

# **Appendix R**

## **Rehabilitation Management Plan**



# Haughton Pipeline Stage 2 Project

## Rehabilitation Management Plan

Townsville City Council

21 October 2022

→ **The Power of Commitment**



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<b>Printed date</b>	3/08/2021 12:45:00 PM
<b>Last saved date</b>	07 October 2022
<b>File name</b>	https://projectsportal.ghd.com/sites/pp10_01/haughtonpipelinedupl2/ProjectDocs/12537606-REP_Rehabilitation Management Plan.docx
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<b>Client name</b>	Townsville City Council
<b>Project name</b>	Haughton Pipeline Duplication Stage 2
<b>Document title</b>	Haughton Pipeline Stage 2 Project   Rehabilitation Management Plan
<b>Revision version</b>	2
<b>Project number</b>	12537606

#### Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	0	L. Liessmann	K. Kerr R. Peardon	*K.Kerr *R.Peardon	S. Orr	*S.Orr	17/12/21
S3	1	L. Liessmann	D.Willis M. Ward	*D.Willis *M. Ward	S.Orr	*S.Orr	27/07/22
S4	2	M. Ward	D.Willis	*D.Willis	S.Orr	*S.Orr	21/10/22

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# 1. Introduction

## 1.1 Project overview

Townsville City Council (TCC) is undertaking the Houghton Pipeline Stage 2 (HPS2) Project which includes a new pump station and pipeline (herein referred to as the 'Project area'), connecting to the constructed Stage 1 and Stage 1.1 Houghton Pipeline Duplication Project (HPDP), to provide transfer of 397 ML/day of raw water from the Burdekin River to the Ross River Dam. The HPDP is a joint funding arrangement between the Queensland Government (the State) and TCC and includes:

- Stage 1 of the HPDP was completed in 2020 and comprises approximately 33 km of DN1800 pipeline constructed from the Houghton River to Toonpan Creek at the head of Ross River Dam
- Stage 1.1 of the HPDP was completed in 2021 and is an extension of the Stage 1 pipeline works from the Houghton River by 3 km, directed towards the Stage 2 pipeline alignment. The Stage 1.1 works end with an isolation valve pit and is the connection point for Stage 2
- Stage 2 comprises the construction of a new pump station adjacent to the Burdekin River (between the Tom Fenwick Pump Station and Clare Weir) and 28.5 km of DN1800 Glass Reinforced Polymer (GRP) pipeline from the pump station to Stage 1.1, to provide an integrated water transfer system.

Construction of the HPS2 Project will be split into two pipeline construction packages, with the pump station being a separate package of work.

Figure 1.1 provides an overview of the HPDP and HPS2 Project area.

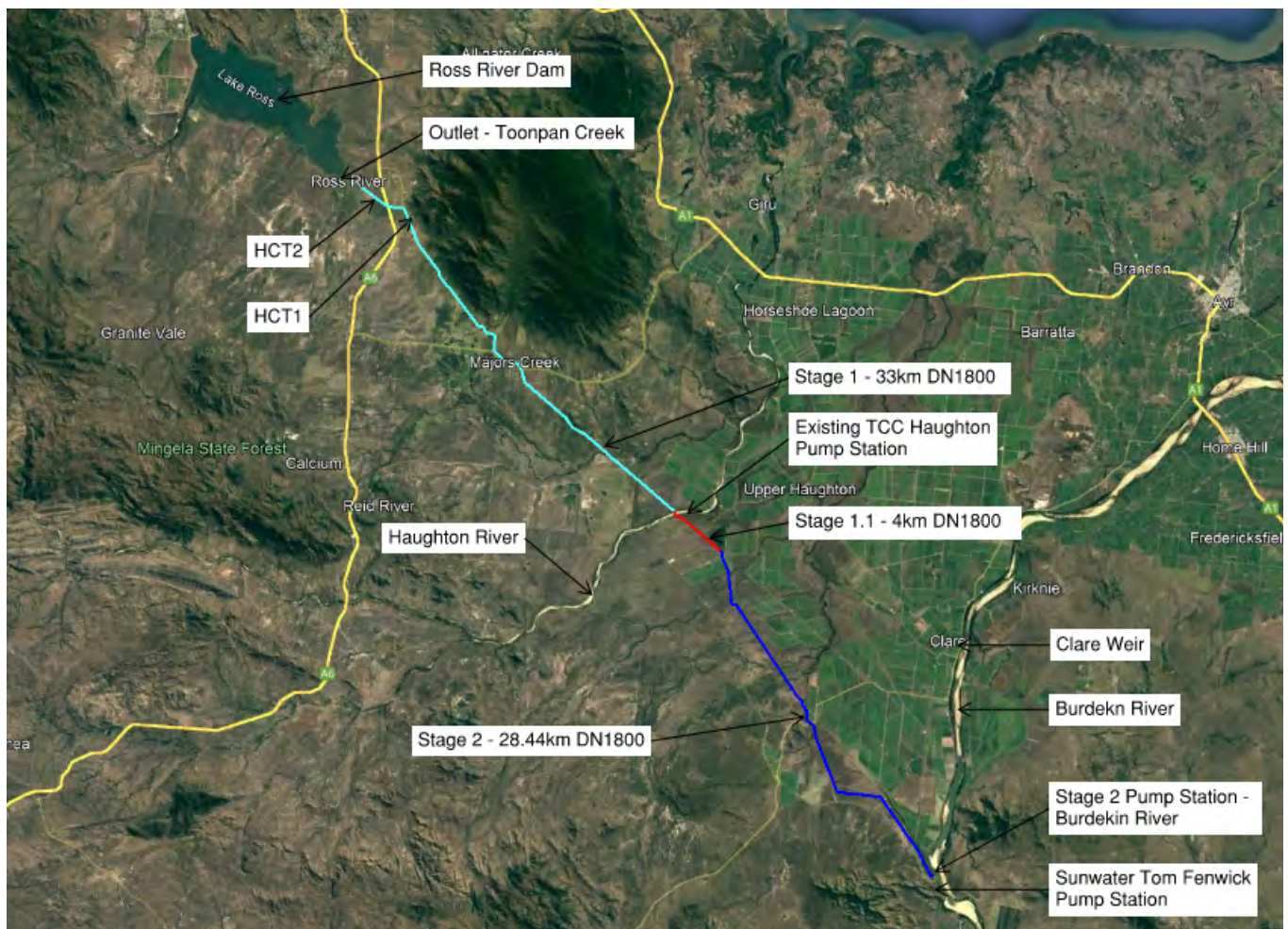


Figure 1.1 HPDP and HPS2 Project area

## **1.2 Purpose and scope of this management plan**

TCC have commissioned GHD to develop this Rehabilitation Management Plan (RMP) for the HPS2 Project. The RMP outlines the requirements for land rehabilitation in areas disturbed by the Project's construction. The scope of the RMP involves the following:

- Identify disturbance areas requiring rehabilitation
- Detail rehabilitation methods, revegetation species and maintenance requirements
- Detail monitoring and reporting requirements.

## **1.3 Limitations**

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

GHD otherwise disclaims responsibility to any person other than TCC 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.

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## 2. Project description

### 2.1 Project location

The HPS2 Project area is located approximately 60 km south-east of Townsville and will connect to the completed Stage 1.1 pipeline. The pipe alignment (approximately 28.5 km in length) extends in a north westerly direction from the new pump station on the Burdekin River to the previously built Stage 1.1 pipeline (Figure 2.1 and Figure 2.2).

The pipeline will intersect a number of waterways, local roads, state-controlled roads, local road reserves and private properties.

The Project resides within the Burdekin Shire Council Local Government Area.

### 2.2 Design and construction details

The project will involve construction of the following:

- A new pump station and intake structure located adjacent to the Burdekin River (between the Tom Fenwick pump station and Clare Weir)
- A buried DN1800 pressure pipeline (approximately 28.5 km in length) connecting to the completed Stage 1.1 pipeline
- Temporary works for the pipeline construction including temporary access and haulage roads and five stockpile areas for materials and equipment
- Above ground facilities including pipeline air release valves, pipeline scour valves and pipeline isolation valves for operation and maintenance.

Project construction works will typically involve the following:

- Clearing vegetation for the pipeline alignment construction corridor, river intake and pump station site
- Stockpiling topsoils to be used in the rehabilitation process
- Construction of temporary access and haulage roads to the pipeline construction corridor and a permanent 4 m wide gravel access road along the pipeline construction corridor
- Construction of five temporary pipe delivery stockpile yards
- Delivery of pipe to designated temporary stockpile holding yards and stringing out along the pipeline construction corridor
- Use of excavators, trenching machines and conventional methods to create an open trench for the pipeline
- Assembly of pipe in the trench, bedding around the pipe with imported embedment materials, and backfilling the trench with stockpiled excavated materials and topsoil
- In-river construction works for construction of an edge of bank intake in the Burdekin River, access road, discharge pipeline and bank erosion and scour protection works
- Civil and building works at top of bank for construction of new pump station and supporting infrastructure
- High voltage (HV) substation and HV power line to supply the pump station from the nearby Powerlink power supply
- Rehabilitation of construction disturbances and non-operational areas

A typical section of the pipeline construction corridor is provided in Figure 2.3.



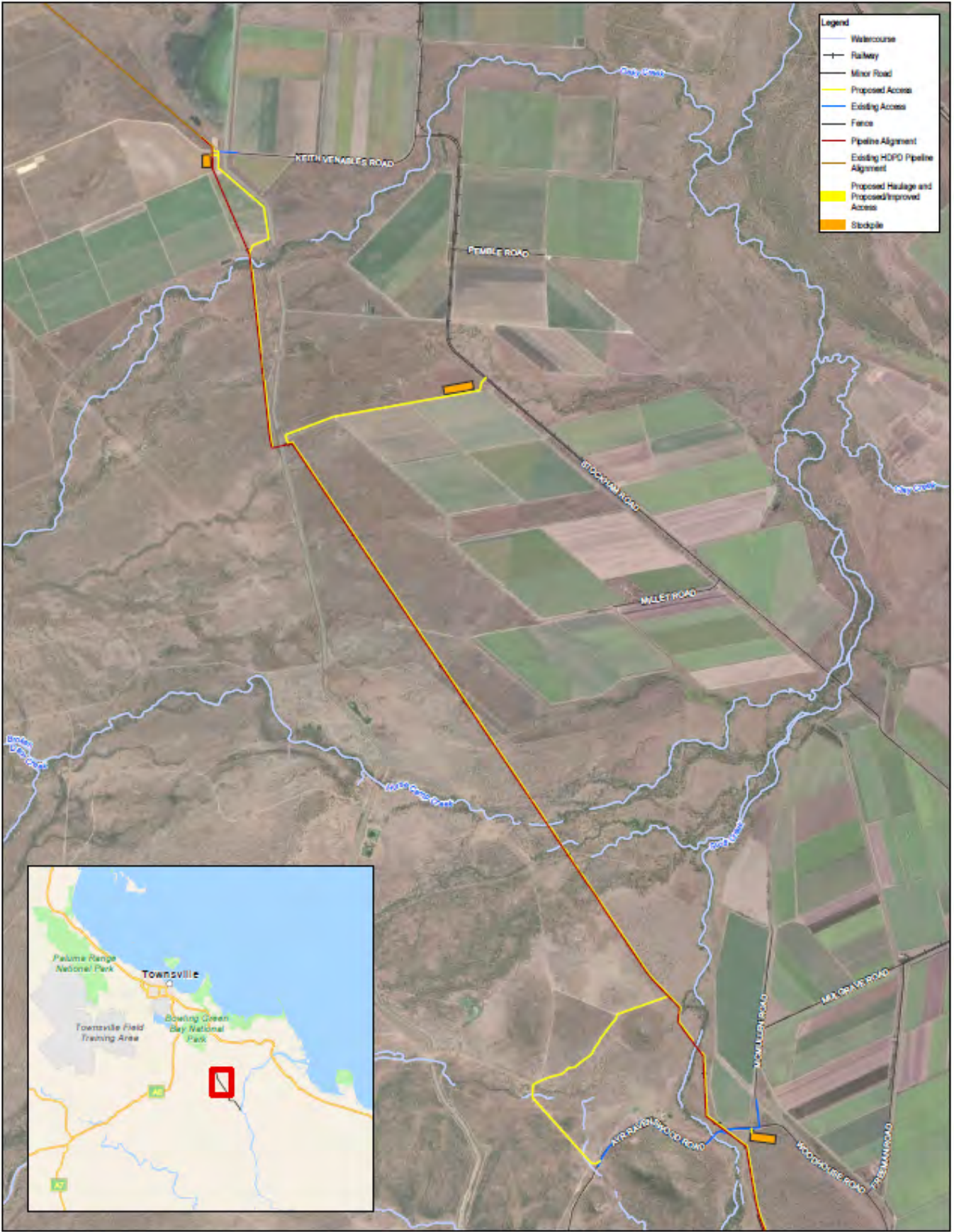


Figure 2.1 HPS2 Project area (Sheet 1)

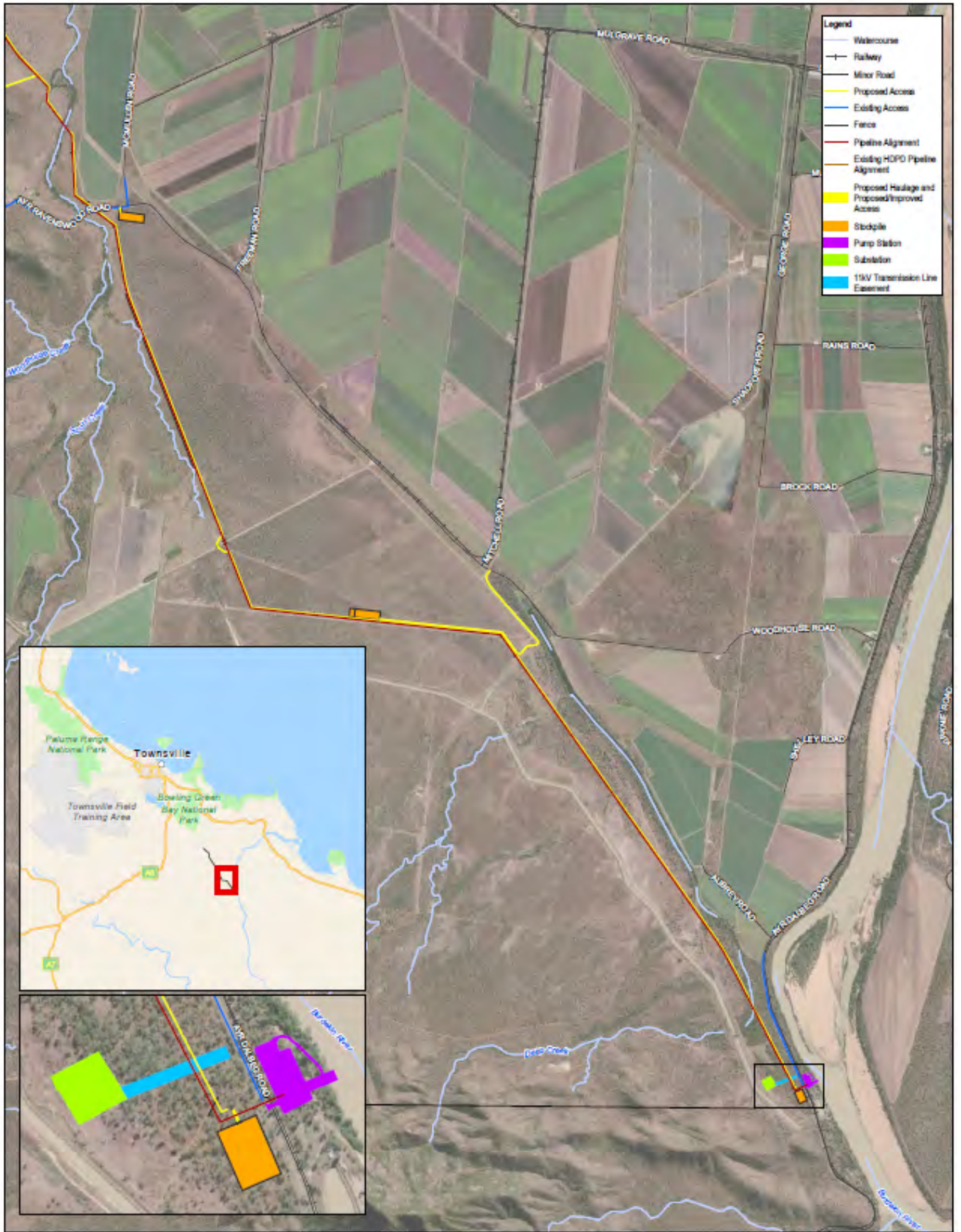


Figure 2.2 HPS2 project area (Sheet 2)

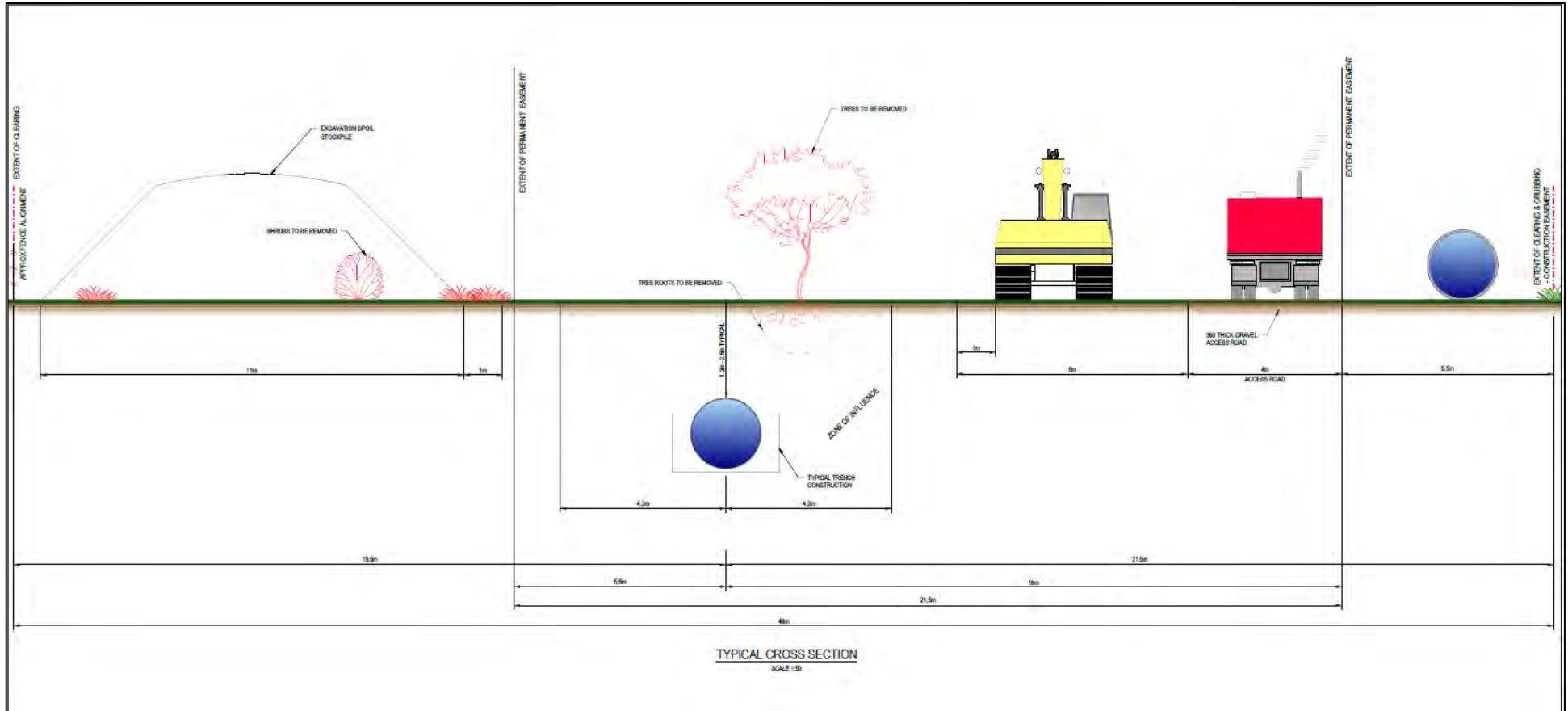


Figure 2.3 Pipeline 40 m wide construction corridor (outside vegetation management watercourses and riparian zones where reduces to 20 m)

## 2.3 Existing environment

### 2.3.1 Rainfall

Rainfall data was obtained from the Bureau of Meteorology (BoM) weather station 033287 (Millaroo Alert) as the closest to the southeast end of the pipeline, and station 033280 (Powerline TM) as the closest station to the northwest end of the pipeline. Historic rainfall data indicates that the area is likely to receive higher rainfall during December to March, with the driest months being August, September and October. Historic rainfall data for Millaroo Alert Station and Powerline TM stations are provided in Table 2.1 and Table 2.2.

Table 2.1 Millaroo rainfall data (BOM 2021)

Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean (mm)	181.4	175.2	96.9	32.5	25.6	21.0	17.5	7.2	7.6	14.6	29.5	88.2
Highest (mm)	381	502	350	86	213	156	93	57	62	47	185	423

Table 2.2 Powerline TM rainfall data (BOM 2021)

Data	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean (mm)	252.3	192.7	113.6	54.7	28.5	18.2	30.9	12.4	9.3	14.6	31.4	75.6
Highest (mm)	583	780	492	258	212	76	166	107	104	64	297	551

### 2.3.2 Regional Ecosystems

Quaternary surveys were completed along the length of the pipeline alignment and Regional Ecosystems (REs) verified within the nominated disturbance areas by Ecological Interpretation (2022). Based on the field verified data, there are 14 REs present within the HPS2 Project area as described in Table 2.3 and shown in Figure 2.4 (REs mapped by DoR for the surrounding landscape are also shown in Figure 2.4 for context).

Table 2.3 Regional Ecosystem descriptions

Regional Ecosystem	VM Act Status <sup>1</sup>	Description
11.3.4	Of Concern	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. woodland on alluvial plains
11.3.4a	Of Concern	<i>Corymbia tessellaris</i> woodland. On alluvial sandridges to elevated levees and level terraces adjacent to larger stream channels which are irregularly flooded or possibly relict.
11.3.7	Least Concern	<i>Corymbia</i> spp. open woodland on alluvial plains
11.3.9	Least Concern	<i>Eucalyptus platyphylla</i> , <i>Corymbia</i> spp. woodland on alluvial plains
11.3.10	Least Concern	<i>Eucalyptus brownii</i> woodland on alluvial plains
11.3.12	Least Concern	<i>Melaleuca viridiflora</i> , <i>M. argentea</i> +/- <i>M. dealbata</i> woodland on alluvial plains
11.3.13	Of Concern	<i>Grevillea striata</i> open woodland on coastal alluvial plains
11.3.25	Least Concern	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines
11.3.25b	Least Concern	<i>Melaleuca leucadendra</i> and/or <i>M. fluviatilis</i> , <i>Nauclea orientalis</i> open forest
11.3.25f	Least Concern	Main river channels. Open water or exposed stream beds and bars. Usually devoid of emergent vegetation although scattered trees and shrubs such as <i>Melaleuca viminalis</i> or <i>Melaleuca</i> spp. May be present and aquatic species may be abundant particularly in water holes and lagoons. Occurs in river channels. Riverine
11.3.30	Least Concern	<i>Eucalyptus crebra</i> , <i>Corymbia dallachiana</i> woodland on alluvial plains
11.3.31	Of Concern	<i>Ophiuros exaltatus</i> , <i>Dichanthium</i> spp. grassland on alluvial plains
11.3.35	Least Concern	<i>Eucalyptus platyphylla</i> , <i>Corymbia clarksoniana</i> woodland on alluvial plains
11.3.35a	Least Concern	<i>Corymbia tessellaris</i> , <i>C. clarksoniana</i> and <i>Eucalyptus platyphylla</i> woodland
11.12.1	Least Concern	<i>Eucalyptus crebra</i> woodland on igneous rocks

<sup>1</sup> Queensland Vegetation Management Act 1999

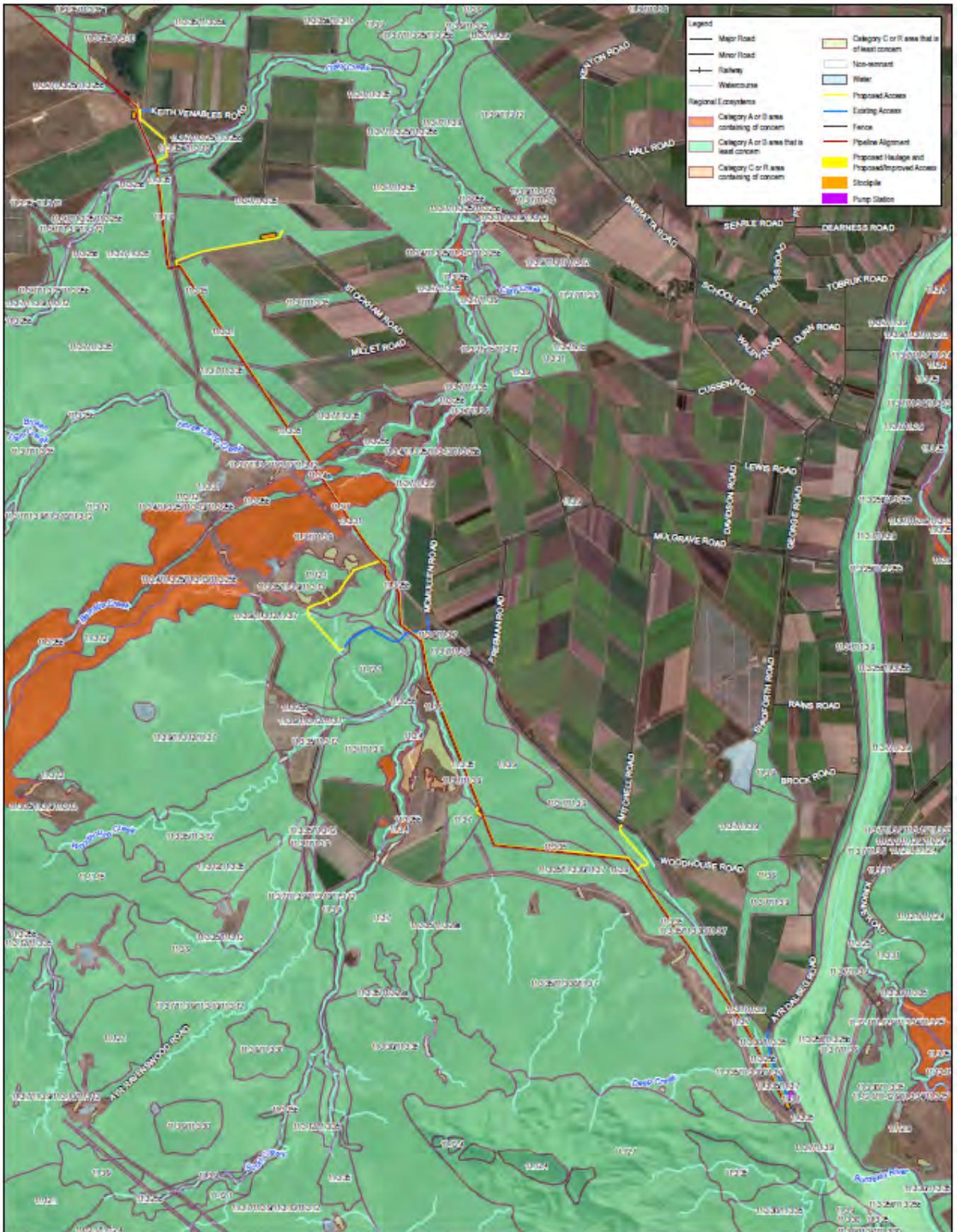


Figure 2.4 Regional Ecosystems

## 3. Rehabilitation approach

### 3.1 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 following:

- *Environmental Protection Act 1994* and the associated regulations
- *Planning Act 2016* and associated *Planning Regulation 2017*.

Further, Commonwealth and State development approvals may stipulate conditions with respect to Project-specific rehabilitation and revegetation measures. This RMP shall be reviewed and updated accordingly prior to the commencement of construction works to comply with any relevant conditions.

### 3.2 Contractor responsibilities

This RMP prescribes standard rehabilitation methods that will 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 development approvals.

### 3.3 Rehabilitation extents and treatments

Rehabilitation shall be undertaken to all disturbance areas within the construction corridor, with the exception of a 4 m wide permanent pipeline access track. Land within the construction corridor has been categorised into two distinct rehabilitation extents, each of which will receive a different rehabilitation treatment, as follows:

- To provide future habitat values for black-throated finch, bare-rumped sheath-tail bat and koala, areas that currently support remnant vegetation and are located within 400 m from a watercourse depicted on the Department of Resources (DoR) Vegetation Management Watercourse and Drainage Feature Map will be revegetated with tubestock consistent with the relevant riparian or woodland REs (i.e. RE 11.3.25 or 11.3.35) and hydromulch comprising endemic grass species. These areas exclude a 10 m wide zone of influence above the pipeline which shall only be hydromulched to enable future maintenance of the pipeline.
- To achieve sufficient protection against erosion, all other areas of the pipeline construction corridor will be hydromulched with endemic grass species. These areas include minor watercourses and drainage lines that are not mapped on the DoR Vegetation Management Watercourse and Drainage Feature Map, the pipeline 10 m wide zone of influence centred about the pipeline (i.e. 5 m either side of the pipeline centerline), temporary construction access roads and stockpile yards.

Where requested by a landholder, some 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.

The type of proposed disturbance, indicative impact and rehabilitation requirements for each of the rehabilitation extents are detailed in Table 4. A schematic representation of the proposed revegetation is presented in Figure 3.1.

The extents of the rehabilitation treatments, as well as the locations of DoR Vegetation Management Watercourses, and the required REs to be restored, are presented in Figure 3.2 to Figure 3.7.

Table 3.1 Project construction components and rehabilitation requirements

Rehabilitation extent	Disturbance	Indicative impact	Rehabilitation requirements	Estimated extent
Remnant vegetation within 400 m of a DoR Vegetation Management Watercourse	<p><i>Temporary</i></p> <ul style="list-style-type: none"> <li>– Clearing of remnant vegetation within a 20 m corridor of a defined distance from a mapped DoR Vegetation Management Watercourse, and 40 m corridor in all other areas</li> <li>– Clearing of temporary construction access roads and stockpile yards within 400 m of a vegetation management watercourse</li> </ul> <p><i>Permanent</i></p> <ul style="list-style-type: none"> <li>– 4 m gravel access track for access along the length of the pipeline</li> </ul>	<ul style="list-style-type: none"> <li>– Clearing/felling/grubbing vegetation within construction corridor</li> <li>– Construction of pipeline trench within pipeline corridor</li> <li>– Gabion mattress scour protection to watercourse defining banks with 300mm topsoil overlaid</li> <li>– Construction of a 4 m wide access track</li> </ul>	<ul style="list-style-type: none"> <li>– Plant tubestock of canopy, sub-canopy, shrub and ground strata (excluding grasses) outside the pipeline 10 m zone of influence and 4m access track; hydromulch with endemic grasses</li> <li>– Hydromulching with endemic grasses to full extent of disturbed corridor including pipeline 10 m zone of influence (i.e. pipeline's 10 m zone of influence is to remain free from tubestock planting)</li> </ul>	<p>22.83 ha comprising:</p> <ul style="list-style-type: none"> <li>– 0.63 ha RE 11.3.25b</li> <li>– 22.2 ha RE 11.3.35</li> <li>– 22.83 ha Hydromulch</li> </ul>
All other areas in the construction corridor including watercourses not mapped on the DoR Vegetation Management Watercourse and Drainage Feature Map, the pipeline 10 m wide zone of influence, temporary construction access roads and stockpile yards	<p><i>Temporary</i></p> <ul style="list-style-type: none"> <li>– Clearing of a 40 m wide pipeline construction corridor</li> <li>– Clearing of temporary construction access roads, stockpile yards and site construction compounds</li> </ul> <p><i>Permanent</i></p> <ul style="list-style-type: none"> <li>– 4 m wide gravel access track parallel to pipeline</li> </ul>	<ul style="list-style-type: none"> <li>– Clearing/felling/grubbing vegetation within construction corridor</li> <li>– Construction of pipeline trench within pipeline corridor</li> <li>– Gabion mattress scour protection to watercourses with 300mm topsoil overlaid</li> <li>– Construction of a 4 m gravel access track</li> </ul>	Hydromulching with endemic grasses	111.91 ha

Rehabilitation extent - Remnant vegetation within 400m of a DoR Vegetation Management Watercourse

Plan View

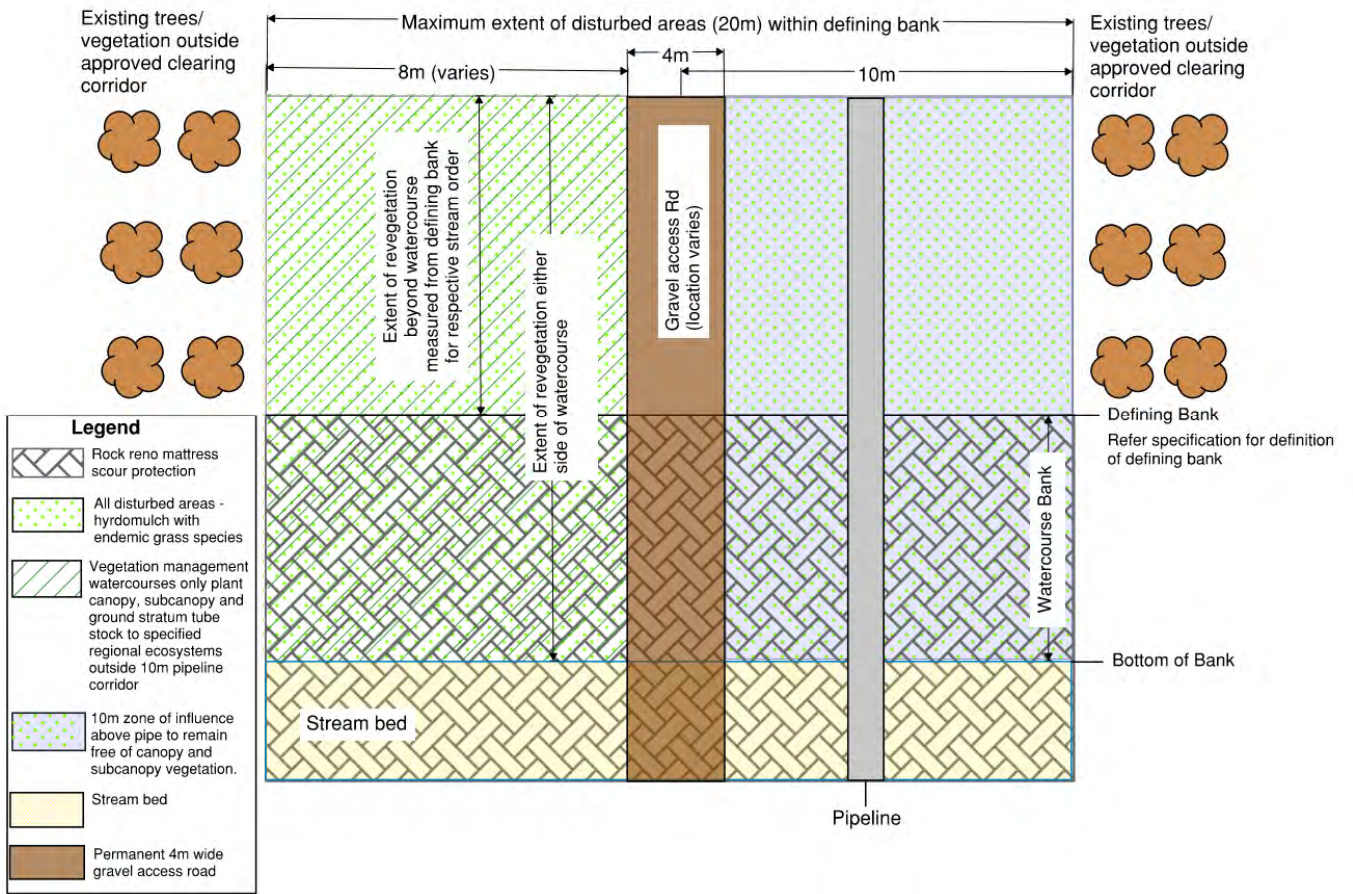
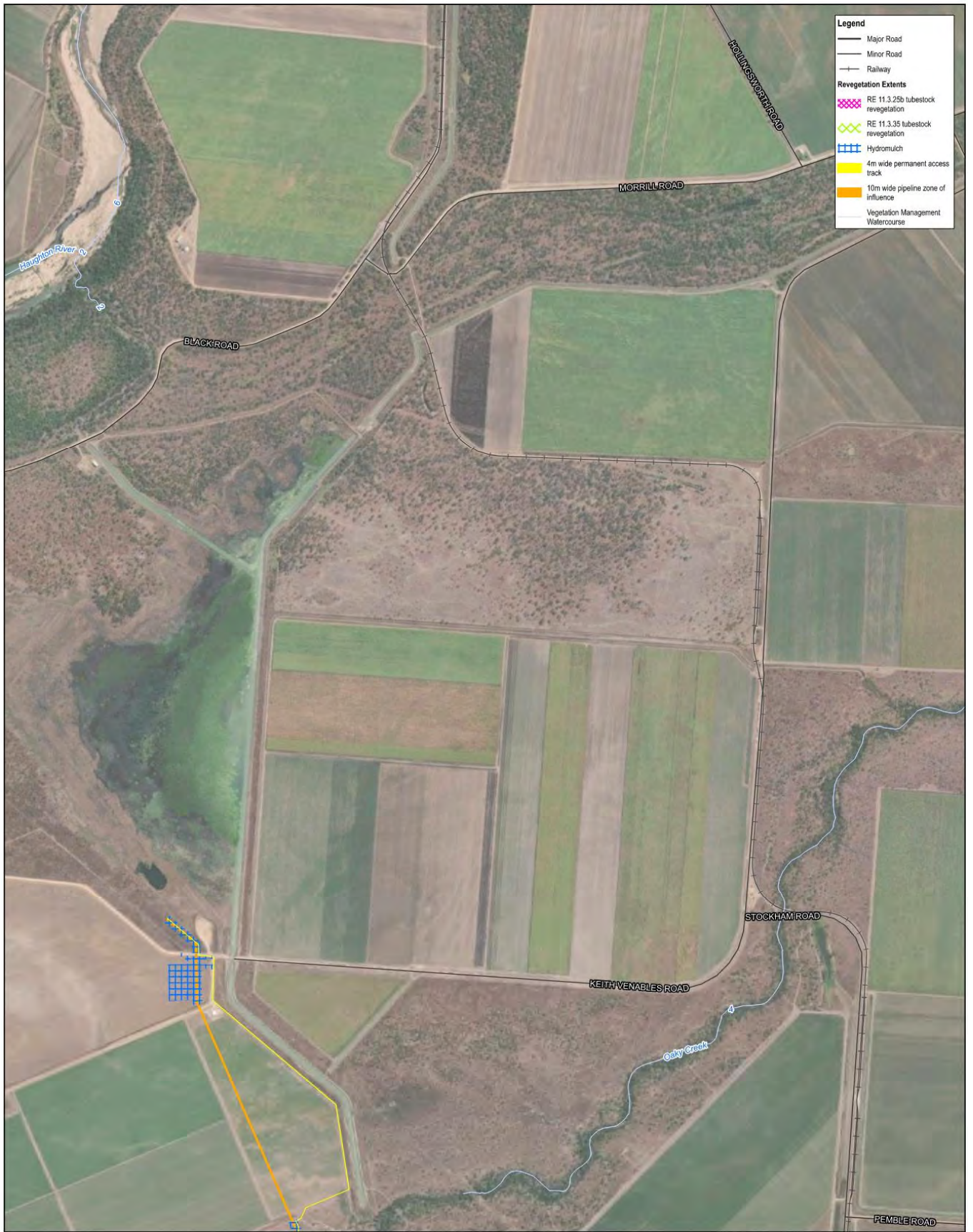


Figure 3.1 Rehabilitation plan for Vegetation Management Watercourses





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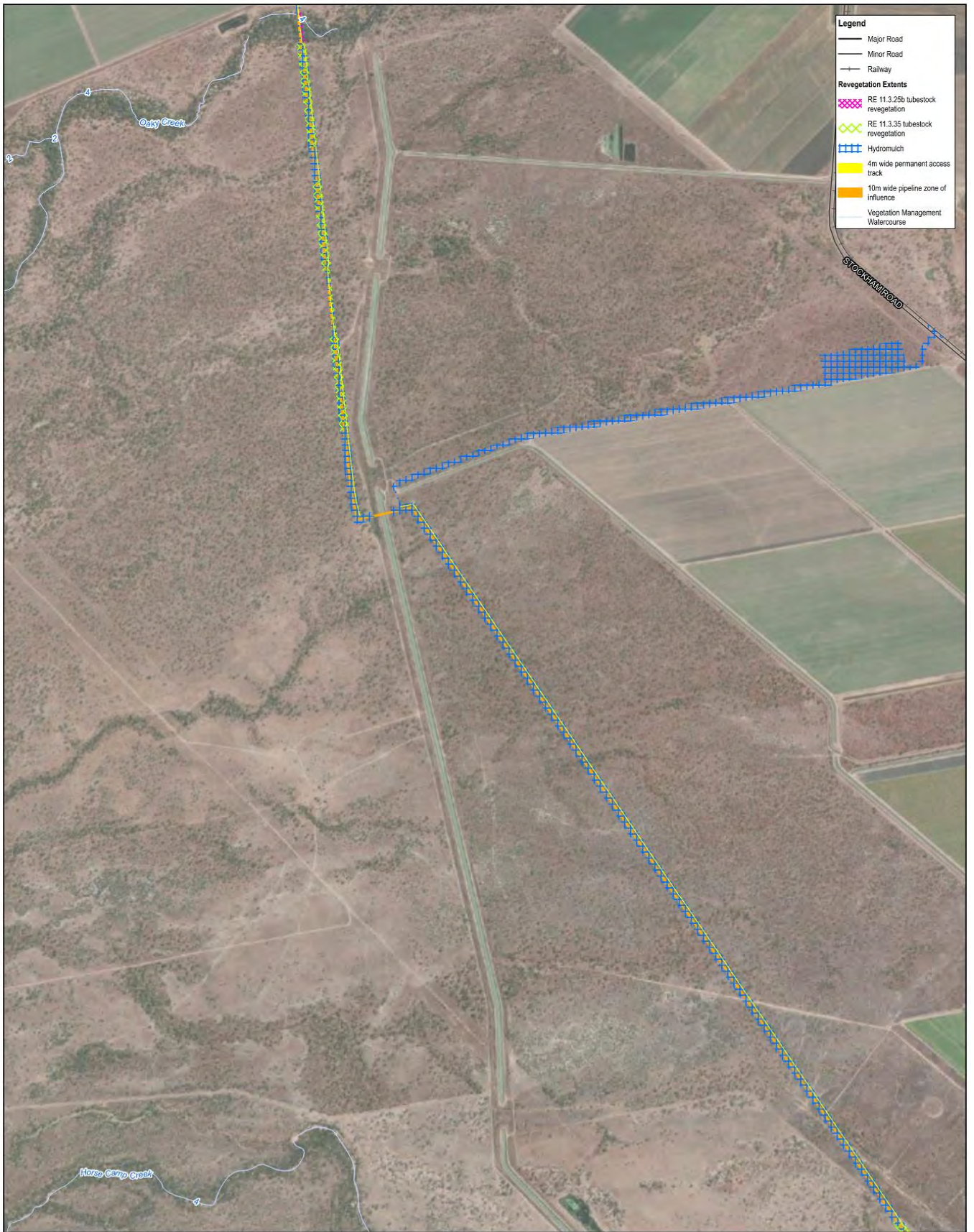
Revegetation extents

Sheet 1 of 6  
 FIGURE 6

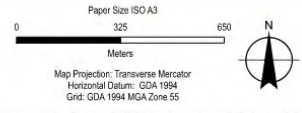
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Figure 3.2 Rehabilitation extent Sheet 1 of 6



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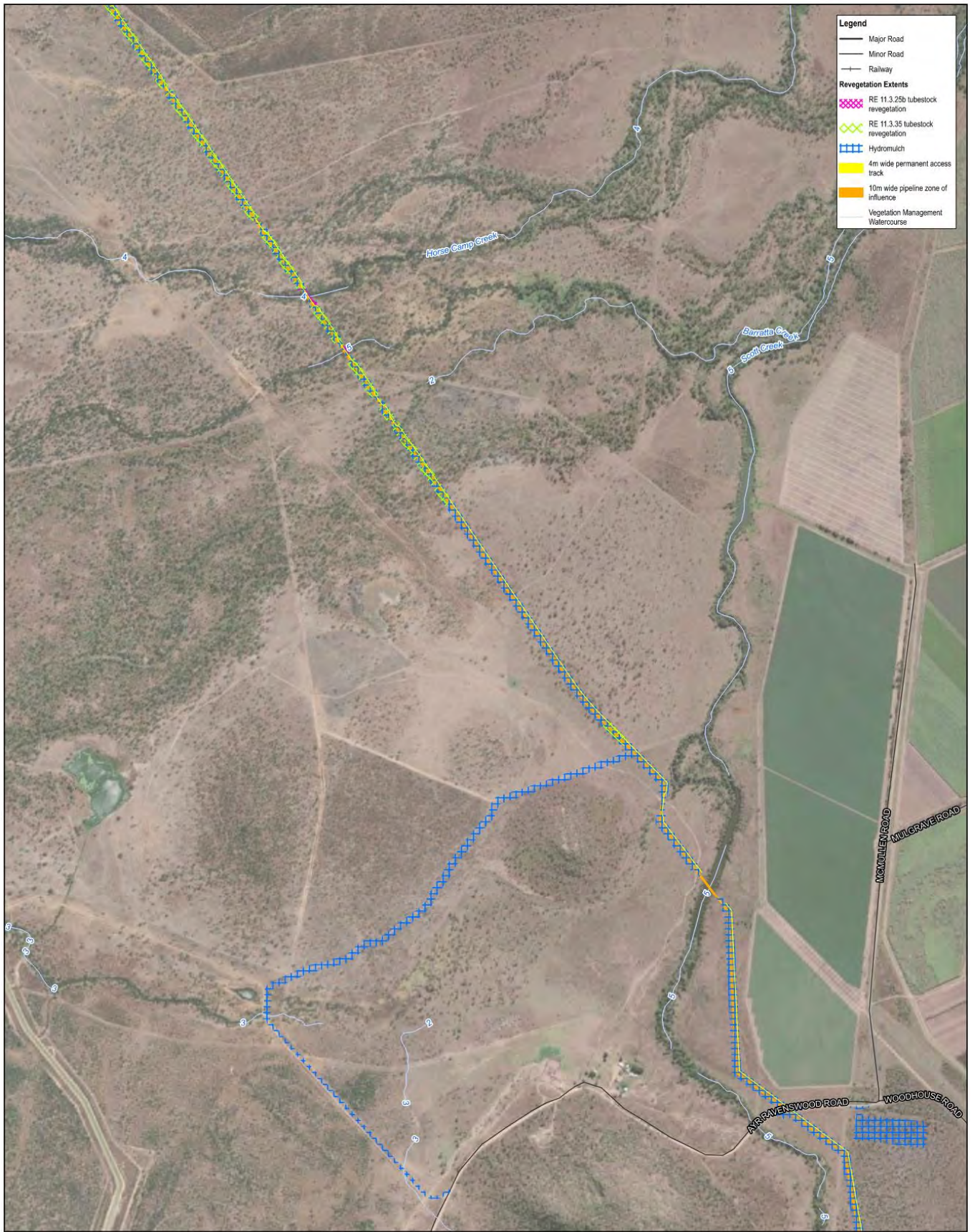
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Date 7/28/2022

Revegetation extents

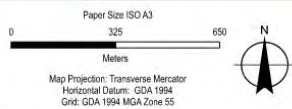
Sheet 2 of 6  
FIGURE 6

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Figure 3.3 Rehabilitation extent Sheet 2 of 6



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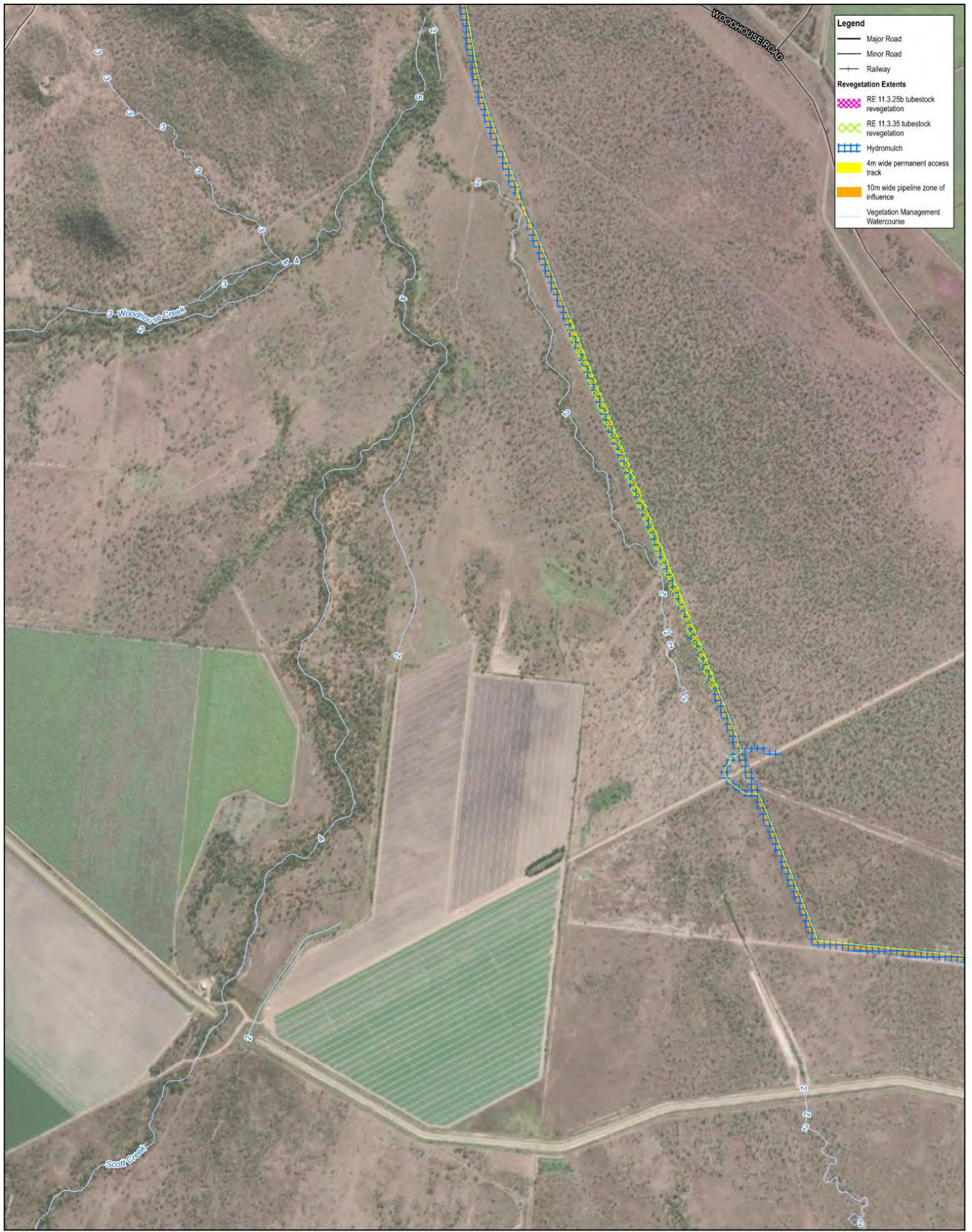
Revegetation extents

Sheet 3 of 6  
FIGURE 6

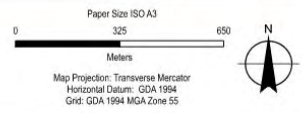
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Figure 3.4 Rehabilitation extent Sheet 3 of 6



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Sheet 4 of 6  
FIGURE 6

Revegetation extents

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Figure 3.5 Rehabilitation extent Sheet 4 of 6



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 Grid: GDA 1994 MGA Zone 55

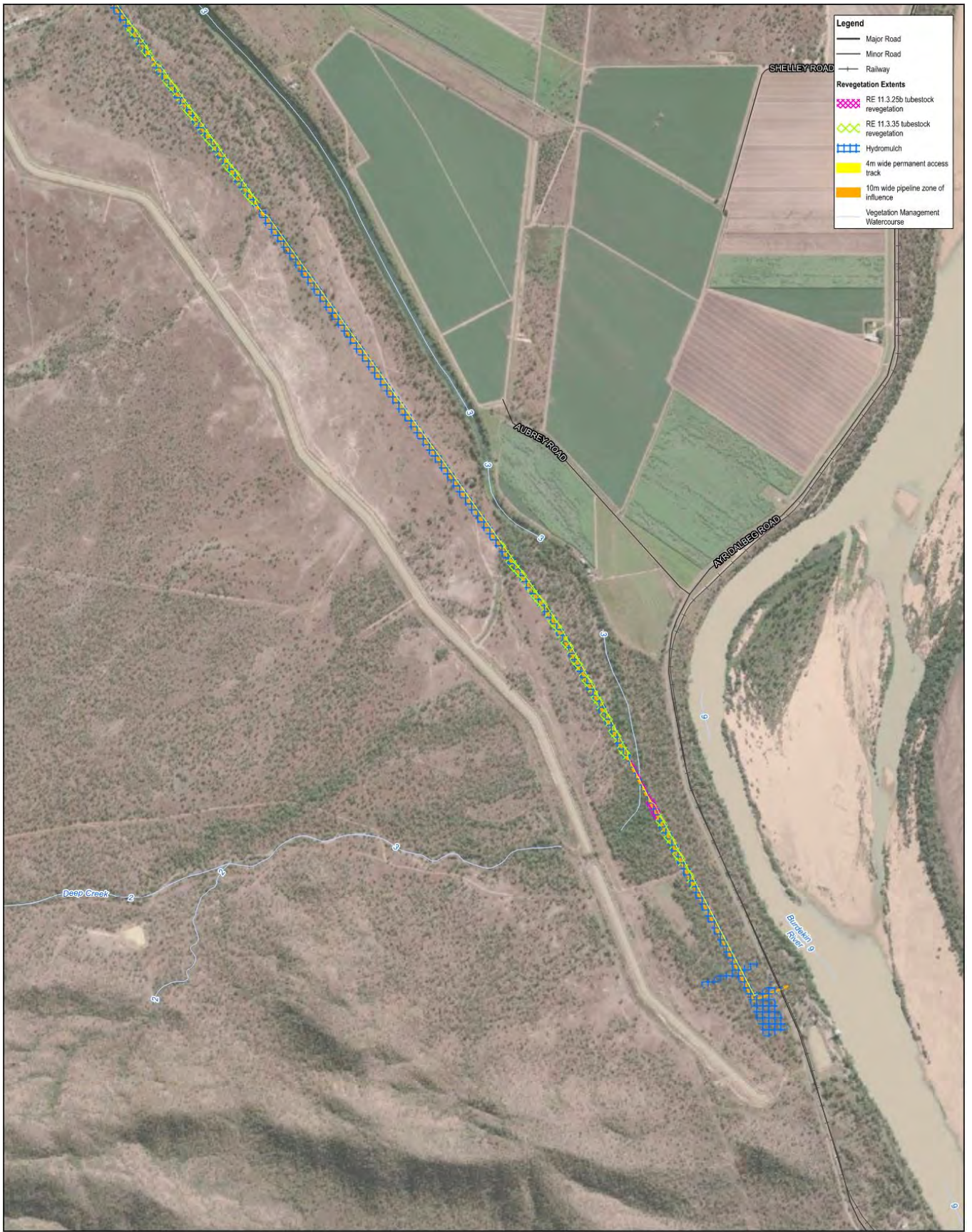
Townsville City Council  
 Haughton Pipeline Stage 2 - Rehabilitation Plan

Project No. 12537606  
 Revision No. C  
 Date 7/28/2022

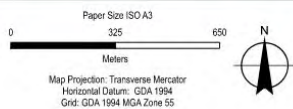
Revegetation extents  
**Sheet 5 of 6**  
**FIGURE 6**

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 Print Date: 29 Jul 2022 - 13:40. Data source: DOR, Roads, Railway, Watercourses (2021), GHD, Site Layout, Potential Habitat, Field Record (2022), World Imagery, Mosaic. Created by: star2

Figure 3.6 Rehabilitation extent Sheet 5 of 6



Based on or contains data provided by the State of QLD 2021.  
 In consideration of the State permitting use of the data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.



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 Haughton Pipeline Stage 2 - Rehabilitation Plan

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Sheet 6 of 6  
 FIGURE 6

Revegetation extents

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Data source: DfR, Roads, Railway, Watercourses (2021), GHD, Site Layout, Potential Habitat, Field Record (2022), Word Imagery, Mosaic. Created by: star2

Figure 3.7 Rehabilitation extent Sheet 6 of 6

## 4. Rehabilitation management plan

### 4.1 Rehabilitation objectives and requisites

The primary objective of this RMP is to return disturbed areas as close as practicable to pre-disturbed conditions within the 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 long term 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
- Rehabilitation areas are suitable for location (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 pipeline
- The execution of planning, implementation, monitoring and reporting on rehabilitation in a manner consistent with industry best practice.

### 4.2 MNES rehabilitation objectives

The assessment of impacts to Matters of National Environmental Significance (MNES) protected under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* associated with the construction, operational and maintenance identified that the Project is likely to result in significant impacts on the following MNES species:

- Bare-rumped sheath-tail bat (*Saccolaimus saccolaimus nudicluniatus*, vulnerable) – due to the impact on habitat critical to the survival of the species, notably loss of potential roosting trees including loss of 10 large- and 27 moderate-sized *E. platyphylla* hollows
- Black-throated finch (southern) (*Poephila cincta cincta*, endangered) – due to the impact on habitat critical to the survival of the species associated with localised indiscriminate loss of trees within 1 km of water
- Koala (*Phascolarctos cinereus*, endangered) – due to the impact on habitat critical to the survival of the species.

While it is acknowledged that rehabilitation measures do not constitute mitigation measures to counteract impacts, habitat reinstatement and improvement for the above MNES was considered in developing the following rehabilitation objectives for this RMP:

- Black-throated finch
  - **Weed management:** Given the extensive weed coverage that currently exists in the Project area, there are substantial opportunities to improve the habitat values for the southern black-throated finch through removal and ongoing management of weeds in all rehabilitation areas.
  - **Revegetation of remnant vegetation areas within 400 m from a DoR Vegetation Management Watercourse:** Remnant areas within 400 m from a DoR Vegetation Management Watercourse will be revegetated (with the exception of the 4 m wide gravel access road and the 10 m wide zone of influence) to establish future areas of suitable habitat for the species. Specifically, these rehabilitation areas will be replanted with tubestock of species that characterise the endemic riparian open forest and woodland communities.
  - **Sowing food grass species:** Rehabilitation areas will be subject to sowing of native grasses that are documented to be food species for the southern black-throated finch.
- Bare-rumped sheath-tail bat
  - **Avoiding direct impact to potential roost trees:** Potential large roost trees will be protected from direct and indirect impact by avoiding the removal of these potential roost trees where possible. Where avoidance is not possible in the remnant watercourse areas, these areas will be replanted with *E. platyphylla* tubestock to increase the availability of future roosting habitat.

- **Revegetation of remnant vegetation areas within 400 m from a DoR Vegetation Management Watercourse:** Remnant areas within 400 m from a DoR Vegetation Management Watercourse will be revegetated (with the exception of the 4 m wide gravel access road and the 10 m wide zone of influence) to establish future areas of suitable habitat for the species.
- Koala
  - **Weed management:** Given the extensive weed coverage that currently exists in the Project area, there are substantial opportunities to improve the habitat values for the koala through removal and ongoing management of weeds in all rehabilitation areas.
  - **Revegetation of remnant vegetation areas within 400 m from a DoR Vegetation Management Watercourse:** Remnant areas within 400 m from a DoR Vegetation Management Watercourse will be revegetated (with the exception of the 4 m wide gravel access road and the 10 m wide zone of influence) to establish future areas of suitable habitat for the species. Specifically, these rehabilitation areas will be replanted with tubestock of species that characterise the endemic riparian open forest and woodland communities.

### 4.3 Rehabilitation success factors

Rehabilitation success factors are as follows:

- Soil moisture availability:
  - Highly variable and low reliability rainfall means rehabilitation timing is critical. Where practicable, rehabilitation will 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 a significant seed bank and mix for native species when respread. This will reduce the reliance on 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 and reduces opportunities for natural recruitment to occur. Ripping along contours will promote successful rehabilitation of native species.

### 4.4 Adaptive management strategies

Adaptive management practices shall be implemented where monitoring indicates rehabilitated areas will not achieve rehabilitation objectives and completion criteria. Adaptive management strategies shall 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 tubestock
- Extending the rehabilitation monitoring and reporting period.

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



## 4.5 Rehabilitation timing

Areas that have been temporarily cleared and are no longer required for construction activities shall be progressively rehabilitated (nominally within six weeks of the cessation of works in an area). Progressive rehabilitation requires rehabilitation of cleared/disturbed areas throughout the work program and minimises opportunities for weed establishment, erosion and degradation of seedbanks, rather than leaving all rehabilitation to the end of the program.

## 4.6 Planning ground disturbance and 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).

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

- The proximity to active drainage lines/waterways and appropriate erosion and sediment control
- Separation of subsoil and 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 equipment involved in the works shall be GPS guided, with working areas and any no-go zones pre-uploaded. Alternatively, disturbance areas shall be surveyed and marked with flagging prior to commencement of the works.

Access for vehicles and machinery shall be along designated access tracks, roads and laydown 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.

In addition, the following will be considered during site establishment/clearing:

- Clearing will be restricted to a maximum 40 m wide construction corridor, except for distances from Regulated Vegetation Management Map mapped watercourses which will be limited to 20 m
- Ancillary activities during construction will be located within the 40 m wide construction corridor, existing non-remnant areas (Category X on the DoR Regulated Vegetation Management Map) or existing cleared areas to avoid additional disturbance
- Where reasonable and practicable, cleared vegetation shall be mulched (e.g. via tub grinding) for use on the site as an erosion control aid. This shall not be undertaken where it comprises topsoil and vegetation stockpiles for use in revegetation works.

## 4.7 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, will be a minimum of 100 mm (where available).

Topsoil stripping activities shall aim to avoid periods of predicted significant rainfall. Topsoil stripping shall be halted during periods of significant rainfall and appropriate control measures implemented and monitored for erosion and sediment control. Where possible, topsoil will be collected at a time of year when the soil seed bank is likely to be at its 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 to reduce wind erosion. To avoid hard setting, water for dust suppression shall be minimised 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 require moving until its required for rehabilitation.

Subsoil will be stockpiled separately for subsequent reuse as trench backfill material, in landscaping or other general fill requirements if appropriate for the use. Excess material shall be removed offsite under an approved Environmental Authority (EA) for Environmentally Relevant Activity ERA 16(2)(b) through the Department of Environmental Science (DES) to be obtained by the construction Contractor.

Where required, diversion berms shall be constructed from subsoil to direct water away from sensitive infrastructure (or disturbed surfaces for erosion protection) before expected rainfall.

If required, sodic soil will be treated with gypsum at an application rate 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 2 m. Subsoil or spoil can be stockpiled to a maximum height of 4 m. A record (via survey) 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 will include mulching, minor diversion of upslope surface water or sediment fencing. Stockpiles shall not be 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.

## **4.8 Soil assessment**

A soil assessment within the revegetation areas shall be undertaken by the Contractor to provide site specific recommendations for soil amelioration.

The soil sampling and assessment program shall be conducted by a suitably qualified soil scientist. Soil analysis will be undertaken by an Australasian Soil and Plant Analysis Council (ASPAC) certified laboratories.

Sampling and analysis conducted on topsoil and subsoils will conform with the below.

### **4.8.1 Topsoil**

Topsoil sampling shall comply with the following requirements:

- Samples shall be representative of the topsoil type (i.e. no mixing different soil types or subsoils)
- Samples shall be collected as per the frequency outlined in Table 4.1
- If sampling stockpiles, sub-samples shall be sampled from various locations and 0.5 m apart
- Composite samples shall include 10 sub-samples
- Approximately 3 kg of sample shall be collected.

**Table 4.1 Topsoil sampling frequency**

Topsoil	Frequency
In situ topsoil	1 per 2,500 m <sup>2</sup> With a minimum of one test per topsoil type
Site stockpile	1 per 500 m <sup>3</sup> With a minimum of one test per topsoil type
Manufactured site topsoil	1 per 500 m <sup>3</sup> With a minimum of one test per topsoil type
Imported topsoil	1 per 500 m <sup>3</sup> With a minimum of one test per topsoil type

Laboratory analysis shall include:

- Bulk density
- Organic matter
- Wettability
- pH
- Electrical conductivity
- Extractable Phosphorus content
- Permeability
- Texture
- Water repellence (hydrophobicity)
- Dispersion
- Exchangeable Calcium, Magnesium
- Calcium/Magnesium ratio
- Exchangeable Sodium percentage
- Exchangeable Potassium, Aluminium
- Effective cation exchange capacity
- If EC > 1.2 dS/m – Soluble Chloride\*
- If EC > 1.2 dS/m – Extractable Sulfur\*.

*Note: \* not included when testing manufactured topsoil*

## 4.8.2 Subsoil

Subsoil sampling shall comply with the following requirements:

- Samples shall be representative of the subsoil type (i.e. no mixing different soil types or topsoils)
- One test per subsoil type
- Composite samples shall include 10 sub-samples
- Approximately 1 kg of sample shall be collected.

Laboratory analysis shall include:

- Wettability
- pH
- Electrical conductivity
- Texture
- Water repellence (hydrophobicity)
- Exchangeable Calcium
- Exchangeable Magnesium
- Calcium/Magnesium ratio
- Exchangeable Sodium percentage
- Exchangeable Potassium
- Exchangeable Aluminium
- Effective cation exchange capacity

## 4.9 Weed management

The rehabilitation areas shall be in a weed-free condition prior to the commencement of ground preparation operations. The contractor can nominate the appropriate weed control methods depending on the conditions and growth characteristics of any weed species present. Weed control methods can include any of the following:

- Mechanical application of herbicide using boom spray or high-volume power applicator
- Manual application of herbicide from knapsack or similar applicator
- Manual mechanical methods, such as hand-pulling

## 4.10 Land stabilisation and erosion management

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. Existing private landowner access tracks made available to the Project are not required to be rehabilitated under this RMP unless it 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.

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 the Project's 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.

The backfilling of trenches will ensure that soil horizons (topsoil, sub-soil) are placed similar to pre-disturbance. Once backfilled, trenches will be compacted, capped with a layer of topsoil to a level at least 75 mm above adjoining ground level.

Trench design will aim to reduce the risk of tunnel erosion and surface slumping, such as the installation of trench breakers (e.g. sand bags) at regular intervals in sections of steeper grade and specified compaction requirements to trench backfill. A diversion berm will be installed immediately down-slope of the trench breaks to ensure that seepage water will be diverted from the trench and across the rehabilitated area.

The watercourses and drainage line embankments will be reprofiled and rock mattress placed where required. Binders suitable for cold spray application may also be applied to stabilise mulched and seeded surfaces on banks in areas of high-risk erosion.

## 4.11 Ripping

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)
- 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 0.1 m. Highly compacted areas such as hardstands, laydowns and temporary access tracks may need to be ripped to a greater depth of 0.3 m if possible, with available machinery

## 4.12 Amelioration and roughening

Any required soil amelioration, as determined through the assessment described in Section 4.9 herein, is to be completed. Roughening shall occur immediately after the application of amelioration agents. Roughening shall:

- Be approximately 50 mm depth
- Incorporate amelioration agents into the subsoil
- Occur when soils are dry enough to break up / crumb the surface
- Be parallel to the contour.

## 4.13 Topsoil re-instatement

Topsoil 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 an excess of topsoil exists, a greater depth of soil may be respread subject to not impeding overland stormwater flow
- Spreading of topsoil will 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 mitigate erosion risk.

## 4.14 Revegetation

### 4.14.1 Preparation for revegetation

Prior to hydromulching and tubestock planting, the following site preparation will be undertaken:

- Revegetation to be undertaken by a suitably qualified and experienced contractor
- Mark out the 10 m corridor over the pipeline (with star pickets and high visibility tape) that is to remain free of tubestock planting (i.e. no canopy, sub-canopy, shrub or ground strata tube-stock)
- Eradicate weeds prior to undertaking revegetation works
- Calculate material requirements for rehabilitation works well in advance of work commencement (noting there may be a requirement to propagate certain plant species)
- Contact nursery/seed providers to ascertain the availability of seed and tube-stock for use in rehabilitation work
- Nursery/seed providers must provide proof of 'local providence' for all material. A record of providence will be maintained by the contractor undertaking the work. Local providence is considered to be within 100 km of Townsville and 100 km of Ayr

Specific hydromulch and tubestock requirements are detailed in Table 4.2, and suitable plant species are recommended in Table 4.3 (hydromulch) and Table 4.4 (tubestock). Further details on these methods are provided as follows.

### 4.14.2 Application of hydromulch

- Apply hydromulching material to revegetation areas (100% cover on areas to be revegetated) at the minimum application rate as per the nominated product requirements.
- Hydromulch shall not be applied under the following weather conditions:
  - Temperature is higher than 35°C
  - Winds exceed 15 km/hr
  - Where, in the opinion of the Superintendent the surface is too wet
  - During rain periods or when rain appears imminent,

### 4.14.3 Planting of tubestock

- Tube-stock will be planted as a minimum several months before the first wet season rains and irrigated, to maximise vegetation establishment before high velocity flows occur in watercourses and drainage features.
- At least 100 days will be allowed between germination of collected seeds and rehabilitation planting to ensure adequate tube-stock maturation.
- Tubestock shall have the following characteristics:
  - Tubestock to be minimum 50 mm diameter and 80 mm deep
  - Tubestock height to be 200 mm when planted
  - Plant stock is to be supplied in good health as demonstrated by the following:
    - Leaf colour and size

- Absences of dieback
- Absence of other plant stress indicators
- Free from significant injury
- Free from pests and diseases
- Tubestock planting methods will include:
  - **Identify the trunk flare.** The trunk flare is where the trunk expands at the base of the tree. This point should be partially visible after the tree has been planted.
  - **Dig a shallow, broad planting hole.** Clear the hydromulch and dig a hole 2-3 times wider than the root ball, but only as deep as the root ball.
  - **Remove the containers or cut away the wire basket.** Inspect container tree root balls for circling roots. Straighten, cut, or remove them.
  - **Place the tree at the proper height.** Take care to dig the hole to the proper depth – and no more. If the tree is planted too deep, new roots will have difficulty developing because of a lack of oxygen.
  - **Straighten the tree in the hole.** Before backfilling, have someone view the tree from several directions to confirm it is straight.
  - **Fill the hole gently, but firmly.** Pack soil around the base of the root ball to stabilize it. Fill the remainder of the hole, firmly packing the soil to eliminate air pockets that may dry out roots. Further reduce air pockets by watering periodically while backfilling. Avoid fertilization at the time of planting.
  - **Stake the tree only if necessary.** Studies have shown that trees establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting.
  - **Mulch the base of the tree.** Mulch is organic matter spread around the base of a tree to hold moisture, moderate soil temperature extremes, and reduce grass and weed competition. Mulch is to be provided for 300 mm around planted tubestock to a depth of 100 mm
  - **Provide follow-up care.** Keep the soil moist, but not water-logged. Water trees at least once a week, barring rain, and more frequently during hot, windy weather.

Table 4.2 Hydromulch and tubestock requirements

Restored Regional Ecosystem	Hydromulch	Tubestock requirements		
		Tubestock planting rate at the following rates per stratum	Tube-stock species diversity requirements	Plant spacing requirements
11.3.25b <i>Melaleuca leucadendra</i> and/or <i>M. fluviatilis</i> ,	<ul style="list-style-type: none"> <li>– Endemic grass species will be used with the goal of surface stabilisation through over-seeding the rehabilitation area with endemic grass species.</li> <li>– Seeding rate will be sufficient for germination and sustainable cover of approximately 1000 plants per hectare, per riparian zone.</li> <li>– A minimum of four different native grass species will be selected from Table 4.3.</li> <li>– Bonded fibre matrix to be provided at watercourse banks as a minimum. 6-month functional longevity, minimum application rate of 5000 kg/ha (500 g/m<sup>2</sup>) and minimum wet thickness of 5 mm.</li> <li>– Apply hydromulching material to rehabilitation areas (100% cover on entire rehabilitation footprint) at the minimum application rate as per the nominated product requirements</li> </ul>	<ul style="list-style-type: none"> <li>– 30 canopy trees per hectare</li> <li>– 50 sub-canopy trees per hectare</li> <li>– 60 shrubs per hectare</li> <li>– 3,000 sedges and forbs per hectare.</li> </ul>	<ul style="list-style-type: none"> <li>– A minimum of four different canopy species</li> <li>– A minimum of three different sub-canopy species</li> <li>– A minimum of five different shrub species</li> <li>– A minimum of four different forb or sedge species.</li> </ul>	<p>Recommended plant spacing is as follows:</p> <p><i>Below the defining bank:</i></p> <ul style="list-style-type: none"> <li>– Forbs and sedges can be planted in clumps of four with a minimum spacing of 1 m between clumps</li> <li>– Plant canopy, sub-canopy and shrub species with a minimum spacing of 2 m (stream order 3 or higher watercourses) or with a minimum spacing of 3 m (stream order 1 and 2 watercourses).</li> </ul> <p><i>Beyond the defining bank:</i></p> <ul style="list-style-type: none"> <li>– Plant sub-canopy, shrub, and ground strata species with a minimum spacing of 2 m</li> <li>– Plant canopy species with a minimum spacing of 3 m.</li> </ul>
11.3.35 <i>Eucalyptus platyphylla</i> , <i>Corymbia clarksoniana</i> woodland on alluvial plains		<ul style="list-style-type: none"> <li>– 30 canopy trees per hectare</li> <li>– 35 sub-canopy trees per hectare</li> <li>– 40 shrubs per hectare</li> <li>– 900 grasses per hectare.</li> </ul>	<ul style="list-style-type: none"> <li>– A minimum of two different canopy species.</li> <li>– A minimum of two different sub-canopy species.</li> <li>– A minimum of two different shrub species.</li> <li>– A minimum of four different grass species.</li> </ul>	<ul style="list-style-type: none"> <li>– Plant sub-canopy, shrub, and ground strata species with a minimum spacing of 10 – 20 m</li> <li>– Plant canopy species with a minimum spacing of 10 – 20 m.</li> </ul>

Table 4.3 Endemic grass species for hydromulch mix

Scientific name	Common name	RE 11.3.35	RE 11.3.25b	All other areas
<i>Alloteropsis cimicina</i>	Carpet Grass	-	-	X
<i>Dichanthium sericeum</i>	Queensland Bluegrass	X	X	X
<i>Enteropogon acicularis</i>	Curly Windmill Grass	-	X	X
<i>Heteropogon contortus</i>	Black Speargrass	X	X	X
<i>Heteropogon triticeus</i>	Giant Speargrass	X	-	X
<i>Panicum decompositum</i>	Native Millet	-	-	X
<i>Panicum effusum</i>	Hairy Panic		X	X
<i>Setaria surgens</i>	Pigeon Grass	X	X	X
<i>Themeda triandra</i>	Kangaroo Grass	X	X	X

Table 4.4 Suitable tubestock plant species for rehabilitation of vegetation management watercourses

Stratum	Lifeform	Species	Common name	RE 11.3.35	RE 11.3.25b
Canopy	Tree	<i>Casuarina cunninghamiana</i>	River She-oak	-	X
	Tree	<i>Corymbia tessellaris</i>	Moreton Bay Ash	X	X
	Tree	<i>Eucalyptus camaldulensis</i>	River Red Gum	X	-
	Tree	<i>Eucalyptus platyphylla</i>	Poplar gum	X	X
	Tree	<i>Eucalyptus raveretiana</i>	Black Ironbox	X	-
	Tree	<i>Eucalyptus tereticornis</i>	Forest red gum	-	X
	Tree	<i>Euroschinus falcatus</i>	Cudgerie	-	X
	Tree	<i>Melaleuca fluviatilis</i>	River tea tree	-	X
	Tree	<i>Melaleuca leucadendra</i>	Weeping Paperbark	-	X
	Tree	<i>Nauclea orientalis</i>	Leichhardt Tree	-	X
Subcanopy	Tree	<i>Alphitonia excelsa</i>	Soap bush	-	X
	Tree	<i>Alphitonia excelsa</i>	Soap tree	-	X
	Tree	<i>Ficus racemose</i>	Cluster Fig	-	X
	Tree	<i>Geijera salicifolia</i>	Wilga	-	X
	Tree	<i>Glochidion apodogynum</i>	Buttonwood	-	-
	Tree	<i>Lysiphyllum hookeri</i>	White Bauninia	-	X
	Tree	<i>Mallotus philippensis</i>	Kamala Tree	-	X
	Tree	<i>Melaleuca nervosa</i>	Firebark	X	X
	Tree	<i>Melaleuca viridiflora</i>	Broad-leaved paperbark	X	X
Shrub	Shrub	<i>Acacia holosericea</i>	Silky Wattle	X	X
	Shrub	<i>Alyxia ruscifolia</i>	Native Holly	-	X
	Shrub	<i>Breynia oblongifolia</i>	Coffee Bush	-	X
	Shrub	<i>Ficus opposita</i>	Sandpaper Fig	-	X
	Shrub	<i>Lophostemon grandiflorus</i>	Northern Swampbox	X	-
	Shrub	<i>Macaranga tanarius</i>	Macaranga	-	X
	Shrub	<i>Planchonia careya</i>	Cocky Apple	X	X
Ground	Forb	<i>Commelina diffusa</i>	Scurvy Weed	-	X



Stratum	Lifeform	Species	Common name	RE 11.3.35	RE 11.3.25b
	Forb	<i>Commelina ensifolia</i>	Scurvy Grass	X-	X
	Forb	<i>Dianella caerulea</i>	Blue Flax Lily	-	X
	Forb	<i>Eustrephus latifolius</i>	Wombat Berry	-	X
	Forb	<i>Lomandra longifolia</i>	Spiny-head Mat-rush	-	X
	Sedge	<i>Cyperus distans</i>	Slender Cyperus	-	X
	Sedge	<i>Cyperus javanicus</i>	Javanese Flatsedge	-	X
	Sedge	<i>Cyperus trinervis</i>	-	-	X
	Sedge	<i>Fimbristylis dichotoma</i>	Common Fringe Sedge	-	X
	Sedge	<i>Fimbristylis littoralis</i>	Lesser Fimbristylis	-	X

## 4.15 Fencing

Fencing of the construction corridor shall remain in place until the end of the monitoring period to protect rehabilitation areas from livestock and to control vehicle access.

## 4.16 Site maintenance

Maintenance of rehabilitation areas will be required to achieve Project objectives. The following maintenance obligations will be required:

- Establishment phase maintenance of rehabilitation areas
- Ongoing maintenance of rehabilitation areas.

### 4.16.1 Establishment phase maintenance

After rehabilitation is established, the following minimum maintenance tasks shall be undertaken for the first 12 weeks after completion of rehabilitation:

- Any combination of water truck, hand watering and/or temporary irrigation system shall be utilised to fully establish the plants and grass within the Project. Watering of tube-stock shall occur at least twice a week for the 12 weeks following planting. Watering may be reduced if climatic conditions provide sufficient rainfall.
- Check the planted tube-stock weekly for mortality. If greater than 5% mortality (per stratum) occurs, replace any plant losses.
- Check for germination weekly and re-apply hydromulch in any areas where germination has not been achieved within one month or if established ground cover is less than the acceptance criteria. Ripping should be undertaken prior to re-seeding if the surface has become compacted.
- Inspection for restricted invasive weed species under the *Biosecurity Act 2014* will be undertaken weekly by personnel experienced in weed identification. If any such species are detected, control will be undertaken using appropriate control techniques (e.g. in accordance with the Department of Agriculture and Fisheries (DAF) factsheets for the relevant species).
- Weekly inspection of erosion and sediment controls and immediate corrective action.
- Inspection of watercourses following any notable weather events to ascertain if degradation of the rehabilitation works has occurred, and undertake restoration works where required.
- Removal of any shrub or canopy species from the pipeline 10 m wide zone of influence.

### 4.16.2 Ongoing maintenance

Once established, the following site maintenance activities will be undertaken until end of the defect liability period (12 months):

- Watering of tube-stock shall occur at least once every two weeks (unless climatic conditions provide sufficient rainfall)
- Check the planted tube-stock every four months for mortality. If greater than 5% mortality (per stratum) occurs, replace any plant losses.
- Check for ground cover dieback every four months and re-apply hydromulch in any areas where ground cover is less than the acceptance criteria. Ripping should be undertaken prior to re-seeding if the surface has become compacted.
- Site inspection for restricted invasive weed species will be undertaken every four months by personnel experienced in weed identification and control will be undertaken as necessary using appropriate control techniques (e.g. in accordance with the DAF factsheets for the relevant species).
- Inspection of watercourses following any notable weather events to ascertain if degradation of the rehabilitation works has occurred, and undertake restoration works where required
- Removal of any shrub or canopy species from the pipeline 10 m wide zone of influence.

## 5. Monitoring

Monitoring will be undertaken by a separate representative appointed by Townsville City Council and undertaken every four months until the end of the Defects Liability Period (12 months). Monitoring elements are detailed in Table 5.1. The rehabilitated vegetation is expected to be well-established by the end of this 12-month period, and will have been subjected to all seasonal conditions, such that this length of time is considered sufficient.

*Table 5.1 Monitoring elements*

<b>Element</b>	<b>Description</b>
Photographic points	Two photographic monitoring points for each intersected Vegetation Management Watercourse will be established and marked with star pickets. Photographs will be taken at each location facing north, south, east and west.
Soil stability	Assessed visually by observing each rehabilitated watercourse as well as the length of the pipeline for signs of erosion.
Groundcover	Groundcover establishment will be assessed by randomly placing five 1x1 m quadrat at each of the intersected Vegetation Management Watercourses, as well as at an additional 10 sites along the pipeline that have been hydromulched. the following will be recorded within each quadrat: <ul style="list-style-type: none"> <li>– Species present and individual percent cover</li> <li>– Litter percent cover</li> <li>– Rock percent cover</li> <li>– Cryptogam percent cover</li> <li>– Bare earth percent cover.</li> </ul>
Tubestock survival	At each of the intersected Vegetation Management Watercourses, tubestock survival rate will be assessed within two quadrats each measuring 2 x 10 m.

## **6. Acceptance criteria and corrective actions**

Acceptance criteria have been developed for each of the two rehabilitation treatments and are provided in Table 6.1. Assessment of monitoring results against these criteria will serve as a trigger for implementation of corrective actions, which are also detailed in Table 6.1.

Table 6.1 Acceptance criteria and corrective actions

Element	Criteria	Compliance	Potential corrective actions
<b>Remnant vegetation within 400 m of a DoR Vegetation Management Watercourse</b>			
Landform	<ul style="list-style-type: none"> <li>Final landform is stable and land surface contours within riparian areas are consistent with the adjacent areas</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>Installation or repair of erosion and sediment control measures where erosion or stabilisation issues are identified</li> </ul>
Restricted invasive weeds	<ul style="list-style-type: none"> <li>No presence of restricted invasive weeds</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>Removal of restricted invasive weeds</li> </ul>
Endemic groundcover	<ul style="list-style-type: none"> <li>Land is vegetated with endemic groundcover exceeding 70%</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>Removal of restricted invasive weeds and any other species observed to be inhibiting endemic ground layer establishment</li> <li>Re-application of hydromulch where bare patches persist</li> </ul>
Tubestock survival	<ul style="list-style-type: none"> <li>&gt;80% of plantings survived</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>Replanting of tubestock</li> <li>Modification of watering regime where plant health indicates insufficient or excess water has been received</li> <li>Application of fertilizer where plant health indicates nutrient deficiency</li> <li>Removal of weeds observed to be inhibiting tubestock establishment</li> </ul>
Suitability	<ul style="list-style-type: none"> <li>Land is suitable for purpose (i.e. supports an establishing ecosystem that will provide future habitat for black-throated finch, bare-rumped sheathtail bat and koala habitat)</li> <li>Safe for humans and wildlife</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>All of the above</li> </ul>
<b>All other areas</b>			
Landform	<ul style="list-style-type: none"> <li>Final landform is stable</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>Installation or repair of erosion and sediment control measures where erosion or stabilisation issues are identified</li> </ul>

<b>Element</b>	<b>Criteria</b>	<b>Compliance</b>	<b>Potential corrective actions</b>
Restricted invasive weeds	<ul style="list-style-type: none"> <li>- No presence of restricted invasive weeds</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>- Removal of restricted invasive weeds</li> </ul>
Groundcover	<ul style="list-style-type: none"> <li>- Land is vegetated with groundcover exceeding 50%</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>- Re-application of hydromulch where bare patches persist</li> </ul>
Suitability	<ul style="list-style-type: none"> <li>- Land is suitable for purpose (grazing pasture, bank stabilisation and pipeline operation)</li> <li>- Safe for humans and wildlife</li> </ul>	At completion of rehabilitation maintenance period	<ul style="list-style-type: none"> <li>- All of the above</li> </ul>

## **7. Completion inspections and reporting**

### **7.1 Rehabilitation works completion**

The Contractor is to notify the Superintendent immediately on completion of the works for inspection by a suitably qualified and experienced representative (e.g. environmental manager). A rehabilitation completion report with suitable records is to be provided to the superintendent within five days following the completion of the rehabilitation works.

### **7.2 Rehabilitation maintenance period completion report**

Following completion of the 12-month revegetation maintenance period (which shall correspond to the Contract Defects Liability Period), a rehabilitation completion report demonstrating compliance of the revegetation works against the acceptance criteria in Section 6 shall be developed by a suitably qualified ecologist engaged by the Contractor and submitted to the Superintendent.

The completion report will be submitted by Townsville City Council to relevant Commonwealth/State government departments under conditions of approval.



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