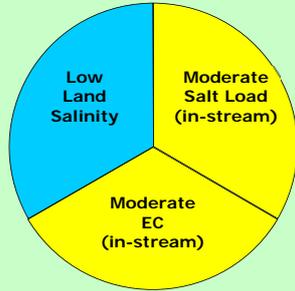


10. Jeir Hill Hydrogeological Landscape

LOCALITIES	Jeir Hill	
MAP SHEET	Brindabella 1:100 000 Canberra 1:100 000	
CONFIDENCE LEVEL	Moderate	

OVERVIEW

The Jeir Hill Hydrogeological Landscape (HGL) extends from the edge of Picadilly HGL to the Uriarra Road HGL in the vicinity of Coree (Figure 1). The area is mostly Uriarra State Forest. The HGL covers an area of 31km² and receives 750 to 1000 mm of rain per annum.

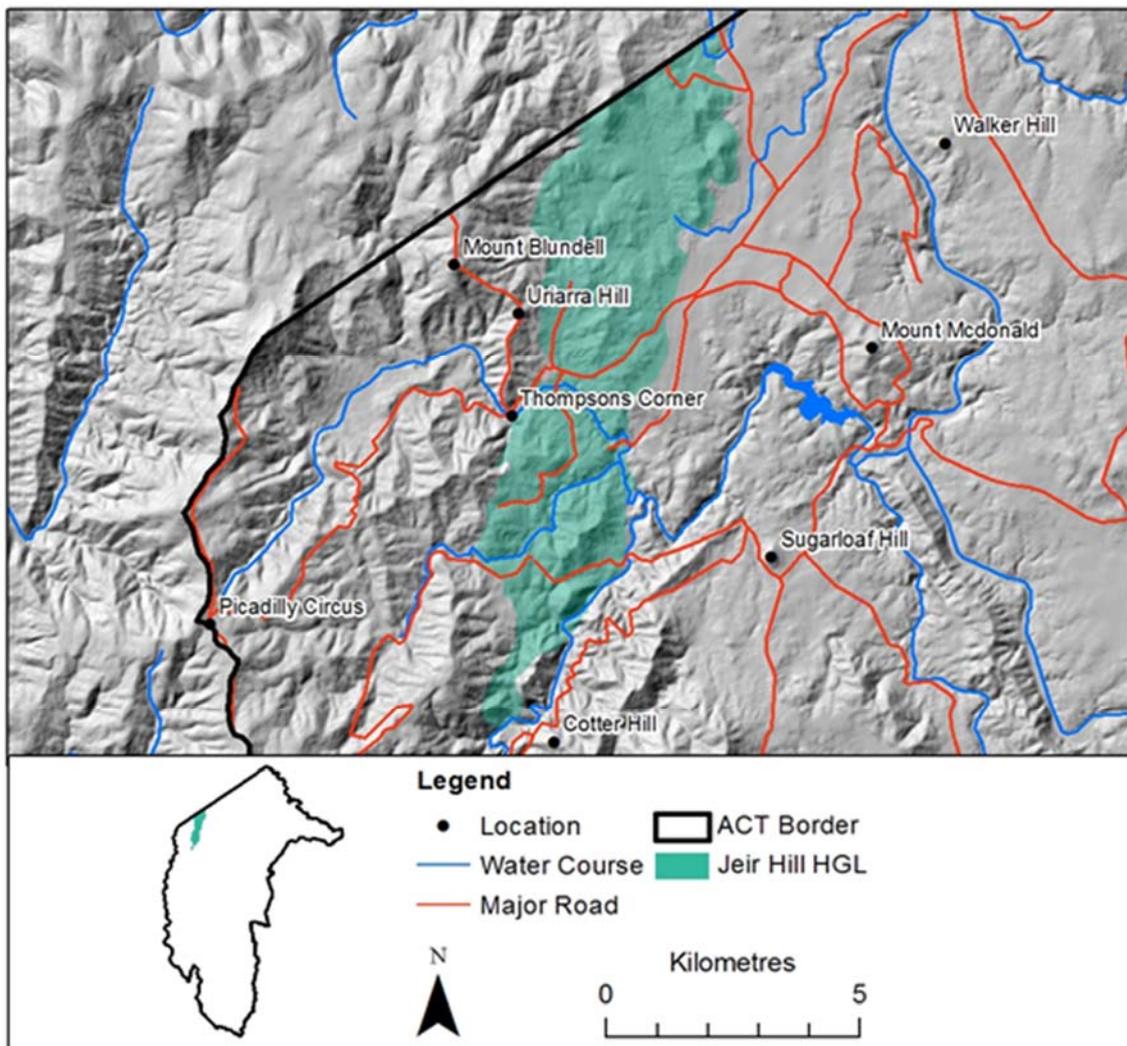


Figure 1: Jeir Hill HGL distribution map.

Jeir Hill HGL is based on geology and soil landscapes (Figure 2). The landscape is under commercial forestry or native timber, with commercial forestry a significant land use.

There are very sodic soils, with swamps in the low lying areas between hills. Gully erosion is a feature of the landscape, which is highly weathered with poor acid soils, and there is high runoff. Jeir Hill HGL abuts the heavily timbered and steep Picadilly HGL.

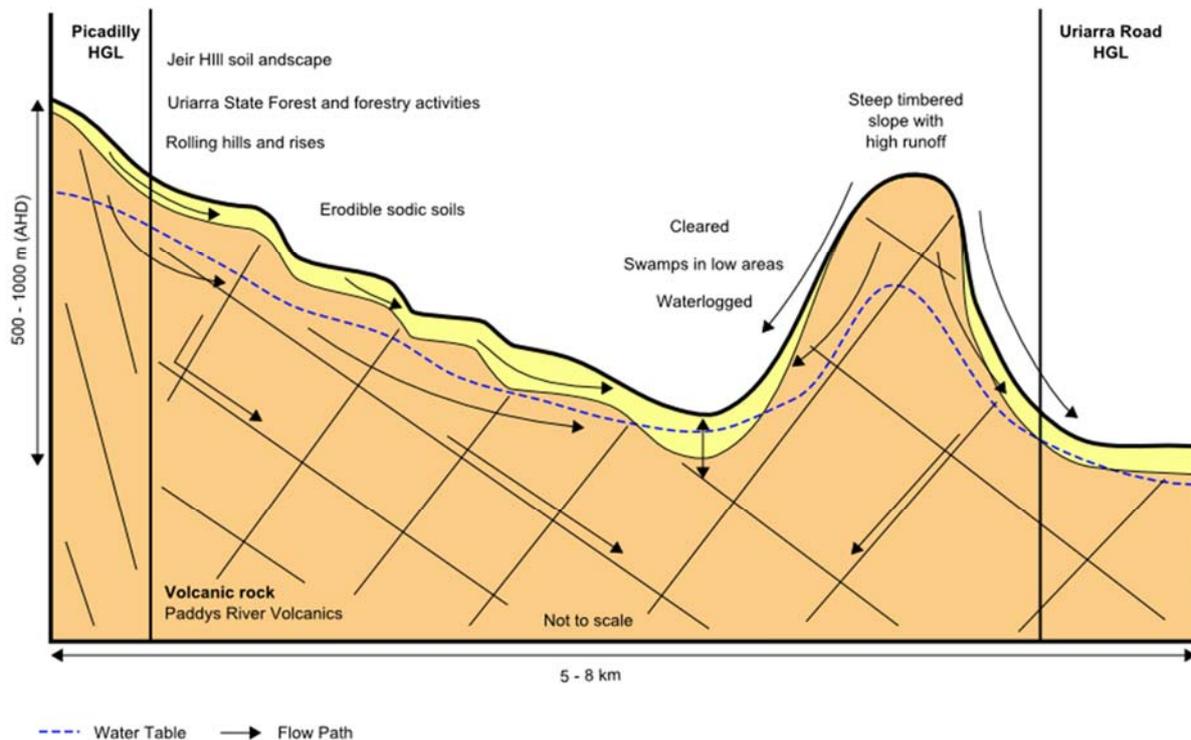


Figure 2: Conceptual cross-section for Jeir Hill HGL showing the distribution of regolith and landforms, salt sites if present, and flow paths of water infiltrating the system.

Salinity expression in this HGL is in the form of stream salt load and EC (Table 1).

Table 1: Jeir Hill HGL salinity expression.

SALINITY EXPRESSION	
Land Salinity (Occurrence)	Low
Salt Load (Export)	Moderate – observed surface water at 800–1600 uS/cm in tributaries in this unit.
EC (Water Quality)	Moderate – observed surface water at 800–1600 uS/cm in tributaries in this unit.

Salt store refers to the amount of salt stored in soil and geology materials. Salt availability refers to how easily this salt can be moved by water. Salt stored within Jeir Hill HGL has moderate mobility. There is a moderate salt store that has moderate availability (Table 2).

Table 2: Jeir Hill HGL salt store and availability.

SALT MOBILITY			
	Low availability	Moderate availability	High availability
High salt store			
Moderate salt store		Jeir Hill	
Low salt store			

Overall salinity hazard is based on the likelihood of salinity occurring and how much impact it would have. The overall salinity hazard in Jeir Hill HGL is low. This is due to the moderate likelihood that salinity issues will occur and that they would have potentially limited impacts (Table 3).

Table 3: Likelihood of salinity occurrence, potential impact and overall hazard of salinity for Jeir Hill HGL.

OVERALL SALINITY HAZARD			
	Limited potential impact	Significant potential impact	Severe potential impact
High likelihood of occurrence			
Moderate likelihood of occurrence	Jeir Hill		
Low likelihood of occurrence			

LANDSCAPE FEATURES

The following photographs illustrate landscapes and specific features observed in this HGL. Information used to define the HGL is summarised in Table 4.



Photo 1: Looking south from “Sherwood Forest Hill” In Jeir Hill HGL (Photo: DPI / A Nicholson).



Photo 2: Valley floor with pine plantation (Photo: DPI / A Nicholson).



Photo 3: Native timber in Jeir Hill HGL (Photo: DPI / A Nicholson).



Photo 4: Picadilly HGL in shadow with mid slope elements of Jeir Hill in foreground (Photo: DPI / A Nicholson).



Photo 5: Rolling rises of Jeir Hill HGL pine plantation and power line access (Photo: DPI / A Nicholson).

Table 4: Summary of information used to define Jeir Hill HGL.

Lithology <i>(Raymond et al. 2007; Geoscience Australia 2015)</i>	This HGL comprises felsic volcanics. The key lithology is: <ul style="list-style-type: none"> • Paddys River Volcanics
Annual Rainfall	750–1000 mm
Regolith and Landforms	Soil generally <0.5 m on crests and slopes; >1 m in drainage lines. Deeper soil and imperfect drainage in the lower landscape provide moderate potential for salt store. Slopes generally 3–10%; 10–32% in highest areas Elevation range is 550–900 m
Soil Landscapes <i>(Jenkins 1993; Jenkins 2000; Cook & Jenkins in prep)</i>	The following soil landscapes are dominant in this HGL: <ul style="list-style-type: none"> • Jeir Hill Clastic Rudosols or Leptic Tenosols (Lithosols) on crests. Red Chromosols and Red Kurosols (Red Podzolic Soils) and Red Kandosols (Red Earths) occur from crests to mid slope positions. Brown Chromosols and Magnesian-Natric Chromosols (Yellow Podzolic Soils) and Brown Kandosols (Yellow Earths) on drained lower slopes. Poorly drained Sodosols (Solodic Soils) on poorly drained lower slopes and drainage lines. Most lower slopes and drainage lines are sodic and have moderate to severe gully erosion.
Land and Soil Capability	Class 6
Land Use	Forestry and native timber

Key Land Degradation Issues	<ul style="list-style-type: none"> • gully erosion • sodicity • waterlogging
Native Vegetation <i>(Keith 2004; Gellie 2005; Dept. of Environment 2012)</i>	<p>This HGL is situated within the IBRA7 South Eastern Highlands (Bondo subregion)</p> <p>The HGL has been extensively cleared with remaining vegetation formations comprising Dry Sclerophyll Forest and Wet Sclerophyll Forest</p> <p>Local vegetation is described by Gellie (2005)</p>

HYDROGEOLOGY

Typical values for the hydrogeological parameters of this HGL are summarised in Table 5.

Table 5: Summary of values for typical hydrogeological parameters of Jeir Hill HGL.

Aquifer Type	Unconfined to semi-confined in fractured rock and saprolite Lateral flow through unconsolidated colluvial sediments on slopes
Hydraulic Conductivity	Moderate Range: 10 ⁻² –10 m/day
Aquifer Transmissivity	Low Range: <2 m ² /day
Specific Yield	Low Range: <5%
Hydraulic Gradient	Moderate to steep Range: 5→15%
Groundwater Salinity	Fresh to marginal Range: <800–1600 µS/cm
Depth to Watertable	Intermediate to deep Range: 2→8 m
Typical Sub-Catchment Size	Medium (100–1000 ha)
Scale (Flow Length)	Small Flow length: <5 km (short)
Recharge Estimate	Moderate
Residence Time	Medium (years)
Responsiveness to Change	Medium (years)

MANAGEMENT OPTIONS

Overarching salinity management strategies have specific biophysical outcomes. These are achieved by implementing a series of targeted land management actions that take into account the opportunities and constraints of the particular HGL. The actions recognise the need for diffuse and specific activities within the landscape to impact on salinity. Further explanation of land management functions, strategies and actions can be found in Wooldridge *et al.* (2015).

Salinity is driven by interactions between water-use capacity of vegetation, physical soil properties and hydrogeological processes within the HGL.

Actions that influence the way water is used by vegetation or stored in the soil profile will have impacts on recharge. The influence of both continual and episodic recharge and the impacts of extreme weather events should be considered when deciding on appropriate management actions. Short and long-term climate cycles also should be considered as they have a bearing on salinity processes, particularly salt load and land salinity.

Landscape Functions – Jeir Hill HGL

Functions this landscape provides within a catchment scale salinity context:

- **A.** The landscape provides fresh water runoff **as an important water source.**
- **H.** The landscape contains high hazard for generating sodic and saline sediments.

Landscape Management Strategies – Jeir Hill HGL

Appropriate strategies pertinent to this landscape:

- **Maintain or maximise runoff (10).**

Key Management Focus – Jeir Hill HGL

The soils are fragile, sodic, dispersive and highly erodible. The current forestry land use is the most appropriate land use, with extreme care needed in harvesting and re-forestation.

The gully lines are very sodic and waterlogged with access a major issue in wet times.

Specific Land Management Opportunities

Specific opportunities for this HGL:

- maintenance of forestry industry
- native regeneration possible from local source material

Specific Land Management Constraints

Constraints on land management in this HGL include:

- access on steep slopes, particularly for logging activities
- sodic, dispersive and highly erodible soils
- waterlogged swamps
- fire regime will have a large impact on the hydrology of this HGL
- soil fertility and acidity.

Specific Targeted Actions

Management areas for this HGL are illustrated in Figures 3 and 4. The specific management actions for these areas are described in Table 6.

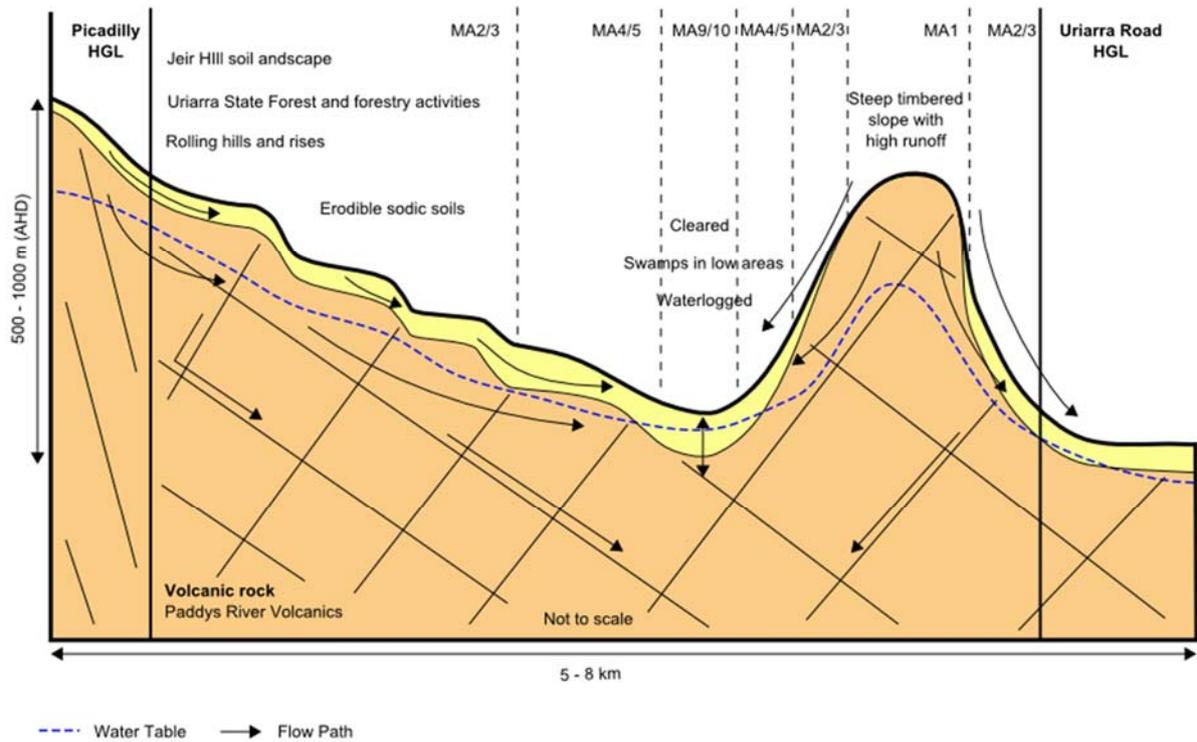


Figure 3: Management cross-section for Jeir Hill HGL showing defined management areas.

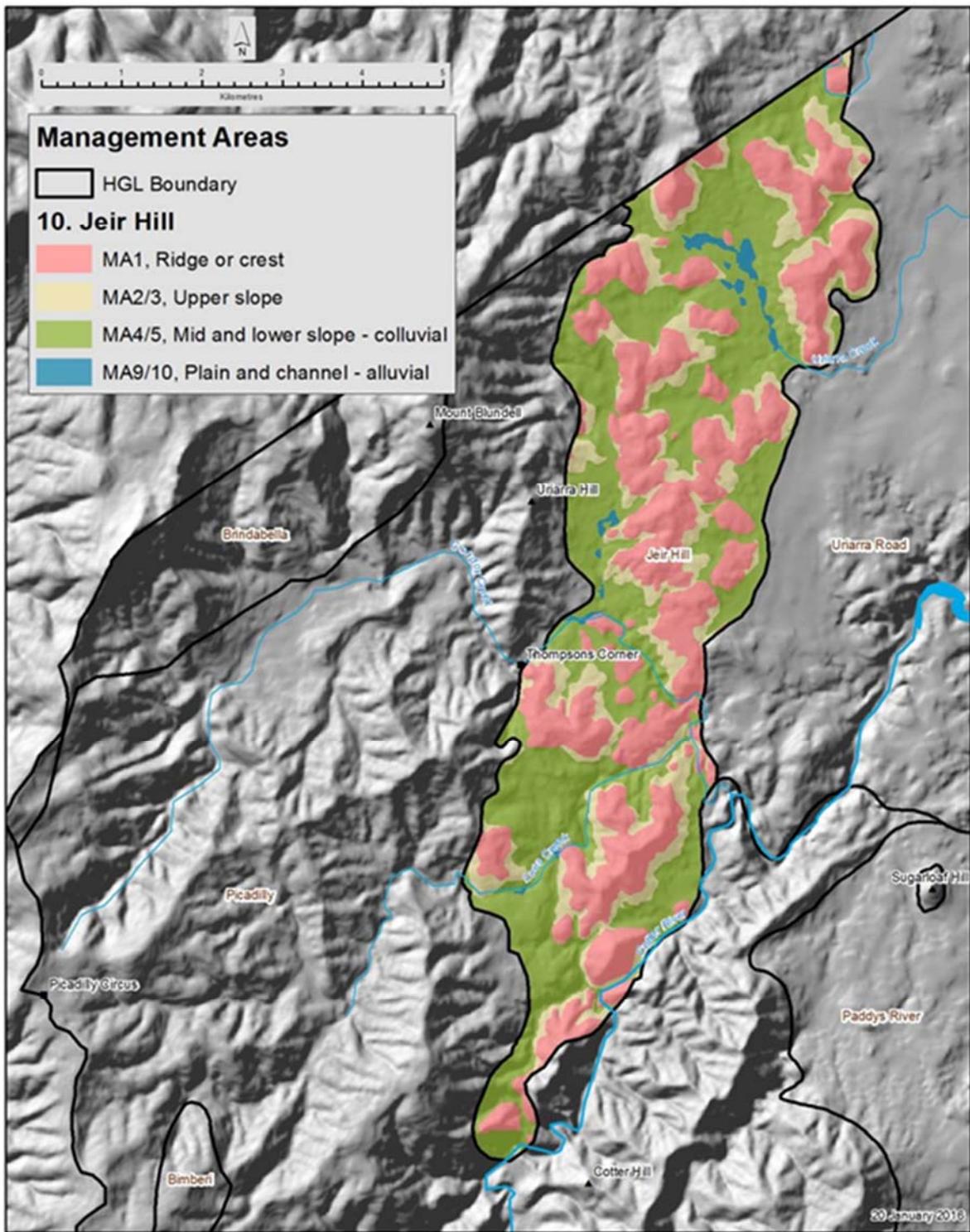


Figure 4: Spatial distribution of management areas for Jeir Hill HGL.

Table 6: Specific management actions for management areas within Jeir Hill HGL.

Management Area (MA)	Action
MA 1 (RIDGES)	<p>Vegetation for ecosystem function Maintain and improve existing native woody vegetation to reduce discharge (VE3)</p> <p>Vegetation for production Establish commercial forestry to manage recharge (VP7)</p>
MA 2/3 (UPPER SLOPE – EROSIONAL)	<p>Vegetation for ecosystem function Maintain and improve existing native woody vegetation to reduce discharge (VE3)</p> <p>Vegetation for production Establish commercial forestry to manage recharge (VP7)</p>
MA 4/5	<p>Vegetation for production Establish commercial forestry to manage recharge (VP7) Improve grazing management of existing perennial pastures to manage recharge (VP1) Establish and manage perennial pastures to manage recharge (VP2) Improve grazing management to improve or maintain native pastures to manage recharge (VP5)</p>
MA 9/10	<p>Vegetation for ecosystem function Maintain and improve riparian native vegetation to reduce discharge to streams (VE4)</p> <p>Vegetation for production Establish commercial forestry to manage recharge (VP7) Revegetation of non-agricultural land with native species to manage recharge (VP8)</p>
MA 2, 3, 4, 5	<p>Vegetation for production Establish commercial forestry to manage recharge (VP7)</p>

High Hazard Land Use

There are some management actions that should be discouraged in this HGL as they will have negative impacts on salinity (Table 7).

Table 7: Management actions having negative salinity impacts in Jeir Hill HGL.

At Risk Management Areas	Action
MA 1, 2, 3, 4, 5	Poor management of grazing pastures (DLU2) Clearing and poor management of native vegetation (DLU4) Locating infrastructure on discharge areas (DLU7) Deep ripping of soils to maximise water infiltration to subsoil (DLU11)
MA 9/10	Clearing and poor management of native vegetation (DLU4) Locating infrastructure on discharge areas (DLU7)

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