

PLAN

REHABILITATION MANAGEMENT PLAN

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Dear Mr Spink

Jemena Northern Gas Pipeline (EPBC 2015/7569)

I refer to the email dated 31 March 2017, from EcOz Environmental Consultants to the Department, seeking approval of the Rehabilitation Management Plan required under condition 5 of the EPBC Act approval for this project.

Officers of this Department have evaluated the Rehabilitation Management Plan, with particular regard for the approval conditions for EPBC 2015/7569. On the Department's advice, and as a delegate of the Minister for the Environment and Energy, I have decided to approve the:

- *Northern Gas Pipeline: Rehabilitation Management Plan V2.9* dated 30 March 2017.

Condition 12 of the EPBC approval for this project allows you, under certain circumstances, to implement revised plans without seeking the Minister's approval. The **attached guidance** on 'New or Increased Impact' outlines these circumstances. Any other changes to approved plans must be approved in accordance with section 143A of the EPBC Act. When submitting a revised plan to the Department under condition 12, or under section 143A of the EPBC Act, please provide a document clearly explaining the revisions (such as a 'tracked changes' version or table); reasoning why you believe the revisions will not have a new or increased impact; as well as notification of the publication of the revised plan on your website.

Should you require any further information please contact Vaughn Cox on 02 6274 2005 or by email (post.approvals@environment.gov.au).

Yours sincerely

Matthew Dutkiewicz
Acting Assistant Secretary
Compliance & Enforcement Branch
Environment Standards Division

19 April 2017

CC: Aiden Campbell, EcOz Environmental Consultants
Encl: Guidance on new or increased impact.



Guidance on 'New or Increased Impact' relating to changes to approved management plans under EPBC Act environmental approvals

Introduction

This guidance is for those environmental approvals under Part 9 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) containing an approval condition which uses the reference 'new or increased impact' in relation to revisions to approved management plans. This condition, referred to in this document as the Revised Management Plan (RMP) condition, allows revised plans to be implemented without approval by the Minister, provided that the proposed changes do not have a new or increased impact on matters protected under the approval.

The aim of this guidance is to assist approval holders and officers of the Department in determining whether or not a change is likely to have a 'new or increased impact' on a protected matter.

Background

Many EPBC Act Part 9 approvals include conditions for management plans, strategies or programs to be implemented, and usually these documents must be submitted for approval by the Minister prior to implementation. For the purposes of this guidance, such documents are referred to collectively as 'plans'.

Section 143A of the EPBC Act allows an approval holder to submit revisions to approved plans for re-approval by the Minister in certain circumstances. In some cases, revisions to approved plans under section 143A will incur a fee under cost recovery provisions of the EPBC Act and regulations.

From late 2015, the RMP condition was included in new approvals where appropriate, and in some cases the RMP condition has been retrospectively added to projects with an existing EPBC Act approval through formal variations to conditions.

In approvals that have the revised management plan condition, a 'new or increased impact' is typically defined as: *a new or increased impact on any matter protected by the controlling provisions for the action, when compared to the plan, program or strategy that has been approved by the Minister.*

In broad terms, section 527E of the EPBC Act defines the term 'impact' as an 'event or circumstance' that is a direct or indirect result of the action taken by the approval holder or someone acting on behalf of the approval holder. A 'new or increased impact' in the context of the RMP condition is therefore very broad, and includes any direct or indirect increase in the impacts of an action, an increase to the risk of an impact occurring, or a change that reduces the acceptability of an impact such as a change to an environmental offset.

Scope of changes to a plan

Approvals are given for the purposes of one or more controlling provisions described in Part 3 of the EPBC Act, and plans may be required to avoid, mitigate or offset impacts to matters protected under those provisions (protected matters).

In some cases a plan may be required under both Commonwealth and state or territory approvals. It is possible that such a plan may require a revision in relation to state or territory matters only, and the changes may not relate to EPBC Act protected matters.

When considering whether a revised plan would have a new or increased impact, approval holders should have regard to all changes to the approved plan (ie. the latest version of that

plan that was formally approved by the Minister or delegate), not an unapproved revised plan (previously deemed by the approval holder to not have a new or increased impact under the RMP condition) or a plan only approved by the state or territory. In other words, if a revised unapproved plan is being implemented, and further revisions are being considered, all deviations (including incremental or cumulative changes) from the approved plan must be considered when making a decision on whether there is a new or increased impact.

The above emphasises the need to approval holders to use proper version control for plans. Further information about document version control can be found in the Department's Environmental Management Plan Guidelines available on the department's website: <http://www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines>

The following paragraphs are intended to provide general guidance about the types of changes to plans that are likely to result in a new or increased impact. They are not intended to be exhaustive or definitive. The particular facts and circumstances of a proposed revision to a plan will need to be taken into account in determining whether there is likely to be a new or increased impact.

What is a new impact?

A 'new impact' may be caused by a change to an activity or a change to circumstances surrounding the activity, and can include:

- new activities that may impact on protected matters;
- any change to an activity that creates a new potential impact to a protected matter; or
- an impact to a protected matter that was not previously foreseen.

It should also be noted that in some cases, a new activity may also require a formal variation to approval conditions (under section 143 of the EPBC Act); or may be beyond the scope of an approved action and could require separate EPBC Act approval.

What is an increased impact?

A change to a plan may increase a known impact. An 'increased impact' can include:

- a new activity;
- an increase in the scale, intensity or duration of impacts;
- an increase in the likelihood or consequences of an impact occurring;
- a change to a measure designed to avoid, mitigate or offset an impact;
- a reduced capacity to identify or measure an impact; or
- any other change that increases the risks or uncertainty associated with an impact.

Some changes above may not be considered an 'increase' if the change is a clear improvement.

Examples of a new or increased impact

Although determined on a case-by-case basis, the following changes to a plan are **likely** to result in a new or increased impact:

- The transition from construction phase to operations phase, where the approved plan only covers the construction period.
- Increasing the amount of habitat for a listed threatened species that will be cleared.
- A change in a measure designed to mitigate the impacts of an action on a RAMSAR wetland.
- A delay to the commencement of an environmental offset.
- A change to the timing of a temporary impact, to a time when a listed migratory species is more prevalent.
- A reduction in the frequency of monitoring.

What is unlikely to be a new or increased impact?

Changes unlikely to be a new or increased impact include:

- changes to the structure or layout of a plan or other administrative changes that are unrelated to environmental impacts or risks;
- a change to a plan which does not affect EPBC Act protected matters; or
- a clear improvement to a measure that avoids, mitigates or offsets the impacts of a proposal.

Examples unlikely to be a new or increased impact

Although determined on a case-by-case basis, the following changes to a plan are **unlikely** to result in a new or increased impact:

- Changes to a person's contact details.
- Changes to the name of a plan, or title page of a plan including version number or date.
- Changes to pagination or chapter format where content is not altered.
- Rectification of a clear typographical, grammatical error or mapping error, where the change does not relate to an impact or an avoidance, mitigation or offsetting measure.
- Changes to a plan that covers both state and EPBC Act requirements, and the change only relates to matters protected under state laws.
- The introduction of an additional mitigation measure.
- An increase in the frequency of monitoring.
- A change to the timing of a temporary impact, to a time when a listed migratory species is less prevalent.

Who decides whether a revised plan is likely to have a 'new or increased impact'?

The onus is on the approval holder to decide if a revision to a plan is likely to result in a new or increased impact.

If, after considering this guidance, approval holders are still unsure whether a proposed revision to a plan is likely to result in a new or increased impact, they may request advice or further information from the Department.

When submitting a revised plan under the RMP condition, the approval holder should include a document clearly explaining the revisions (such as a 'tracked changes' version of the plan) and reasoning why they believe that the revisions will not have a new or increased impact.

Approvals that include the RMP condition also include a condition which gives the Minister the power to require implementation of the previously approved plan if the Minister believes that a revision is likely to result in a new or increased impact. In order to reduce the likelihood of the Minister making this decision, the approval holder should contact the Department for advice if they have any doubt about whether a change is likely to result in a new or increased impact.


Option to submit revised plan to Minister for approval

Nothing in the RMP condition prevents an approval holder from choosing to submit a revised management plan to the Minister for formal approval under section 143A of the EPBC Act at any time.

Advice and further information

Approval holders may request advice relating to the matters described in this document by emailing: post.approvals@environment.gov.au

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Recipients are responsible for eliminating all superseded documents in their possession.

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Declaration of accuracy

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this [insert relevant management plan] is complete, current and correct.

2. I am duly authorised to sign this declaration on behalf of the approval holder.

3. I am aware that:

a. Section 490 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.

b. Section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth) where the person knows the information or document is false or misleading.

c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed



Full name (please print)

Jonathan Spink _____

Organisation (please print)

Jemena Northern Gas Pipeline Pty Ltd

Date

31 / 03 / 2017

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1 INTRODUCTION

This Rehabilitation Management Plan (the Plan) has been developed to articulate rehabilitation goals, objectives and criteria as well as the process to achieve them for the Northern Gas Pipeline (NGP) Project (the Project). The environmental risk assessment conducted as part of the Project's environmental approvals identified a number of impacts from the Project's activities requiring rehabilitation. This Plan describes the rehabilitation management measures that will be implemented to mitigate these impacts and meet the relevant rehabilitation criteria.

The Plan covers both the construction and operation of the NGP. Relevant parts of the Plan will form part of the Construction Environmental Management Plan (CEMP) and the Operations Environmental Management Plan (OEMP).

There are three phases to this Plan: reinstatement, transitional rehabilitation and rehabilitation. For consistency these terms are adopted throughout this plan as defined below.

Definitions:

- **Reinstatement:** The process of bulk earth works and structural replacement of pre-existing conditions of a site (i.e. backfilling of trench, reinstating soil surface typography including scouring or ripping, watercourse lines, culverts, fences and gates and other landscape features) as detailed in the APGA Code of Environmental Practice: Onshore Pipelines (APGA 2013). It also includes placing cleared vegetation across disturbed areas. Reinstatement occurs during the construction phase and is the responsibility of the Construction Contractor.
- **Transitional rehabilitation:** The process of returning disturbed areas to a stable, non-polluting landform, the return of native species and the control of weed species. It differs from the reinstatement phase in that it generally does not involve bulk earthworks but monitors areas to ensure they are progressing towards final rehabilitation.
- **Rehabilitation:** The process of returning a site's structural habitat complexity, and ecosystem processes and services to that of the pre-existing conditions at the site or an analogue site.
- **Right of Way (ROW):** The 30 m wide corridor in which the pipeline will be laid and pipeline construction activities will occur.
- **Disturbed areas:** All areas which are disturbed as part of the Project's activities. They include the ROW, temporary construction camps, access tracks, temporary work spaces and permanent facilities.
- **Plains Death Adder habitat:** The flat, treeless, cracking-soil riverine floodplains of the Mitchell Grass Downs bioregion and associated land systems (Georgina, Austral, Kallala, Wonardo and Barkly) within the project area.
- **Project area:** As described in the final public environment report as:
 - 30 metre construction right-of-way;
 - proposed work spaces;
 - proposed camp sites;
 - proposed operational facilities;
 - proposed dams; and
 - access tracks.

1.1 Objectives, scope and goals

This Plan has been developed to fulfil the requirements of the environmental approvals processes for the Project, in particular condition 5 of the EPBC approval dated 9 March 2017.

The primary objective of the Plan is to return the land to comparable state to the pre-construction condition such that it can support a suitable land use and function as Plains Death Adder habitat.

The primary strategies to manage the key risks and achieve the objectives of this Plan include a baseline assessment and management actions focussing on three key areas – weed control, progressive habitat rehabilitation (to minimise the duration of disturbance) and management of erosion and sediment.

The scope of the Plan is to detail the rehabilitation management measures which will be implemented to meet the rehabilitation objective for the Project, and attendant monitoring and continuous improvement systems to ensure completion criteria are attained and maintained. The Plan is applicable to all activities permitted to be undertaken for the Project and will be used by all personnel (including contractors) involved in the Project's activities. The Plan covers the entire length of the pipeline including all areas within the project area in both the Northern Territory (NT) and Queensland (Qld).

The goals of this Plan are to:

- comply with all applicable legislation, regulations, conditions regarding rehabilitation
- address the specific rehabilitation management requirements of land owners/occupiers
- minimising the duration of disturbance through progressive and timely rehabilitation actions
- ensure land disturbed as part of the NGP construction activities is returned to a stable land-form and rehabilitated to its prior functional condition (including as Plain Death Adder habitat)
- establish adaptive implementation systems to support attainment of rehabilitation criteria, including through detailed monitoring, reporting, review and incident response procedures.

1.2 NGP Project overview

The NGP will involve the construction of 622 km of buried gas pipeline linking existing gas pipelines in the NT and Qld. The pipeline will commence at Warrego, approximately 45 km north-west of Tennant Creek, and will terminate 7 km south-west of Mount Isa where it will connect to the existing Carpentaria Gas Pipeline (Figure 1-1; Figure 1-2; Figure 1-3).

The following infrastructure and facilities will be constructed, described in order from west (NT) to east (Qld):

- A 12-inch (323.9 mm) buried gas pipeline; approximately 457 km of which will traverse land in the NT with 165 km in Qld.
- A start of line receipt/compressor station at Warrego, located 45 km north-west of Tennant Creek in the NT. Referred to as the Phillip Creek Compressor Station (PCCS).
- Three main line valve (MLV) facilities at locations along the pipeline
- An end of line delivery station located to the south-west of the Mica Creek Meter Station in Qld. Referred to as the Mount Isa Compressor Station (MICS).
- Five cathodic protection (CP) stations, spaced between PCCS, MICS and the MLV sites. The CP sites will comprise buried anode beds, located some distance from the pipeline (generally less than 500 m). The beds are connected to the pipeline by buried cables.

The project area will comprise a 30 m wide pipeline construction Right of Way (ROW), and extra work space for temporary facilities required to support construction. Extra work space and temporary facilities will include:

- accommodation camps for work personnel
- access tracks (upgrade of existing and construction of new)

- additional works areas (turn-around points, additional work space for crossings and, if required, temporary storage areas)
- water supply bores and dams for storing water required for dust suppression and hydrostatic testing (pressure testing) of the pipeline.

The construction ROW and all temporary facilities, temporary access tracks and works areas will be progressively rehabilitated on completion of the construction phase; the only components to be retained long term are permanent facilities (compressor stations, MLV and CP stations) and their associated access tracks and any access tracks or dams requested by the landholder.

The pipeline has a design life of 60 years, but with ongoing integrity management, and subject to appropriate commercial drivers, the operational life is expected to be longer. If, and when, the pipeline is no longer required, and, if a decision is made to abandon the pipeline, all above-ground infrastructure will be disposed of in accordance with the legislative requirements applicable at the time.

1.2.1 Construction activities requiring rehabilitation

This Plan specifically addresses the following activities associated with construction of the NGP and ancillary infrastructure that will cause disturbance to land and will thus require rehabilitation:

- Clearing of vegetation for:
 - temporary access tracks which will be used to access the ROW for construction activities
 - the construction ROW
 - construction camps and temporary work spaces
- Soil and sub-soil disturbance during trenching operations
- Disturbance of land (including vegetation, bed and bank) at watercourse crossings
- Disturbance from construction of compressor stations, mainline valves, cathode protection stations and permanent access tracks (rehabilitation applicable following decommissioning).

1.2.2 Rehabilitation overview

A vegetation baseline assessment will be conducted to determine baseline conditions against which the rehabilitation can be assessed. The vegetation baseline assessment will document characteristics present on and adjacent to the site (where a flood, or other such event has changed the characteristics of the baseline survey site). The method for vegetation baseline assessment is detailed in Appendix A.

Rehabilitation of disturbed areas will be undertaken progressively by a rehabilitation crew as each pipe installation segment is completed and reinstatement criteria fulfilled. All temporary access tracks, additional work spaces and construction camps will be rehabilitated when no longer required. The rehabilitated areas will be monitored following completion of construction activities, and it is anticipated that minor rehabilitation works and weed control activities will be required during the first few years of operation.

Reinstatement will involve backfilling the trench with sub-soils, re-spreading all top soils, re-contouring of the disturbed area to match the surrounding landscape and minimise erosion risk, installing erosion controls as required by the relevant Progressive Erosion and Sediment Control Plan (ESCP) and re-spreading cleared vegetation over the reinstated soils.

Specific reinstatement requirements for major watercourse crossings will be determined in the ESCP, but will include as a minimum:

- immediate re-contouring of beds and banks following pipe installation
- installation of flow diversion banks on watercourse approaches
- stabilising the banks and approaches.

Transitional rehabilitation will to be achieved through natural processes of germination following the reinstatement of disturbed areas. The topsoil will contain seed stock which will aid in natural revegetation of the area. If initial reinstatement activities do not facilitate regrowth and/or adequate stabilisation in some areas, then other rehabilitation methods will be implemented (ripping and/or seeding etc) during the rehabilitation phase.

Transitional rehabilitation incorporates management actions detailed in the Primary ESCP, specifically, erosion and landform stability controls, and the Operational Weed Management Plan, including weed hygiene, monitoring and control actions. These management actions have been included in the relevant sections (Section 4.1, Section 4.2 and Section 4.3)

Transitional rehabilitation will be monitored following construction activities until the transitional rehabilitation criteria (Section 4.2) are met. The program for monitoring the effectiveness of transitional rehabilitation is specified in the Plan.

In the area of suitable Plains Death Adder habitat, yearly monitoring will be undertaken to ensure that the seed stock is regenerating to meet the rehabilitation criteria. Yearly monitoring will be undertaken for the first five years or until the rehabilitation criteria are met. Following the rehabilitation criteria being met, monitoring will be undertaken at 5 year intervals for the period of the environmental approvals. Monitoring will allow an assessment of the rehabilitation sites against the rehabilitation criteria to be made. Rehabilitation monitoring will assess detailed vegetation aspects (species richness, percent cover etc). Monitoring will identify if further management actions (further to those undertaken as part of reinstatement and transitional rehabilitation) will be required. Management actions may include weed treatment or erosion controls.

On-going monitoring of rehabilitation will be undertaken until the rehabilitation criteria are met; methods for monitoring are provide in Appendix A.

A detailed decommissioning or abandonment plan will be developed and implemented in consultation with landholders and government at the time of decommissioning. If a decision is made to abandon the pipeline, all above-ground infrastructure will be disposed of appropriately in accordance with the legislative requirements applicable at the time.

1.2.3 Relationship to other plans

The success of this rehabilitation plan is dependent on effective weed and erosion and sedimentation control. Jemena is obligated to develop a Weed Management Plan to the satisfaction of the Northern Territory Government.

Erosion and Sedimentation

A Primary ESCP was submitted with the Draft EIS. It is standard process under the IECA Best Practice Erosion and Sediment Control Guidelines 2008 (www.austieca.com.au) that the primary ESCP is developed as the framework for the later Progressive ESCPs which outline location specific erosion and sedimentation control devices. This is particularly true in a project such as this where access is limited.

Nevertheless, Jemena has committed through its approvals process (see Commitments table in Appendix C of the Supplementary EIS/PER) to:

- All ESCP's will be developed by a suitably qualified person and will be reviewed and approved by Certified Professional in Erosion and Sediment Control (CPESC). The CPESC will inspect works and provide written approval that all works have been undertaken in accordance with the approved plan.
- Copies of endorsed ESCP's and inspection records will be provided to the Department of Environment and Natural Resources who, as the Authority, will ensure that all erosion and sediment control planning, implementation and auditing is undertaken to their satisfaction.

The Construction Contractor is responsible for engaging suitably qualified professionals to prepare and approve the Primary and Progressive ESCP's required for the Project construction activities. Jemena will ensure that approved plans are provided to DENR prior to the commencement of works.

Weeds

The Draft EIS/PER contained a Weed Management Plan (WMP). The WMP had two broad objectives:

- (i) No introduction of new weed species to the Project area
- (ii) No spreading of existing weed species within the Project area

To reduce the occurrence of (i) protocols for weed hygiene inspection were developed. These protocols include the requirement for all vehicles to be certified weed free (by a qualified certifier) before entering the Project area. This certification will be in place until the vehicle leaves the designated 'clean' areas (those that are declared weed free).

The likelihood of spreading existing weeds (point ii above) is reduced through effective weed hygiene practices. Here, those vehicles involved in clear and grade activities are required to have all soil removed when they move from an area with weeds into an area where weeds are not found.

Since the Draft EIS/PER was published weed survey work has been undertaken meaning that the extent and types of weed infestation has been determined and consequently the location of the weed hygiene stations.

In the Supplementary EIS/PER Jemena has committed to:

The Construction Contractor will implement an approved Weed Management Plan

Recommendation 3 of the NT EPA's assessment of the EIS/PER (https://ntepa.nt.gov.au/_data/assets/pdf_file/0008/396287/assessment_report_northern_gas_jemena.pdf) states:

A Weed Management Plan for the control and management of weeds shall be prepared and implemented to the satisfaction of the Department of Primary Industry and Resources. The Weed Management Plan must identify the species of weeds, their location in and around the Northern Gas Pipeline and outline methods for avoiding and eradicating/controlling existing infestations. It must identify actions to prevent the introduction of new weed species from vehicles, machinery or any other method, and align with Statutory Weed Management Plans. The Weed Management Plan should specify equipment and vehicle washdown locations and a rationale for their selection.

The WMP will be sent to the weeds branch of the NT DENR for review.

1.2.4 Roles and responsibilities

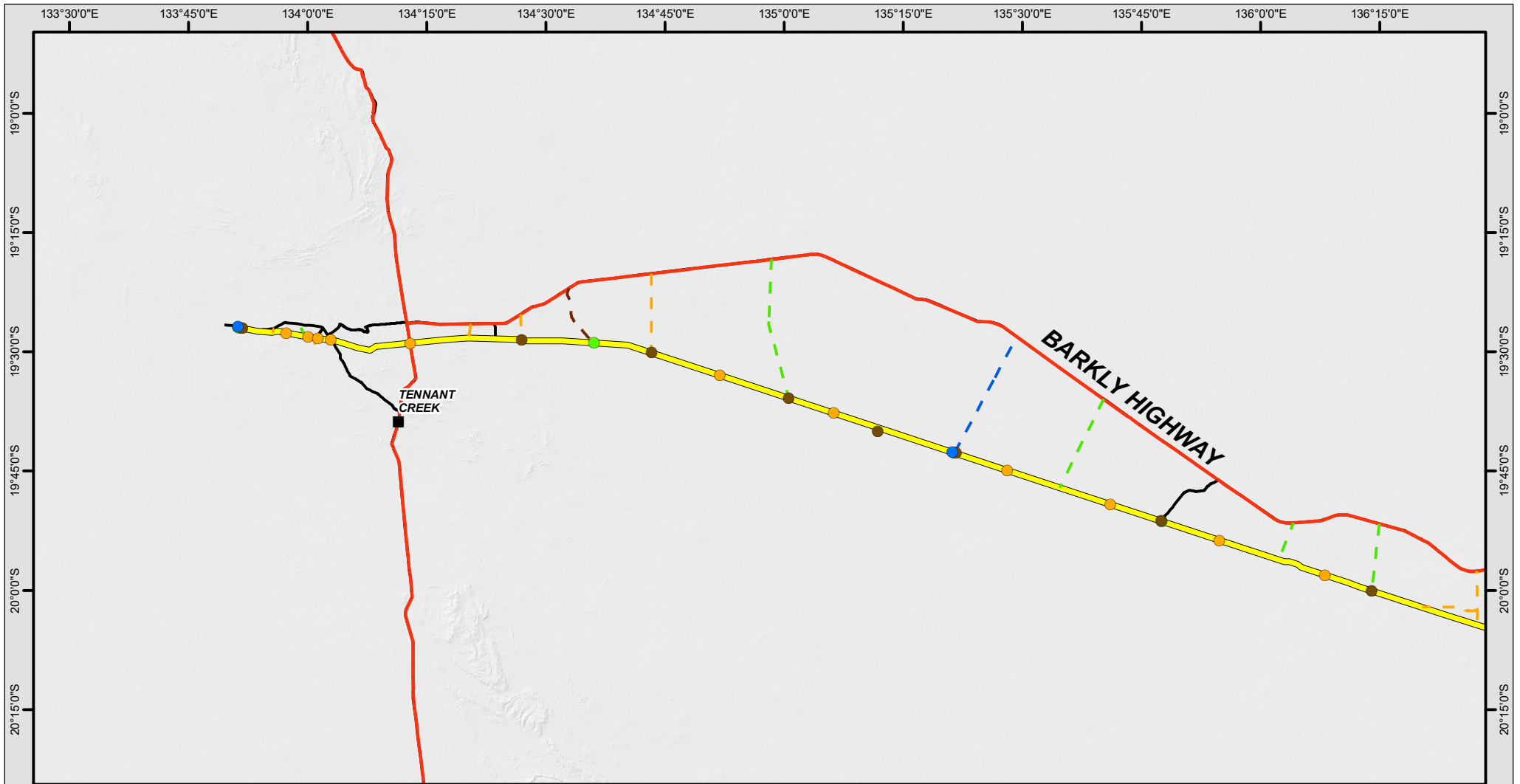
The Construction Contractor is responsible for reinstatement until the reinstatement criteria are met and certified as complete based on the performance indicators specified in Section 4.1. Jemena is responsible for monitoring transitional rehabilitation following the completion of reinstatement and completing corrective actions as required. The Construction Contractor will be required to complete corrective actions depending on the outcome of reinstatement inspections. Jemena takes responsibility for rehabilitation management and monitoring until the transitional and rehabilitation criteria are met.

Both Jemena and the Construction Contractor will engage appropriately qualified third parties to undertake the actions specified in this Rehabilitation Management Plan without devolving final responsibility. Jemena maintains accountability for achieving all reinstatement and rehabilitation criteria under the EPBC Act approval.

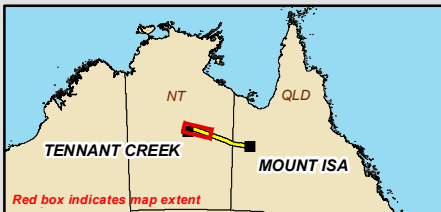
1.2.5 Construction schedule

Construction is currently scheduled to commence in March 2017 and the pipeline system is planned to be operational in 2018. The exact timing is dependent on a number of factors including the timeliness of the required approvals, access agreements with relevant stakeholders and weather conditions.

Reinstatement, transitional rehabilitation and rehabilitation monitoring timelines are provided within the relevant sections of this plan.



Project construction footprint



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Topographic data

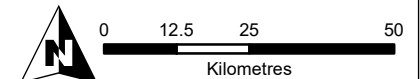
- Town
- Principal road
- Road
- ▭ State and Territory boundary

NGP Project components

- Construction right of way
- Proposed work space
- Proposed camp site
- Proposed facility
- Proposed dam

Access tracks

- Temporary existing widen
- Existing permanent widen
- Permanent new
- Temporary new



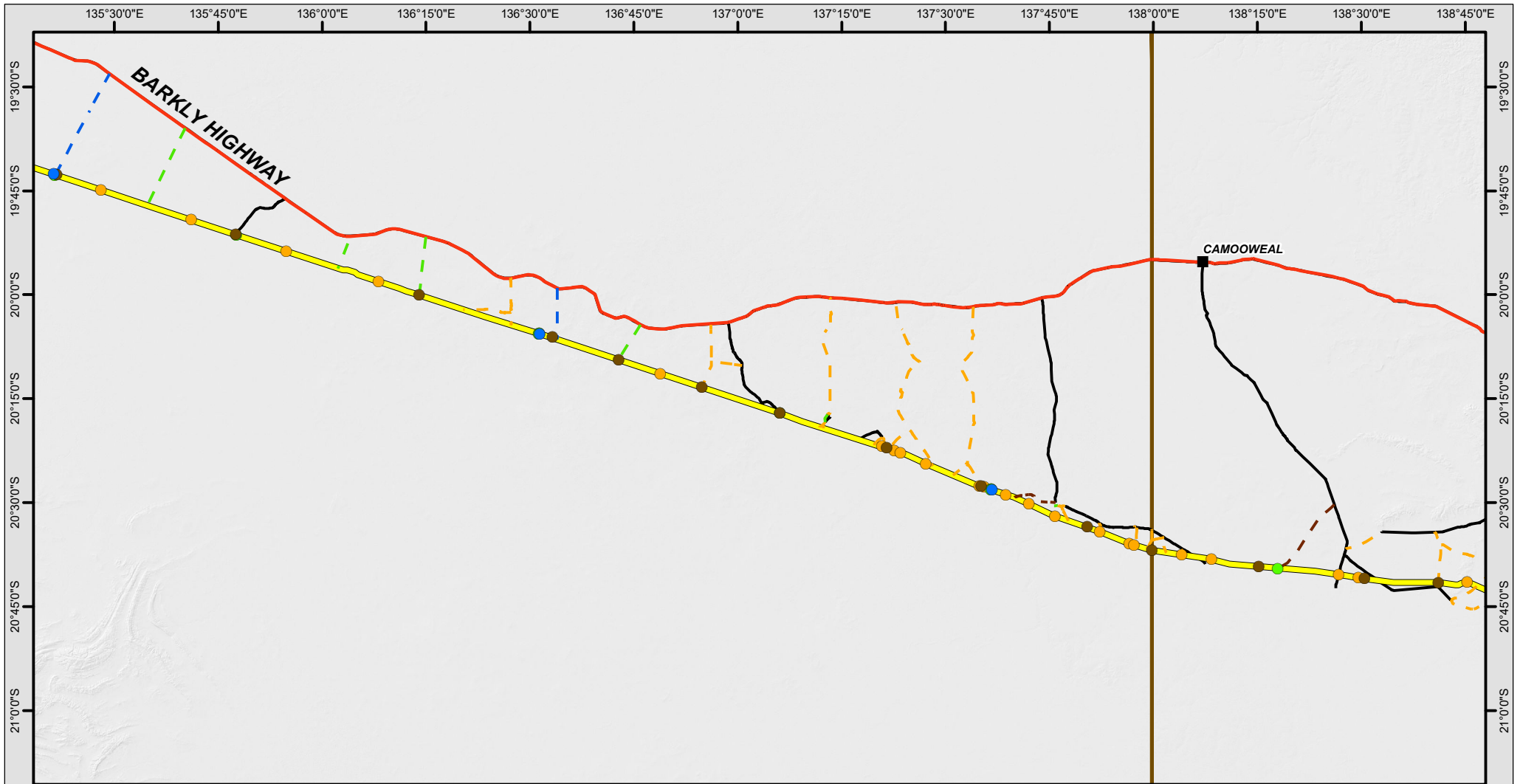
MAP INFORMATION

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 Client: Jemena
 Author: D. Carroll (reviewed J. Richardson)

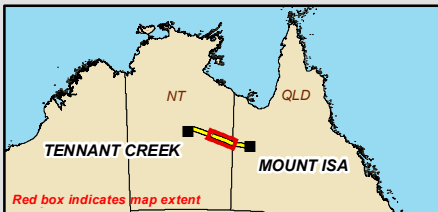
DATA SOURCE

Background: STRM Relief
 Topographic data: Geosciences Australia
 Project data: Jemena and MCD





Project construction footprint



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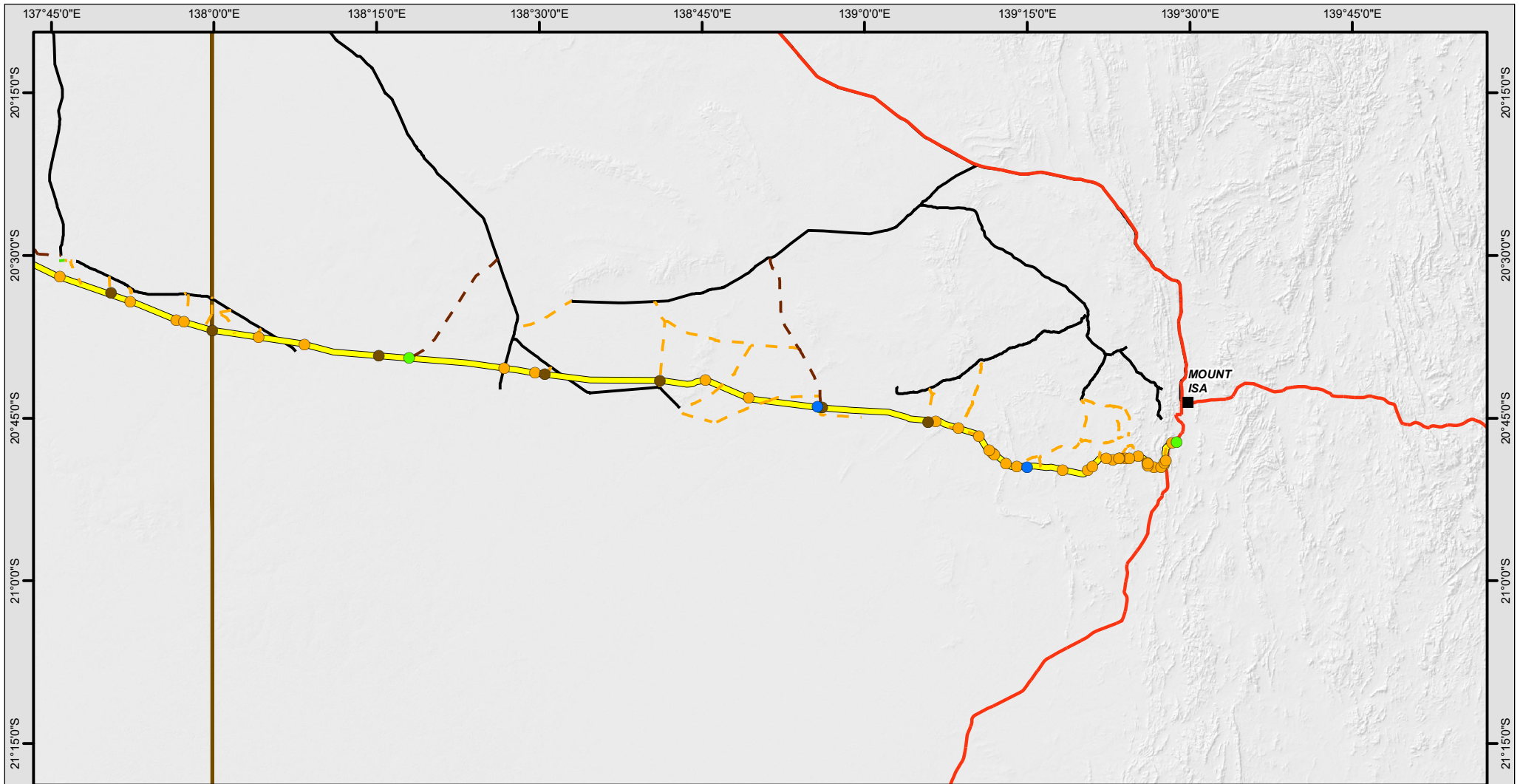
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 Author: D. Carroll (reviewed J. Richardson)

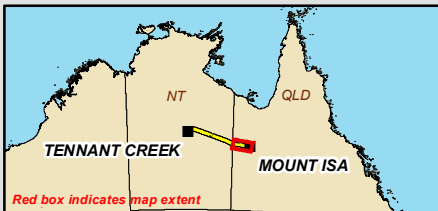
DATA SOURCE

Background: STRM Relief
 Topographic data: Geosciences Australia
 Project data: Jemena and MCD





Project construction footprint



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Topographic data

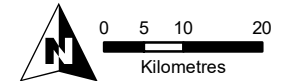
- Town
- Principal road
- Road
- State and Territory boundary

NGP Project components

- Construction right of way
- Proposed work space
- Proposed camp site
- Proposed facility
- Proposed dam

Access tracks

- Temporary existing widen
- Existing permanent widen
- Temporary new



MAP INFORMATION
 Scale: 1:955,760 at A4
 Projection: GCS GDA 1994
 Date Saved: 02-Feb-17
 Client: Jemena

Author: D. Carroll (reviewed J. Richardson)
DATA SOURCE
 Background: STRM Relief
 Topographic data: Geosciences Australia
 Project data: Jemena and MCD



1.3 Regulatory framework

The Project has been assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), Environmental Assessment Act (NT) (EA Act) and Environment Protection Act (Qld) (EP Act). The key primary environmental assessment and approvals documents that are conditional upon implementation of this Plan are listed below:

- NTEPA Assessment Report 79 (January 2017) issued pursuant to the EA Act (NT)
- EPBC Act Approval (2015/7569) issued pursuant to the EPBC Act (Cth)
- Environmental Authority EPPG03497815 issued pursuant to the EP Act (Qld).

1.3.1 Approval conditions, commitments and regulatory requirements

As part of the EPBC approval, conditions regarding the rehabilitation of habitat for threatened species have been included. These conditions relevant to rehabilitation and where that condition is addressed within this Plan is detailed in Table 1-1.

Table 1-1. EPBC approval conditions relevant to rehabilitation and cross reference within this Plan

Condition	Cross reference
4. Within five (5) years of the completion of construction, the approval holder must rehabilitate no less than 791 hectares of suitable Plains Death Adder habitat.	Section 4
5. The approval holder must submit a Rehabilitation Management Plan for the Minister's approval in writing. The Rehabilitation Management Plan must include: <ul style="list-style-type: none"> a) rehabilitation acceptance criteria; b) procedures, including contingency measures, that will be undertaken to achieve the rehabilitation acceptance criteria; and c) a monitoring program to determine the success of rehabilitation procedures implemented by the approval holder over the duration of the approval. 	a) Section 4 b) Section 4 and Section 5 c) Section 6 and Appendix A
6. The approval holder must not commence the action until the Rehabilitation Management Plan has been approved by the Minister in writing. The approved Rehabilitation Management Plan must be implemented by the approval holder.	
9. Within three (3) months of every 12 month anniversary of the commencement of the action, the approval holder must publish a report (the Annual Compliance Report) on its website describing compliance with each of the conditions of this approval, during the previous 12 months. The approval holder must also provide in this report: <ul style="list-style-type: none"> a) a reconciliation of actual disturbance and removal of suitable Plains Death Adder habitat (in hectares) on the project area against the disturbance and removal limits specified in condition 2; and b) progress against the rehabilitation acceptance criteria required at condition 6. 	Section 4 and Section 6

The Environmental Authority (EA) issued pursuant to the EP Act contains conditions (listed as schedules in the EA) relating to rehabilitation. These conditions specify rehabilitation requirements and criteria which must be met. These conditions are:

Pipeline reinstatement and revegetation

(E20) Pipeline trenches must be backfilled and topsoils reinstated within 3 months after pipe laying.

(E21) Reinstatement and revegetation of the pipeline right of way must commence within 6 months after completion of petroleum activities for the purpose of pipeline construction.

(E22) Backfilled, reinstated and revegetated pipeline trenches and right of way must be:

- (a) a stable landform*
- (b) re-profiled to a level consistent with surrounding soils.*
- (c) Re-profiled to original contours and established drainage lines.*
- (d) Vegetated with groundcover which is not a declared pest species, and which is established and self-sustaining.*

Transitional rehabilitation criteria

(F5) Significantly disturbed areas that are no longer required for the on-going petroleum activities, must be rehabilitated within 12 months (unless exceptional circumstance in the area to be rehabilitated (e.g. flood event) prevents this timeframe being met) and be maintained to meet the following acceptance criteria:

- (a) Contaminated land resulting from petroleum activities is remediated and rehabilitated*
- (b) The areas are:*
 - (i) Non-polluting*
 - (ii) a stable landform*
 - (iii) re-profiled to contours consistent with the surrounding landform*
- (c) surface drainage lines are re-established*
- (d) top soil is reinstated; and*
- (e) either*
 - (i) groundcover, that is not a declared pest species, is growing; or*
 - (ii) an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained.*

Final rehabilitation acceptance criteria

(F6) All significantly disturbed areas caused by petroleum activities which are not being or intended to be utilised by the landholder or overlapping tenure holder, must be rehabilitated to meet the following final acceptance criteria measured either against the highest ecological value adjacent land use or the pre-disturbed land use:

- (a) greater than or equal to 70 % of native ground cover species richness*
- (b) greater than or equal to the total per cent of ground cover*
- (c) less than or equal to the per cent species richness of declared plant pest species; and*
- (d) where the adjacent land use contains, or the pre-clearing land use contained, one or more regional ecosystem(s), then at least one regional ecosystem(s) from the same broad vegetation group, and with the equivalent biodiversity status or a biodiversity status with a high conservation value as any of the regional ecosystem(s) in either the adjacent land or pre-disturbed land, must be present.*

The primary approvals required for construction and operation of the NGP and associated facilities are pipeline licences issued pursuant to the Energy Pipelines Act (NT) and Petroleum and Gas (Production and Safety)

Act 2004 (Qld). The issue of Pipeline Licences is conditional upon the Project obtaining environmental approvals required under Commonwealth, NT and Qld legislation.

The approval conditions are broadly similar and have been combined within this document to form the rehabilitation criteria to be achieved for the entire area of the Project across the NT and Qld. The criteria relating to rehabilitation specified within the approvals are detailed in the section relevant to each stage of the rehabilitation program (Section 4).

All commitments made during the environmental assessment process (i.e. in the EIS/PER) will be fulfilled. Where applicable, commitments made regarding rehabilitation have been included in the relevant management action section of this plan.

1.3.2 Guidelines and standards

The Australian Pipelines & Gas Industry Association (APGA) has developed and published the APGA Code of Environmental Practice 2013 (the Code) (APGA, 2013). The Code details industry best practice for the construction of pipelines and includes management measures for rehabilitation and revegetation following construction activities. These management measures have been utilised in this plan where relevant to achieving the stated rehabilitation criteria (see Section 4).

2 ENVIRONMENTAL MANAGEMENT FRAMEWORK

The Project environmental management framework is illustrated in Figure 2-1 below. This Rehabilitation Management Plan forms part of the approvals' phase environmental assessment and management documentation. Implementation will occur through the Jemena and Construction Contractors' Environmental Management System (EMS).

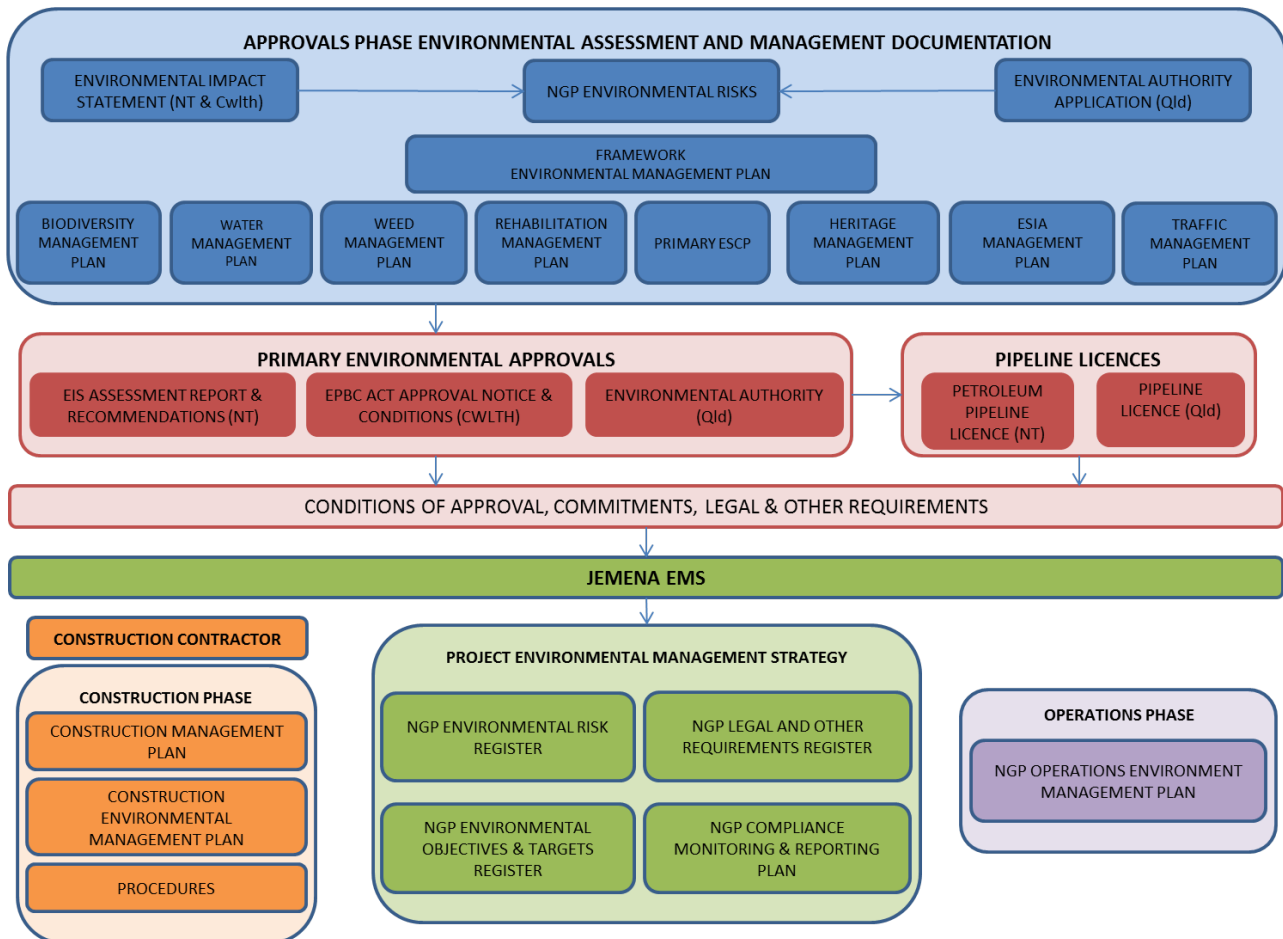


Figure 2-1. NGP Project environmental management framework

The Jemena EMS forms part of the companies' Health, Safety, Environment and Quality (HSEQ) Strategy. The EMS provides a framework for identifying and managing environmental risks, and for compliance monitoring and reporting. During the Project's construction phase, environmental risk management is delegated by Jemena to the pipeline Construction Contractor. Jemena is responsible for over-arching compliance monitoring and reporting in accordance with the primary environmental approvals and pipeline licences.

During construction, the constructors and any sub-contractors will operate under an EMS, which provides the structure and supporting documents for environmental management for all aspects of the company and construction projects. The EMS forms part of the Construction Contractors Management System which is accredited to *AS/NZS ISO 9001:2008 – Quality Management System*, *AS/NZS ISO 14001:2004 – Environmental Management System* and *AS/NZS 4801:2001 – Occupational Health and Safety Management System*.

The rehabilitation management actions and monitoring programs documented in this Plan will be implemented through the Construction Environmental Management Plan (CEMP) and associated procedures prepared by the Construction Contractor prior to commencement of construction. The CEMP assigns project-specific roles and responsibilities for environmental management and establishes a framework for the provision of environmental induction and training, complaints management, and meeting the Project's internal and external environmental monitoring and reporting requirements.

All construction staff and sub-contractors will be inducted prior to commencing works. The induction will include an explanation of the environmental management framework and requirements of management plans, including this Plan.

Transitional rehabilitation and rehabilitation management actions and monitoring programs, which continue following the cessation of the CEMP, will be implemented through an Operational Environment Management Plan (OEMP) prepared by Jemena.

Both the CEMP and OEMP will be consistent and integrated with the Jemena EMS.

3 RISKS TO OBJECTIVES

This section identifies the events which may impede the objectives of this plan being reached. The events and circumstances which pose a risk to the objectives are essentially the same across each of the three rehabilitation phases.

The following events/circumstances have been identified as posing a risk to achieving objectives:

- **Increase in the diversity of weed species.** Even after weed hygiene is undertaken (particularly vehicle hygiene and weed inspections prior to transport to site), there is a chance that weed species not currently present in within the Project footprint may be brought to site. New weed introduction poses a risk to the land returning to a comparable pre-disturbance state and the habitat for Plains Death Adder being rehabilitated.
- **Increase in weed cover.** Increase in weed cover could occur due to opportunistic growth into disturbed areas where there are existing weeds present. Increase in weed cover could prevent or delay the establishment of native ground cover species and/or suppress ground cover species richness. This would hinder suitable habitat for the Plains Death Adder returning, and the return of the land to comparable pre-disturbance state.
- **Erosion at watercourse crossings.** Watercourse crossings are the most likely location for erosion to occur. Without management actions, watercourse crossings are expected to erode due to river flow. Erosion of this nature poses a risk to the objective of returning the land to a comparable pre-disturbance state, and (in areas) would prevent the successful rehabilitation of suitable Plains Death Adder habitat.
- **Extreme weather event which negatively impacts rehabilitation.** As construction is occurring in the dry season, it is unlikely that an extreme weather event (particularly flooding rain) will occur prior to reinstatement, however, such an event could occur before rehabilitation is complete. An extreme weather event could wash away rehabilitated areas (both land and vegetation) and negatively impact on landform in general and specifically Plains Death Adder habitat. Alternately, a protracted drought could lead to rehabilitation objectives not being met.
- **Stock or native fauna activity impacting rehabilitation.** As the land is currently used for grazing stock and also supports native fauna, rehabilitation could be impacted by stock and/or fauna grazing. This is most likely to occur around water points (troughs, dams etc). This activity could suppress regeneration of native species, and in turn, the rehabilitation of the land to its pre-disturbance condition.
- **Unplanned/uncontrolled fire.** Construction activities during the dry season, particularly the use of heavy machinery for vegetation clearing, are a possible source a wildfire ignition. Although heavy machinery will be used predominately in clearing and on the cleared ROW, a fire which spreads into reinstated areas could negatively impact rehabilitation success through burning new growth.

4 REHABILITATION MANAGEMENT ACTIONS

This section:

- sets the criteria which will enable assessment of whether the rehabilitation meets the objectives of this plan;
- details the management measures which will be undertaken to achieve these criteria and manage the risks identified in Section 3; and
- outlines the monitoring to be undertaken (further detailed in Section 6) and assigns responsibility for each of the stages of rehabilitation.

The residual risks which may prevent attainment of the identified completion criteria are discussed in Section 5.

The goals and criteria for rehabilitation of land disturbed through construction activities, have been adapted from the conditions of the EA issued pursuant to the EP Act (Qld) and the EPBC approval (Cth) for the entire Project footprint across the NT and Qld.

As the actions and responsibility differ through the timeframe of the project the activities have been divided into three stages: reinstatement, transitional rehabilitation and rehabilitation. This rehabilitation plan uses these stages to set management actions to meet the rehabilitation goals and completion criteria. The goals and criteria for each stage are detailed below along with the management actions that will be implemented to achieve these requirements.

4.1 Reinstatement

Reinstatement actions will involve backfilling the trench with sub-soils, re-spreading all top soils, re-contouring of the disturbed area to match the surrounding landscape and minimise erosion risk, installing erosion controls as required by the relevant Progressive Erosion and Sediment Control Plan (ESCP) and re-spreading cleared vegetation over the reinstated soils. Reinstatement will be undertaken progressively to minimise the duration of disturbance.

Re-spreading of top soils is a key component of achieving rehabilitation success. The use of topsoil increases the probability of achieving a successful rehabilitation of disturbed areas which is self-sustaining in the long term (Corbett 1999; Tongway et al 1997). Re-instatement of top soils returns organic matter to the site which promotes seedling emergence (Schwenke et al. 1999) and provides a viable seed bank from which germination of vegetation occurs (especially grassland species) (Hinz 1992 cited in Corbett 1999).

Progressive reinstatement is designed to minimise the duration for which the top soil is stockpiled. The fertility of the seed bank within top soil stockpiled for long periods has been shown to degrade (reviewed by Corbett 1999). Rehabilitation success has shown to be most likely when top soil is reinstated as soon as possible (months rather than years) (reviewed in Corbett 1999).

Reinstatement is undertaken as part of the construction phase of the project. Reinstatement is the responsibility of the construction contractor, accountable to the approval holder, and will be undertaken in accordance with this Plan.

4.1.1 Reinstatement Completion Criteria

The criteria against which successful reinstatement of disturbed areas will be assessed following construction activities are:

Pipeline trenches must be backfilled and topsoils reinstated within 3 months after pipe laying.

Reinstatement of the pipeline right of way must be completed within 6 months after completion of pipeline construction.

Other disturbed areas are to be reinstated within 12 months after construction

Reinstated pipeline trenches, pipeline right of way and disturbed areas must be:

- (a) a stable landform*
- (b) re-profiled to a level consistent with surrounding soils.*
- (c) Re-profiled to original contours and established drainage lines.*
- (d) Vegetated with groundcover which is not a declared pest species, and which is established and self-sustaining.*

The Construction Contractor will be accountable to the approval holder for attainment of the reinstatement criteria. Jemena maintains accountability for achieving all reinstatement criteria under the EPBC Act approval.

4.1.2 Management Actions

The reinstatement management actions are specified in Table 4-1.

Table 4-1. Reinstatement actions

Performance Indicators	Management Actions	Monitoring and Frequency	Trigger for Corrective Action	Corrective Actions to achieve performance criteria
Pipeline trench is backfilled and covered with topsoils within 3 months of pipe laying and is: (a) <i>a stable landform</i> (b) <i>re-profiled to a level consistent with surrounding soils.</i> (c) <i>Re-profiled to original contours and established drainage lines.</i> (d) <i>Vegetated with groundcover which is not a declared pest species, and which is established and self-sustaining.</i>	Trench spoil, top soil and vegetation will be separated during construction and stored in separate piles	Weekly site inspections Weekly environmental audits	Trench sections not backfilled within 3 months of pipe laying	Backfill trench sections, implement ESC measures as required
	Trench will be progressively backfilled with trench spoil to match levels of surrounding land form		Top soils not spread over backfilled trench within 3 months of pipe laying	Respread top soils over backfilled trench
	Top soil will be spread over the backfilled trench and contoured to surrounding land form		Vegetation not spread over topsoils within 3 months of pipe laying	Respread cleared vegetation over top soils
	Cleared vegetation will be spread over the reinstated top soils			
Construction ROW reinstated within 6 months of completion of pipeline construction and other disturbed areas reinstated within	Construction ROW and other disturbed areas will be contoured to surrounding land form	Weekly site inspections	Contouring is not completed within the applicable timeframe	Undertake contouring earthworks

Performance Indicators	Management Actions	Monitoring and Frequency	Trigger for Corrective Action	Corrective Actions to achieve performance criteria
<p>12 months of completion of pipeline construction, and are:</p> <p>(a) <i>a stable landform</i></p> <p>(b) <i>re-profiled to a level consistent with surrounding soils.</i></p> <p>(c) <i>Re-profiled to original contours and established drainage lines.</i></p> <p>(d) <i>Vegetated with groundcover which is not a declared pest species, and which is established and self-sustaining.</i></p>	<p>Top soil will be spread over disturbed areas</p>	<p>Weekly environmental audits</p>	<p>Top soils not spread within applicable timeframe</p>	<p>Identify ESC measures required</p>
	<p>Hard pack areas created as part of the construction camp will be remediated by ripping or scarifying soils</p>		<p>Hard pack areas are identified following reinstatement through inspections or audits</p>	<p>Review Reinstatement Management Procedure</p>
	<p>Cleared vegetation will be spread over construction ROW and other disturbed areas</p>		<p>Vegetation not spread within applicable timeframe</p>	<p>Spread cleared vegetation over area</p>
	<p>All vehicles, equipment and machinery for the Project shall be thoroughly cleaned and declared “Clean” (i.e. weed free) on Weed Hygiene Declaration Forms, prior to mobilisation to the construction footprint or immediately on arrival at the Contractor’s construction camp and/or either of the compressor station sites.</p>	<p>Spot checks on vehicles and machinery</p>	<p>1 or more new weed species identified with disturbed areas as compared to pre-disturbance assessment</p>	<p>Undertake immediate control of incursion</p>
	<p>Any vehicles, equipment or machinery which are not deemed “Clean” after inspection on arrival at the Contractor’s construction camp and/or either of the compressor station sites, will be cleaned in-situ and reinspected. Any weed material will be disposed of appropriately.</p>	<p>Weed hygiene inspections</p>		<p>Review weed hygiene inspection process</p>
	<p>Transport to construction footprint is to be via approved transport routes (existing railway and roads, and Project access tracks); no travelling off designated transport routes is to occur.</p>	<p>Weekly environmental audits</p>		

Performance Indicators	Management Actions	Monitoring and Frequency	Trigger for Corrective Action	Corrective Actions to achieve performance criteria
	Any soil or fill material that is imported must be checked for weed seeds and accompanied by a Weed Hygiene Declaration form.		Weeds identified outside the weed control zone	Undertake targeted control Review use of weed hygiene stations
	Vehicles, equipment and machinery travelling over topsoil or involved in soil disturbance activities must use allocated weed hygiene locations where vehicles are to be cleaned and declared weed free before progressing. Clean downs and inspections must occur during the following periods: <ul style="list-style-type: none"> • up to, and including, clear and grade; and • including and post reinstatement of top soil. No soil is to be pushed past a weed hygiene station.			
	During periods when clean downs and inspections must occur, vehicles, equipment and machinery will carry the necessary equipment to undertake vehicle, plant, clothing and footwear clean downs as required. Additional clean down support and equipment (such as vehicle or trailer mounted water tanks and gurney high-pressure sprays) will be available if required (such as for the clean down of larger items of plant).			
	Inspection and clean down logs will be maintained for each vehicle or plant which require clean down and/or inspection at a weed hygiene location.:			
	Undertake chemical control of weed populations in identified control zones along the construction ROW, within topsoil stockpiles, and along access tracks, prior to undertaking rehabilitation works. Controls to be implemented by suitably qualified workers in accordance with NT or Qld guidelines, or Statutory Weed Management Plan.			

Performance Indicators	Management Actions	Monitoring and Frequency	Trigger for Corrective Action	Corrective Actions to achieve performance criteria
	Replace removed topsoil and cleared vegetation back to original location. No topsoil or vegetation is to move between weed zones.	Weekly environmental audits Spot checks of reinstatement operations	Monitoring identifies soil movement between weed zones	Implement additional monitoring of area where soil has been moved Control any weed spread
<p>Pipeline trench is a stable landform within 3 months of pipe laying.</p> <p>Construction ROW is a stable landform within 6 months of pipeline construction.</p> <p>Other disturbed areas are stable landforms within 6 months of pipeline construction.</p>	Erosion and sediment control measures shall be implemented to manage exposed earth and top soils until stable groundcover is established. Required measures will be identified by a CPESC. Measures will be specified in the applicable Progressive ESCP	<p>Weekly site inspections</p> <p>Weekly environmental audits</p>	Consecutive monitoring events identify ongoing erosion	Review erosion and sedimentation controls
	CPESC will sign-off all reinstatement in areas of high erosion risk		CPESC sign off not obtained 1 month post reinstatement of watercourse	<p>Have reinstatement assessed by CPESC immediately</p> <p>Implement any measures CPESC identifies¹</p>

¹ Examples of plausible corrective actions which may be identified by a CPESC include: divert overbank inflow away from recently rehabilitated area using diversion berms, sandbags or similar, protect banks from overbank inflow (e.g. rock protection), reinstate watercourse to natural bed level and protect bank and bed from erosion with geofabric overlain with suitably sized rock, reinstate banks to a stable batter slope. Lightly compact fill material and replace stripped topsoil. Protect with jute or coir matting (for immediate erosion protection) and revegetate with appropriate species, including groundcover.

Performance Indicators	Management Actions	Monitoring and Frequency	Trigger for Corrective Action	Corrective Actions to achieve performance criteria
Recording and reporting	Pre-construction Vegetation Baseline Assessment Report Site inspection reports Environmental Audit Report Inspection and clean down log Annual Petroleum Pipeline Licence Report Reinstatement completion report – as part of construction completion report Annual Compliance Report			
Responsibility				Construction Contractor has responsibility for management actions and weekly sites inspections Jemena has responsibility for weekly environmental audits and to regulators for achieving the reinstatement criteria

4.1.3 Reinstatement completion

Following successful reinstatement by the Construction Contractor the ownership of rehabilitation management is transferred to Jemena. Prior to the transfer of ownership, reinstatement must be assessed as completed and certified on behalf of Jemena. The reinstatement will be certified when it meets the reinstatement criteria specified above.

The assessment of reinstatement completion will be assessed by a suitably qualified person through visual assessment of landform, profile, contours, soil reinstatement and replacement of cleared vegetation. Photos will be taken at representative sites, at areas susceptible to land form instability (e.g. watercourse crossings), and at any locations where reinstatement has not met the completion criteria. The results of the assessment will be detailed in the Reinstatement Completion Report and the applicable Annual Compliance Report.

4.2 Transitional Completion Rehabilitation

Bulk earth works and spread of top soil containing seed will be achieved through the reinstatement phase; this process is expected to achieve successful transitional rehabilitation. Transitional rehabilitation management actions will focus on monitoring the progress of rehabilitation, particularly in areas where failure risk is high. Erosion and weed invasion and spread (EPA 1995; Cowie & Finlayson 1986) are two of the largest risks to successfully achieving transitional rehabilitation. Further, it has been identified that prevention should be emphasised in weed management (Storrs 1996). Effective treatment of erosion is best achieved when areas of erosion are identified early and managed. As such, management actions are focussed on monitoring areas of high risk (erosion – watercourse crossings; weeds – construction weed hygiene locations) and preventing any weed incursion.

Transitional rehabilitation commences on the successful completion of reinstatement. The timeframes for reinstatement differ depending on the type of disturbed area (e.g. ROW has a different timeframe for reinstatement to the access tracks). As such transitional rehabilitation will in most instances start at different times depending on the type of disturbed area (i.e. transitional rehabilitation may commence on the ROW whilst the access tracks are being reinstated). The responsibility for reinstatement remains with the Construction Contractor even when transitional rehabilitation has commenced in some areas.

4.2.1 Criteria

The following criteria will be used to demonstrate successful transitional rehabilitation of disturbed areas.

Significantly disturbed areas that are no longer required for operational purposes, must be transitionally rehabilitated within 12 months (unless exceptional circumstance in the area to be rehabilitated (e.g. flood event) prevents this timeframe being met) and be maintained to meet the following acceptance criteria:

- (a) *Disturbed areas are:*

 - (iv) *a stable landform*
 - (v) *re-profiled to contours consistent with the surrounding landform*

- (b) *surface drainage lines are re-established*
- (c) *top soil is reinstated in disturbed areas; and*
- (d) *either*
 - (iii) *groundcover, that is not a declared pest species, is growing in disturbed areas; or*
 - (iv) *an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained in disturbed areas.*

Transitional rehabilitation will commence on the certification of reinstatement (and hand-over of the NGP footprint to Jemena). Transitional rehabilitation will be implemented through the OEMP and is the responsibility of Jemena.

4.2.2 Management Actions

The transitional rehabilitation management actions are specified in Table 4-2.

Table 4-2. Transitional rehabilitation actions

Performance Indicators	Management Actions	Monitoring	Trigger for Corrective Action	Corrective actions to achieve performance criteria
Disturbed areas are a stable landform within 12 months	A CPESC will assess areas of high erosion risk to identify any required erosion and/or sediment control measures. Measures will be detailed in relevant Progressive ESCP	Rehabilitation Monitoring Program	Monitoring identifies ongoing erosion at 1 or more areas of high erosion risk in successive monitoring events	CPESC to reassess area of erosion and update management actions in Progressive ESCP Jemena to implement identified management actions
	Erosion and sediment control measures identified in Progressive ESCP will be implemented			
	Temporary erosion and sediment control measures are removed upon transitional rehabilitation criteria being met (as assessed through the Rehabilitation Monitoring Program)			
	Yearly monitoring of landform will be undertaken as part of the Rehabilitation Monitoring Program			
Disturbed areas are re-profiled to contours consistent with surrounding landform within 12 months Surface drainage lines are re-established within 12 months	Re-profiled areas will be monitored yearly (for the first 5 years) following the completion of construction	Yearly monitoring over the first 5 years	Monitoring identifies area where re-profiling has failed such that it will lead to negative environmental impact	Undertake earthworks to correctly reinstate areas Undertake seeding (or other revegetation method) to establish groundcover

Performance Indicators	Management Actions	Monitoring	Trigger for Corrective Action	Corrective actions to achieve performance criteria
<p>Top soil is re-instated and maintained in all disturbed areas</p>	<p>Top soils within disturbed areas will be monitored yearly (for the first 5 years) following the completion of construction</p>	<p>Yearly monitoring over the first 5 years</p>	<p>1 monitoring event identifies areas where top soil has not been established or maintained</p>	<p>Determine the cause of the top soil absence</p> <p>Reinstate top soil (from other source) if the cause was due to project activities</p> <p>Implement seeding or other soil stabilisation method</p>
<p>Groundcover which is not a declared species is growing in disturbed areas within 12 months of the completion of construction activities and maintained</p> <p>An alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained in disturbed areas.</p>	<p>Establishment and maintenance of groundcover will be monitored in accordance with the Rehabilitation Monitoring Plan</p> <p>In areas where there is no groundcover, implement alternative soil stabilisation method</p>	<p>Rehabilitation Monitoring Program</p>	<p>Successive monitoring events identify site where groundcover is below natural variability as compared to baseline data</p>	<p>Assess areas where revegetation has failed</p> <p>Undertake additional revegetation actions to establish groundcover (e.g. seeding, scarifying)</p> <p>Utilise interim alternative soil stabilisation methods as required</p>

Performance Indicators	Management Actions	Monitoring	Trigger for Corrective Action	Corrective actions to achieve performance criteria
No weed incursion or spread within the NGP footprint	All vehicles, equipment and machinery for the Project shall be thoroughly cleaned and declared "Clean" (i.e. weed free) on Weed Hygiene Declaration Forms, prior to mobilisation to the project footprint.	Spot checks	Vehicle enters the project footprint without appropriate weed hygiene inspection and declaration	Undertake weed management as required Enforce weed hygiene controls
	Undertake monitoring of weeds within the reinstated areas. Include all weed hygiene locations in the weed monitoring	Rehabilitation Monitoring Program	New species of declared weed species at monitoring location	Undertake control of identified weeds until not detected in consecutive monitoring events
	Continue to undertake control of areas of weed incursion within the disturbed areas		Area of identified weed incursion has spread from previous monitoring event	Review control strategy Increase control intensity
Recording and reporting	Annual Petroleum Pipeline Licence Report Rehabilitation Monitoring Plan Rehabilitation Monitoring Report Annual Compliance Report			
Responsibility	Jemena			

4.3 Rehabilitation

The key components of successful rehabilitation are soil management, and weed and erosion control (see review by Corbett 1999). These are largely addressed through reinstatement and transitional rehabilitation (see Section 4.1 and Section 4.2). Although these actions optimise the likelihood of rehabilitation success, ongoing risks (weeds, erosion and unexpected events) can still impact rehabilitation success until ecological function has returned to the system (and in this case for the life of the project). With ongoing preventative weed measures through monitoring (Storrs 1996), an effective monitoring program is critical in enabling intervention and rectification of any threats posed to successful rehabilitation (Corbett 1999).

Rehabilitation commences once the transitional rehabilitation criteria are met. The following criteria have been specified to achieve successful rehabilitation of disturbed areas. They are part of the EA for the Project and have been adopted for the length of the pipeline. Criteria 'a' – 'c' have been adopted for all of the NGP footprint. Criterion 'd' will only apply to sections of the NGP footprint within Qld, where regional ecosystems are recognised. Requirement for the area of Plains Death Adder habitat to be rehabilitated has been specified in the EPBC approval for the NGP Project.

4.3.1 Rehabilitation Completion Criteria

The following criteria has been specified to achieve successful rehabilitation of disturbed areas.

All significantly disturbed areas caused during construction of the NGP which are not being or intended to be utilised by the landholder or overlapping tenure holder, must be rehabilitated to meet the following final acceptance criteria measured either against the highest ecological value adjacent land use or the pre-disturbed land use:

- (a) greater than or equal to 70 % of native ground cover species richness*
- (b) greater than or equal to the total per cent of ground cover*
- (c) less than or equal to the per cent species richness of declared plant pest species; and*
- (d) where the adjacent land use contains, or the pre-clearing land use contained, one or more regional ecosystem(s), then at least one regional ecosystem(s) from the same broad vegetation group, and with the equivalent biodiversity status or a biodiversity status with a high conservation value as any of the regional ecosystem(s) in either the adjacent land or pre-disturbed land, must be present.*

No less than 791 ha of suitable Plains Death Adder habitat is rehabilitated within 5 years of completion of construction. Rehabilitation of suitable Plains Death Adder habitat will be complete when the above completion criteria are met.

Rehabilitation will be implemented through the OEMP and any applicable Decommissioning and Abandonment Plan. Rehabilitation is the responsibility of Jemena.

4.3.2 Management Actions

The rehabilitation management actions are specified in Table 4-3.

Table 4-3. Rehabilitation actions

Performance Indicator	Management actions	Monitoring	Trigger for Corrective Action	Corrective actions to achieve performance criteria
<p>NGP footprint has \geq 70% native groundcover species richness of the baseline</p> <p>NGP footprint has greater than or equal to the total per cent ground cover of the baseline</p>	<p>Rehabilitation will be measured against sites specified in the Rehabilitation Monitoring Plan (Appendix A)</p>	<p>Yearly Rehabilitation Monitoring over the first 5 years post construction then monitoring every 5 years for the period of the approval</p>	<p>Species richness is \leq 50 % of baseline after third year of monitoring</p> <p>Ground cover does not progress towards completion criteria between monitoring events</p>	<p>Assess the reason for performance indicator not being met</p> <p>Undertake other methods to facilitate rehabilitation²</p> <p>Undertake ongoing monitoring of applicable sites</p>

² Examples of methods to facilitate rehabilitation include: seeding or planting with suitable species within areas where the rehabilitation criteria are not met, undertake ripping if there is compaction at site which has inhibited rehabilitation.

Performance Indicator	Management actions	Monitoring	Trigger for Corrective Action	Corrective actions to achieve performance criteria
Disturbed areas contain less than or equal to the per cent species richness of weed species	Any vehicles, equipment and machinery entering the construction footprint must be accompanied by a valid and properly authorised weed hygiene declaration	Rehabilitation Monitoring Program	Vehicle enters site without weed hygiene declaration	Enforce weed management actions
	Weed monitoring will be undertaken at weed hygiene locations and at any area previously identified as having a new weed species		No decrease in weed diversity or cover in successive monitoring events	Assess control method Increase control intensity
	Continue to undertake weed management (mapping, removal, spraying etc) on identified incursions until the weed is absent from two successive monitoring events			
A suitable regional ecosystem is restored to the disturbed area where applicable in Qld	Where applicable, regional ecosystems will be assessed through the Rehabilitation Monitoring Plan	Rehabilitation Monitoring Program	Regional ecosystem within grassland systems has not been established after 5 years	Undertake assessment of ecosystem function Complete active revegetation if required
Recording and reporting	Rehabilitation Monitoring Plan Rehabilitation Monitoring Report Final Rehabilitation Report Annual Petroleum Pipeline Licence Report			
Responsibility	Jemena			

5 LIMITATIONS AND RESIDUAL RISKS

The management actions detailed above have been identified to meet the respective completion criteria. However, following the implementation of the management actions, events or circumstances may pose a residual risk to the attainment of completion criteria. An assessment of those risks are provided below. The identified risks are largely similar to those identified in the general risk identification (Section 3), with the addition of one risk (delays in reinstatement due to unforeseen circumstances). However, the residual risk is assessed against the attainment of the completion criteria rather than against the objectives of the plan.

The following events/circumstances have been identified as posing a residual risk to the attainment of completion criteria:

- **Delays in reinstatement due to unforeseen circumstances.** A delay in completion of reinstatement increases the period which disturbed areas are exposed. The longer the soil surface is exposed the greater the risk of erosion occurring which would impact landform stability. Additionally, the longer the seed bank is prevented from regenerating the greater the risk that the seeds become non-viable.
- **Increase in the diversity of declared weed species.** Even after weed hygiene is undertaken (particularly vehicle hygiene and weed inspections prior to transport to site), there is a chance that weed species not currently present in within the Project footprint may be brought to site.
- **Increase in weed cover:** Increase in weed cover could occur due to opportunistic growth into disturbed areas where there are existing weeds present. Increase in weed cover could prevent or delay the establishment of native ground cover species and/or suppress ground cover species richness.
- **Erosion at watercourse crossings.** Watercourse crossings are the most likely location for erosion to occur. Management actions identified by CPESC are expected to minimise erosion. There is a small chance that erosion occurs at watercourse crossings which would hinder the achievement of a stable landform.
- **Extreme weather event which negatively impacts rehabilitation (flooding).** As construction is occurring in the dry season, it is unlikely that an extreme weather event will occur prior to reinstatement, however, such an event could occur before rehabilitation criteria are met. An extreme weather event could wash away rehabilitated areas (both land and vegetation) and negatively impact on the attainment of rehabilitation criteria.
- **Stock or native fauna activity impacting rehabilitation:** As the land is currently used for grazing stock and also supports native fauna, rehabilitation could be impacted by stock and/or fauna grazing. This is most likely to occur around water points (troughs, dams etc). This activity could impact the rehabilitation attaining the ground cover criterion.
- **Unplanned/uncontrolled fire.** Construction activities during the dry season, particularly the use of heavy machinery for vegetation clearing, are a possible source a wildfire ignition. Although heavy machinery will be used predominately in clearing and on the cleared ROW, a fire which spreads into reinstated areas could negatively impact rehabilitation success through burning new growth. There are regular uncontrolled fires across the Project footprint which are caused by natural processes (i.e. lightning); of all the areas within the project footprint, fires are least common within the black soil plains.

An assessment of these residual risk has been made, the results of which are provided in Table 5-1. The risk framework and likelihood and consequence measures used in this assessment are provided in Table 5-2 and Table 5-3 respectively.

Table 5-1. Residual risk assessment table.

Event or circumstance	Likelihood	Consequence	Risk level	Trigger for Contingency Action	Contingency Action
Delays in reinstatement past the specified timeframe	Unlikely	Minor	Low	Reinstatement has not been completed within specified timeframe	Immediately reinstate areas which were not reinstated within the required timeframe
Increase in weed species diversity	Unlikely	Moderate	Low	Increase in weed diversity from baseline conditions in any monitoring event	Undertake targeted eradication program (suitable for the weed species)
Increase in percentage weed cover	Possible	Moderate	Medium	Increase of 20% weed cover from baseline conditions in any monitoring event	Undertake appropriate control (e.g. spraying, physical removal) at site(s) of increased weed cover.
Erosion at watercourse crossings	Likely	Moderate	Medium	Continual erosion over two successive monitoring events	CPESC to specify site specific erosion control strategies for implementation by Jemena. Examples include installation of geofabric covered with rocks, protection with jute, or use of coir matting.
Flood impacts rehabilitation	Possible	High	Medium	Flooding of any rivers on which there is an NGP water crossing	Undertake assessment of rehabilitation sites and analogue sites post weather event. Implement recommendations of assessment monitoring ³ as per adaptive implementation

³ Examples of actions which may be undertaken following the assessment of a flood event are: bed and/or banks stabilisation control using CPESC approved method such as laying geofabric covered with appropriately sized rocks, use of ground stabilisation method approved by CPESC such as jute or coir matting, direct seeding of area effected by flood with selected species. These examples are not a commitment to undertake particular management actions post flood assessment, but serve as an indication. The management actions which will be implemented will be site specific and determined post assessment.

Event or circumstance	Likelihood	Consequence	Risk level	Trigger for Contingency Action	Contingency Action
Stock/native fauna activity impacting regeneration around water points	Likely	Minor	Low	0.2 ha or more does not meet relevant criteria in successive monitoring events	Temporarily exclude stock from water point in consultation with landholder
Unplanned/uncontrolled fire from construction activities which affects rehabilitation	Likely	Moderate	Medium	Fire from construction burns reinstated or rehabilitated area	Assess impact of fire at rehabilitation and analogue sites. Implement soil stabilisation methods at watercourse crossings ⁴ . Undertake seeding if fire occurs after germination of vegetation from the seed bank.

Table 5-2. Risk framework

		Consequence				
		Minor	Moderate	High	Major	Critical
Likelihood	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

⁴ Examples are: bed and/or banks stabilisation control using CPESC approved method such as laying geofabric covered with appropriately sized rocks, use of ground stabilisation method approved by CPESC such as jut or coir matting. These examples are not a commitment to undertake particular management actions post flood assessment, but serve as an indication. The management actions which will be implemented will be site specific and determined post assessment.

Table 5-3. Likelihood and consequence measures

Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor	Minor risk of failure to achieving the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions.
Moderate	Moderate risk of failure to achieving the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions.
High	High risk of failure to achieving the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions.
Major	The plan's objectives are unable to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies.
Critical	The plan's objectives are unable to be achieved, may include widespread and severe environmental harm, with no evidenced mitigation strategies.

6 MONITORING AND REPORTING

The following sections outline the monitoring and reporting which will be undertaken as part of the Plan. The rehabilitation monitoring actions are summarised in table 6-1. The methods for rehabilitation monitoring are provided in Appendix A.

6.1 Vegetation baseline assessment

A vegetation baseline assessment will be undertaken to determine baseline conditions against which rehabilitated sites will be compared. This comparison will enable a determination to be made of whether the transitional and rehabilitation criteria have been met.

Rehabilitation Monitoring Program will assess the ground cover species richness, total percentage ground cover, weed species richness and total weed species ground cover (Appendix A). Regional Ecosystems have been assessed and mapped within the Qld section of the NGP footprint; this assessment will be used to assess the presence of suitable regional ecosystems following rehabilitation.

Vegetation baseline assessments will be conducted within disturbance areas prior to construction or at analogous sites prior to transitional rehabilitation monitoring. Vegetation baseline assessments will be conducted in early 2017.

A report will be prepared to document the results of the vegetation baseline assessment. This report will be prepared by a suitably qualified person and provided to Jemena and the Construction Contractor upon completion.

6.2 Reinstatement Monitoring Program

During the construction phase weekly site inspections will be undertaken by the Construction Contractor to ensure that management actions specified within this Plan are being undertaken. Monitoring and reporting will be coordinated by the Construction Contractor Environmental Manager. It is the ultimately the responsibility of the Construction Project Manager to ensure that monitoring during the construction phase is undertaken in accordance with this, and all other, management plans.

Site inspections will as a minimum:

- Visually inspect the condition and progress of reinstated areas across the Project area
- Check run off after rain events from reinstated areas
- Visually inspect major watercourse reinstatement

The Construction Contractor Environmental Manager will be responsible for inspections of construction areas, including the laydowns, potential erosion risk areas, vegetation and soil stockpiles. Inspections, and any follow up corrective actions, will ensure that the reinstatement is being conducted in accordance with the requirements of this Plan and the reinstatement criteria.

The Construction Contractor will also be responsible for inspections detailed within other management plans (e.g. ESCP and Weed Management Plan).

Records of all site inspections must be prepared and kept by the Construction Contractor. Environmental audits may inspect site inspection documents to ensure compliance with the management actions.

6.3 Weekly Environmental Audits

Pipeline reinstatement will be monitored through environmental audits. The audits will assess the progress of backfilling the trench, the contours of the land, reinstatement of top soils, the re-instatement of drainage lines and the stability of the landform. The audits will also assess whether the re-instatement earthworks have commenced within the required timeframe.

Environmental audits will be conducted throughout the construction phase of the Project. These will be conducted by a suitably qualified person. Each audit will report on whether the Construction Contractor is meeting the requirements of the Environmental Management Plan and associated sub-plans including this Plan.

The assessment of reinstatement will be conducted prior to the handover of the NGP from the Construction Contractor to Jemena. If reinstatement does not meet the criteria specified within this Plan further works may be required of the Construction Contractor.

Details of reinstatement will be included in any relevant approvals reporting requirements. Outcomes from environmental audits will be detailed in a monthly report. A report will be prepared detailing the completion of reinstatement across the NGP footprint.

6.4 Rehabilitation Monitoring Program

A Rehabilitation Monitoring Program will be developed which will detail the monitoring methods and frequency which will be undertaken to assess rehabilitation. Methods will be developed to assess attainment and maintenance of transitional rehabilitation and rehabilitation outcomes by a suitably qualified person.

The Rehabilitation Monitoring Program will be designed to assess the rehabilitation against the relevant criteria (specified within this plan) and will assess environmental characteristics across the Project area. The environmental characteristics which apply to each set of criteria (transitional rehabilitation and rehabilitation) differ, however, they include:

- Bioregion
- Landform
- Regional Ecosystem
- Land System
- Land Unit
- Vegetation community
- Environmentally sensitive areas
- Prescribed Environmental Matters (Qld)
- Threatened species habitat
- Watercourses
- Erosivity of the soil

The following sections provide broad detail on the scope of the Rehabilitation Monitoring Program (Appendix A) and the frequency at which monitoring will be undertaken.

6.4.1 Transitional Rehabilitation

Transitional rehabilitation will be monitored through the Rehabilitation Monitoring Program (Appendix A).

Monitoring of transitional rehabilitation in the Project area will be first conducted following the wet season after the completion of construction activities. Monitoring will be conducted annually for the first five years following completion of construction (or until the transitional rehabilitation criteria are met). If the transitional rehabilitation criteria are not met within five years following completion of construction, a review of the Plan and monitoring

program will be undertaken and current actions modified or additional actions implemented in order to meet the transitional rehabilitation criteria.

Following the achievement of the transitional rehabilitation criteria, monitoring of transitional rehabilitation will be undertaken every five years. If monitoring detects a previously rehabilitated area is failing to maintain the transitional rehabilitation criteria, corrective actions will be implemented and a minimum annual monitoring will occur until the transitional rehabilitation criteria are once again achieved. A report on the success of transitional rehabilitation from each 5 yearly monitoring will be prepared, stored, published on the project's website and furnished to regulatory authorities as part of the periodic performance reporting.

Transitional rehabilitation of permanent facilities (e.g. compressor stations) will not be initiated until the NGP is decommissioned (i.e. 60 years plus into the future). Following decommissioning, transitional rehabilitation will be undertaken on these sites, and the monitoring program specified above will be implemented.

Extreme weather events have the potential to impact the success of transitional rehabilitation. If there is an extreme weather event (cyclone, flood etc) before the transitional rehabilitation criteria is met, the weather event and potentially unstable landform may interact to produce undesirable environmental outcomes (erosion, subsidence, wash away of vegetation etc). If there is an extreme weather event before decommissioning and rehabilitation has been achieved, this will be reported, and an additional monitoring event will be undertaken to determine the impact of the unplanned/weather event on attainment of the transitional rehabilitation criteria. Additional monitoring will be undertaken at both rehabilitation sites and analogue sites following extreme weather events to assess the impact of the event on the rehabilitated areas and inform corrective actions (if required).

Results from each transitional rehabilitation monitoring event will be included in the rehabilitation monitoring reports.

Conditions attached to the approval pursuant to the EPBC Act require that Jemena report on the progress of the rehabilitation. Given the timeframes for construction and reporting, transitional rehabilitation will need to be included in the report.

9. *Within three (3) months of every 12 month anniversary of the commencement of the action, the approval holder must publish a report (the Annual Compliance Report) on its website describing compliance with each of the conditions of this approval, during the previous 12 months. The approval holder must also provide in this report:*

- b) progress against the rehabilitation acceptance criteria required at condition 6.*

Documentary evidence providing proof of the date of the publication must be provided to the Department at the same time as the Annual Compliance Report is published. The approval holder must continue to publish the Annual Compliance Report each year until such time as agreed to in writing by the Minister.

The results of the rehabilitation monitoring will be included in the Annual Compliance Report published on Jemena's website.

6.4.2 Rehabilitation

The Rehabilitation Monitoring Program incorporates monitoring that informs how rehabilitation is progressing to meet the rehabilitation criteria. Specifically, the Rehabilitation Monitoring Program will assess the ground cover species richness, total percentage ground cover, weed species richness and total weed species ground cover, and the presence of regional ecosystems (where relevant). This will enable additional management actions to be implemented if required to achieve the rehabilitation criteria for that section of the NGP (e.g. active revegetation of a specific species).

Rehabilitation monitoring will be undertaken annually for five years and then every five years following the transitional rehabilitation criteria being met over three consecutive years. Each monitoring event will measure all attributes of the rehabilitation criteria. If the rehabilitation criteria are not met within 5 years of the transitional rehabilitation being achieved, this plan will be reviewed in light of monitoring results to ensure rehabilitation criteria are met.

Within suitable Plains Death Adder habitat, rehabilitation monitoring will be undertaken yearly commencing after the first wet season. If the rehabilitation criteria are not met following three years of monitoring, this plan will be reviewed and existing rehabilitation actions modified or additional management actions proposed in order to achieve the relevant rehabilitation criteria.

The Rehabilitation Monitoring Program will be designed such that monitoring sites within the Project area are assessed against analogous sites outside the NGP footprint. These sites will be identified in the Rehabilitation Monitoring Program. The Rehabilitation Monitoring Program will identify areas which have similar vegetation, soil and landform and identify a suitable number of sites within each of these areas. The number of sites will be based on the variability of species richness identified during the vegetation baseline assessment as well as the location of particular environmental features such as watercourses. Using analogue sites will ensure that changes in landscape scale conditions over the life of the NGP do not affect the assessment of rehabilitation against the rehabilitation criteria. Suitable monitoring sites will be included in Plains Death Adder habitat to ensure accurate assessment of the effectiveness of rehabilitation actions, and that account for landscape scale factors (e.g. flood, fire, drought).

Rehabilitation of permanent facilities (e.g. compressor stations) will not be initiated until the NGP is decommissioned. Following decommissioning, and successful transitional rehabilitation, rehabilitation monitoring will be undertaken on these sites, and the monitoring program specified above will be implemented.

Once the rehabilitation criteria are met, two additional rehabilitation monitoring events will be undertaken to ensure that the rehabilitation is stable. That is, three consecutive annual surveys must demonstrate that the rehabilitation criteria have been attained/maintained, before cessation of rehabilitation condition monitoring may be considered for the respective NGP sector.

Results from each rehabilitation monitoring event will be included in the rehabilitation monitoring reports.

Conditions attached to the approval pursuant to the EPBC Act require that Jemena report on the progress of the rehabilitation. Given the timeframes for construction and reporting, it is anticipated that rehabilitation monitoring will be included in the reporting.

9. *Within three (3) months of every 12 month anniversary of the commencement of the action, the approval holder must publish a report (the Annual Compliance Report) on its website describing compliance with each of the conditions of this approval, during the previous 12 months. The approval holder must also provide in this report:*

- c) *progress against the rehabilitation acceptance criteria required at condition 6.*

Documentary evidence providing proof of the date of the publication must be provided to the Department at the same time as the Annual Compliance Report is published. The approval holder must continue to publish the Annual Compliance Report each year until such time as agreed to in writing by the Minister.

The results of the rehabilitation monitoring will be included in the Annual Compliance Report published on Jemena's website.

Following the rehabilitation criteria being met over a three-year period, a final rehabilitation report will be prepared, published and submitted to regulators.

Table 6-1. Monitoring activities, timeframe and responsibility

Monitoring activity	Timeframe	Responsibility
Vegetation baseline assessment	Prior to construction or at analogue sites prior to transitional rehabilitation monitoring	Jemena
Reinstatement monitoring	Weekly during construction	Construction Contractor
Environmental audits	Weekly during construction	Jemena
Reinstatement completion	On completion of construction	Jemena
Yearly monitoring of rehabilitation and analogue sites	First 5 years post construction	Jemena
5-yearly monitoring of rehabilitation and analogue sites	Once rehabilitation criteria have been met and for the life of the approval	Jemena
Post flood assessment monitoring	As soon as possible following flood event	Jemena
Post fire assessment monitoring	Following fire	Jemena

6.5 Justification of Monitoring Methods

The rehabilitation monitoring program specified within the Plan (including Appendix A) have been designed to: be practical, be able to detect the effect of management actions on environmental condition, and measure the success of the rehabilitation as measured against the completion criteria.

The remote location of the NGP means that access to sites presents constraints to use. The rehabilitation monitoring sites have been selected with regard to the location of access tracks which will exist after the completion of construction whilst appropriately stratifying the sites though across the footprint. It is acknowledged that periods of high rainfall may inhibit access to the rehabilitation sites. This has been considered in the timing of surveys so that surveys are undertaken when access availability coincides with period of highest growth.

Monitoring of the implementation of the Plan will be conducted both during and following construction of the NGP. This will allow monitoring of the implementation of management actions, and in the case of monitoring during construction, real-time assessment of the effectiveness of the actions. The monitoring of analogue sites throughout the rehabilitation monitoring program will enable assessment of change in environmental condition within and outside the NGP footprint – allowing for assessment of management actions.

The monitoring program has been designed such that the environmental characteristics relating to each of the completion criteria is measured for the life of the approval. This enable tracking of rehabilitation success against each of the completion criteria.

6.6 Data Management

A database will be developed for the collection and analysis of rehabilitation monitoring results. The database will be housed on Jemena's internal intranet (with appropriate back-ups). Results on the monitoring will be entered into the database within 1 month of each monitoring event and will be available to DEE on request.

6.7 Adaptive Implementation

Data from rehabilitation monitoring provides the most accurate and up-to-date information on the progress towards meeting the rehabilitation criteria, and the objectives of this Plan. Similarly, on ground assessment

through monitoring provides the most accurate assessment of risk realisation. As such, the results of rehabilitation monitoring will be used to continually update this Plan. The updates of the Plan will include consideration of management actions and additional monitoring.

- Results from weekly reinstatement monitoring will be reviewed at the end of each month (i.e. following every 4 monitoring events). Results from reinstatement monitoring will be stored within the database. By conducting a monthly review of the reinstatement monitoring results, management actions can be adapted or amended throughout the construction period to maximise reinstatement success. Review of the results will focus on the aspect which pose the highest residual risk to reinstatement failure - erosion at creek crossings (residual risk of medium).
- Results from rehabilitation monitoring will be entered into the database and analysed within a month of each monitoring event. The outcome of the analysis will assess the effectiveness of the rehabilitation management actions and will pay particular focus to the areas of highest residual risk - weed and erosion impacts (fire and flood are addressed below). The proposed timeframe for review allow 11 months (minimum) for any proposed adaptations or amendments to the management actions to be implemented before the next monitoring round.
- Where a monitoring event is undertaken post flood (see section 6.4.1), the results will be entered into the database and analysed within a month of monitoring. Any adaptations to management measures or new management measures will be implemented as soon as practicable following monitoring and prior to the onset of the next wet season. The results of monitoring may change the assessment of residual risk associated with floods; a review of the residual risk will be conducted. If there is an increase in risk category to rehabilitation success from a flood, additional management actions will be proposed and implemented. These management actions will be site specific.
- Where a monitoring event is undertaken post fire (see section 6.4.1), the results will be entered into the database and analysed within a month of monitoring. Any adaptations to management measures or new management measures will be implemented as soon as practicable following monitoring and prior to the next dry season. The results of monitoring may change the assessment of residual risk associated with extreme weather events; a review of the residual risk will be conducted. If the review of the risk profile results in an increase in risk category to rehabilitation success from fire, additional management actions will be proposed and implemented.

If there any changes in the management actions or risk profile associated with rehabilitation from analysis of monitoring results, the Plan will be revised to reflect these changes and reissued.

6.8 Auditing Plan implementation and effectiveness

Both the implementation and effectiveness of the Plan will be audited throughout the period of approval.

Auditing will occur during the Project's construction phase (when earth works will occur). This audit has two broad components:

1. Auditing soil management
2. Auditing landscape reinstatement

Soil Management auditing is to ensure that trench spoil is separated from topsoil during the construction and backfilling.

- Landscape reinstatement auditing criteria are outlined in section 4.1.1:
- backfilling the trench with sub-soils
- re-contouring of the disturbed area to match the surrounding landscape and minimise erosion risk

- installing erosion controls as required by the relevant Progressive Erosion and Sediment Control Plan (ESCP) and
- re-spreading cleared vegetation over the reinstated soils.

These audits will be performed monthly during the Project's construction phase. A final audit reported will be prepared following the completion of construction and submitted to DEE within 2 months.

Effectiveness

Effectiveness audits will be conducted assessing the effectiveness of the Plan in meeting the rehabilitation criteria specified in 4.3. Audits will be conducted if in any year there is no progress towards meeting any of the rehabilitation criteria. The results of any such audit will be reported to DEE.

Following any and all such audits, the Plan will be revised to reflect the outcomes of the audit and will be reissued.

6.9 Review of the Plan

If results of the Rehabilitation Monitoring Program, or the Annual Compliance Report show a delay in progress towards meeting the rehabilitation completion criteria over two consecutive years, a review of this Plan will be undertaken. The review will be undertaken by a suitably qualified person and will include consideration of:

- The risks to meeting the completion criteria
- Results of rehabilitation monitoring
- The effectiveness of management actions
- New advice, literature and/or guidelines relating to the rehabilitation
- Realisation of any residual risks to the successful completion of the rehabilitation criteria

Following any such review, this Plan will be revised to include the outcomes of the review.

7 ACRONYMS, GLOSSARY & REFERENCES

7.1 Acronyms

CEMP	Construction Environmental Management Plan
CPESC	Certified Professional in Erosion and Sediment Control
EA	Environmental Authority
EMS	Environmental Management System
EP Act	Environmental Protection Act
NT EPA	Northern Territory Environment Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act
ESCP	Erosion and Sediment Control Plan
GPS	Global Positioning System
NGP	Northern Gas Pipeline
NT	Northern Territory
OEMP	Operations Environmental Management Plan
PPL	Petroleum Pipeline Licence
Qld	Queensland
ROW	Right of Way
TPWC Act	Territory Parks and Wildlife Conservation Act

7.2 Glossary

Analogue site: A site outside disturbed areas which is assessed to determine the baseline against which the rehabilitation criteria are compared. Analogue sites are determined based on suitable vegetation, soil and landform characteristics.

Backfilled: Returning trench spoil (earth material) to the excavated trench including compaction.

Disturbed areas: All areas which are disturbed as part of Project activities. They include the ROW, temporary construction camps, access tracks, temporary work spaces and permanent facilities.

Environmental Assessment Act: Legislation governing the assessment of environmental matters within the Northern Territory.

Environmental Authority: The primary environmental approval for the construction and operation of the NGP within Queensland.

Environment Protection and Biodiversity Conservation Act: Legislation for protection Matters of National Environmental Significance. The Act applies across the NGP and is administered by the Federal Department of Environmental and Energy.

Environmental Protection Act: Legislation governing the assessment of environmental matters within Queensland. The EA is issued pursuant to this Act.

Extreme weather event: means any event which produces whether events outside the normal range (e.g. more or less rain than a region usually receives with a defined period). Examples of an extreme weather event are cyclones, floods and droughts.

Territory Parks and Wildlife Conservation Act: Is Northern Territory legislation which protects native plants and animals (particularly threatened species) and protected areas within the Northern Territory.

Construction Contractor: means the organisation who has entered into agreement with Jemena to undertake the construction of the NGP.

Petroleum Pipeline Licence: Is the mechanism under which the construction and operation of the NGP is regulated within Queensland.

Pipeline Licence: Is the mechanism under which the construction and operation of the NGP is regulated within the Northern Territory.

Regional Ecosystem: means a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil.

Reinstatement: Means the process of bulk earth works and structural replacement of pre-existing conditions of a site (i.e. backfilling of trench, reinstating soil surface topography including scouring or ripping, watercourse lines, culverts, fences and gates and other landscape features) as detailed in the APGA Code of Environmental Practice: Onshore Pipelines (APGA 2013). It also includes placing cleared vegetation across disturbed areas. Reinstatement occurs during the construction phase and is the responsibility of the Construction Contractor.

Transitional rehabilitation: is the process of returning disturbed areas to a condition which meets the transitional rehabilitation criteria. Generally, transitional rehabilitation includes returning the site to a stable, non-polluting landform, a return of native species and the control of any weed species. It differs from the reinstatement phase in that it generally does not involve bulk earthworks but monitors and areas to ensure they are progressing towards the rehabilitation criteria.

Rehabilitation: is the process of returning a site's structural habitat complexity, ecosystem processes and services to that of the pre-existing conditions at the site or an analogue site. These site values are achieved through meeting the rehabilitation criteria. For the purposes of pipelines, rehabilitation applies following the decommissioning of the pipeline and facilities, but may be completed early in some areas (i.e. temporary construction camps).

Ripping and scarifying: means using mechanical methods (usual strong tines) to break up compacted soil down to 35-50cm.

ROW: is the 30 m wide corridor in which the pipeline will be laid and pipeline construction activities will occur.

Scarifying: see ripping and scarifying.

Sensitive area: means an area identified through legislation, regulations or ecological surveys as having particular environmental value. Areas include Environmental Sensitive Areas in Queensland, threatened species habitat, riparian vegetation and culturally significant areas.

Suitably qualified person: means a person with suitable qualifications and training relevant to the task being undertaken and commensurate with the environmental risk and the extent and complexity of the works. The person is a member of an appropriate professional organisation. For the assessment of baseline condition and rehabilitation a suitably qualified person will have training in environmental science/ecology and demonstrable experience undertaking similar assessments. For preparation of Progressive Erosion and Sediment Control Plans, the person must have experience preparing plans with a similar level of complexity. Examples of appropriate professional organisations include Environmental Institute of Australia and New Zealand, the Ecological Society of Australia, and the International Erosion Control Association.

Topsoil: means the surface layer of a soil profile, which is more fertile, darker in colour, better structured and supports greater biological activity than underlying layers. The surface layer may vary in depth depending on soil forming factors, including parent material, location and slope, but generally is not greater than about 300 mm in depth from the natural surface.

7.3 References

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Appendix A Survey methodology for baseline assessment and rehabilitation monitoring

Introduction

This document details the methods which will be used to collect baseline data and rehabilitation monitoring procedures for the Northern Gas Pipeline (NGP). The method has been developed with reference to the *Northern Territory Guidelines and Field Methodology for Vegetation Survey* and the Department of Environment and Conservation (WA) *Standard Operating Procedure: Establishing Vegetation Transects (SOP No:6.2)*. Baseline assessment and rehabilitation monitoring will be conducted by a suitably qualified expert.

Survey timing

Due to the highly seasonal nature of the environment in northern Australia surveys will be conducted at a consistent time of year. All surveys will be conducted in the early dry season (between March and June) when roads and tracks are sufficiently dry to allow access and while many plants (particularly grasses) have reproductive material to aid in identification (Neldner et al. 2004).

Baseline

The intent of the baseline survey is, within each broad vegetation community, to quantify the groundcover species assemblage, plant density and cover, and weed species cover and richness. Ground cover species are targeted as the completion criteria require 70% of ground cover species are returned. Assessment of these vegetation characteristics in the baseline survey will allow a comparison of rehabilitation sites to baseline data to be made. This comparison will allow an assessment of whether the rehabilitation criteria have been met.

Personnel

Survey site determination, baseline surveys and rehabilitation monitoring will be undertaken by suitably qualified person.

Survey Method

Surveys to describe ground stratum species richness will be conducted within a 20 x 20 metre quadrat in line with the *Northern Territory Guidelines and Field Methodology for Vegetation Survey* (Brocklehurst et al. 2007). The guidelines state this size is sufficient to recognise the majority of ground and mid strata/sub strata species, provided adequate sites are sampled for a particular map unit (see Sampling Intensity section below). Quadrats will be permanently marked with steel pickets and their location recorded with a GPS. All ground strata plants in each quadrat will be identified and an estimate made of the percentage of the quadrat covered by each species.

To provide a measure of ground cover a point intercept method will be used. The point intercept method is one of the most common approaches to estimating cover and is not subject to observer bias in contrast to methods that involve visual estimates (Clarke 2009). At each survey location a 100 m tape will be run from a permanent point marked with a star picket. At each metre along the transect what intersects the tape will be categorised as vegetation, litter, bare ground or rock. The results will be presented as the proportion of points for each category.

Sample intensity

The sampling intensity is based on the recommendations of the *Northern Territory Guidelines and Field Methodology for Vegetation Survey* (Brocklehurst et al. 2007) which recommends a sample intensity of four survey quadrats per square kilometre for vegetation mapping at 1:25,000. Sampling will be stratified by vegetation community and within communities by land use and distance to water (as a surrogate for grazing

intensity). Sampling will be at a higher intensity at water crossings as these areas support distinctive vegetation, are of particular importance for fauna and pose unique challenges for rehabilitation. A site will be placed at all crossings of all water courses of stream order 4 or above as defined in the EIS (Chapter 7). A site will also be placed at a minimum of 50% of crossings of lower order streams (Table 7-2). Sampling will also be at a higher intensity in the Mitchell Grass tussock grassland (twice that of other communities) as this community supports the threatened Plains Death Adder.

Baseline Sample Sites

Sampling has been stratified by the vegetation communities of the Project area. The number of sample sites is dependent on the area being disturbed (Table 7-1) with extra sites to establish baselines for watercourse crossings (Table 7-2). Sample sites will be located close to (within 200 m of) the disturbance footprint, but not within the footprint. This is because the survey will be conducted after an access track is established (thereby allowing access). This also allows these sites to be resurveyed in the future to account for vegetation change related to factors other than the project (e.g. climate change, grazing intensity, introduced species, fire).

Table 7-1. Vegetation communities, footprint area and number of survey sites

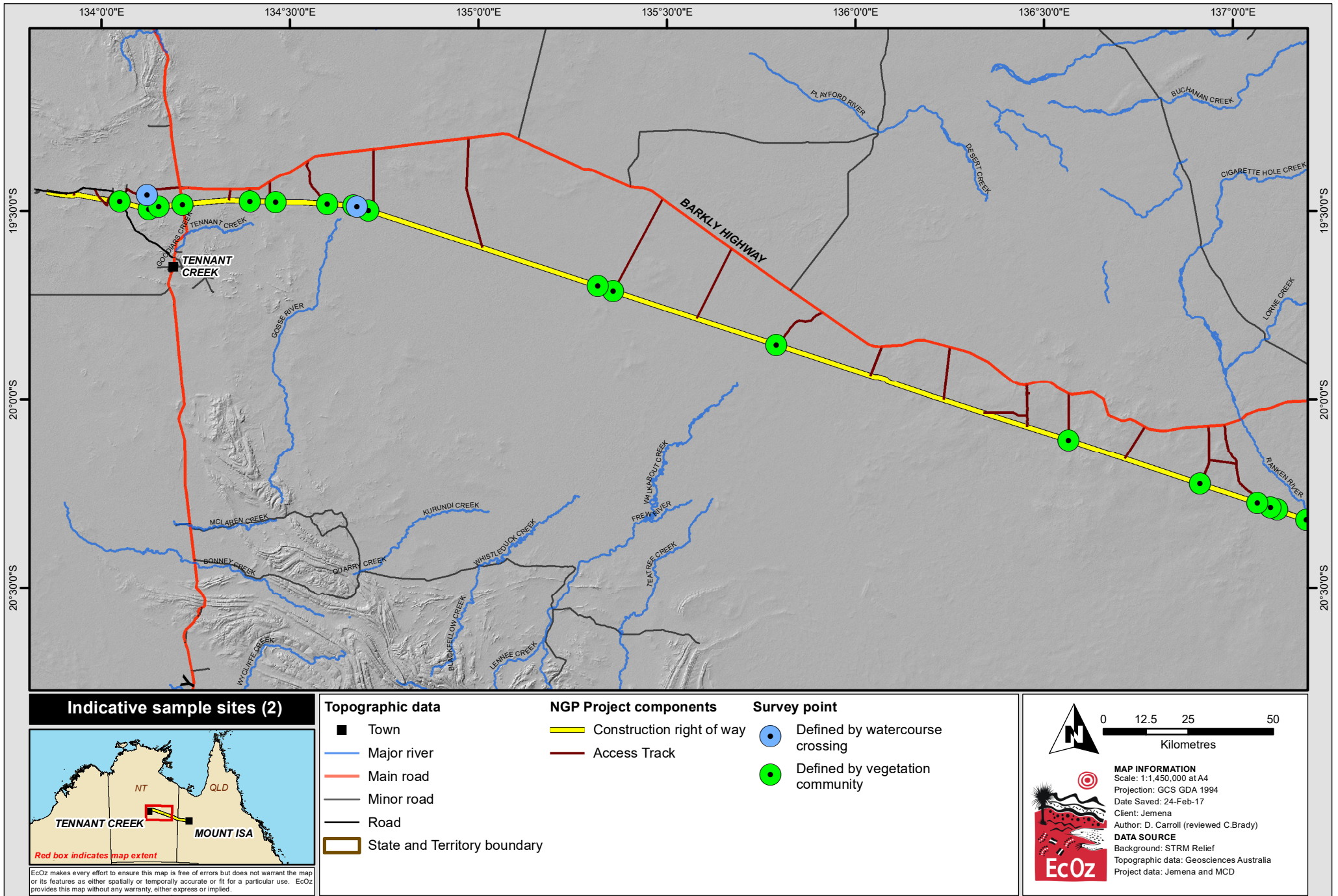
Vegetation community	Project Footprint (ha)	No. of quadrats
Northern Territory		
<i>Eucalyptus</i> low open woodland with Hummock grass	1191	12
Mitchell Grass (<i>Astrebla sp.</i>) tussock grassland	267	6
Acacia (+/- low) open woodlands and sparse shrublands +/- tussock grass	156	2
Mulga (<i>Acacia aneura</i>) open woodlands and sparse shrublands with hummock grass	67	1
Mulga (<i>Acacia aneura</i>) woodlands and shrublands +/- tussock grass +/- forbs	26	1
Hummock grasslands	25	1
<i>Eucalyptus</i> low open woodlands with tussock grass	17	1
Queensland		
Mitchell Grass (<i>Astrebla sp.</i>) tussock grassland	330	8
<i>Eucalyptus</i> low open woodland with Hummock grass	216	3
Regrowth or modified shrubland	50	1
Acacia (+/- low) open woodlands and sparse shrublands +/- tussock grass	20	1
Other tussock grassland	12	1
Hummock grasslands	8	1
<i>Eucalyptus</i> open woodlands with a grassy understorey	14	1
<i>Eucalyptus</i> low open woodlands with tussock grass	15	1
<i>Eucalyptus</i> woodlands with a shrubby understorey	10	1
Mulga (<i>Acacia aneura</i>) open woodlands and sparse shrublands +/- tussock grass	28	1
Saltbush and/or Bluebush shrublands	2	1
<i>Eucalyptus</i> woodlands with a tussock grass understorey	4	1
Other <i>Acacia</i> forests / woodlands	1	1
Total number of Quadrats		46

Table 7-2. Watercourses intersected by the project and number of survey sites.

Name	Watercourse type (stream order ⁵)	No. of crossing	No. of quadrats
Northern Territory			
Bishop Creek	Drainage line (2)	1	1
Gosse River	Flood-out (n/a)	1	1
Ranken River	River (5+)	1	1
	Drainage line (1)	5	3
James River	River (5+)	1	1
	Drainage line (1-2)	5	3
Georgina River	River (5+)	1	1
	Drainage line (1-2)	2	1
Blue Bush Creek	Creek (4)	2	2
	Drainage line (1)	4	2
Queensland			
Redbank Creek	Creek (3-4)	2	2
Mingera Creek	River (5+)	1	1
	Drainage line (1-2)	3	2
Polygonum Creek	Drainage line (1-2)	5	3
One Mile Creek	Drainage line (1)	1	1
Lily Hole Creek	Creek (3)	1	1
Templeton River	River (5+)	1	1
	Drainage line (1-2)	11	6
Yaringa Creek	River (5+)	1	1
	Creek (3-4)	3	3
	Drainage line (1-2)	14	7
Mica Creek	Creek (3-4)	4	4
	Drainage line (1-2)	9	5
Total number of quadrats			53

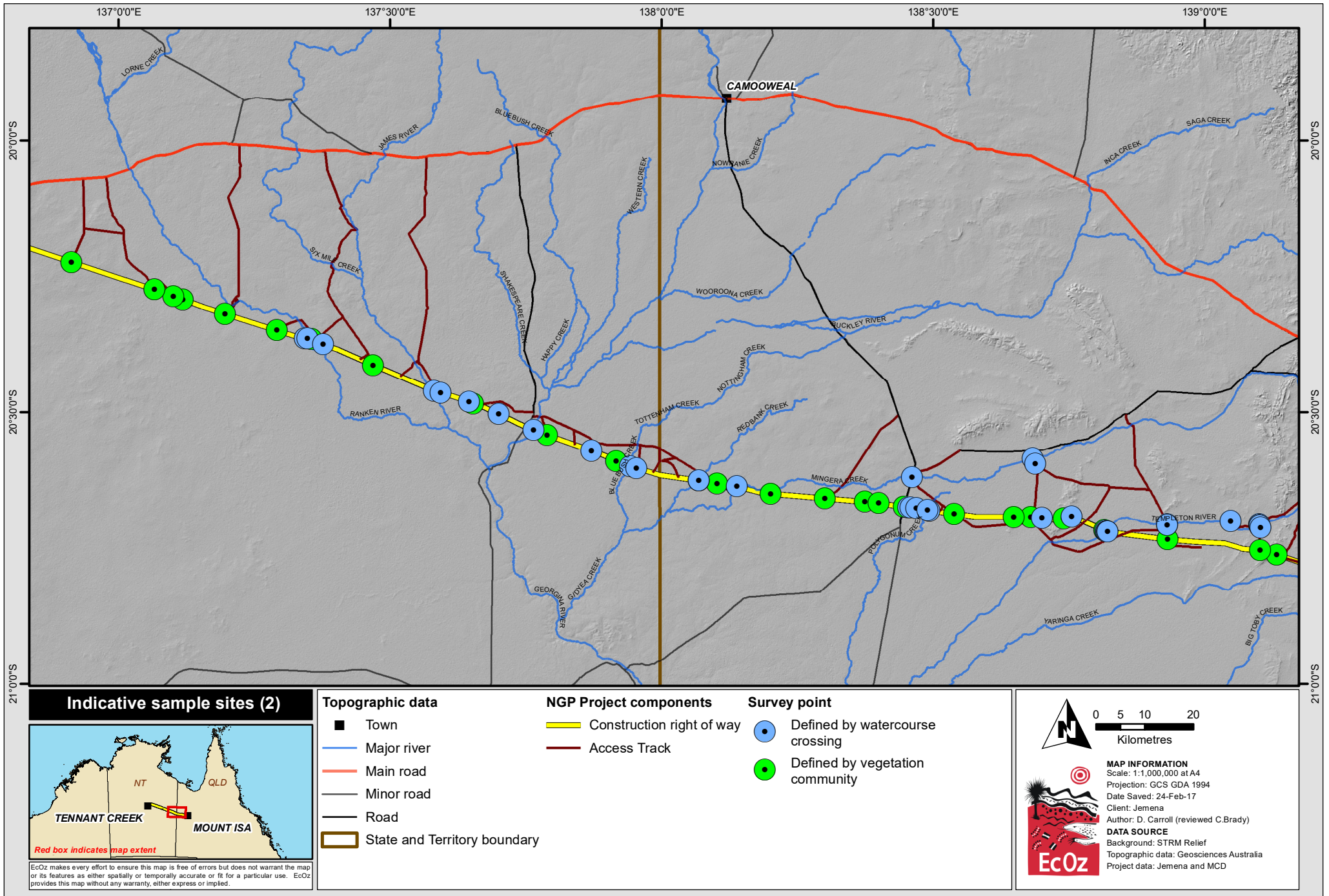
Using this site selection process baseline surveys will take place at 99 sites (Figure 7-1, Figure 7-2, Figure 7-3).

⁵ The watercourse types are from chapter 7 of the EIS/PER. The stream order was determined using 'Strahler's stream order'.



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Figure 7-1. Map showing survey sites within the western portion of the Project footprint



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Figure 7-2. Map showing survey sites within the black soil plains portion of the Project footprint

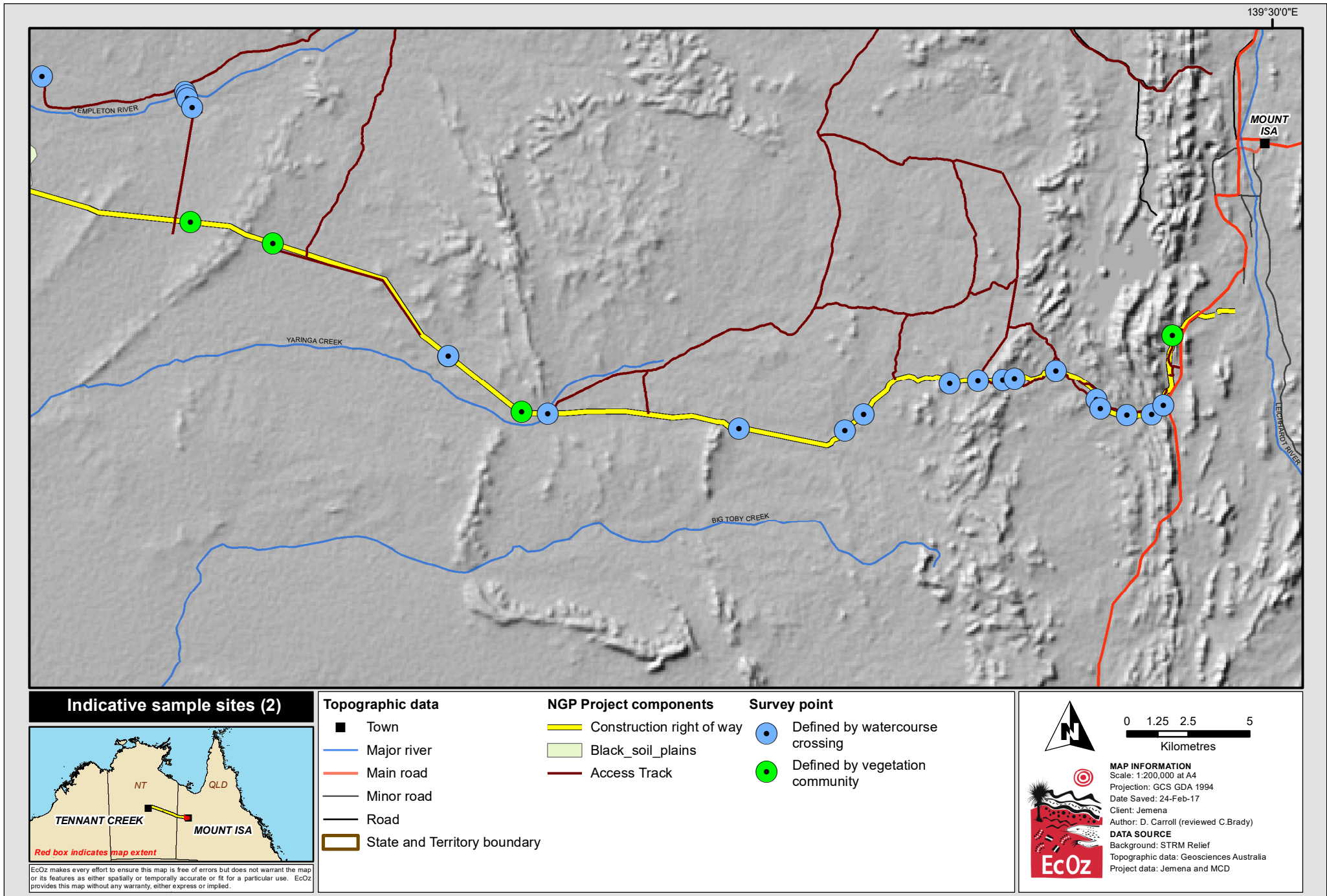


Figure 7-3. Map showing survey sites within the eastern portion of the Project footprint

Monitoring Transitional rehabilitation

The Rehabilitation Management Plan defines several stages of rehabilitation; reinstatement, transitional rehabilitation and rehabilitation. This Rehabilitation Monitoring Plan is concerned with the monitoring of transitional rehabilitation and rehabilitation (reinstatement is monitored through site inspections and weekly audits). As each of these phases have different performance criteria the monitoring program is designed to reflect this.

For the first three years post construction the monitoring aims to assess the transitional rehabilitation across the footprint to identify if and where management intervention is required. The main issues in establishing vegetation similar to that pre-construction are considered to be erosion, introduced species and failure of revegetation (through an absence of seed or animal grazing)

Monitoring will occur at areas with an increased chance of transitional rehabilitation failure. At a minimum this will include creek crossings, proximity to human activity (increased weed and fire risk), weed hygiene locations, areas near watering points (and consequently areas with a higher grazing potential) and areas with special values - including areas of suitable Plains Death Adder habitat. A report will be produced and published on Jemena's website within 3 months of each annual survey. Recommendations will be made on management actions which should be undertaken to minimise the risk of transitional rehabilitation failure. The recommendations will be included within the report.

Monitoring Rehabilitation

When the annual surveys of transitional rehabilitation determine that the transitional rehabilitation criteria have been met, an assessment will be made of progress towards the rehabilitation criteria. This will involve surveys by the baseline survey method (above) at points on the footprint adjacent to the locations of the baseline surveys. In areas that appear to be different to that described in the baseline the original baseline site will also be surveyed. In this case the results from these adjacent quadrats surveyed at the time of the rehabilitation site survey will be used as the values for the completion criteria.

The survey results will be compared with the baseline data. A report will be produced and published on Jemena's website within 3 months of each annual survey. Recommendations will be made on management actions which should be undertaken to minimise the risk of transitional rehabilitation failure. The recommendations will be included within the report.

Monitoring will continue for the period of approval (until 2027).

Data Management and Program Review

Data from baseline surveys and will be retained in a dedicated database managed through Jemena's document management system. Results will be updated within 3 months of each monitoring event. Monitoring data will be available to the Department of Environment and Energy on request.

The monitoring program will be the subject of technical review and evaluation at least every five years. The review will include the monitoring method, data analysis and presentation.

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