Rehabilitation Plan Guide for Surface Disturbance: onshore petroleum exploration

NORTHERN TERRITORY GOVERNMENT

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Acronyms	Full form
DENR	Department of Environment and Natural Resources
DEPWS	Department of Environment, Parks and Water Security (formerly DENR)
DLRM	Department of Land Resource Management
DMIRS	Department of Mines, Industry Regulation and Safety (WA)
EMP	Environment Management Plan
LFA	Landscape Function Analysis
NT	Northern Territory
RP	Rehabilitation Management Plan
RUSLE	Revised Universal Soil Loss Equation
SERA	Society for Ecological Restoration Australasia
SMART	Specific (simple, sensible, significant) Measurable (meaningful) Achievable (agreed, attainable) Relevant (realistic and resourced, results-based) Time bound (time-sensitive)
UAV	Unmanned Aerial Vehicle
WA	Western Australia

Contents

Figures

Tables

Appendices

1. Introduction

This guide has been written to provide interest holders conducting onshore petroleum activities with a practical tool to support rehabilitation for surface activities. This guide is also intended to assist with the preparation of a Rehabilitation Plan (RP)[1] as a component of an Environment Management Plan (EMP) under the Petroleum (Environment) Regulations 2016 (Regulations) and in accordance with the Code of Practice: Onshore Petroleum Activities in the Northern Territory (the Code).

A RP helps interest holders: understand and manage rehabilitation risks; demonstrate preparedness; identify and implement progressive rehabilitation projects; comply with the Regulations and the Code; and start a conversation between staff, contractors, neighbours and the Department of Environment, Parks and Water Security (DEPWS). This shared understanding aims to improve collaboration, transparency, clarify responsibilities and reduce potential conflicts in meeting environmental outcomes for a regulated activity.

A RP should be informed by pre-disturbance land condition assessments and be operationally focussed. The RP should cover all zones associated with the regulated activity and can be developed for one type of zone (e.g. access tracks, well sites) or multiple zones, depending on the nature and scale of the disturbance described in the EMP.

The goal of the RP is to describe the processes for achieving a rehabilitated landform that is physically safe, geotechnically stable, non-polluting and capable of sustaining the post activity land use. In this context, SERA (2017) recommends correctly assessing the capacity of the area to recover and where practical, focusing on rehabilitation that maximises harnessing the natural regeneration capacity of the native biota.

1.1. Purpose of this document

This guide provides a practical tool to interest holders conducting exploration onshore petroleum activities to support rehabilitation for surface activities. The document outlines:

- minimum information requirements for an RP to ensure it meets the requirements of the Regulations and the Code
- rehabilitation monitoring and reporting requirements
- site-specific rehabilitation risks affecting rehabilitation success across one or multiple rehabilitation management zones
- template for a single, high-level A3 “plan on a page” for rehabilitation

Figure 1 provides a flow chart outlining the main steps for developing an RP and completing rehabilitation works.

[1] Rehabilitation plan has the same meaning as defined in cl A.3.9 of the Code of Practice: Onshore Petroleum Activities in the Northern Territory.

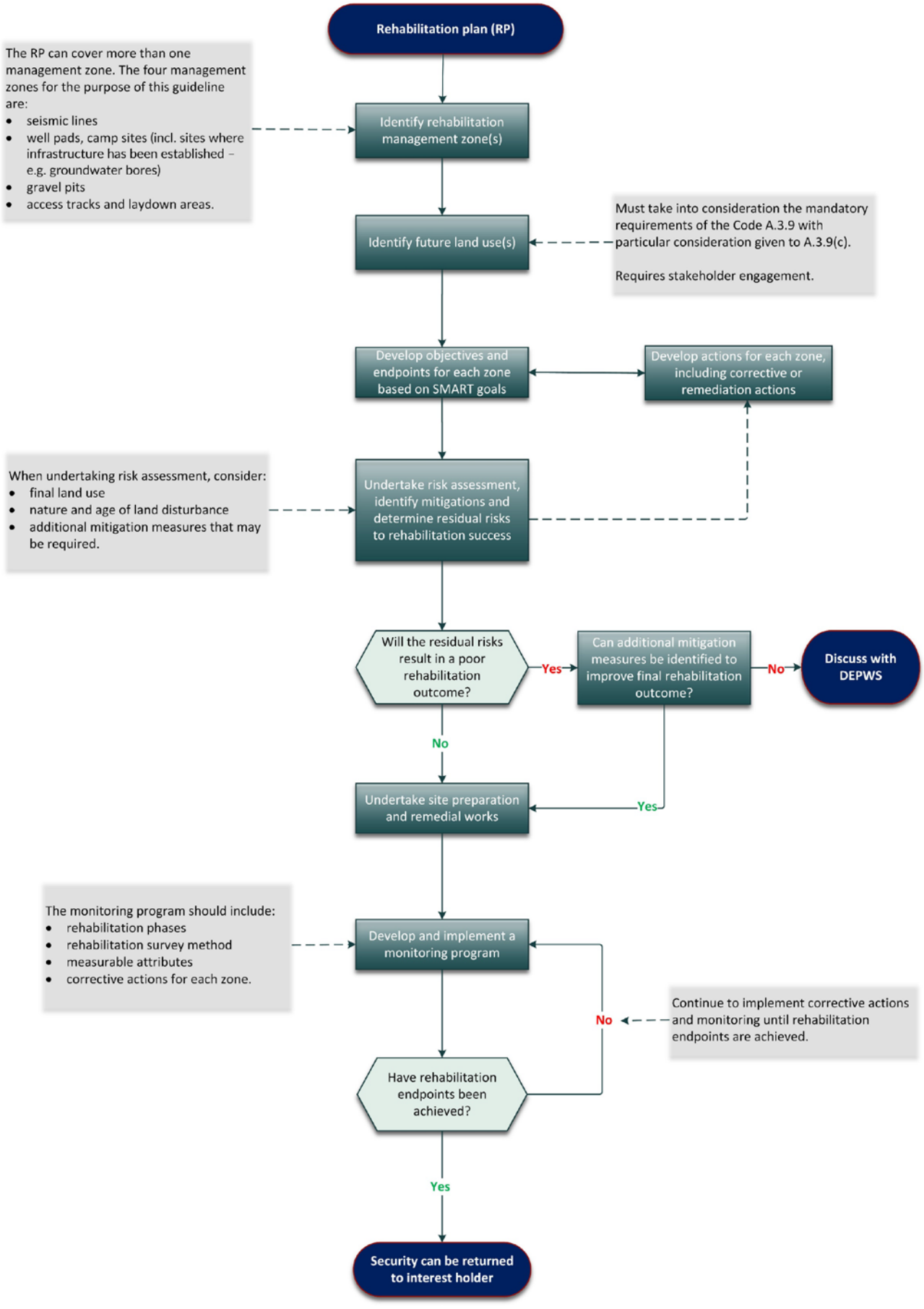

Figure 1: Guide to developing a rehabilitation plan

2. Approvals

The Minister for Environment is responsible for approval of Environment Management Plans (of which, RPs are a component). Recommendation for the approval or otherwise will be sought from DEPWS as the lead agency for rehabilitation associated with onshore petroleum activities in the Northern Territory (NT).

3. Scope

This guide covers all surface disturbance activities described in reg 5, including for example, well pads, access tracks, gravel pits and seismic lines. This document also provides guidance on requirements for rehabilitation under cl A.3.9 of the Code. It does not include consideration of rehabilitation required for sub-surface disturbances or rehabilitation that may be required under the *Petroleum Act 1984* including:

- 23(d) Application for renewal of exploration permit
- 45(f) Application for production licence
- 58(c) General conditions
- 73(1c) Surrender
- 77(1) Removal of property on surrender, expiry or cancellation
- 79 Security for compliance with Act and conditions of petroleum interest
- incidents that have caused material environmental harm
- incidents that have caused serious environmental harm.

4. Legal responsibilities

The Regulations do not specify the requirements for rehabilitation with the exception that, for the purposes of an EMP, a regulated activity includes decommissioning, dismantling or removal of a well, pipeline or other facility reg 5(2)(c).

Rehabilitation management planning should be guided by the following provisions, stipulated in the Code:

- **A.3.9 Rehabilitation**:
    a) Development of a RP by a suitably qualified person[2] and must include specific environmental outcomes and performance standards (e.g. monitoring and reporting requirements).
    b) Development of a RP appropriate to the scale and nature of the activity and include:
        i. strategies for the determination of final land use(s) and rehabilitation goals and details of how rehabilitation objectives will be achieved;
        ii. a monitoring and maintenance program for reinstated and rehabilitated areas.

[2] A 'suitably qualified person' is "a person with professional qualifications, training or skills or experience in assessing remediation and/or rehabilitation requirements, and can give authoritative assessment, advice and analysis about rehabilitation performance using relevant protocols, standards, methods or literature or conduct tasks in accordance with requirements, to ensure that rehabilitation and the ongoing risks to its success have been appropriately managed." (Adapted from the definition in the Code, p118.)

c) Progressive rehabilitation of significantly disturbed land which is not required for the ongoing conduct of the petroleum activity(ies) or future activities, must commence as soon as practicable, but not longer than 12 months following the cessation of activities on the land.

d) All significantly disturbed land must be reinstated to its pre-disturbed condition (including landform and surface drainage/hydrology). For areas that previously contained native vegetation, native vegetation must be re-established such that the corridors become ecologically integrated into the surrounding landscape.

e) Regular maintenance and at least yearly monitoring of rehabilitated areas must take place to measure compliance with the RP. (The timeframe for maintenance and monitoring should be commensurate with the nature and scale of the disturbance.)

f) If contamination is detected, remediation must commence immediately in accordance with the spill management plan and/or emergency contingency plan.

- **A.3.5 Biodiversity Protection:** Location and extent of disturbance of flora and fauna including geospatial information depicting areas cleared.
- **A.3.7(a)(vi) Fire Management:** Annual fire mapping to monitor changes to fire frequency and intensity in the relevant area. (Note, this provision is useful for identifying risks to rehabilitation success rather than rehabilitation endpoints.)
- **B.4.15.1(f) Well suspension and decommissioning principles:** The site is rehabilitated and left safe and free from contaminants as per cl A.3.9 of this Code.
- **B.4.15.2(a) Mandatory requirements for decommissioning wells:** Concurrently to the well integrity monitoring, the well pad may be rehabilitated as much as practicable (in Stage 1) and site rehabilitation may be completed (in Stage 2).

Other sources of information to assist with rehabilitation management planning include the weed management guidelines and fire management guidelines, which can be found on the DEPWS website.

5. Minimum information requirements for an RP

Below is a list of minimum requirements[3] that should be included in an RP:

- SMART rehabilitation objectives and endpoints relevant to each of the environmental factors impacted by the activity, across rehabilitation management zones
- GANTT chart or similar outlining the decommissioning and rehabilitation activities and timeframes
- a list of future zones identified for progressive decommissioning and rehabilitation
- description of the reference sites, including location, GPS co-ordinates and photos
- description of the systems in place for rehabilitation performance monitoring and maintenance
- description of the annual monitoring proposed for each rehabilitation management zone

[3] Adapted from WA DMIRS (2020). *Guidance Note – Decommissioning, rehabilitation and closure of petroleum activities*. https://www.dmp.wa.gov.au/Documents/Environment/Guidance-note-for-decommissioning-rehabilitation-and-closure-of-petroleum-activities.pdf.

- trigger levels and management strategies for intervention and adaptive environmental management
- threshold levels of acceptable impact beyond which there is likely to be a significant effect on the environment
- commitment that if contamination is detected, remediation will commence immediately
- description of the reporting systems for reporting trends against predicted performance based on endpoints
- A3 'plan on a page' depicting each rehabilitation management zone.

6. Recommended points to address when preparing the rehabilitation plan

6.1. Site-specific analysis of rehabilitation risks

A risk assessment should be conducted to identify threats to successful longer term rehabilitation when a new RP is developed, or when a RP is revised. Considering risk is a universally recognised way to assess the "effect of uncertainty on objectives". Below are a set of considerations to aid in assessing rehabilitation risks to specific locations:

- What are the adjoining land uses (e.g. economic, social, cultural and environmental values) that might be impacted by existing and proposed activities and influence rehabilitation outcome/endpoints?
- Has an analysis of vegetation history[4] for the previous 10 years been developed to understand and identify potential areas of rehabilitation risk (examples of useful metrics are provided in Table 1)?
- Have on-site sources of degradation been identified for each rehabilitation management zone? For example, erosion (presence and cause), contaminated soils and any remediation requirements necessary to meet final objectives and endpoints.
- Have local site conditions, including seasonal rainfall, soil condition, erosion, fires, grazing and weed incursions, been assessed?
- What does data collected from field surveys (e.g. surface soil at site, weed surveys, reference site survey) indicate for rehabilitation success?
- Have regeneration approaches been identified – e.g. natural regeneration approach, assisted regeneration approach, reconstruction approach or a combined approach (SERA, 2017)?

RPs need to demonstrate collaboration with neighbours and develop strong working relationships. The following points outline how this can be achieved:

- find out neighbour's/land holder's aspirations for the final land use, if any, to determine fit with intended rehabilitation approach, ensuring regulatory requirements are met
- clearly communicate to neighbours and landholders the interest holder's rehabilitation objectives, as well as consult on their land management objectives
- discuss potential collaboration and collect contact details, including emergency contacts.

[4] See NR Maps, 2020: http://nrmaps.nt.gov.au/nrmaps.html
https://www.environment.gov.au/land/native-vegetation/national-vegetation-information-system

Table 1 provides examples of environmental factors that will aid interest holders to develop the RP. The list is not exhaustive and the number of parameters to consider will vary across sites and the nature of the regulated activity. They are a guide to assist in the identification and establishment of continual rehabilitation improvements and endpoints over the life of the regulated activity. Fauna, including threatened species, feral animals, and livestock are examples of other considerations that may need to be addressed.

Table 1: Examples of environmental factors influencing rehabilitation success

Factor	Parameters	Example considerations
Climate	• rainfall volume, timing, intensity, history and projections • seasonality and time of year • drought • temperature • evaporation	Rainfall and temperature will influence vegetation growth and erosion risk.
Topography	• position in landscape and catchment • slope gradient • slope direction.	Topography influences how water and soil behave in the landscape and will influence soil type, vegetation type, erosion risk (and potential consequences e.g. soil loss and sediment deposition) and weed dispersal.
Soil	• type • soil attributes e.g. texture, structure, pH, organic matter. • sodicity, salinity • erosion presence, type and cause • erosion risk factors (e.g. rainfall, soil erodibility, length of slope, slope gradient, groundcover density, land use and management practices).	Soil type and its inherent properties will influence vegetation growth and erosion risk (and potential consequences e.g. soil loss and sediment deposition). Soil health (including fertility) will also influence plant growth. Vegetation species composition will also be influenced by soil type.
Land condition	• grazing land condition • land condition classes: a (excellent), b (good), c (fair), or d (poor).	Much of the exploration will be across pastoral land tenure, where grazing land is regularly monitored using a long-established method for measuring soil, pasture and woodland condition that takes into account landholder productivity goals (e.g. including presence of 3P species i.e. perennial, productive and palatable). Note however that rehabilitation goals of a grazing ecosystem may vary to ecological rehabilitation goals.
Native vegetation	• species, form, density and behaviour • age, health and condition.	Rehabilitation should aim to reflect surrounding vegetation community and enhance vegetation health and land condition, note that some species such as *Triodia* spp. may be difficult to re-establish. For each rehabilitation management zone, develop specific rehabilitation management objectives and endpoints, including any site-specific remediation actions that need to be undertaken, in

Factor	Parameters	Example considerations
		accordance with SMART goals (i.e. specific, measurable, achievable, realistic and time-bound).
Weeds	• species, class, location and density • weed risk factors (e.g. species behaviour.	All disturbance and rehabilitation activities should aim to control existing weeds and prevent weed seed spread.
Fire	• history • risk (e.g. rainfall, bare ground, fuel load)	Fire history will influence land condition and fire risk will influence rehabilitation success.
Land use	• pre- and post- disturbance land use • rehabilitation measures • land management practices.	Include identification of underlying landholders.

The risk assessment should be reviewed annually and as outlined above, it should be informed by data collected during field surveys. Field surveys should be undertaken using NT survey techniques and guidance documents that are being adopted in the SREBA Framework (DENR 2019a) – e.g. Brocklehurst *et al*., *2007*; DENR N.D.; DLRM 2015a, b; Gillespie *et al*., 2015; Oberprieler *et al*., 2019; Woinarski *et al*., 2010.

6.2. Rehabilitation management zones, objectives and endpoints

Maps are an effective way to communicate the rehabilitation management objectives of the RP. To achieve this, interest holders should:

- develop a map defining boundaries of different rehabilitation management areas or zones and infrastructure, including access roads
- include neighbouring land.

Ideally boundaries should be workable management lines such as access tracks, creeks or hard stand areas.

6.2.1. Rehabilitation management zones

Ground disturbance from onshore petroleum activities can be broken into two basic categories, refined further into a total of four rehabilitation management zones across the two categories:

1. **Linear infrastructure:**

- seismic lines
- access tracks

2. **Sites:**

- well pads and camp sites (including sites where infrastructure has been established – e.g. groundwater bores, laydown areas, helipads)
- gravel pits.

The RP should cover all zones associated with the regulated activity and can be developed for one zone or multiple zones, depending on the nature and scale of the disturbance described in the EMP.

Each management zone is subdivided into four activity phases (see examples **Appendix A**):

- planning and design
- stabilisation and maintenance
- transitional rehabilitation
- final rehabilitation.

The RP should be accompanied by an A3 'plan on a page', which acts as a visual aid for the proposed rehabilitation strategy (**Appendix B**). As outlined above, the RP may consist of one A3 'plan on a page' or several such visual aids, depending on the nature and scale of surface disturbance, landscape variation and number of rehabilitation management zones covered by the RP. Each RP should be accompanied by a risk assessment, and A3 map depicting the endpoint "land types"[5] (DENR 2019b) and disturbance footprint of the rehabilitation management zone(s), using a mapping program such as GIS to ensure spatial accuracy (see **Appendix B**).

6.2.2. Objectives and endpoints

Most surface disturbance from exploration activities are relatively small in area, on predominantly natural substrate and are often linear with good connectivity to pre-disturbance flora and fauna.

In most instances, the focus of rehabilitation endpoints will be predominantly on landform, erosion and vegetation. All interest holders should strive to design a rehabilitation program that ultimately results in viable ecological systems, which are comparable and compatible with surrounding native vegetation and its land uses.[6]

Identifying endpoints should start with the development of the overriding strategy for the rehabilitation of disturbed areas based on pre-disturbance surveys. Rehabilitation should be integrated into every phase of the regulated activity, including during initial site selection considerations, which may strongly influence final rehabilitation achievability. The rehabilitation strategy should be based on:

- pre-disturbance field surveys
- the collection and management of topsoil
- management of weeds and fire
- management of vegetation resources at the time of clearing
- retaining good records of how and where materials have been used on the site or stored (e.g. topsoil) during construction, and
- the timely engagement in progressive rehabilitation activities.

For most onshore gas exploration rehabilitation, topsoil management during operations will be of critical importance to maintaining a source of remnant seed, nutrients, and beneficial soil organisms necessary for establishing a functioning vegetation community.

6.2.2.1. Landform

Landform endpoints should focus on achieving a landform that is stable, blends with the surrounding landscape, is capable of supporting a functioning vegetation community and is not susceptible to erosion. Surface soil should be sufficiently rough and appropriately contoured to reduce erosion, encourage infiltration of rainfall, and trap seed and other resources. Additional

[5] At a minimum the "land type" consists of landform, slope and vegetation data. These parameters may be supplemented with soil profile data according to the degree of landscape complexity and the intensity of the regulated activity. Further information is available in DENR 2019(b), section 3.1.3.
[6] The Code cl A.3.9(d) requires disturbed land become ecologically integrated into the surrounding landscape.

endpoints should include the removal of infrastructure that is not to be used as part of the final land use.

6.2.2.2. Erosion

Erosion endpoints are intrinsically linked to the final landform design and construction. Erosion endpoints should focus on minimising the use of surface structures to manage and control run-off and erosion and reinstating flow paths. Rehabilitation should achieve a landform that is absent of active erosion or accelerated sediment movement (Ecoz 2013), and the tendency for it to become a key threating process to a successful rehabilitation outcome.

6.2.2.3. Vegetation

Revegetated areas should develop into viable ecological systems that are comparable and compatible with surrounding native vegetation and its land uses. Vegetation should be restored as closely as practicable to the pre-disturbance conditions. Vegetation communities should be re-established based on data from pre-disturbance surveys/adjoining undisturbed areas and community descriptions of the respective area held in the National Vegetation Information System (NVIS) database.

Endpoints for establishing ecologically functioning vegetation should, at a minimum, focus on achieving three measurable objectives:

1) establishment of the dominant species per hectare (ha)
2) community structure – ground, mid and upper layers (herbaceous flora/grasses, shrubs and trees)
3) establishment of perennials to stabilise soils and reduce erosion.

As a general commitment, rehabilitation endpoints should also be identified for:

- ensuring planning, implementation, monitoring, corrective actions, and reporting on rehabilitation is carried out in a manner consistent with industry best practice
- ensuring that the management of rehabilitation continues until affected areas are self-sustaining.

6.2.3. Measurement criteria

Each objective must be supported by auditable and measurable criteria. Measurement criteria must address the full range of objectives and allow for direct measurement of performance through monitoring, data analysis, inspections or audits. Objectives, endpoints and respective measurement criteria will generally achieve the purpose of demonstrating environmental performance if they fulfil the intent of the 'S.M.A.R.T' criteria:

Specific	well defined, meaningful and not open to wide interpretation
Measurable	can be measured, and where possible, in a quantitative manner
Achievable	can be met, i.e. are realistic
Relevant	relate to the potential environmental impacts and risks of the activity to each environmental value
Time-based	include a time component (where relevant)

Table 2 provides an example of how to present objectives, standards and measurement criteria in a RP. The example provided does not provide a complete suite of information required for each source of risk.

Table 2: Example objectives, endpoints and measurement criteria

Objective(s)	Endpoint(s)	Measurement criteria
• The vegetation composition (e.g. type, density and maturity) of the rehabilitation is recognisable as the target vegetation community and indistinguishable from the surroundings. • The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target plant community. • Access tracks and/seismic lines are indistinguishable from the surrounding vegetation. • No adverse erosion	• Establishment of the dominant species per hectare (ha). Community structure – groundcover, shrubs and trees. • Establishment of perennials to stabilise soils and reduce erosion.	• Site stability using Landscape Function Analysis (LFA) • Dominant species (%) • Community structure (%) • Perennial cover (%) • Erosion (qualitative – photo evidence of scarring, rill /sheet erosion) • Weeds (%) • Fire (frequency and intensity)

6.3. Rehabilitation management actions

Once the final land use is identified and agreed, land management actions that will assist with meeting environmental endpoints should be identified, for example:

- identifying and establishing vegetation reference sites and survey planning
- identifying non-essential infrastructure for removal
- weed management and surveys
- sustainable local provenance seed harvesting
- establishing an area for growing tubestock and methods for propagating native seeds
- identifying domestic and feral animal management and control
- identifying areas that may require intensive remediation
- identifying staff training requirements.

A useful tool may include a calendar of progressive rehabilitation actions (Figure 2). Fire, weeds, and erosion in linear corridors, are examples of three key threatening processes affecting the Top End environment. As such, the example rehabilitation calendar incorporates optimum timing for the installation and management of erosion and sediment controls; the fire risk phases;[7] and, the optimum times for undertaking weed management and surveys, with a principal focus on rehabilitation preparation activities. Many of the example activities within corresponding months of the same colour are interchangeable.

[7] See DENR 2020, *Bushfire Management Planning Guide: Onshore Petroleum Projects.*

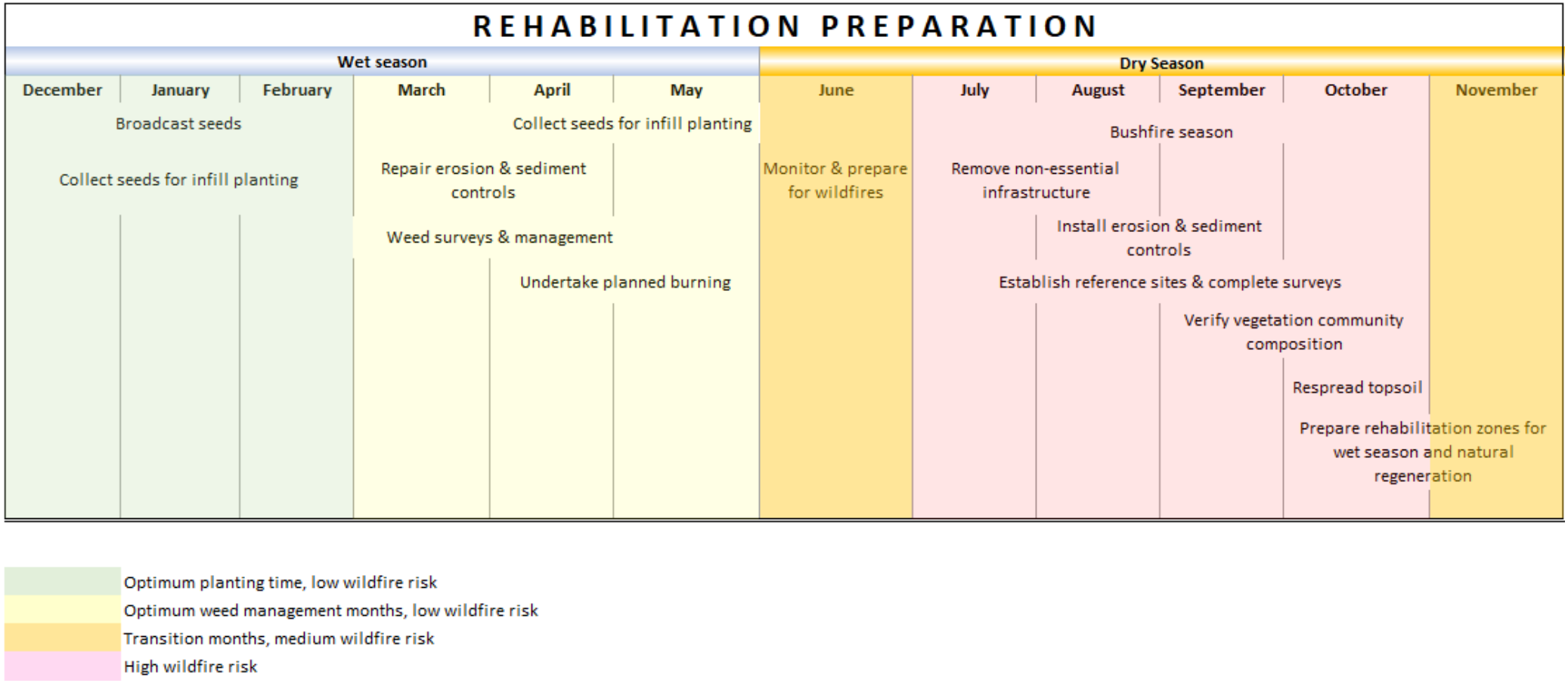

Figure 2: Example rehabilitation management calendar

7. Monitoring and reporting

The RP should detail the ongoing environmental management and monitoring activities. A Gantt chart, or similar should be included, detailing the intended monitoring and reporting programs, against the timing of cessation of regulated activities and/or future activities.

The focus of rehabilitation monitoring will be to compare the performance of rehabilitation zones against the reference sites in similar vegetation associations and landform positions as the rehabilitation. The reference sites will provide the real time values for each aspect against which rehabilitation performance can be compared.

Monitoring and management should continue during the decommissioning and subsequent rehabilitation phases until it can be demonstrated that each zone is safe, stable and non-polluting, and where relevant, that targeted rehabilitation endpoints have been met (Table 2).

Evidence and details of rehabilitation outcomes are to be reported annually as part of the Annual Environment Performance Reporting requirements for each EMP. Interest holders must be able to demonstrate consistent monitoring and record keeping associated for all site rehabilitation.

Table 3: Example of monitoring and corrective actions

Rehabilitation phase	Rehabilitation surveys	Method	Measureable attributes	Corrective actions in rehabilitation zone(s)
6 to 12 months prior to commencement of rehabilitation	Establish reference sites	• Identify permanent reference sites. • Establish monitoring transects. • Complete preliminary vegetation survey. • Flora and fauna surveys in reference sites and rehabilitation areas should use survey techniques from source references (Section 8). • Include high-resolution aerial imagery of the disturbance and rehabilitated area using digital aerial photography or Unmanned Aerial Vehicle (UAV) imagery.	• Ground cover (%) • Perennial cover (%) • Dominant species (%) • Community structure (%) • Site stability using land function analysis (LFA)[8] • Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) • Weeds (%) • Fire (frequency and intensity)	N/A – data from these parameters should transfer into the pre-disturbance rehabilitation endpoints.
Preliminary (6 to 9 months post rehabilitation)	End of wet season survey (March to June)	• Establish permanent monitoring transects in rehabilitated area(s). • Establish photo monitoring points in rehabilitation area(s). • Areas should be adequately signed for ease of identification. • Measure ground cover using a combination of quadrats along randomly selected transects. • Complete survey in rehabilitated area and	• Ground cover (%) • Perennial cover (%) • Dominant species (%) • Community structure (%) • Site stability using LFA • Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) • Weeds (%)	• Infill seeding • Soil amelioration • Pest management • Erosion remediation • Weed management

[8] See Tongway & Hindley (2004).

Rehabilitation phase	Rehabilitation surveys	Method	Measureable attributes	Corrective actions in rehabilitation zone(s)
		reference sites.		
Interim (1 to 3 years post rehabilitation)	Annually at the end of each wet season – survey March to June	• Monitoring to be undertaken using permanent transects. • Collect data from reference site and rehabilitation area(s) as per preliminary methods. • Compare results from previous assessment to determine if corrective actions are required (e.g. seeding, stabilisation, fire exclusion, and weed management). • Review rehabilitation endpoints.	• Ground cover (%) • Perennial cover (%) • Dominant species (%) • Community structure (%) • Site stability using LFA • Erosion (qualitative – photo evidence of scarring, rill/sheet erosion) • Weeds (%) • Fire (frequency and intensity)	• Erosion remediation • Plant thinning or infill direct seeding • Weed management • Fire management • Pest management
Long term (4 to 5 years post rehabilitation) Review if this phase extends past 5 years including previous phases.	Annually until final rehabilitation endpoints have been met. End of wet season survey March to June	• Monitoring to be undertaken using permanent transects. • Collect data from reference site and rehabilitation area(s) as per preliminary methods. • Compare results from previous assessment to determine if require additional management inputs (e.g. seeding, stabilisation, fire exclusion, weed management). • Review rehabilitation endpoints.	• Ground cover (%) • Perennial cover (%) • Dominant species (%) • Community structure (%) • Site stability using LFA • Erosion (qualitative – photo evidence of scarring, rill /sheet erosion) • Weeds (%) • Fire (frequency and intensity)	• Plant thinning or infill direct seeding • Weed management • Fire management

8. Relinquishment and transfer of liability to landholders

The transfer of infrastructure to landholders should only be considered once all remediation and rehabilitation works have been carried out and the long term stability of the infrastructure can be adequately demonstrated. For example, if a landholder(s) requests access tracks or groundwater bores to be left on an exploration licence, a number of matters must be resolved, including:

- providing detailed written and signed evidence from the landholder, outlining the access tracks and/or groundwater bores to be transferred (including maps of specific infrastructure), noting the landholder is required to accept liability for future management of transferred infrastructure
- providing evidence that any infrastructure intended for transfer to a landholder is acceptable to the Pastoral Land Board
- demonstrating that tracks are in a suitable location and appropriately constructed to remain open, noting erosion and sediment controls may be required in some locations and evidence of installation of control measures to provide for long term stability may be requested

- demonstrating that groundwater quality and flow rate meets pre-activity groundwater conditions and that transfer of the bore(s) is sanctioned by the Water Resources Division, DEPWS.

9. Annual review of the rehabilitation plan

RPs should be reviewed and updated annually, based on progressive rehabilitation activities, identification of reference sites or changes to the disturbance footprint that may have occurred during the previous year – for example, new disturbances (sites/linear infrastructure, erosion, fire or weed coverage). RPs also need to be updated as risks change (e.g. additional land clearing, spill incidents requiring remediation, gravel pits or access tracks that are no longer required).

Performance against commitments made in RPs is to be included as a component of the Annual Environment Performance Report for each EMP.

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Appendix A: Examples of environmental aspects relevant to rehabilitation management zones

Activity phases for seismic line rehabilitation – example

Activity	Activity phases			
	Planning and design considerations	**Stabilisation and maintenance**	**Transitional rehabilitation**	**Final rehabilitation**
Seismic lines	Site selection is a primary consideration for all regulated activities. Site selection should follow the principles: avoid, mitigate or manage potential significant impacts. Examples of other considerations during planning and design include: – Sensitive crossing areas such as sand dunes, waterways, floodplains, saltpans wetlands and riparian vegetation adequately described. – Clear definition on whether any seismic line will be handed over to a third-party at the end of required service life. – Commitment to blade-up disturbance that avoids mature/large trees, large termite mounds, sensitive areas such as sand dunes, waterways, floodplains, saltpans wetlands and riparian vegetation. – Seismic recorders hand –walked across sensitive areas where possible. – Removed vegetation windrowed for use in subsequent rehabilitation.[9] – Up-hole drilling sites in locations that avoid sensitive areas. – Vibroseis truck and other vehicular traffic along seismic lines kept to absolute minimum. – Maintain buffers for sensitive vegetation through the use of visual and audible alerts. – Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, and steep slopes). Monitoring points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.	– Effective weed management. – Effective fire management of stockpiled vegetation (i.e. fire prevention). – Effective erosion and sediment controls and management practices implemented. – Is seed collection required yes/no? If 'yes', ensure seed collection permits have been acquired and suitable seed collection storage is available (to maintain seed viability).	– All waste and foreign material removed from seismic lines. – Appropriate use of mulching in key areas. – Bare earth area covered as soon as possible. – Up-hole drilling sites refilled and excess cuttings redistributed to surrounding contour (i.e. match existing soil surface levels, without modifying surface drainage patterns). – Windrows redistributed along the seismic line corridors. – Effective implementation of appropriate erosion and sediment controls (for example but not limited to diversion banks and level sills, rock check dams, sediment fences, mulch banks, soil binder). – Facilitation of natural colonisers in rehabilitation prior to wet season. – Effective fire and weed management. – Measures to prevent vehicle and cattle access to rehabilitated areas. – Rehabilitation site success is identified in comparison to reference sites with the same pre-disturbed land types (e.g. vegetation and soil units). – Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes, mitre drains) should include <u>after first wet season and post wet season photographs in transitional phase.</u> – Monitoring points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.	Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes) in final rehabilitation phase <u>including photographs and vegetation assessment criteria as below</u>: – Rehabilitation site success is identified in comparison to reference sites with the same pre-disturbed land types (e.g. vegetation and soil units). Final criteria should achieve: – A rehabilitated landform consistent with adjacent landforms. – Surface soil is sufficiently rough and appropriately contoured to reduce erosion, encourage infiltration of rainfall. – Rates of erosion will be consistent with adjacent landforms. – Absence of weed species for rehabilitated zones. – Plant species are local provenance. – A vegetation community consistent with the target vegetation community (reference site), consisting of: – Dominant species (%) – Structure – e.g. % herbaceous flora/grasses, shrubs, trees – Perennial cover (%). – Maintenance effort is not greater than that required for the land prior to its disturbance. In addition to the above on-ground surveys, monitoring should include the use of high-resolution aerial imagery of the disturbance and rehabilitated area using, for example: drone footage, digital aerial photography or UAV imagery.

[9] Windrows concentrate runoff – depending on topography. Windrows may need to contain breaks to allow water to pass through and to prevent scouring and gully formation. Topsoil stockpiles should not exceed a height of 1.5 m (particularly if they contain soil), as seed viability is compromised with height/heat.

Activity phases for well pad area and camp site rehabilitation – example

Activity	Activity phases			
	Planning and design considerations	**Stabilisation and maintenance**	**Transitional rehabilitation**	**Final rehabilitation**

Well pad area and camp site	Site selection is a primary consideration for all regulated activities. Site selection should follow the principles: avoid, mitigate or manage potential significant impacts.
	
	As a minimum, the standard of stability, drainage, erosion and sediment controls are commensurate with the well site conditions including:
	– Footprint delineation of proposed well site mapped in sufficient spatial resolution and scale for assessing topographical, vegetation, land system, micro-catchment hydrology and erosion factors.[10]
	– Area estimation and design dimensions for proposed disturbance of proposed well site.
	– Sensitive areas such as sand dunes, waterways, floodplains, saltpans wetlands and riparian vegetation avoided.
	– Expected service life defined.
	– Rainfall patterns and floods adequately defined.
	– Micro-catchment hydrology adequately defined.
	– Erosion factors[10] defined.
	– Scope of well pad base material required – source, quality, placement, quantity.
	– Estimated requirements and identified sources of water (bores and any turkey nests) for civils activity during construction and for maintenance.
	– Design requirements considered, including traffic and load requirements, and seasonal service considerations.
	– Adequate crowning and cross-fall drainage, including grading and compaction of well site and batter stabilisation.
	– Effectiveness of well site drainage design to prevent scouring and gullying of surrounding area.
	– Appropriate use of bunding, table drains, stormwater settling basins, firebreaks and access tracks.
	– Residual drill cuttings and muds must be tested in accordance with the Code (cl C.4.1.2), to determine appropriateness for disposal on site.
	– Records retained of source material for landform construction.
		– Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes, mitre drains). Monitoring points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.
		– No contaminated soil on site.
		– Effective implementation of erosion and sediment controls, including (but not limited to) diversion banks, rock check dams, mulch bunds, sediment fences, and soil binder. Stockpile and re-use topsoil and other organic materials from the site. Stockpile heights not to exceed 1.5 m to enhance viability of seedbank.
		– Effective fire and weed management.
		– Effective drainage control across rehabilitated areas.
		– Clean surface water deposited into natural drainage depressions /lines, without scouring.
		– Maintenance to manage flattening out of crown or cross-fall.
		– Maintenance to manage rills and/or scouring of the road surface.
		– Maintenance to manage build-up of sediment or blockage of table and mitre drains.
		– Build-up of sediment and/or appropriately managed.
		– Appropriate civils maintenance schedule (e.g. seasonal) for grading and stabilisation works.
		– Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes, mitre drains) should include post wet season photographs in maintenance phase, GPS coordinates and mapped on suitable GIS layers.
		– Is native seed collection required yes/no? If ‘yes’, ensure seed collection permits have been acquired and suitable seed collection storage is available (to maintain seed viability).
			– Monitoring of established critical control reference points should include initial transitional photographs, GPS coordinates and mapped on suitable GIS layers.
			– Fencing, well head, signage, and other well site infrastructure (e.g. turkey nest liners) removed from disturbance area.
			– Road base graded into stockpiles and removed to source gravel pits.
			– Well site, table drains, rollover diversion banks (whoa boys), laydown areas and other well site features ripped.
			– Contour elevations returned to baseline conditions consistent with the surrounding landform.
			– Surface water flows contoured to deposit into natural drainage depressions /lines in key crossover areas.
			– Effective use of mulching in key areas.
			– Effective implementation of erosion and sediment controls, including (but not limited to) diversion banks, rock check dams, mulch bunds, sediment fences, and soil binder. Bare earth area covered as soon as possible.
			– Facilitation of natural colonisers in rehabilitation prior to wet season.
			– Effective fire and weed management.
			– Effective drainage control across rehabilitated areas.
			– Measures to prevent vehicle and cattle access to rehabilitated areas.
			– Surface drainage lines are re-established.
			– A stable landform established with no subsidence or erosion evident.
			– A minimum of 40% vegetation establishment compared to reference vegetation community.
				Monitoring of established critical control reference points in final rehabilitation phase including photographs and vegetation assessment criteria as below.
				– Rehabilitation site success is identified in comparison to reference sites with the same pre-disturbed land types (e.g. vegetation and soil units). Final criteria should achieve:
				  – A rehabilitated landform consistent with adjacent landforms.
				  – Surface soil is sufficiently rough and appropriately contoured to reduce erosion, encourage infiltration of rainfall.
				  – Rates of erosion will be consistent with adjacent landforms.
				  – Absence of weed species for rehabilitated zones.
				  – Plant species are local provenance.
				  – A vegetation community consistent with the target vegetation community (reference site), consisting of:
				  – Dominant species (%)
				  – Structure – e.g. % herbaceous flora/grasses, shrubs, trees
				  – Perennial cover (%).
				  – Maintenance effort is not greater than that required for the land prior to its disturbance.
				
				In addition to the above on-ground surveys, monitoring should include the use of high-resolution aerial imagery of the disturbance and rehabilitated area using, for example: drone footage, digital aerial photography or UAV imagery.

[10] See erosion factors listed on the Revised Universal Soil Loss Equation (RUSLE) website: http://www.iwr.msu.edu/rusle/factors.htm.

Activity phases for gravel pit rehabilitation – example

Activity	Activity phases			
	Planning and design considerations	**Stabilisation and maintenance**	**Transitional rehabilitation**	**Final rehabilitation**

Gravel pits	Site selection is a primary consideration for all regulated activities. Site selection should follow the principles: avoid, mitigate or manage potential significant impacts.
	
	Examples of other considerations during planning and design include:
	– Footprint delineation of gravel pits (existing and proposed) mapped in sufficient spatial resolution and scale for assessing topographical, vegetation, land system, micro-catchment hydrology and erosion factors.[10]
	– Avoidance of low-lying areas and surface water flows.
	– Area estimation and design dimensions including depth and batter gradient of proposed new gravel pits (DEPWS recommends maximum of 1:4).
	– Estimated quantity of road base material required from gravel pits for new tracks, existing track upgrades, well pads and other proposed civil works.
	– Visual amenity assessment of proposed gravel pit locations.
	– Appropriate conservation of topsoil and vegetation in windrows (height must not exceed 1.5 m to maintain seed viability).
	– Residual drill cuttings and muds tested and approved for disposal in gravel pits.
	– Water accumulation considerations to mitigate propensity for range extension of feral animals.
	– Records of source material allocation for other construction activities.
		– Monitoring of established critical control reference points at gravel pits should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile. Provide photos of gravel pits prior to any remediation.
		– Effective use of surface water diversions around gravel pit.
		– Stockpile (1.5 m maximum height) and re-use topsoil and other organic materials from the site.
		– Effective weed management.
		– Effective fire management of stockpiled vegetation.
		– Effective drainage control across rehabilitated areas.
		– Clean surface water deposited into natural drainage depressions/lines, without scouring.
		– Is native seed required yes/no? If ‘yes’, ensure seed collection permits have been acquired and suitable seed collection storage is available (to ensure seed viability).
			– Pits suitably contoured to conform to the surrounding topography and a stable, safe and non-polluting form.
			– Pit suitably contoured to eliminate ponding
			– Topsoil and other organic materials from the site used to remediate bare earth areas. (Subsoil should be ripped prior to respreading of topsoil, to enhance bonding.)
			– Emerging vegetation is appropriate – e.g. species composition and relative abundance.
			– Fire and weeds excluded.
			– Effective erosion prevention and maintenance of erosion and sediment controls.[11]
			– Monitoring of established critical control reference points at gravel pits should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.
			– Provide photos of gravel pits across all phases of rehabilitation.
				– A vegetation community consistent with the target vegetation community (reference site), consisting of:
				  – Dominant species (%)
				  – Structure – e.g. % grasses, shrubs, trees
				  – Perennial cover (%).
				– Ponding is not evident across the rehabilitation zone. Ecoz (2013) identifies ponding as a key threat to gravel pit rehabilitation success.
				– Monitoring of established critical control reference points at gravel pits should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.
				– Provide photos of gravel pits across all phases of rehabilitation to demonstrate they meet rehabilitation endpoints.
				– Maintenance effort is not greater than that required for the land prior to its disturbance.
				
				In addition to the above on-ground surveys, monitoring should include the use of high-resolution aerial imagery of the disturbance and rehabilitated area using, for example: drone footage, digital aerial photography or UAV imagery.

[11] These activities should ensure prevention of gully erosion arising from gravel pit filling with water and breaching batters, bunds and/or entry tracks.

Activity phases for access track and laydown area rehabilitation – example

Activity	Activity phases			
	Planning and design considerations	**Stabilisation and maintenance**	**Transitional rehabilitation**	**Final rehabilitation**

Access tracks and laydown areas	Site selection is a primary consideration for all regulated activities. Site selection should follow the principles: avoid, mitigate or manage potential significant impacts.
	
	As minimum, the standard of stability, drainage, erosion and sediment controls are commensurate with the site conditions along the access track including:
	– Footprint delineation of proposed track, turn-around and laydown areas mapped in sufficient spatial resolution and scale for assessing topographical, vegetation, land system, micro-catchment hydrology and erosion risk factors (e.g. soil type and slope gradient and direction).
	– Area estimation and design dimensions for proposed disturbance of proposed track, turn-around and laydown areas.
	– Sensitive crossing areas such as sand dunes, waterways, floodplains, wetlands and riparian vegetation adequately described.
	– Expected service life defined.
	– Rainfall patterns and floods adequately defined.
	– Micro-catchment hydrology adequately defined.
	– Erosion factors[10] defined.
	– Scope of road base material required – e.g. source, storage, quality, placement, quantity.[12]
	– Estimated requirements and identified sources of water (bores and any turkey nests) for civils activity during construction and for maintenance.
	– Design requirements considered including traffic and load requirements, and seasonal service considerations.
	– Adequate crowning and cross-fall drainage, including grading and compaction.
	– Adequacy of road drainage design to mitigate scouring and gullying in adjoining areas.
	– Recommended maximum distance of water flow along road surface and table drains considered in relation to road grade and erodibility of native soil.
	– Appropriate application, construction and use of surface, side and cross drainage.[13]
	– Flow constraints adequately defined in floodways and mitre drains.
	– Stabilisation in erosion hazard areas– e.g. sloping land, drainage line intersections, waterway crossing and sand dune crossings.
	– Erosion and sediment controls considered in low soil drainage areas– e.g. intermittent flooded areas, depressions, cracking clay areas.
	– Appropriate conservation of topsoil and vegetation in windrows and for stabilisation of batters (stockpiles not to exceed 1.5m).
	– Critical control points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes, mitre drains) established prior to disturbance as ongoing monitoring reference points.
		– Monitoring of established critical control reference points (e.g. Creek line crossings, riparian areas, dune crests, high erosion slopes, mitre drains) should include after first wet season and post wet season photographs in transitional phase.
		  – Monitoring points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.
		– Effective erosion and sediment controls in areas of disturbed sensitive vegetation (e.g. riparian areas and sand dunes).
		– Effective implementation of erosion and sediment controls, including (but not limited to) diversion banks, rock check dams, mulch bunds, sediment fences, and soil binder. Stockpile (maximum height 1.5m) and re-use topsoil and other organic materials from the site.
		– Effective use of mulching in key areas.
		– Bare earth area covered as soon as possible.
		– Facilitation of natural colonisers in roadside batter rehabilitation.
		– Effective weed management.
		– Effective drainage control across rehabilitated areas.
		– Surface water deposited into natural drainage depressions /lines, without scouring.
		– Maintenance to manage flattening out of crown or cross-fall.
		– Maintenance to manage rills and/or scouring of the road surface.
		– Maintenance to manage build-up of sediment or blockage of drains.
		– Management of windrows to prevent outfall drainage or blocking of the entrance to drainage structures.
		– Management, removal and disposal of sediment and/or debris in drainage, erosion and sediment controls.
		– Stabilisation of discharge surfaces.
		– No deposition of road-base sediment in a watercourse.
		– Seasonally appropriate civils maintenance schedule for grading and stabilisation works.
		– Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes, mitre drains) should include after first wet season and post wet season photographs in transitional phase.
		  – Monitoring points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.
			– Monitoring of established critical control reference points (e.g. Creek line crossings, riparian areas, dune crests, high erosion slopes, mitre drains) should include after first wet season and post wet season photographs in transitional phase.
			  – Monitoring points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.
			– Signage, and other infrastructure (e.g. turkey nest liners) removed from disturbance area.
			– Road base graded to stockpiles and removed to source gravel pits.
			– Track, table drains, mitre drains, rollover diversion banks, floodways, laydown areas and other track features ripped or scarified.
			– Contour elevations returned to baseline conditions consistent with the surrounding landform.
			– Surface water flows contoured to deposit into natural drainage depressions /lines in key crossover areas, without scouring.
			– Effective use of mulching in appropriate areas.
			– Effective implementation of erosion and sediment controls, including (but not limited to) diversion banks, rock check dams, mulch bunds, sediment fences, and soil binder. Bare earth area covered as soon as possible.
			– Facilitation of natural colonisers in rehabilitation prior to Wet season
			– Effective weed management
			– Effective drainage control across rehabilitated areas.
			– Measures to prevent vehicle and cattle access to rehabilitated areas.
			– Surface drainage lines are re-established.
			– Establishment of stable landform with no subsidence or erosion evident.
			– A minimum of 40% vegetation establishment compared to reference vegetation community.
			– Rehabilitation site success is identified in comparison to reference sites with the same pre-disturbed land types (e.g. vegetation and soil units).
			– Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes, mitre drains) should include after first wet season and post wet season photographs in transitional phase.
			  – Monitoring points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile.
				Monitoring of established critical control reference points (e.g. waterway crossings, riparian areas, sand dune crests, steep slopes, mitre drains) in final rehabilitation phase including photographs and vegetation assessment criteria as below:
				– Rehabilitation site success is identified in comparison to reference sites with the same pre-disturbed land types (e.g. vegetation and soil units). Final criteria should achieve:
				  – A rehabilitated landform consistent with adjacent landforms.
				  – Surface soil is sufficiently rough and appropriately contoured to reduce erosion, encourage infiltration of rainfall.
				  – Rates of erosion will be consistent with adjacent landforms.
				  – Absence of weed species for rehabilitated zones.
				  – Plant species are local provenance.
				  – A vegetation community consistent with the target vegetation community (reference site), consisting of:
				  – Dominant species (%)
				  – Structure – e.g. % grasses, shrubs, trees
				  – Perennial cover (%).
				  – Maintenance effort is not greater than that required for the land prior to its disturbance.
				
				In addition to the above on-ground surveys, monitoring should include the use of high-resolution aerial imagery of the disturbance and rehabilitated area using, for example: drone footage, digital aerial photography or UAV imagery.

[12] Stockpiles of fill material should not exceed 2 m in height when near a sensitive receptor; or 3 m in height elsewhere. As per footnote 4, the maximum height for topsoil storage is 1.5 m.
[13] See DLRM 2016a. *Road Drainage* Fact sheet: https://nt.gov.au/__data/assets/pdf_file/0004/212269/road-drainage.pdf.

Activity	Activity phases			
	Planning and design considerations	**Stabilisation and maintenance**	**Transitional rehabilitation**	**Final rehabilitation**
	– Monitoring reference points should be shown on a map, coordinates provided in a table and the spatial data provided in a shapefile. Additional technical notes relevant to access tracks include: – DLRM, 2016b Diversion Banks, Technical Note No. 8 – Erosion and Sediment Control Guidelines: https://nt.gov.au/__data/assets/pdf_file/0015/212253/diversion-banks.pdf – NTG 2020. Soil management, erosion and sediment control information. Website: https://nt.gov.au/environment/soil-land-vegetation/soil-management-erosion-sediment-control – Pringle *et al,* 2019. Managing Outback Roads: https://rangelandswa.com.au/wp-content/uploads/2019/05/0518-Rangelands-A5-Outback-Roads-Book-Mar19-WEB.pdf	– Is native seed required yes/no? If 'yes', ensure seed collection permits have been acquired and suitable seed collection storage is available (to ensure seed viability).		

Appendix B: Example A3 rehabilitation ‘plan on a page’

Add the following rehabilitation details:
- EP 123456
- Well site 1 (if applicable)
- Plan name – e.g. Rehabilitation Plan 20xx – 20xx, [location]
- Total area of approved surface disturbance (200 ha)
- Total area covered by this RP for rehabilitation = 10.00 ha.

Location of [activity] on EPxxx	
Property land uses	For example: gas exploration, cattle grazing.
Site rehabilitation aim	State the overarching aim for rehabilitation of the zone(s), consistent with industry standards, the Code and in consultation with landholder(s).
Rehabilitation objectives	For example: • relinquishment of the site that is stable • sustainable and non-polluting • minimise visual impact • revegetation of native species.

Pre-disturbance land condition summary

Provide a brief overview of the land condition prior to the activity, including:
- Bioregion
- Landform characteristics
- Creeks / streams
- Vegetation cover and composition, include a species list
- Habitat condition and values – e.g. # of large trees, hollows, etc
- Other impacts – e.g. weeds, grading, degradation, etc.
- Identify sensitive receptors / listed threatened fauna in the vicinity of the rehabilitation.
- A3 GIS map depicting the vegetation communities and disturbance footprint.

Contact details	
Title of responsible person	Name: Phone: Email:

Rehabilitation management zones*

Infrastructure	Size (ha)	Vegetation community	Soil type / slope
Seismic lines**			
Well pad RMZ #3	9	Low woodland	Kandosols (red, yellow and brown earths) Less than 2% slope
Gravel pits**			
Access track RMZ #1 & RMZ #2**	0.96	Low woodland	Kandosols (red, yellow and brown earths) Less than 2% slope

* NB: Each rehabilitation management zone can be depicted as a separate A3 plan on a page. This will be based on the nature and scale if impact and land types. GIS layer(s) to be provided DENR Petroleum Operations within 3 months of initial land clearing.

** List separately if vegetation communities differ across locations.

Rehabilitation risks

Describe all rehabilitation risks, include corrective actions under **monitoring and corrective actions**. Each RP must be accompanied by a risk assessment. Examples of rehabilitation risks include:
- Extreme weather events (e.g. flood, fire, cyclone, draught) destroys immature vegetation / regeneration.
- Fauna (including cattle) grazing on tube stock/seedlings reduces rehabilitation outcomes.
- Exposed land surface contributes to increased weed recruitment and increased fire intensity, decreasing revegetation success.

Append full rehabilitation risk assessment with RP.

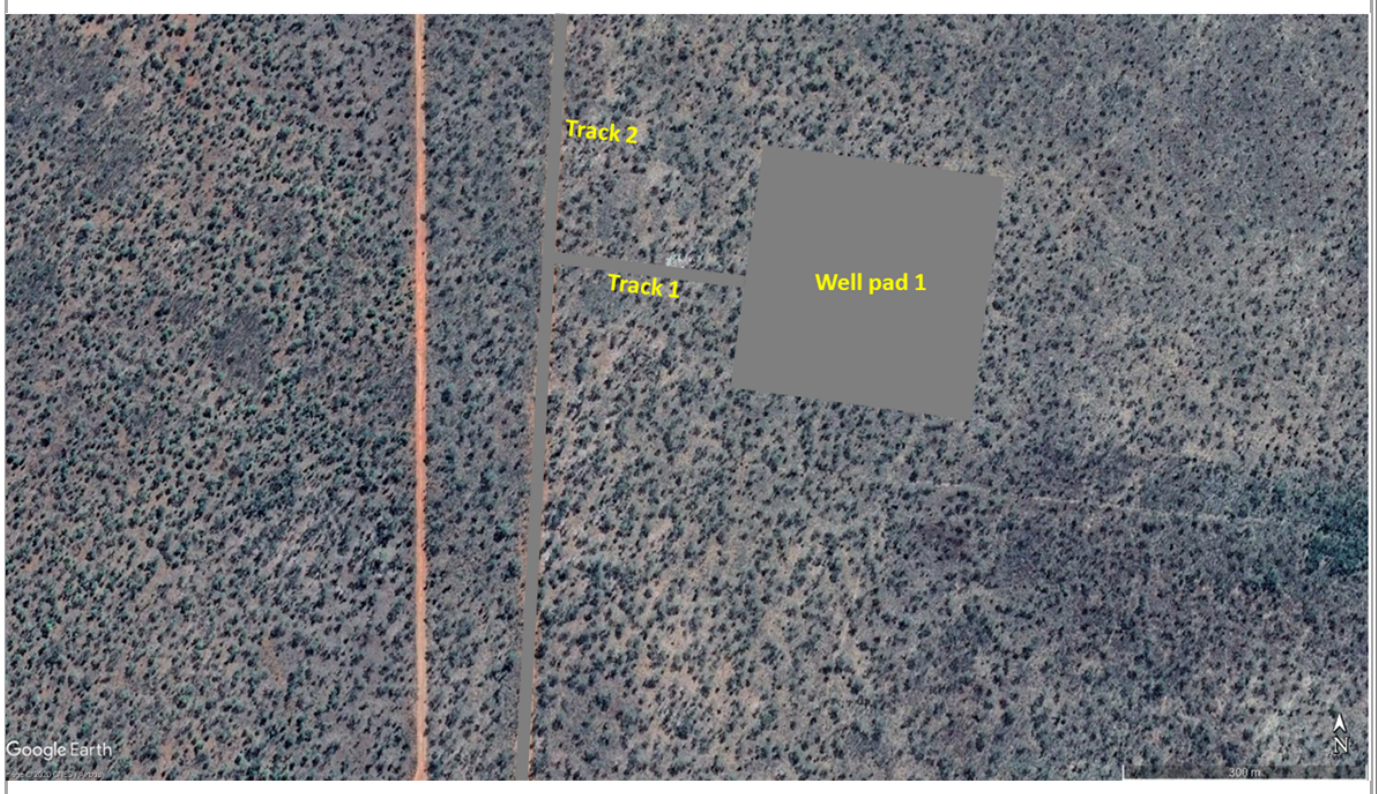
Add photos of regional location and pre-disturbance site (3 maximum)
- Photos should clearly show vegetation storeys
- Include captions

Location map EP 123456


Corymbia dichromophloia and *Erythrophleum chlorostachys* low woodland in east of EPxx (courtesy of Origin Energy)

Rehabilitation management zones and objectives

- Provide an aerial photo of the rehabilitation management zone(s) with land types identified. Where more than one zone is covered by the RP, use transparent overlays if areas have already been cleared and/or to delineate zones.



RMZ #1—Access track 1 (1000 m x 8 m)0.80 ha

RMZ #2—Access track 2 (200 m x 8 m)0.16 ha

RMZ #3—Well pad 1 (300 m x 300 m); 9.00 ha

Soils—Kandosols (red, yellow and brown earths)

Land type 2: Plains, slopes 0 to 2%, nil rock with *Eucalyptus miniata* (Woolybutt); *Eucalyptus tetrodonta* (Stringy Bark) with deep well-drained red (Kandosol) soils. Sandy surfaced to sandy clay loam at 1.0 m. Significant gravel from 1.0 m.

State the objectives for each rehabilitation management zone. Examples are provided below:

Zone RMZ #1—access track 1 km (0.80 ha)
Co-ord: xxxxxx, xxxxxx; GDA94z53

Zone RMZ #2—access track 200 m (0.16 ha)
Co-ord: xxxxxx, xxxxxx; GDA94z53

Zone RMZ #3—well pad 300 m x 300 m (9.00 ha)
Co-ord: xxxxxx, xxxxxx; GDA94z53

- Infrastructure: All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.
- Soils: There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
- Ecosystem rehabilitation:
  - The vegetation composition (e.g. type, density and maturity) of the rehabilitation is recognisable as the target vegetation community and indistinguishable from the surroundings.
  - The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target plant community.
- Pastoral revegetation: Revegetation is sustainable for the long term and only requires maintenance that is consistent with the final land use.
- Access tracks: Visually, track contours and colour blend with surrounding area and previous surface disturbance is indistinguishable.