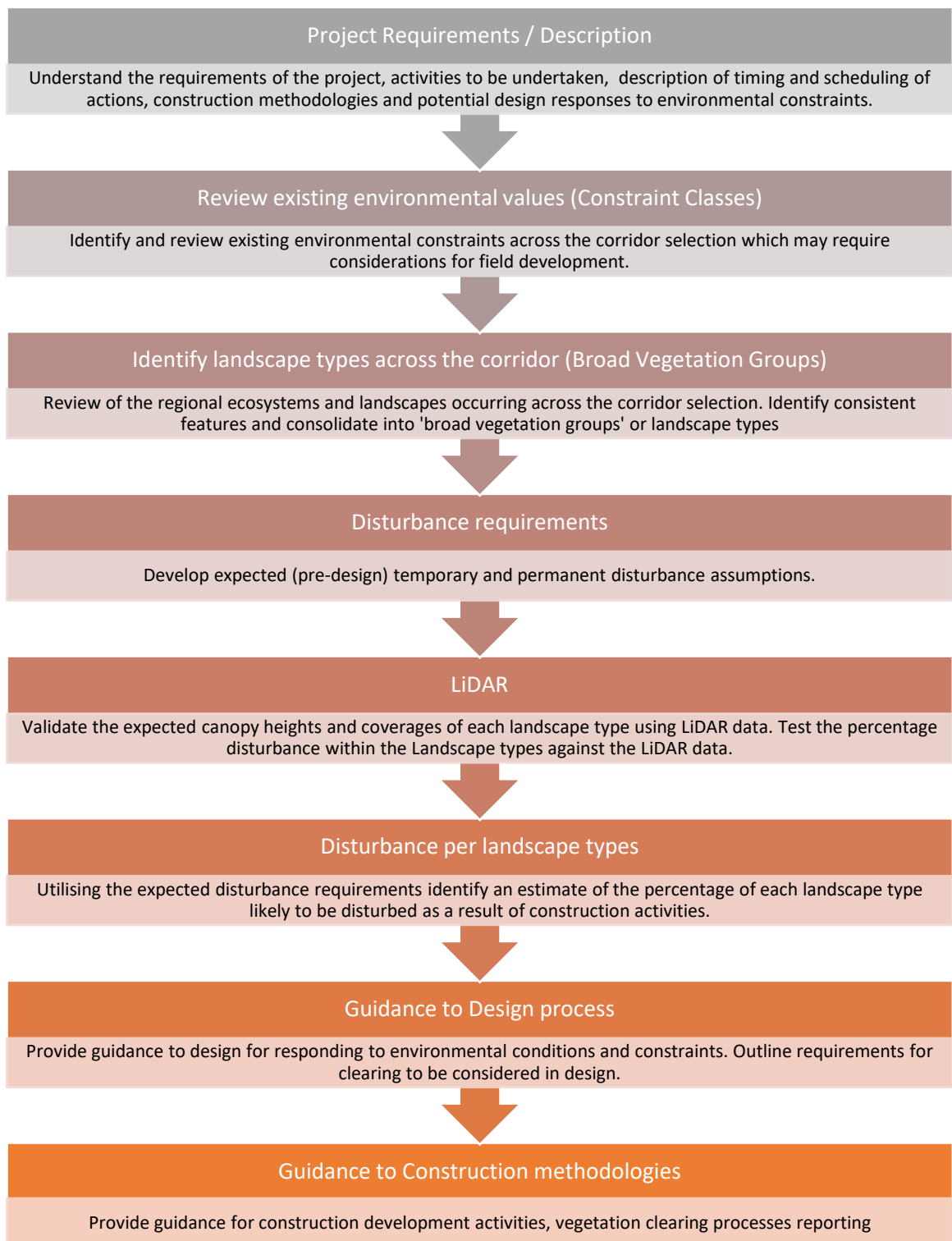


Figure 1-1 Development of the plan

1.6 Implementation of plan

The FDP will be a live document which will be implemented and evolve throughout the Project lifecycle phases, as shown in Figure 1-2. These phases are defined as follows:

Project feasibility and planning:

Quantification and assessment of likely impacts will be undertaken using the disturbance footprints associated with activities detailed in the Project description (Volume 1 Chapter 2 Project Description) against defined environmental constraint classes outlined in Section 3.2.

Design, pre-construction, procurement and logistics:

Refinement of impacts by providing guidance to the engineering team for the detailed design of towers (heights and locations), CEV huts, substations and other necessary infrastructure to meet the Project environmental commitments and mitigation measures as outlined in the FEMP.

Mobilisation, construction and demobilisation:

Provide clarification to the Designer and Construction Contractor to guide the design and site selection of access tracks (particularly near waterways and watercourses, temporary laydown areas, tower assembly areas, minor benching earthworks at tower locations and brake and winch sites to minimise impacts to environmentally sensitive areas.

Commissioning, operations and maintenance:

Conditions of approval have been satisfied and operation management is conducted in accordance.

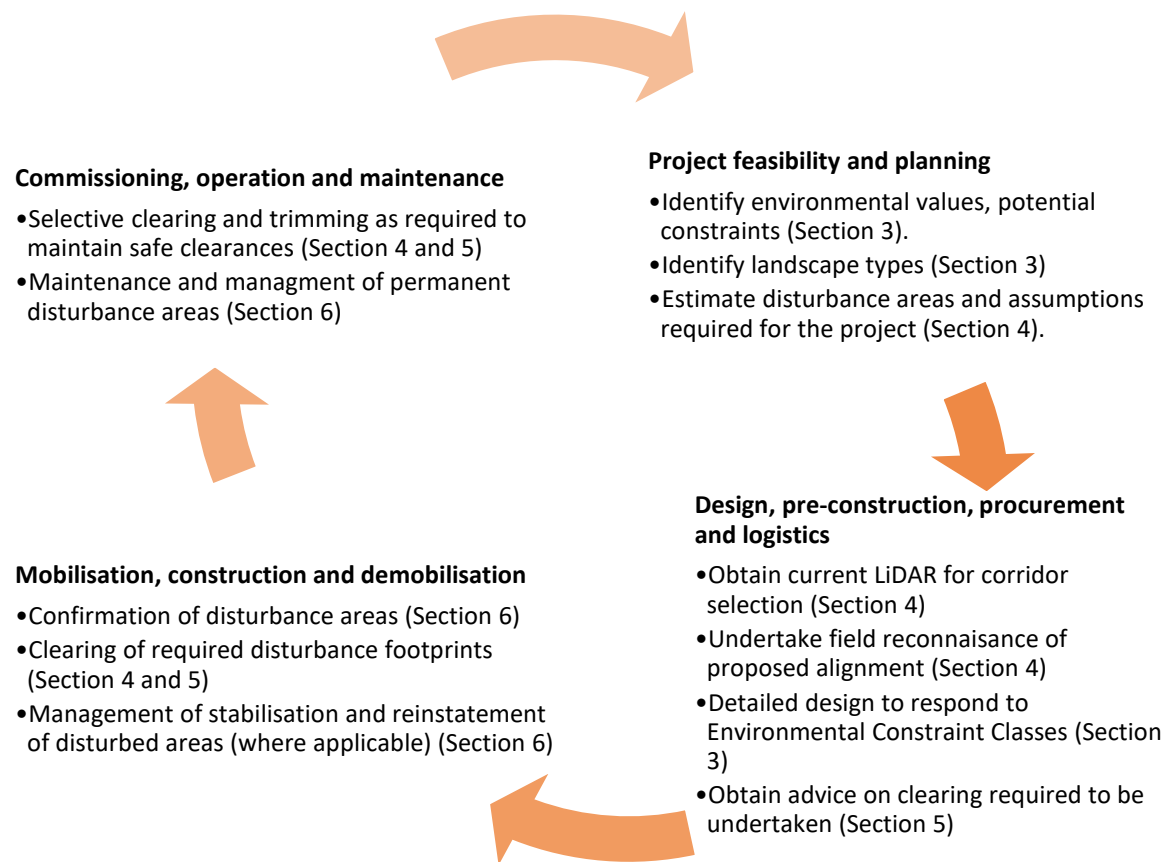


Figure 1-2 Implementation of the plan

1.7 Regulatory requirements

For the purposes of this document, vegetation clearing pertains only to native vegetation species protected under the Queensland *Nature Conservation Act 1992* (NC Act) and the EPBC Act (including endangered, vulnerable and near threatened native species); which is defined as removing, cutting down, ringbarking, pushing over, poisoning or destroying native vegetation in any way, including by burning, flooding or draining (as per the Queensland *Vegetation Management Act 1999*).

The following environmental approvals, permits and licenses are relevant to vegetation clearing works:

- (Commonwealth) EPBC Act approval conditions for a controlled action.

- (Queensland) *State Development and Public Works Organisation Act 1971* approval conditions for a coordinated project.
- Requirements under the *Environmental Offsets Act 2014* and Queensland offsets framework, in particular for state significant biodiversity values.
- A protected plant under the *Nature Conservation (Plants) Regulation 2020*.
- Clearing permits, such as Operational work for clearing native vegetation or clearing within the requirements of an Accepted development clearing code under the *Planning Act 2016* and *Vegetation Management Act 1999*.
- Environmental authorities issued under the Queensland *Environmental Protection Act 1994* (EP Act) for Environmentally Relevant Activities.
- Riverine protection permits or exemption requirements, under the Queensland *Water Act 2000*.
- A 'high risk' Species Management Program (SMP – high risk) for tampering with animal breeding places – for all protected wildlife including special least concern animals and colonial breeders, under the NC Act.
- A 'low risk' SMP (SMP – low risk) for tampering with animal breeding places – for least concern animals (excluding special least concern or colonial breeders), under the NC Act.
- General environmental duty to minimise environmental harm under the EP Act.
- Cultural heritage management requirements under the *Aboriginal Cultural Heritage Act 2003*.

2. Project details

2.1 Project description

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 at Woodstock, south of Townsville (Refer to Figure 2-1).

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 2-1:

- Woodstock substation
- Renewable energy hub
- CopperString core
- Mount Isa augmentation
- Southern connection
- Cannington connection
- Phosphate Hill connection
- Kennedy connection (option).

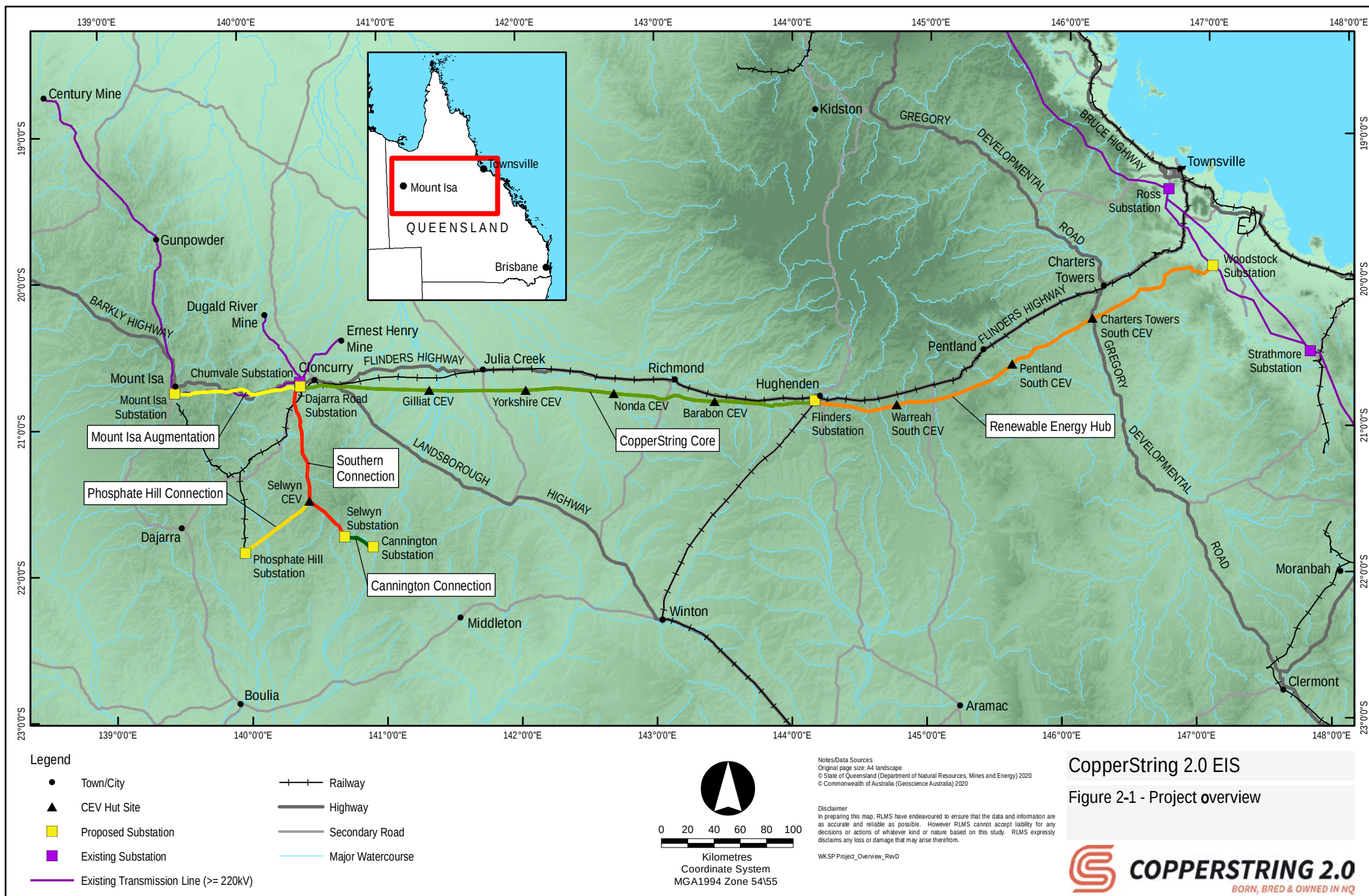
2.2 Scope of the plan

The FDP applies to the life of the Project, including planning and design, construction and operation. Decommissioning activities and impacts will be addressed prior to the commencement of that stage. The FDP will apply to all development or modifications to existing infrastructure associated with the Project.

Development activities shall include works associated with:

- Transmission line easement
- Tower construction footprint
- Access tracks
- CEV huts
- Brake and winch sites
- Substations
- Laydown areas.

Concept tower siting plans have been developed for the extent of the corridor selection and are included in Volume 3 Appendix H Tower siting plans of the EIS. Indicative layouts and footprints of associated infrastructure including CEV huts and substations is provided in Volume 3 Appendix I Indicative infrastructure layout and cross-section drawings.



3. Environment and planning constraints

3.1 Environmental constraints

Planning and environmental constraints have been identified from information obtained during the EIS surveys and investigations, including:

- Three pre-wet season Environmental surveys in September and December 2019 and October 2020.
- Habitat assessments as part of Environmental field surveys.
- Publically available mapping as detailed in Section 3.2.

The identified environment constraints in Section 3.1 and planning constraints in Section 3.2 highlight factors which will be considered and where relevant incorporated into the design of the Project. These were utilised in the definition of the four environmental constraint classes in Section 3.2. The environmental constraint classes were mapped for the purpose of guiding the development of the Project in the field by advising areas which should be avoided or where works should be restricted (refer Figure 3-3).

3.1.1 Noise and air

Constraints relating to noise and air impacts are applicable where Project activities will occur near sensitive receptors. Sensitive receptors for noise and air impacts include residences, schools, childcare facilities, and medical facilities. The A total of 55 sensitive receptors have been identified within two kilometres of the centreline of the corridor selection, of which the majority are located more than 750 m from the proposed transmission line. Proximity to sensitive receptors will require the implementation of noise and dust measures detailed in the framework environmental management plan (FEMP).

Noise limits will apply at sensitive receptor locations consistent with the identified environmental values, in the *Environmental Protection (Noise) Policy 2019* (EPP Noise), which sets out acoustic quality objectives as shown in

Table 3-1. Based on a typical dwelling façade noise reduction of 10 dB (A) through a partially open window, an external criterion of 40 dB (A) $L_{Aeq, adj, 1hr}$ is recommended for health and well-being in relation to the ability to sleep. This acoustic quality objective is measured at the receptor.

Table 3-1 Acoustic quality objectives for dwellings

Sensitive receptor	Time of day	Acoustic quality objectives (measured at receptor) dB(A)			Environmental value
		$L_{Aeq, adj, 1hr}$	$L_{A10, adj, 1hr}$	$L_{A1, adj, 1hr}$	
Dwelling (for outdoors)	Daytime and evening	50	55	65	Health and wellbeing
Dwelling (for indoors)	Daytime and evening	35	40	45	Health and wellbeing
	Night-time	30	35	40	Health and wellbeing, in relation to the ability to sleep

3.1.2 Watercourses

The majority of watercourses flow intermittently or are ephemeral. Construction timeframes will be finalised in consultation with the Construction Contractor during the tender phase, however, as construction is intended to occur primarily during the dry season, it is anticipated that watercourses will be dry during the construction period. Watercourses are environments subject to erosion and sedimentation, flooding risks and sensitive to changes in water quality. Mitigation measures outlined in the FEMP and in Section 5 should be implemented during development and operation of the Project.

Riparian areas are located along the banks of watercourses and can be up to 50 m wide. They form a vegetated corridor and mark the transition to from terrestrial to aquatic environments. These riparian perform an important function in providing bank stability to the watercourse, protecting waterquality, habitat connectivity and directing flood flows.

The following actions will be reflected in the detailed design of the Project:

- New on-easement and off-easement access tracks are selected to avoid establishing multiple crossings of the same watercourse where possible.
- Where watercourse bedlevel crossings are required, existing crossings will be preferentially utilised and with agreement of the landholder.
- Transmission towers will not be constructed within the high banks of watercourses, other than where it cannot be avoided (such as large braided ephemeral systems wider than 500 m e.g. Gilliat River). Clearing of vegetation to establish vehicle access across a watercourse shall not occur within 10 m of the defining high bank of a watercourse, other than where it cannot be avoided.
- Laydown areas shall not be located within 40 m of the high bank of watercourses.
- Erosion and sediment control measures shall be included in the Construction Environmental Management Plan.
- Access tracks shall:
 - Be a maximum of 7 m wide;
 - Constructed in a manner which will not undermine the existing natural bank stability and positioned so as to minimise potential interruption of low flow conditions and scour or erosion.
 - Be at right angles to the water flow.

3.1.3 Wetlands

'Wetland' is a broad term used for different kinds of wet ecosystems or ecosystems that are subject to permanent or intermittent inundation, with water that can be either static or flowing, brackish or salt. Wetlands¹ generally include one or more of the following:

- Supports plants or animals adapted to and dependent on living in wet conditions
- Substrate is undrained soils that are saturated long enough to develop anaerobic conditions
- The substrate is not soil and is saturate or covered with water at some time.

Three sections of the corridor selection contain Matters of State Environmental Significance (MSES) values that relate to wetlands, these being, the Renewable Energy Hub, CopperString

¹ Department of Environment and Science (2020). *Wetland definition, WetlandInfo*. Retrieved 9 September 2020 from <https://wetlandinfo.des.qld.gov.au/wetlands/what-are-wetlands/definitions-classification/wetland-definition.html>

Core and the Mount Isa Augmentation, including areas containing regulated vegetation within 100 m of a wetland and high ecological significance wetlands. The corridor selection intersects a trigger area for a MSES Wetland Protection Area (wetland of high ecological significance) within the Renewable Energy Hub at KP 177WD for a distance of approximately 700 m.

Disturbance of these wetland areas should be avoided.

3.1.4 Regulated vegetation

The Queensland *Vegetation Management Act 1999* (VM Act) regulates vegetation across Queensland. Vegetation has been mapped into five categories as defined under the VM Act. These categories are defined in Table 3-2 as described under the VM Act. The management of each vegetation category is regulated differently under the VM Act.

Table 3-2 Vegetation category areas

Vegetation category area	Definition under the <i>Vegetation Management Act 1999</i>
Category A area	An area, other than a category B area, category C area, category R area or category X area, shown on the regulated vegetation management map as a category A area that— (a) is any of the following— (i) a declared area; (ii) an offset area; (iii) an exchange area; or (b) has been unlawfully cleared; or (c) is, or has been, subject to— (i) a restoration notice; or (ii) an enforcement notice under the Planning Act containing conditions about restoration of vegetation; or (d) has been cleared of native vegetation and in relation to the clearing a person has been found guilty by a court, whether or not a conviction has been recorded, of a clearing offence; or (e) the chief executive decides under section 20BA is a category A area; or (f) is a category A area by agreement under section 20C(3) if, immediately before the agreement is entered into, the area was a category X area on a PMAV containing remnant vegetation or high value regrowth.
Category B area	An area, other than a category A area, category C area, category R area or category X area, shown on the regulated vegetation management map as a category B area that— (a) contains remnant vegetation; or (b) the chief executive decides to show on the regulated vegetation management map as a category B area
Category C area	An area, other than a category A area, category B area, category R area or category X area, shown on the regulated vegetation management map as a category C area that— (a) contains high value regrowth vegetation; or (b) the chief executive decides to show on the regulated vegetation management map as a category C area.
Category R area	An area, other than a category A area, category B area, category C area or category X area, shown on the regulated

Vegetation category area	Definition under the <i>Vegetation Management Act 1999</i>
	vegetation management map as a category R area that is a regrowth watercourse and drainage feature area.
Category X area	An area, other than a category A area, category B area, category C area or category R area (in which the clearing of vegetation has happened), shown on the regulated vegetation management map as a category X area.

3.1.5 Conservation significant communities

Figure 3-1 shows the regional ecosystems (REs) and essential habitat areas intersected by the corridor selection.

One Threatened Ecological Community likely under the EPBC Act was confirmed present in the study area, however it is not within the Project area and will not be impacted.

3.1.6 Conservation significant species

Vegetation within the Project area supports habitat values for conservation significant species, including MNES and MSES. Conservation significant species include those listed under the EPBC Act or the NC Act that have been confirmed present or are likely to occur within the Project area are listed in Table 3-3.

Table 3-3 Conservation significant species

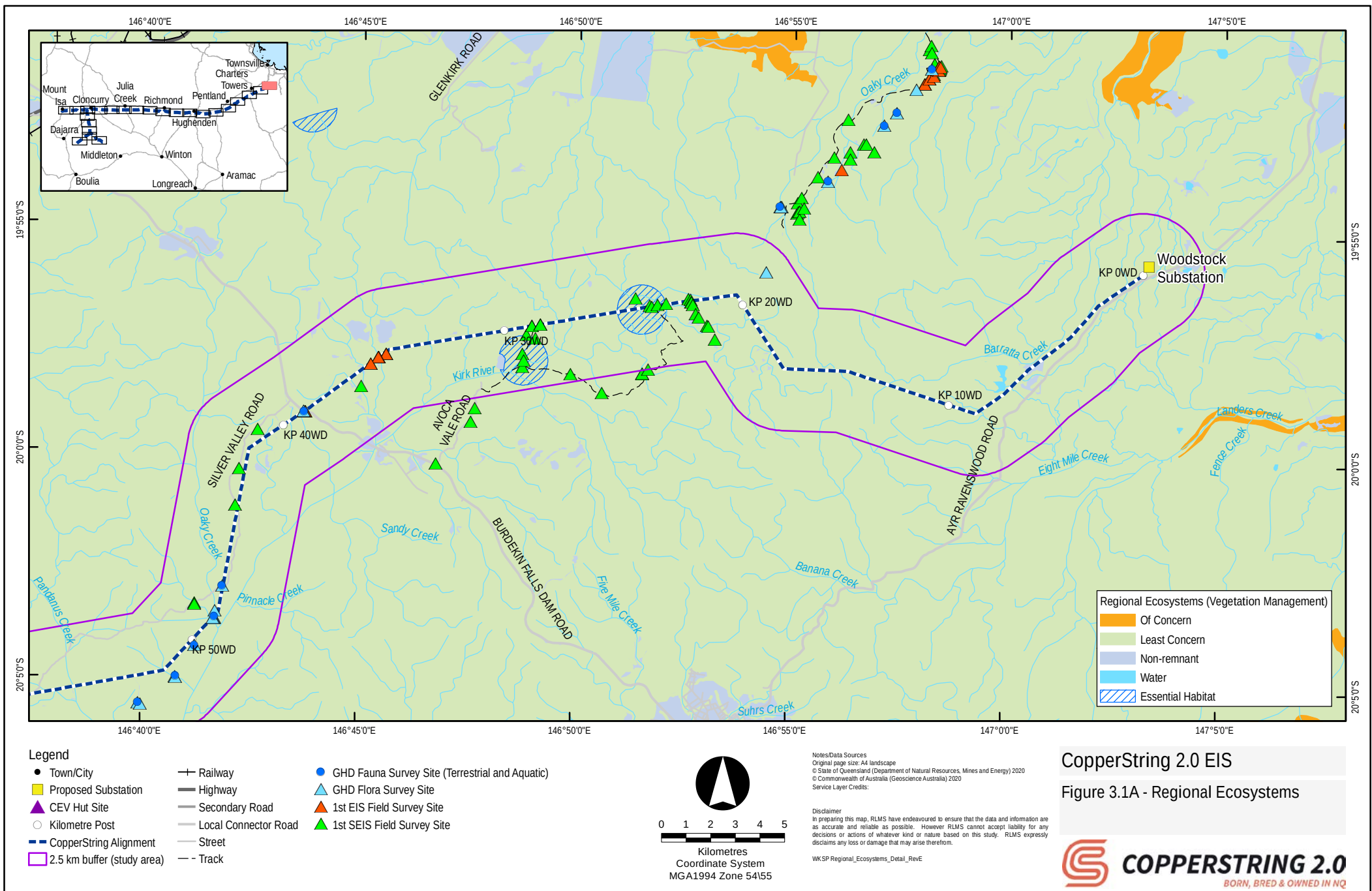
Conservation significant species	EPBC Act listed	NC Act listed
Species confirmed present		
<i>Acacia armitii</i>	NL	NT
Black ironbox (<i>Eucalyptus raveretiana</i>)	V	LC
<i>Eucalyptus nudicaulis</i>	NL	E
Waxy cabbage palm (<i>Livistona lanuginosa</i>)	V	V
Julia Creek dunnart (<i>Sminthopsis douglasii</i>)	V	E
Koala (<i>Phascolarctos cinereus</i>)	V	V
Purple-necked rock wallaby (<i>Petrogale purpureicollis</i>)	NL	V
Short-beaked echidna (<i>Tachyglossus aculeatus</i>)	NL	SLC
Black-throated finch (southern) (<i>Poephila cincta cincta</i>)	E	E
Squatter pigeon (southern) (<i>Geophaps scripta scripta</i>)	V	V
Vine-thicket fine-lined slider (<i>Lerista cinerea</i>)	NL	V
Species likely to occur		
Pink gidgee (<i>Acacia crombiei</i>)	V	V

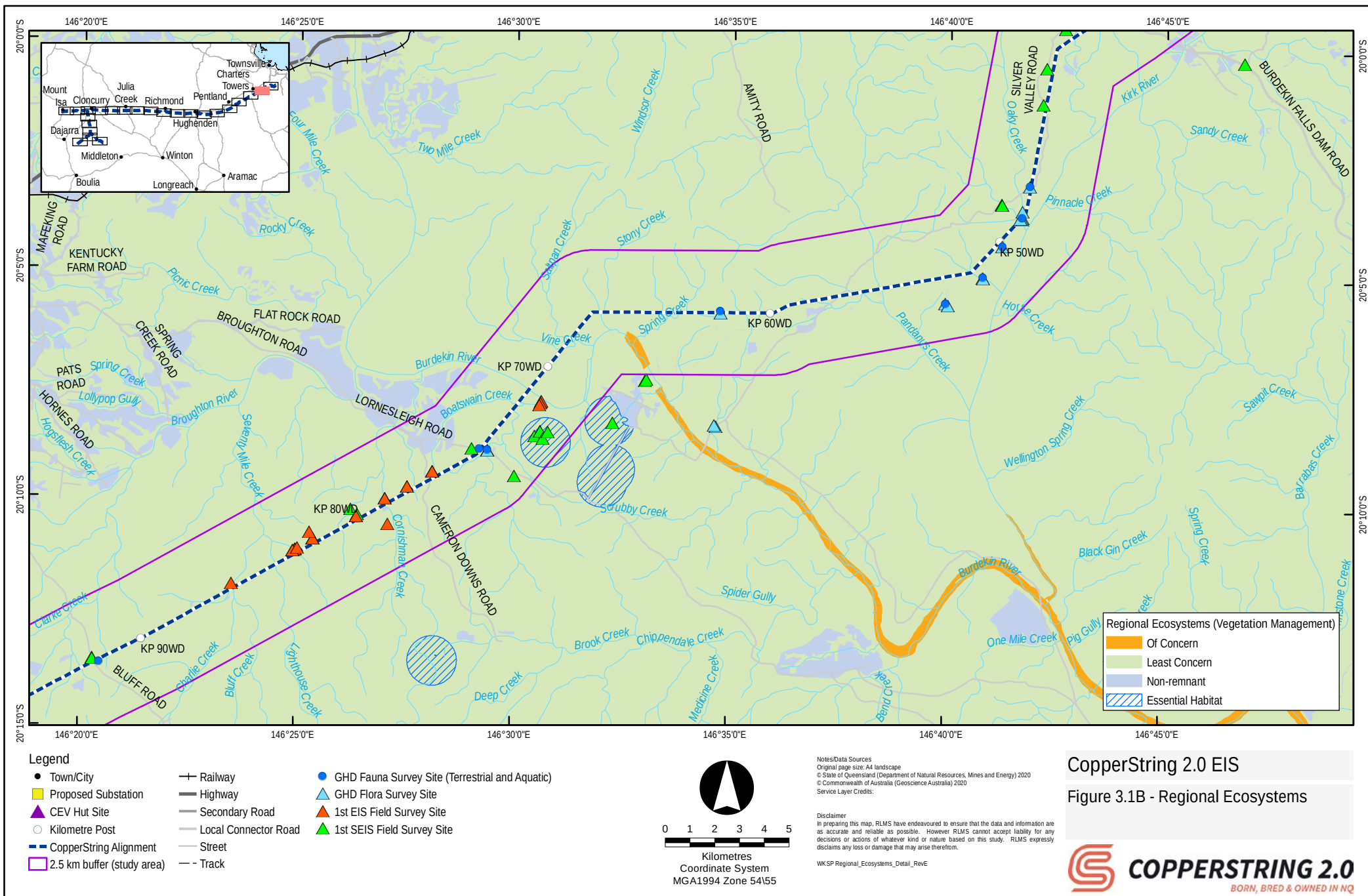
Northern leaf-nosed bat (<i>Hipposideros stenotis</i>)	NL	V
Pebble mound mouse (<i>Pseudomys johnsoni</i>)	NL	LC
Australian painted snipe (<i>Rostratula australis</i>)	E	V
Grey falcon (<i>Falco hypoleucos</i>)	V	V
Night parrot (<i>Pezoporus occidentalis</i>)	E	E
Painted honeyeater (<i>Grantiella picta</i>)	V	V
Red goshawk (<i>Erythrotriorchis radiatus</i>)	V	E
White-throated needletail (<i>Hirundapus caudacutus</i>)	V	SLC
Common death adder (<i>Acanthophis antarcticus</i>)	NL	V
Ornamental snake (<i>Denisonia maculata</i>)	V	V
Plains death adder (<i>Acanthophis hawkei</i>)	V	V
Note: E – Endangered; V – Vulnerable; NT – Near Threatened; NL – Not listed; LC – Least Concern; SLC – Special Least Concern		

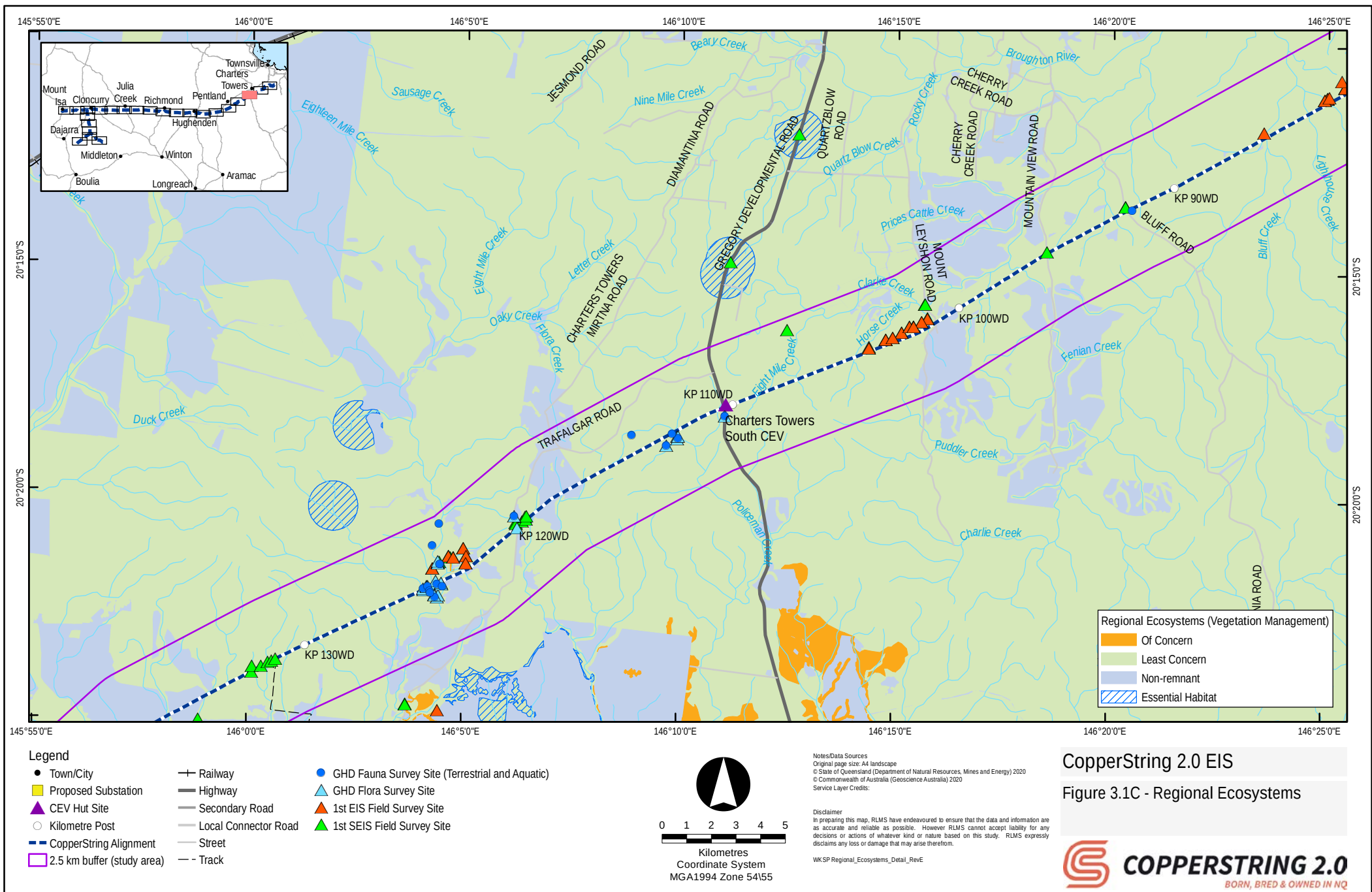
In total, 11 conservation significant species are confirmed present and 12 conservation significant species are likely to occur within the study area.

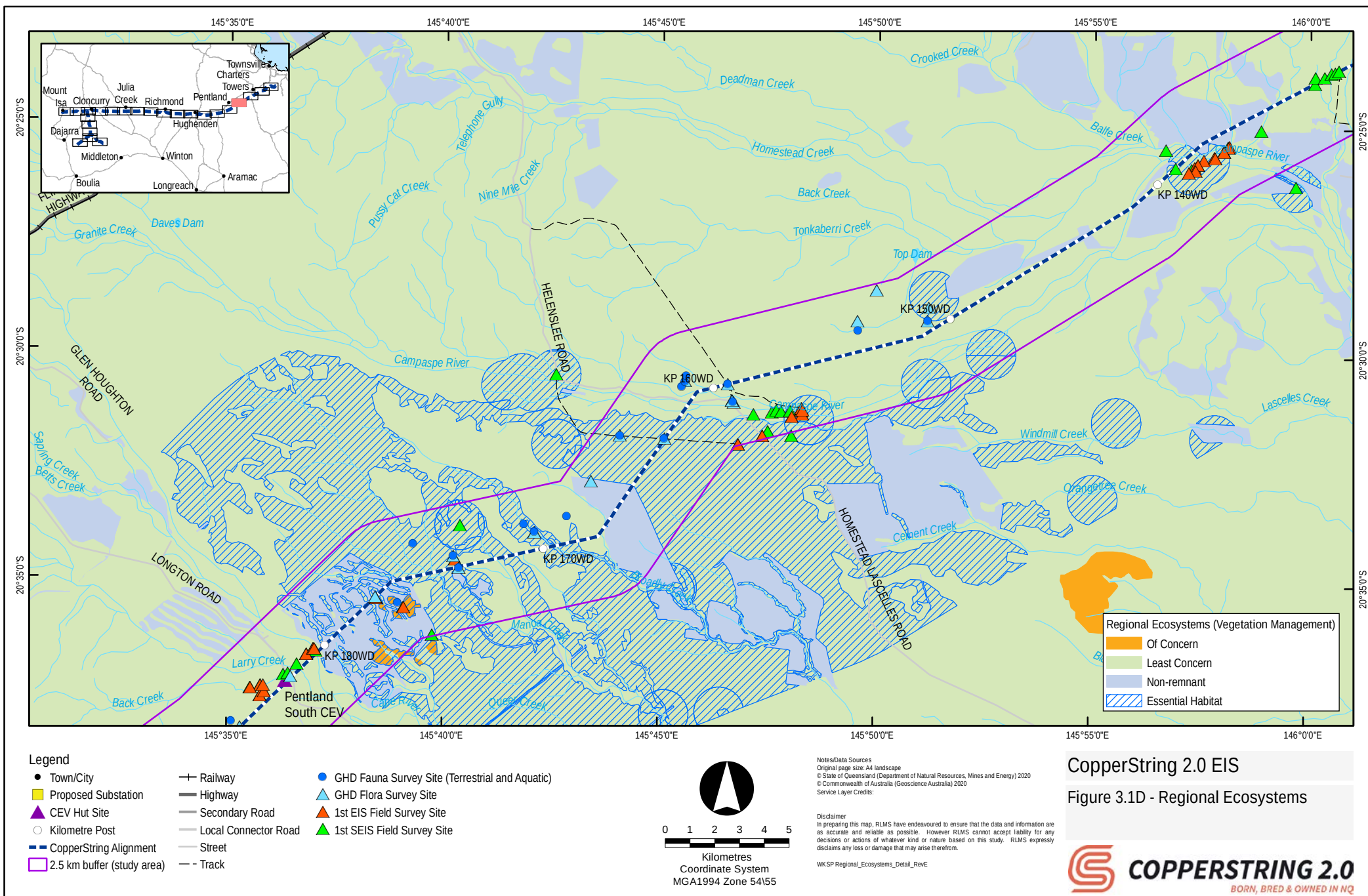
The constraints associated with these species are restrictions on the level disturbance of the species and their habitats:

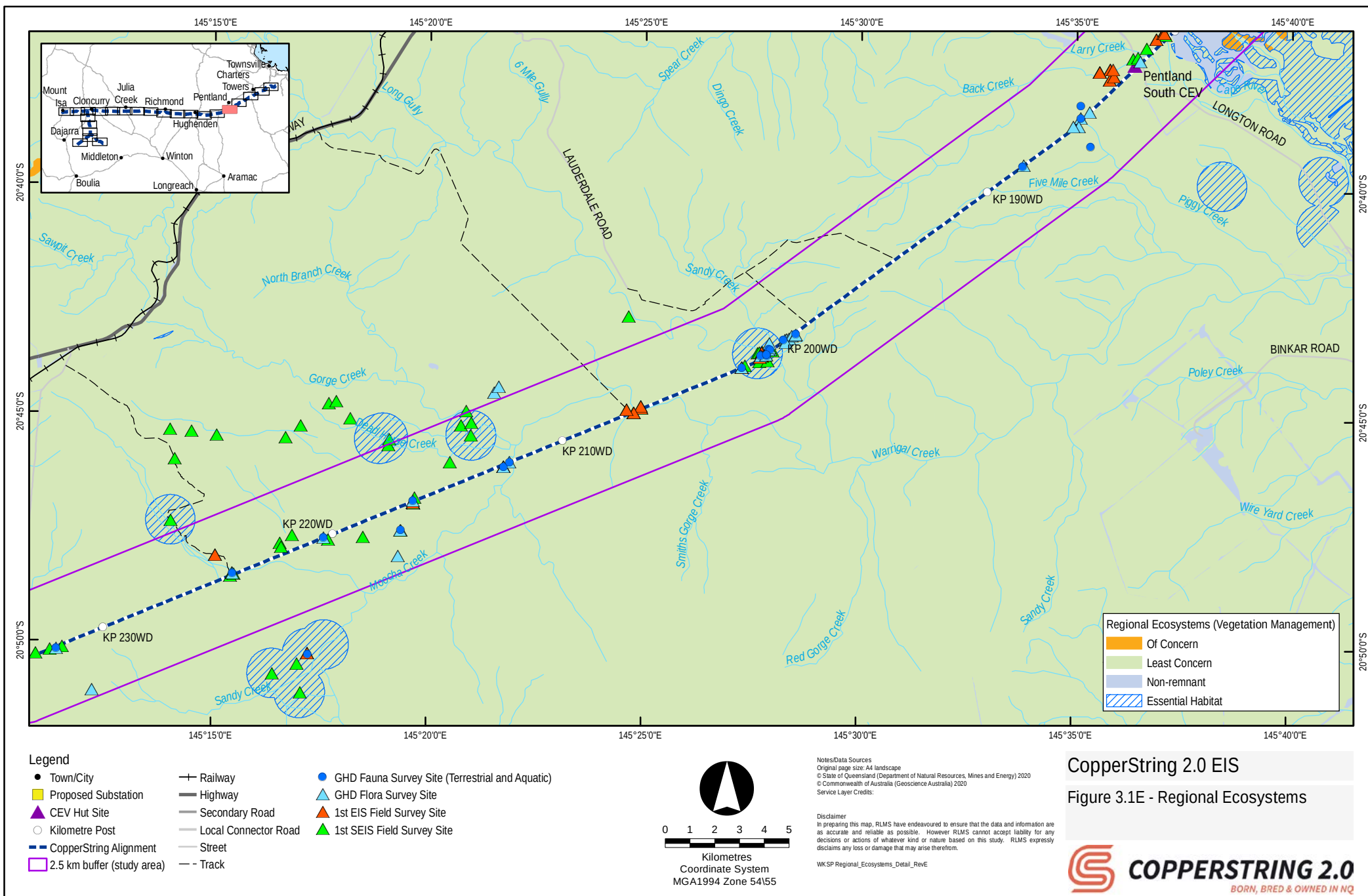
Mitigation measures to manage impact of conservation significant species are discussed in Section 5.

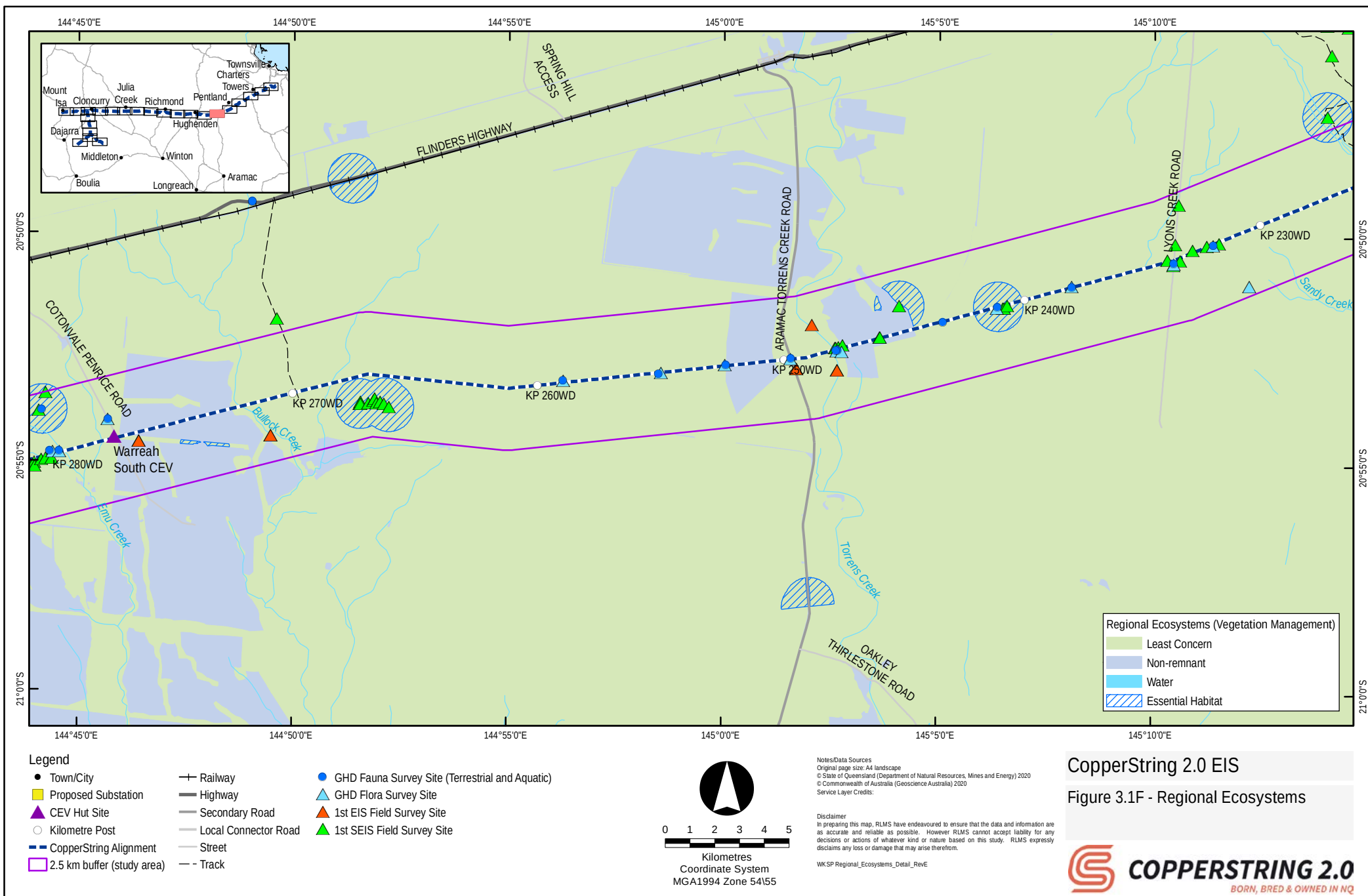


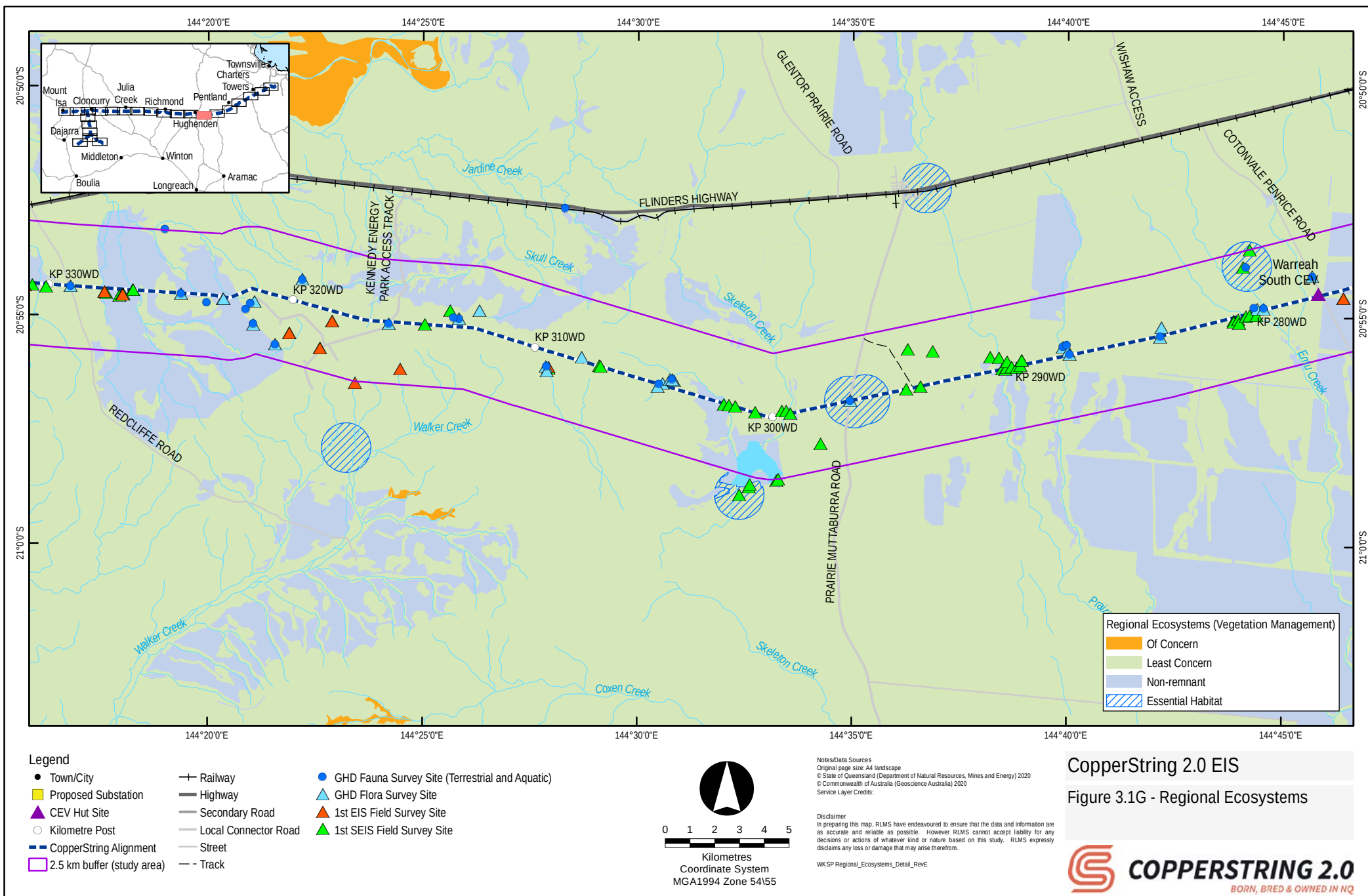


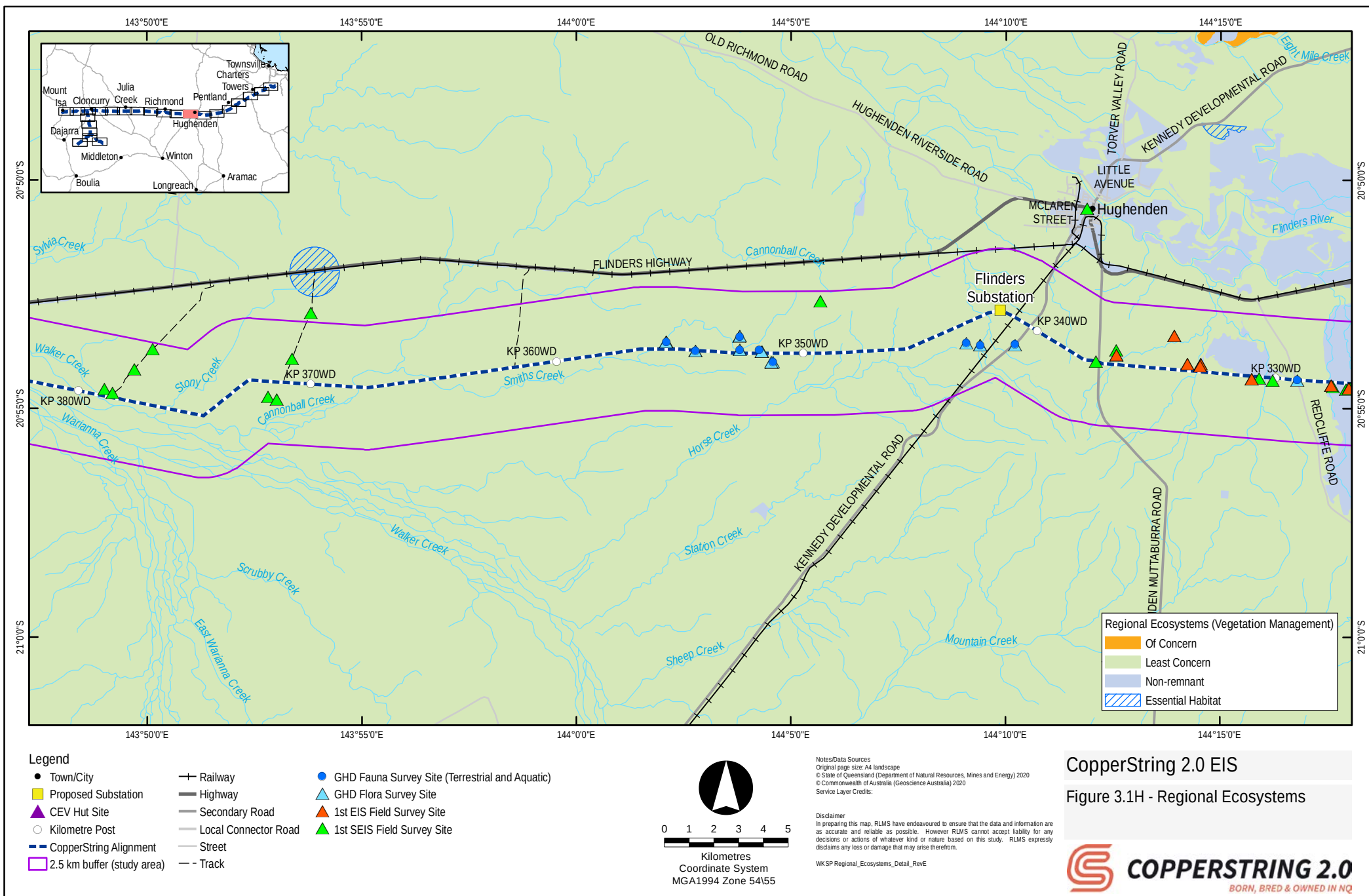


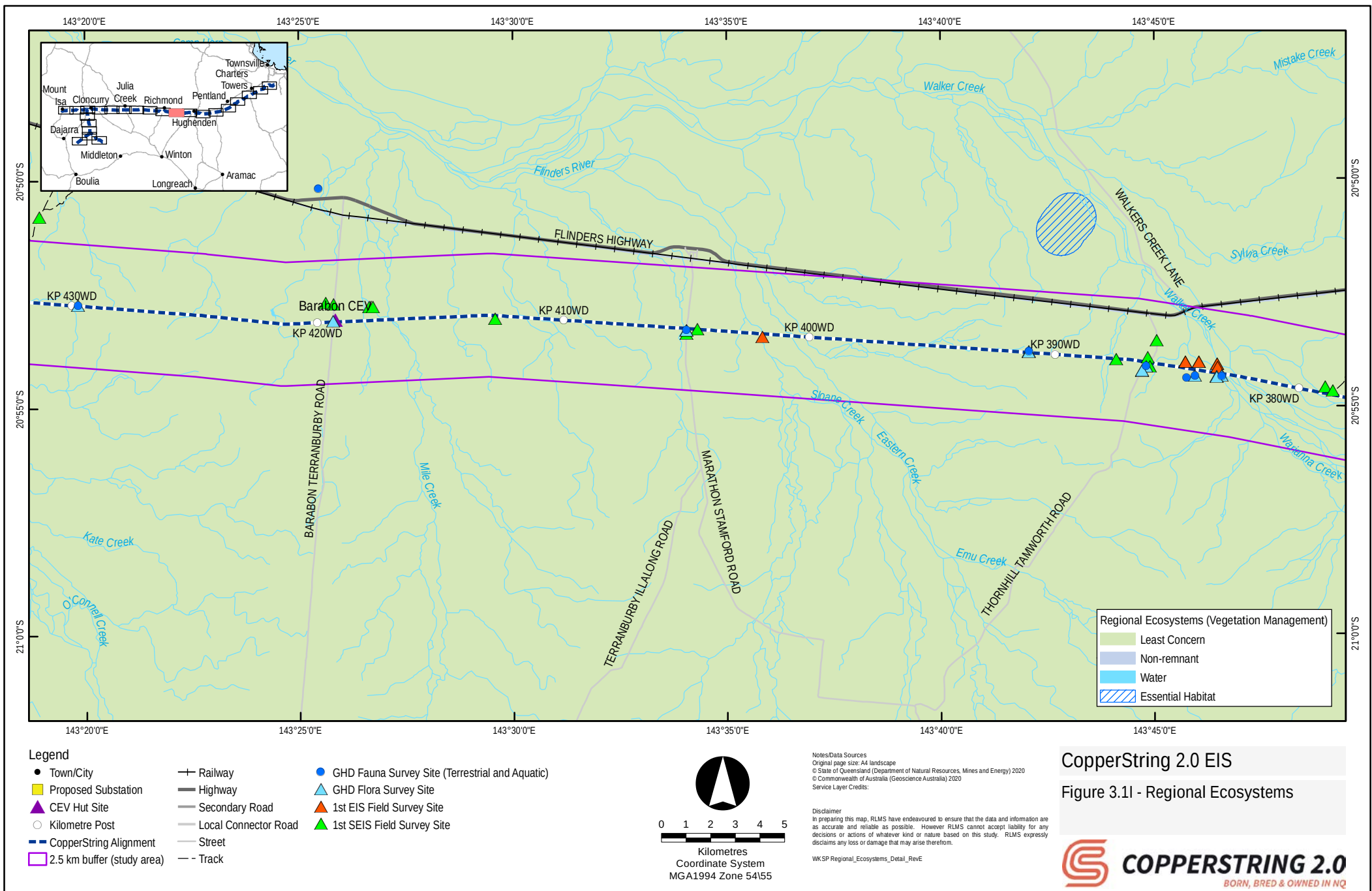


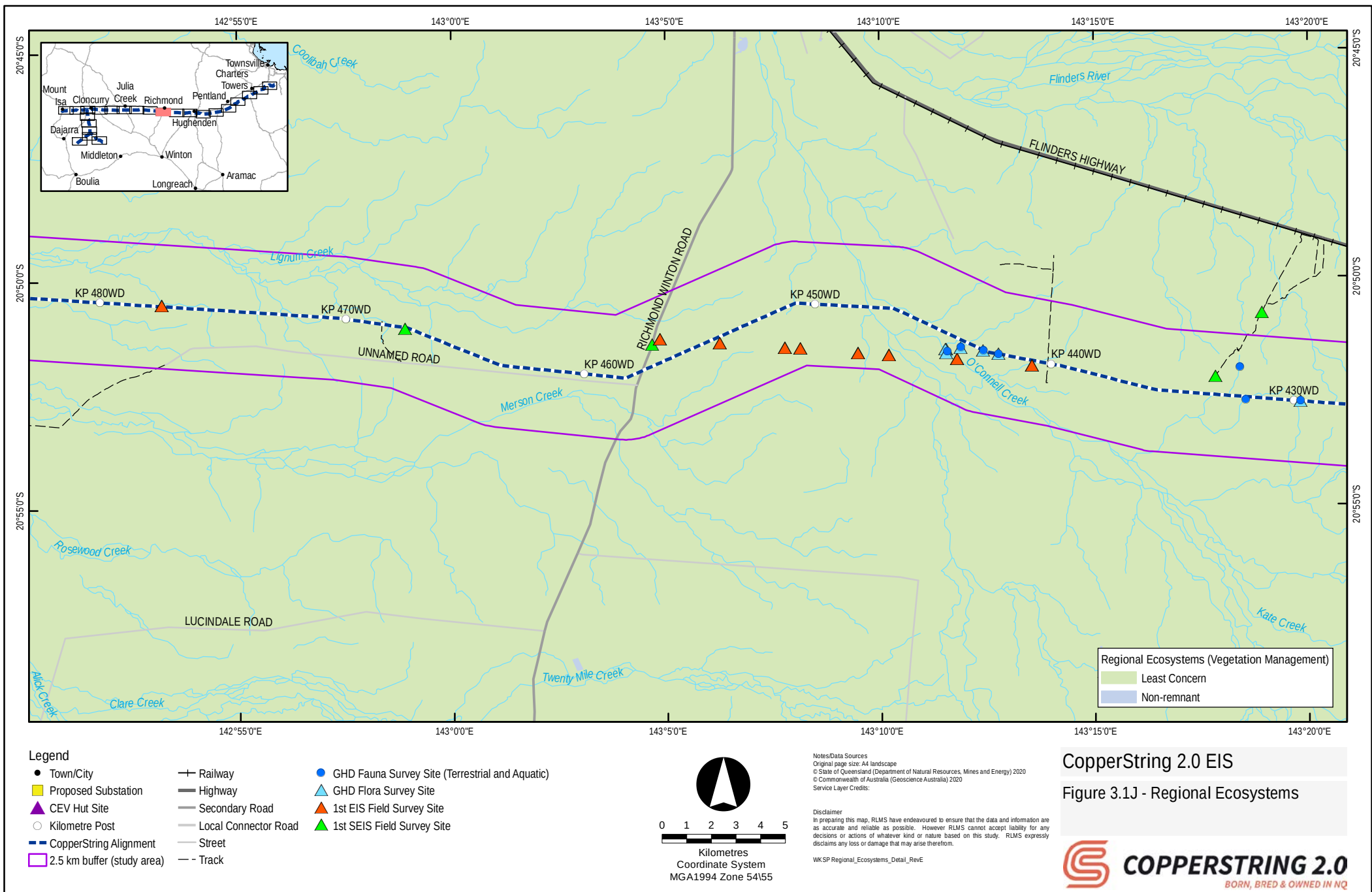


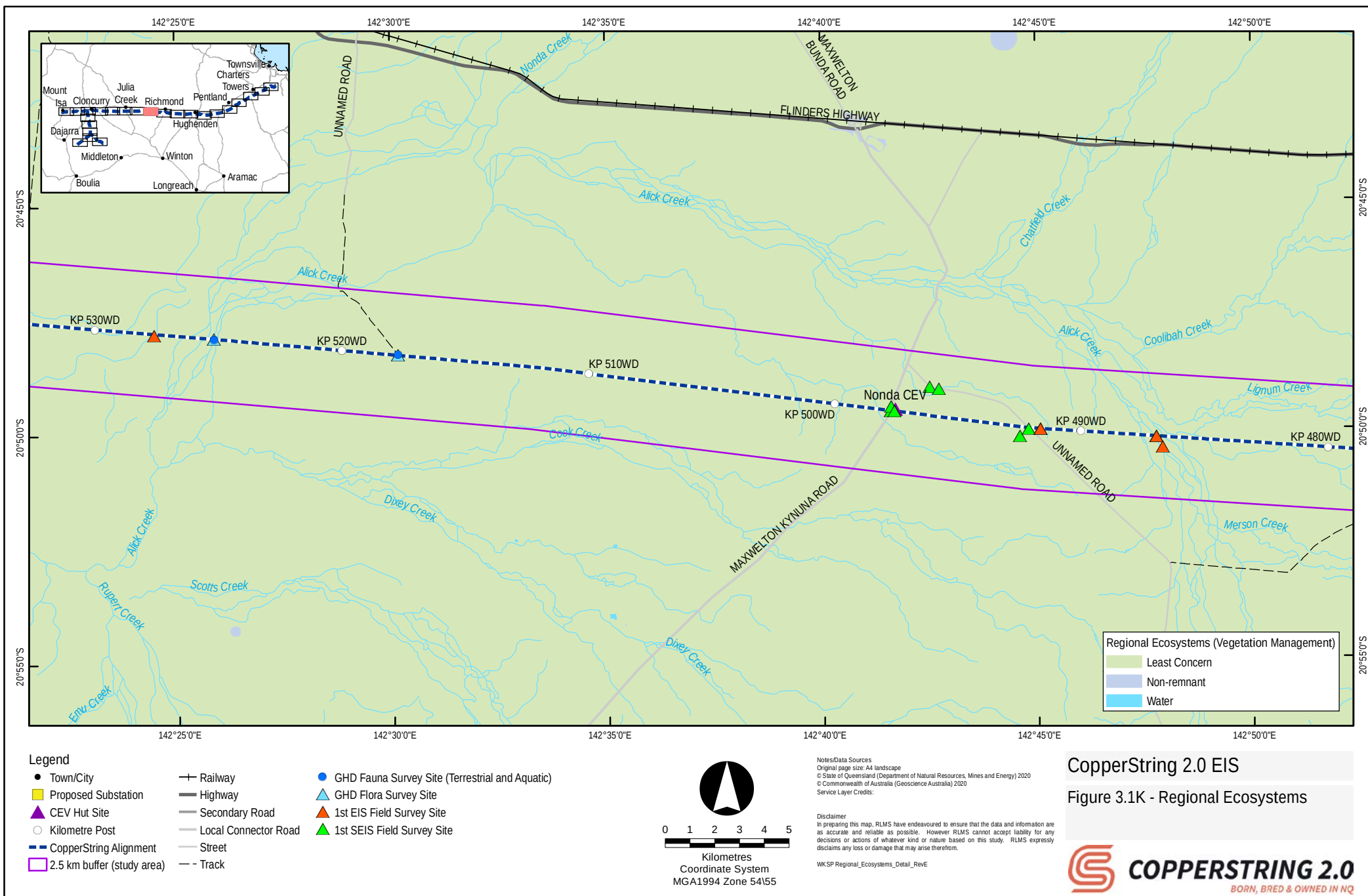


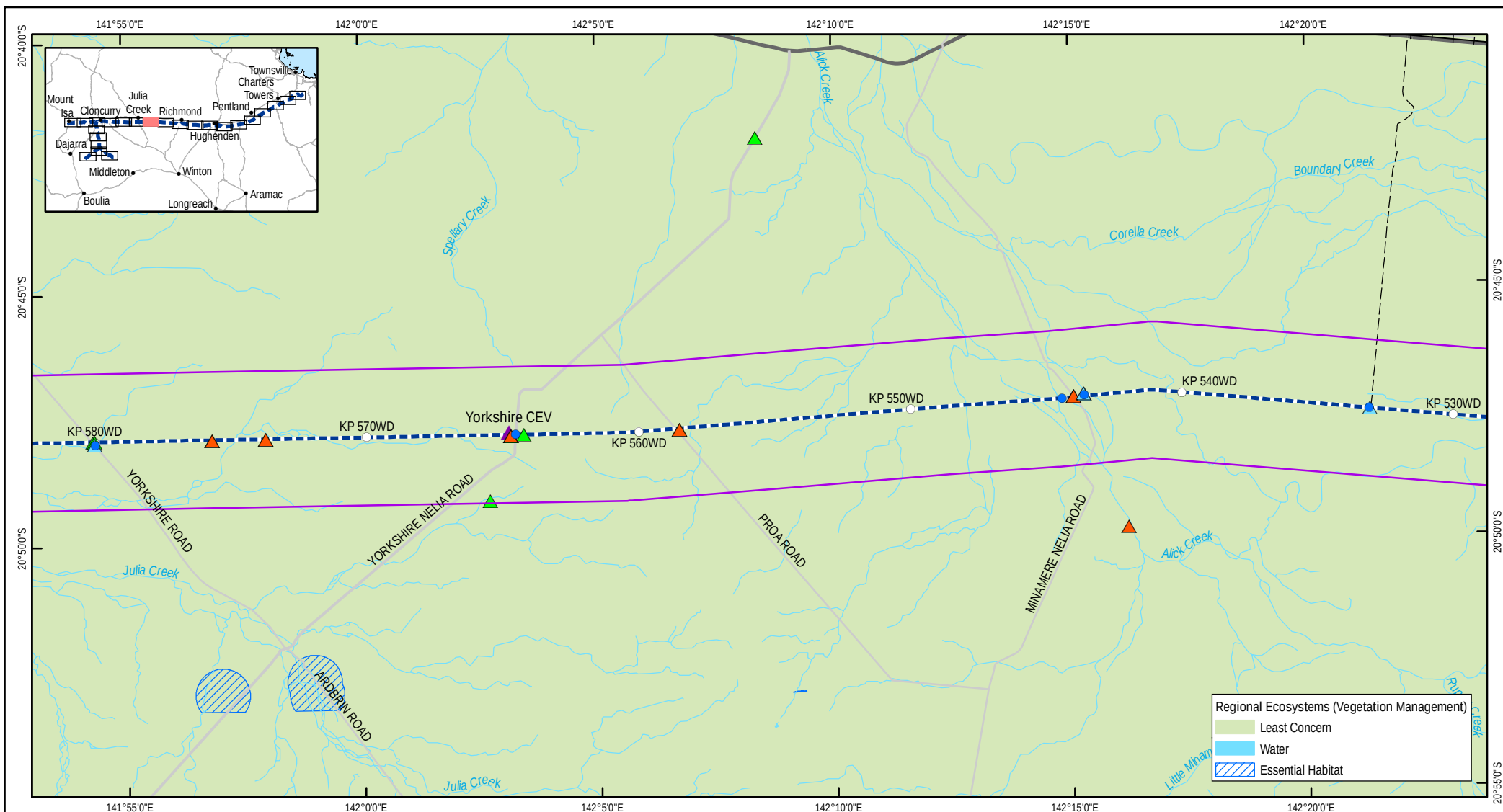






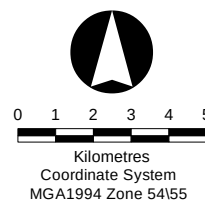






Legend

- Town/City
- Proposed Substation
- CEV Hut Site
- Kilometre Post
- CopperString Alignment
- 2.5 km buffer (study area)
- Railway
- Highway
- Secondary Road
- Local Connector Road
- Street
- Track
- GHD Fauna Survey Site (Terrestrial and Aquatic)
- GHD Flora Survey Site
- 1st EIS Field Survey Site
- 1st SEIS Field Survey Site



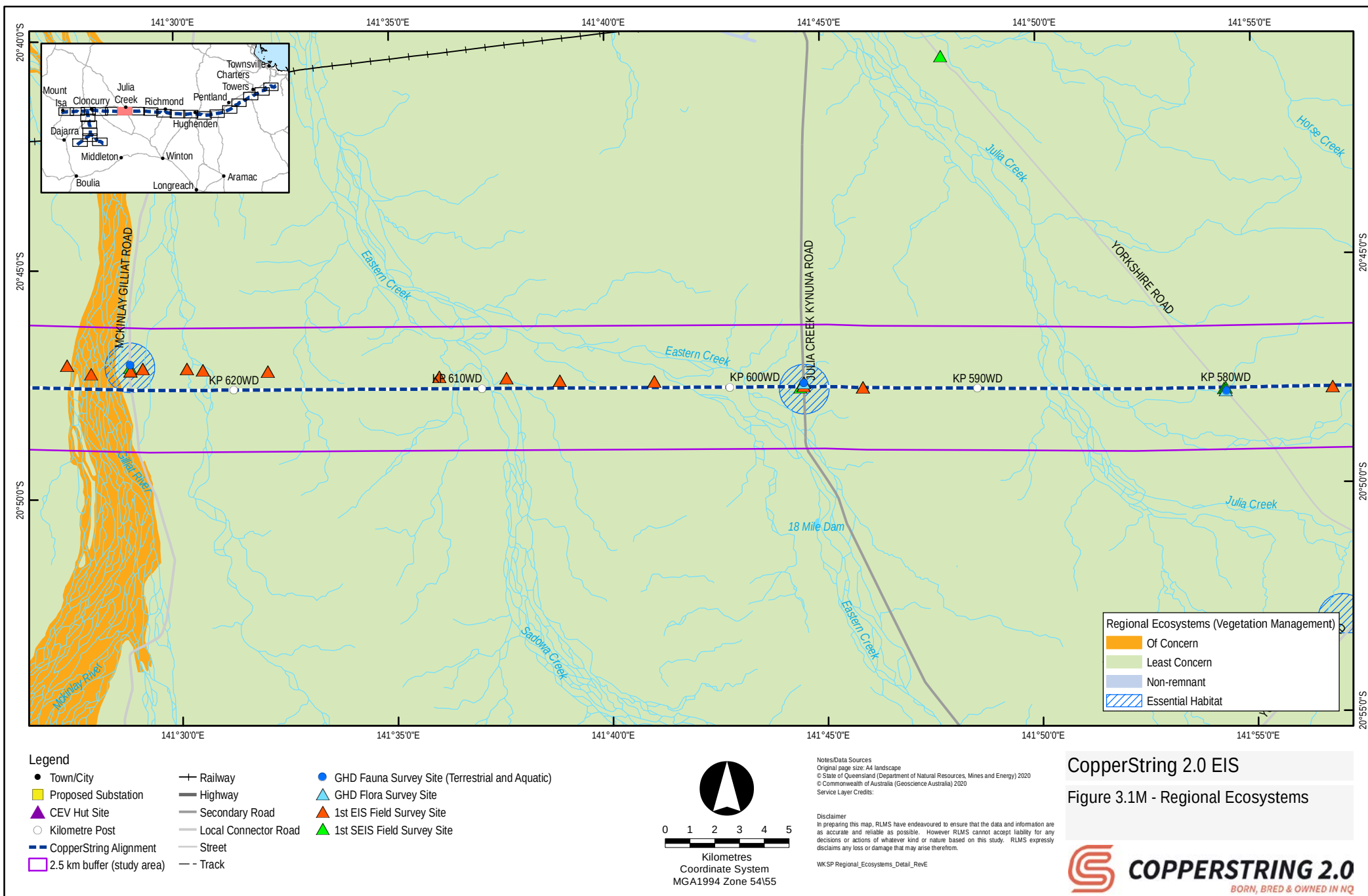
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Original page size: A4 landscape
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Service Layer Credits:

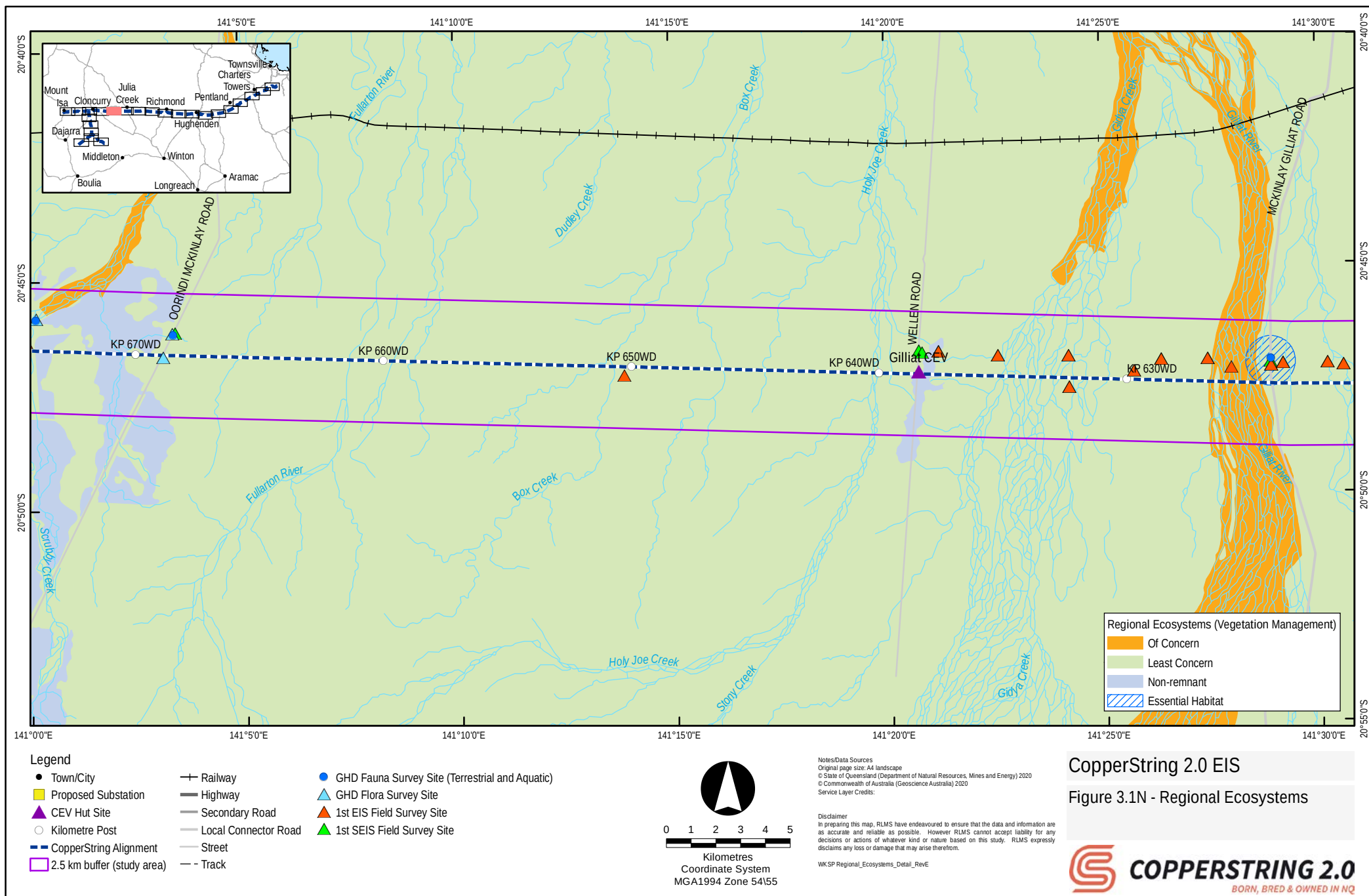
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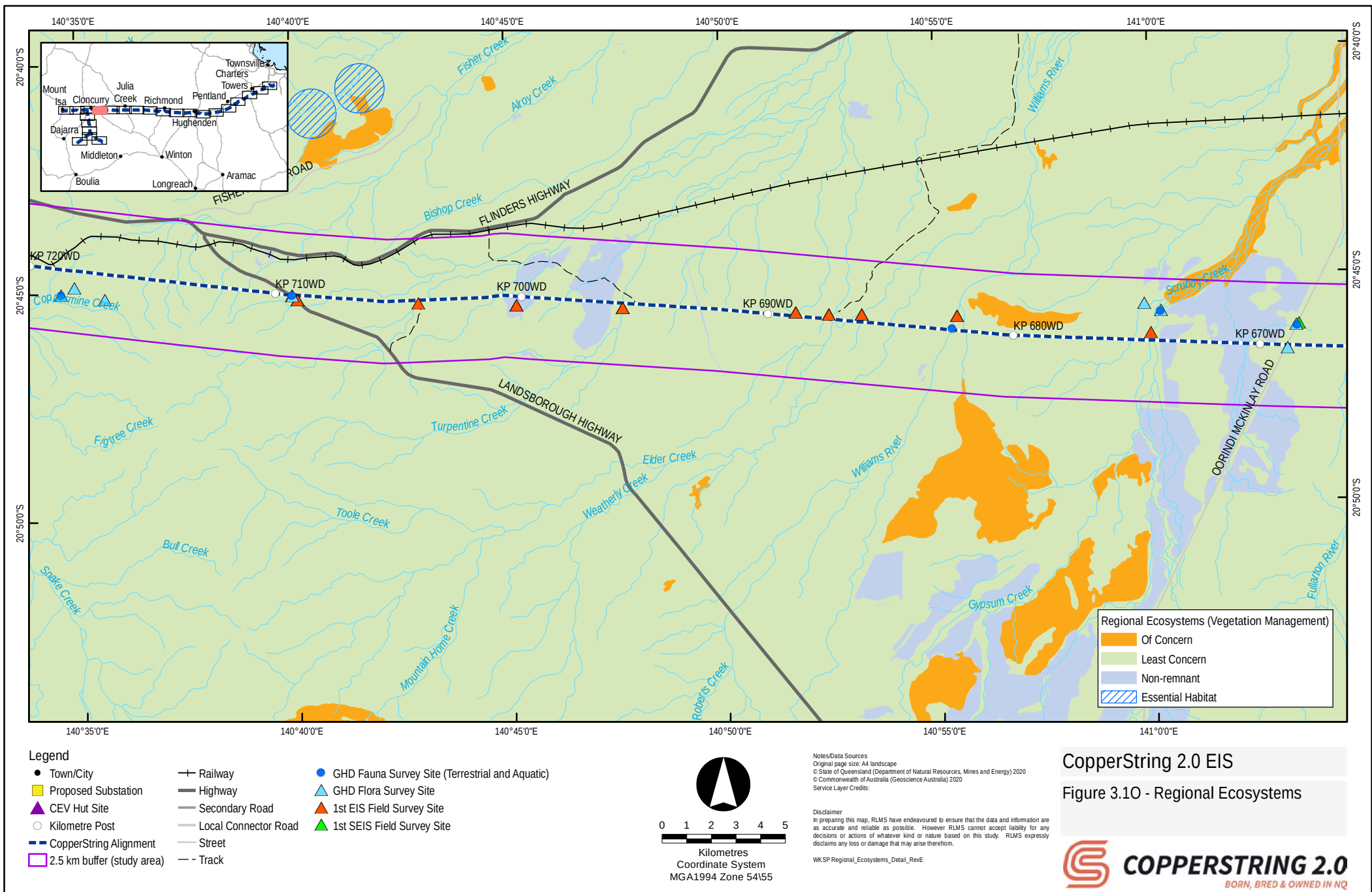
WKSP Regional_Ecosystems_Detail_RevE

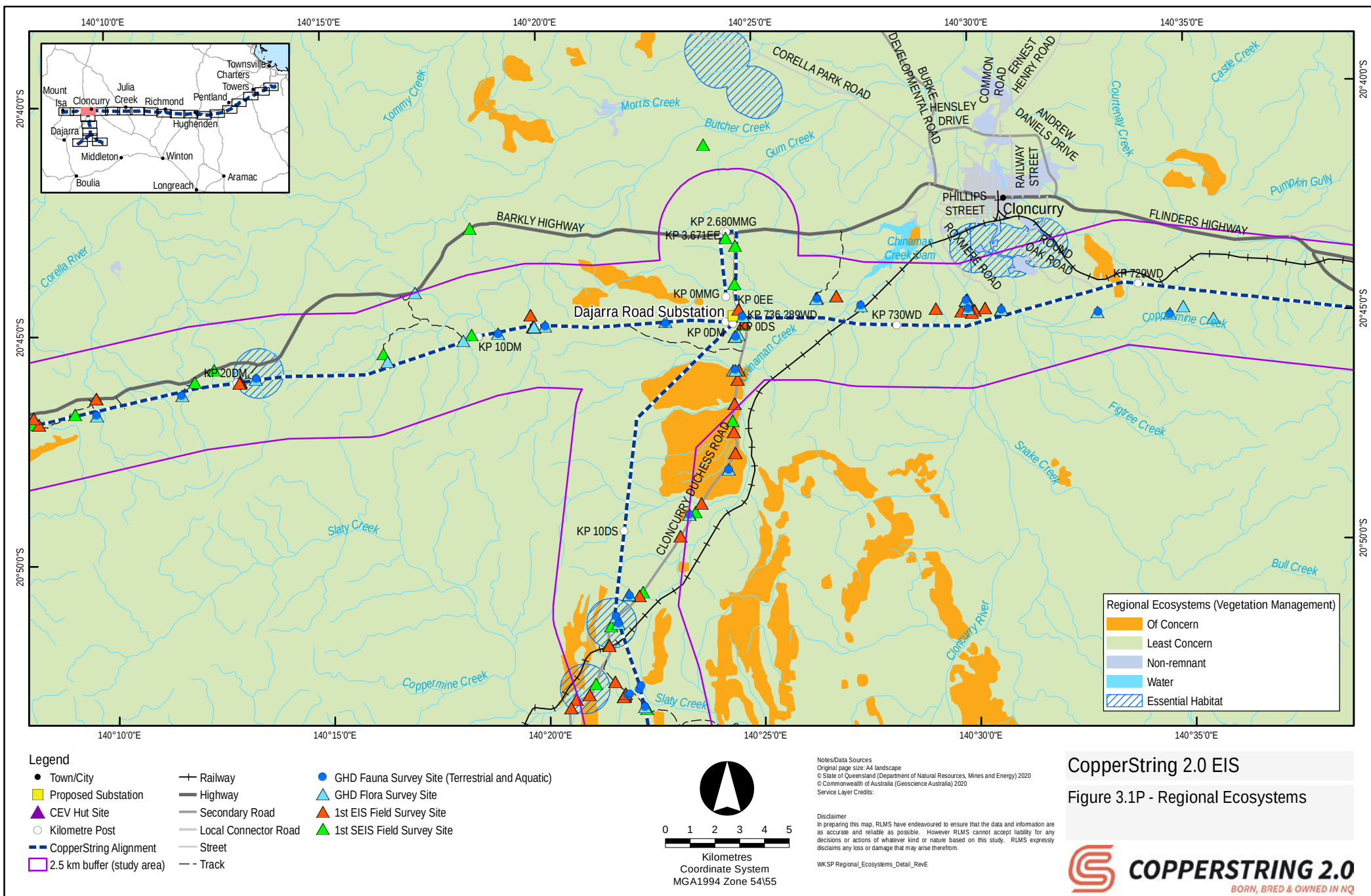
CopperString 2.0 EIS

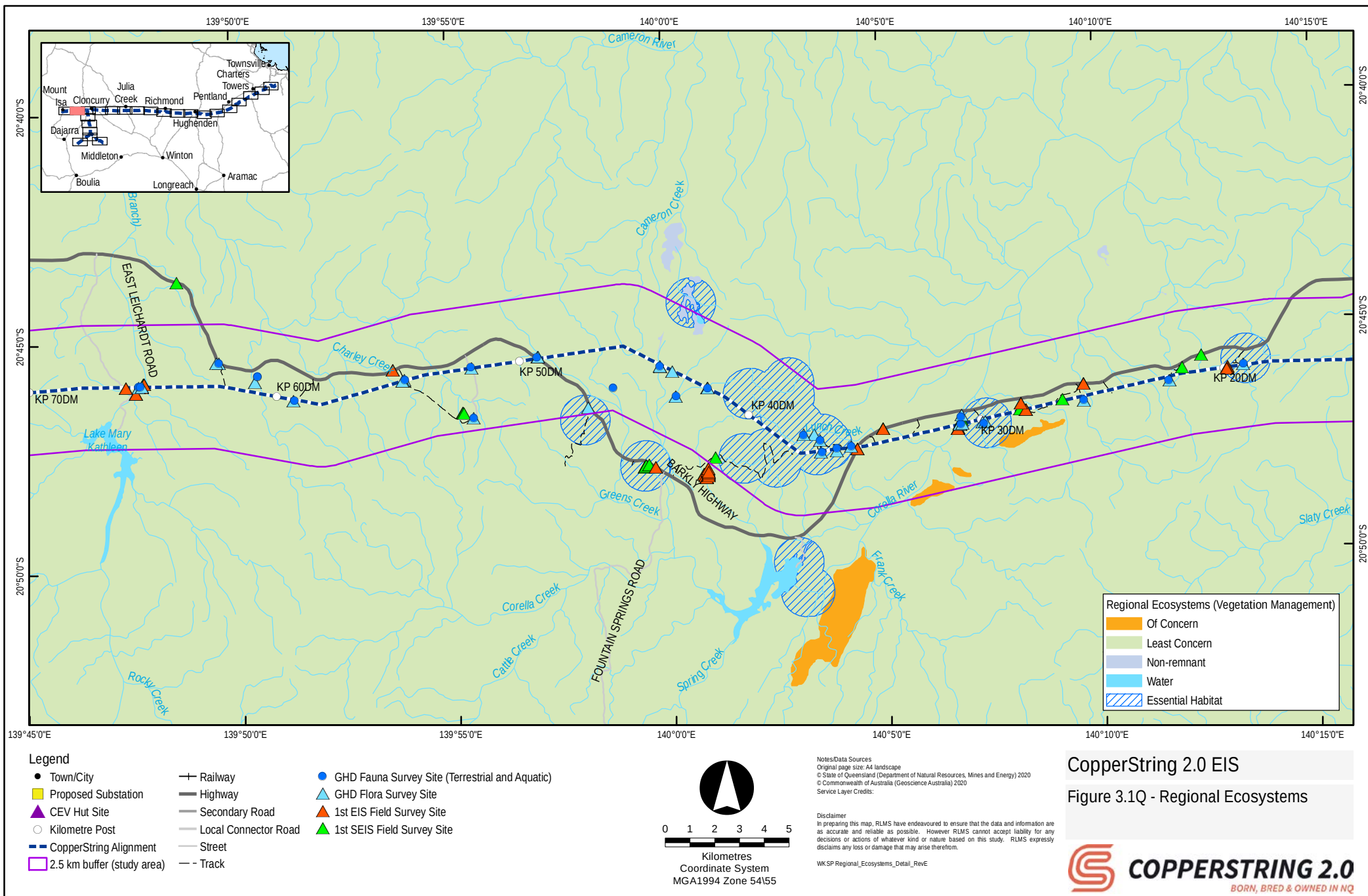
Figure 3.1L - Regional Ecosystems

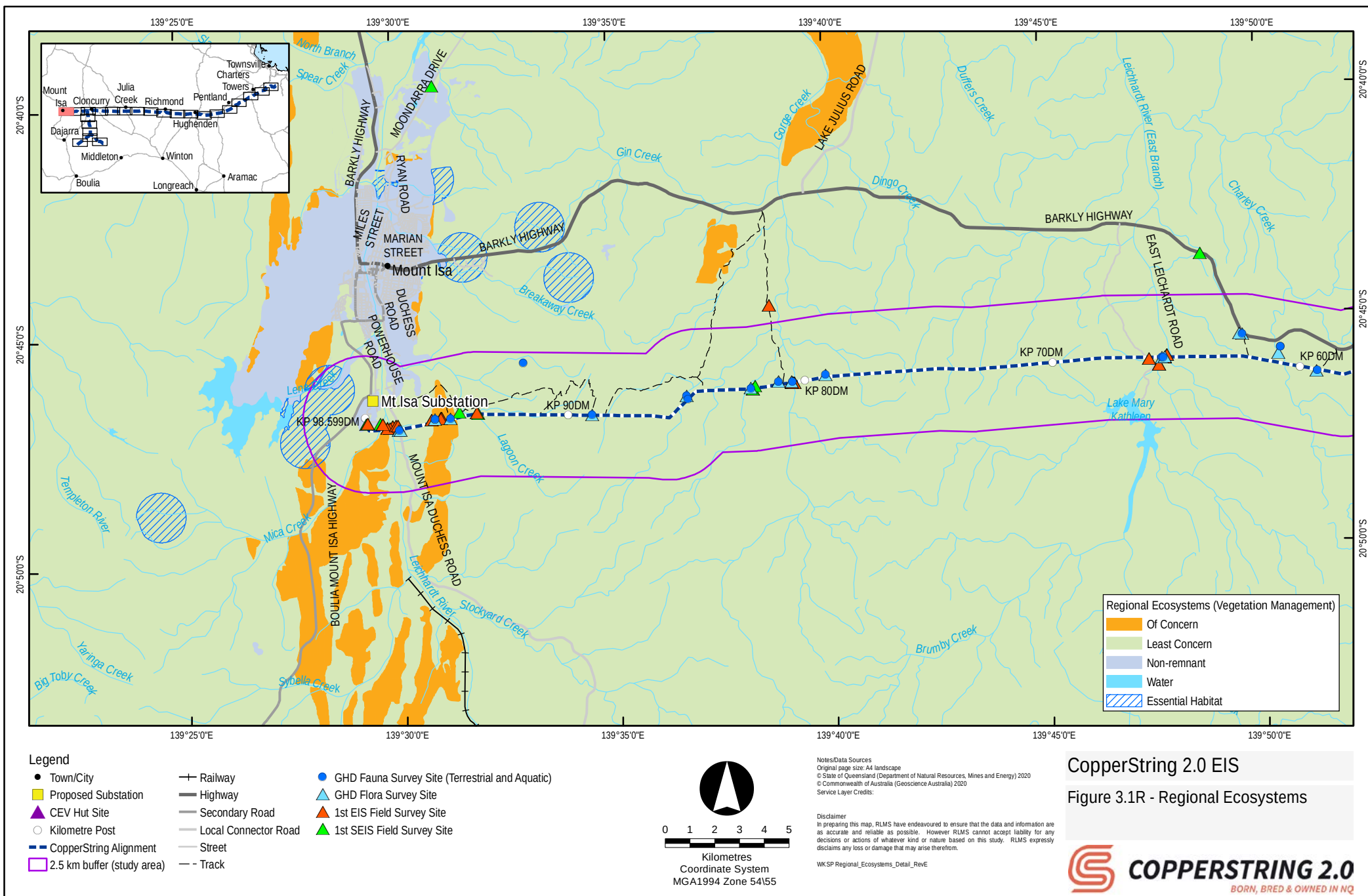


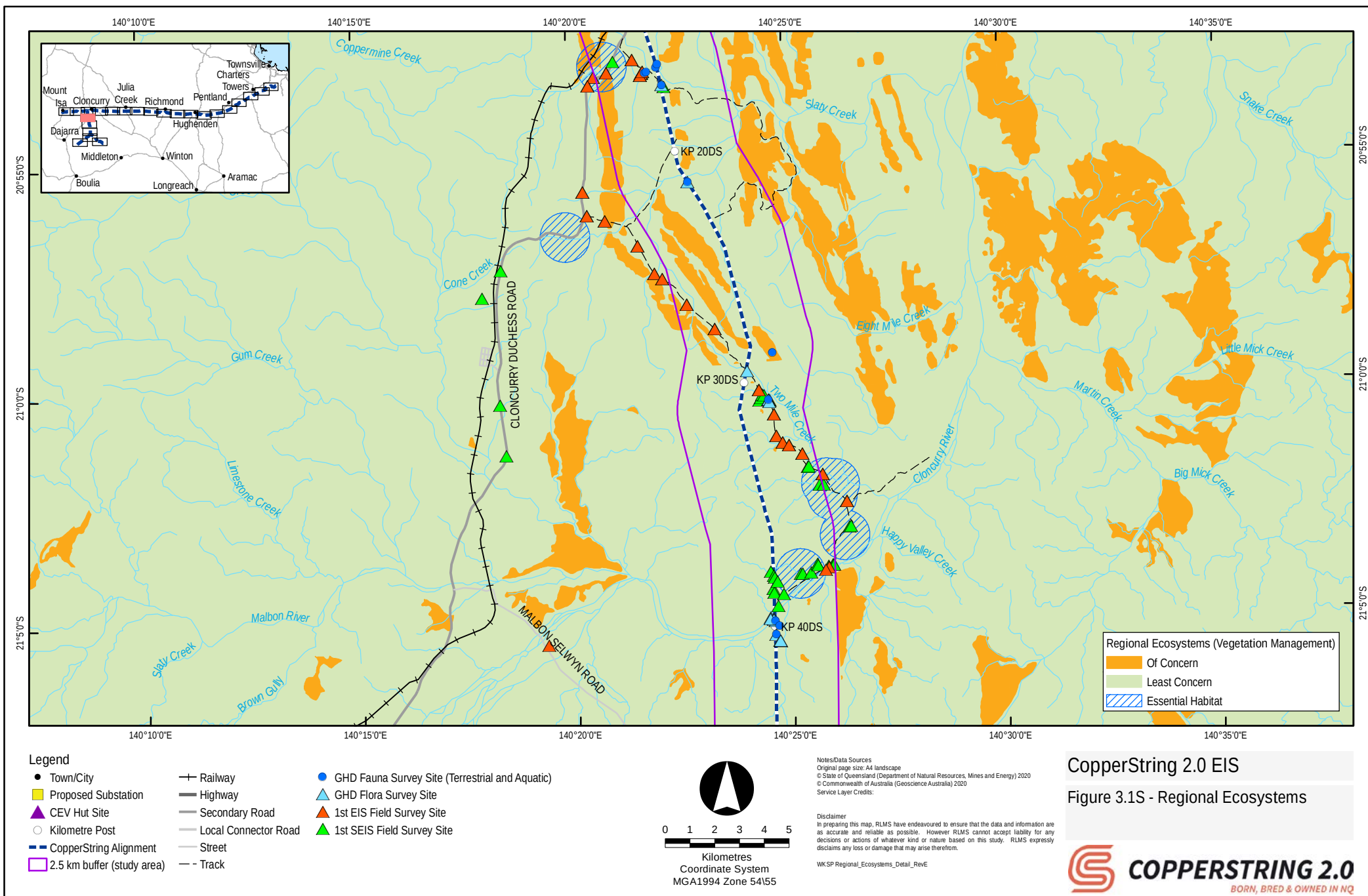


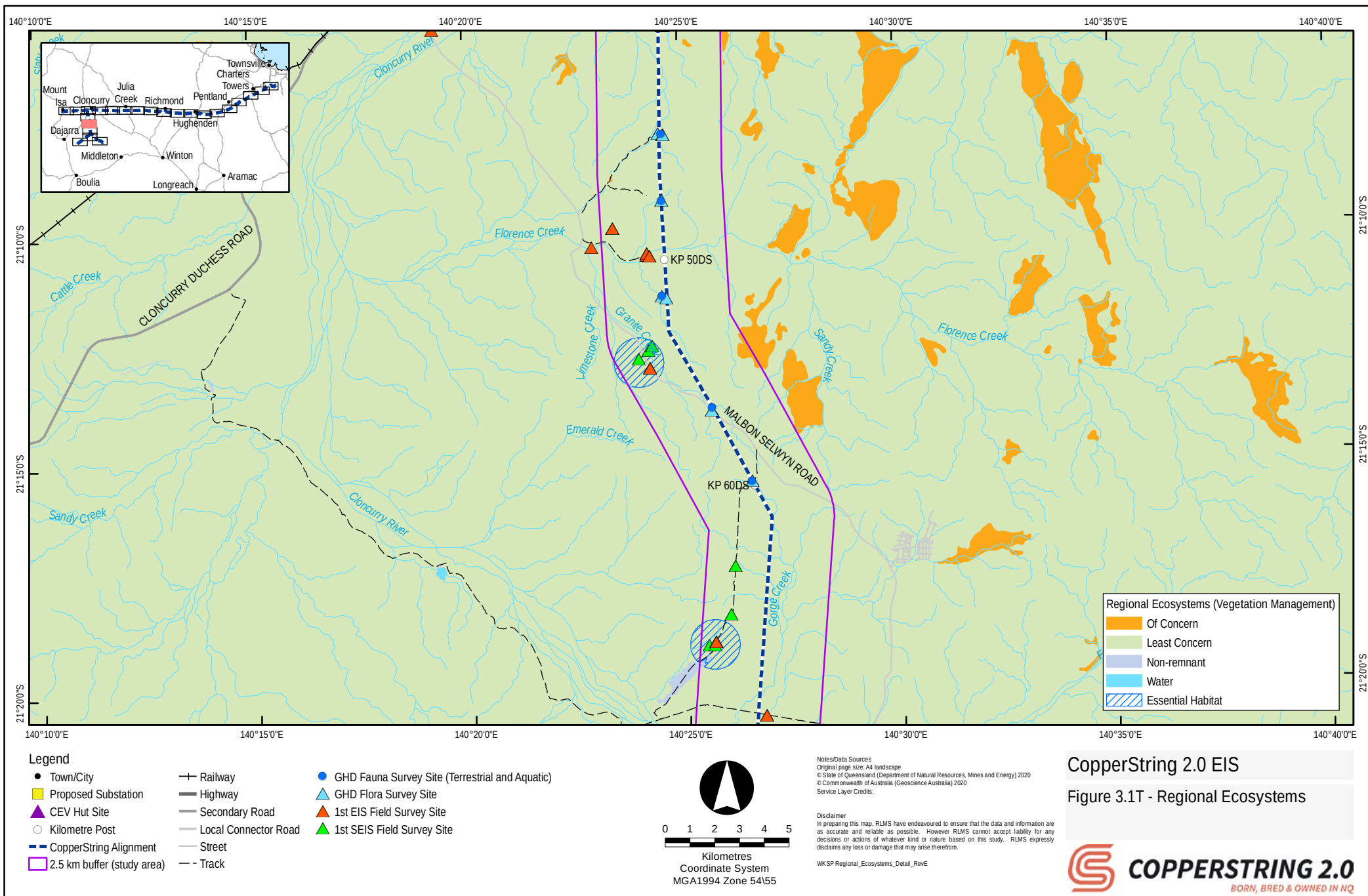


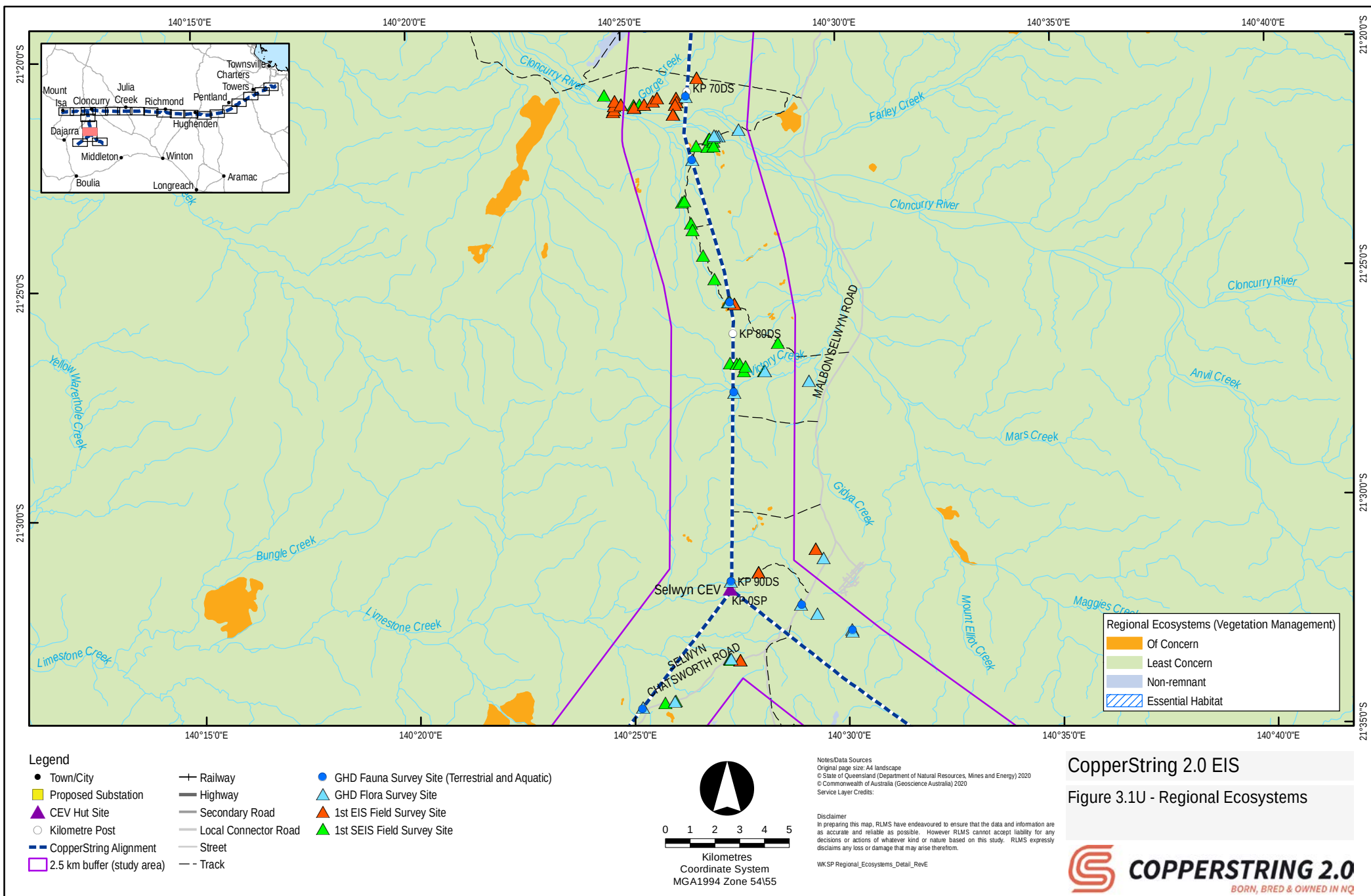


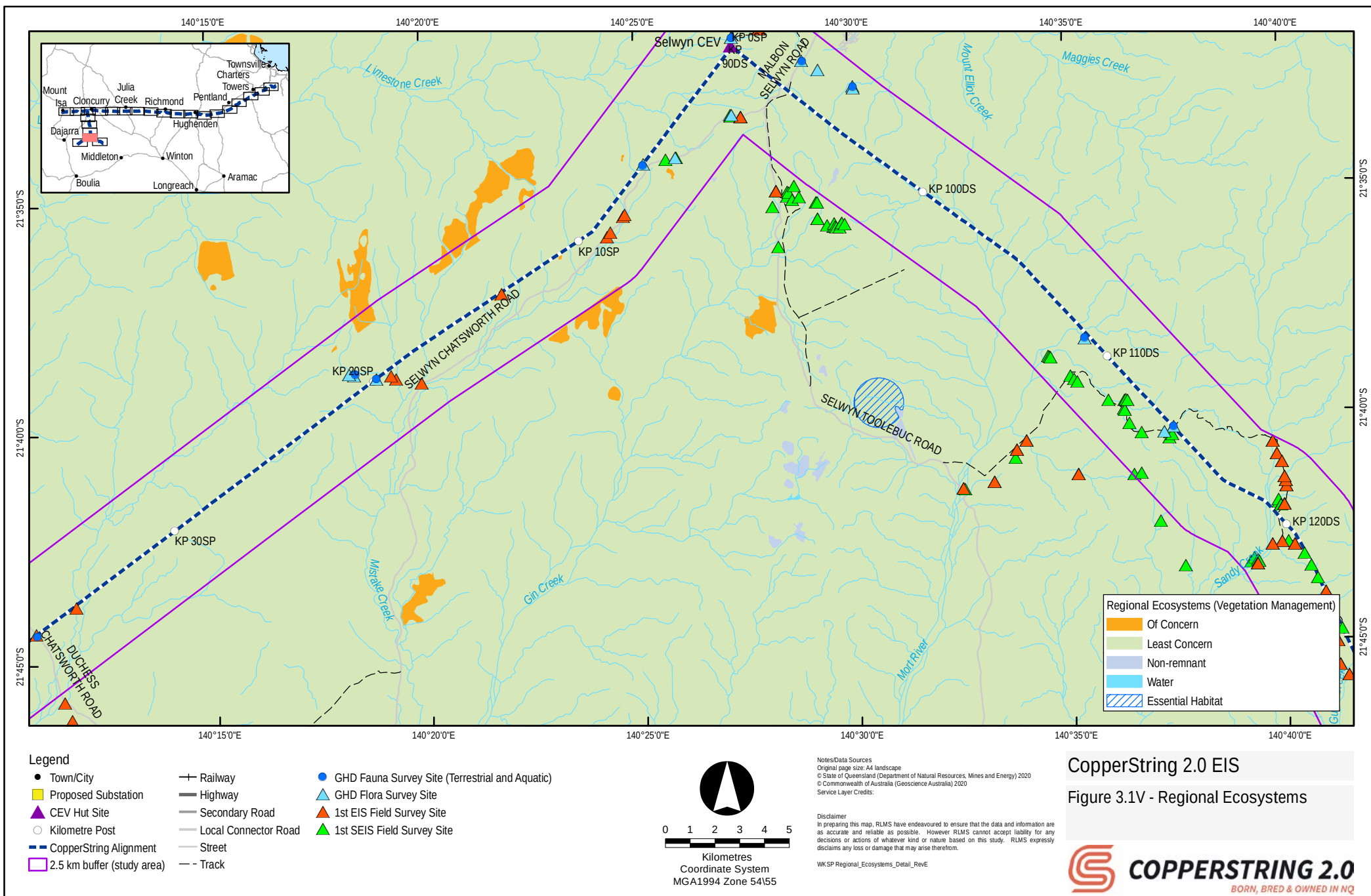


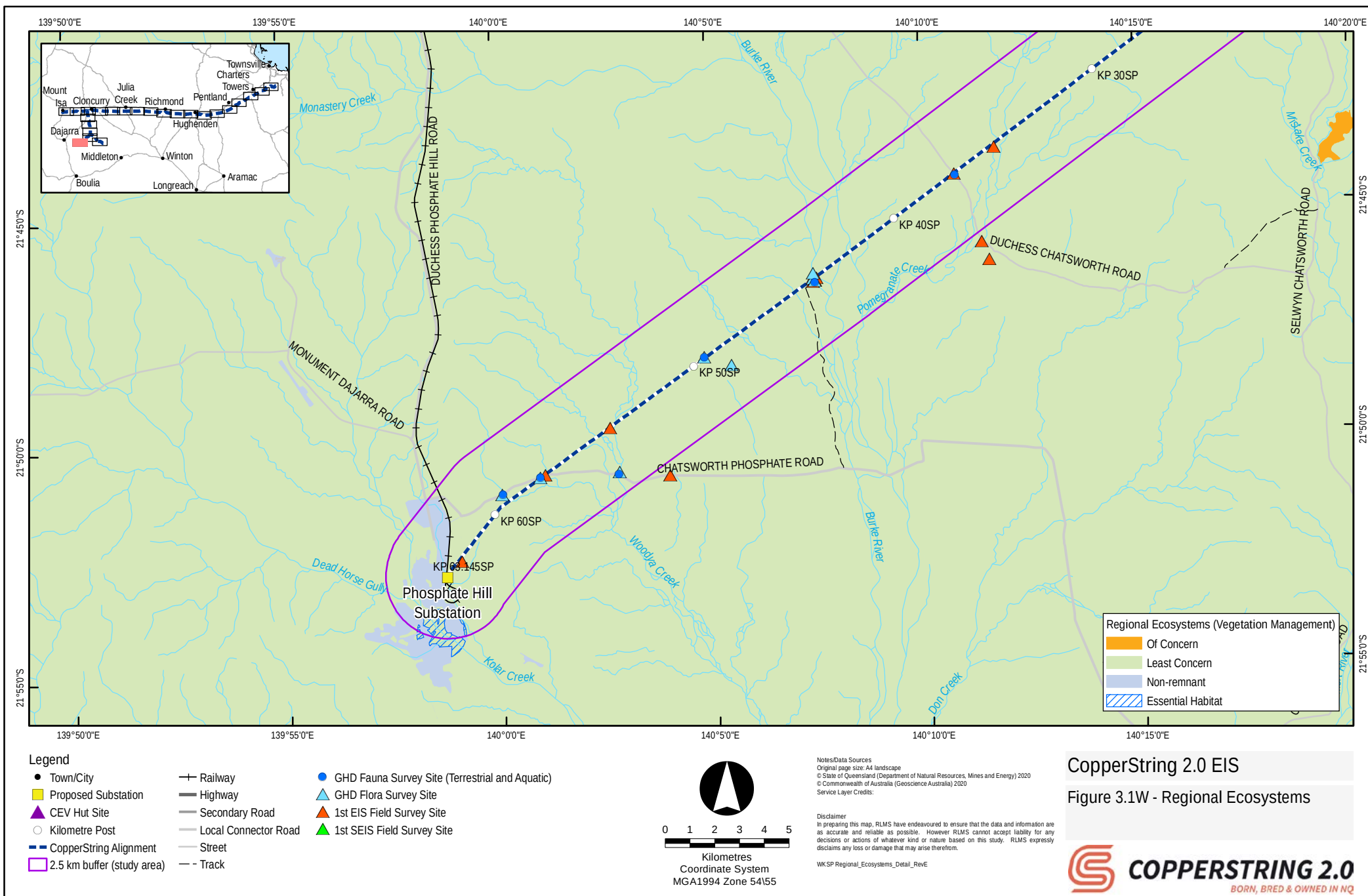


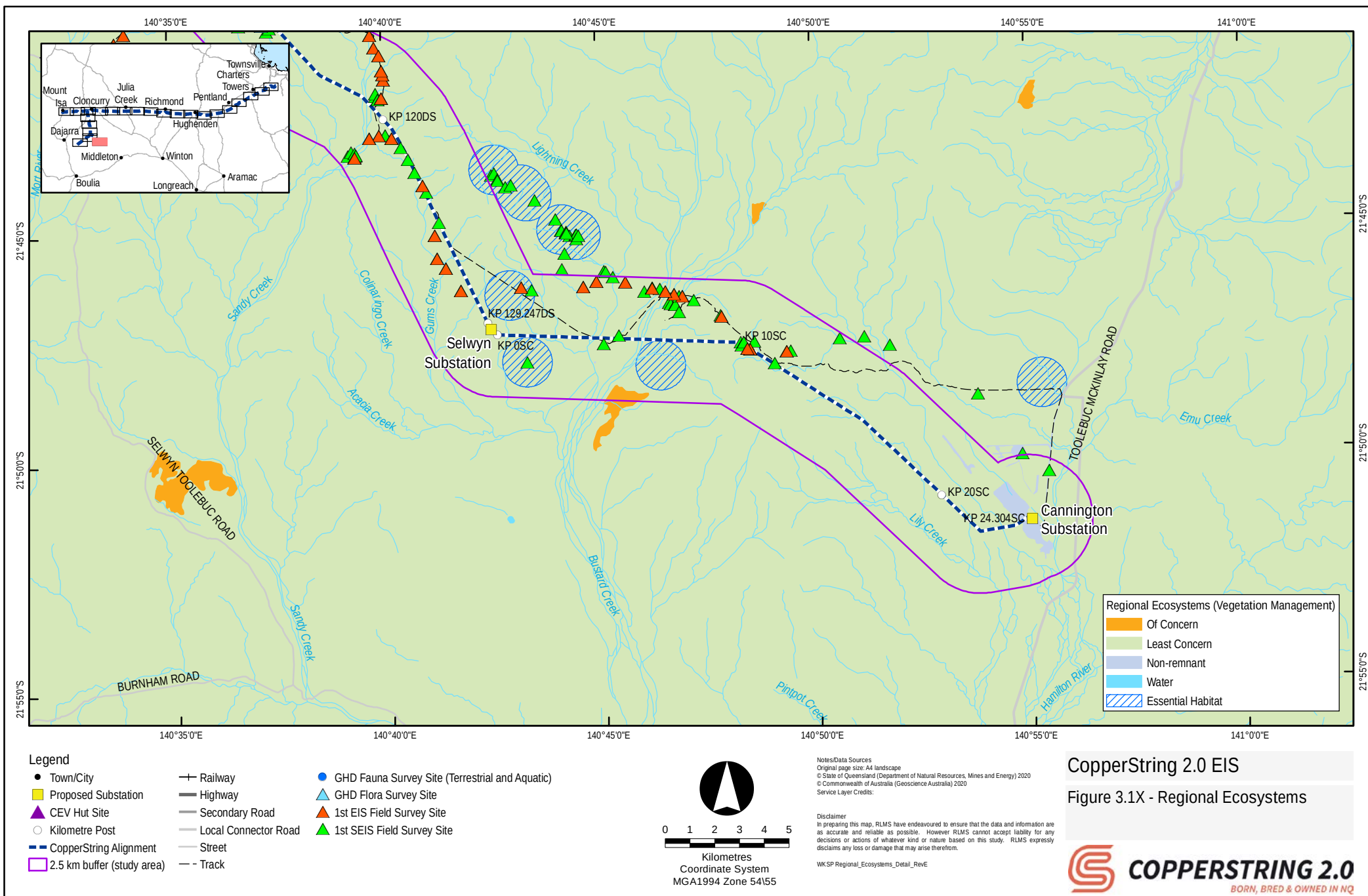












3.1.7 Heritage

Areas that contain indigenous and non-indigenous heritage require specific management measures and controls to be implemented which may constrain the design and development of the Project.

3.1.8 Contaminated land

Areas that contain contaminated land require specific management measures and controls to be implemented which may constrain the design and development of the Project.

The construction of access tracks and towers should avoid known areas of contaminated land.

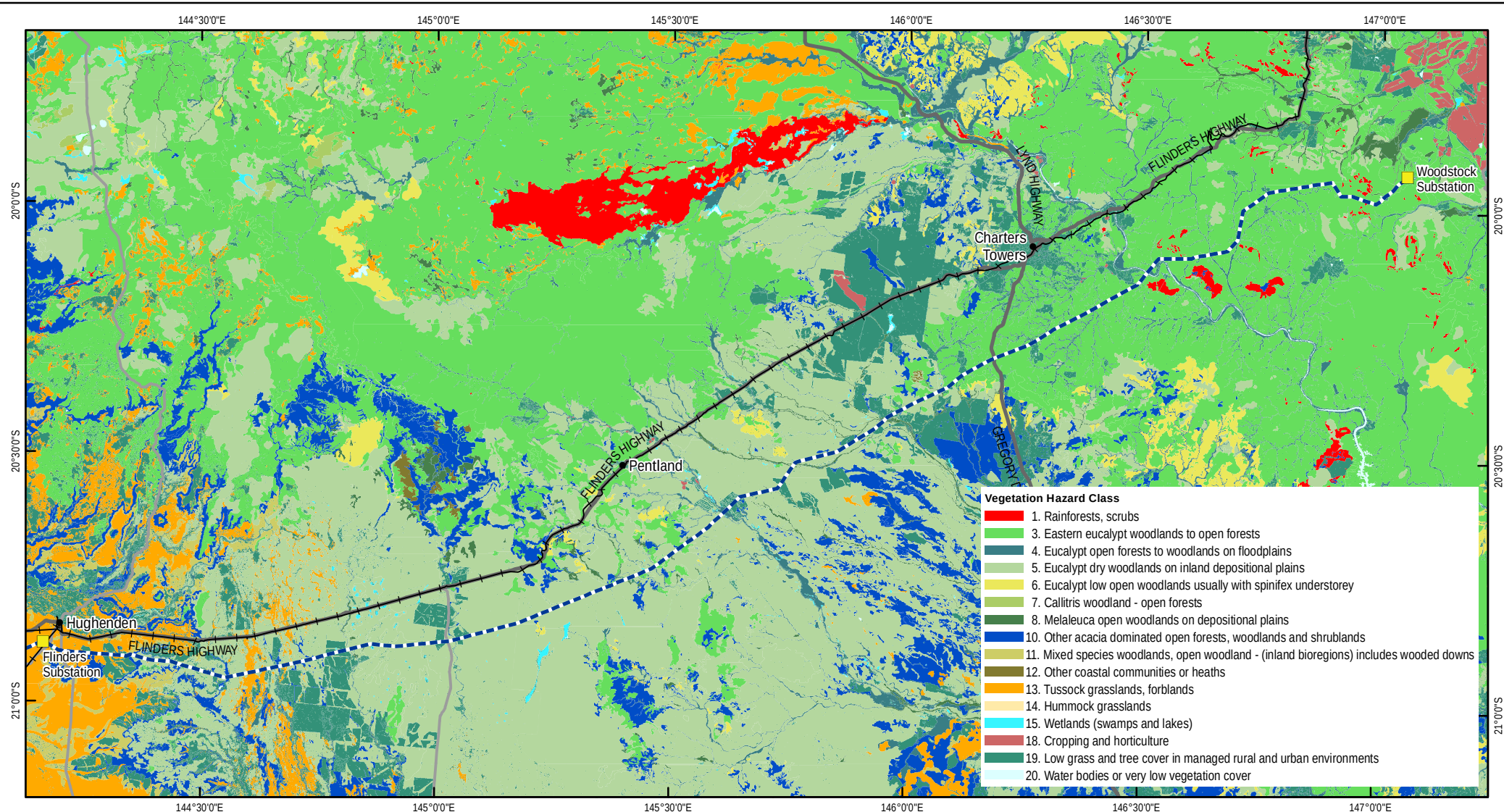
3.1.9 Bushfire risk

The Commonwealth Scientific and Industrial Research Organisation in conjunction with the Queensland Fire and Emergency Service developed mapping of Vegetation Hazard Classes (VHC)². Land use and vegetation data sets were used to define 20 VHC. Each VHC can be classified as either:

- Bushfire prone vegetation classes
- Grassfire prone vegetation classes
- Low fuel load classes.

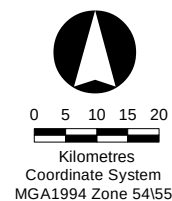
The VHC across the corridor selection are shown in Figure 3-2. Each of the VHC also has an identified potential fuel load.

² Leonard, J., Newnham, G., Opie, K., and Blanchi, R. (2014) A new methodology for state-wide mapping of bushfire prone areas in Queensland. CSIRO, Australia



Legend

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



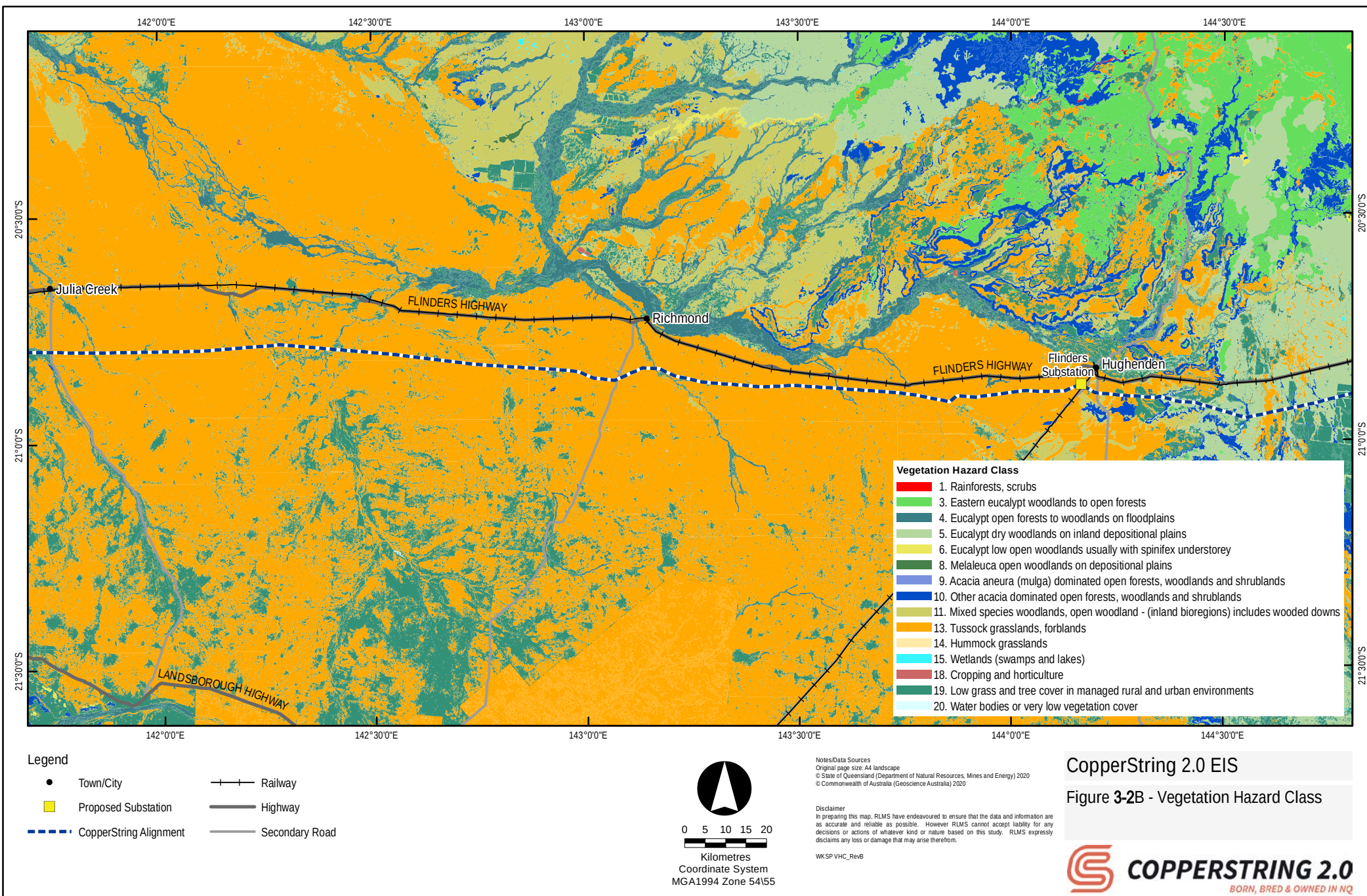
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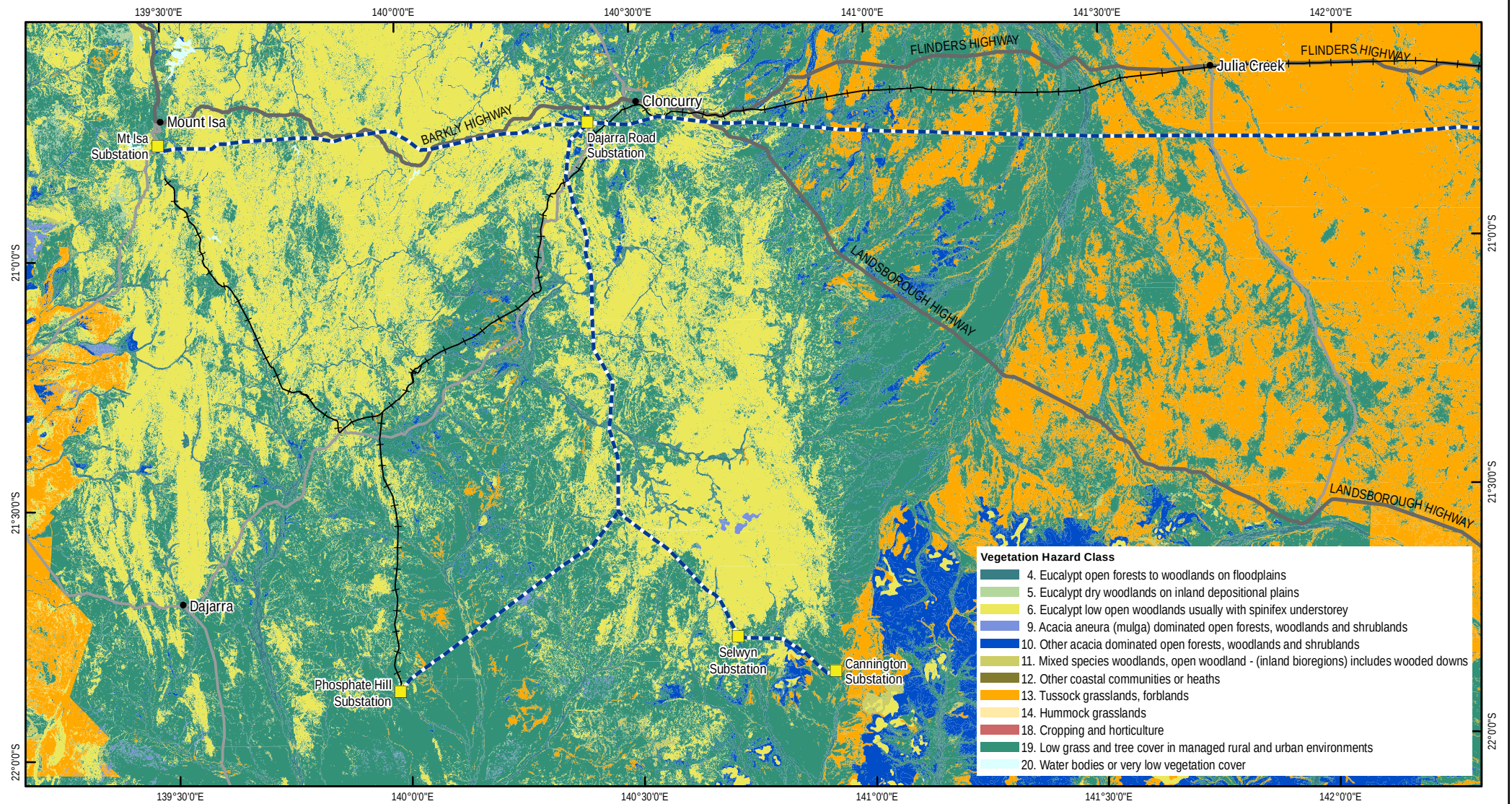
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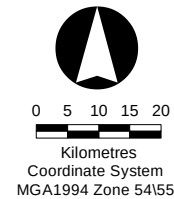
Figure 3-2A - Vegetation Hazard Class





Legend

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



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CopperString 2.0 EIS

Figure 3-2C - Vegetation Hazard Class

3.2 Planning constraints

The following regulatory planning instruments may require development approvals or permits to be obtained in the event the Project undertakes certain activities:

- *Vegetation Management Act 1999*
- *Environmental Protection Act 1994*
- *Environmental Protection Regulation 2019*
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
- *Nature Conservation Act 1992*
- *Planning Act 2016*
- *Planning Regulation 2017*
- *Water Act 2000*
- *Fisheries Act 1994*
- Local Government Areas Planning Schemes

These planning constraints are detailed further in Volume 1 Chapter 4 Legislation and Approvals.

3.3 Environmental constraint classes

Four environmental constraint classes with graduated levels of Environmental sensitivity (environmental constraint classes) have been developed for the FDP, these classes are detailed further below and are shown in Figure 3-3.

A range of data layers and the results from previous field environmental surveys were used to compile the environmental constraint classes. The data layers include:

- Queensland Government listed Regulated vegetation (QLD Globe)
- Regional Ecosystem Mapping under the *Vegetation Management Act 1999* (VM Act), regulated by the Department of Environment and Science (DES) (QLD Globe)
- Wetland Protection Area under the *Environmental Protection Regulation 2019* (QLD Globe)
- EPBC Act listed threatened ecological communities, regulated by the Department of Agriculture, Water and the Environment (DAWE) (In Queensland these are identified by the Regional Ecosystem mapping)
- Habitat mapping of EPBC Act listed species
- Queensland Directory of Important Wetlands produced by DES (*WetlandMaps*)
- Essential Habitat Mapping for NC Act listed significant species, produced and regulated by DES (QLD Globe)
- Watercourses mapped under the *Water Act 2000* (QLD Globe)
- Bioregional Corridors Mapping. (QLD Globe).

3.3.1 Environmental Constraint Class A

Environmental Constraint Class A includes:

- All Category A areas of regulated vegetation as defined under the VM Act, and
- Wetland within a Wetland Protection Areas.

These areas are of very high conservation value and are designated 'no-go' areas and shall be avoided in the planning phase. Disturbance activities will not occur in these areas.

Environmental Constraint Class A areas will also include those areas where the disturbance limits for environmentally sensitive areas, including MNES have been reached.

3.3.2 Environmental Constraint Class B

Environmental Constraint Class B areas include:

- Trigger area within a Wetland Protection Area
- All Category B (remnant) regulated vegetation that is 'Of Concern' or 'Endangered' Regional Ecosystems as defined under the VM Act.
- Field verified threatened ecological communities as defined under the EPBC Act.
- Essential habitat as defined under the VM Act
- Nature Refuges as defined under the NC Act
- Protected Plants as defined under the NC Act, and
 - mapped Protected Plants Flora Survey trigger area, or
 - within 100 m of a flora survey trigger area
- Mapped habitat for conservation significant fauna species (Volume 3 Appendix P Ecological Assessment of the EIS). Species breeding and foraging habitats have been mapped within the EIS. The mapping was developed with reference to State and Commonwealth species databases, records and mapping and refined using field verified information, historical records and assessment of unsuitable habitat areas.
- Places of cultural heritage significance
- All Queensland Government listed Regulated vegetation that is Category C (high value regrowth) REs
- All Queensland Government listed Regulated vegetation that is Category R (Great Barrier Reef watercourse buffers) REs.

Environmental Constraint Class B areas (with the exception of the Ballara Nature Refuge) will be avoided where possible at the planning stage for the siting of towers, access routes and other infrastructure associated with the corridor selection. If the Environmental Constraint Class B area cannot be avoided through relocation at the planning stage, then tower sites or associated infrastructure will be sited in previously disturbed areas if possible, or in locations least likely to cause adverse impacts based on the preclearance surveys.

The CopperString Corridor selection report has undertaken a detailed assessment of alternatives regarding avoidance of the Ballara Nature Refuge. A number of alternative alignments were also considered to minimise or avoid areas of high value within the nature refuge. This assessment is in accordance with this FDP and therefore impacts to this Environmental Constraint Class B can not be avoided. Further information has been included within Volume 3 Appendix D Corridor selection report of the EIS.

Clearing for construction or operational related activities should be avoided or minimised wherever practical in Environmental Constraint Class B areas to reduce the impact on any MNES or MSES.

Protocols for management of activities within Environmental Constraint Class B sites includes:

- Avoid
- Minimise

- Mitigate
- Post Construction Surveys
- Rehabilitation.

3.3.3 Environmental Constraint Class C

Environmental Constraint Class C contains:

- All Queensland Government listed Regulated vegetation that is Category B 'Least Concern' REs.
- Suitable or foraging habitat for conservation significant flora and fauna species (within habitats where pre-clearance surveys have been recommended). Species breeding and foraging habitats have been mapped within the EIS. The mapping was developed with reference to State and Commonwealth species databases, records and mapping and refined using field verified information, historical records and assessment of unsuitable habitat areas.
- Sites of unexploded ordnance
- Contaminated site areas (e.g. stock dips).

Protocols for management of activities in Environmental Constraint Class C include:

- Pre-clearance surveys
- Mitigation
- Post-construction surveys.

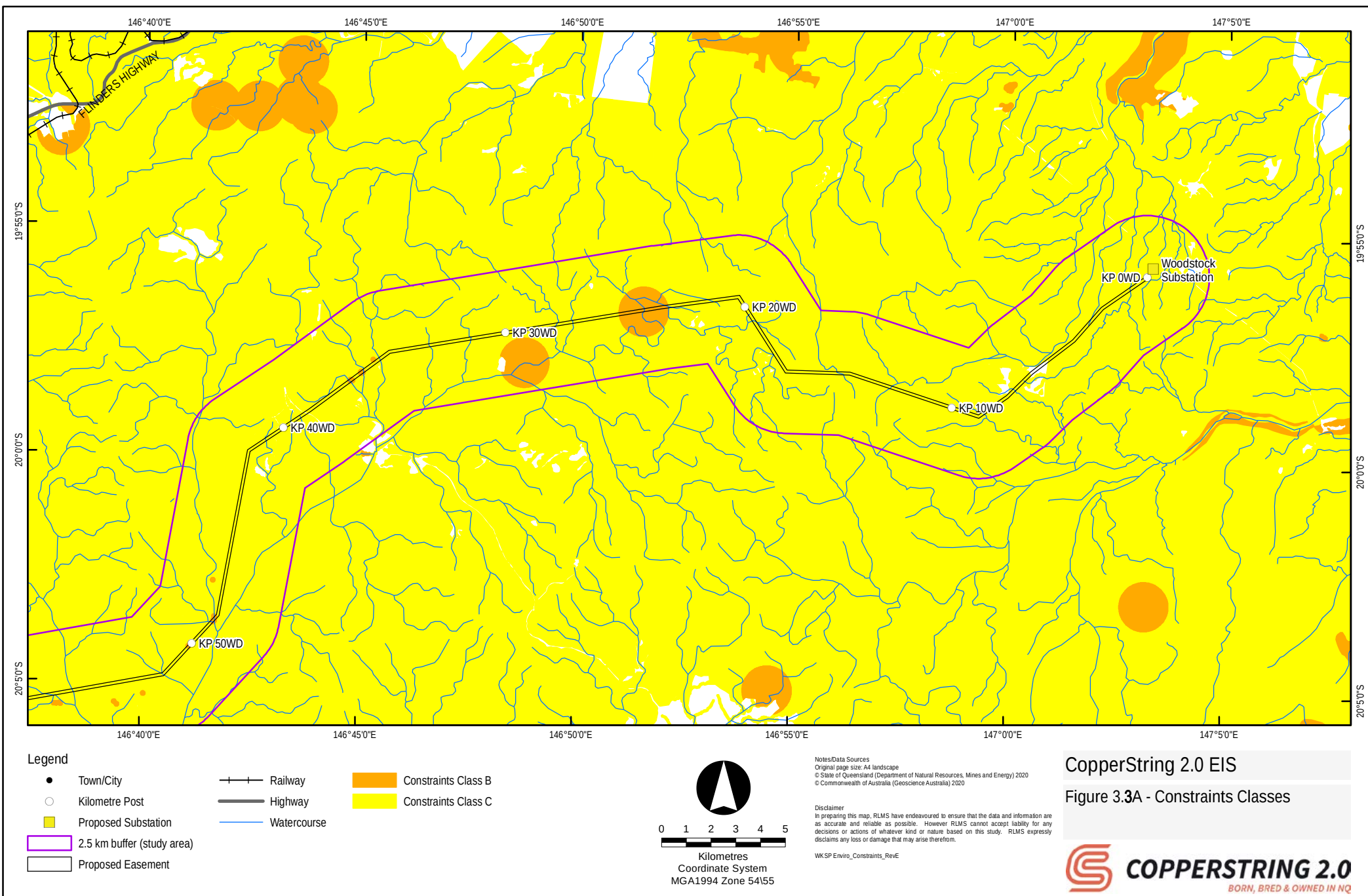
3.3.4 Environmental Constraint Class D

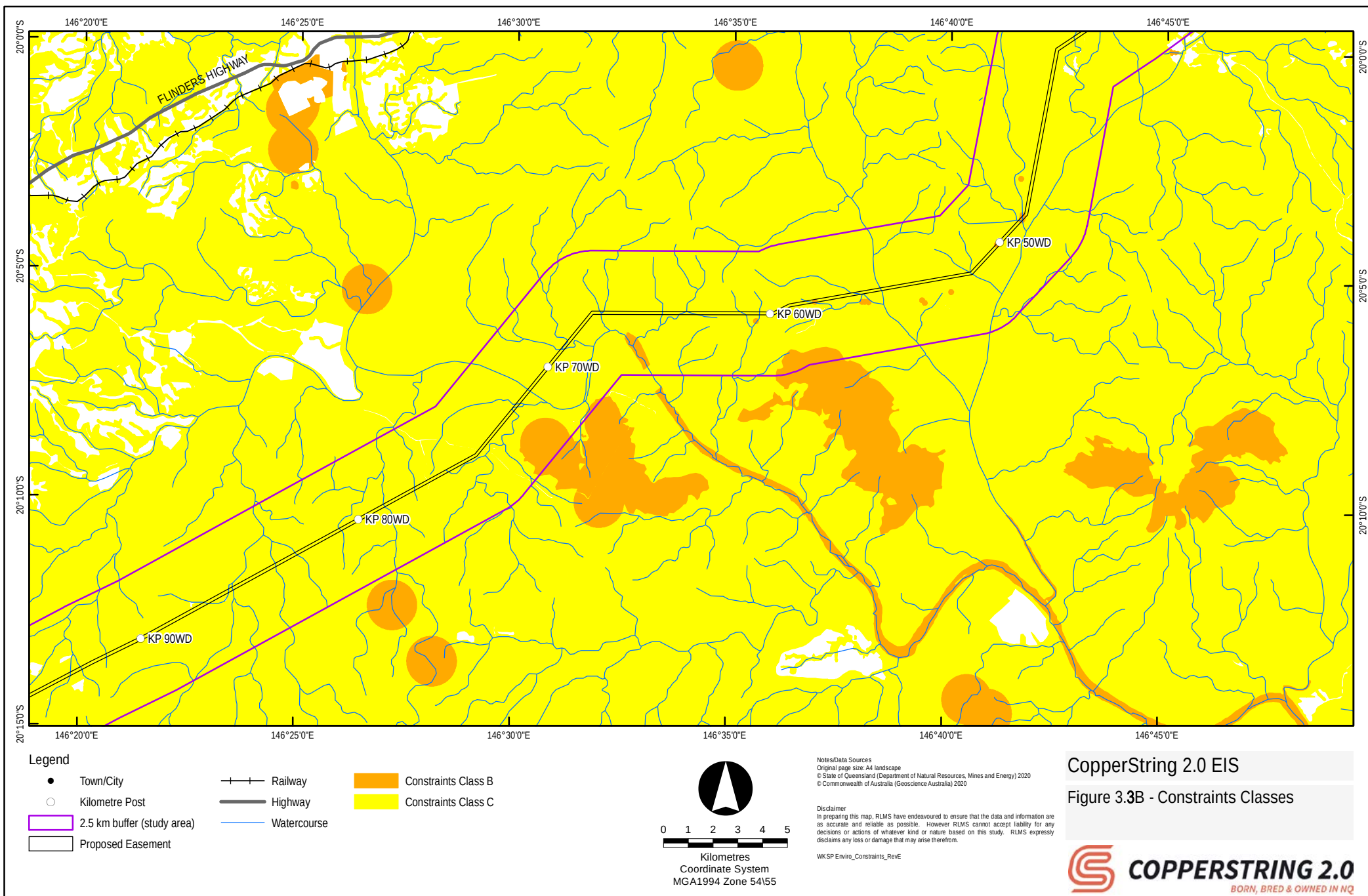
Environmental Constraint Class D areas are:

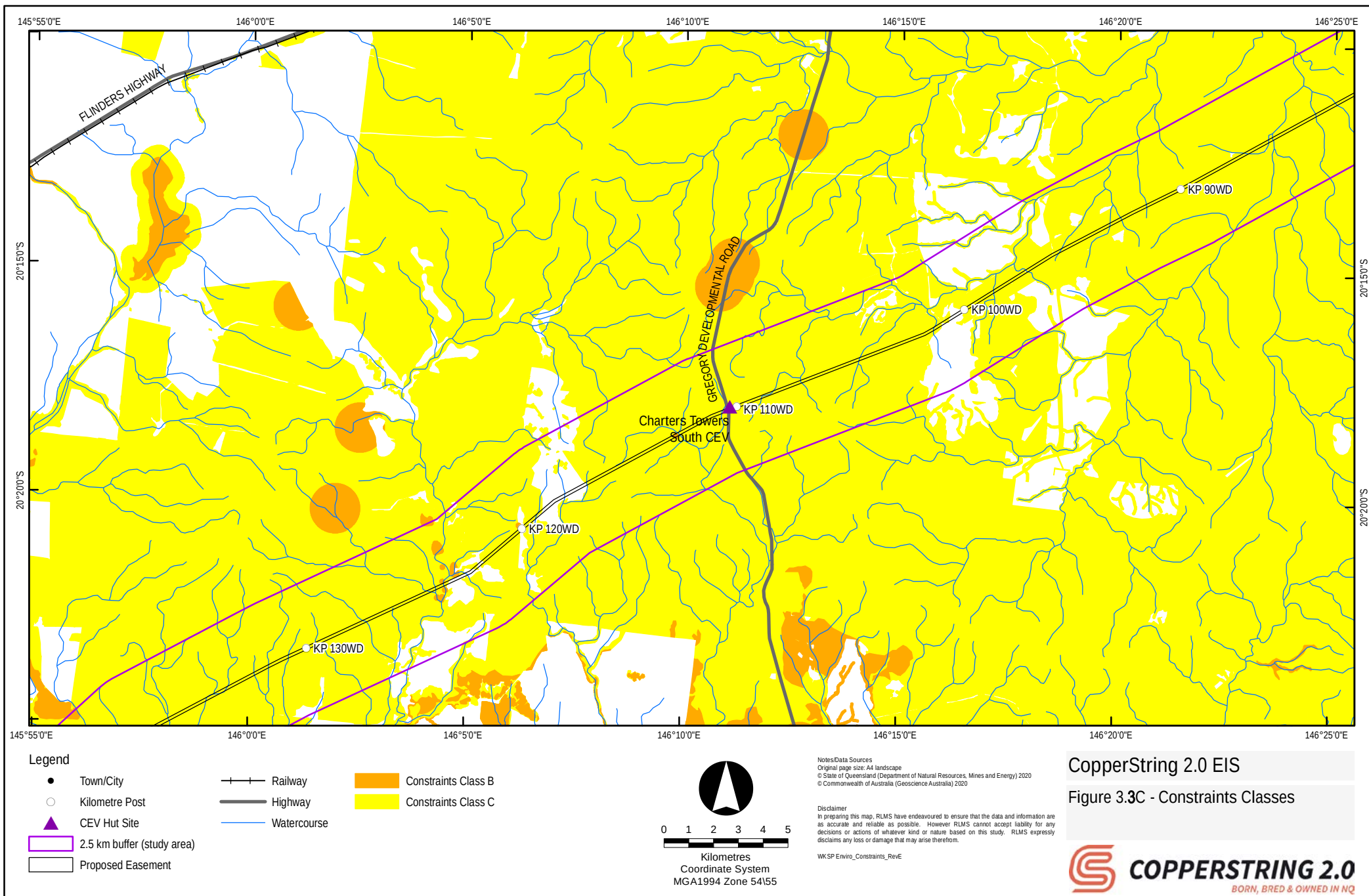
- All Queensland Government listed regulated vegetation which are classified as Category X non-remnant vegetation under the VM Act. These are generally areas of lower environmental sensitivity.

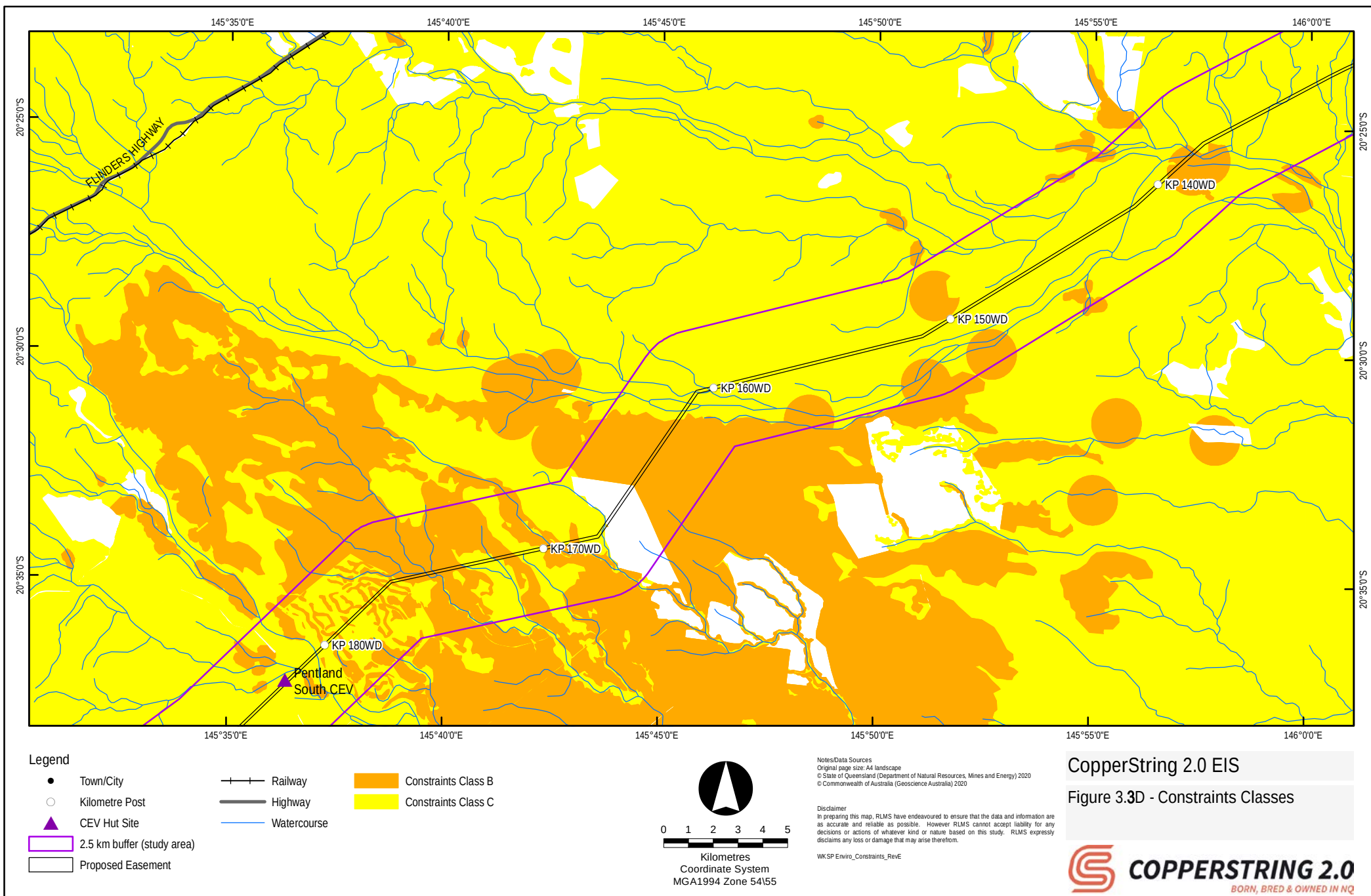
Protocols for management of activities in Environmental Constraint Class D include:

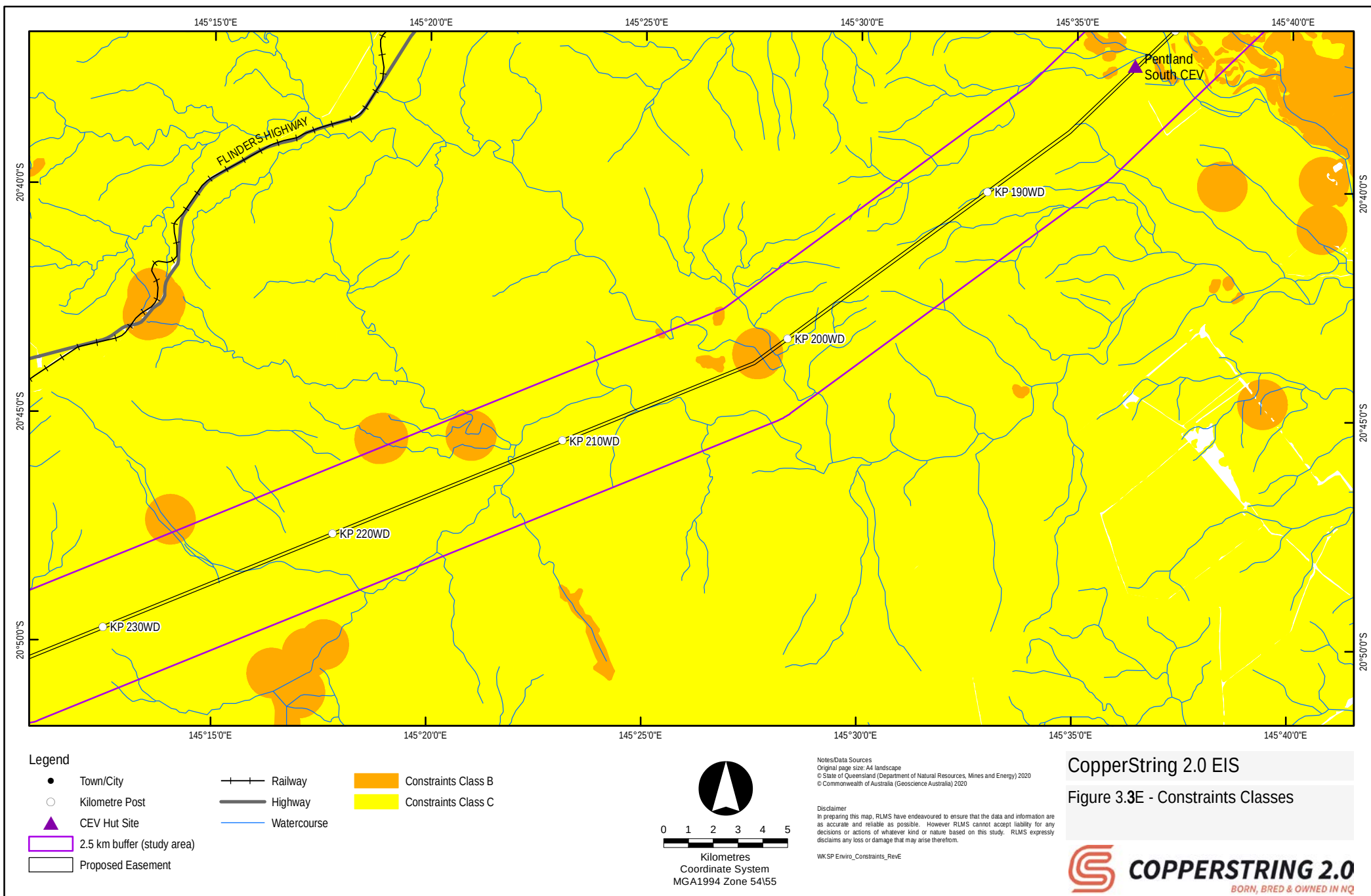
- Pre-clearance surveys
- Mitigation
- Post-construction surveys.

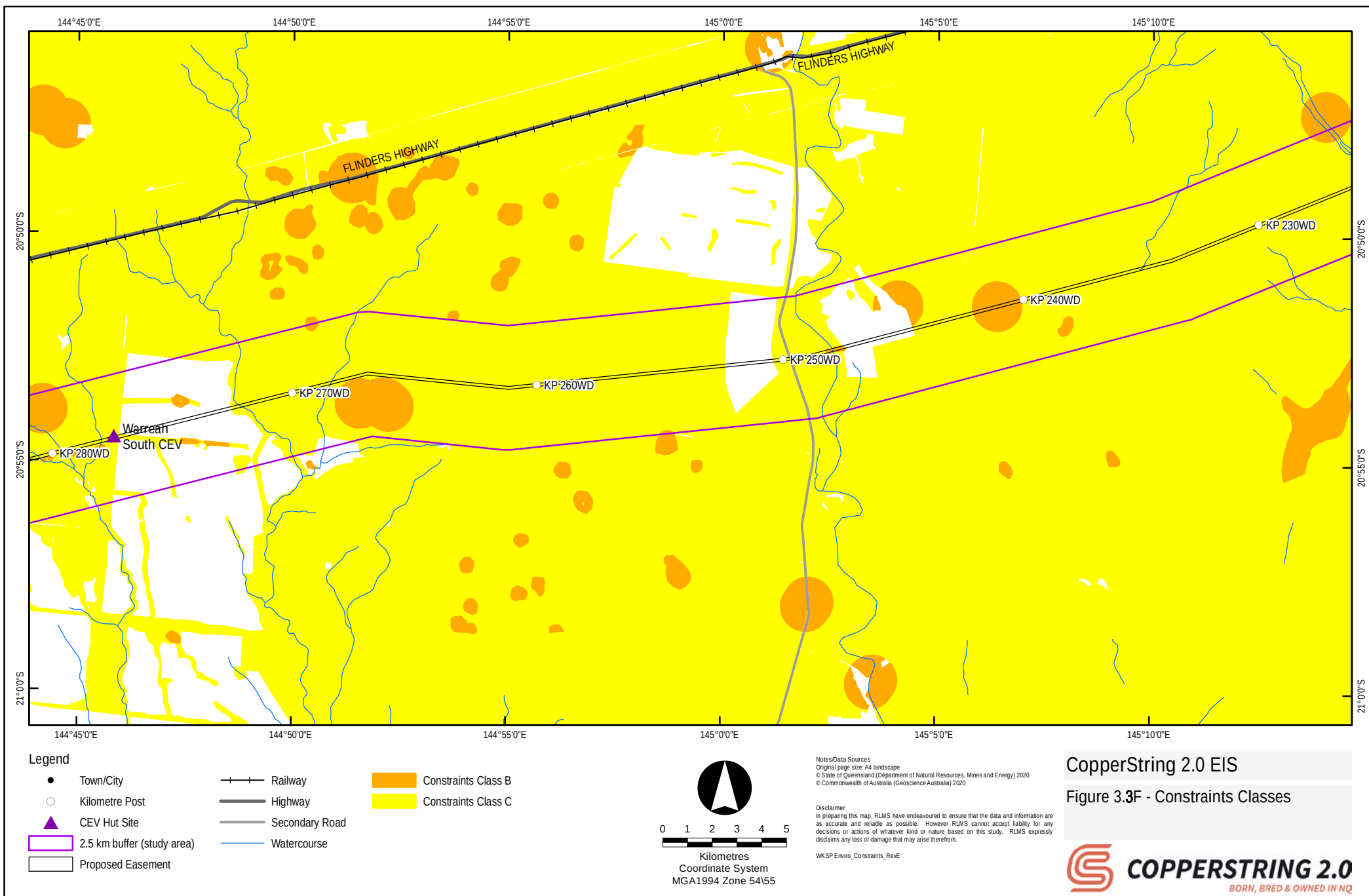


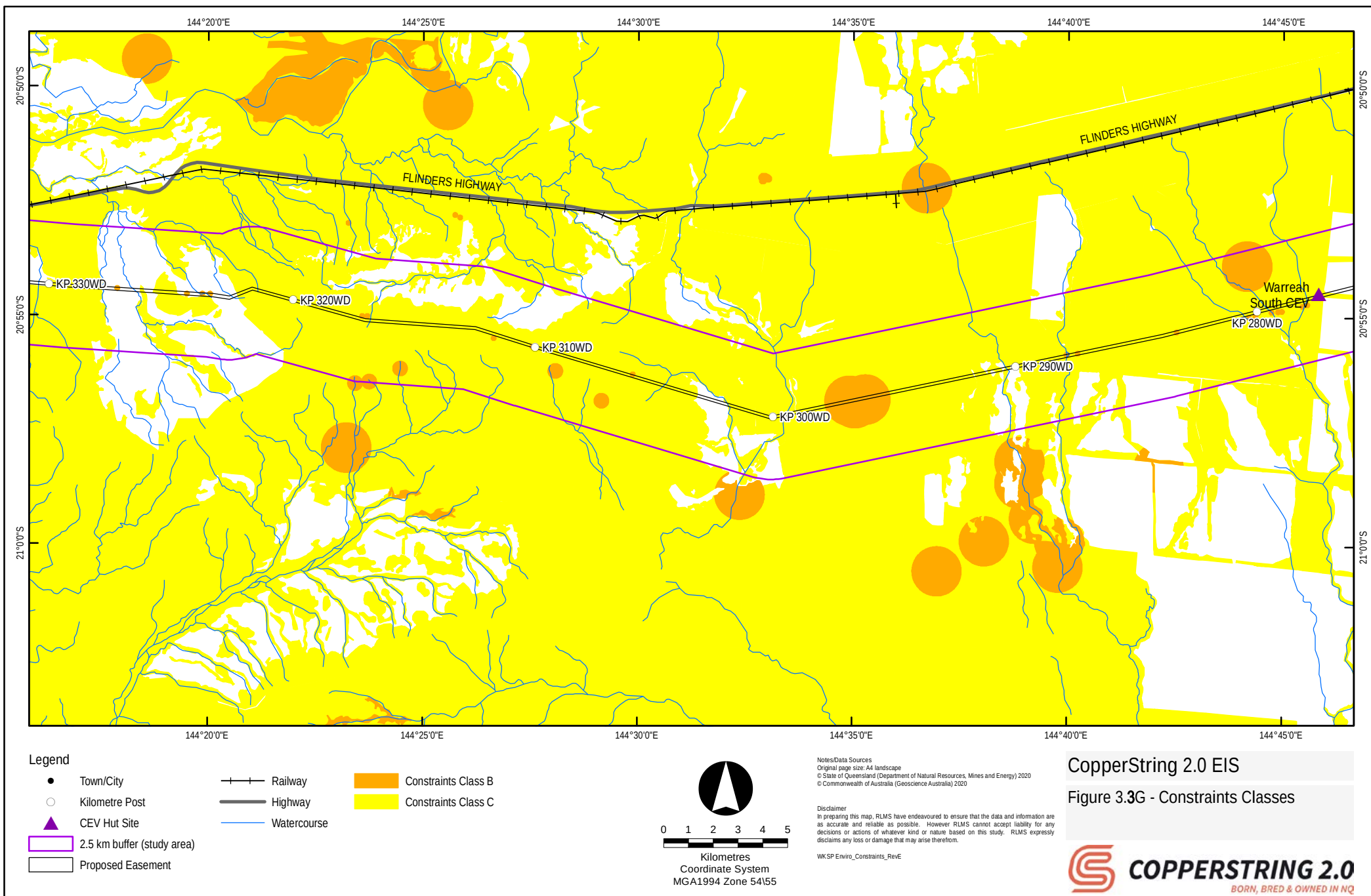


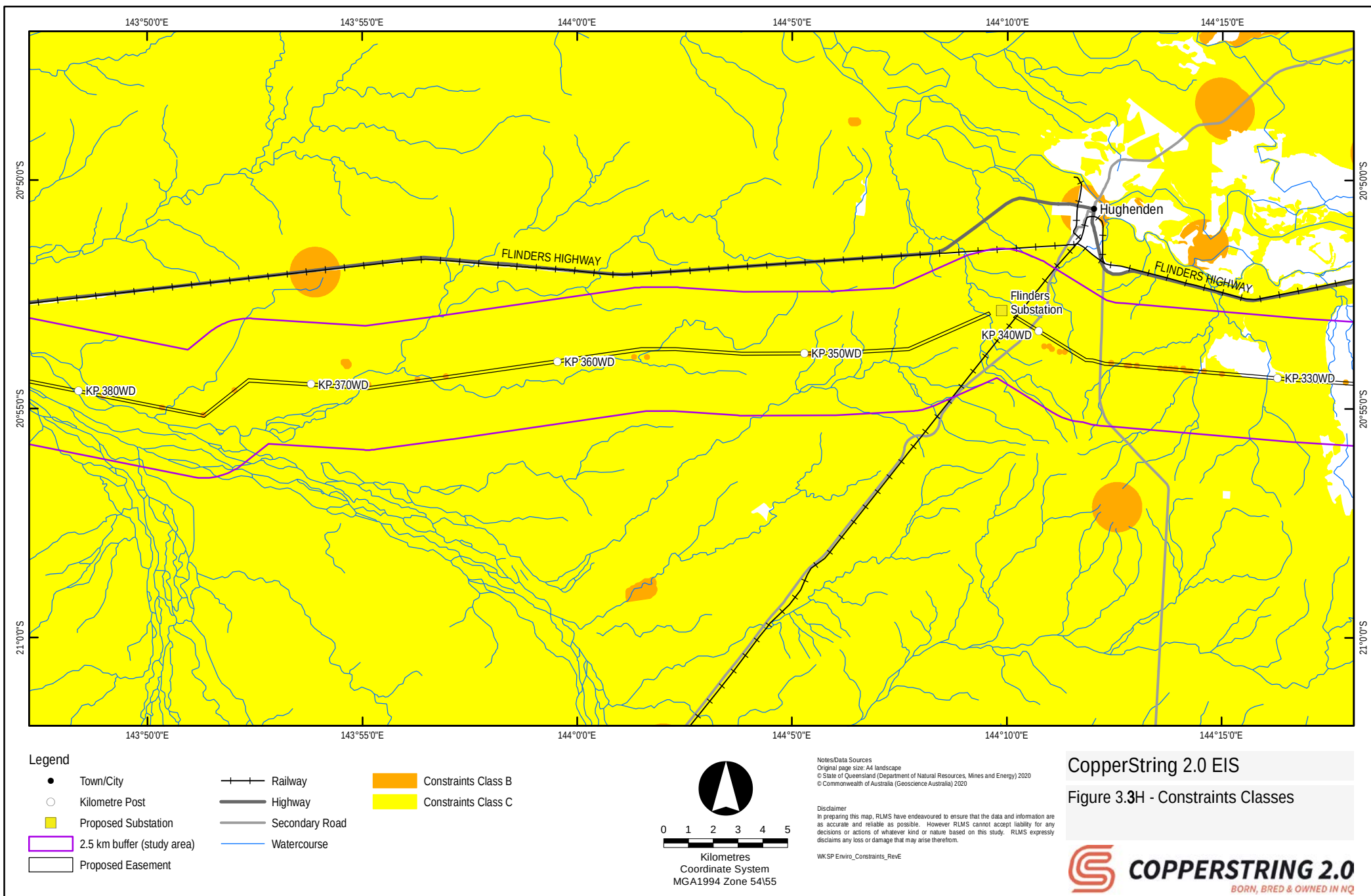


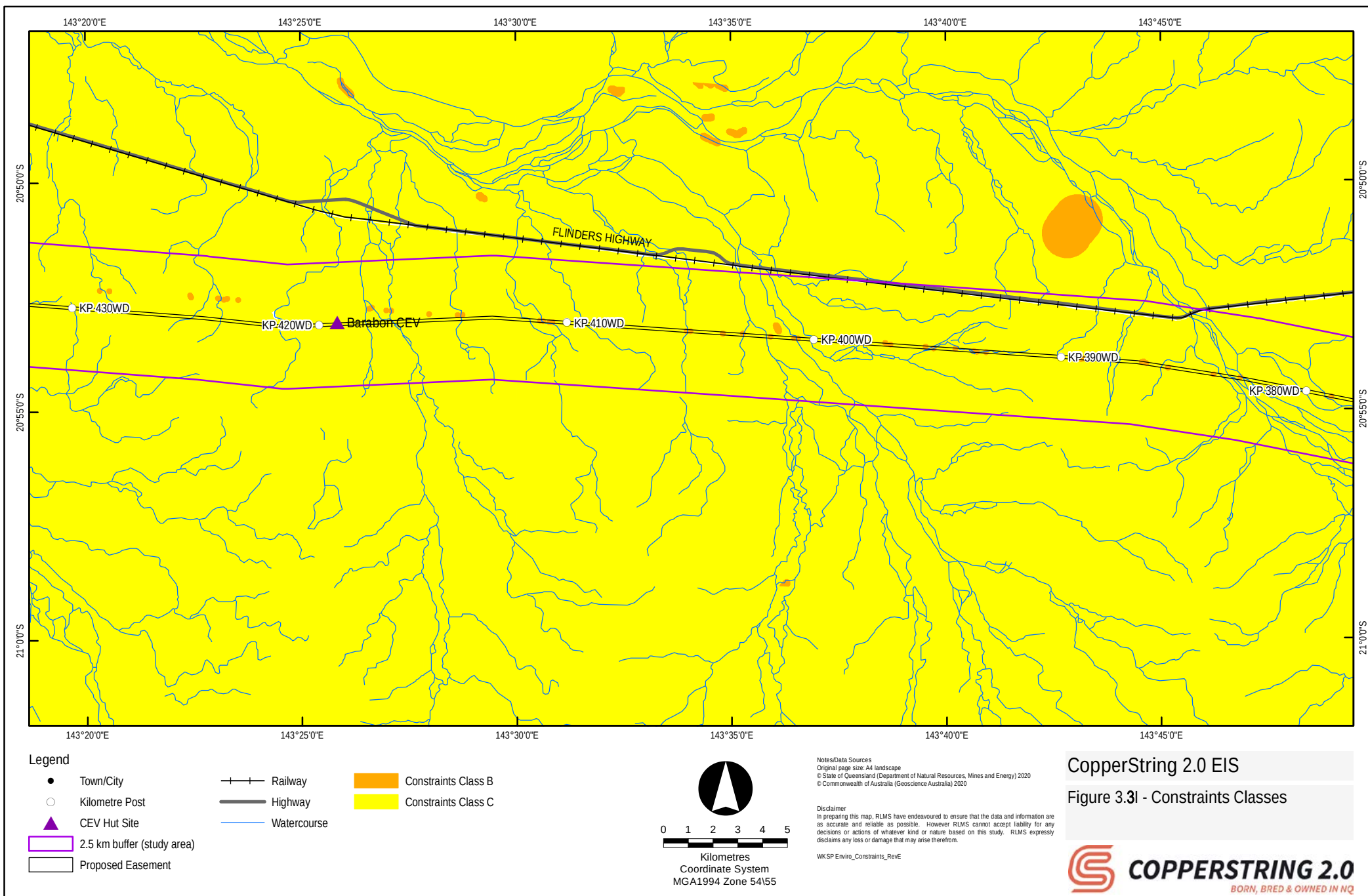


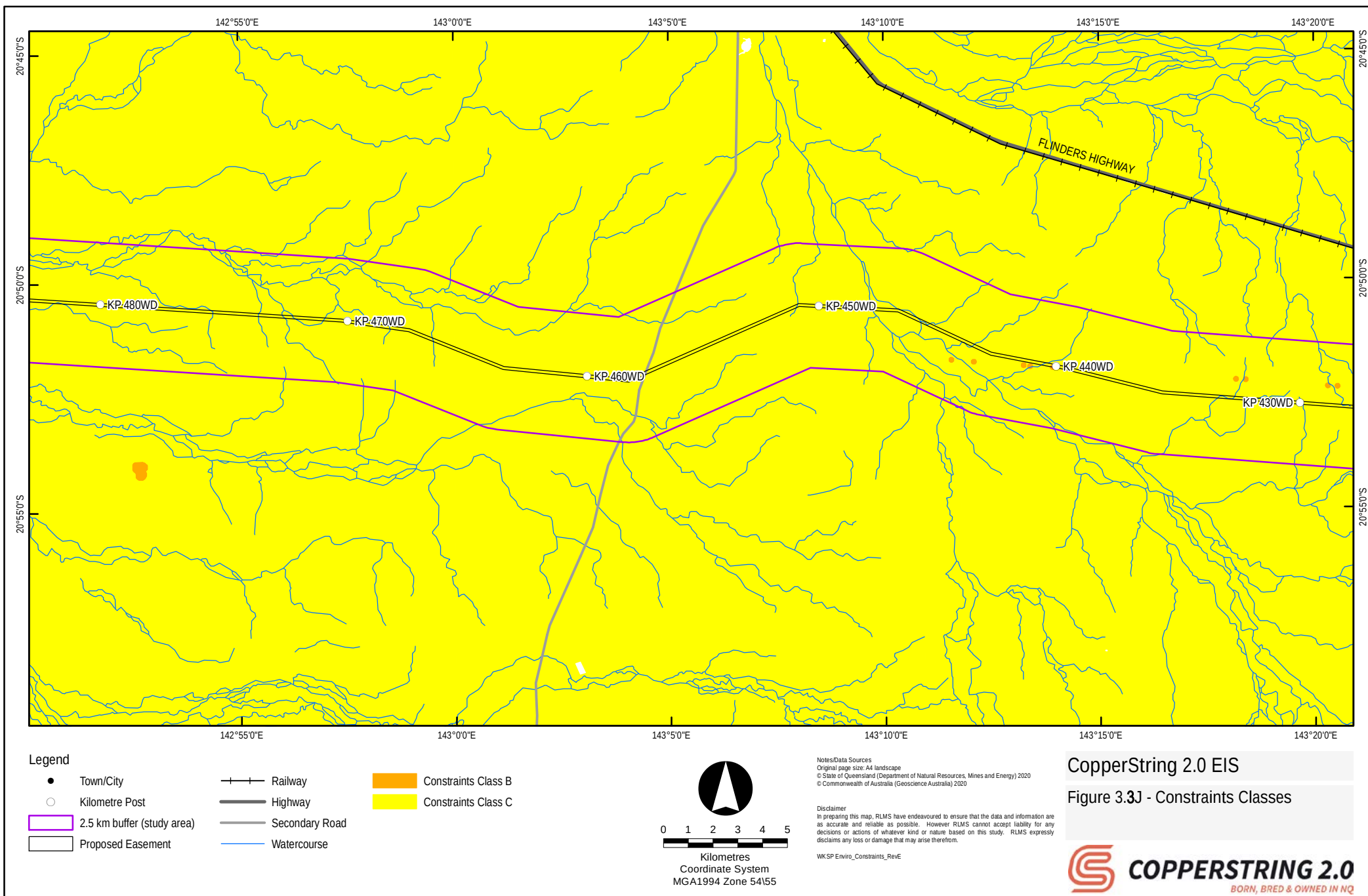


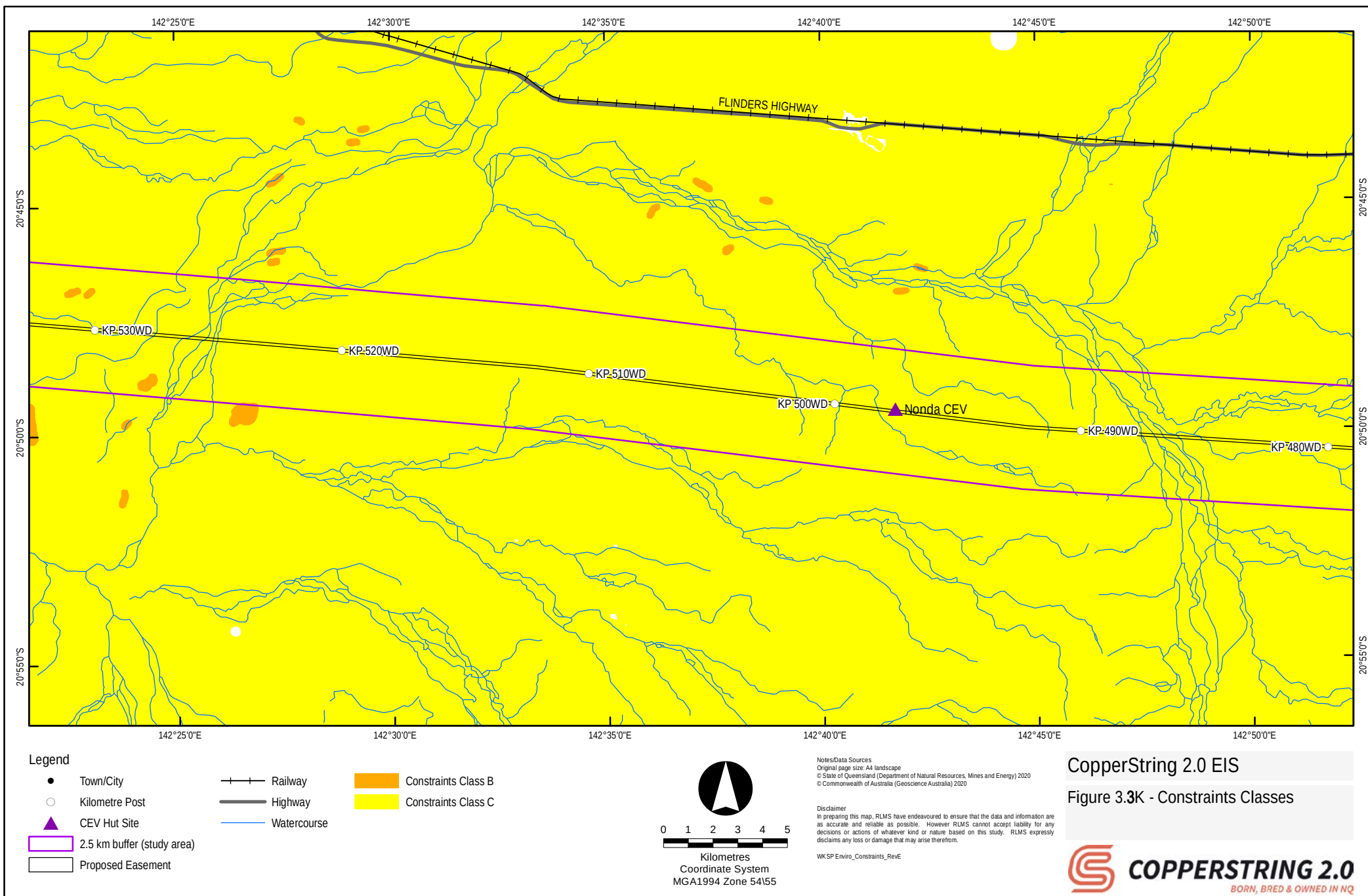


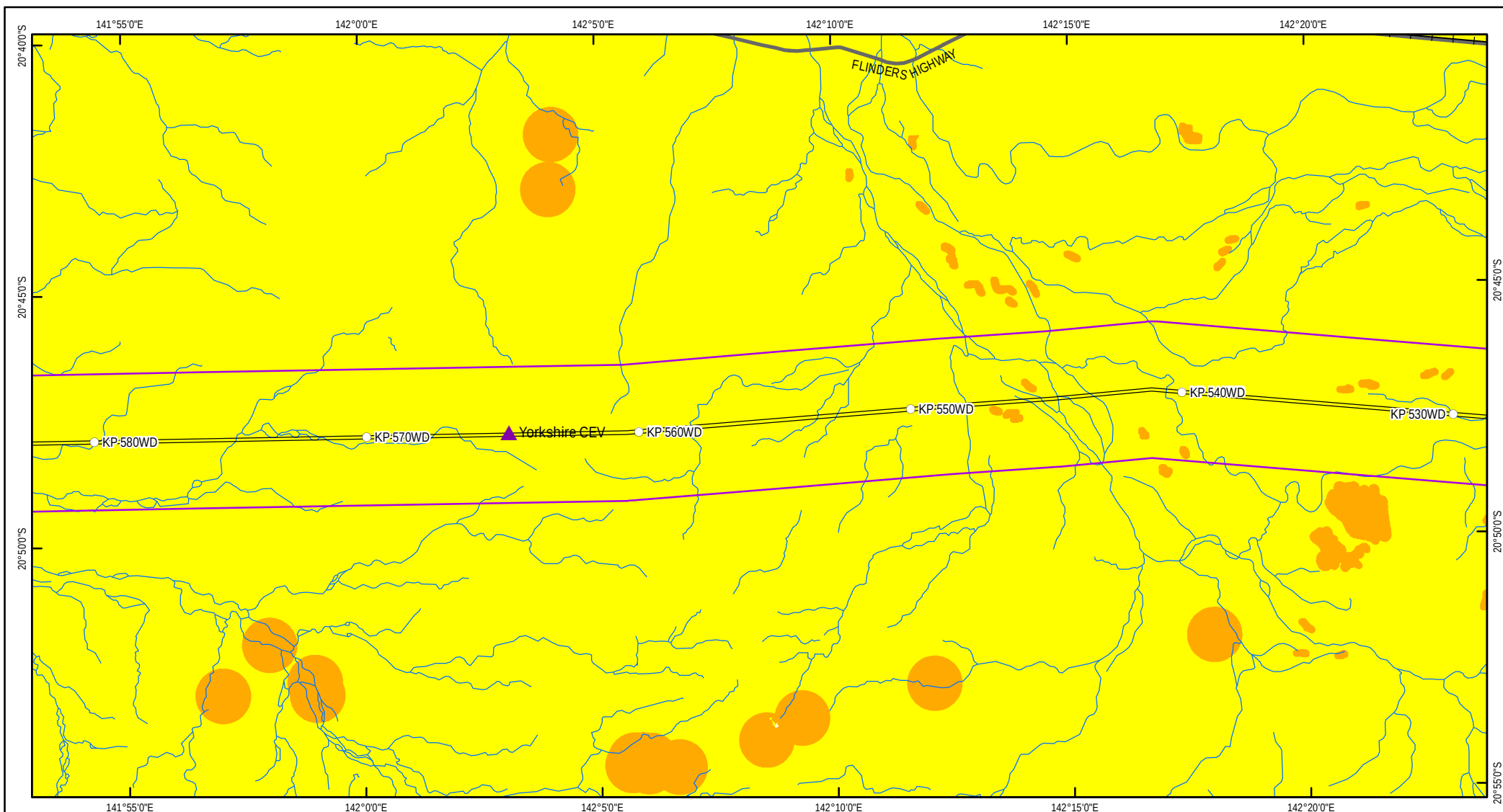








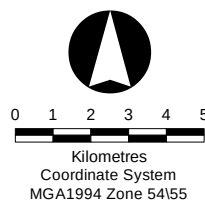




- Legend**
- Town/City
 - Kilometre Post
 - ▲ CEV Hut Site
 - 2.5 km buffer (study area)
 - Proposed Easement

- +—+— Railway
- Highway
- Watercourse

- Constraints Class B
- Constraints Class C



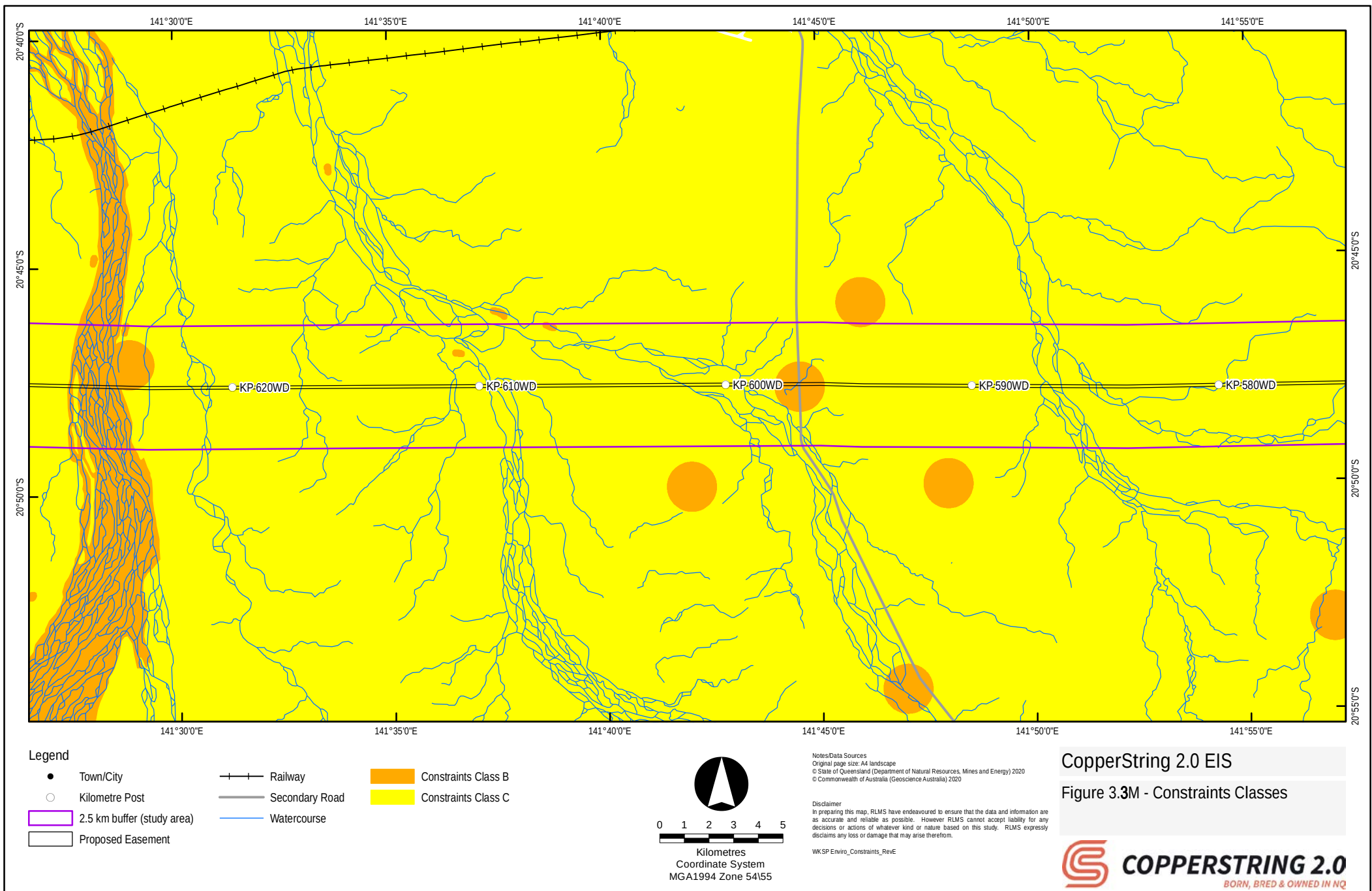
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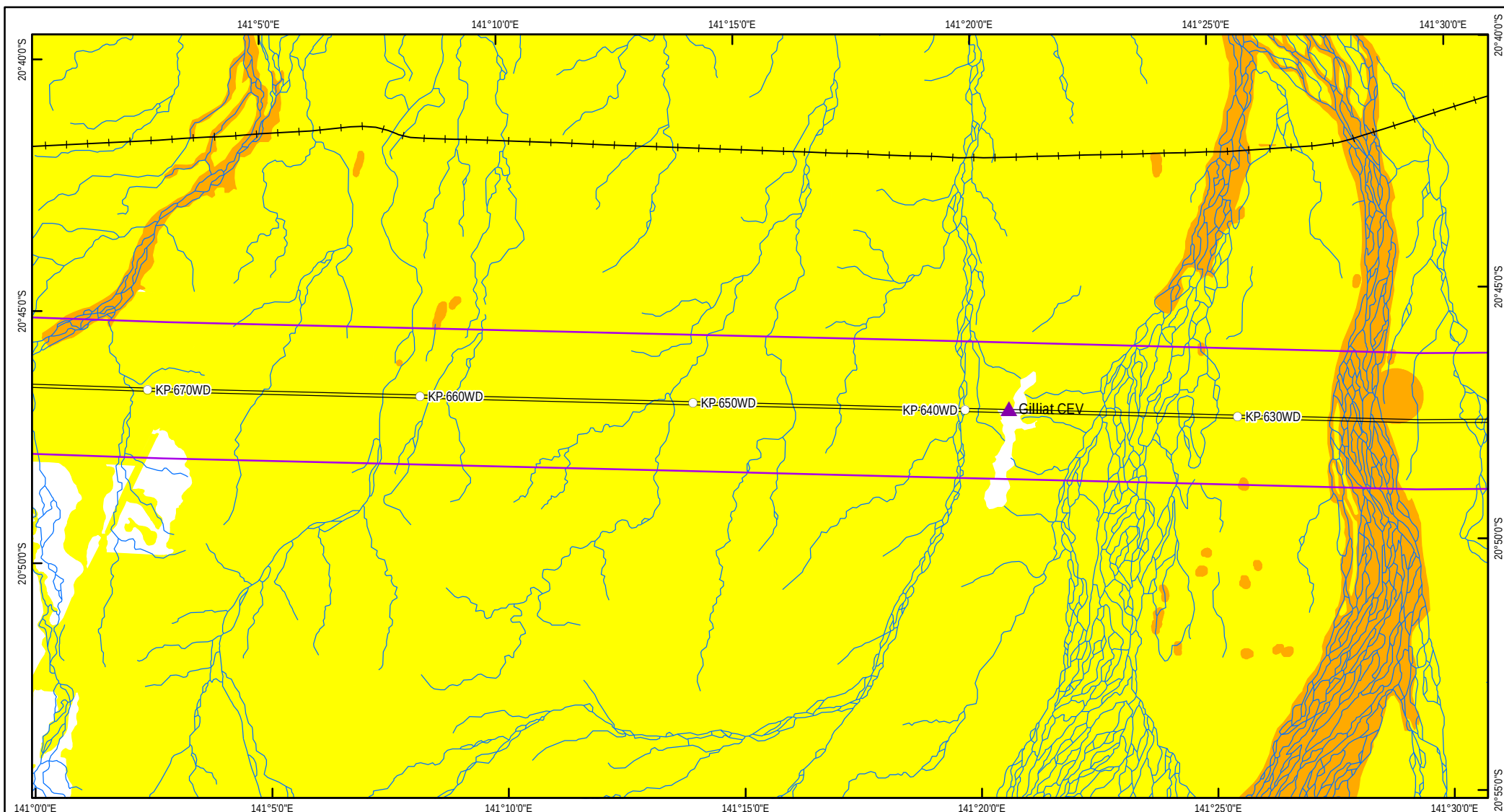
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WKSP Enviro_Constraints_RevE

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Figure 3.3L - Constraints Classes

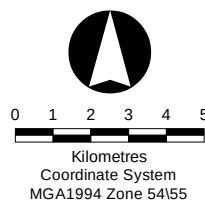




- Legend**
- Town/City
 - Kilometre Post
 - ▲ CEV Hut Site
 - 2.5 km buffer (study area)
 - Proposed Easement

- +—+— Railway
- Watercourse

- Constraints Class B
- Constraints Class C



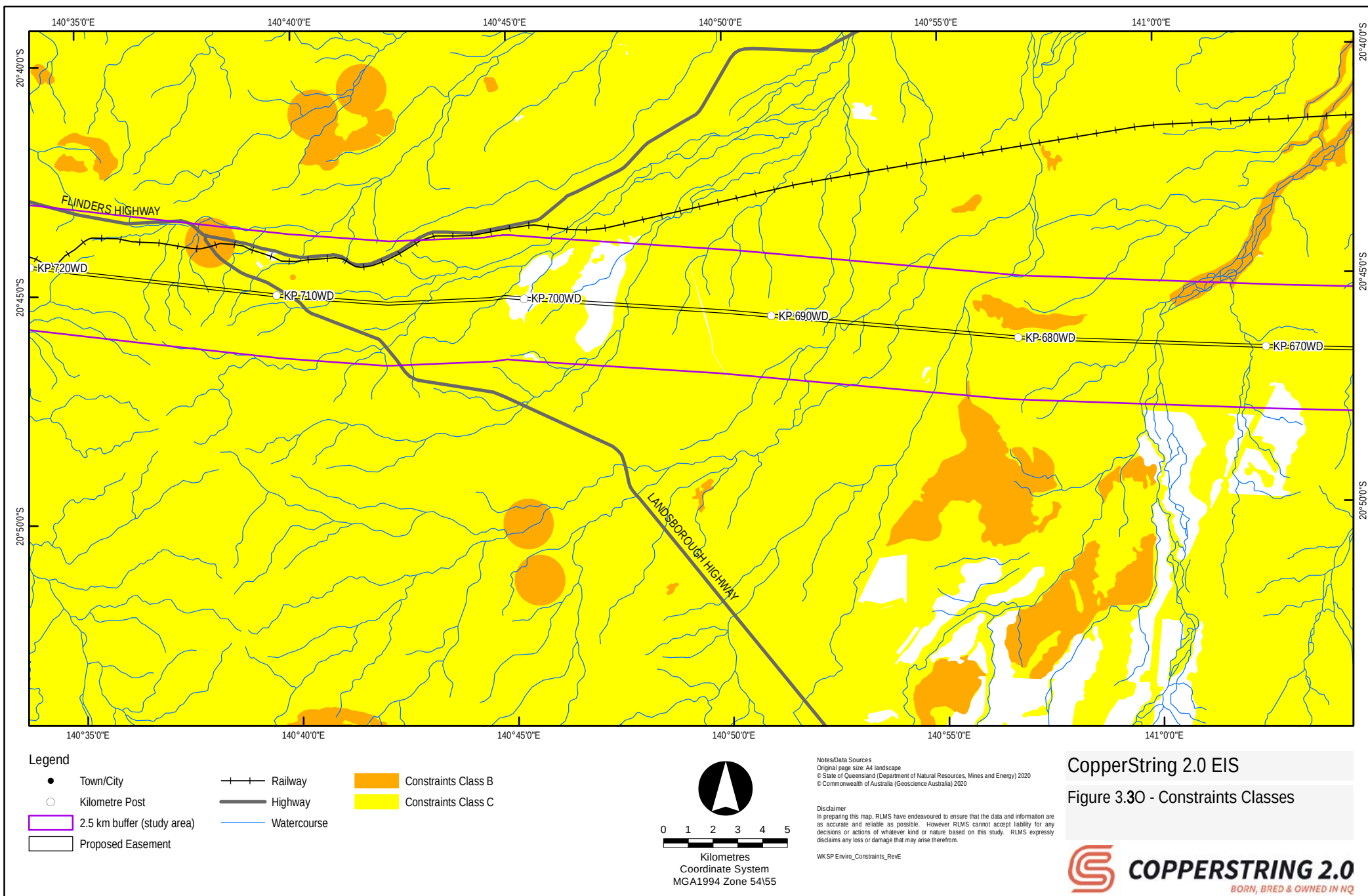
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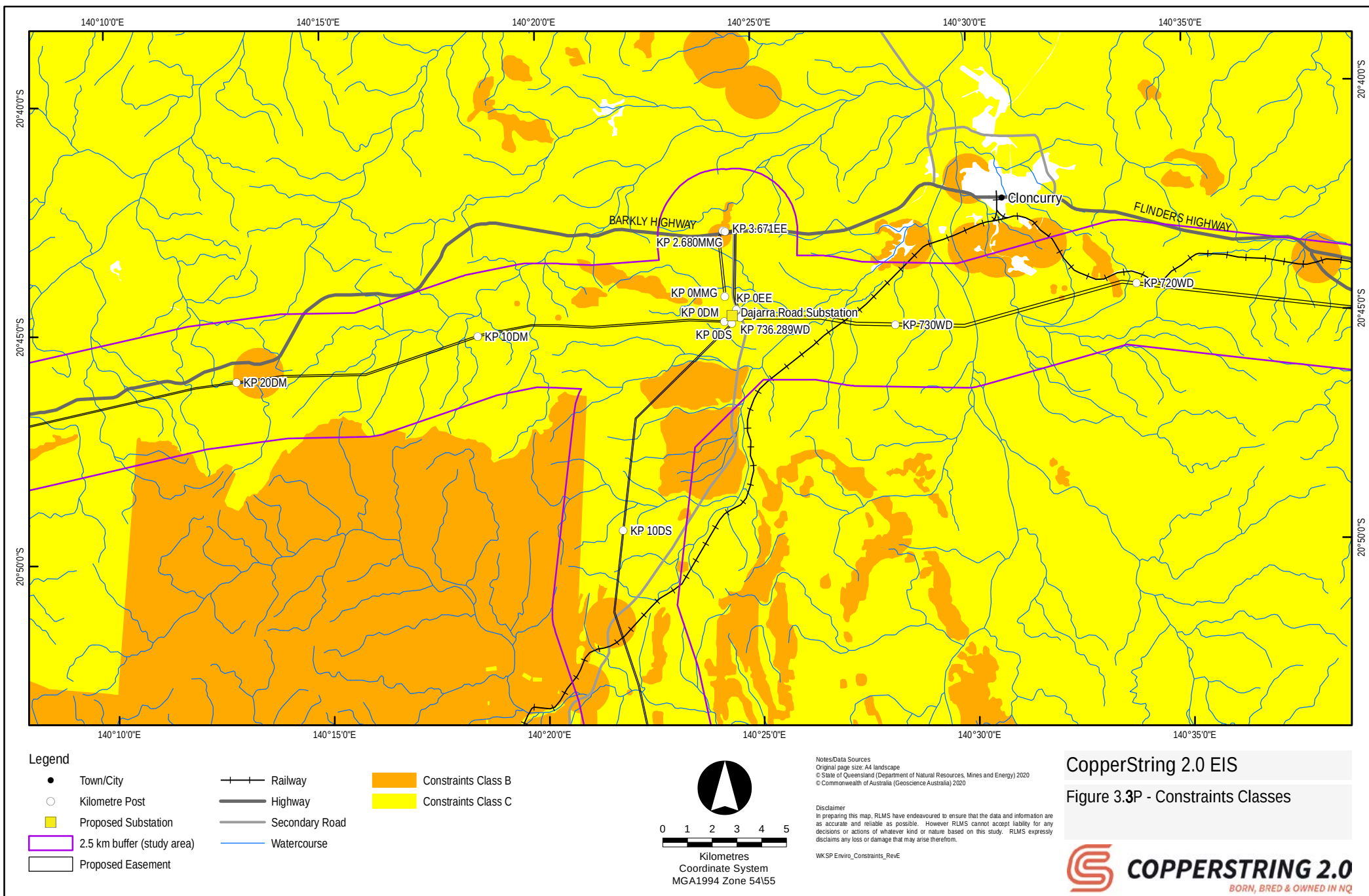
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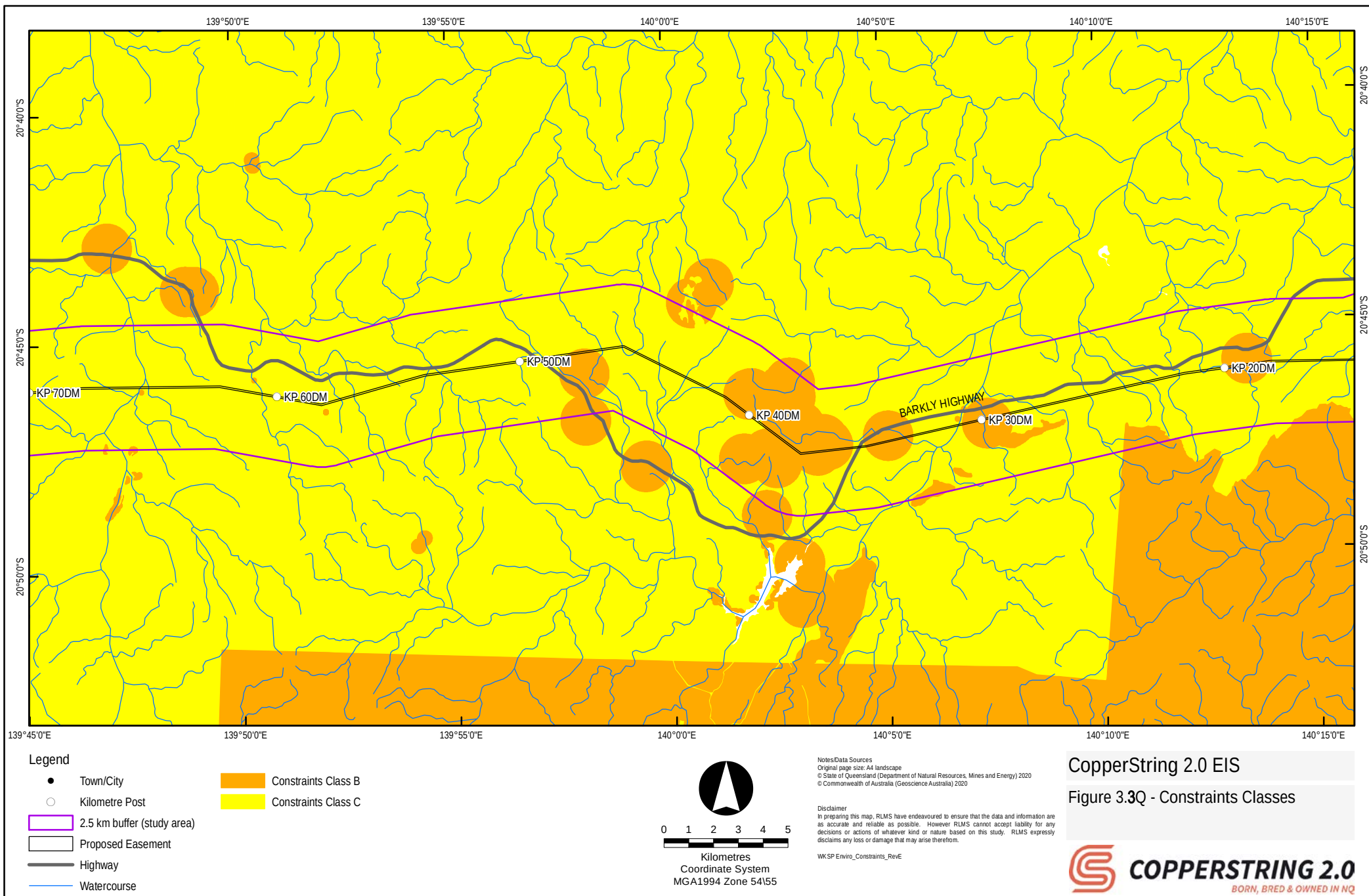
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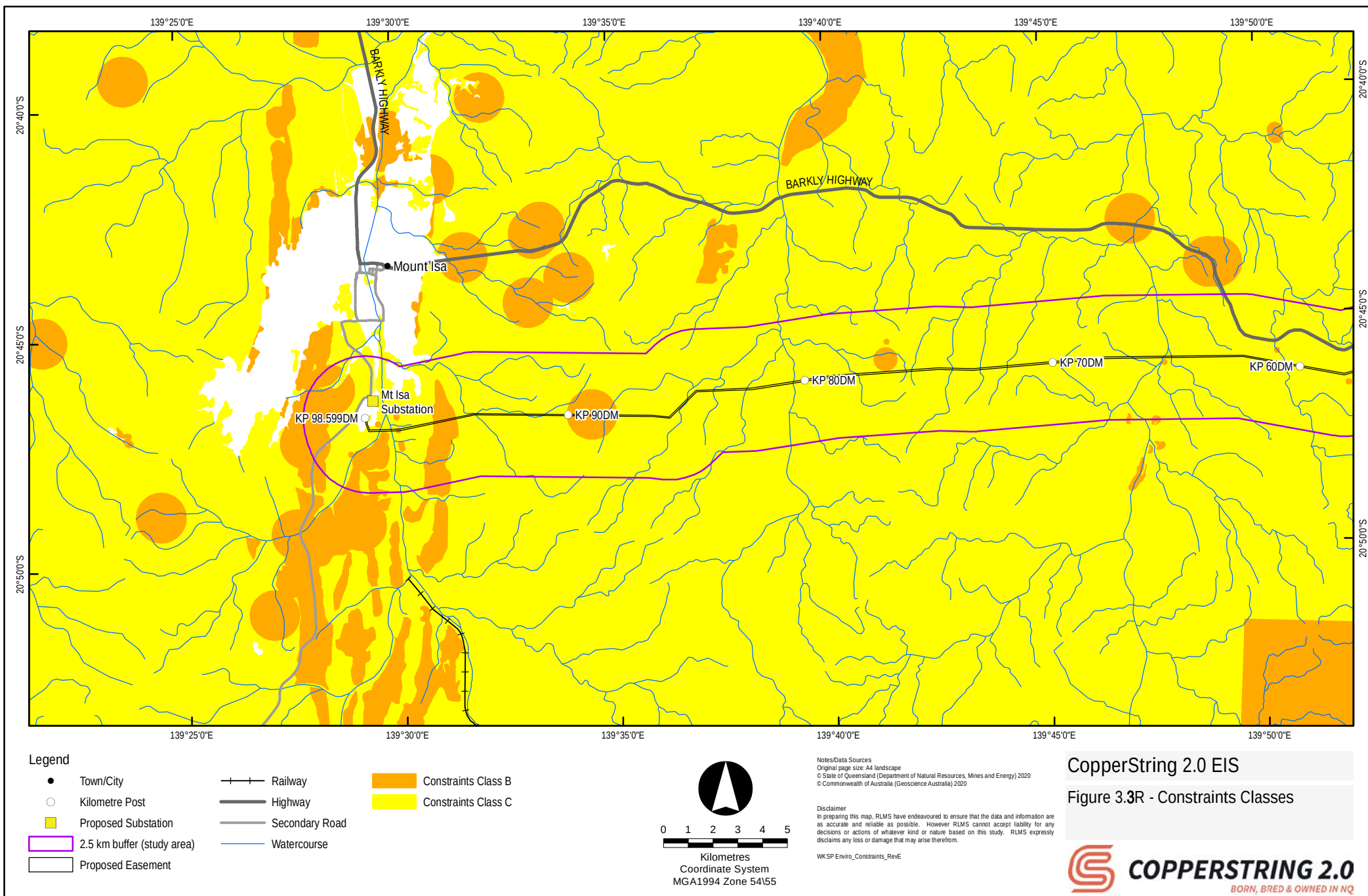
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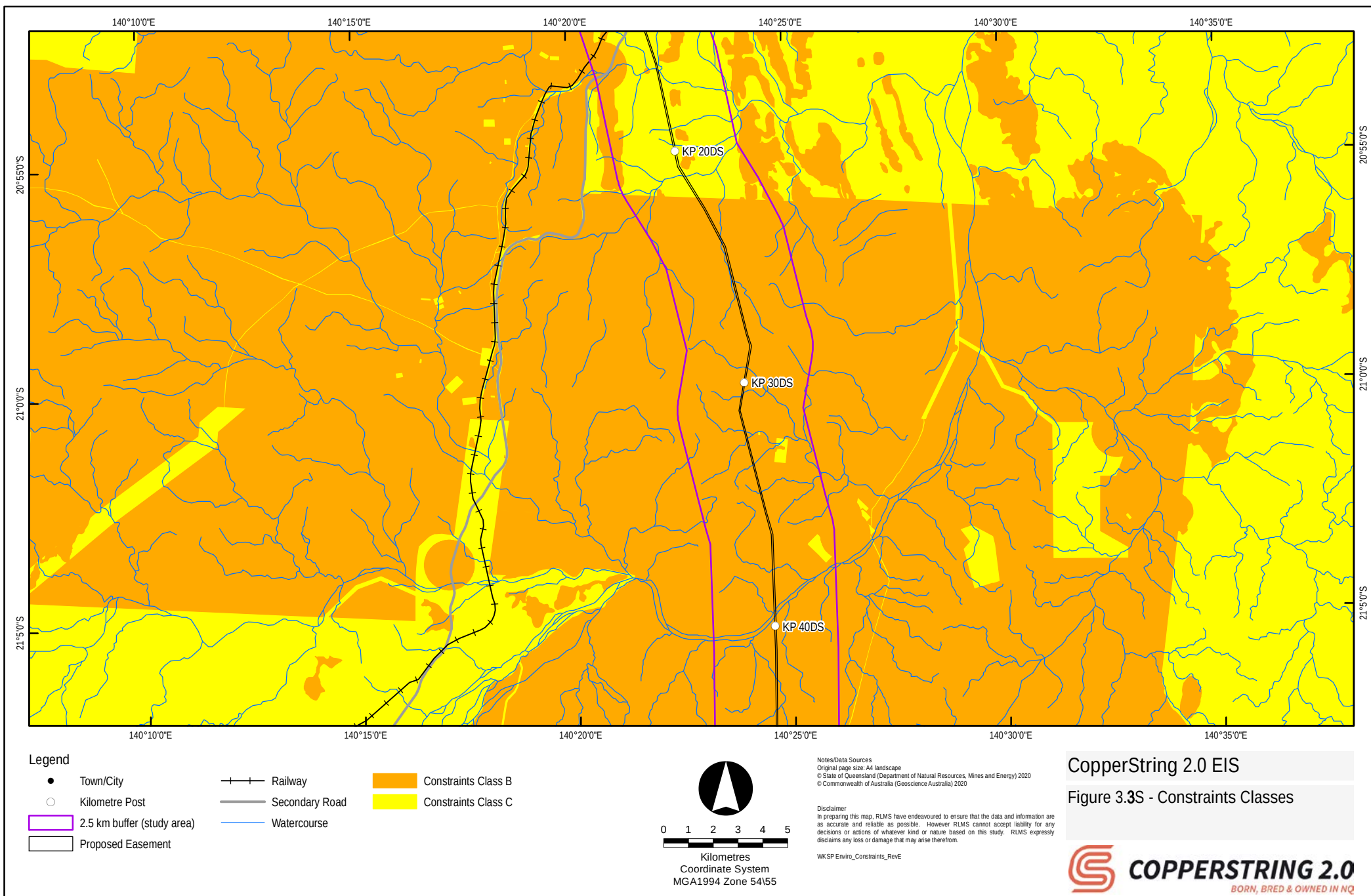
Figure 3.3N - Constraints Classes

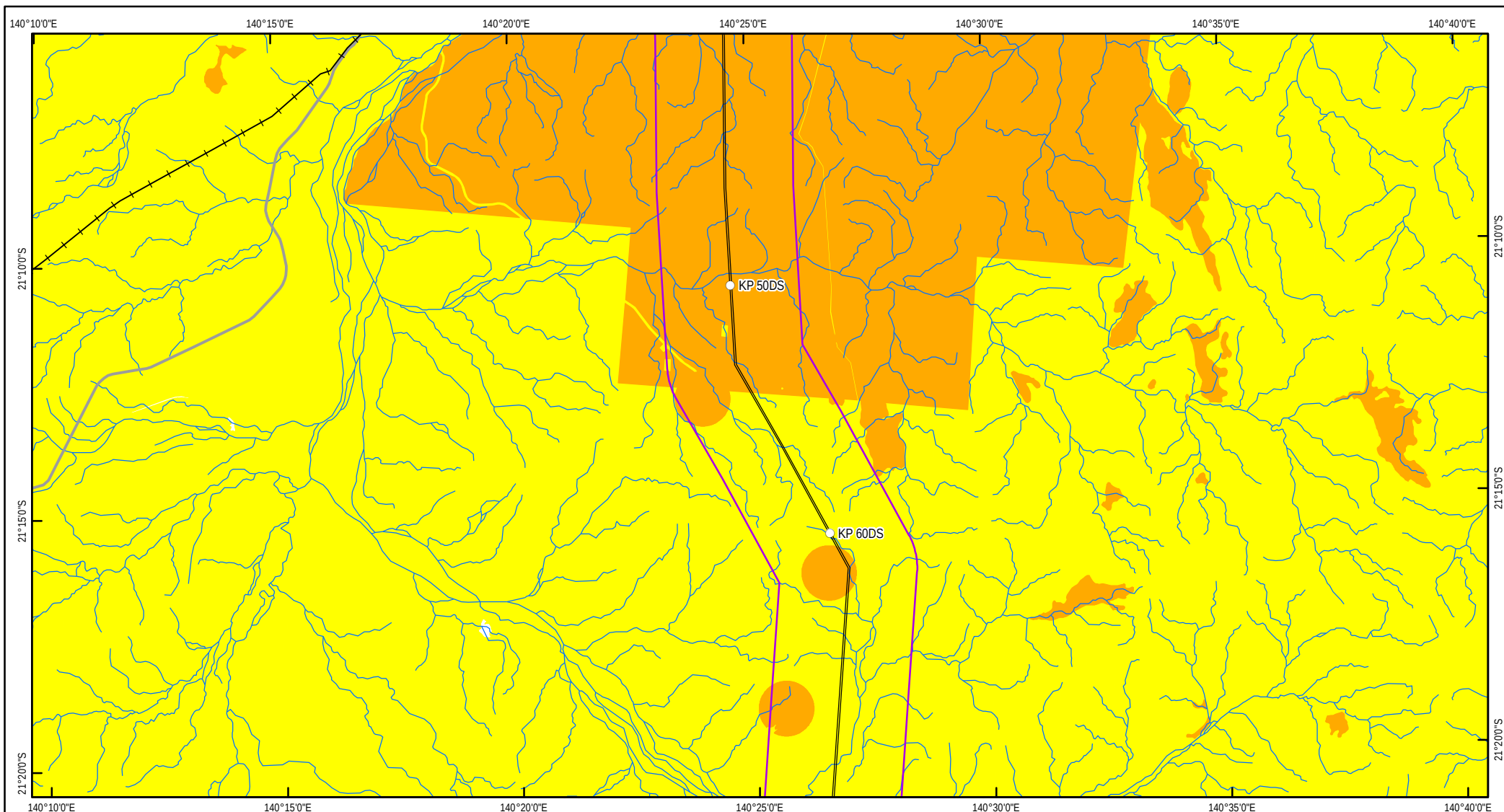








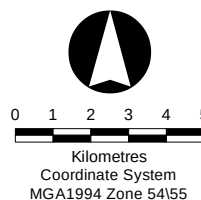




- Legend**
- Town/City
 - Kilometre Post
 - 2.5 km buffer (study area)
 - Proposed Easement

- +—+— Railway
- Secondary Road
- Watercourse

- Constraints Class B
- Constraints Class C



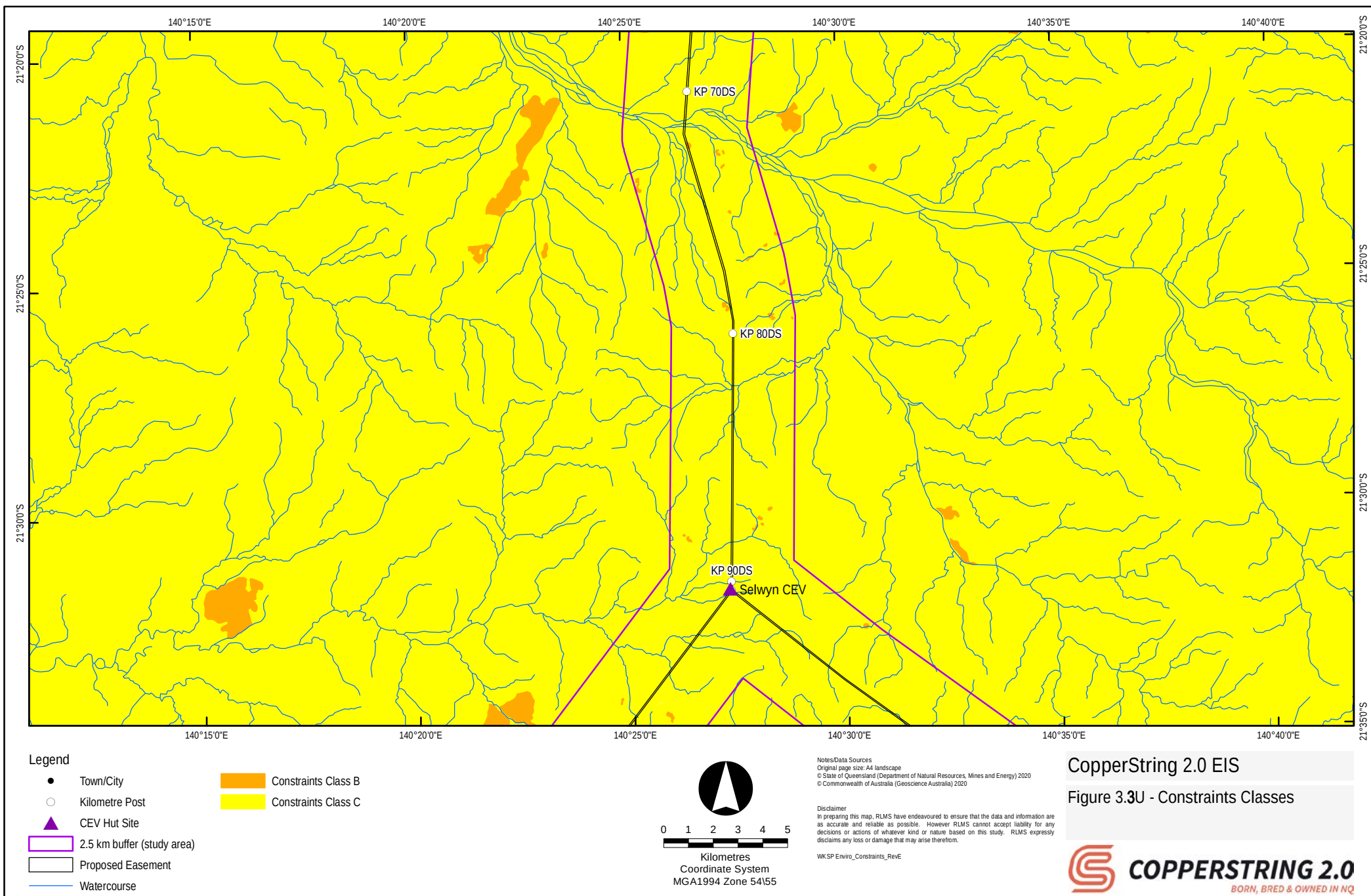
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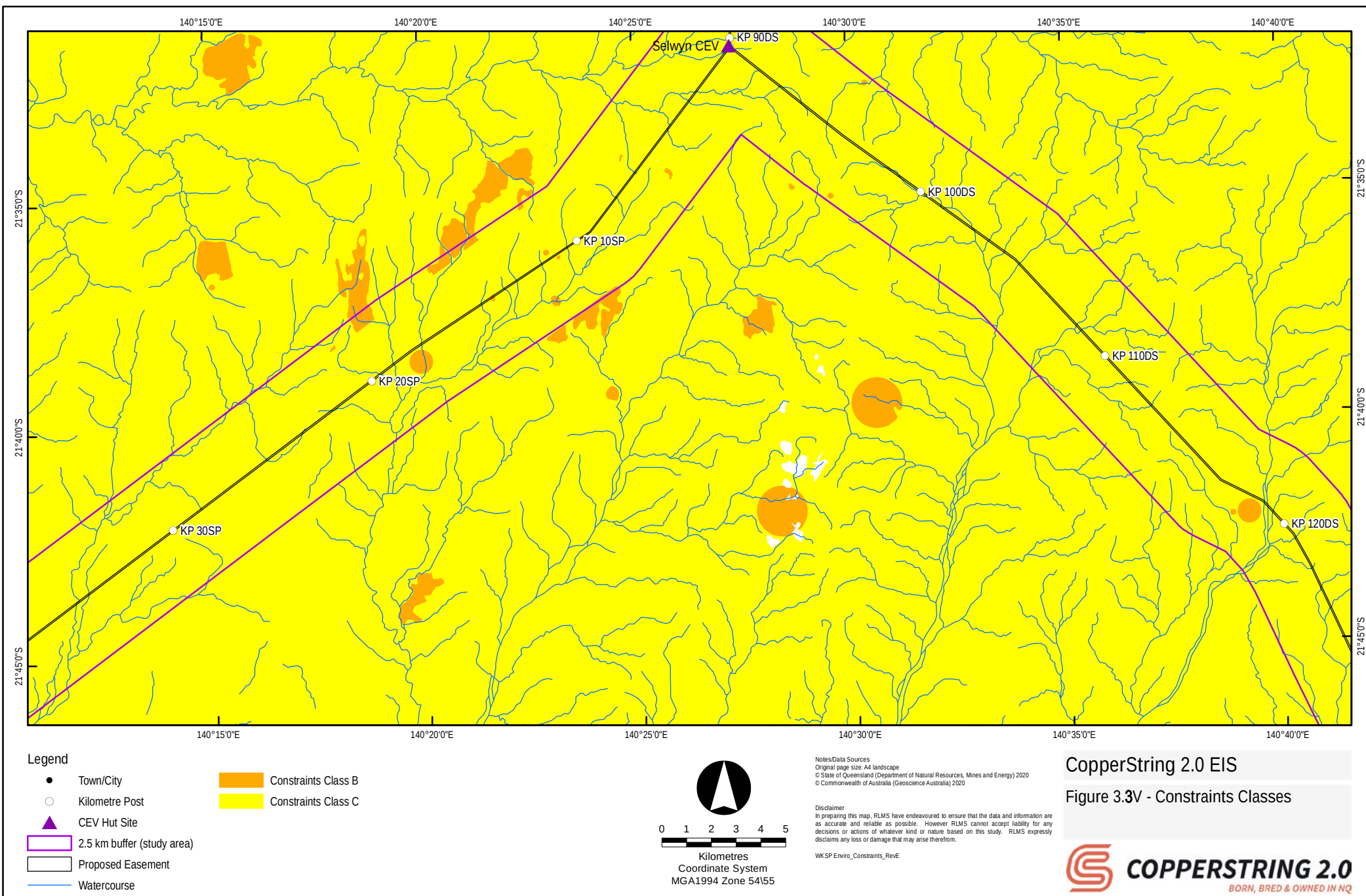
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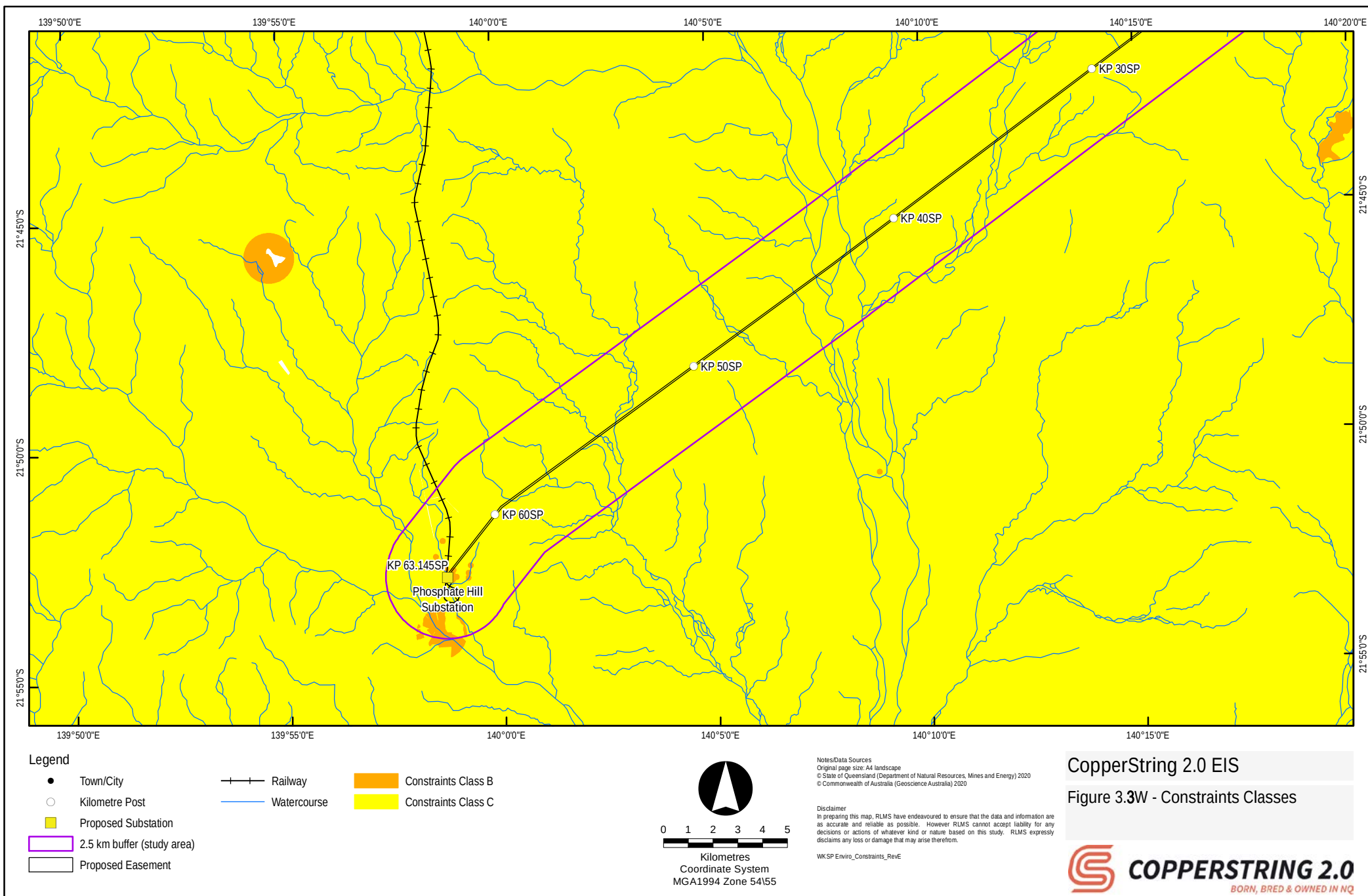
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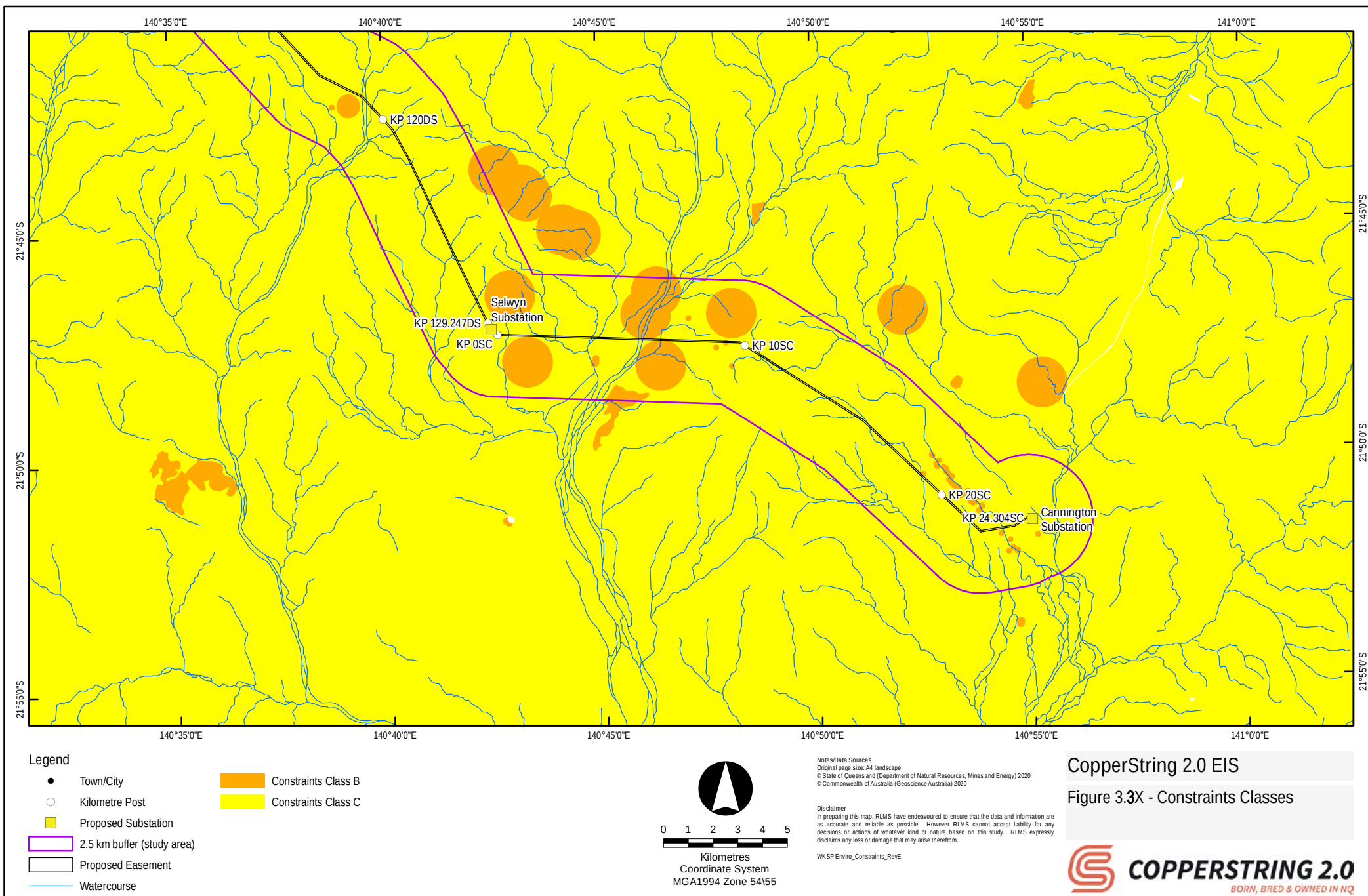
CopperString 2.0 EIS

Figure 3.3T - Constraints Classes









4. Disturbance assumptions for the EIS

4.1 Disturbance footprint assumptions

Table 4-1 below outlines the likely disturbance footprint assumptions associated with Project infrastructure, access tracks and construction related areas. Some of the impacted disturbance areas can be considered temporary in accordance with the definition under the *Planning Regulation 2017*, Schedule 24:

Temporary use means a use that—

- (a) is carried out on a non-permanent basis; and
- (b) does not involve the construction of, or significant changes to, permanent buildings or structures.

Clearing or slashing of vegetation to ground level will be required to accommodate permanent (vehicle access tracks, bedlevel crossings, tower foundations, substations, CEV huts) and temporary activities (tower assembly, brake and winch, laydown, construction camps).

Clearing of some vegetation with a canopy height greater than 5 m in accordance with the Australian Standard for OHPL 7000/7001, may be required to accommodate safe buffer distances to the transmission line and tower infrastructure.

The height of the transmission towers, and the resulting line height at maximum sag, will be developed during design from the constraints outlined in this document. The aim of this FDP is to minimise the environmental impacts of vegetation clearance and the on-going operational costs of vegetation management. This must be weighed against the capital cost of increased tower height (which also increases the tower footprint, foundation size, and associated disturbances) and the customer value of reliable electricity transmission (which includes environmental risk to the infrastructure through events such as fire induced flashover from wildfires especially in bushfire prone areas). Bushfire vegetation hazard class areas and the risk associated with bushfires are detailed in Section 3.1.9 and Volume 2 Chapter 16 Hazards, health and safety.

During vegetation management activities, such as initial construction or operational maintenance (of regrowth), all vegetation within the easement will be controlled to ensure that there is at least four metres clearance below the maximum sag of the transmission line for the associated overhead span. Where the towers are constructed with a minimum height, vegetation adjacent to, but outside of, the easement will be cut back to a plane rising at 45 degrees from 10 m high at the edge of the easement. Note that the gap between line and vegetation allows not just for conductors operating at elevated temperatures under high load conditions (maximum sag in still wind) but also for swing of the conductor under the maximum design wind conditions. Volume 3 Appendix I Indicative infrastructure layout and cross-section drawings of this EIS contains a drawing cross-section detailing the clearing requirements on a cross section of the easement.

Where trimming is detrimental to the health or stability of a tree that would eventually fall into the easement resulting in contact with the transmission line or encroaching the vegetation management buffer, the tree will be felled.

Table 4-1 Disturbance footprint assumptions

Temporary / Permanent infrastructure	Standard impact footprint (area and height)	Design recommendations (by Environmental Constraint Class)	Construction recommendations	Post construction / Rehabilitation	Operation
Transmission line easement	Vegetation over 5 m within the 60 m wide easement will be removed to prevent interaction with the overhead span. Vegetation adjacent to, but outside of, the easement will be cut back to a plane rising at 45 degrees from the base of the tower. Span length between 400 m and 500 m dependent on terrain.	• Environmental Constraint Class A-span • Environmental Constraint Class B-D clearing permitted as per standard impact footprint • Riparian landscape type to be undisturbed	• Where possible, retain riparian landscape type by spanning vegetation	• Rehabilitate cleared areas with appropriate species (mature canopy height less than vegetation clearance height)	• Vegetation management where required
Tower footprint	Disturbance footprint: approx. 144 m ² (12 m x 12 m) Additional temporary disturbance for tower construction at each tower approx 960m ² (12 m x 80 m)	• Environmental Constraint Class A-avoid, move footprint location • Environmental Constraint Class B-D clearing permitted as per standard impact footprint • Erosion and sediment control as required	• Environmental Constraint Class A-avoid • Erosion and sediment control as required • Riparian landscape type to be avoided where possible	• Rehabilitate pad area with grasses • Erosion and sediment control as required	• Erosion and sediment control as required

Temporary / Permanent infrastructure	Standard impact footprint (area and height)	Design recommendations (by Environmental Constraint Class)	Construction recommendations	Post construction / Rehabilitation	Operation
Access track	7 m max wide	• Environmental Constraint Class A-avoid clearing • Environmental Constraint Class B-D clearing permitted as per standard impact footprint • Erosion and sediment control as required	• Environmental Constraint Class A -avoid • Erosion and sediment control as required	• Erosion and sediment control as required	• Erosion and sediment control as required
CEV hut	Disturbance footprint: 60 m x 65 m (approx. 0.39 ha each)	• Environmental Constraint Class A-avoid • Environmental Constraint Class B-D – clearing permitted as per standard impact footprint • Avoid areas below 1 in 200 year flood level • Erosion and sediment control as required	• Environmental Constraint Class A -avoid • Erosion and sediment control as required • Riparian landscape type to be avoided where possible	• Buffer area-rehabilitate with grasses between CEV hut and outer fence	• Vegetation management within disturbance footprint
Brake and winch site	Temporary disturbance footprint: every 7 km with a 60 m x 250 m (1.5 ha) area about 100-200 m away from	• Environmental Constraint Class A-avoid clearing • Environmental Constraint Class B-D	• Environmental Constraint Class A-avoid clearing • Environmental Constraint Class B-D	• Rehabilitate with grasses and appropriate tree species as per	N/A

Temporary / Permanent infrastructure	Standard impact footprint (area and height)	Design recommendations (by Environmental Constraint Class)	Construction recommendations	Post construction / Rehabilitation	Operation
	tower on each side under the transmission line or two 125 x 60 m each located at bends in the corridor. This footprint can be contained within cleared easement if the line is straight at the site, or possibly out of easement in the direction of the pull/brake if the site is on a bend in the line (approximately once every 70 km)	clearing permitted as per standard impact footprint	clearing permitted as per standard impact footprint • Erosion and sediment control as required • Riparian landscape type to be avoided where possible	transmission line easement	
Substation	Permanent disturbance footprint: up to 39 ha	• Environmental Constraint Class A - avoid • Environmental Constraint Class B-D - clearing permitted as per standard impact footprint • Avoid areas of below 1 in 200 year flood level	• Cleared, levelled • Stormwater system with first flush diversion system • Erosion and sediment control as required • Riparian landscape type to be avoided where possible	• Buffer area-rehabilitate with grasses between substation and outer fence	• Could replant inner-outer buffer area • Erosion and sediment control as required

Temporary / Permanent infrastructure	Standard impact footprint (area and height)	Design recommendations (by Environmental Constraint Class)	Construction recommendations	Post construction / Rehabilitation	Operation
		• Stormwater system with first flush diversion system • Erosion and sediment control as required			
Laydown areas (transmission line)	Temporary disturbance footprint: 4 ha	• Environmental Constraint Class A- avoid clearing • Environmental Constraint Class B-D clearing permitted as per standard impact footprint • Stormwater system • Erosion and sediment control as required Co-located with accommodation camps where practicable	• Environmental Constraint Class A – avoid • Cleared, levelled, stormwater system • Hard stand gravel (all weather surface) • Riparian landscape type to be avoided where possible	• Rehabilitate 250 m x 250 m footprint • Remove gravel, go back to surface • Re-seed and reuse	N/A
Fly yards	100 m*100 m (1 every 20 towers – approx. 1 per 10 km.	• Avoid riparian landscape type areas • Fly yard positioning to prioritise selection of pre-disturbed sites • Clearing for fly yards only anticipated in Mount Isa	• Environmental Constraint Class A – avoid • Riparian landscape type – avoid	• Rehabilitate 1 ha footprint • Re-seed and reuse	N/A

Temporary / Permanent infrastructure	Standard impact footprint (area and height)	Design recommendations (by Environmental Constraint Class)	Construction recommendations	Post construction / Rehabilitation	Operation
		Augmentation, Southern Connection, Phosphate Connection and Cannington Connection corridor sections • Utilise substation and CEV hut footprints where practicable			
Construction accommodation camps	Temporary disturbance footprint: 8 ha 350 person camp estimated at 110 demountable buildings each, unless existing camps are identified	• Environmental Constraint Class A-avoid • Prioritise location in existing cleared area • Stormwater system • Erosion and sediment control as required	• Environmental Constraint Class A-avoid • Stormwater system • Erosion and sediment control as required • Riparian landscape type to be avoided where possible	• Remove gravel or hardstand, go back to natural surface • Re-seed and reuse	N/A

4.2 Landscape types

Six general landscape types occur across the study area, based on regional ecosystem mapping classified by broad vegetation groups (BVG), and other features such as watercourses. The BVGs are classified by the Queensland Herbarium³ by amalgamating vegetation communities on an Environmental basis. The BVGs might be grouped according to a single dominant species or suite of species, or by a distinct structural formation (e.g. grasslands) or a combination of structural formation and habitat (e.g. low woodlands on plains). The dominant BVG type (where a mixed regional ecosystem polygon occurs) at the 1:1 million scale have been used to derive landscape types.

The following landscape types have been defined for the purposes of setting criteria for clearing in the Project area:

- Open forest to open woodland (eucalypt/melaleuca/belah dominated) on flat to undulating plains.
- Riparian zone and fringing vegetation along ephemeral channels, watercourses and channelised floodplains.
- Low open woodland to wooded spinifex grassland (eucalypt/acacia dominated) on slopes, crests and scarps.
- Mixed low woodland with spinifex (gidgee/mulga/eucalypt dominated) on plains.
- Tussock/hummock grassland.
- Cleared grazing land with scattered trees.

These are further described in Table 4-2 in terms of typical tree heights and densities, habitat features and associated mapped BVGs.

LiDAR data from the 2010 CopperString 1.0 EIS has been used to confirm assumptions around canopy heights in the different landscape types contained within Table 4-3. Further information on this is contained in Volume 1 Chapter 3 Site Description of this EIS.

³ Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science. Available: https://www.des.qld.gov.au/data/assets/pdf_file/0029/81929/descriptions-of-broad-vegetation-groups.pdf

Table 4-2 General landscape types across the study area

Landscape type	Landform	Habitat features	Height range / cover	Locations
Open forest to open woodland (eucalypt, melaleuca or belah dominated)	Flat to gently undulating plains	• Mature hollow-bearing trees • Some ground cover vegetation and shrub layer providing shelter and food resources • Potential habitat for conservation significant species – short-beaked echidna, grey falcon, northern greater glider, black-throated finch	Trees 10-30 m Very sparse to mid-dense (<20-80% canopy cover)	Between Woodstock and Hughenden BVG: 9e, 12a, 13c, 14b, 17a, 17b, 17c, 18a, 18b, 21a, 21b, 25a



BVG 21a



BVG 17c



BVG 25a

Landscape type	Landform	Habitat features	Height range / cover	Locations
Riparian zone and fringing vegetation along ephemeral channels/ watercourses/ channelised floodplains	Fringing drainage lines on alluvial plains Alluvial terrace (e.g. adjacent Burdekin River) Sand, rock or water river bed	• Movement corridor and flyway • Ephemeral pools an important source of drinking water • Mature hollowing bearing trees provide blossoms and nesting opportunities. • Sparse shrub layer provide nesting habitat and foraging opportunities • Ground-level microhabitats • Ground cover vegetation contains variety of grasses, burrs, legumes, piles of woody debris and large logs providing food resources and protection. • Potential habitat for conservation significant species – painted honeyeater, masked owl, grey falcon, common death adder, plains death adder	Trees 10-30 m 20-80% canopy cover Narrow and linear, sometimes extending adjacent watercourse	Whole alignment BVG: 16a, 16b, 16c, 16d, 22c Assumed to buffer of 50 m either side of mapped watercourses



BVG 16a



BVG 16c



BVG 16d

Landscape type	Landform	Habitat features	Height range / cover	Locations
Low open woodland with spinifex or other grasses (eucalypt or acacia dominated)	Scarps, crests, plateaus and slopes	• Large rock formations with large to small crevices, large openings providing shelter for larger fauna and large surfaces that have the potential to be used as basking areas for snakes, geckos and lizards. • Grass tussocks (e.g. <i>Spinifex spp.</i>) and sparse shrubs protrude between the boulders, providing food resources for granivorous birds and shelter for small reptiles (e.g. skinks) and small mammals. • Mature, hollow bearing <i>Eucalyptus sp.</i> are canopy dominant, providing foraging and nesting opportunities for birds and arboreal mammals and reptiles. • Other habitat resources include termite mounds, small, loose rocks, larger boulders, gidgee provides fallen woody debris and large hollow ground logs, and stags. • Potential habitat for conservation significant species – purple-necked rock wallaby, painted honeyeater, southern black-throated finch, masked owl, short-beaked echidna, common death adder, plains death adder	Trees 2-10 m Sparse (20-50% canopy cover)	West of Cloncurry to Mount Isa and south to Selwyn BVG: 19a, 19b, 19d, 24a



BVG 19b



BVG 19a



BVG 19b

Landscape type	Landform	Habitat features	Height range / cover	Locations
Mixed low woodland with grasses (gidgee, mulga, or eucalypt dominated)	Gently undulating to flat plains	• Gidgee and sandalwood canopy providing peeling bark, fallen logs and debris for habitat for arboreal and ground dwelling reptiles. • Grasses provides shelter for small mammals and reptiles and food resources for granivorous birds. • Cracking clay and mulching soils present to provide shelter for ground dwelling reptile species. • Hollow-bearing trees are moderately prevalent and provide habitat for microbats, hollow-nesting birds and arboreal reptiles. • Shrub layer is predominately sparse in most areas, and provides some nesting and foraging resources for shrub-nesting birds, including finches. • Scattered rocks and boulders may be present for shelter and basking opportunity for reptiles and mammals. • Termite mounds provide shelter and food resources for ground-dwelling mammals and reptiles. • Potential habitat for conservation significant species – painted honeyeater, masked owl, short-beaked echidna, common death adder and plains death adder.	Trees to 12 m Very sparse (<20% canopy cover)	Between Hughenden and Cloncurry and south to Selwyn BVG: 23a, 26a, 27a, 27b, 27c



BVG 26a



BVG 27a



BVG 27c

Landscape type	Landform	Habitat features	Height range / cover	Locations
Tussock/hummock grassland (Mitchell grass/spinifex)	Flat to undulating plains Cracking clay plains with gilgai	• Red sands and clays present which can be utilised by reptiles and amphibians for shelter. • Sparsely distributed mature, hollow bearing <i>Corymbia sp.</i> along the creek line. Habitat hollows providing nesting areas for arboreal mammals and birds. • <i>Acacia sp.</i> with peeling bark present, providing habitat for arboreal reptiles such as geckoes. • Moderately dense grass species present including buffel and <i>Aristida sp.</i> that is heavily grazed. Some value is present for foraging opportunities by granivorous bird species and shelter for reptiles. • Sparse woody debris present to provide shelter for reptiles. • Cracking clays present, providing shelter and habitat for reptile species. • Area heavily impacted by cattle grazing and trampling which compacted the ground in places. • Potential habitat for conservation significant species – Julia Creek dunnart, ornamental snake (gilgai)	Very few to no trees Grasses <1 m	Between Hughenden and Cloncurry BVG: 30a, 30b, 31a, 31b, 33b



BVG 30a



BVG 30b



BVG 30b (gilgai)

Landscape type	Landform	Habitat features	Height range / cover	Locations
Previously cleared/grazing land with scattered trees	Various	• Area heavily impacted by cattle grazing and trampling which compacted the ground in places. • Red sands and clays can be used by reptiles and amphibians for shelter. • Sparsely distributed mature, hollow bearing trees providing nesting areas for arboreal mammals and birds. • <i>Acacia sp.</i> with peeling bark present, providing habitat for arboreal reptiles such as geckoes. • Moderately dense grass species present including buffel and <i>Aristida sp.</i> that is heavily grazed. Some value is present for foraging opportunities by granivorous bird species and shelter for reptiles. • Sparse woody debris present to provide shelter for reptiles.	Scattered trees to 20 m Very sparse (<20% canopy cover)	Scattered along whole corridor BVG: NA (non-remnant)



Non-remnant areas

Table 4-3 Landscape types per corridor section

Corridor Section	Landscape type					
	Riparian	Open forest	Low open woodland	Mixed low woodland	Tussock	Previously cleared
Percentage of landscape type per corridor section						
Cannington Connection (24 Km)	0.25	0.00	0.25	0.28	0.20	0.02
Chumvale Connections (4 Km)	0.27	0.00	0.71	0.02	0.00	0.00
CopperString Core (395 Km)	0.18	0.00	0.08	0.03	0.70	0.01
Mount Isa Augmentation (99 Km)	0.26	0.00	0.69	0.00	0.05	0.00
Phosphate Hill Connection (63 Km)	0.12	0.00	0.46	0.10	0.32	0.00
Renewable Energy Hub (342 Km)	0.17	0.68	0.00	0.01	0.05	0.09
Southern Connection (129 Km)	0.21	0.00	0.74	0.03	0.02	0.00
Percentage of vegetation over 5 m in each landscape type and corridor section						
Cannington Connection	1.63	-	1.78	0.29	0.38	-
Chumvale Connections	3.19	10.13	0.19	0.26	0.05	0.08
CopperString Core	3.19	10.13	0.19	0.26	0.05	0.08
Mount Isa Augmentation	3.47	-	2.23	0.01	0.18	-
Phosphate Hill Connection	1.25	-	0.77	0.10	0.23	0.00
Renewable Energy Hub	3.19	10.13	0.19	0.26	0.05	0.08
Southern Connection	2.82	-	3.85	0.18	0.03	-

4.3 LiDAR

Updated LiDAR data will be procured as part of the detailed design process. The data collected will be used to:

- Determine topography of the corridor selection and assist in the siting of tower locations.
- Verify the actual canopy height within the corridor selection and confirm these against the assumed canopy types within the landscape types. This will supersede assumptions around canopy within landscape types.

The LiDAR data will also be used to ensure that the design does not exceed assumptions in the EIS (planning phase) and can verify the expected clearing densities and qualities prior to commencement of construction. Where canopy height is a factor influencing the design (e.g. in the case of tower heights), the LiDAR information will be used to critically evaluate the corridor selection so the canopy height can be considered in the design process. In this way the LiDAR data will be used to assist in design of infrastructure and contribute to meeting aims set out in Section 5.

4.4 Landscape types clearing assumptions

The disturbance footprint assumptions in Table 4-1 have been developed from the Project description (Volume 1 Chapter 2 Project Description). These footprints were then used to estimate total potential disturbance across the Project area per landscape type (Appendix A). These disturbance footprints were estimated using the disturbance footprint assumptions in Table 4-1 and proportioning the disturbance across the landscape types in each corridor section (Appendix A).

The total permanent and temporary disturbance footprints within the easement corridor were also calculated to determine the permanent clearing loss as a percentage of each corridor section (Appendix A).

All woody vegetation within the transmission line easement, which is or may grow to a height which interferes with the sag of the transmission line for the associated overhead span, it will require removal. In some landscape types this may require:

- clearing of all vegetation within the corridor with a canopy height which interferes with the transmission line;
- only trimming of taller trees, or
- selective clearing of taller vegetation and retention of lower vegetation.

All vegetation within the standard footprint of permanent infrastructure such as access tracks, tower footprints, CEV huts and substations will be required to be cleared for the life of the infrastructure. Any large open earth areas (fire breaks) within these facilities will be seeded for ground cover.

All vegetation within the assumed disturbance footprint of temporary infrastructure sites such as tower construction areas, and brake and winch sites will be rehabilitated to match surrounding conditions following construction.

The total area within the corridor selection that is expected to be disturbed is influenced by:

- The ability to position towers in topographically high locations, limiting interaction with taller trees found in gullies.
- The ability to position high towers close to riparian vegetation to allow riparian vegetation to be spanned.

- Some landscape types may only require the removal of limited areas of trees for the associated overhead span, whilst retaining lower growing vegetation.

Estimates for the percentage of each corridor likely to experience permanent clearing loss in the easement are summarised in Appendix A. The assumptions made in developing the disturbance percentages are outlined in Table 4-1.

Plans outlining the proposed locations of towers are provided in Volume 3 Appendix H Tower siting plans of this EIS. These plans are for conceptual purposes only to demonstrate how the transmission line might be positioned within the corridor selection and is not intended to represent final design alignment. A cross-section detailing typical clearing requirements and other plans showing infrastructure footprints and layouts is included in Volume 3 Appendix I Indicative infrastructure layout and cross-section drawings of the EIS.

5. Requirements for clearing

Clearing shall be undertaken generally in accordance with the Ergon Energy 'Specification for Clearing and Access Work for Overhead Powerlines' and Energy Queensland 'G001 Vegetation Management Strategy Version 2'. Whilst this specification was developed for lower voltage lines, the general principles apply for creating a safe operating footprint.

The clearing corridor and access tracks will be inspected in the company of the landowner prior to clearing to identify and work within any specific actions required by the landowner. The meeting with the landowner will identify the clearing extent, machinery required to be used and agreement on the management of cleared timber and waste with the landowner.

Clearing of vegetation will be undertaken using mechanical methods, dependent on the environmental conditions. Clearing methodology will be confirmed with the Construction contractor during the tender phase of the Project.

Where trimming of vegetation is required to obtain the required effective corridor width or working area, hand trimming with a chainsaw may be required. Clearing requires the complete removal of all stumps within the clearing profile, with the exception of:

- The banks of watercourses;
- Terrain which is inaccessible for machine clearing;
- Areas subject to erosion.

Machine clearing will not be undertaken within 10 m of the low flow banks of any watercourse. If clearing is required within this area, trees will be felled at stump height and debris removed from the flood zone.

In areas such as deep gullies and valleys, where the line conductors will be well above the tops of mature trees, only a portion of the trees may require clearing or no clearing may be required.

Similarly, grassland vegetation may require little to no clearing.

Vehicular access to the whole Project corridor is required, with additional access tracks from existing public roadways or property access roads. New access tracks shall be shown on design drawings and marked in the field. Designated avoidance areas such as cultural heritage sites, steep slopes, sensitive species habitat areas and riparian zones will also be marked in the field.

Mitigation measures will be implemented during vegetation clearing as outlined in Table 5-1.

Table 5-1 Mitigation measures required for vegetation clearing of the Project area

Phase	Management actions
Design	Preference must be given to locating all works in previously cleared areas and outside of areas with mapped MNES and MSES habitat values.
	Preference must be given to using existing access tracks and state/local controlled roads where possible to avoid additional clearing, or constructing tracks in previously cleared areas.
	Under this Plan, the clearing of vegetation shall: • Be limited to the extent necessary for construction, operation and maintenance • Not exceed the limits of clearing specified in the SDPWO Act and EPBC Act approvals for each applicable MSES and MNES, upon which the Project is anticipated to have a significant residual impact • Be re-vegetated in accordance with the rehabilitation Plan requirements of the Construction Environmental Management • Not occur in a wetland • Not occur within 10 metres of the defining bank of a watercourse, unless access across the watercourse is required
	Under this Plan, clearing for access tracks shall: • Be no wider than the width required for the type of vehicle for which the access track is required • Be constructed in a manner in which watercourse bank erosion is minimised • Be at right angles to the water flow • Bedlevel crossings to comply with <i>Fisheries Act</i> requirements for waterway crossings/barriers
	Minimal clearing of riparian vegetation is permitted under this Plan with a 25 m buffer zone to be maintained around minor watercourse and 50 m buffer around major watercourses.
	The Construction Contractor shall develop a clear staged approach to vegetation clearing prior to the commencement of works. The staging of works will need to be deemed suitable by the Contract Administrator prior to commencement. The Contract Administrator is responsible for developing, negotiating and evaluating company contracts on behalf of the Project.
	Erosion and sediment control procedures are to be included in the Construction Environmental Control Plan and approved by the Contract Administrator prior commencement of vegetation clearing works.
Field assessment and sites evaluation	No-go zones are to be clearly set out by the pioneering team and marked prior to construction activities commencing. Inspection of the clearing corridor and access with the landowner to identify the clearing extent and access route. No-go zones shall be shown on relevant design plans produced by the Construction Contractor. The nominated no-go zones are to be submitted to and deemed suitable by the Contract Administrator. No works are to be undertaken in these areas, nor are these areas to be used as storage of materials/plant.

Phase	Management actions
Pre-construction/ pre-clearing phase	Holders of fauna spotter catcher permits under Queensland regulations shall be appointed by the Construction Contractor prior to construction commencing. Prior to vegetation clearing, the fauna spotter catcher will undertake a pre-clearing survey to identify and mark habitat features (i.e. hollow bearing logs, hollow bearing trees). The fauna spotter catcher will also be required to identify the fauna species likely or known to be present.
	Results of the pre-clearance survey are to be reported by the Construction Contractor in the monthly report to the Contract Administrator, prior to clearing commencing in an area.
	A flora survey is to be undertaken by the Construction Contractor for conservation significant flora species by a suitably qualified person in accordance with the <i>Flora Survey Guidelines – Protected Plants, 2019</i> (DES, 2019) or current version where the area is mapped within a high risk flora survey trigger area.
	The Construction Contractor is required to undertake a pre-clearing weed survey documenting areas of existing weed infestation and identifying treatment and management requirements.
	The Proponent shall maintain an up-to-date list of Commonwealth and State regulatory approval requirements and identify additional approvals required to facilitate the vegetation clearing including, but not limited to: • Species Management Program – high risk • Species Management Program – low risk • Protected plant clearing permit under the <i>Nature Conservation (Plants) Regulation 2020</i>.
	The Construction Contractor is to provide a plan of proposed works to the Contract Administrator for approval prior to the commencement of any vegetation clearing works.
	Hygiene declaration forms are to be prepared by the Construction Contractor for all plant/vehicles working within the area.

Phase	Management actions
Vegetation clearing phase / construction	The fauna spotter catcher is required to undertake an immediate pre-clearance survey a maximum of 24 hours ahead of vegetation clearing, to search habitat features previously marked for fauna and/or breeding activity. When working within areas mapped as Koala habitat, the fauna spotter catcher shall undertake a daytime canopy search of the clearing area to identify any vegetation with koalas and adjacent vegetation with overlapping crowns. Should a koala be present, suspension of clearing works will occur for the koala to move away from the Project area on its own accord, which may include delay overnight. A two stage approach to clearing will be implemented where hollow bearing trees have been identified. Non-hollow bearing trees will be cleared before hollow bearing trees to allow fauna an opportunity to move away and allow time to concentrate rescue efforts on the trees that are most likely to be inhabited. Hollow bearing trees will be felled after a minimum 24 hour delay after clearing of non-habitat trees. The fauna spotter catcher will be on site for all clearing works, including clearing of hollow bearing trees. Individual hollows of felled hollow bearing trees will be inspected using a torch or similar by the fauna spotter catcher and the relevant fauna contingency actions initiated. Once the trees are deemed clear by the fauna spotter catcher further processing can occur. The fauna spotter catcher is required to be present during any woody vegetation clearing issued under the <i>Nature Conservation (Animals) Regulation 2020</i> and shall be responsible for the management of the handling, capture and release of native fauna in accordance with either the SMP – low risk or the SMP – high risk, dependant on the species listing under the <i>Nature Conservation (Administration) Regulation 2017</i> The Construction Contractor is to complete an environmental induction for all site personnel to outline responsibilities in relation to environmental matters, the use of no-go zones, staged clearing requirements, and cultural heritage and archaeological finds. This induction is to also outline the procedures to follow in the event of injured wildlife occurring within the survey area (refer to the SMP – high risk). Where a conservation significant flora species is recorded during the pre-clearance surveys of the Project area the Construction Contractor is to notify the Contract Administrator. If required, obtain a protected plant clearing permit under the <i>Nature Conservation (Plants) Regulation 2020</i>. No benching or vegetation clearing activities are to occur in, or within 150 m of known cultural heritage sites. No temporary construction activities are to occur in, or within proximity of, known cultural heritage sites. The construction of access tracks will avoid known cultural heritage sites. Project activities to be undertaken in accordance with an approved Cultural Heritage Management Plan. No benching or vegetation clearing activities are to occur in, or in close proximity to, known areas of contaminated land, including near stock dips.

Phase	Management actions
	No construction activities or other activities that cause ground disturbance are to occur in, or in close proximity to, known areas of contaminated land, including near stock dips.
	Advise the clearing extent, machinery to be used and management of cleared timber to the landholder
	The Construction Contractor is to maintain the flow of watercourses (mapped on the Queensland waterways for waterway barrier works GIS layer) in accordance with relevant waterway barrier works codes or approvals gained for the works.
	The use of herbicides to control vegetation, and insecticides are to be restricted over and adjacent to dams, drainage lines and watercourses due to the potential indirect impacts on conservation significant fauna.
	If there is more than one machine clearing vegetation, a fauna spotter catcher is required to accompany each machine.
	Earthworks shall be scheduled to occur as soon as practicable after grubbing and removal of vegetation.
	Hollow timber, woody debris and bush rock suitable for fauna habitat are to be relocated to retained habitat areas outside/adjacent to the clearing area.
	In some circumstances cleared native vegetation may be mulched and reused onsite during rehabilitation and stabilisation activities where possible.
Post-construction	Progressive revegetation shall commence progressively as soon as practicable once earthworks are complete.
	Rehabilitation/revegetation of temporarily disturbed areas is to be undertaken as quickly as possible.
	The fauna spotter catcher is to prepare and submit a post-clearing report. The Construction Contractor is required to provide the post-clearing report to the Contract Administrator within the monthly report following completion of clearing each stage.
	The Construction Contractor is to complete reporting requirements as per Section 6 of this Plan.

6. Reporting requirements

6.1 Environmental surveys and management plans to be developed preclearance

Pre-clearance surveys should be undertaken prior to clearing of vegetated areas. The FEMP outlines specific environmental management measures and procedures to be developed to manage impacts associated with the design and construction of the Project.

6.2 Construction contractor reporting

Details of vegetation cleared shall be reported on a monthly basis to the Contract Administrator in accordance with the contract documentation.

6.3 Specialist reporting

In addition to the Construction Contractor's reporting requirements, the licenced fauna spotter catcher shall provide the following information:

- Results of pre-clearance survey are to be included in the Construction Contractor's monthly report to the Contract Administrator, prior to clearing commencing in an area.
- A post-clearing report to the Contract Administrator within the Construction Contractor's monthly report, following completion of clearing each stage.

6.4 CuString reporting

CuString will be responsible for providing reports required under State and Commonwealth permits and approvals.

Appendices

Appendix A – Workings for impact percentages for landscape types

Landscape type

- 1 Low open woodland with spinifex or other grasses (eucalypt or acacia dominated)
- 2 Mixed low woodland with grasses (gidgee, mulga, or eucalypt dominated)
- 3 Open forest to open woodland on plains
- 4 Previously cleared / grazing land with scattered trees
- 5 Riparian zone and fringing vegetation along ephemeral channels / watercourses / channelised floodplains
- 6 Tussock/hummock grassland (Mitchell grass / spinifex)

Table 0-1 Project infrastructure disturbance

[illegible]

Hughenden Camp	0.00	0.00	0.00	0.00	0.00	12.00	12.00
Julia Creek Camp	0.00	0.00	0.00	0.00	0.00	12.00	12.00
Mount Isa Augmentation							
<i>Transmission line</i>	13.23	0.07	0.00	0.00	0.00	1.08	14.39
<i>Access tracks</i>	0.00	0.00	0.00	0.00	4.58	0.00	4.58
<i>Towers</i>	3.34	0.00	0.00	0.00	0.00	0.15	3.50
<i>Tower Construction</i>	22.27	0.00	0.00	0.03	0.00	1.03	23.33
<i>Brake and winch</i>	21.48	0.00	0.00	0.03	0.00	0.99	22.50
Mount Isa Laydown	12.00	0.00	0.00	0.00	0.00	0.00	12.00
Mount Isa Substation	0.00	0.00	0.00	7.01	0.00	0.00	7.01
Nonda CEV	0.00	0.00	0.00	0.00	0.00	0.35	0.35
Nonda CEV Access Easement	0.00	0.00	0.00	0.00	0.00	0.15	0.15
Pentland Laydown	0.00	0.00	12.00	0.00	0.00	0.00	12.00
Pentland South CEV	0.00	0.00	0.30	0.00	0.00	0.00	0.30
Pentland South CEV Access Easement	0.00	0.00	0.32	0.00	0.00	0.00	0.32
Phosphate Hill Connection							
<i>Transmission line</i>	2.90	0.38	4.72	0.00	0.00	0.88	8.88
<i>Access tracks</i>	0.00	0.00	0.00	0.00	1.35	0.00	1.35
<i>Towers</i>	1.23	0.21	0.00	0.00	0.00	0.68	2.13
<i>Tower Construction</i>	8.23	1.42	0.00	0.02	0.00	4.54	14.21
<i>Brake and winch</i>	8.69	1.50	0.00	0.02	0.00	4.79	15.00
Phosphate Hill Substation	0.00	0.00	0.00	0.00	0.00	1.00	1.00
Phosphate Hill Substation Access Easement	1.05	0.00	0.00	0.14	0.32	0.01	1.52
Renewable Energy Hub							
<i>Transmission line</i>	3.99	5.36	207.89	1.62	0.00	1.07	219.93
<i>Access tracks</i>	0.00	0.00	40.91	0.00	10.32	0.00	51.23
<i>Towers</i>	0.01	0.16	8.97	0.94	0.00	0.40	10.48
<i>Tower Construction</i>	0.08	1.04	59.82	6.27	0.00	2.67	69.89
<i>Brake and winch</i>	0.09	1.12	64.19	6.73	0.00	2.87	75.00
Richmond Camp and Laydown	0.00	0.00	0.00	0.00	0.00	12.00	12.00
Selwyn Camp	12.00	0.00	0.00	0.00	0.00	0.00	12.00
Selwyn CEV	0.30	0.00	0.00	0.00	0.00	0.00	0.30
Selwyn CEV Access Easement	4.85	0.00	0.00	0.00	0.83	0.00	5.68
Selwyn Substation	0.07	24.93	0.00	0.00	0.00	0.00	25.00
Southern Connection							
<i>Transmission line</i>	29.83	1.38	21.82	0.00	0.00	0.23	53.26
<i>Access tracks</i>	0.00	0.00	0.00	0.00	4.80	0.00	4.80
<i>Towers</i>	4.31	0.13	0.00	0.00	0.00	0.08	4.52
<i>Tower Construction</i>	28.71	0.88	0.00	0.00	0.00	0.55	30.14
<i>Brake and winch</i>	28.57	0.88	0.00	0.00	0.00	2.87	32.32
Warreah South CEV	0.00	0.00	0.36	0.00	0.00	0.00	0.36
Warreah South CEV Access Easement	0.00	0.00	15.21	1.23	0.29	0.20	16.94
Woodstock Laydown	0.00	0.00	12.00	0.00	0.00	0.00	12.00
Woodstock Substation	0.00	0.00	35.69	3.52	0.00	0.00	39.21
Yorkshire CEV	0.00	0.00	0.00	0.00	0.00	0.31	0.31
Yorkshire CEV Access Easement	0.00	0.00	0.00	0.00	0.11	0.00	0.11
Grand Total	301.60	54.12	740.97	32.84	36.55	257.28	1423.36

Table 1-2 Clearing loss

Section	Length	Width (km)	Area (ha)	Total Disturbance in easement (ha)	Temporary disturbance in easement (ha)	Permanent loss (% of Corridor section)
Renewable Energy Hub	342	0.06	2052	426.53	144.89	13.73
CopperString Core	395	0.06	2370	430.87	162.85	11.31
Chumvale connections	7	0.06	42	14.76	9.61	12.27
Mount Isa Augmentation	99	0.06	594	68.30	45.83	3.78
Southern Connection	129	0.06	774	125.04	62.46	8.08
Cannington Connection	23	0.06	144	18.64	13.01	3.91
Phosphate Hill Connection	63	0.06	378	41.57	29.21	3.27

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