Rehabilitation Plan

Atlas Stage 3 Gas Project

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Table of Contents

Document Status

Revision History

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Rehabilitation Plan

1 Introduction

1.1 Purpose

Senex Energy Pty Ltd (**Senex**), through its subsidiaries Senex Assets Pty Ltd and Senex Assets 2 Pty Ltd, is progressing development of Atlas Stage 3 Gas Project on Authority to Prospect (**ATP**) 2059, Petroleum Lease (**PL**) 445, the northern half of PL209 and parts of PL1037, and any subsequent or replacement petroleum authorities over the areas so described (together, the **Project Area** shown in Figure 1) in the central part of the Surat Basin; an established gas producing region. The Atlas Stage 3 Gas Project (the **Project**) will involve developing production wells and supporting infrastructure to produce gas for domestic and international markets.

Due to the different types of land use, disturbance and petroleum activities across the Atlas Stage 3 Gas Project, there is need for a diversified approach to rehabilitation.

This Rehabilitation Plan (the **Plan**) identifies a range of rehabilitation methods required to successfully undertake rehabilitation of land to pre-disturbance land use. This Plan has been developed to meet the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (**EPBC Act**) and the State Environmental Authority (**EA**) Conditions.

The Plan will assist to minimise impacts to Matters of National Environmental Significance (**MNES**) through the restoration of MNES dispersal habitat and microhabitat features. The Plan also identifies rehabilitation monitoring, indicators and acceptance criteria to be met in returning land to a pre-disturbance land use and ecological condition.

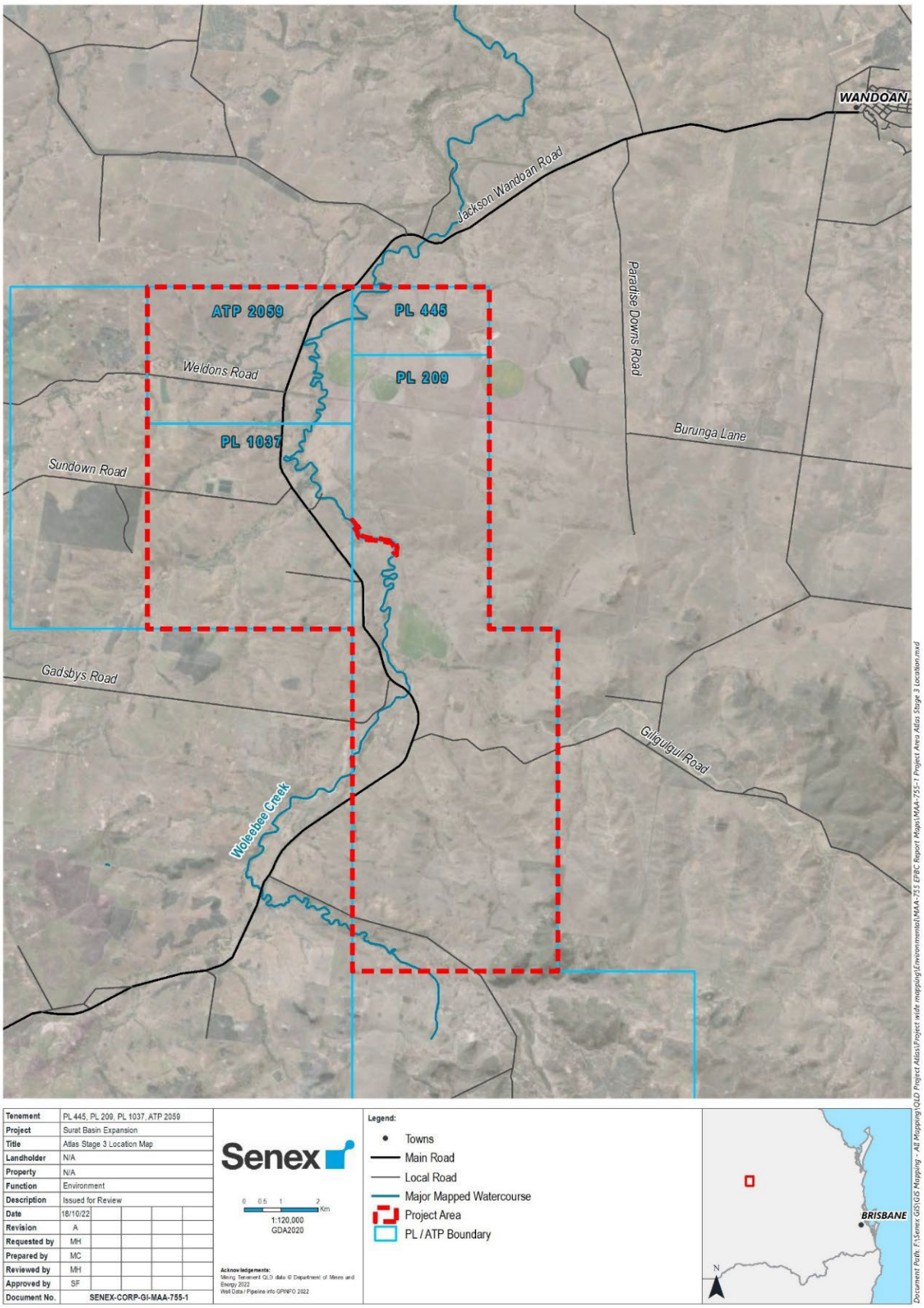

Figure 1 Atlas Stage 3 Gas Project Area and Location

1.2 Project Approvals

1.2.1 Environment Protection and Biodiversity Conservation Act 1999

The Project has been deemed a ‘controlled action' under the EPBC Act and is currently undergoing assessment in the process of an application for EPBC approval.

This Plan has been prepared with consideration to the MNES values potentially impacted by the Project and operates in conjunction with other key documentation including the Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [OPS-ATLS-EN-PLN-001] and the Significant Species Management Plan (ERM 2023) for the implementation of the hierarchy of management principles to avoid, minimise and manage land disturbance impacts on MNES during the Project.

The Project will avoid areas confirmed as threatened ecological communities (TECs) and habitat for listed species (identified in the Constraints Protocol and listed below), except for Koala dispersal habitat. Based on the mapped extents of the TECs and the fauna habitat, no remnant vegetation will be cleared for the Project.

This Plan focuses on the following management principle:

- Restore (remediate and rehabilitate) – actively remediate and rehabilitate impacted areas to promote and maintain long-term recovery of the values unavoidably impacted by the Project.

Based on the ecological assessments undertaken for the Project the following MNES have been identified as potentially occurring that could be impacted by the Project:

- Listed Threatened and/or Migratory Birds
    - Australian Painted Snipe (*Rostratula australis*)
    - Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*)
    - Diamond Firetail (*Stagonopleura guttata*)
    - Glossy Black-cockatoo (*Calyptorhynchus lathami lathami*)
    - Painted Honeyeater (*Grantiella picta*)
    - Southern Squatter Pigeon (*Geophaps scripta scripta*)
    - Southern Whiteface (*Aphelocephala leucopsis*)
    - White-throated Needletail (*Hirundapus caudacutus*)
- Listed Threatened Mammals
    - Corben’s Long-eared Bat (*Nyctophilus corbeni*)
    - Greater Glider (central and southern) (*Petauroides volans*)
    - Koala (*Phascolarctos cinereus*)
    - Northern Quoll (*Dasyurus hallucatus*)
    - Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*)
- Listed Threatened Reptiles
    - Collared Delma (*Delma torquata*)
    - Dunmall’s Snake (*Furina dunmalli*)
    - Five-clawed Worm-skink (*Anomalopus mackayi*)
    - Grey Snake (*Hemiaspis damelii*)
    - Yakka Skink (*Egernia rugosa*)
- Listed Threatened Invertebrates
    - Dulacca Woodland Snail (*Adclarkia dulacca*)

- Listed Threatened Ecological Communities (**TEC**)
    - Brigalow (*Acacia harpophylla* dominant and codominant) TEC
    - Poplar Box grassy woodland on alluvial plains TEC
- Listed Threatened Flora
    - Belson's Panic (*Homopholis belsonii*)
    - Ooline (*Cadellia pentastylis*)
    - Slender Tylophora (*Vincetoxicum forsteri*)

1.2.2 Environmental Authority Conditions

The Atlas Stage 3 Gas Project is subject to the following EA's, which include streamline model conditions (**SMCs**):

- PL 1037 – EA0001207;
- PL 445 and 209 – P-EA-100112777; and
- ATP 2059 – EA0002524.

Senex is exploring the amalgamation of these EAs.

This Plan has been developed to achieve compliance with rehabilitation conditions within EA0001207 (i.e. the SMCs). Table 1 identifies the conditions relating to rehabilitation that are relevant to the plan. For the purposes of the plan and in accordance with the EA, rehabilitation means:

'the process of reshaping and revegetating land to restore it to a stable landform and in accordance with acceptance criteria and, where relevant, includes remediation of contaminated land. For the purposes of pipeline rehabilitation, rehabilitation includes reinstatement, revegetation and restoration'.

Table 1 EA conditions for rehabilitation on the Atlas project area

Environmental Authority Condition Number	Requirement	Section addressed
(E2) Topsoil management	Topsoil must be managed in a manner that preserves its biological and chemical properties.	Section 4.2
(E3) Land management	Land that has been significantly disturbed by the petroleum activities must be managed to ensure that mass movement, gully erosion, rill erosion, sheet erosion and tunnel erosion do not occur on that land.	Section 4.3 and 7
(E7) Pipeline reinstatement and revegetation	Pipeline trenches must be backfilled and topsoils reinstated within three months after pipe laying.	Section 3.2
(E8)	Reinstatement and revegetation of the pipeline right of way must commence within 6 months after cessation of petroleum activities for the purpose of pipeline construction	Section 3.2
(E9)	Backfilled, reinstated and revegetated pipeline trenches and right of ways 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; and	Section 6

Environmental Authority Condition Number	Requirement	Section addressed
	d) vegetated with groundcover which is not a declared pest species, and which is established and growing.	
(I4)	When no longer required all low consequence dams must be decommissioning to no longer accept inflow from the petroleum activities and be either: a) rehabilitated; or b) agree to in writing by the administering authority and the landholder to remain in situ following the cessation of the petroleum activity(ies) associated with the dam, with the contained water of a quality suitable for the intended ongoing use(s) by that landholder.	Section 3
(I28) Decommissioning and Rehabilitation	Regulated structures must not be abandoned but be either: a) decommissioned and rehabilitated to achieve compliance with condition (I29); or b) be left in-situ for a beneficial use(s) provided that: i) it no longer contains contaminants that will migrate into the environment; and ii) it contains water of a quality that is demonstrated to be suitable for its intended beneficial use(s); and iii) the administering authority, the holder of the environmental authority and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activity(ies).	Section 3
(I29)	Subject to Condition I28, before surrendering this environmental authority the site must be rehabilitated to achieve a safe, stable, non-polluting landform consistent with final land use.	Section 3
(J1) Rehabilitation Planning	A Rehabilitation Plan must be developed by a suitably qualified person and must include the: a) rehabilitation goals; and b) procedures to be undertaken for rehabilitation that will: i) achieve the requirements of conditions (J2) to (J8), inclusive; and ii) provide for appropriate monitoring and maintenance.	This Plan
(J2) Transitional rehabilitation.	Significantly disturbed areas that are no longer required for the on-going petroleum activities, must be rehabilitated within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a 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) topsoil is reinstated; and e) either: i) groundcover, that is not a declared pest species, is growing; or	Section 3.2 and 7

Environmental Authority Condition Number	Requirement	Section addressed
	ii) an alternative soil stabilisation methodology that achieves effective stabilisation is implemented and maintained.	
(J3) Final rehabilitation acceptance criteria.	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 percent of ground cover; c) less than or equal to the percent 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 higher conservation value as any of the regional ecosystem(s) in either the adjacent land or pre-disturbed land, must be present.	Section 3.3 and 7. The Project will not disturb any REs so clause d) is not applicable.
(J4) Final rehabilitation acceptance criteria in environmentally sensitive areas.	Where significant disturbance to land has occurred in an environmentally sensitive area (ESA), the following final rehabilitation criteria as measured against the pre-disturbance biodiversity values assessment (required by conditions (F1) and (F2)) must be met: a) greater than or equal to 70% of native ground cover species richness; b) greater than or equal to the total percent ground cover; c) less than or equal to the percent species richness of declared plant pest species; d) greater than or equal to 50% of organic litter cover; e) greater than or equal to 50% of total density of coarse woody material; and f) all predominant species in the ecologically dominant layer, that define the pre-disturbance regional ecosystem(s) are present.	Not applicable - the Project will not disturb any ESAs.

1.3 Relevant Standards and Guidelines

The following standards and guidelines have been used to develop this plan and will be considered accordingly for periodic revision and implementation purposes:

- Final rehabilitation report for resource activities – Department of Environment and Science: Version 4.02, 4 May 2022
- Code of Practice for the construction and abandonment of petroleum wells and associated bores in Queensland – Department of Natural Resources, Mines and Energy (Queensland): Version 2, 16 December 2019.
- Indicators of Ecosystem Rehabilitation Success – CSIRO July 2003.
- Mine Closure and Completion – Australian Government: October 2006.
- Transferring petroleum infrastructure to landholders - Department of Environment and Science: Version 1.01, 4 May 2022 (ESR/2020/5403)

- BioCondition: A condition assessment framework for terrestrial biodiversity in Queensland: Assessment manual. Version 2.2 February 2015.
- Best Practice Erosion and Sediment Control. International Erosion Control Association. 2008.
- Australian Standard 2885.3—2012, Pipelines—Gas and liquid petroleum Part 3: Operation and maintenance.
- Australian Petroleum Production and Exploration Association, Code of Environmental Practice, October 2008.
- Australian Pipeline Industry Association Ltd, Code of Environmental Practice – Onshore Pipelines, Revision 5, April 2022.

1.4 Abbreviations

ATP	Authority to Prospect
CSG	Coal Seam Gas
DES	Department of Environment and Science (formerly DEHP)
EA	Environmental Authority
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act* (1999) (Cth)
ESA	Environmentally Sensitive Area
MNES	Matters of National Environmental Significance
NC Act	*Nature Conservation Act 1992* (Qld)
PL	Petroleum Lease
RE	Regional Ecosystem
RoW	Right of Way
TEC	Threatened Ecological Community

2 Background

2.1 Project Background

The Project is to develop, operate, decommission and rehabilitate up to 151 coal seam gas wells; gas and water gathering systems for the producing wells; access tracks; brine and produced water storages; borrow pits; and ancillary supporting facilities on ATP 2059, PL 445, the northern portion of PL209 and PL1037 in the central part of the Surat Basin, Queensland.

Most of the Project Area is historically cleared areas with non-native pastures, and the Project will avoid areas confirmed as TECs and habitat for listed species, except for Koala dispersal habitat.

The Atlas Stage 3 Environmental Constraints Protocol for Planning and Field Development [OPS-ATLS-EN-PLN-001] the "Constraints Protocol" outlines how the Project will avoid, minimise, and manage land disturbance impacts on MNES during the planning and implementation of new petroleum activities for the Project.

2.2 Existing Environment

2.2.1 Landscape and Soils

The predominant land use within the project area is used for cattle grazing.

The landscape ranges from gentle to moderately undulating or rolling lands, to strongly undulating or low hilly lands, dissected with small stream floodplains that rise gradually to moderately undulating marginal valley slopes.

The land units and dominant soil types associated with the Project Area are summarised in Table 2.

Table 2 Land Units and Dominant Soil Types

Mapping code	Concept	Dominant soils
CB3	Gentle to moderately undulating or rolling lands	Moderate to shallow depth, chiefly grey clays but with important areas of dark clays or brown clays.
Rq1	Strongly undulating or low hilly lands	Gravelly mostly shallow loamy duplex soils with mottled clay subsoil. A wide range of other shallow duplex soils are associated, chiefly alkaline forms. Associated drainage lines have small flood-plains with loamy soils together with small areas of clays.
SI4	Small stream flood-plains that rise gradually to moderately undulating marginal valley slopes	Loamy duplex soils. Associated are smaller areas of similar soils and local occurrences of clays. Some stream levees have deep sand soils. The marginal valley slopes have alkaline soils with some uniform clays. Upslope these soils merge into the cracking clays of unit CB3

Acid-sulfate soil-prone areas or acid-bearing rock formations are not mapped within the Project Area.

2.2.2 Vegetation

The Project Area is in the Queensland Brigalow Belt South bioregion. Native vegetation of the bioregion is characterised by woodland and forest communities of *Acacia harpophylla* (Brigalow) with scattered ecosystems dominated by eucalypt species, cypress pine, acacia species and grassland (Sattler and Williams, 1999).

There are no mapped high-risk areas under the Nature Conservation (Plants) Regulation 2020.

Regional ecosystems (RE) listed under the Vegetation Management Act 1999 (Qld) (VM Act) which have been validated as occurring within the Project Area are listed within Table 3 and shown in Figure 2. As further field development planning is undertaken, additional areas will be ground-truthed to validate the biodiversity values including RE, regrowth vegetation and species habitat.

Table 3 Validated Regional Ecosystems (Biodiversity Status)

RE Code	RE Short Description	Biodiversity Status
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Of Concern
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. woodland on alluvial plains	Of Concern
11.3.17	*Eucalyptus populnea* woodland with *Acacia harpophylla* and/or *Casuarina cristata* on alluvial plains	Endangered
11.3.19	*Callitris glaucophylla, Corymbia spp.*and/or *Eucalyptus melanophloia* woodland on Cainozoic alluvial plains	No concern at present
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Of Concern
11.3.27	Freshwater wetlands. Vegetation is variable including open water with or without aquatic species and fringing sedgelands and eucalypt woodlands. Occurs in a variety of situations including lakes, billabongs, oxbows and depressions on floodplains.	Of Concern
11.3.39	*Eucalyptus melanophloia* +/- *E. chloroclada* open woodland on undulating plains and valleys with sandy soils	No concern at present
11.5.1	*Eucalyptus crebra* and/or *E. populnea, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sand plains and/or remnant surfaces	No concern at present
11.5.5	*Eucalyptus melanophloia*, Callitris glaucophylla woodland on Cainozoic sand plains and/or remnant surfaces. Deep red sands.	No concern at present
11.9.2	*Eucalyptus melanophloia* +/- *E. orgadophila* woodland on fine-grained sedimentary rocks	No concern at present
11.9.4	Semi-evergreen vine thicket or *Acacia harpophylla* with a semi-evergreen vine thicket understorey on fine-grained sedimentary rocks	Endangered
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	Endangered
11.9.7	*Eucalyptus populnea, Eremophila mitchellii* shrubby woodland on fine-grained sedimentary rocks	Of concern
11.9.9	*Eucalyptus crebra* woodland on fine-grained sedimentary rocks	No concern at present
11.9.10	*Eucalyptus populnea* open forest with a secondary tree layer of *Acacia harpophylla* and sometimes *Casuarina cristata* on fine-grained sedimentary rocks	Endangered
11.10.1	*Corymbia citriodora* woodland on coarse-grained sedimentary rocks	No concern at present
11.10.7	*Eucalyptus crebra* woodland on coarse-grained sedimentary	No concern at present
11.10.11	*Eucalyptus populnea, E. melanophloia* +/- *Callitris glaucophylla* woodland on course-grained sedimentary rocks	No concern at present

2.2.3 Environmentally Sensitive Areas

There are limited areas of Category B Environmentally Sensitive Areas (ESAs) consisting of remnant and regrowth endangered vegetation. Category C ESAs are more common consisting of 'of concern' vegetation and areas of essential habitat. No Category A ESAs are present within the tenure.

The Project will not construct infrastructure within or significantly disturb any ESAs.

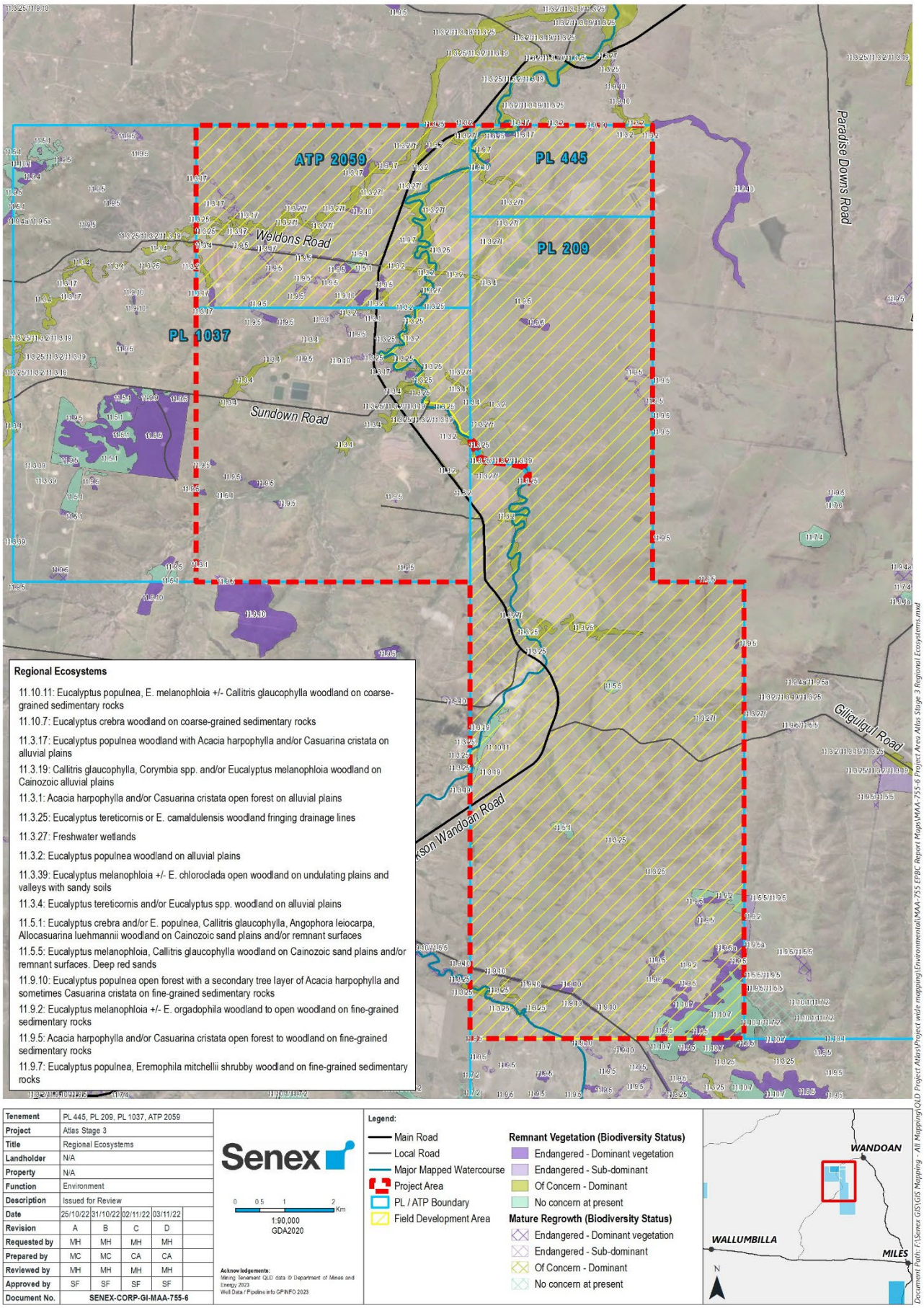

Figure 2 Regional Ecosystems (ground-truthed) for the Project

3 Rehabilitation Strategy

A distinction is made in the plan between transitional rehabilitation and final rehabilitation, and the two stages are outlined in the sections below.

Final rehabilitation requirements apply when assets are no longer required for ongoing petroleum activities and are not assets being transferred to the landholder. The transfer of infrastructure assets to landholders will be undertaken in compliance with the Department of Environment and Science Guideline for Petroleum Activities (ESR/2020/5403) before the surrender of the environmental authority or petroleum tenure.

Areas classified as ESAs are excluded from being transferred to landholders.

The timeframes on rehabilitation activities are as follows:

- Excavations (eg pipeline trenches) will be backfilled within 3 months of pipelaying/installation of infrastructure.
- Rights of Way will be reinstated within 6 months of pipelaying.
- Direct seeding will be undertaken if groundcover establishment via regeneration has not met 70% cover within 6 months.
- For areas being cropped by landholders, a cover crop will be sown within 3 months. These locations will be detailed in the CCA for the property.
- Disturbances no longer required for ongoing petroleum activities will be rehabilitated within 12 months.

3.1 Landholder Considerations

Prior to commencing rehabilitation activities, engagement and consultation will occur between all relevant parties (e.g. landholders) to seek agreement on rehabilitation objectives so that the final agreed land use and associated ecological values can be established.

Consistent with EA Conditions (refer (J3) in Table 1), Senex will enter into a written agreement such as a Conduct and Compensation Agreement (CCA), with the landholder detailing site specific rehabilitation requirements relevant to the area and its intended future use. The CCA will identify that the landholder has a preferred use of the land such that rehabilitation standards for revegetation outlined in the EA are no longer required (DES, 2016). Transfer of infrastructure from Senex to the land holder will be undertaken in accordance with the Guideline: Transferring petroleum infrastructure to landholders (DES, 2022).

Rehabilitation requirements and objectives subject to a CCA will be developed on a case-by-case basis, however, it is anticipated that each indicator and acceptance criteria relevant to safety, landforms, cover and soil stability will be compatible with those developed in this plan.

EA Condition J2 in Table 1 will be complied with, irrespective of whether the landholder wishes to utilise those areas already disturbed by CSG activities.

3.2 Transitional Rehabilitation Approach

Transitional rehabilitation (also known as reinstatement or partial rehabilitation) will be undertaken on disturbance associated with ongoing operational activities where part of the disturbed area is no longer required. Examples include where:

- The construction area of a well pad is reduced from approximately 0.6 ha to an operational area of approximately 0.36 ha (60 m x 60 m);
- The construction width required for an access track is reduced to a narrower operational width; and
- The pipeline has been installed and the RoW can be reinstated.

The aim of transitional rehabilitation is to stabilise disturbed land during the operational phase, thereby minimising potential impacts on surrounding environmental values (e.g. minimising erosion and potential for

weed establishment). Transitional rehabilitation will involve re-contouring the land surface (if required), replacing topsoil, and direct seeding groundcover species (pasture or native grasses depending on the final post-disturbance land use) and allowing natural recruitment of plant species with ongoing maintenance undertaken where corrective actions are identified during monitoring.

Significantly disturbed areas that are no longer required for the on-going operational phase petroleum activities, will be rehabilitated within 12 months.

Pipeline trenches will be backfilled and topsoils reinstated within three (3) months after pipe laying. Reinstatement and revegetation of the pipeline right of way will commence within six (6) months after cessation of petroleum activities for the purpose of pipeline construction.

3.2.1 Transitional Rehabilitation Acceptance Criteria

Significantly disturbed areas that are no longer required for the on-going petroleum activities to be rehabilitated within 12 months (unless an exceptional circumstance in the area to be rehabilitated (e.g. a flood event) prevents this timeframe being met) and be maintained to meet the following acceptance criteria (refer EA Condition J2 in Table 1):

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) topsoil 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.

3.3 Final Rehabilitation Approach

Final rehabilitation will be undertaken once the site is no longer required for exploration or operational activities (e.g. the well has been plugged and abandoned and the well pad is no longer required) and are not assets being retained by the landholder. Final rehabilitation will, where required, include;

- Remediating any contamination;
- Re-contouring the landform;
- Replacing subsoil and topsoil;
- Ripping; and
- Direct seeding pasture grass or native grass, or allowing natural recruitment of plant species.

For the purposes of this plan, assets being retained by the landholder are not subject to final rehabilitation.

3.3.1 Rehabilitation of MNES Habitat

The Project will avoid impacts to MNES habitat through the use of the Constraints Protocol in the development of the gas field with no impacts to remnant vegetation.

A Significant Species Management Plan has been developed that outline specific requirements for managing potential impacts to significant species during preconstruction, construction and operation phases of the Project. Rehabilitation activities will have regard to the MNES habitat values identified during the pre-

clearance surveys undertaken in accordance with the Constraints Protocol.

The aim of rehabilitation of koala dispersal habitat is to not fragment vegetated corridors or inhibit koalas' ability to move across the landscape. Measures to avoid the creation of barriers for koala movement include the burial of pipes during construction, prompt reinstatement of pipeline trenches, minimising windrowed vegetation and implementation of biosecurity measures and fire management where required to reduce excessive vegetation thickening. The rehabilitation methods as described in Section 4 through all Project phases will ensure appropriate and effective reinstatement and land management of dispersal habitat. The effectiveness of final rehabilitation is assessed as described in Section 7.2.3.

3.3.2 Final Rehabilitation Acceptance Criteria

Significantly disturbed areas to 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 (refer EA Condition J3 in Table 1):

- Greater than or equal to 70% of native ground cover species richness; and
- Greater than or equal to the total percent of ground cover; and
- Less than or equal to the percent species richness of declared plant pest species.

To determine the individual site-specific rehabilitation requirements to satisfy this condition (i.e. to determine the species to be established, the required species diversity, the required abundance and composition and the required ground cover), and achieve the nominated post-disturbance land use, adjacent areas or the area to be disturbed will be assessed to obtain data used to develop final acceptance criteria for rehabilitation.

This will be obtained by utilising the pre-disturbance ecological assessment results for each project site. Comparative ecological assessments will be conducted in adjacent vegetation as the site is re-establishing and considered near final completion criteria.

Areas to be rehabilitated will be compared with a reference site that occurs as close as possible to the area to be assessed and has similar environmental conditions, that is, the same vegetation, similar landscape conditions (soil, slope, position in the landscape, geology etc.) and similar natural disturbance (such as fire history).

3.4 Site Relinquishment

The progress of the rehabilitation over time will be monitored and assessed against the final acceptance criteria to determine whether the rehabilitation is progressing toward achieving, or has achieved, the post-disturbance land use (refer Section 7). When monitoring indicates that the rehabilitation has achieved the final acceptance criteria and the site meets the rehabilitation objectives above, a rehabilitation report that meets DES requirements will be prepared and submitted to DES. The site can then be relinquished. The **CCAs** can also cease between Senex and the landholder, if no further access to the land is required. This plan does not consider the rehabilitation of transferred assets but does ensure the asset is safe, stable and non-polluting.

4 Rehabilitation Methods

Generally, rehabilitation methods will be undertaken sequentially as outlined in this section. In some instances, site-specific variation to these methods may be necessary depending on the site requirements as detailed further in this Plan. The rehabilitation techniques are standard industry practice for the Western Downs/Maranoa region and are applied in existing gas field operations with reliable success for land use outcomes. Senex has undertaken rehabilitation works on exploration wells that have been plugged and abandoned, rehabilitated using the methodologies for well pads and completed final rehabilitation reporting through the EP Act including landholder agreement closure. Based on these experiences, Senex applies the following rehabilitation methods for all disturbances.

4.1 Vegetation Clearing and Mulching

Vegetation cleared for development may be mulched or left intact to use in rehabilitation and/or sediment and erosion control works. The use of mulch or green waste for rehabilitation works can assist in soil moisture retention, create micro-habitats for seed germination, provide seed stock for rehabilitating areas and provide fauna habitat.

Where identified habitat features (e.g. tree hollows, hollow logs, woody debris, clumps of leaf litter around woody debris) cannot be avoided and it is practical to do so, the habitat feature will be relocated outside the disturbance footprint using standard techniques.

4.2 Soil Management

4.2.1 Topsoil and Subsoil Stripping

Prior to commencing soil stripping it is necessary to identify how the topsoil will be reinstated during rehabilitation, and to plan accordingly, to maximise direct re-spreading and to minimise the length of time that soil is stockpiled. Handling and storage methods will aim to minimise chemical and physical deterioration of the topsoil to maintain its viability.

Construction of some infrastructure will require excavating the subsoil, or it will be exposed when topsoil is stripped. As described above, depending on the soil type, subsoil can be sodic and dispersive and will be excavated and managed to:

- Prevent mixing and potential contamination of topsoil;
- Prevent degradation of the subsoil structure;
- Ensure reinstatement in the correct location and in the correct order; and
- Ensure effective management of unused subsoil.

4.2.2 Stockpiling

The primary objectives of topsoil and subsoil stockpiling are to:

- Minimise damage to, and maintain fertility of, stockpiled material;
- Ensure soil is stockpiled in a manner that will preserve its biological and chemical properties for use in rehabilitation activities; and
- Ensure stockpiles have minimal impact on surrounding environmental values.

Topsoil will be stockpiled separately from other site reinstatement material and stabilised to minimise erosion. Topsoil and subsoil stockpiles will be separated by an adequate distance to ensure they are not mixed during construction or rehabilitation works. This is because subsoil can be highly saline, sodic and dispersive.

4.2.3 Backfilling

Backfilling of trenches and other areas generally involves the following, although site-specific requirements may apply depending on soil type:

- Pipeline trenches will be backfilled within three months of pipe laying (refer Table 1);
- During backfilling of pipeline trenches, soil will be replaced so that topsoil does not mix with subsoils;
- Subsoil will not be contaminated with general rubbish or any foreign material that may damage the pipe during backfill; and
- Pipeline backfill, and compaction of the fill will be controlled to minimise subsidence and the need for excessive temporary soil mounding.

4.2.4 Reinstating Landform

Re-contouring disturbed areas will reinstate surface drainage lines, and to create a stable, non-polluting landform consistent with the surrounding landform. This will ensure water flowing over the surface is comparable with the surrounding landscape and minimises the risk of erosion. It also ensures that the final landform is consistent with the surrounding land features. Infrastructure siting and field planning will aim to reduce the need for significant cut and fill to minimise the need for re-contouring. Surface re-contouring will be completed prior to re-spreading of topsoil.

4.2.5 Tilling and Scarification

Prior to the re-spreading of topsoil, the ground surface may need to be tilled. Tilling assists with binding of the soil layers, increases retention time of water on the slope, aids water infiltration into the soil increasing the opportunity of seed germination success, and reduces the volume and velocity of runoff generated from the slope. Requirements for tilling depend on the degree of compaction of the ground surface.

4.2.6 Soil Amelioration

The need for soil amelioration will depend on soil type and associated chemical and physical properties, and the length of time soil has been stockpiled (or if in-situ, the time it has been exposed and previous treatments). This will be determined on a case-by-case basis.

4.2.7 Topsoil Re-spreading

Topsoil will be replaced on disturbed areas and site-specific requirements, including depth of spreading will be determined by the Site Supervisor in consideration of on-site conditions.

4.3 Erosion and Sediment Control

Erosion can have an adverse effect on soil structure and fertility, which can impact the success of revegetation. Sodic soils pose an elevated risk of erosion due to their dispersive nature. Sodic soils are to be ameliorated or covered by ≥10 cm of non-sodic topsoil during rehabilitation.

Erosion and sediment control (ESC) will be implemented during the construction phase in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008.

4.4 Revegetation Methods

4.4.1 Natural Recruitment

Natural regeneration is one of the key methods used to re-establish vegetation. It will be achieved by re-spreading the stockpiled topsoil across the site, and recruitment of seedlings from in-situ sources and from wind borne seed from adjacent areas. Natural regeneration may be supplemented with direct seeding.

Trees, shrubs and grasses will be allowed to regenerate naturally where:

- Soil is not disturbed and root stock is left in the ground to facilitate rapid regrowth and soil stabilisation (e.g. seismic surveys); and
- Cleared areas are not required to be kept tree free for the purpose of operating and maintenance.

4.4.2 Direct Seeding

Where sites are no-longer required for operational activities and natural recruitment is not considered viable, direct seeding of grass cover species (native/introduced species) will be undertaken after the topsoil has been re-spread but before spreading any mulch. Timeframes for seeding will consider the most appropriate season for germination and establishment of seedlings (i.e. immediately before the commencement of the wet season).

4.5 Weed, Pest and Livestock Management

Weed and pest management is governed by the Queensland Operations Biosecurity Management Plan (SENEX-QLDS-EN-PLN-001) and associated procedures. In relation to rehabilitation, controlling Senex Priority Weeds is required during transition and final rehabilitation development.

Pest control on establishing rehabilitated areas may also be required to minimise grazing, trampling and uprooting of vegetation (e.g. by rabbits and pigs) occurring.

Where livestock are able to access areas undergoing rehabilitation, temporary stock fencing will be erected where required to ensure cattle/pigs etc. cannot damage revegetation / rehabilitation activities (refer to Section 7).

4.6 Maintenance and Rework

Following rehabilitation works, limited access to infrastructure will be allowed to perform essential maintenance requirements. Traffic will be restricted on the rehabilitation areas to enable successful establishment of groundcover. Depending on results of rehabilitation monitoring (refer Section 7) or other observations, maintenance and rework activities may be required to ensure:

- Landforms remain stable;
- Erosion control measures remain effective and stormwater runoff and seepage from rehabilitated areas does not impact on nearby watercourses;
- Senex Priority Weed species are managed on rehabilitated areas; and
- Vegetation is establishing to reflect relevant reference sites or baseline site data.

Corrective actions in response to rehabilitation monitoring are identified in Section 7.2.

5 Revegetation

5.1 Transitional Rehabilitation Revegetation

Where transitional works are to be undertaken prior to final rehabilitation, disturbed areas may be direct seeded with either pasture species or native grasses, depending on the desired post-disturbance land use and any requirements for the area to remain free of woody vegetation during operations.

Natural recruitment of seed to a site and reliance on topsoil seed reserves will also be considered in certain circumstances.

5.2 Final Rehabilitation Revegetation

5.2.1 Cropping Land

On areas where the landholder will be sowing a crop, a cover crop will be sown to protect the soil, where the soil will be exposed for 3 months or more, prior to cropping.

5.2.2 Pasture Grassland

Pasture establishment during final rehabilitation may involve direct seeding. Species selection will be made in consultation with landholders. Alternatively, natural regeneration may be used where existing site conditions are conducive to effective regeneration (i.e., existing seed bank, good quality topsoil).

6 Rehabilitation by Disturbance Type

Project disturbances occur in three distinct stages: construction, operation and final rehabilitation. Regardless of the stage, all works aim to achieve a safe, stable, and non-polluting landform. All new disturbance works are undertaken in accordance with the Constraints Protocol and are stored within GIS spatial data.

Reinstatement and rehabilitation methods for infrastructure types are detailed within relevant reinstatement and rehabilitation procedures. The following table outlines the key rehabilitation requirements for the primary types of infrastructure present within the project area.

Table 3 Typical rehabilitation methods

Infrastructure Type	Rehabilitation Technique
Well pads (production wells, exploration/appraisal wells, and monitoring bores)	▪ Partial reinstatement following the completion of drilling to reduce well pad area to approximately 0.36 ha. ▪ Stabilise batters, if a cut and fill lease, including profiling to reduce batter slope where required. Most surface drainage lines occur with areas of greater slope so extra measures are required for erosion control and soil stabilisation. ▪ Respread topsoil (will be a minimum depth of 100 mm, if material available). Do not compact topsoil. ▪ Surface roughness is encouraged when respreading topsoil in order to trap water and seeds. ▪ Lightly tyne (scarify) topsoil, but no do mix with subsoil. ▪ Revegetate with native or pasture grasses (pasture grasses create cover to allow native species to colonise the area and impedes weed growth.) ▪ For plug and abandoned wells, final rehabilitation including reprofiling cut and fill batters, and enabling the site to return to pre-existing conditions. ▪ Restrict vehicles from driving on rehabilitated areas. ▪ Manage weeds. ▪ Temporary ESC's will be removed from site only once sufficient rehabilitation has been established to ensure site stability.
Gathering lines (gas and water)	▪ Backfill trenches with subsoil. Do not mix with topsoil. ▪ Re-profile natural contours and drainage lines to their original profile. ▪ Rip subsoil and compacted areas. ▪ Install whoa-boys along slopes, as per Senex Erosion and Sediment Control Plan (ESCP). ▪ Restoration of watercourses by installing, as required, jute matting on the banks, contour berms on the high bank, rock lining the creek base to minimise scour, and limiting the use of fertilisers. ▪ Seeding will be utilised where rapid restoration is required (e.g. watercourse crossings and potential high erosion areas). ▪ Respread topsoil (will be a minimum depth of 100 mm). Do not compact topsoil. ▪ Surface roughness is encouraged when respreading topsoil in order to trap water and seeds. ▪ Lightly tyne topsoil, but no do mix with subsoil. ▪ Respread mulch or felled vegetation across the RoW for stability and fauna habitat. ▪ Allow for natural regeneration. Seed areas, if natural regeneration (>70 % groundcover) has not occurred within 6 months. ▪ Restrict vehicle access from driving on rehabilitated areas. ▪ Temporary ESC's will be removed from site only once sufficient rehabilitation has been established to ensure site stability.

Infrastructure Type	Rehabilitation Technique
	▪ Manage weeds to remove existing and prevent spread of any new plants.
Dams Embankments	▪ Permanently stabilise dam batters. Stabilisation approach to be used by contractors must be approved by Senex ahead of works commencing. This will include but not be limited to: o Respread topsoil to a minimum depth of 100 mm, where available. o Install permanent ESC's to shed runoff from the altered surface. o Temporary ESC's will be removed from site only once sufficient rehabilitation has been established to ensure site stability.
Regulated Structures (Dams)	▪ A regulated structure will be subject to EA conditions for its final rehabilitation or handover. ▪ Where it is proposed to be left in-situ for a use by the landholder it must: o no longer contain contaminants that will migrate into the environment; and o contain water of a quality that is demonstrated to be suitable for its intended use(s); and o the holder of the environmental authority and the landholder agree in writing that the; ▪ dam will be used by the landholder following the cessation of the environmentally relevant activity(ies); and ▪ landholder is responsible for the dam, on and from an agreed date. ▪ Alternatively the site of the regulated structure must be rehabilitated to achieve a safe, stable, non-polluting landform and grazing land use, which would require: o Removal of contaminants (salt slurry). o Removal of liner to a waste facility licensed to receive such material. o Removal of seepage collection system components. o Assessment of contamination of underlying soils as per the current National Environment Protection (Site Assessment) Measure and remediate soils or remove for disposal off site at a suitably licensed facility. o Reshaping of embankments to match surrounding topography. o Respreading of topsoil. o Direct seeding with landholders preferred pasture seed type. o Restrict vehicle access from driving on rehabilitated areas. o Temporary ESC's will be removed from site only once sufficient rehabilitation has been established to ensure site stability. o Manage weeds to remove existing and prevent spread of any new plants.
Low Consequence Dams	▪ The dam will be decommissioned to no longer accept inflow from the petroleum activities and the contained water must be of a quality suitable for the intended on-going uses by the landholder.
Access Tracks	▪ Where retained, grade wheel ruts to prevent erosion on access track. ▪ Maintain ESC's as per Senex ESCP (whoa-boys, table drains, etc.) ▪ Temporary access tracks not required for either operations or retained by the landholder are to be rehabilitated by ripping to remove compaction, re-spreading stockpiled topsoil. ▪ Allow for natural regeneration. Seed areas, if natural regeneration (>70 % groundcover) has not occurred within 6 months. ▪ Manage weeds.

Infrastructure Type	Rehabilitation Technique
Non-operational areas (excess construction site area not required for ongoing operations)	▪ Undertake reinstatement of areas not required to remain open during operations. ▪ Re-profile natural contours and drainage lines to their original profile. ▪ Rip subsoil and compacted areas. ▪ Respread topsoil (will be a minimum depth of 100 mm). Do not compact topsoil. ▪ Surface roughness is encouraged when respreading topsoil in order to trap water and seeds. ▪ Lightly tyne (scarify) topsoil, but no do mix with subsoil. ▪ Revegetation with native grasses / pasture grasses and ground cover species (cropping or grazing). ▪ Manage weeds. ▪ Temporary ESC's will be removed from site once sufficient rehabilitation has been established to ensure site stability.

7 Rehabilitation Monitoring

Rehabilitation monitoring is undertaken to address site specific requirements and inform subsequent monitoring frequency and methods for the following key project stages:

- Practical Completion[1];
- Transitional Rehabilitation; and
- Final Rehabilitation.

Rehabilitation progress will be monitored with an aim to:

- Identify any required corrective actions or intervention;
- Measure progress toward transitional and/or final rehabilitation success; and
- Identify rehabilitation acceptance.

A rehabilitation register / disturbance tracker will be maintained in GIS.

During the Project, a risk-based inspection program is implemented to ensure installed ESC is functioning and disturbed areas are stabilising through vegetation growth.

Monitoring will assess a range of performance indicators to ensure that rehabilitation is approaching rehabilitation acceptance criteria as stipulated in the relevant EA and stage of works (i.e., transitional or final).

Maintenance and corrective actions will be implemented where monitoring identifies that there are issues with the performance indicators and rehabilitation acceptance criteria are not being met.

7.1 Risk Based Monitoring

Risk based monitoring will be undertaken for the rehabilitation works. Low, medium and high risk areas will be identified based on site conditions. A description of the risk categories is described in the sections below.

Risk category	Monitoring frequency
High risk areas	Annually
Medium risk areas	Annually or longer depending on weather
Low risk areas	Based on previous monitoring data

7.1.1 High Risk Areas

High risk areas are classified as areas requiring rework or corrective actions to meet the transitional rehabilitation criteria. High risk areas may require a combination of reprofiling, stabilisation works and/or reseeding/revegetation works. An area that is deemed high risk will require a review of the rehabilitation based on the final land use requirements.

7.1.2 Medium Risk Areas

Medium risk areas meet the transitional rehabilitation criteria but require time and potentially intervention to meet the final rehabilitation criteria.

7.1.3 Low Risk Areas

Low risk areas are rehabilitated areas that meet the transitional rehabilitation criteria and are projected to meet the final rehabilitation criteria without any active intervention.

[1] Practical completion refers to when construction works are finished.

7.2 Corrective Actions by Key Project Stage

7.2.1 Practical Completion - Completion of Construction

Rehabilitation land use	Criteria	Performance indicators	Corrective actions
All	• No contamination • No erosion /subsidence present • Landform is stable • Contours consistent with surrounding landform • ESCP cover stabilisation targets met	The Environmental Inspection Checklist completed	Identify any corrective actions during the defects liability period (or similar)

7.2.2 Transitional Rehabilitation

Rehabilitation land use	Criteria	Performance indicators	Corrective actions
All	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) topsoil 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	Review the general conditions of the site for a 10 m x 10 m area making note of the landform, vegetative cover, stability and any signs of external impacts. • No contamination • No erosion /subsidence present • Landform is stable • Contours consistent with surrounding landform • No topsoil stockpiles • Ground cover established • No windrowed vegetation more than 50 m long • No excavations open greater than 3 months	As required: • Remediate contamination • Rework site and reseed • Limited temporary fence until stable/meets performance indicators • Soil amelioration

Rehabilitation land use	Criteria	Performance indicators	Corrective actions
	stabilisation is implemented and maintained. f) No significant barriers to koala movement through the landscape		

7.2.3 Final Rehabilitation

The effectiveness of the proposed mitigation measures will be assessed against the criteria specified in the following table.

Rehabilitation land use	Criteria	Performance indicators	Corrective actions
Pasture grassland	• Greater than or equal to total percent groundcover of adjacent vegetation or pre-disturbance assessment • Greater than or equal 70 % native groundcover species richness compared to adjacent vegetation/ pre-disturbance assessment • Declared weed species less than or equal to the percent species richness of adjacent area/ pre disturbance assessment.	Comparison with analogue site in the adjacent vegetation or pre-disturbance assessment using: • 1 m x 1 m quadrats and the BioCondition Assessment Methodology (Eyre et al 2015) for % groundcover	If site is not progressing or likely not to reach acceptance criteria. Assess if it is a result of soil conditions and/or livestock grazing and/or fire management and/or pest animal damage and/or weed infestation, the following will be undertaken: • A review and evaluation of monitoring results from previous site assessments to confirm attributable issue; • Additional targeted surveys to identify the magnitude of the attributable issue; • Review of current attributable management measures; and • If required, amendment of attributable management measure to ensure consistency with completion criteria. Actions may include supplementary soil amendment / amelioration and reseeding, control of weeds / pests or stock fencing.

8 Data Management and Reporting

Information on site rehabilitation activities carried out on the project area will be recorded upon completion of transition or final rehabilitation works.

Monitoring data recorded by Senex staff or external consultants will be stored within GIS spatial data. Monitoring data will be analysed to evaluate rehabilitation progress over time.

All documents including rehabilitation monitoring reports will be kept for a minimum of five years and will be made available to approval agencies upon request, as required by approval conditions.

9 Responsibility

The Senex Environment Team will provide direction and instruction for all staff and contractors undertaking rehabilitation works, to ensure they are familiar with the content of this Plan and the rehabilitation program.

The Senex Environment Team are responsible for undertaking on-site checks to ensure the procedures in this Plan are followed. Senex Site Supervisors are responsible for implementing any corrective actions identified through assurance activities.

10 References

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