

Surat Gas Project – Petroleum Pipeline License (PPL) 2048 (McNulty)

Significant Residual Impacts to Prescribed Environmental Matters
EA0002214

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Please see document administration section for more information

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1. Introduction

Arrow Energy Pty Ltd (Arrow) is planning to construct the 'McNulty' pipelines (PPL 2048), hereafter the Project, as a component of our Surat Gas Project (SGP). This part of the SGP (McNulty PPL) comprises coal seam gas and water pipelines, and associated infrastructure, required to transfer coal seam gas and produced water. The key details for the current report are outlined in Table 1.

Table 1. Project details

	Key project details
Project Name	'McNulty' Pipeline
Petroleum Pipeline Licence	PPL 2048
Environmental Authority	EA0002214 (anticipated EA amendment approval date, 22 April 2024)
Appropriately Qualified Person and Contact	Dr Paul Finn, Principal Ecologist paul.finn@arrowenergy.com.au

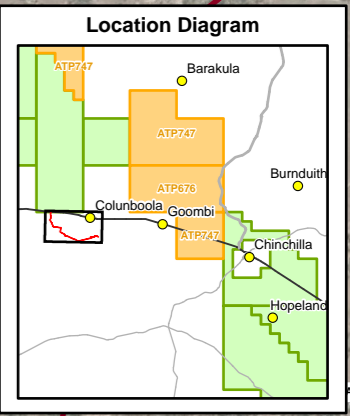
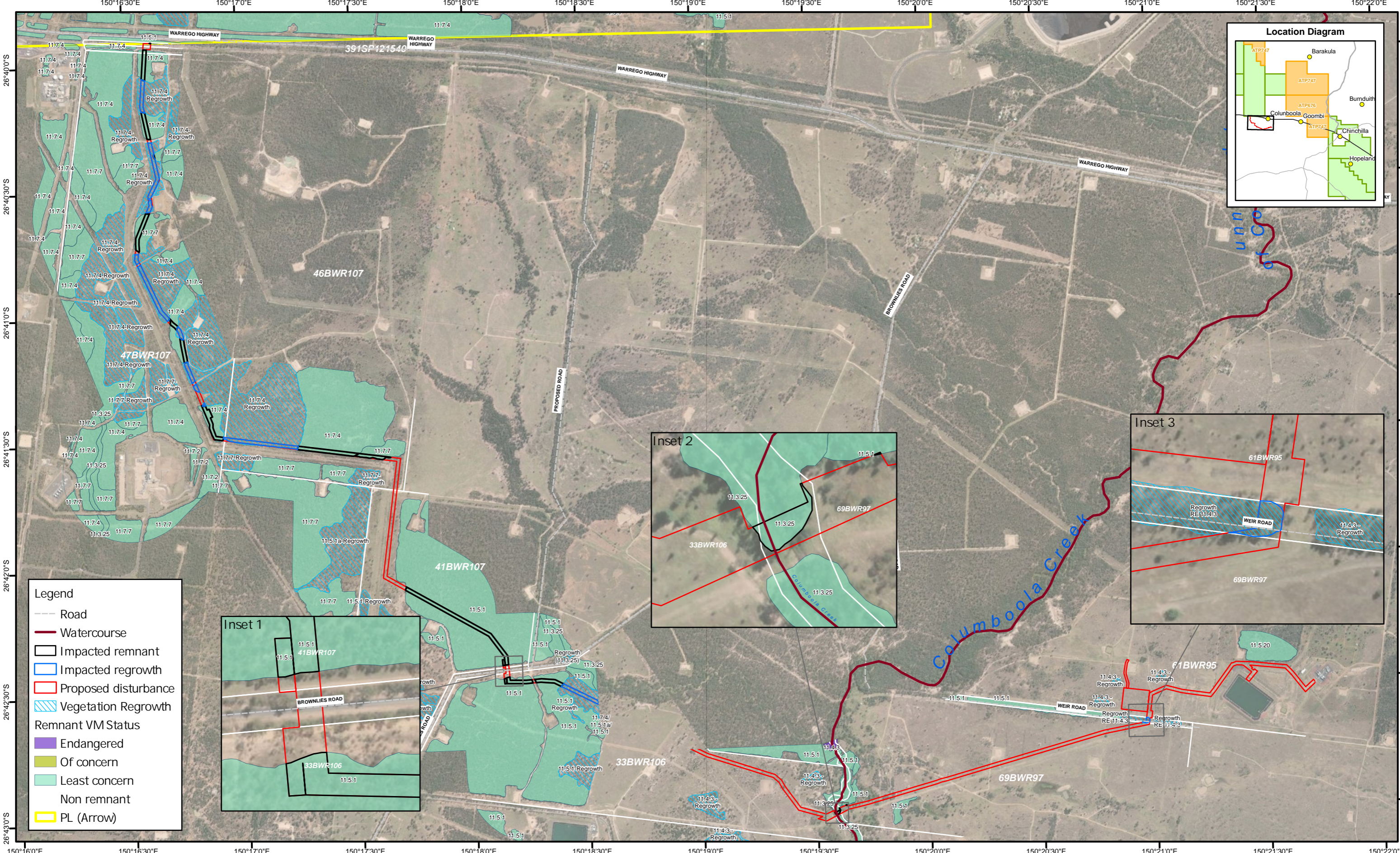
The relevant Environmental Authority (EA) for the Project is the McNulty EA0002214 (anticipated EA amendment approval date, 22 April 2024). This report addresses relevant EA conditions for the above-mentioned project, specifically 'Variation 13', by providing a significant residual impact (SRI) assessment on Prescribed Environmental Matters (PEMs) to determine the Project's environmental offset requirements under the *Environmental Offsets Act 2014* (EO Act).

The Project is located on Petroleum Pipeline Licence (PPLL) 2048 in the Surat Basin, approximately 108 km north-west of Dalby, in the Southern Brigalow Belt Bioregion. The Project has a total disturbance footprint of approximately 38 ha, and is predominantly located in pre-disturbed, non-remnant vegetation. The total area of remnant and regrowth vegetation to be cleared is approximately 15 ha (Table 2).

Table 2. Ground-verified vegetation communities and cleared areas impacted by the Project

Vegetation Community	Area (ha)
Remnant 11.3.25	0.079
Remnant 11.5.1	3.562
Remnant 11.7.4	3.619
Remnant 11.7.7	1.221
Regrowth 11.4.3	0.099
Regrowth 11.5.1	0.727
Regrowth 11.7.4	5.194
Cleared land (not remnant or regrowth)	23.199
Total Disturbance	37.699

The location of the Project is shown in Figure 1.

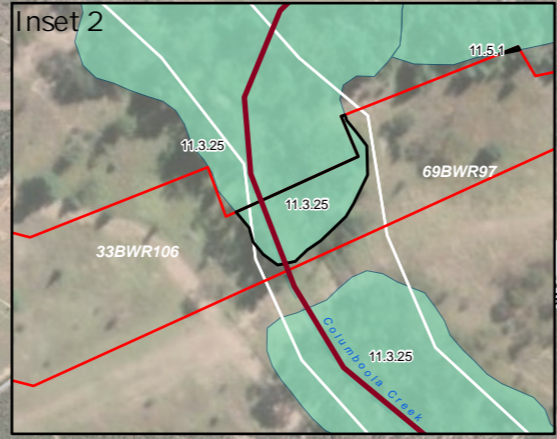
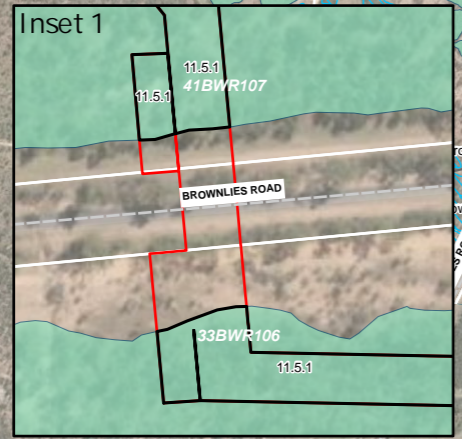


Legend

- Road
- Watercourse
- ▭ Impacted remnant
- ▭ Impacted regrowth
- ▭ Proposed disturbance
- ▨ Vegetation Regrowth

Remnant VM Status

- Endangered
- Of concern
- Least concern
- Non remnant
- PL (Arrow)



Rev	Date	Revision Description	By	App'd
D	26/10/23	Update RE extents	AW	XX
C	19/10/23	Add RE values	TS	XX
B	22/09/23	Revise route	TS	XX
A	31/08/23	First issue	TS	XX

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Author: avolhuter

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Coordinate System: GDA2020MGA Zone 56

Figure 1
McNulty
location along with that
of ground-verified remnant
and regrowth vegetation

Uncontrolled (D)

1.1 Purpose

There are several requirements of EA0002214 relating to managing environmental offsets for the proposed activities to be undertaken. This report has been prepared to address the EA Condition Variation 13:

Prior to the commencement of any impacts to a prescribed environmental matter for which an environmental offset is required by condition (Variation 12), a report completed by an suitably qualified person that contains an analysis of the estimated maximum extent of impact to each prescribed environmental matter must be provided to the administering authority.

1.2 Surat Gas Project development

The proposed pipeline will include the construction and operation of one produced gas and one produced water pipeline, access tracks, Inlet Processing Facility (IPF) and incidental activities required to transfer produced gas and water in support of Arrow's Surat Gas Project (SGP) in the vicinity of the McNulty Field Compression Station (FCS) and pond.

Generally, the pipelines will be installed by conventional trenching with a trenching machine. Where the pipelines are required to be installed below existing roads, infrastructure or major waterways, other trenchless technologies such as thrust bore or horizontal directional drilling (HDD) may be used.

No impacts beyond those included in the PPL 2048 EA PEMs table will be included (unless authorised via our existing *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval).

1.3 Surat Gas Project EPBC Act Approval

The areas of the SGP that are located on Arrow off-tenure PPL tenements, of which the Project is a part, is approved under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) approval (EPBC 2018/8223). As an approval condition, the SGP off-tenure pipelines Offset Area Management Plan (EPBC Act Offset Area Management Plan – SGP PPLs) was prepared by Arrow to address the offset requirements and delivery plan for the off-tenure pipelines the SGP. The EPBC Act Offset Area Management Plan – SGP PPLs was approved by The Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 24 March 2021. This EPBC Act approval for the off-tenure pipelines incorporates impacts from infrastructure located on PPL 2048 and as such addresses the offsets from any impacts to relevant Matters of National Environmental Significance (MNES) on this tenement.

1.3.1 MNES and MSES where they are substantially the same matter

On many occasions, remnant and high-value regrowth vegetation listed as PEMs or Matters of State Environmental Significance (MSES) are the same or substantially the same matter as a MNES either as a threatened ecological community or habitat for a threatened species. In these situations, the Federal approval takes precedent and therefore offsets provided for MNES also satisfies the requirement for State offsets.

The EO Act contains a number of provisions that prevent two or more administering agencies from imposing duplicate offset conditions. Duplicate offset conditions are conditions that relate to the same or substantially the same impact and the same or substantially the same prescribed environmental matter (PEM). Table 4 notes where there is overlap between MSES and MNES, and in the latter case the associated offsets will be dealt with under the EPBC Act Stage 1 Offset Strategy.

Some MSES species habitat identified in the Project (Table 3), overlaps with matters assessed and approved under the EPBC Act Offset Area Management Plan – SGP PPLs (OAMP). DCCEEW assessed and approved this OAMP to address conditions 3 to 7 of the approval. Condition 3 required the proponent not to commence the action until an OAMP addressing offset obligations for the development has been approved by the Minister. The OAMP was approved on 24 March 2021, enabling the development to commence. As such, where PEMs overlap with matters offset under the OAMP, they will be offset via the EPBC Act approval and offset.

2. Methods

2.1 Identifying Prescribed Environmental Matters (PEMs)

The Project's disturbance footprint (Figure 1) has been used to identify areas that may have a SRI on PEMs as defined in the EO Act. The presence/absence of each matter was determined in accordance with the 'Method for mapping Matters of State environmental significance For the State Planning Policy 2017' (DES, 2020).

Detailed and seasonal ecological assessments (Ecosmart Ecology and 3D Environmental, 2017, 2018, 2019 and 2021) were undertaken for the SGP area (covering on-tenure PLs and off-tenure PPLs) which provided ground-verified data on PEMs that are regulated vegetation including essential habitat, protected wildlife habitat, connectivity areas, wetlands and watercourses. These assessments included:

- detailed, seasonal terrestrial ecological surveys across the full range of habitats occurring within the SGP on- and off-tenure areas.
- validating and refining regional ecosystem (RE) mapping for the project, including wetlands of high ecological significance.
- refining mapping for 'core habitat known' and 'core habitat possible' for all relevant species identified under the EPBC Act and *Nature Conservation Act 1992* (NC Act).

This ground-verified data was used to cross-check government supplied mapping data on PEMs that are regulated vegetation including essential habitat, protected wildlife habitat, connectivity areas, wetlands and watercourses. Government supplied mapping data was relied upon to identify the following PEMs:

- Wetlands and watercourses
- Designated precincts in strategic environmental areas.
- Protected areas.
- Highly protected zones of State marine parks.
- Fish habitat areas.
- Waterway providing for fish passage.

- Marine plants.
- Legally secured offset areas.

Additionally, the government's Landscape Fragmentation and Connectivity (LFC) Tool was used to assess potential impacts on connectivity areas using ground-verified data.

Conclusions drawn on the presence/absence of PEMs are provided in Section 3.1 (Table 3), which covers all PEMs listed in the PPL 2048 EA and whether or not they were identified within impact areas. Further detailed assessment is provided in Sections 3.2.1 to 3.2.4 for those PEMs that were identified from mapping sources and potentially impacted by the Project. No additional PEMs are applicable and therefore need to be assessed, other than those presented in Section 3.2.

2.2 Significant residual impact (SRI) assessment

The following documents have been used to assess whether the Project will have a SRI on any PEMs:

- *Environmental Offset Act 2014* (EO Act).
- *Environmental Offset Regulation 2014* (EO Regulation).
- Queensland Environmental Offsets Policy (Version 1.13) (DES, 2022).
- Queensland Environmental Offsets Policy Significant Residual Impact Guideline (DEHP, 2014).
- Method for mapping Matters of State environmental significance (DES, 2020).

3. Results

3.1 Assessment of PEMs for Potential SRI

As per Variation 13, Table 3 includes an analysis and estimated significant residual impact against all of the PEMs listed in the PPL 2048 EA. It identifies four (4) PEMs that warrant further assessment to establish the presence or absence of a significant residual impact. These being:

- 1) Regulated vegetation, regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map.
- 2) Protected wildlife habitat, habitat for animals that are Endangered or Vulnerable wildlife.
- 3) Protected wildlife habitat, habitat for animals that are Special Least Concern wildlife.
- 4) Waterway providing for fish passage, fish passage (not in an urban area).

Table 3. Analysis of all Prescribed Environmental Matters (PEMs) and whether or not they have the potential for a Significant Residual Impact (SRI)

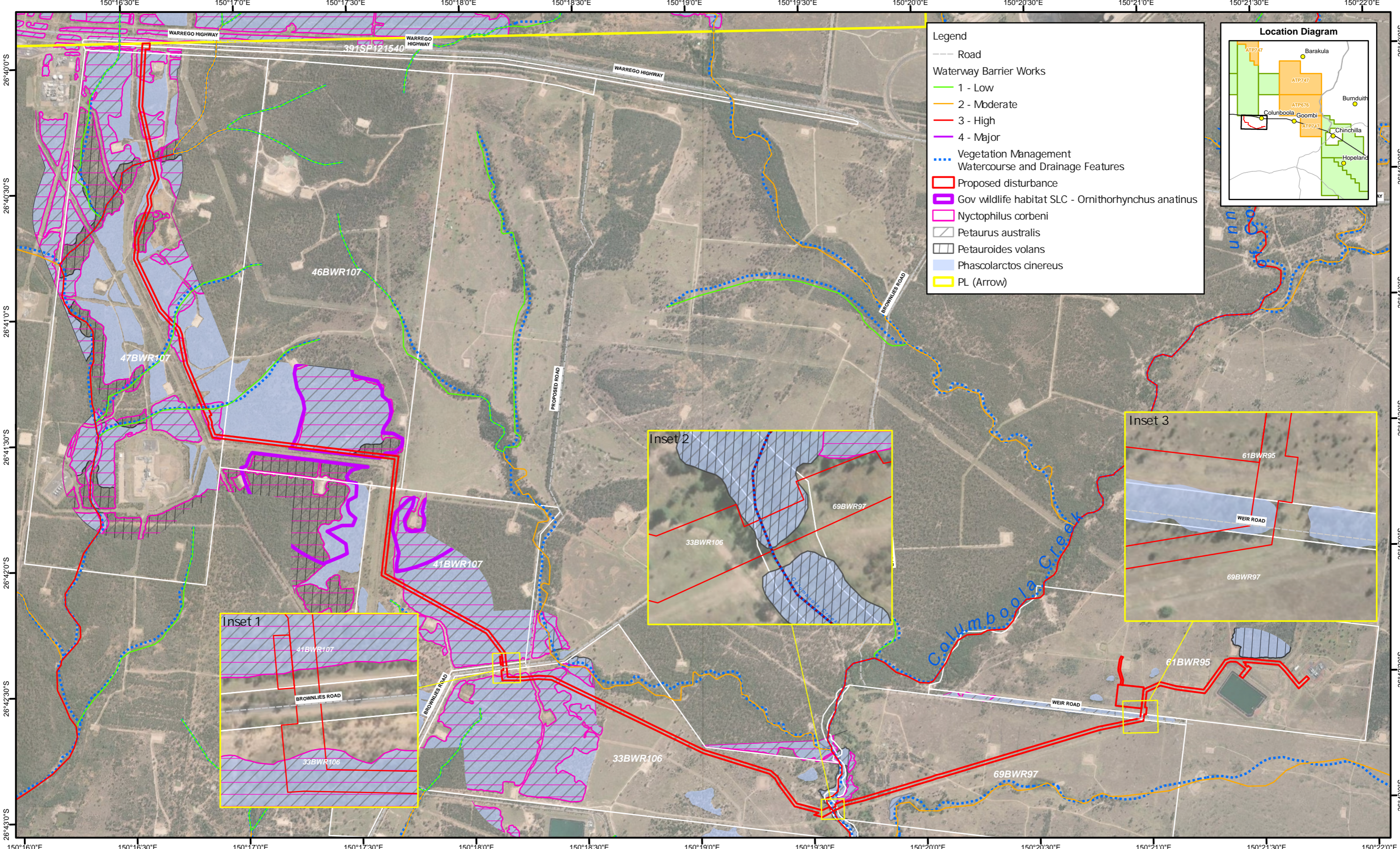
Item	PEM	Potential for SRI	Comments
1	Regulated vegetation – Endangered regional ecosystems.	No	Not located within the disturbance footprint of the current project.
2	Regulated vegetation – Of concern regional ecosystems.	No	Not located within the disturbance footprint of the current project.
3	Regulated vegetation – Regional ecosystems (not within an urban area) that intersect a wetland on the vegetation management wetlands map.	No	Not located within the disturbance footprint of the current project.
4	Regulated vegetation – Regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map.	Yes	<p>Includes a total of 0.405 ha of ground-verified remnant vegetation across the following REs:</p> <ul style="list-style-type: none"> • 0.079 ha of RE 11.3.25. • 0.313 ha of RE 11.7.4. • 0.013 ha of RE 11.7.7. <p>This vegetation is associated with Columboola Creek and several other unnamed tributaries with stream orders of 1 and 3.</p> <p>Refer to Section 3.2.1 for the SRI assessment of this PEM.</p> <p>All vegetation polygons are co-located with protected wildlife habitat (Table 4, Figure 2).</p>
5	Regulated vegetation – Essential habitat (not in an urban area) for critically endangered, endangered or vulnerable wildlife.	No	Not located within the disturbance footprint of the current project.
6	Connectivity Areas – Connectivity area that is a regional ecosystem (not in urban area)	No	Not located within the disturbance footprint of the current project.
7	Wetlands and watercourses – A	No	Not located within the disturbance footprint of the current project.

Item	PEM	Potential for SRI	Comments
	wetland in a wetland protection area		
8	Wetlands and watercourses – A wetland of high ecological significance shown on the map of Queensland wetland environmental values	No	Not located within the disturbance footprint of the current project.
9	Wetlands and watercourses – A wetland or watercourse in high ecological value waters	No	Not located within the disturbance footprint of the current project.
10	Designated precinct in a strategic environmental area	No	Not located within the disturbance footprint of the current project.
11	Protected wildlife habitat – An area that is shown as a high risk area on the flora survey trigger map and that contains plants that are critically endangered, endangered or vulnerable.	No	Not located within the disturbance footprint of the current project.
12	Protected wildlife habitat – An area that is not shown as a high risk area on the flora survey trigger map, to the extent the area contains plants that are critically endangered, endangered or vulnerable.	No	Not located within the disturbance footprint of the current project.
13	Protected wildlife habitat – A koala habitat area as determined by the chief executive on the koala conservation plan map.	No	Not located within the disturbance footprint of the current project.
14	Protected wildlife habitat – Habitat for an animal	Yes	A total of 37.699 ha will be disturbed with 14.500 ha of ground-verified remnant and regrowth

Item	PEM	Potential for SRI	Comments
	<p>that is critically endangered, endangered or vulnerable.</p>		<p>vegetation to be cleared representing core habitat for one or more of the 12 species listed below (species listed under the NC Act only are bolded):</p> <ul style="list-style-type: none"> • 13.280 ha for the Koala¹, <i>Phascolarctos cinereus</i> (Endangered under both the NC Act and EPBC Act)¹. • 8.480 ha for the Greater Glider¹, <i>Petauroides volans</i> (Endangered under both the NC Act and EPBC Act). • 8.480 ha for the Yellow-bellied Glider, <i>Petaurus australis</i> (Vulnerable under both the NC Act and EPBC Act). • 8.402 ha for the South-eastern Long-eared Bat¹, <i>Nyctophilus corbeni</i> (Vulnerable under both the NC Act and EPBC Act). • 8.480 for the Diamond Firetail, <i>Stagonopleura guttata</i> (Vulnerable under both the NC Act and EPBC Act). • 8.912 ha for the South-eastern Glossy Black-cockatoo, <i>Calyptorhynchus lathami</i> (Vulnerable under both the NC Act and EPBC Act). • 0.099 ha for the Painted Honeyeater¹, <i>Grantiella picta</i> (Vulnerable under both the NC Act and EPBC Act). • 8.463 ha for the Common Death Adder, <i>Acanthophis antarcticus</i> (Vulnerable under the NC Act). • 8.402 ha for the Dunmall’s Snake¹, <i>Glyphodon (Furina) dunmalli</i> (Vulnerable under both the NC Act and EPBC Act). • 0.177 ha for the Grey Snake, <i>Hemiaspis damelii</i> (Endangered under both the NC Act and EPBC Act). • 0.177 ha for the Brigalow Woodland Snail, <i>Adclarkia cameroni</i> (Vulnerable under the NC Act and Endangered EPBC Act). • 0.099 ha for the Dulacca Woodland Snail, <i>Adclarkia dulacca</i> (Endangered under both the NC Act and EPBC Act). <p>All remnant and regrowth vegetation is mapped as protected wildlife habitat for one or more threatened species, with all vegetation polygons</p>

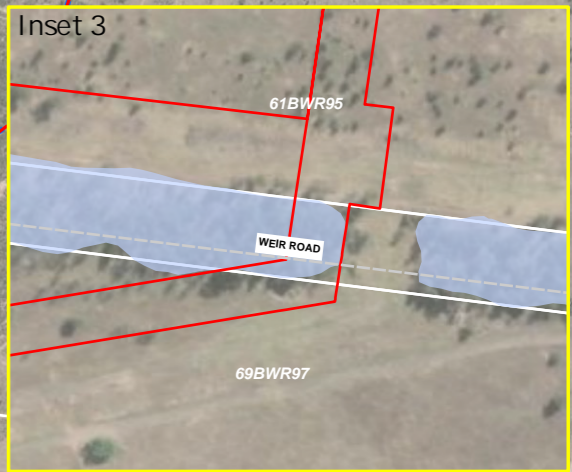
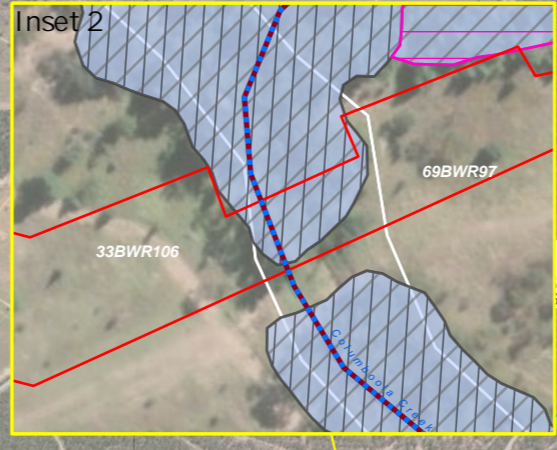
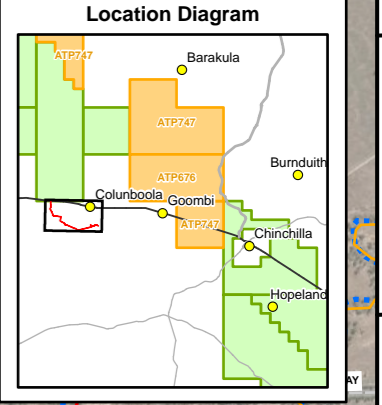
Item	PEM	Potential for SRI	Comments
			co-located to varying degrees with all other matters (Table 4, Figure 2). Refer to Section 3.2.2 for the SRI assessment of this PEM.
15	Protected wildlife habitat – Habitat for an animal that is special least concern (i.e. echidna or platypus).	Yes	A total of 1.655 ha of Queensland Government mapped MSES wildlife habitat for the Platypus (<i>Ornithorhynchus anatinus</i>), listed as Special Least Concern under the NC Act, will be impacted for the project (Table 4, Figure 2). Refer to Section 3.2.3 for the SRI assessment of this PEM. All vegetation polygons are co-located with protected wildlife habitat for threatened species (Table 4, Figure 2).
16	Protected areas	No	Not located within the disturbance footprint of the current project.
17	Highly protected zones of State marine parks	No	Not located within the disturbance footprint of the current project.
18	Fish habitat area	No	Not located within the disturbance footprint of the current project.
19	Waterway providing for fish passage – Fish passage (not in an urban area)	Yes	A total of 0.080 ha within in-stream components of watercourses will be impacted. These are associated with Columboola Creek and several other unnamed tributaries with Waterway Barrier Works (fish passage) impact categories of 1 and 3 (Table 4, Figure 2). Refer to Section 3.2.4 for the SRI assessment of this PEM. Most are remnant or regrowth vegetation polygons and are therefore co-located with protected wildlife habitat (Table 4, Figure 2).
20	Marine plants	No	Not located within the disturbance footprint of the current project.
21	Legally secured offset area	No	Not located within the disturbance footprint of the current project.

(¹) Instances where the PEM corresponds to a MNES assessed under EPBC Act Approval (EPBC 2018/8223).



Legend

- Road
- Waterway Barrier Works
 - 1 - Low
 - 2 - Moderate
 - 3 - High
 - 4 - Major
- Vegetation Management
- Watercourse and Drainage Features
- Proposed disturbance
- Gov wildlife habitat SLC - Ornithorhynchus anatinus
- Nyctophilus corbeni
- Petaurus australis
- Petauroides volans
- Phascolarctos cinereus
- PL (Arrow)



Rev	Date	Revision Description	By	App'd
D	26/10/23	Species extent updates	AW	XX
C	19/10/23	General map updates	TS	XX
B	22/09/23	Revise route	TS	XX
A	31/08/23	First issue	TS	XX

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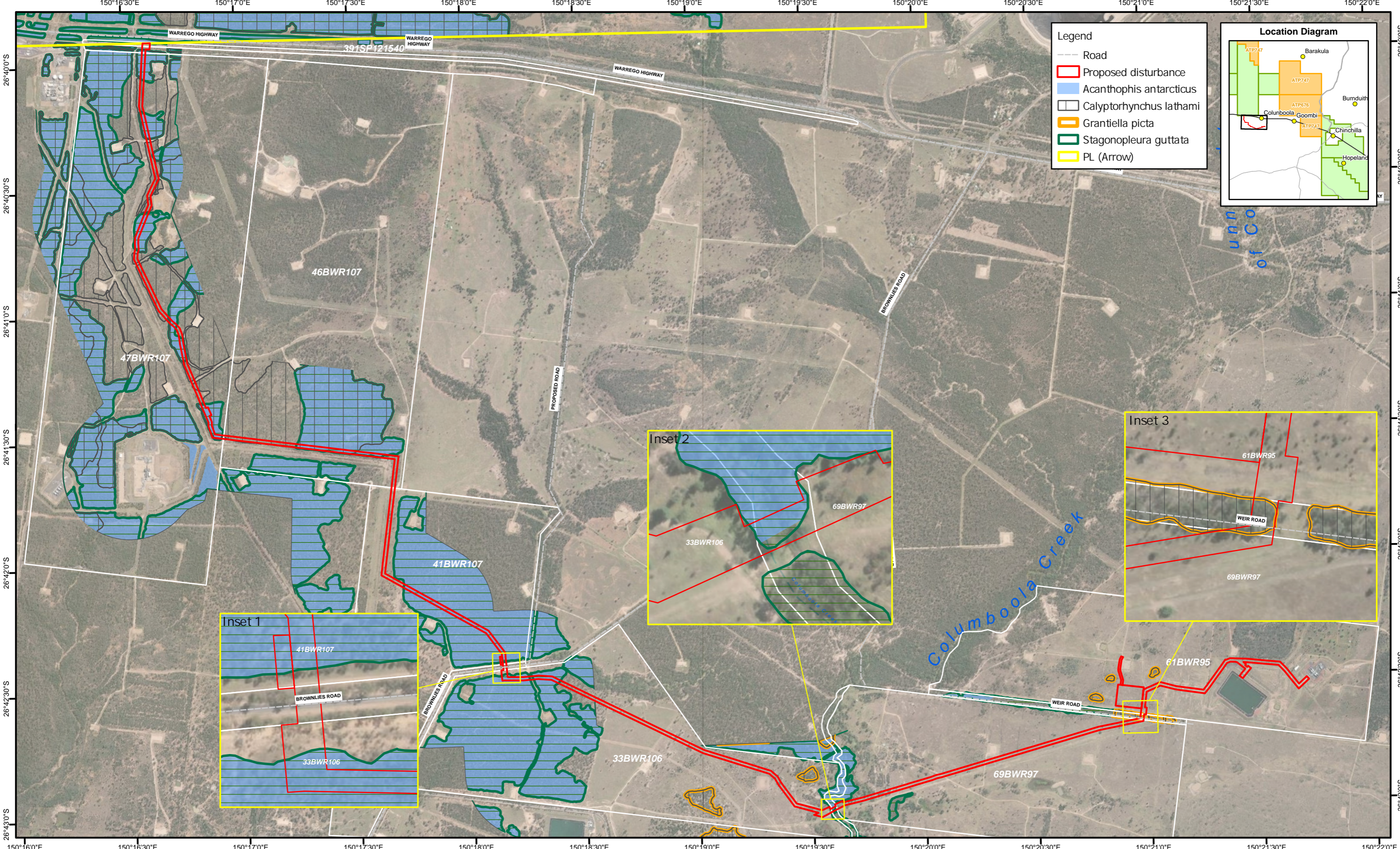
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Figure 2a
Prescribed Environmental
Matters (PEMs) occurring
within the project footprint

Uncontrolled (D)



Rev	Date	Revision Description	By	App'd	Check'd
D	26/10/23	Species extent update	AW	XX	XX
C	19/10/23	General map updates	TS	XX	XX
B	22/09/23	Revise route	TS	XX	XX
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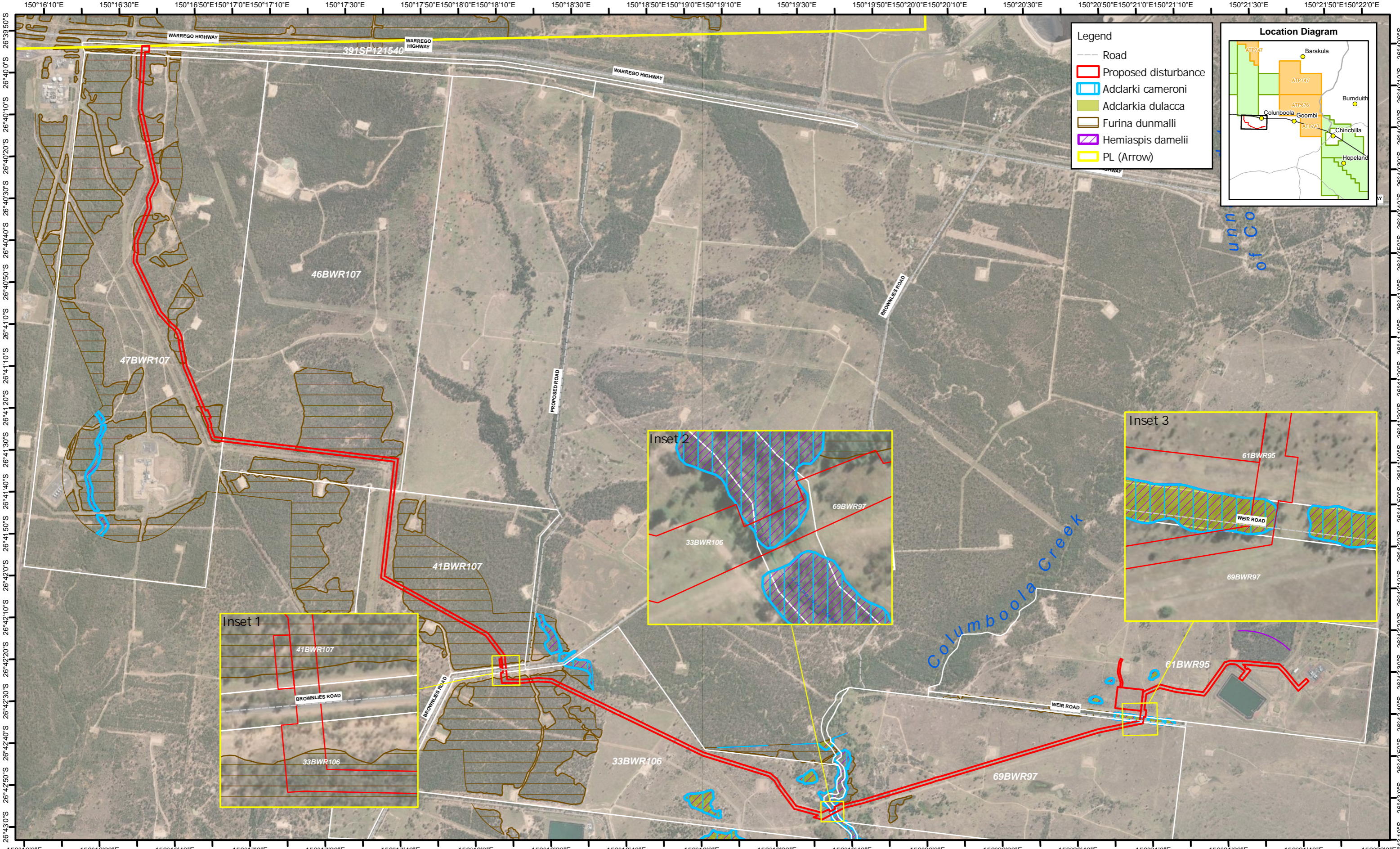
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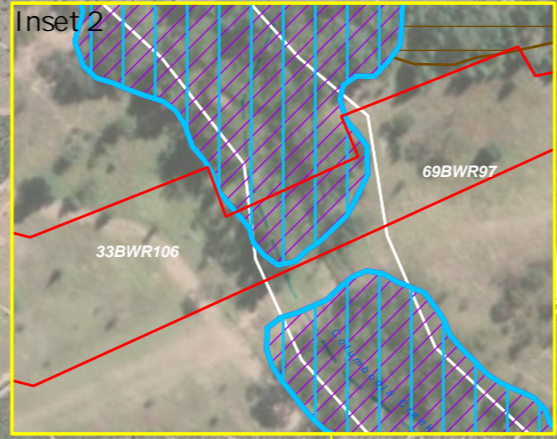
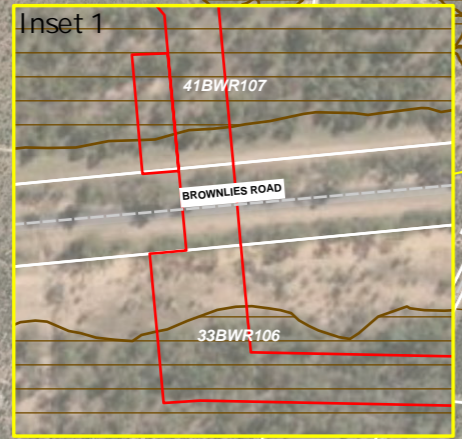
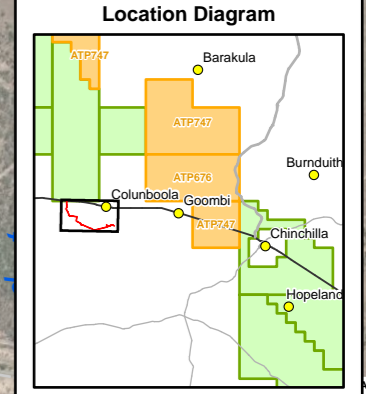
Figure 2b
Prescribed Environmental
Matters (PEMs) occurring
within the project footprint

Uncontrolled (D)



Legend

- Road
- ▭ Proposed disturbance
- ▭ Addclarki cameroni
- ▭ Addclarkia dulacca
- ▭ Furina dunmalli
- ▭ Hemiaspis damelii
- ▭ PL (Arrow)



Version	Date	Description	Author
D	26/10/23	Species extent updates	AW/XX/XX/XX/XX/PF
C	20/10/23	General map updates	TS/XX/XX/XX/XX/PF
B	22/09/23	Revise route	TS/XX/XX/XX/XX/PF
A	31/03/23	First issue	TS/XX/XX/XX/XX/PF

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Figure 2c
Prescribed Environmental
Matters (PEMs) occurring
within the project footprint

Uncontrolled (D)

3.2 Assessment of PEMs for Actual SRI

Review of Table 3 shows four (4) PEMs with a potential for SRI (see Figures 1 and 2 for locations). Sections 3.2.1 to 3.2.4 provide a further assessment of these four matters. Table 4 provides a breakdown of each vegetation community that is impacted by the Project and the relevant PEM that is associated with each one.

Table 4. Summary of Impacted Prescribed Environmental Matters (PEMs) including areas (ha), vegetation communities and co-locations

Vegetation Community	Area (ha)	Regulated Vegetation	Protected Wildlife Habitat													Waterway providing for fish passage
		RE (not within an urban area) within the defined distance from the defining banks of a relevant water course	Koala ¹	Greater Glider ¹	Yellow-bellied Glider	South-eastern Long-eared Bat ¹	South-eastern Glossy Black-cockatoo	Diamond Firetail	Painted Honey-eater ¹	Common Death Adder	Dunmall's Snake ¹	Grey Snake	Brigalow Woodland Snail	Dulacca Woodland Snail	Platypus	Fish passage (not in an urban area)
Remnant 11.3.25	0.079	0.079	0.079	0.079	0.079			0.079		0.062		0.079	0.079			0.023
Remnant 11.5.1	3.562		3.562	3.562	3.562	3.562		3.562		3.562	3.562					
Remnant 11.7.4	3.619	0.313	3.619	3.619	3.619	3.619	3.619	3.619		3.619	3.619				1.081	0.030
Remnant 11.7.7	1.221	0.013		1.221	1.221	1.221		1.221		1.221	1.221				0.466	
Regrowth 11.4.3	0.099		0.099				0.099		0.099			0.099	0.099	0.099		
Regrowth 11.5.1	0.727		0.727													
Regrowth 11.7.4	5.194		5.194				5.194								0.060	0.025
Cleared	23.199														0.047	0.002
Total	37.699	0.405	13.280	8.480	8.480	8.402	8.912	8.480	0.099	8.463	8.402	0.177	0.177	0.099	1.655	0.080

(¹) Instances where the PEM corresponds to a MNES assessed under EPBC Act Approval (EPBC 2018/8223).

3.2.1 Regulated vegetation – regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map.

Table 4 shows that 0.405 ha of three (3) vegetation communities that occur within the defined distance from the defining banks of a relevant watercourse will be impacted by the Project. This includes:

- 0.079 ha of remnant RE 11.3.25
- 0.313 ha of remnant RE 11.7.4
- 0.013 ha of remnant RE 11.7.7

This PEM is listed within the PPL 2048 EA with sufficient allowable impact areas.

As shown in Table 4, these RE polygons also provide habitat for protected species listed under the EPBC Act. It is Arrow's consideration that under such circumstances the biodiversity offset associated with this PEM would therefore be managed under the EPBC Act approval (EPBC 2018/8223) and associated Offset Strategy for the SGP Stage 1. However, The Department of Environment and Science (DES) considers regulated vegetation within the defined distance from a watercourse as a substantially different matter to habitat for protected species. Given the time-critical nature of the approval for this SRI report, Arrow will include a total area of 0.405 ha within the Notice of Election for this project.

This PEM overlaps with ground-verified protected wildlife habitat for endangered and vulnerable species (possible habitat for Koala, Greater Glider, Yellow-bellied Glider, South-eastern Long-eared Bat, Glossy Black-cockatoo, Diamond Firetail, Painted Honeyeater, Common Death Adder, Dunmall's Snake, Grey Snake and Brigalow Woodland Snail), as shown in Table 4 (see also Section 3.2.2). It is noted that Arrow will further investigate options to avoid this sort of duplication of offset requirements in the future.

3.2.2 Protected wildlife habitat – habitat for an animal that is endangered or vulnerable

As shown in Tables 3 and 4 there is habitat for twelve (12) endangered or vulnerable species to be impacted by the Project. In all situations, the specific area of habitat to be impacted for a listed species protected under the NC Act is also habitat to be impacted for a species protected under the EPBC Act.

As noted in Section 3.2.1, Arrow will further investigate options to avoid this sort of duplication of offset requirements when State matters overlap with Federal matters for the same impact area. However, given the time-critical nature of the approval for this SRI report, Arrow will include the areas of impacted PEMs for protected wildlife habitat. This totals an area of 13.774 ha to be included in the Notice of Election for this project. This offset area includes a combination of regulated vegetation and protected wildlife habitat (refer to Table 4 for breakdown), including:

- 0.079 ha remnant RE 11.3.25
- 3.562 ha remnant RE 11.5.1
- 3.619 ha remnant RE 11.7.4
- 1.221 ha remnant RE 11.7.7
- 0.099 ha regrowth RE 11.4.3

- 5.194 ha regrowth RE 11.7.4

3.2.3 Protected wildlife habitat – habitat for an animal that is Special Least Concern

As shown in Tables 3 and 4 there is 1.655 ha of protected wildlife habitat for the Platypus, listed as a special least concern species, to be impacted by the Project. This habitat is comprised of State-mapped wildlife habitat (Special Least Concern species). Of the 1.655ha, 0.047 ha has been ground verified as cleared land, leaving 1.608 ha of remnant and regrowth vegetation (REs 11.7.4 and 11.7.7) (Table 4). This area completely overlaps with protected wildlife habitat for several other threatened species (Table 4).

Under the SRI Assessment Guideline (DEHP, 2014), an action is likely to have a significant impact on a special least concern (non-migratory) wildlife habitat if it is likely that it will result in:

- a long-term decrease in the size of a local population; or
- a reduced extent of occurrence of the species; or
- fragmentation of an existing population; or
- result in genetically distinct populations forming as a result of habitat isolation; or
- disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.

The Platypus is a widespread and common mammal, occurring along the east coast of Australia from northern Queensland through to Tasmania. They are semi-aquatic, occurring in freshwater systems including waterways, lakes, and ponds. They are dependent on aquatic environments for breeding and foraging, however, can move over land if required.

The State-mapped wildlife habitat for the Platypus within the clearing footprint has been derived by mapping government regulated vegetation within a 1.1 km radius of a previous Platypus record. Within the clearing footprint, this occurs within 1.608 ha of ground-verified remnant and regrowth REs 11.7.4 and 11.7.7, which are both comprised of dry Eucalypt woodland on lateritic duricrust. In addition, these areas are not within or in close proximity to a waterway. These vegetation communities are not consistent with Platypus habitat, as they are not aquatic or riparian, and do not contain a waterway or waterbody.

Therefore, the removal of 1.655 ha of State-mapped wildlife habitat for the Platypus is not likely to lead to a long-term decrease in the size of a local population, or a reduced extent of occurrence of the species.

The nature of the clearing works for the Project does not involve broadscale clearing but is instead linear in nature, with vegetation clearing comprising of a single narrow linear strip within a pipeline right of way (RoW) within State-mapped Platypus habitat. To avoid and minimise the risk of impact to vegetation and habitat, the RoW for this project has been further refined and reduced from a width of 30 m to 25 m, resulting in only 1.655 ha of mapped Platypus habitat being located within the clearing footprint.

This type of clearing footprint is not likely to result in fragmentation of an existing population, as the species primarily moves and disperses through aquatic environments including waterways, which are not present within the mapped Platypus habitat being impacted. In addition, the nature of the clearing does not create a 'hard' barrier to dispersal (such as a permanent road or large building).

Therefore, the proposed action is unlikely to result in fragmentation of populations or result in genetically distinct populations forming as a result of habitat isolation.

The location of the State-mapped Platypus habitat within the clearing footprint is not located within an area suitable for ecologically significant activities such as breeding or foraging.

Furthermore, although no burrows or potential den sites have been specifically recorded within the Project area, Arrow's *Species management program for Tampering with Animal Breeding Places* (2023) (SMP) will be implemented prior to and during habitat disturbance during all habitat clearing works throughout the Project. The SMP outlines specific controls and mitigation measures to be implemented if individual Platypus, as well as potential or active burrows are found within the clearing area during pre-clearing surveys or clearing works. The impact minimisation hierarchy ensures that avoiding disturbance during breeding season (August – September) is the highest priority in the hierarchy of controls, as well as additional measures including exclusion zones around individuals or burrows, and specific management by an experienced fauna spotter catcher.

Therefore, the proposed action is unlikely to result in disruption to ecologically significant locations for the Platypus.

In summary, it is very unlikely that the construction of the pipeline will result in a long-term decrease in the size of a local population, or reduce the extent of occurrence of the Platypus, and is also very unlikely to result in population fragmentation or genetically distinct populations of Platypus. Furthermore, it is very unlikely that the construction works will result in a disruption to ecologically significant locations (breeding or foraging sites).

The results of this SRI assessment conclude that the construction and operation of the pipeline for the Project is unlikely to have a significant impact on the Platypus. A SRI for this PEM is not considered likely and therefore this PEM will not be included in the Notice of Election for biodiversity offset for this project.

3.2.4 Waterway providing for fish passage – Fish passage (not in an urban area).

There are several watercourses associated with Columboola Creek and other unnamed tributaries intersecting the Project footprint, that are categorised by DAF as having 'low' and 'high' risks of impact for fish passage. Waterway barrier works in a fish passage waterway will be undertaken in accordance with the DAF guideline "*Accepted development requirements for operational work that is constructing or raising waterway barrier works*" (DAF, 2018). The purpose of this section is to assess if the proposed pipeline crossing construction will have a SRI relating to the MSES 'Waterway providing for Fish Passage'.

Under the SRI Assessment Guideline (DEHP, 2014), an environmental offset may be required '*for any part of a waterway that provides for passage of fish (other than that part of a waterway within an urban area) if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway*'.

In accordance with DEHP (2014), the construction and operation of the pipeline for the Project is not likely to:

- result in the mortality or injury of fish; or

- result in conditions that substantially increase risks to the health, wellbeing and productivity of fish seeking passage such as through the depletion of fishes energy reserves, stranding, increased predation risks, entrapment or confined schooling behaviour in fish; or
- reduce the extent, frequency or duration of fish passage previously found at a site; or
- substantially modify, destroy or fragment areas of fish habitat (including, but not limited to in-stream vegetation, snags and woody debris, substrate, bank or riffle formations) necessary for the breeding and/or survival of fish; or
- result in a substantial and measurable change in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration and frequency of flows; or
- lead to significant changes in water quality parameters such as temperature, dissolved oxygen, pH and conductivity that provide cues for movement in local fish species.

The focal watercourses are ephemeral in nature. Construction of the pipelines is proposed to be a standard open-cut (trenching) method. This technique is most suited to dry or low flow conditions and involves establishing a stable working platform either side of the watercourse and creating a trench using excavators, or similar. Tie-in points will be located on high ground, away from any water flow. Trench spoil removed from the watercourse will be positioned above the high bank. Welded pipe will be laid in the trench and spoil material returned to the trench. Trench and backfill activities will be undertaken to ensure that the bed and bank materials are stockpiled separately and returned to the trench to match original conditions to the greatest extent possible. Rock protection may be placed over the trench if required, to prevent potential scouring during high water flow conditions.

Pipeline construction will be undertaken outside of the wet season when the watercourses are not expected to be flowing. As such it is very unlikely that fish species will be present during construction. Construction time for watercourse crossing is expected to be approximately 10 days. Construction methodology will not introduce any chemicals or solvents, alter water chemistry, or change flow regimes. All construction works will be undertaken and completed in accordance with IECA Best Practice Erosion & Sediment Control Guidelines (IECA, 2008). If water is present in the watercourse, erosion and sediment control (ESC) measures such as temporary coffer dams and silt curtains, as determined by a suitably qualified person, will be installed for the duration of instream works. These measures may temporarily restrict passage whilst in place. If required, water quality monitoring (such as, total dissolved solids (TDS), dissolved oxygen, pH, etc.) will be undertaken during instream construction works to ensure ESC measures and construction methodology is effective. Fauna spotter-catchers will regularly monitor the crossing for possible presence of aquatic species including fish. In the event that monitoring has indicated an impact then works will cease until such time as the issue is resolved in consultation with a suitably qualified person. The ESC measures will be removed once in-stream construction works are completed.

Following construction, the construction trench will be backfilled using spoil to match original conditions. All temporary construction materials and equipment will be removed from the crossing location prior to the onset of the following wet season. No permanent structure or water barrier will be left in-situ that will meaningfully change local hydrology. Following completion of construction activities, the disturbed area will be rehabilitated to reflect the pre-disturbance state and surrounding area.

Therefore, it is very unlikely that the construction of the pipeline will result in the direct mortality or injury of fish, or substantially increase risks to fish health and wellbeing through stranding,

entrapment, or confined schooling behaviour. The extent, frequency or duration of fish passage is unlikely to be reduced. The construction and operation of the pipeline is unlikely to substantially modify, destroy or fragment areas of fish habitat necessary for the breeding and/or survival of fish. It is also very unlikely to result in a substantial and measurable change in the hydrological regime of the waterway or lead to significant changes in water quality.

The results of this SRI assessment conclude that the construction and operation of the pipeline for the Project is very unlikely to have a significant impact to a waterway providing for fish passage and will not limit the passage of fish along the waterway. A SRI for this PEM is not considered likely and therefore this PEM will not be included in the Notice of Election for biodiversity offset for this project.

4. Conclusion

Arrow is yet to investigate options to avoid duplication in regard to biodiversity offsets for overlapping State and Federal matters for the same impact area. This, in combination with the time critical nature of the Project (McNulty SGP PPL 2048) SRI assessment report approval, has led Arrow to identify a total of 13.774 ha of vegetation clearing to require an offset under the State process for the following overlapping PEMs:

- Regulated vegetation:
 - Regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse
- Protected wildlife habitat for the Yellow-bellied glider, Glossy Black-cockatoo, Diamond Firetail, Common Death Adder, Grey Snake, Brigalow Woodland Snail and Dulacca Woodland Snail.

These PEMS are within the following REs:

- 0.079 ha within remnant RE 11.3.25
- 3.562 ha within remnant RE 11.5.1
- 3.619 ha within remnant RE 11.7.4
- 1.221 ha within remnant RE 11.7.7
- 0.099 ha within regrowth RE 11.4.3
- 5.194 ha within regrowth RE 11.7.4

As noted above, Arrow will further investigate options to avoid this sort of duplication of offset requirements when State matters overlap with Federal matters for the same impact area.

Table 5 shows the SRIs for PEMs impacted by the current Project (McNulty SGP PPL 2048) reconciled with the PPL 2048 EA Table 2 (Variation 9).

Table 5. Significant Residual Impacts (SRIs) to Prescribed Environmental Matters (PEMs) reconciled with the Environmental Authority (EA) Table 2 (Variation 9) for SGP McNulty PPL 2048

PEM	Total area (ha) authorised in EA	Total area (ha) from SGP McNulty pipeline	Estimated area (ha) remaining
REGULATED VEGETATION			
Regional ecosystems (not within an urban area) within the defined distance from the defining banks of a relevant watercourse on the vegetation management watercourse map			
RE 11.3.25	0.1	0.1	0
RE 11.7.4	0.4	0.4	0
RE 11.7.7	0.1	0.1	0
PROTECTED WILDLIFE HABITAT			
Habitat for an animal that is endangered wildlife			
<i>Phascolarctos cinereus</i> (Koala) ¹	13.5 (MNES)	13.5	0
<i>Petauroides volans</i> (Greater Glider) ¹	8.5 (MNES)	8.5	0
<i>Hemiaspis damelii</i> (Grey Snake)	0.2	0.2	0
<i>Adclarkia dulacca</i> (Dulacca Woodland Snail)	0.1	0.1	0
Habitat for an animal that is vulnerable wildlife			
<i>Petaurus australis</i> (Yellow-bellied Glider)	8.5	8.5	0
<i>Nyctophilus corbeni</i> (South-eastern Long-eared Bat) ¹	8.5 (MNES)	8.5	0
<i>Calyptorhynchus lathamii</i> (Glossy Black Cockatoo)	9.0	9.0	0
<i>Stagonopleura guttata</i> (Diamond Firetail)	8.5	8.5	0
<i>Grantiella picta</i> (Painted Honeyeater) ¹	0.1 (MNES)	0.1	0
<i>Glyphodon (Furina) dunmalli</i> (Dunmall's Snake) ¹	8.5 (MNES)	8.5	0
<i>Acanthophis antarcticus</i> (Common Death Adder)	8.5	8.5	0
<i>Adclarkia cameroni</i> (Brigalow Woodland Snail)	0.2	0.2	0
Habitat for an animal that is special least concern wildlife			

PEM	Total area (ha) authorised in EA	Total area (ha) from SGP McNulty pipeline	Estimated area (ha) remaining
<i>Ornithorhynchus anatinus</i> (Platypus)	1.7 (no SRI)	1.7	0
WATERWAY PROVIDING FOR FISH PASSAGE			
Fish passage (not in an urban area)	0.1 (no SRI)	0.1	0

(¹) In instances where the PEM corresponds to a MNES assessed under EPBC Act Approval (EPBC 2018/8223).

4.1 Distinct Matter Area (DMA) Grouping Justification for Financial Offsets

If this SRI assessment is approved by DES a corresponding Notice of Election (NoE) submission will be made as a Financial Offsets Calculation. Regional ecosystems (11.3.25, 11.7.4 and 11.7.7) within the defined distance from the defining banks of a relevant watercourse and Yellow-bellied Glider (*Petaurus australis*) habitat will be grouped with together in the same Distinct Matter Area (DMA) (Table 6), due to colocation of habitat. The purpose of this Section is to provide supporting justification that demonstrates why it is appropriate to group these matters in the same DMA, in relation to their habitat requirements and rehabilitation management actions.

Table 6. Distinct Matter Area (DMA) Groupings for Financial Offsets Calculation

DMA	Matter Groups	Impact Area (ha)
1.1	1.1.1: Regional ecosystem - 11.3.25 (<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines) 1.1.2: Threatened animals - <i>Petaurus australis</i> (Yellow-bellied Glider)	0.1
1.2	1.2.1: Regional ecosystem – 11.7.4 (<i>Eucalyptus decorticans</i> and/or <i>Eucalyptus spp.</i> , <i>Corymbia spp.</i> , <i>Acacia spp.</i> , <i>Lysicarpus angustifolius</i> woodland on Cainozoic lateritic duricrust) 1.2.2: Threatened animals - <i>Petaurus australis</i> (Yellow-bellied Glider)	0.4
1.3	1.3.1: Regional ecosystem – 11.7.7 (<i>Eucalyptus fibrosa</i> subsp. <i>nubilis</i> +/- <i>Corymbia spp.</i> +/- <i>Eucalyptus spp.</i> woodland on Cainozoic lateritic duricrust) 1.3.2: Threatened animals - <i>Petaurus australis</i> (Yellow-bellied Glider)	0.1
1.4	1.4.1: Threatened animals - <i>Petaurus australis</i> (Yellow-bellied Glider)	7.9
1.5	1.5.1: Threatened animals - <i>Calyptorhynchus lathami</i> (South-eastern Glossy Black-cockatoo)	9.0
1.6	1.6.1: Threatened animals - <i>Stagonopleura guttata</i> (Diamond Firetail)	8.5
1.7	1.7.1: Threatened animals - <i>Acanthophis antarcticus</i> (Common Death Adder)	8.5
1.8	1.8.1: Threatened animals - <i>Hemiaspis damelii</i> (Grey Snake)	0.2
1.9	1.9.1: Threatened animals - <i>Adclarkia cameroni</i> (Brigalow Woodland Snail)	0.2
1.10	1.10.1: Threatened animals - <i>Adclarkia dulacca</i> (Dulacca Woodland Snail)	0.1

The habitat mapping rules provided for the SGP identifies the following with respect to Yellow-bellied Glider habitat (Ecosmart Ecology and 3D Environmental, 2023):

- Contiguous or near-contiguous areas of REs 11.3.4, 11.3.25, 11.3.26, 11.5.1, 11.5.4, 11.5.20, 11.5.21, 11.7.4, 11.7.6 and 11.7.7 should be classed as 'Core Habitat Possible'.

Therefore, remnant REs 11.3.25, 11.7.4, and 11.7.7 constitute 'Core Habitat Possible' for the Yellow-bellied Glider, and as such, the implementation of management actions relating to the rehabilitation of these REs will apply to the rehabilitation of habitat for the Yellow-bellied Glider.

Appendix 6 of the Queensland Environmental Offsets (EO) Policy (v1.13) (DES, 2022) outlines several examples of direct management actions that can achieve a conservation outcome. The implementation of such management actions when applied to rehabilitated areas of remnant REs 11.3.25, 11.7.4, and 11.7.7 for the Yellow-bellied Glider can lead to an improvement in the extent and quality of available habitat for the species.

Based on the habitat mapping rules (Ecosmart Ecology and 3D Environmental, 2023) management actions intended to restore disturbed and/or degraded areas remnant REs 11.3.25, 11.7.4, and 11.7.7 for the Yellow-bellied Glider will simultaneously result in an improvement in the shelter and foraging habitat for the species. Therefore, grouping remnant REs 11.3.25, 11.7.4, and 11.7.7 and Yellow-bellied Glider habitat in the same DMAs for the purposes of calculating the financial offset liability for SGP PPL 2048 (McNulty) is appropriate.

5 References

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6 Document Administration

Revision history

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Position	Incumbent	Release Date
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Position	Incumbent	Review Date
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