



Department of
Agriculture and Food



Recommended General Erosion Mitigation Strategies for the State Barrier Fence Esperance Extension

**Report prepared by the
Department of Agriculture and Food, Western Australia**

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Background

The proposed State Barrier Fence Esperance extension may cause soil erosion as a result of vegetation clearing. A 15-20m wide track was proposed to be cleared of all vegetation along the length of the fence. The clearing was required for maintenance vehicles to access the fence from both sides, to reduce damage to the fence from wild fires and to provide a cleared area so animals can see the fence to avoid running into it. Erosion could negatively impact on environmental and cultural values, other landholders properties, reduce the effectiveness of the fence by undercutting it (allowing wild dogs to crawl under), and significantly increase future track maintenance costs.

An erosion desktop analysis was prepared by the Department of Agriculture and Food (DAFWA) in March 2015 that characterised the risks of building the proposed State Barrier Fence Esperance extension in terms of potential on-site and off-site soil erosion (DAFWA 2015). Land evaluation standards from DAFWA were used to identify the relative hazard from water or wind erosion (van Gool et al. 2005), and a recent study of erosion assessment provided localised within stream hazard information (Holmes et al., 2010). This desktop study identified and ranked areas with potential moderate to high erosion hazards that warranted further field investigation.

The moderate to high risk erosion sections identified in the desk top study were surveyed in the field by Precision Technology Solutions (PTS) in June 2015 (report at Attachment 2). One additional section identified as eroded from previous DAFWA field investigations at the far western end of the proposed alignment was also surveyed. The PTS survey involved driving the existing tracks at each moderate to high risk erosion section of the alignment and recording vertical and horizontal GPS positions every four to eight meters with a horizontal accuracy of four centimetres and a vertical accuracy of nine centimetres. This allowed precise calculations of percentage slope to be made. Photographs and notes on any existing erosion were also taken at each section. The GPS positions and percentage slopes were digitised in colour-coded KMZ files for interactive visualisation in Google Earth Pro.

The percentage slopes, soil types, rainfall events, field notes and photographs allowed appropriate erosion mitigation strategies to be developed for the moderate to high risk erosion areas along the proposed alignment. The erosion mitigation strategies are based on the Fire and Emergency Services Authority of Western Australia "Firebreak Location, Construction and Maintenance Guidelines". Advice was also sought from relevant experts at the Shire of Esperance, Main Roads WA and Department of Parks and Wildlife.

Track Construction Recommendations

It was considered that the original proposal to clear a 15-20m wide track area with a bulldozer and grader would exacerbate any future track erosion problems and lead to poorer environmental and cultural heritage outcomes. A large, cleared area like this without any soil protection would encourage water to flow and build up speed.

The recommended track design would therefore incorporate the following:

- chain all vegetation as close as possible to ground level over a 15m wide clearing footprint, with the exception of the previously unchained area roughly north of Salmon Gums that will require a 20m chained area to minimise fire risk to the fence and large trees falling on the fence;
- bulldoze (if necessary) and grade a 6m wide, flat maintenance track providing 3m of vehicle access to either side of the fence down the middle of the 15m or 20m chained area;
- evenly spread the cleared vegetation from the 6m wide track across the remaining 4.5m wide chained area on either side of the 6m wide graded track;
- Where possible all tree stumps greater than 15cm in width on the 6m wide track are to be removed;
- construct water diversion turnouts into the design where it is located on vacant crown land, alternating turnouts every 200m along the 6m wide cleared track where necessary. These will divert water off and away from the track. Water turnouts are to be 10m long by 2.5m wide and can be constructed through the chained area. This will result in an additional 5.5m x 2.5m (13.75m²) of clearing every 200m. Note that in very sandy soils on flat terrain water turnouts will not likely be required. Inspections of existing fire tracks will provide an indication of potential for erosion.

Some of the advantages of this design include that chaining minimises disturbance to the soil structure, it maintains the seed bank, provides cover to the soil and reduces potential for any buried cultural materials to be disturbed.

General Erosion Mitigation Measures

- The 6m wide track clearing activities should disturb the soil surface as little as possible to ensure the long term soil structure is maintained. In time this will allow grasses to regrow, stabilise the soil and minimise soil erosion. Machines used for pushing and heaping operations (typically bulldozers) would need to be fitted with root rakes or similar equipment and operated in a manner such that as little soil as possible is removed and heaped with the cleared vegetative material.
- No clearing to be undertaken at the three main river crossings (the Lort, Oldfield and Young Rivers). A gap in the fence at each river eliminates potential for new clearing to cause erosion at these high risk locations. The proposed river crossing on private land at Thomas River will replace an existing private fence line and no new clearing will be undertaken.

- No driving on the maintenance track after rainfall events to prevent wheel ruts from forming channels for water to run along.

Specific Moderate to High Risk Survey Report Section Recommendations (refer to cover page of Precision Technology Solutions 2015 for survey report section locations; subject to survey).

Survey Report Section	Section length	Metres between water turn outs and comments	Approx. additional # turnouts	Water bank distance apart and #
W0	4km	150m x 3km (from west to east) 70m x 1km towards Oldfield River	14	Every 150m first 3km (20) Every 70m last 1km (14)
W1	7.1km	Existing cleared fire track shows no sign of water erosion. Minimum turnout every 200m adequate.		N/A
W2	8.4km	200m for 8km. No clearing undertaken across 400m section adjacent to Young River		N/A
W3	8.4km	Existing cleared fire track shows no sign of water erosion. Minimum turnout every 200m adequate.		N/A
E1	13.6km	Minimum turnout every 200m. 3.6km private fence section replaced with barrier fence and no additional clearing undertaken/turnouts. Minor cross slope erosion from Mt Ney Reserve into paddock to be discussed with property owner.		N/A
E2	14.3km	Turnout every 70m for two steep sections totalling 1km. Standard 200m turnouts adequate for remainder.	7	Every 70m
E3-1	22.7km	Private fence to be replaced with barrier fence and no additional clearing undertaken. Erosion from Merivale Rd into farmers paddock to be discussed with property owner and Shire of Esperance. Additional rock or clay may be required to improve fence integrity and reduce erosion potential.		N/A

Survey Report Section	Section length	Metres between water turn outs and comments	Approx. additional # turnouts	Water bank distance apart and #
		Thomas River crossing to be fenced as per existing fence subject to any cultural heritage constraints. 5.5km northerly rectangular section on private farm land has not been adopted due to very steep gradients. Instead, the 1.6km section of UCL adjacent to Merivale Rd has been adopted. 200m turnouts required for UCL section.		
E3-2		Private fence to be replaced with barrier fence and no additional clearing undertaken. Any erosion on private farm fenceline to be discussed with property owner. Additional rock or clay may be required to improve fence integrity and reduce erosion potential.		N/A
E3-3		Private fence to be replaced with barrier fence and no additional clearing undertaken. Any erosion on private farm fenceline to be discussed with property owner.		N/A
Rest of UCL		Maximum of one water turnout every 200m where required.		N/A