CopperString 2.0

Concept rehabilitation plan

Volume 3 Appendix T

Table of contents

1. Introduction 1
   - 1.1 Background information 1
   - 1.2 Purpose of this report 1
   - 1.3 Statement of limitations 1
2. Approach and methodology 4
   - 2.1 Site-specific background documents 4
   - 2.2 Standards and guidelines 4
   - 2.3 Legislative framework 4
   - 2.4 Contractor responsibilities 4
3. Rehabilitation requirements 5
   - 3.1 Minimum requirements 5
   - 3.2 Rehabilitation objectives and requisites 7
   - 3.3 Rehabilitation success factors and timing 7
   - 3.4 Adaptive management strategies 8
   - 3.5 Rehabilitation timing and process 8
   - 3.6 Planning ground disturbance/clearing 9
   - 3.7 Topsoil and subsoil management 9
   - 3.8 Land stabilisation and erosion management 10
   - 3.9 Ripping prior to placement of topsoil 11
   - 3.10 Topsoil and vegetation dispersal 11
   - 3.11 Fauna habitat return 12
   - 3.12 Weed management 12
   - 3.13 Access and signage post-rehabilitation 12
   - 3.14 Revegetation 12
   - 3.15 Watercourse crossings (riparian habitat) 13
   - 3.16 Permanent infrastructure 13
4. Monitoring and reporting 14
   - 4.1 Post rehabilitation inspections and corrective actions 14
   - 4.2 Post rehabilitation monitoring 14
   - 4.3 Revegetation monitoring 14
   - 4.4 Completion reporting 14

Table index

Table 3-1 Project infrastructure and rehabilitation requirements 5

Figure index

Figure 1-1 – Project Corridor Sections 3

1. Introduction

1.1 Background information

CuString Pty Ltd (CuString) engaged GHD Pty Ltd (GHD) to assist in the preparation of the Environmental Impact Statement (EIS) and supporting technical reports for the CopperString 2.0 Project (the Project).

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 1-1:

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).

1.2 Purpose of this report

This Concept Rehabilitation Plan (CRP) outlines the requirements for the rehabilitation of land temporarily cleared for Project construction works and not required for use during operation. This CRP provides for standard rehabilitation methods that may be applied to the Project as a minimum.

1.3 Statement of limitations

This report has been prepared by GHD for CuString Pty Ltd and may only be used and relied on by CuString Pty Ltd for the purpose agreed between GHD and the CuString Pty Ltd as set out in Section 1.2 of this report.

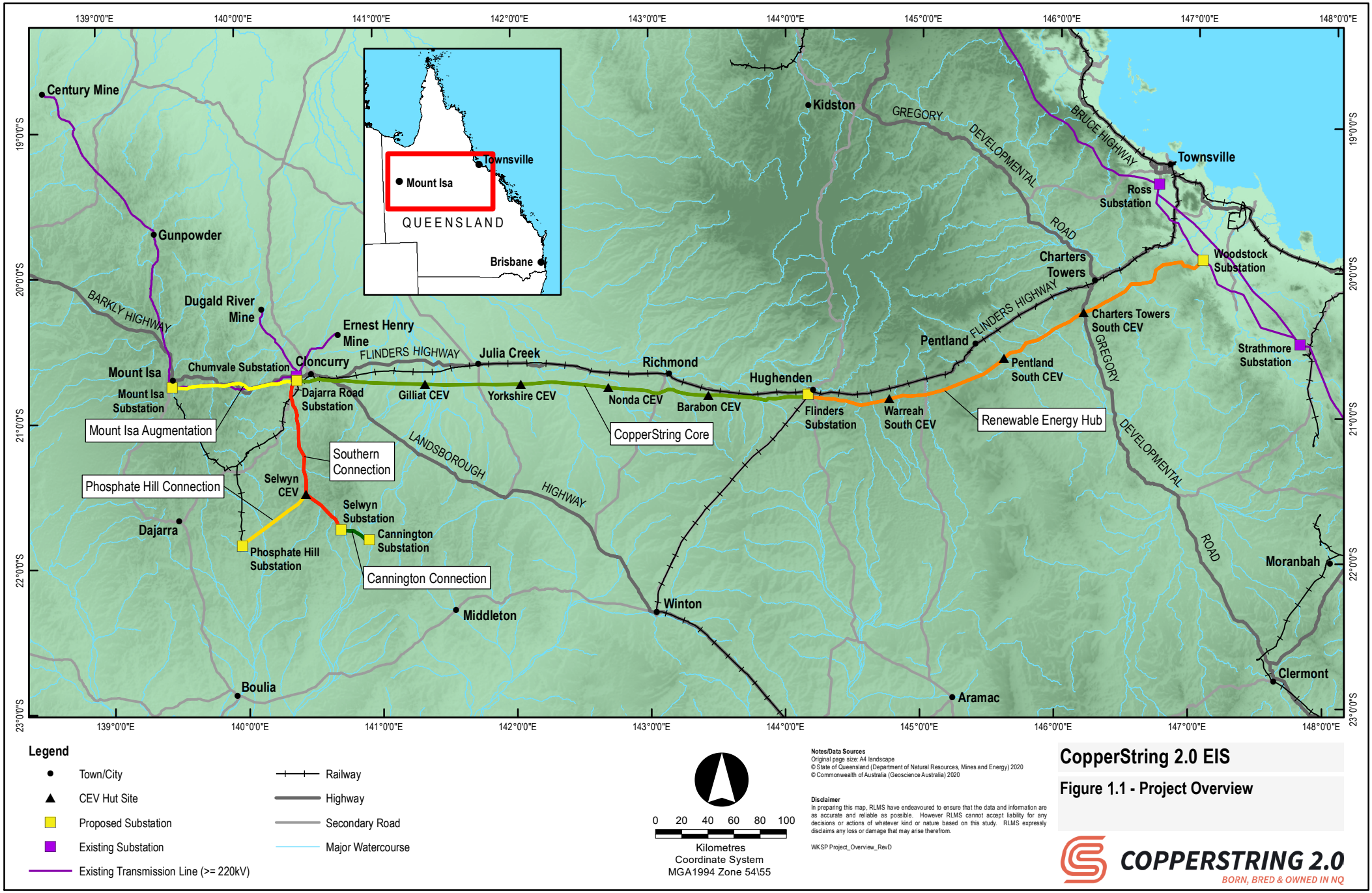
GHD otherwise disclaims responsibility to any person other than CuString Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by CuString Pty Ltd and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.


139°0'0"E
140°0'0"E
141°0'0"E
142°0'0"E
143°0'0"E
144°0'0"E
145°0'0"E
146°0'0"E
147°0'0"E
148°0'0"E
19°0'0"S
20°0'0"S
21°0'0"S
22°0'0"S
23°0'0"S
QUEENSLAND
Townsville
Mount Isa
Brisbane
Century Mine
Gunpowder
Dugald River Mine
Ernest Henry Mine
Mount Isa
Mount Isa Substation
Chumvale Substation
Cloncurry
Dajarra Road Substation
Julia Creek
Richmond
Hughenden
Flinders Substation
Kidston
Pentland
Charters Towers
Charters Towers South CEV
Pentland South CEV
Warreah South CEV
Ross Substation
Townsville
Woodstock Substation
Strathmore Substation
Moranbah
Clermont
Gilliat CEV
Yorkshire CEV
Nonda CEV
Barabon CEV
Selwyn CEV
Selwyn Substation
Cannington Substation
Phosphate Hill Substation
Dajarra
Boulia
Middleton
Winton
Aramac
Mount Isa Augmentation
Phosphate Hill Connection
Southern Connection
Cannington Connection
CopperString Core
Renewable Energy Hub
BARKLY HIGHWAY
FLINDERS HIGHWAY
LANDSBOROUGH HIGHWAY
GREGORY DEVELOPMENTAL ROAD
BRUCE HIGHWAY
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
© State of Queensland (Department of Natural Resources, Mines and Energy) 2020
© Commonwealth of Australia (Geoscience Australia) 2020
Disclaimer
In preparing this map, RLMS have endeavoured to ensure that the data and information are as accurate and reliable as possible. However RLMS cannot accept liability for any decisions or actions of whatever kind or nature based on this study. RLMS expressly disclaims any loss or damage that may arise therefrom.
WKSP Project_Overview_RevD
CopperString 2.0 EIS
Figure 1.1 - Project Overview
COPPERSTRING 2.0
BORN, BRED & OWNED IN NQ

2. Approach and methodology

2.1 Site-specific background documents

The CRP has been developed with reference to relevant sections of the CopperString 2.0 EIS and has been referenced within Volume 3 Appendix O Framework environmental management plan developed for the Project.

2.2 Standards and guidelines

The following standards and guidelines have informed the development of this CRP:

- Department of Agriculture and Fisheries' Accepted development requirements for operational work that is constructing or raising waterway barrier works (WWBW ADR) (DAF 2018)
- International Erosion Control Association's Best Practice Erosion and Sediment Control Guidelines (IECA 2008) hereafter referred to as the IECA Guidelines).

2.3 Legislative framework

A person or persons conducting land-disturbing development must conduct such development in accordance with the requirements of relevant environmental legislation including but not limited to the *Environmental Protection Act 1994* (EP Act) and the associated Regulations as well as the *Planning Act 2016* (Planning Act) and associated Planning Regulation 2017 (Planning Regulation). Additional legislative requirements as outlined within Volume 1 Chapter 4 Legislation and approvals may apply to rehabilitation activities.

Further, at the completion of the CopperString 2.0 EIS, the Coordinator-General's evaluation report on the EIS may state conditions with respect to rehabilitation that must be attached to development approval and/or infrastructure designation. This CRP shall be reviewed and updated accordingly prior to the commencement of clearing to comply with any relevant conditions.

2.4 Contractor responsibilities

This CRP does not prescribe rehabilitation requirements in detail but provides for standard rehabilitation methods that may be applied to disturbed land as a minimum. The Contractor(s) will be responsible for developing and implementing site and stage-specific rehabilitation plans as required, taking into consideration detailed staging of works, local environmental and landholder requirements and relevant conditions of approvals.

3. Rehabilitation requirements

3.1 Minimum requirements

This section outlines the minimum requirements to be met when rehabilitating temporary and around permanent construction areas as they are no longer required (i.e. progressive rehabilitation) and prior to demobilisation from site.

Key infrastructure and how this CRP shall be applied is described in Table 3-1.

Table 3-1 Project infrastructure and rehabilitation requirements

Infrastructure	Temporary/ Permanent	Indicative impact	Rehabilitation requirements
Transmission line easement	Permanent	Clearing/felling/trimming vegetation over 5 m high within easement (up to 60 m wide). Clearing/felling/trimming vegetation within 45 degrees from 10 m above ground at edges of 60 m wide easement.	Where physical ground disturbance only occurs (i.e. soil and ground cover), rehabilitation per this CRP required. Where clearing occurs with minimal disturbance to topsoil and ground cover (i.e. < 5 m) rehabilitation will not be required as this will likely result in additional disturbance.
Tower footprint	Permanent (tower) Temporary (construction pads and assembly areas)	Disturbance footprint: approx. 144 m^2 (12 m x 12 m) Additional temporary disturbance for tower construction at each tower approx. 960 m^2 (12 m x 80 m)	Temporary pad only, rehabilitation per this CRP required.
Access track	Permanent (easement)	7 m maximum width for ground disturbance	No rehabilitation required due to continued use for operational activities.
CEV Hut	Permanent	Permanent footprint of 60 m x 65 m (0.39 ha) consisting of CEV hut site of 15 m x 16 m (0.024 ha) surrounded by a buffer area revegetated with grass	Buffer area surrounding CEV hut requires rehabilitation per this CRP.
Brake and winch site	Temporary	Temporary disturbance footprint: every 7 km with a 60 m x 250 m (1.5 ha) area about 100-200 m away from tower on each side under the	Rehabilitation per this CRP required.

Infrastructure	Temporary/ Permanent	Indicative impact	Rehabilitation requirements
		transmission line or two 125 x 60 m each located at bends	
Substation	Permanent	Permanent disturbance footprint: up to 39 ha including a buffer area between substation and outer fence	Rehabilitation of buffer area between substation and outer fence per this CRP required.
Laydown areas (transmission line)	Temporary	Temporary disturbance footprint: 4 ha. Includes temporary access tracks from main transmission line.	Rehabilitation per this CRP required. Existing laydown areas made available to the Project are not required to be rehabilitated under this CRP unless if forms part of terms of use.
Fly yard (helicopter landing area)	Permanent (pad at substations) Temporary (construction pad)	100 m*100 m (1 ha) every 20 towers – approx. 1 per 10 km.	Temporary pad only, rehabilitation per this CRP required.
Construction Camps	Temporary	350-person camp estimated at 110 demountable buildings each, unless existing camps are identified.	Temporary pad only, rehabilitation per this CRP required unless otherwise agreed with landholder and permitted under approvals/permits.

3.2 Rehabilitation objectives and requisites

The following construction areas will be rehabilitated to their pre-clearance state:

- Temporary laydown areas
- Temporary construction camps
- Temporary construction pads at transmission tower and substation sites (including helicopter landing areas)
- Brake and winch sites.

Rehabilitation will occur progressively, as areas are no longer required for construction activities, and prior to demobilisation from the site.

The primary objective of this CRP is to return disturbed areas as close as practicable to pre-disturbed conditions within the Project temporary construction footprint. This incorporates the following requisites:

- The establishment and reinstatement of land surface consistent with the surrounding topography
- The long-term stability of soils, landforms and hydrology
- Use of local provenance species in the revegetation areas (as defined in pre-disturbance surveys/mapping)
- Rehabilitation areas are self-sustainable and resilient, i.e. require no water and weed management except to control invasive weed species as legally obliged
- Establish rehabilitated areas that provide appropriate habitat for local flora and fauna recruitment
- Rehabilitation areas are fit for purpose (e.g. regeneration of native vegetation, endemic grass species, riparian vegetation) while maintaining safety of humans and livestock and the ongoing access to and operation of the transmission line
- The execution of planning, implementation, monitoring and reporting on rehabilitation in a manner consistent with industry best practice.

Specific rehabilitation objectives, performance indicators and measurable targets shall be developed for site and stage-specific rehabilitation sub-plans as required, taking into consideration detailed design, staging of works, local environmental and landholder requirements and relevant conditions of approvals.

3.3 Rehabilitation success factors and timing

Typical rehabilitation success factors are as follows:

- Soil moisture availability:

  Highly variable and low reliability rainfall means rehabilitation timing is critical. Rehabilitation should be scheduled immediately prior to the wet season to ensure soil moisture levels are optimal and to provide a greater chance of subsequent rain events. This will mitigate the requirement for manual watering (e.g. water trucks or equivalent methods). Seasonal trends can be reviewed at Queensland Government the Long Paddock SOI Phase Rainfall Probabilities for planning purposes.

- Seed bank and mix and weed management:

Topsoil when correctly stripped, stockpiled and managed can provide significant seed bank and mix for native species when respread. This will mitigate the requirement for application of additional native grass seed to rehabilitation areas. However, fast germinating weed species may colonise rehabilitation areas if necessary, conditions for native species are not met (i.e. soil moisture). Segregation of weed-infested and weed-free topsoil stockpiles and appropriate weed management controls will be critical to the success of rehabilitation.

- Soil nutrients:

  Vegetation and soil nutrient cycles can be disrupted from construction activities resulting in nutrient deficiencies in underlying subsoil and stockpiled topsoil. Topsoil when correctly stripped, stockpiled and managed can retain sufficient nutrients for native species when respread. Placing vegetation (mulched or otherwise) on top of topsoil stockpiles and following rehabilitation can also assist in nutrient retention. This may mitigate the requirement for application of fertilisers to rehabilitation areas.

- Site preparation:

  Soil compaction from construction activities inhibits rainfall infiltration and increases the risk of erosion to rehabilitation areas. Ripping along contours will promote successful rehabilitation of native species.

Temporary disturbance areas and permanent infrastructure will be located primarily in disturbed or grassed areas and will avoid heavily vegetated (or wooded) areas as far practicable. There will also be ongoing vegetation maintenance obligations within the easement due to health and safety requirements and for protection of electrical infrastructure. It is therefore not unreasonable to suggest that rehabilitated areas could achieve indicative completion criteria e.g. >70% groundcover comprising of preferred endemic species within 1- 2 years.

3.4 Adaptive management strategies

Adaptive management practices may be implemented where monitoring indicates rehabilitated areas will not achieve rehabilitation objectives and completion criteria. Adaptive management strategies may include a combination of the following:

- Manual watering (e.g. water trucks or equivalent methods)
- Application of additional native seed bank
- Soil testing and application of fertilisers or other soil treatments based on chemical and physical soil test results
- Direct seeding, hydromulching or planting of tube stock
- Extending the rehabilitation monitoring and reporting period.

It will be the responsibility of the Contractor(s) to implemented rehabilitation and adaptive management strategies if required.

3.5 Rehabilitation timing and process

Areas that have been temporarily cleared and are no longer required for construction activities shall be progressively rehabilitated. Progressive rehabilitation requires rehabilitation of cleared/disturbed areas throughout the work program rather than leaving all rehabilitation to the end of the program. In addition to this, consideration will be given to the timing of rehabilitation activities such that it promotes natural regeneration of disturbed areas, maximising potential of existing seedbank and minimising potential for erosion.

3.6 Planning ground disturbance/clearing

No work, including ground disturbance and clearing of vegetation, shall be undertaken without works approval (or equivalent Contractor permit to work approval). The works approval shall confirm proposed works are undertaken within an approved area and all environmental management requirements have been considered and are in place, or construction teams are sufficiently resourced to implement such management requirements. Works approvals shall be reviewed by a suitably qualified representative familiar with Project requirements (e.g. environmental manager or equivalent).

Clearing of vegetation, including damage to vegetation from driving over it, shall be minimised as far as is reasonably practicable to undertake completion of the works. Where possible, more heavily vegetated areas will be avoided for temporary infrastructure. Existing cleared areas and tracks shall be preferentially utilised for temporary construction works where possible.

Sufficient area for stockpiling of topsoil/subsoil shall be included in works approvals. This should consider the following:

- The proximity to active drainage lines/waterways and appropriate erosion and sediment control
- Separation of subsoil and topsoil stockpiles
- Segregation of weed-infested and weed-free topsoil stockpiles
- Location as close as practicable to the final use area while avoiding potential for disturbance from construction activities.

Ground disturbance/clearing areas shall be clearly demarcated on construction drawings and/or equipment involved in the works shall be GPS guided with working areas and any no-go zones pre-uploaded.

Access for vehicles and machinery shall be along designated access tracks, roads and parking areas. These areas will be defined in the field and on construction drawings to limit impacts on native vegetation, flora and fauna and to reduce subsequent rehabilitation requirements.

3.7 Topsoil and subsoil management

Topsoil stripping shall occur as close to the ground works commencement date as practicable using a technique that minimises compaction and handling and preserves seed bank. Topsoil shall be stripped to a suitable depth based on analysis of the soil profile from geotechnical investigations however should be a minimum of 100 mm (where available).

The collection of saturated topsoil following rainfall should be avoided. Where possible, topsoil will be collected at a time of year when the soil seed bank is likely to be highest (i.e. post wet season).

Vegetation and topsoil shall be removed in separate stages and stripped vegetation may be temporarily placed on top of topsoil where practicable to reduce wind erosion. To avoid hard setting, water shall not be used for dust suppression during topsoil stripping or on topsoil stockpiles unless required to mitigate dust impacts to sensitive land uses.

Topsoil shall be reused immediately or stockpiled for rehabilitation. The location of the stockpile shall be planned sufficiently such that the stockpile will not have to be moved again until required for rehabilitation. Topsoil stockpiles may constitute windrows adjacent to access tracks, linear infrastructure or construction pads in circumstances where they can be appropriately protected from subsequent construction activities.

Subsoil or spoil (e.g. from tower footings) should be stockpiled separately for subsequent reuse as backfill material in landscaping or other general fill requirements if appropriate for the use. Where required, diversion berms may be constructed from subsoil to direct water away from tower foundations or other sensitive infrastructure (or disturbed surfaces for erosion protection) before expected rainfall.

If required, sodic soil will be treated with gypsum at an application rate to be determined by soil testing. Where treating is not required or warranted, sodic soil may be reburied under a subsoil/topsoil cap of no less than 300 mm.

Topsoil shall be stockpiled to a maximum height of two metres. Subsoil or spoil can be stockpiled to a maximum height of four metres. A record of topsoil and subsoil stockpiles shall be kept, outlining the date of placement, source location, mapped location of stockpile and estimated volumes. If at risk of disturbance from construction activities, topsoil signs are to be placed on stockpiles and shall include the following details:

- Black lettering on a white background, with a lettering size that can be clearly seen from a vehicle close by
- The words “TOPSOIL STOCKPILE”
- The date of placement
- The source location (e.g. chainage or KP)
- A “KEEP OFF” warning
- Indication if the topsoil is from a weed risk area.

Stockpiles shall be stabilised where necessary and dependant on the duration and size of the stockpile, be protected using viable erosion and sediment control measures. This may include mulching, minor diversion of upslope surface water or sediment fencing. Stockpiles shall not be located in or adjacent to drainage lines or areas where eroded material could be transported into surface water bodies. Topsoil stockpiles shall not be placed where they can slump into sensitive areas. Stockpiles shall be located within the disturbance area where vegetation has been cleared where they will not impede construction activities.

Habitat features such as boulders and hollow logs shall be set aside during clearing works for later placement in rehabilitated areas for rehabilitation stabilisation and fauna habitat.

Topsoil stockpiles contaminated with weeds shall be quarantined from clean topsoil stockpiles, with clear signage, and shall be identified on a site plan. Spatial data, including GPS coordinates shall be recorded. A bund shall be constructed around the toe of weed-contaminated topsoil stockpiles, if require where there is potential for discharge of weed seed material to surrounding environments.

3.8 Land stabilisation and erosion management

Prior to commencement of rehabilitation, disturbed areas shall be reshaped to a stable form and to blend in with surrounding natural landforms. It is not envisaged that reshaping will generally be required as existing flat, cleared areas will be utilised where possible for sites such as laydown areas and construction pads. Existing areas may include trucking yards off the main roads, previous industrial sites or stock yard areas. Existing laydown areas made available to the Project are not required to be rehabilitated under this CRP unless if forms part of terms of use. Disturbed surface areas will be roughened to reduce the effects of compaction, allowing for natural regeneration processes to occur.

Access tracks through river/creek banks will not be reformed, as they will be retained for 4WD access for maintenance operations.

Natural drainage patterns shall be reinstated as close to pre-disturbance as reasonably possible. Where natural drainage patterns cannot be re-established, drainage control measures shall be implemented. Any drainage control measures must take into consideration the potential for erosion from channelled runoff. Erosion and sediment control measures shall be developed in line with the requirements of Volume 3 Appendix Q Concept erosion and sediment control plan.

Slope lengths and angles shall be compatible with the surrounding landscape, suitable for the proposed land use and resistant to erosion. Reconstructed landforms shall be left with a relatively natural profile to allow for topsoil placement and re-spreading.

Consideration shall be given to the reduction of wind erosion on rehabilitated areas. This may include placement of cleared vegetation, installation of matting, incorporating rocks or other rehabilitation material where there is potential for impacts to sensitive land uses. The exact technique will be suited to the situation. Mulched material shall be obtained from previously disturbed native vegetation.

Mulched vegetation shall be stockpiled in a manner where endemic seeds remain viable and weeds are treated to minimise their spread. Heavily weed infested vegetation should only be placed within similarly disturbed areas to prevent the further spread of weeds or shall be removed from site and destroyed in accordance with legislative requirements and Volume 3 Appendix S Biosecurity management plan.

3.9 Ripping prior to placement of topsoil

Ripping may be required to reduce compaction and allow infiltration of rainfall into rehabilitated areas. This shall include:

- Removal of any hardstand material (i.e. gravel) and potentially contaminated material (e.g. residual material (not previously removed from site following a spill or incident) near high risk construction actives such as refuelling or mechanical maintenance areas.
- Deep ripping of compacted areas such as hardstand and laydown areas shall take place after land stabilisation and prior to the placement of topsoil.
- Deep ripping shall take place across the natural slope (i.e. parallel to contours) to reduce overland flow velocity and mitigate erosion, at a depth of approximately 0.3 metres. Highly compacted areas such as hardstands, laydowns and temporary access tracks may need to be ripped to a greater depth of 0.5 to 1.0 metres if possible, with available machinery.

3.10 Topsoil and vegetation dispersal

Following ripping, topsoil and vegetation shall be redistributed across the area in accordance with the following steps:

- The source stockpile used during rehabilitation shall comprise topsoil taken from the area or from within similar types of soil and vegetation.
- Recovery and dispersal of any soil shall not occur if the stockpiles are in a saturated condition.
- Topsoil shall be respread to a depth of approximately 100 mm where volumes permit. Where an excess of topsoil exists, a greater depth of soil may be respread.
- Spreading of topsoil should occur from the far edge of the disturbed area (i.e. further from the access point), progressively moving inwards as to reduce the risk of compaction and destruction of seed bank.

- Topsoil shall tie in evenly to the natural slope and adjacent vegetation to mintage risk of erosion.

3.11 Fauna habitat return

Notable fauna habitat features (e.g. boulders, large logs, vegetation with hollows) shall be placed across the rehabilitation area. This shall be planned to minimise compaction and destruction of seed bank from equipment. For example, in large laydown yards or concrete batching areas, an access track may be left to provide access for placement of fauna habitat and then rehabilitated (i.e. ripped and topsoil placed) as the last item for completion.

Prior to moving any stockpiled rocks or logs for use in rehabilitation they shall be inspected to ensure there are no resident fauna. Any identified fauna shall be removed and relocated by a qualified fauna handler.

3.12 Weed management

Rehabilitated areas shall be treated for weeds in accordance with Volume 3 Appendix S Biosecurity management plan.

3.13 Access and signage post-rehabilitation

The Project will be constructed on an easement traversing properties held generally by primary producers. Access to these properties and any rehabilitated sites will be restricted to landholders and transmission line maintenance personnel. Where there are rehabilitation areas that have been seeded or planted with tube stock, signs shall be posted to restrict access. Signage shall read, “Rehabilitation Area – Please Do Not Enter”. Signage shall be printed as black lettering on a white background. Signage shall only be installed if there is a real risk of disturbance to the rehabilitation area. Temporary signage (i.e. laminated sheets) shall not be used as they will degrade and blow into the environment or be eaten by cattle.

3.14 Revegetation

For the bulk of the Project temporary disturbance footprint, no revegetation i.e. direct seeding, hydromulching or planting of tube stock is planned. However, this may be required in response to rehabilitation monitoring and adaptive management measures discussed in section 3.4.

Specific rehabilitation sub-plans may be required in these circumstances and shall be developed in consultation with specialists’ personnel (e.g. ecologist). This is unlikely as temporary disturbance areas and permanent infrastructure will be located primarily in disturbed or grassed areas and will avoid heavily vegetated (or wooded) areas as far practicable. There will also be ongoing vegetation maintenance obligations within the easement due to health and safety requirements and for protection of electrical infrastructure. This will generally restrict revegetation from planting shrub, sub-canopy or canopy species.

Where this is required, the following section provides some general guidance for such works.

If revegetation with native tree and shrub species is required, a combination of direct seeding and tube-stock planting techniques may be used with reference to pre-disturbance vegetation communities and plant species relevant to the area or fauna species habitat values (e.g. foraging grass species and habitat shrubs for Black-Throated Finch). Planting techniques may include the following, however, will be specific to the vegetation communities and flora species:

- Apply 100 mm hydroseeding/hydromulching material as soon as practicable after topsoil application to rehabilitation areas (100% cover on entire rehabilitation footprint)

- Tube-stock should be planted just prior to first wet season rains (if irrigation is not available) to maximise vegetation establishment before the next dry season.
- Revegetation to be undertaken by a suitably qualified and experienced contractor. The recommended steps for manually planting tube-stock into a hydromulched site are as follows:
    - Clear hydromulch
    - Prepare planting hole using a mechanical or hand auger
    - Water in the plant and the planting hole immediately before planting
    - Remove tube-stock from the pot supporting the stem and protecting the root system
    - Plant seedling ensuring the seedling is planted below the surface of the ground
    - Backfill hole so that no potting mix is exposed to avoid capillary drying of the roots immediately after planting
    - Firm in and re-establish mulch around the plant keeping stems clear of mulch
    - Water in to establish good root to soil contact
    - Stake and secure canopy and sub-canopy trees planted on banks
    - Tree guards may be required if predation from wildlife or livestock is a risk.
    - If required, erect hard exclusion fencing to protect the rehabilitated areas from wildlife, livestock and vehicle access. Plastic fencing/mesh and hazard triangle flagging should not be used if there is livestock present in the area.

3.15 Watercourse crossings (riparian habitat)

Waterway crossings shall be constructed to minimise disturbance to riparian habitat and prevent erosion and scouring during times of flows. Erosion and sediment controls relevant to watercourse crossings shall be undertaken in accordance with Volume 3 Appendix Q Concept erosion and sediment control plan and IECA Guidelines. Consideration shall also be given to the WWBW ADR, which provides for standard requirements for all work conducted under the WWBW ADR for rehabilitation generally as follows:

- Stability and profiles of the bed and banks are re-instated to natural stream profiles and stability
- The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency
- Site conditions allow the rapid re-establishment of native vegetation and cover, or native species are replanted to re-establish the natural plant community.

3.16 Permanent infrastructure

Areas designated for permanent infrastructure (e.g. access tracks, substations, and transmission towers) will not require rehabilitation. Further, appropriate rehabilitation setbacks from key infrastructure (e.g. substations) shall be maintained for integrity of critical infrastructure (e.g. fire breaks), health and safety purposes, and to meet contemporary State and local government standards at the time of works.

Where agreement can be obtained with a landholder, temporary construction areas (e.g. laydown areas, access tracks etc.) may be retained by the landholder subject to formal agreement and handover and where permitted under approvals/permits.

4. Monitoring and reporting

4.1 Post rehabilitation inspections and corrective actions

Following the completion of rehabilitation works and prior to demobilisation from site, rehabilitated areas shall be inspected by a suitable qualified and experienced representative familiar with Project requirements (e.g. environmental manager or equivalent). The purpose of the inspection will be to record and sign off that works have been completed generally in accordance with this CRP. If rehabilitation works are considered not to meet the requirements outlined in this CRP, corrective actions shall be agreed and recorded. Corrective actions shall then be implemented by the responsible Contractor with a follow up inspection completed to certify the rectification works were completed to the required standard.

4.2 Post rehabilitation monitoring

Rehabilitated areas shall be monitored prior to and following the wet season for a period of 1-2 years. Pre wet season monitoring shall be completed so enough time is allowed for development and execution of any rectification works.

Pre and post season monitoring shall jointly cover rehabilitation progress (i.e. vegetation composition, health and condition), erosion and sediment controls, and weed control as per Volume 3 Appendix Q Concept erosion and sediment control plan and Volume 3 Appendix S Biosecurity management plan.

4.3 Revegetation monitoring

Where specific rehabilitation plans require revegetation i.e. direct seeding, hydromulching or planting of tube-stock, additional monitoring is likely to be required. These plans should include rehabilitation objectives, performance indicators and measurable targets relevant to the vegetation communities and flora species being planted. Where these are required in relation to conservation significant fauna habitat, fauna monitoring programs may also be required however are not addressed in this CRP.

General revegetation monitoring techniques may include:

- Establishment of photographic points (using star pickets) within revegetation areas and baseline sites for comparative analysis
- Monitoring endemic plant species establishment through appropriately sized plots along transects across revegetation areas recording percentage cover for relevant characteristics (e.g. grasses, leaf litter, etc.)
- Recording progress toward completion criteria (e.g. >70% groundcover comprising of preferred endemic species).

4.4 Completion reporting

Following completion of any specific revegetation monitoring program a rehabilitation completion report shall be developed by a suitably qualified ecologist for the Project. Given the construction program for the Project and scheduling of works, several completion reports may be developed across various sections of the Project. Completion reports shall include confirmation that temporary construction areas have been rehabilitated in accordance with the CRP or applicable stage-specific sub-plans or as otherwise required.

Completion reports may also be required to be submitted to relevant Commonwealth/State government departments under conditions of approval.

GHD

71 Stanley Street
Townsville
T: 61 7 4720 0400 F: 61 7 4772 6514 E: tsvmail@ghd.com

4221176-93985-1037/https://projects.ghd.com/oc/NQOC2/copperstring2/Delivery/Documents/05 Technical studies and Task Sheets/4221176-REP-Concept Rehabilitation Plan Rev A.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	K. Cauchi	K. Kerr	KK*	P. Bradley	PB*	20/07/20
0	K. Kerr					

* Electronic Approval on File.

www.ghd.com