Comet Ridge

Comet Ridge Limited

DCCEEW IESC Ecohydrological Model
Mahalo North PL 1128

Revision 0, 23 July 2025

Comet Ridge

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1 CONTEXT

This document supports the *Independent Expert Scientific Committee on Unconventional Gas Development and Large Coal Mining Development* (the IESC) advice (March 2025). It provides Comet Ridge Limited's (Comet Ridge's) response to Advice Item 3.

The ecohydrological conceptual models (ECMs) represent one transect of PL 1128 and identify potential impact pathways resulting from groundwater drawdown or overtopping of coal seam gas (CSG) produced from water holding tanks or chemical spills. The ECMs consolidate learnings from the following technical studies commissioned by Comet Ridge:

- DPM Environmental (2023) *Aquatic Values Assessment*
- Epic Environmental (2024a) *Matters of National Environmental Significance: Ecological Assessment Report*
- Epic Environmental (2024b) *Chemical Risk Assessment*
- Office of Groundwater Impact Assessment (OGIA) (2023) *Surat CMA UWIR groundwater model data provision to Comet Ridge for the Mahalo North Project*
- RDM Hydro (2023) *Mahalo North Coal Seam Gas Water Management Plan*
- RDM Hydro (2024) *Groundwater Impact Assessment*
- Terra Sana Consultants (2025a) *Water Monitoring and Management Plan 2025*
- Terra Sana Consultants (2025b) *Rewan Connectivity Plan 2025*
- Watermark Eco (2024) *Groundwater Dependent Ecosystems Assessment*

The ECMs have been prepared with reference to the IESC (2024) guidelines. Three ECMs have been prepared, including:

- Pre-impact base model for the dry season;
- Pre-impact base model for the wet season; and
- Post-impact model for the dry season

The location of the ECM transect used for all three ECMs is shown in **Figure 1**.

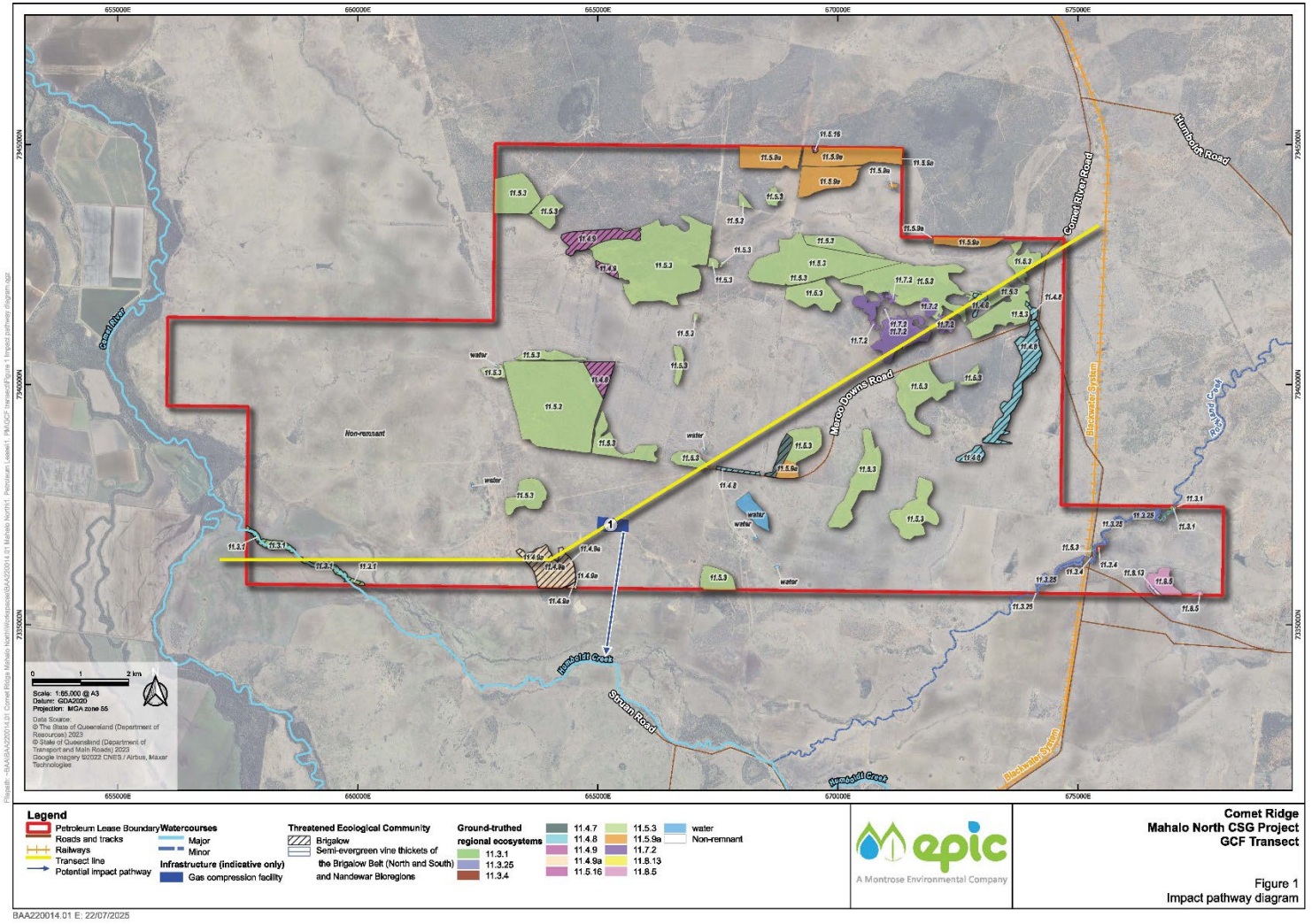

Figure 1 Project Layout, ECM Transects and Potential Impact Pathway

2 POTENTIAL IMPACT PATHWAYS

The potential impact pathways (**Table 1**) have been determined to be overland flow releases to Humbolt Creek from accidental leaks or releases from the storage tanks located at the GCF. This potential impact pathway is also represented on **Figure 1**.

As a result of the mitigation measures proposed by Comet Ridge (as described in the Preliminary Documentation), the risk of this impact pathway occurring is considered minor/negligible.

Table 1 Potential Impact Pathways

Pathway number	Impact (locations and activities)	Associated stressors	Receptor	Pathway
1	Gas Compression Facility (produced water tank, Brine tank)	Reduced water quality from overtopping of tanks	Humboldt Creek	Overland flow

3 ECOHYDROLOGICAL CONCEPTUAL MODELS

3.1 Pre-Impact Base ECM (Dry Season)

The pre-impact base ECM illustrates the ecohydrological function of the site prior to any potential impact during the dry season.

The major features shown in this pre-impact base ECM include:

- A hydraulic disconnect between groundwater in the Tertiary and the coal seams;
- Possible perching of seasonal groundwater in the alluvium association with Humbolt Creek;
- The alluvial groundwater is recharged by surface flows and disconnected from groundwater in the coal seams; and
- The brigalow and poplar box ecosystems have a shallow rooting system, meaning that tree roots are disconnected from regional groundwater tables in the Tertiary and Coal seam groundwater units.

The pre-impact base ECM for PL 1128 has been shown on **Figure 2**.

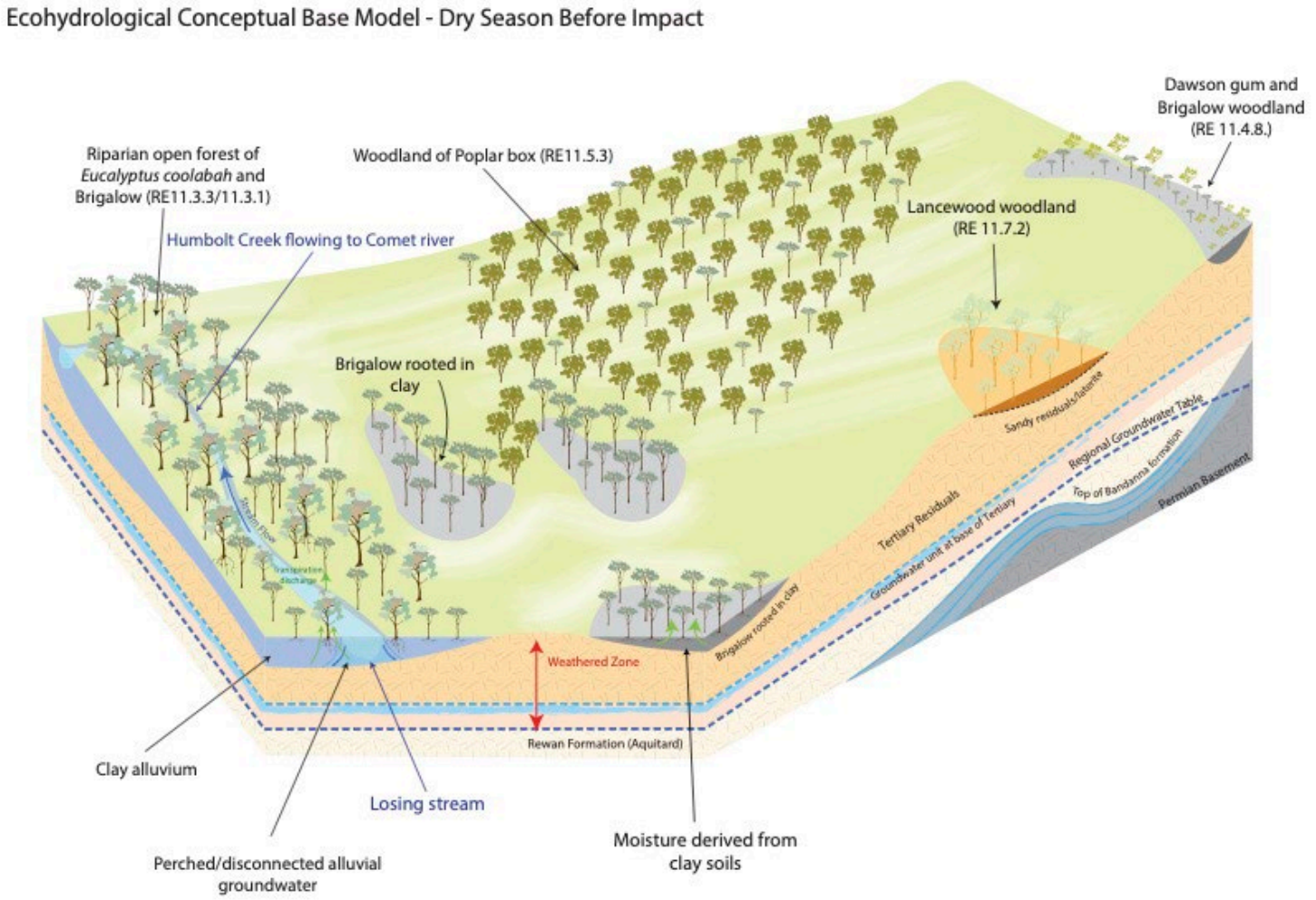

Figure 2 Pre-Impact Base ECM (Dry Season)

3.2 Pre-Impact Base (Wet Season)

The pre-impact base ECM illustrates the ecohydrological function of the site prior to any potential impact during the wet season.

The major features shown in this pre-impact base ECM include:

- There is increased bank storage as a result of flooding and overbank flow (noting surface water to the edge of the alluvial plain);
- Surface flows recharge Gilgai in brigalow; and
- There may be minor leakage from the alluvial groundwater table into the Tertiary system. However, both units remain disconnected from groundwater in the coal seams.

The pre-impact base ECM for PL 1128 has been shown on **Figure 3**.

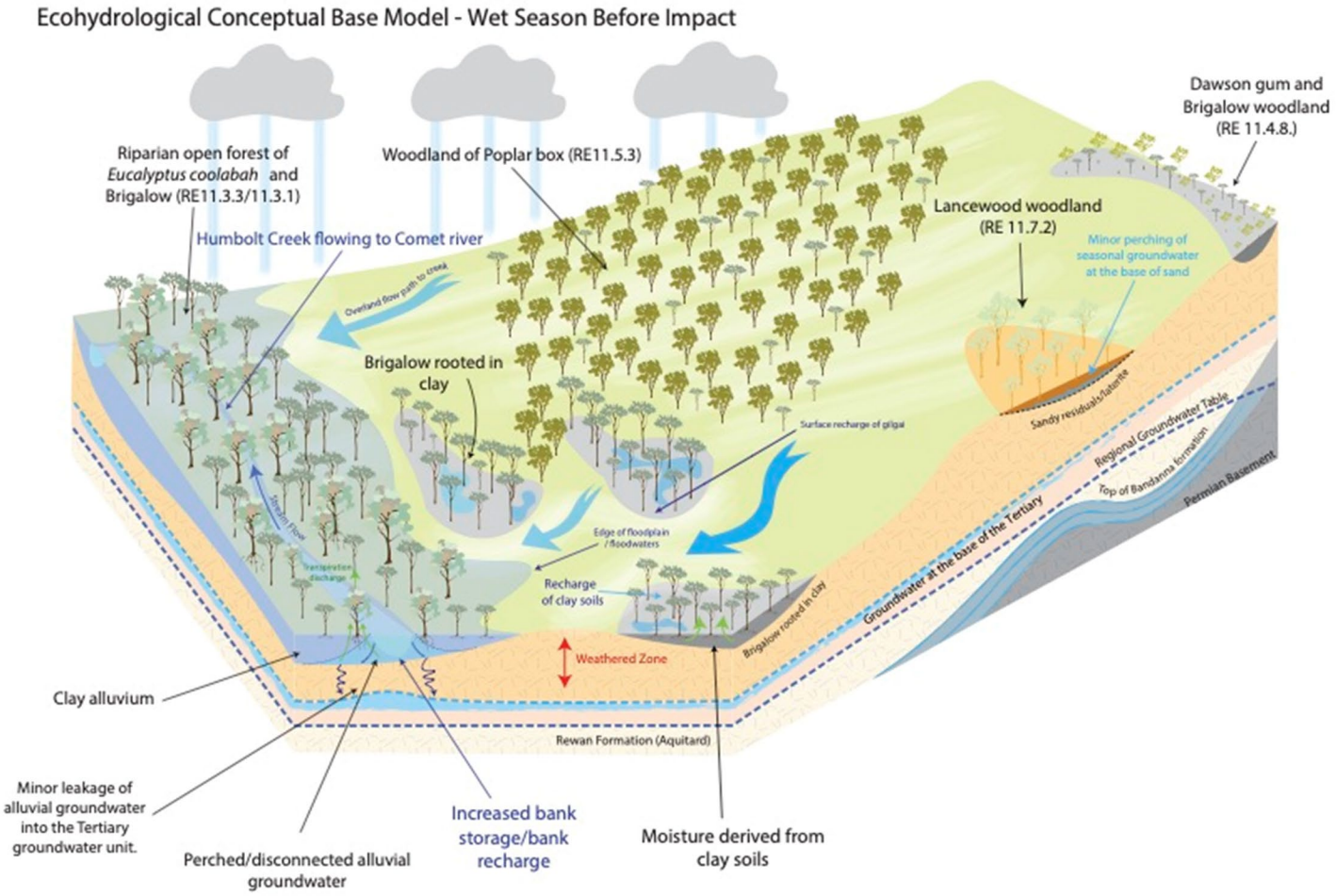

Figure 3 Pre-Impact Base ECM (Wet Season)

3.3 Post-Impact ECM (Dry Season)

The post-impact ECM illustrates the ecohydrological function of the site following development of the Mahalo North Project, during the dry season. It should be noted that a wet season ECM has not been developed, as there are no significant differences between the potential impacts of the wet and dry seasons.

The major features shown in this post-impact ECM include:

- There is a drawdown of the regional groundwater table in the coal seams due to groundwater extraction during gas production;
- A minor drawdown in the Tertiary groundwater unit may occur, although this is not significant as it does not propagate through into the alluvium;
- Production wells have been included (diagrammatic); and
- The potential Impact pathway through surface discharge to Humbolt Creek is shown.

The post-impact ECM for PL 1128 has been shown on **Figure 4**.

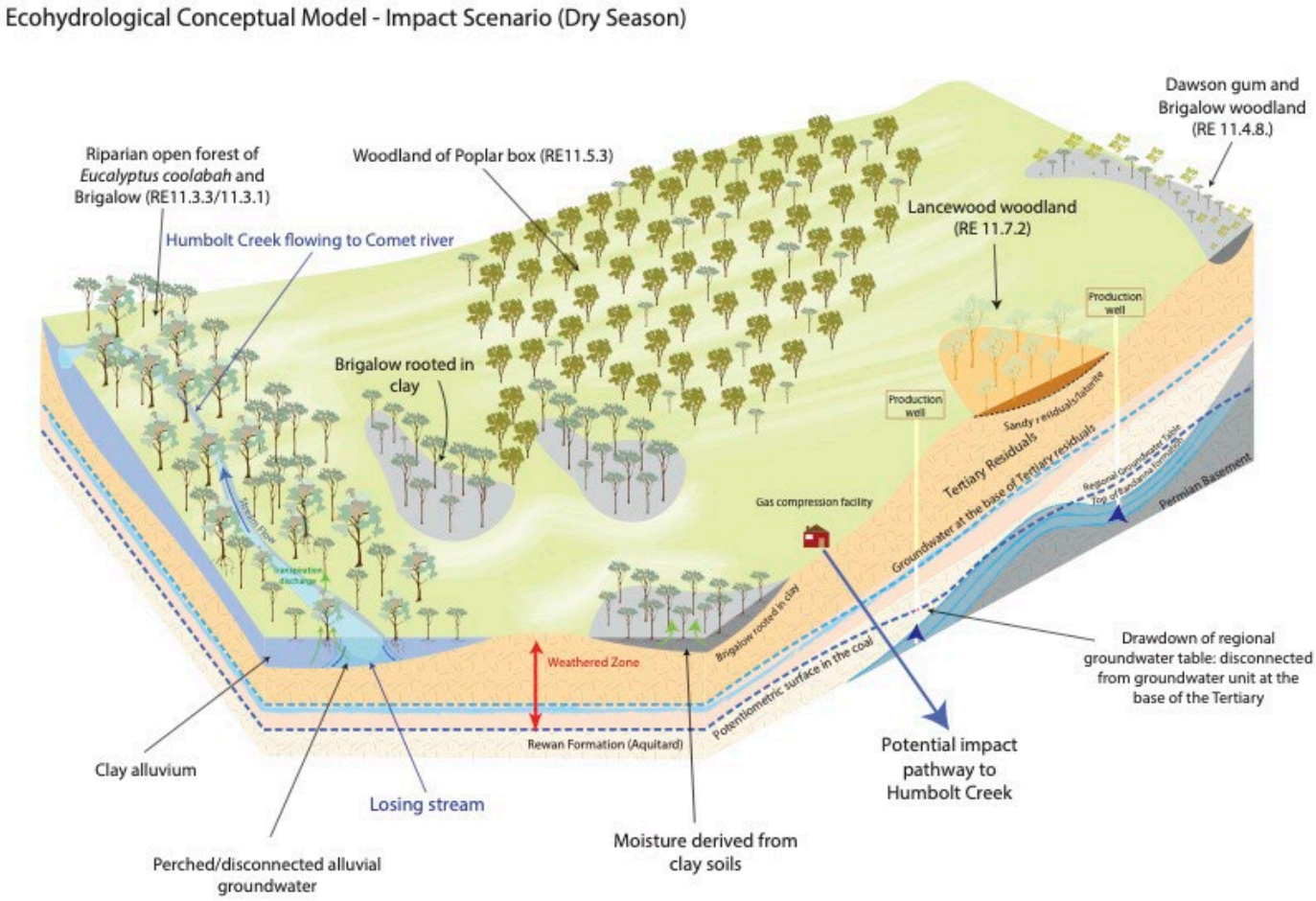

Figure 4 Post-Impact ECM (Dry Season)

4 REFERENCE

DPM Environmental, 2023, *Aquatic Values Assessment*, prepared for Comet Ridge Ltd, Brisbane, Australia

Epic Environmental 2024a, *Matters of National Environmental Significance: Ecological Assessment Report*, prepared for Comet Ridge Mahalo North Pty Ltd, Brisbane, Australia

Epic Environmental 2024b, *Chemical Risk Assessment*, prepared for Comet Ridge Mahalo North Pty Ltd, Brisbane, Australia

IESC, 2024a, *Information Guidelines Explanatory Note - Using impact pathway diagrams based on ecohydrological conceptualisation in environmental impact assessment*, accessed on 14 April 2025, from https://www.iesc.gov.au/publications/information-guidelines-explanatory-note-using-impact-pathway-diagrams-based-ecohydrological-conceptualisation-environmental-impact-assessment

IESC, 2024b, *Information Guidelines for Proponents Preparing Coal Seam Gas and Large Coal Mining Development Proposals,* accessed on 14 April 2025, from https://www.iesc.gov.au/sites/default/files/2024-02/info-guidelines-proponents-preparing-coal-seam-gas-large-coal-mining-development-proposals.pdf

OGIA 2023, *Surat CMA UWIR groundwater model data provision to Comet Ridge for the Mahalo North Project*

RDM Hydro, 2023, *Mahalo North Coal Seam Gas Water Management Plan*, prepared for Comet Ridge Ltd, Brisbane, Australia

RDM Hydro, 2024, *Groundwater Impact Assessment*, prepared for Comet Ridge Ltd, Brisbane, Australia

Terra Sana Consultants, 2025, *Water Monitoring and Management Plan 2025*, prepared for Comet Ridge Ltd, Brisbane, Australia

Terra Sana Consultants, 2025a, *Rewan Connectivity Plan 2025*, prepared for Comet Ridge Ltd, Brisbane, Australia

Watermark Eco 2024, *Groundwater Dependent Ecosystems Assessment*, prepared for Comet Ridge Mahalo North Pty Ltd, Brisbane, Australia