conservation council of western australia (inc.) abn 35 982 476 107
citywest lotteries house 2 delhi street west perth western australia 6005
t 08 9420 7266 f 08 9420 7273 conswa@ccwa.org.au

Dr Paul Vogel
Chairperson
Environmental Protection Authority
Locked Bag 33
CLOISTERS SQUARE WA 6850

03/04/2013

Dear Dr Vogel

REFERRAL OF THE PROPOSED EXTENSION TO THE STATE BARRIER FENCE (ESPERANCE EXTENSION)

Please find enclosed our referral of the above proposal under Section 38 of the Environmental Protection Act 1986. The Conservation Council of Western Australia submit that the Proposal constitutes a significant proposal and should be formally and publicly assessed under Part IV of the Act.

The Proposal, by the Department of Agriculture and Food Western Australia, is to construct up to 730 km of new wildlife barrier fencing between where the current State Barrier Fence intersects the South Coast Highway and the Cape Arid area. We believe the Proposal is likely to lead to numerous significant impacts on flora, fauna and the ecological processes that support biodiversity in the Great Western Woodlands and the more southern ecosystems of the Esperance and Ravensthorpe areas as well as impacting on the main ecological connectivity between the inland and the south west forests. Some of the broader impacts of the Proposal on regional ecological processes are poorly known as little if any research has been conducted on how wildlife barrier fences alter fauna behavior and the interactions between faunal groups and between fauna and flora.

It is also likely to significantly degrade the cultural values and traditional use of country by the area's Traditional Owners.

This fence is not an isolated farm boundary fence. It is a 500 -730 km barrier, and permanently scrub-rolled buffer, specifically designed to reduce the movement of medium and large sized native fauna and feral dogs. The fence design includes a base mesh (lapwire), intentionally designed to prevent animals burrowing under the fence. A top, barbed wire will lead to many emus, kangaroos, and other fauna becoming entangled in the fence. These species play important ecological roles which will be prevented by the fence.

We believe there is insufficient knowledge and no research undertaken on the impact of this Proposal on overall ecological connectivity, on reducing the viability of existing fauna populations, on the specific importance of emu movement and on predator-prey relationships, including the role of dingoes in controlling feral predators. Research elsewhere in Australia suggests that the Proposal will cause a significant impact on native fauna, including conservation significant species through changing predator-prey relationships on either side of the fence. This risks the viability of local populations of conservation significant species. The Fence also comprises the ecological role of emus in transporting seeds over long distances.

It is particularly concerning for us that this proposal, if implemented, will significantly reduce ecological connectivity at the very time that climate change is increasing the need for strong connectivity to give species and systems the ability to adapt.

The proponent has so far failed to conduct a public assessment of alternatives for this Proposal and has moved into a design and construction phase with no certainty that public environmental

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Conservation Council of Western Australia
ccwa
Look forward

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It is particularly concerning for us that this proposal, if implemented, will significantly reduce ecological connectivity at the very time that climate change is increasing the need for strong connectivity to give species and systems the ability to adapt.

The proponent has so far failed to conduct a public assessment of alternatives for this Proposal and has moved into a design and construction phase with no certainty that public environmental

assessment will be sought, as has been the case with other upgrades and extensions already undertaken by the proponent.

We submit that the Proposal will cause significant impact on the environmental values of the Great Western Woodlands, the Conservation Estate and remnant bushland in south coast agricultural zone and should be formally assessed at a high level under the Environmental Protection Act.

Our referral includes:

- Proforma Information, Referral of a Proposal by a Third Party;
- Attachment 1: State Government Media Release – Minister Terry Redman, 19 December 2011
- Attachment 2: Proposal Background and details;
- Attachment 3: Evaluation of alternatives
- Attachment 4: Potential impacts on vegetation and flora
- Attachment 5: Potential impacts on fauna
- Attachment 6: Potential impacts on rivers, creeks and wetlands
- Attachment 7: Potential impact on significant areas and/or land areas
- Attachment 8: Potential impacts coastal zone areas
- Attachment 9: Potential impacts on social surroundings
- Attachment 10: Ability of current processes to address proposal's potential environmental impacts
- Attachment 11: Don't fence them in – Full Background Brochure. (Separately bound)
- Attachment 12: Report for the State Barrier Fence Esperance Extension Scoping Study, by consultants GHD (GHD, 2012). (Separately bound)

We believe that the Proposal is likely to have a significant effect on the environment, given the:

- values, sensitivity and quality of the environment which is likely to be impacted;
- extent (intensity, duration, magnitude and geographic footprint) of the likely impacts;
- consequence of the likely impacts (or change);
- cumulative impact with other projects;
- level of confidence in the prediction of impacts and the success of proposed mitigation;
- (lack of) a strategic planning policy framework;
- (lack of) other statutory decision-making processes which regulate the mitigation of the potential effects on the environment to meet the EPA's objectives and principles for EIA.

The likely significant impacts of the Proposal are not and cannot be addressed through existing processes or regulations and should be formally and publicly assessed under the Environmental Protection Act 1986 (Attachment 10).

We note that the Esperance Extension is being implemented as part of a wider State Government Program, which has seen most of the existing State Barrier Fence substantially upgraded, a 165km extension underway south of Southern Cross, and significant extra dingo baiting occurring in a wide buffer inland of the agricultural areas. In addition to this formal referral, we believe that this wider Program of Upgrades and Extensions to the State Barrier Fence (the Program), as announced by the State Government (e.g. Attachment 1) should also be formally assessed by the EPA. As an indication of the significant impacts of the Program, we have evidence that the Program's dingo trapping program is killing Chuditch (*Dasyurus geoffroii*), a species listed as Vulnerable under the Environment Protection and Biodiversity Conservation Act 1999.

Thank you for your attention on this matter.

Yours sincerely

PIERS VERSTEGEN
DIRECTOR
CONSERVATION COUNCIL OF WESTERN AUSTRALIA

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

EPA REFERRAL FORM THIRD PARTY

Referral of a Proposal by A Third Party to the Environmental Protection Authority under Section 38(1) of the *Environmental Protection Act 1986*.

PURPOSE OF THIS FORM

Section 38(1) of the *Environmental Protection Act 1986* (EP Act) provides that any person may refer a significant proposal (one that is likely to have a significant effect on the environment) to the Environmental Protection Authority (EPA) for a decision on whether or not it requires assessment under the EP Act. This form sets out the information requirements for the referral of a proposal by a third party.

Referrors are encouraged to familiarise themselves with the EPA's *General Guide on Referral of Proposals* [see Environmental Impact Assessment/Referral of Proposals and Schemes] before completing this form.

A referral under section 38(1) by a third party to the EPA must be made on this form. This form will be treated as a referral even though a third party may not be able to provide sufficient information on the proposal to enable to EPA to make a decision on whether or not to assess the proposal. Generally, the EPA will obtain additional project information from the proponent. The referral form and proponent information will be made available for public comment for a period of 7 days, prior to the EPA making its decision on whether or not to assess the proposal.

CHECKLIST

Before you submit this form, have you

	Yes	No
Completed all applicable questions in the form	X	
Completed the Referror's Declaration	X	

Following a review of the information presented in this form, please consider the following question. (A response is Optional)

DO YOU CONSIDER THE PROPOSAL REQUIRES FORMAL ENVIRONMENTAL IMPACT ASSESSMENT?

X YES ☐ NO ☐ NOT SURE

IF YES, WHAT LEVEL OF ASSESSMENT?

☐ ASSESSMENT ON PROPONENT INFORMATION

X PUBLIC ENVIRONMENTAL REVIEW

THIRD PARTY REFERROR DECLARATION (To be completed by the Referror)

I, PIERS JOHN VERSTEGEN, *(full name)* submit this referral to the Environmental Protection Authority for consideration of the environmental significance of its impacts.

Signature	Name (print) PIERS VERSTEGEN
Address 20 Alma St. West	Perth 6005
Date 3/4/13	

1. PROPONENT, PROPOSAL AND LOCATION INFORMATION

1.1 PROPONENT

Name	Department of Agriculture and Food Western Australia (DAFWA)
Joint Venture parties (if applicable)	N/A
Postal Address	3 Baron-Hay Court, South Perth Western Australia 6151
Key proponent contact for the proposal • Name • Address • Phone • Email	Mr Viv Read Director, Invasive Species 3 Baron-Hay Court, South Perth Western Australia 6151; Phone: + 61 (0) 8 9368 3561 Viv.Read@agric.wa.gov.au

1.2 PROPOSAL

Title	State Barrier Fence Esperance Extension
Description	The construction of at least 500 km of new fencing to extend the State Barrier Fence from near Ravensthorpe to the Cape Arid area east of Esperance. The fence is to be constructed to wild dog standard to a height of 1.35 m, and includes a lapwire skirt to prevent burrowing under the fence. The fence is designed to prevent movement of native and introduced animals southwards onto farms and remnant vegetation in the south coast agricultural region.

1.3 LOCATION

Name of the Shire in which the proposal is located	Shire of Ravensthorpe, Shire of Esperance
For urban areas – • street address • lot number • suburb • nearest road intersection	N/A
For remote localities – • nearest town • distance and direction from that town to the proposal site	Ravensthorpe, distance to fence alignment option of Least Constraint is approximately 30 km. Salmon Gums, distance to fence alignment option of Least Constraint is approximately 30 km.

2. POTENTIAL ENVIRONMENTAL IMPACTS

Use the following list of environmental elements to set out your concerns in relation to the potential impacts of the proposal and in explanation of your judgement that the proposal is significant in terms of the *Environmental Protection Act 1986*:

Element of the environment	Potentially significant impact
Flora and vegetation • Clearing of native vegetation • Rare or priority flora • Threatened Ecological Communities	See Attachment 4.
Fauna • Fauna or fauna habitat • Specially Protected (Threatened) fauna	See Attachment 5.
Rivers, creeks, wetlands and estuaries • Proximity of development to waterways	See Attachment 6.
Significant areas and/or land features • National Park or Nature Reserve • Environmentally sensitive areas • Significant natural land features (caves, ranges, etc)	See Attachment 7.
Coastal zone areas • Proximity of proposed development to coastal area • Significant landforms, eg beach ridge plain • Mangroves	See Attachment 8
Marine areas and biota • Sensitive benthic communities, eg seagrasses, coral reefs, mangroves • Marine conservation reserves • Recreation or commercial fishing areas	Not applicable to this Proposal
Water supply and drainage catchments • Proclaimed groundwater or surface water protection area • Underground Water Supply and Pollution Control area • Public Drinking Water Supply Area	It is understood that there are no gazetted water supply catchments within the Project Area.
Pollution – discharge of • Noise • Gaseous emissions • Dust • Liquid effluent • Solid waste	The Proposal currently includes the construction of river crossings, and may result in increased erosion and soil discharge in these areas. Soil erosion will be exacerbated by the channelling and concentration of large number of animals, particularly emus, against the fence.
Greenhouse gas emissions	The Proposal will increase the emissions of Greenhouse Gases through the clearing of approximately 1000 ha of native vegetation, and the associated loss of soil carbon.
Contamination	No known significant impacts, other than the potential for animal carcasses, trapped against the fence to be washed into rivers.
Social surroundings • Aboriginal ethnographic or archaeological significance • Site of high public interest, eg recreation, scenic • Goods transport affecting amenity	See Attachment 9.

Attachment 1: State Government Media Release, 19 December 2011

Closing the gap in fight against wild dogs, Redman

Author: Terry Redman , Published on: 19-December-2011 (Downloaded 2 April 2013 from: http://www.mediastatements.wa.gov.au/pages/StatementDetails.aspx?listName=StatementsBarnett&StatId=5270

The State Government has committed a further $5million to help regional communities combat wild dogs.

Agriculture and Food Minister Terry Redman said Royalties for Regions funding would go towards significant upgrades and extensions to the State Barrier Fence.

"This Government has been working closely with industry and regional communities to control wild dogs, which can impact substantially on livestock production and businesses," Mr Redman said.

"The State Barrier Fence is part of a broader strategic approach to protecting rural communities from pests such as wild dogs."

The funding would include construction of 180km of new fencing in the eastern Wheatbelt region, known as the 'Yilgarn Gap', with the shires of Westonia and Yilgarn working closely with the Department of Agriculture and Food to build the new fence.

Funding will also go towards the proposed 'Esperance extension' to the fence. This will include a pilot construction project in one section of the estimated 500km extension.

"The pilot construction project will follow a scoping study to determine the best route for the fence, and the approvals processes. These are overseen by an already established local reference group, which includes the shires of Esperance and Norseman and South Coast Regional NRM," the Minister said.

"Last year, $8.82million of Royalties for Regions funding was allocated towards purchasing the materials required for construction of fence extensions and the appointment of eight additional doggers, now operating across the agricultural and pastoral region."

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Attachment 2: Proposal background and details

In 2010 the Government of Western Australia, publicly committed and part-funded the construction of an extension to the State Barrier Fence from east of Ravensthorpe to Cape Arid, east of Esperance (Figure 1) referred to as the Esperance extension or the Proposal. This is part of a government program to upgrade and extend the State Barrier Fence to 'wild dog standard' (Redman & Faragher, 2010).

A Scoping Study has been completed for the Esperance Extension and consultation with potentially affected landowners has occurred. Construction of a 30 km pilot section of the Esperance extension was announced in 2010 and funding of $5.17 million has been made available for the Program.

The State Barrier Fence currently extends from north of Kalbarri to east of Ravensthorpe. The Esperance extension to the State Barrier Fence is in response to campaigning by a small number of farmers who are concerned over the impact (actual or perceived) of feral dogs, dingos and emus on their farms.

Figure 1: Location of State Barrier Fence and the proposed Esperance Extension

In September 2012, the Department of Agriculture and Food Western Australia released the *Report for the State Barrier Fence Esperance Extension Scoping Study,* by consultants GHD (GHD, 2012). This report is referred to as the Scoping Study, and is included as Attachment 12.

The Scoping Study presents 'the expected primary environmental impacts of the Esperance Extension of the SBF and recommends an alignment option(s) for the purposes of consultation and to inform the next phase of planning." (GHD, 2012, p2). The Scoping Study identifies an option of Least Constraint and has recommended (to DAFWA) that this option is accepted as the preferred alignment (GHD, 2012, p viii.). The option of Least Constraint is shown in Figure 1 above. In arriving

at the option of Least Constraint, up to three alignments were assessed for various segments of the fence (see Figure 1 in GHD, 2012).
The fence to be constructed on the alignment will be 1.35 m high mesh fence including a top barbed wire strand and fabricated mesh base (lapwire) to prevent burrowing of animals. A sample view of the existing State Barrier Fence, east of Hyden is shown in Figure 2. An example of lapwire recently used on one section of the existing SBF is shown in Figure 2.

Figure 2: State Barrier Fence east of Hyden. Note the insert shows the lapwire in this location constructed with small aperture 'chicken wire'.


Figure 3: Example of lapwire on the State Barrier Fence without 'chicken wire'

The fence is specifically designed to prevent the movement of the following native and introduced* species from one side of the fence to the other:

- Emu *(Dromaius novaehollandiae)*
- Dingo *(Canis lupus dingo)*
- Western Grey Kangaroo ***(****Macropus fuliginosus)*
- Red Kangaroo ***(****Macropus rufus)*
- Feral Dog* *(Canis familiaris, Canis familiaris dingo* and hybrids)

Significantly, the fence impacts on the movement of other large and medium sized native species (See Attachment 5).

It is understood that the final approval of Cabinet/Minister for Agriculture and Food is now being sought by the Department of Agriculture and Food WA. It is critical that formal environmental impact assessment of this significant proposal occurs prior to further commitments and investments are made by the Department of Agriculture and Food WA.

Attachment 3: Evaluation of alternatives

This referral of the Proposal has been made because of its likelihood to be a significant proposal causing substantial impacts on biodiversity and the ecological processes that support biodiversity. However, it our understanding that reasonable alternatives exist to construction of a wildlife barrier fence, and that these alternatives have not been fully and publicly assessed.

The intended purpose of the Proposal is to reduce or prevent the movement of dingoes, feral dogs and emus onto adjacent farms of the south coast agricultural zone. However, there has been no demonstration that alternatives to address the real or perceived problems of farmers could be implemented to achieve the same result.

- For example, an alternative may exist to conduct a strategic feral dog control program targeted to where the feral dog occurrences are observed. It is our understanding, through anecdotal evidence from farmers operating in the vicinity of the Project Area, that feral dogs are not observed along large parts of the area to be fenced as part of the Proposal.

- Another alternative is the use of Livestock Guardian Dogs (LGDs) may be one such option. A recent survey of 150 livestock producers across Australia found that 65.7% reported that predation ceased after obtaining LGDs, and a further 30.2% reported a decrease of predation (van Bommel and Johnson 2012). The survey suggested "The *cost of obtaining a LGD is returned within 1–3 years after the dog starts working*". The authors of the survey concluded that "*Provided a sufficient number of LGDs are used, they can be as effective in protecting livestock from predators in Australia when ranging freely on large properties with large numbers of livestock as they are in small-scale farming systems. LGDs can provide a cost-effective alternative to conventional predator control methods in Australia's extensive grazing enterprises, potentially reducing or eliminating the need for other forms of control.*"

Attachment 4: Impacts on vegetation and flora

Currently known potential impacts of the Proposal include:

a) Clearing of at least 1057 ha of native vegetation, most of which is in Excellent condition – (GHD, 2012, p viii); Longest possible fence alignment would lead to clearing of 1437 ha of native vegetation (estimated based on fence length of 751.0 km – (GHD, 2012);

b) Direct loss of a wide diversity of vegetation associations. In broad terms, 22 vegetation associations have been mapped within the Project Area (GHD, 2012). These are broad vegetation units and may only be generally indicative of impact on vegetation diversity;

c) Possible direct impact on at least eleven (11) priority flora (GHD, 2012);

d) Possible direct impact on some or all of the ten (10) Priority Ecological Communities potentially occurring within the Project Area (GHD, 2012, p 30);

e) Possible direct impact on Declared Rare Flora, *Conostylis lepidospermoides*, within the Project Area and a population of *Rhizanthella gardneri* located south west of Rawlinson Road and east of the Oldfield River (GHD, 2012, p 16);

f) Further separation of bushland in the south-coast agricultural region from the largely unfragmented areas of the Great Western Woodlands;

g) Increased risk of introduction and spread of weeds in the vegetation in the vicinity of the Proposal, due to increased vehicular movements and regular scrub-rolling to protect the Fence. The Scoping Study confirms that "much of the Project Area contained (sic) undisturbed vegetation in excellent condition (GHD, 2012, p 28).

h) Increased risk of introduction and spread of dieback, Phytophthora, in the vegetation in the vicinity of the Proposal, due to the same reasons as (g) above. Areas within the 400 – 600 mm rainfall zone are susceptible to dieback. Dieback has been positively identified some locations within the Project Area (GHD, 2012). Dieback mapping and interpretation should occur in all bushland within 200 m of the Proposal within the 400 mm + isohyet. Many of these susceptible areas are likely to be dieback-free.

Key issues

The Proposal's impacts on flora and vegetation are likely to be significant, but are poorly described and understood at this stage due to the low level of field study by the proponent or other parties, including Government.

The precautionary principle should be strictly applied to this proposal. Given the lack of prior field survey in the vicinity of the Proposal, there is a high risk that unsurveyed populations of conservation significant species could occur as a result of construction.

The Proposal crosses through an area of high floral diversity, and passes through numerous vegetation types. During a Level 1 field survey conducted in May 2012, 395 species were recorded on a limited number of sites. A greater number of species would be expected to be identified during the flowering period (GHD, 2012, Appendix G, p 53).

The Proponent has not conducted any (publicly available) Level 2 flora and vegetation survey for the Proposal.

Botanically, all that is known about this part of WA is that it is exceptionally rich, supports many species listed nationally as endangered and is characterised by fine-scale endemism. Botanical surveys in the region have been minimal, with the few surveys undertaken invariably uncovering new or poorly recorded species. This localised occurrence of both plants and animals makes the fence an inherently high-risk development, even if it largely uses existing cleared lines around the farm boundaries. For example, the few remaining known populations of a Priority One species, *Eucalyptus misella*, have already been damaged by agricultural clearing followed by bulldozing and chaining by the Department of Environment and Conservation (DEC) of habitat adjoining farmland in the North Cascades area, north-east of Esperance. To avoid further serious damage to this and other species, comprehensive survey work over a number of different seasons is needed along any proposed fence line.

Attachment 5: Potential impacts on fauna

The Proposal potentially has numerous significant impacts on native fauna, and yet there has been little study or research in Western Australia into the direct and indirect impact of barrier fences, or this Proposal specifically. The Proposal purposely targets large native fauna and feral dogs and prevents their natural movements in response to seasonal and habitat conditions, or to evade predators. At this stage the likely impacts on native fauna have been determined through the available scientific literature and the Scoping Paper (GHD, 2012).

Significant potential impacts of the Proposal are:

1. The Proposal will reduce and prevent the movement of emus between the largely unfragmented bushland of the Great Western Woodlands and remnant vegetation in the south coastal agricultural zone, and via versa.

    a. **Emus are key dispersers of seed.** Emus may exert a *"powerful influence"* over the diversity of vegetation by carrying large amounts of seed while moving long distances (Noble 1975:983). The germination of seeds of some species is also helped by passage through the digestive system of an emu and deposition in droppings (Noble 1975; Noble and Whalley 1978). Chalwell and Ladd (2005: 446) comment that *"With the restriction of the range of emus as a result of agricultural development, a key seed disperser has been lost"*. By restricting emu movement, it is likely the fence extension will adversely affect the health, resilience and diversity of the region's native vegetation communities.

    b. **Movements of large numbers of emus (in the order of tens of thousands) occur in particular seasons where food and water resources become scarce in inland areas.** With the existing State Barrier Fence (SBF) this has happened seven times over the past 40 years (Warr & Diver, 1992).

2. The Proposal will impact on predator-prey dynamics by preventing movement of dingoes. The Proposal is specifically targeted at dingoes and will prevent their movement in the vicinity of the fence.

    a. **Dingoes help maintain balanced population levels.** While maintaining movement and migratory patterns is ecologically important, the imbalance of large native herbivores – kangaroos and emus – due to increased availability of water and feed can be both ecologically and agriculturally damaging. Dingoes, as top order predators, have an important role in restoring and maintaining balanced populations, and have been shown to play a part in in controlling populations of native herbivores (Terborgh et al 1999; Letnic et al 2011a). Studies on both sides of the Eastern Australian Dingo Fence have shown that numbers of kangaroos and emus are greatly reduced in the presence of dingoes (Caughley et al 1980; Letnic et al 2009). Any ecological assessment of the fence Proposal needs to consider how it would affect the balance between predators, such as dingoes, and grazers such as kangaroos and emus.

    b. **Dingoes reduce predation by cats and foxes.** Dingoes are the top predator in the landscape (excluding humans), and intact and functioning packs of dingoes can play an important role in reducing cat and fox predation on wildlife (Ritchie and Johnson 2009; Letnic et al 2011a; Letnic et al 2011b). By preying on cats and foxes and

excluding them from hunting sites dingoes are likely to protect small- to medium-sized mammals (Letnic 2009, 2011a), such as Woylies, which persist precariously in the Great Western Woodlands. Mammals of this size have been disproportionately threatened since European colonisation, and so are now of great conservation importance (Burbidge and McKenzie, 1989). Many details of these ecological interactions are not yet well understood, so opportunities for investigating them at various scales and in different ecological regions are important. The interface of the WA agricultural zone and the Great Western Woodlands presents an opportunity for large-scale scientific investigations into the role of top-order predators, native and invasive, in the landscape.

3. The Proposal will be a barrier for other large, flightless fauna that will be too big to pass through the fence mesh and which cannot pass over the fence (GHD, 2012, Appendix G, p 38). Other native species that may have their movement physically prevented by the fence mesh include:
    a. Western Grey Kangaroo ***(****Macropus fuliginosus)*
    b. Red Kangaroo ***(****Macropus rufus)*
    c. Black Gloved (Western Brush) Wallaby *(Macropus irma)*
    d. Woylie (Bettongia pencillata ogilbyi)

4. Proposal will cause the direct death of native wildlife by entanglement, such as snakes, other reptiles, kangaroos and emus (e.g. as outlined in GHD, 2012, Appendix G, p 50). This is particularly of concern in regard to the Proposal's use of a top barbed strand, and the lapwire installed at the base of the fence to prevent animals burrowing under the fence (See inset Figure 2 and Figure 3).

5. Significant reduction of connected habitat and the construction of a new physical barrier across habitats; It is unclear how much native vegetation currently connected to the largely unfragmented portion of the Great Western Woodlands will be separated by the Proposal. An assessment of this impact is critical, and should include site specific survey and research.

    a. **The Proposal largely ignores the importance of connectivity.** The principles of connectivity of habitats, populations and processes are now part of best scientific practice in conservation biology and restoration ecology, yet the State Barrier Fence aims to reduce ecological connectivity. For example, the southward movement of tens of thousands of emus in certain seasons is one of Australia's greatest examples of wildlife migration, yet the fence is specifically designed to cut off these migrations. While the Australian Government is a signatory to and has supported the Convention on the Conservation of Migratory Species of Wild Animals, the Convention is largely focused on migrations that cross international boundaries. There has been little parallel action in Australia to legally protect our own migratory species and processes.

    b. The fence counters major regional and national efforts to re-establish landscape connectivity,[i] and conflicts with objectives of the Federal Government's National Wildlife Corridors Plan.

6. **The Proposal undermines adaptation to climate change**. With intense international focus on restoring ecological connectivity to enable species and genetic material to move in response to climate change, there can be no justification for deliberately preventing the movement of

species across their original range. It is particularly unwise to do so for a key species like the emu, with its seed dispersal functions.

a. Nineteen leading scientists have worked with climate change data for the Great Western Woodlands to develop a conceptual framework for assessing the risk and effectiveness of various management options (Prober et al 2011). They identified relative intactness as one of the attributes that will enable the Great Western Woodlands to survive climate change better than more fragmented areas. Their predictions clearly identify the small 'jagged edge' habitat areas immediately north of the Esperance agricultural area as critical for maintaining the habitats of the Great Western Woodlands in the face of climate change (Prober et al 2011: see Fig 3, p 232, which gives high, medium and low range scenarios for 2030, 2050 and 2070). Alarmingly, the proposed Esperance fence extension dissects this crucial part of the Great Western Woodlands.

7. **Based on all of the above potential impacts, the Proposal has a largely unknown impact on some or all of the eleven (11) fauna species listed as endangered or vulnerable** under the Environment Protection and Biodiversity Conservation Act that are occur along the route of the Proposal (Table 1). The Scoping Paper outlines that where the Proposal "fragments habitat and isolates fauna populations there is the risk that these small populations will be unviable into the future (GHD, 2012, Appendix G, p 39).

Table 1: Fauna species listed as endangered or vulnerable under the EPBC Act that occur along the route of the proposed Esperance Extension

Species	**Presence**	**EPBC status**
Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris)*	Present	Endangered
Western Ground Parrot *(Pezoporus wallicus subsp. Flaviventris)*	Eastern end	Critically Endangered
Woylie (*Bettongia penicillata ogilbyi)*	Sighted in Great Western Woodlands in recent years	Endangered
Dibbler (*Parantechinus apicalis)*	Likely on western end	Endangered
Red-tailed Phascogale (*Phascogale calura)*	Likely on western end	Endangered
Western Bristlebird (*Dasyornis longirostris)*	Likely on western end	Vulnerable
Malleefowl (*Leipoa ocellata)*	Common	Vulnerable
Western Whipbird (eastern) (*Psophodes nigrogularis leucogaster)*	Common on western end	Vulnerable
Chuditch, Western Quoll (*Dasyurus geoffroii)*	Present	Vulnerable
Dayang, Heath Rat (*Pseudomys shortridgei)*	Likely on western end	Vulnerable

Key issues

The Proposal is specifically designed to prevent the movement of fauna. With the exception of feral dogs, the species being targeted by the Proposal are native wildlife, and each plays a distinct and important ecological role in the wider region. Apart from flagging, in general terms, that the Proposal is likely to have impacts on native fauna, the Proposal's Scoping Paper provides no indication as to the magnitude of the impact, or the scientific basis of the stated claims. Full public assessment of the Proposal's impacts on the fauna and ecology of the southern parts of the Great Western Woodlands, and the remnant bushland of the south coast agricultural areas should occur.

Attachment 6: Potential impacts on rivers, creeks, and wetlands

The Project Area traverses five rivers (Oldfield River, Young River, Lort River, Thomas River and Kennedy River and a further two identified drainage lines (GHD, 2012) . The Proposal may include the construction of the fence across these rivers, or the use of wings to reduce the impact of the fence on the river bed.

The Proposal crosses four wetland systems: Peak Charles system, Kumarl Lake King, Salmon Gums and Lake Herbert (GHD, 2012). No detailed mapping of wetlands potentially within the fence alignment has been carried out, and so it is possible that other wetland systems will be directly impacted by the Proposal.

It is unclear what impact the Proposal may have on river and wetland systems.

Should the fence be constructed through river beds then this will create a new barrier across important ecological connections between the Great Western Woodlands and the south coast agricultural areas.

The impact of the Proposal on animal movement and land and soil resources in the vicinity of rivers and wetlands should be fully assessed.

Attachment 7: Significant areas and/or land features

There are numerous significant areas and land features within the Proposal Area, the most important of which is the Great Western Woodlands, the remnant bushlands within the adjacent agricultural areas, and protected areas. The Proposal crosses the southern extent of the Great Western Woodlands and will create a new 500 – 730 km fixed barrier across the landscape.

Great Western Woodlands

The extension will damage the values and integrity of the GWW, a key part of an internationally-recognised biodiversity hotspot.

The **Great Western Woodlands** (GWW) is a 16 million hectare area of woodlands and heathlands interspersed with salt lakes. It represents the largest intact remaining Mediterranean habitat in the world. They have gained this status due to the loss or degradation of other major woodlands, such as Africa's Sahel and the box woodlands of eastern Australia.

The GWW is home to more than 20% of all Australia's known plant species and remains a unique haven for a community of animal species that are now threatened elsewhere in Australia. The current connection between GWW and areas to the south provides the main ecological connection between the forests of the south west and the arid-zone ecosystems of the Australian interior. It is recognised as a nationally significant ecological corridor in the National Wildlife Corridors Plan (Commonwealth of Australia, 2012).
However, the Great Western Woodlands themselves have suffered, and will continue to suffer, some loss of habitat through development of high-value mining projects. The rate of cumulative impacts has increased in the past decade, and the proposed fence will significantly add to this, for little if any economic benefit.

The location of the proposed fence, and the southern extent of the Great Western Woodlands, are within the internationally recognised south-west biodiversity hotspot. One of the definitive works on botanical richness and species turnover in the hotspot (Burgman 1988) involved survey and sampling of areas just north of the Esperance fence extension. It found extremely high levels of species richness and turnover, and that *"rare plants in this region exist in small geographic patches"*. It was recommended that *"reserves must include replicates of habitats at intervals no greater than 15 km simply to accommodate the more common mallee species"* (Burgman 1988, pages 426-7). This systematic, science-based approach to providing basic levels of protection to the species of the area has not been implemented. Regardless of the route chosen for the proposed fence, it will damage plant species and communities worthy of high levels of protection.

Reserves and conservation areas

The Scoping Study has identified eight (8) nature reserves and one (1) national park that occur within 100 m of the 'study alignment' (GHD, 2012, p 15) (Table 2).

The likely impact of the fence in proximity to these nature reserves and the Cape Arid National park is considered significant as the Proposal is specifically designed to obstruct and prevent the free movement of fauna.

Note that the list does not include proposed future conservation reserves as outlined in DEC's statuary South Coast Regional Management Plan (1992-2002) and the draft (but not yet released by the Minister) Esperance and Recherche Parks and Reserves Management Plan (GHD, 2012).

The presence of a number of sites of significance to Aboriginal People along the Fence is discussed in Attachment 9.

Table 2: Nature Reserves and National Parks within 100 m of the Proposal

Nature Reserve or National Park		Area
a)	Beaumont Nature Reserve R6975	7,082 ha
b)	Un-named Nature Reserve R7510	1,008 ha
c)	Clyde Hill Nature Reserve R9172	1,670 ha
d)	Un-named Nature Reserve R5975	11,571 ha
e)	Mount Key Nature Reserve R9897	609 ha
f)	Un-named Nature Reserve R7999	131 ha
g)	Cheadanup Nature Reserve R 186	7,139 ha
h)	Niblick Nature Reserve R9500	839 ha
i)	Cape Arid National Park	278,184 ha

Attachment 8: Coastal zone areas

At its southern terminus, the Proposal potentially impacts on the coastal zone, west of Cape Arid National Park.

Three options for end points of the fence are presented in the Scoping Study.

The Coastal Endpoint option, where the fence terminates on a granite outcrop on the coastline raises numerous issues with respect to Aboriginal Heritage, ecological impact, three watercourse crossings and placement of structures in an unstable dune environment. Selection of the Coastal Endpoint option would be a significant, avoidable impact of the Proposal.

It is unclear as to whether the Proponent will construct the fence to the Coastal Endpoint, Median Wing Endpoint, or Northern Wing Endpoint.

Attachment 9: Potential impact on social surroundings

The Proposal is located within the traditional lands of two groups of Aboriginal People: the Ngadju and the Esperance Nyungars.

The Ngadju had their Native Title Rights to their lands recognized by the Federal Court of Australia on 21 December 2012.

The Proposal is likely to have a significant impact on the unencumbered traditional use of country. It would prohibit free movement across and along the fence alignment, and trespassers risk prosecution. It is understood that the Claim groups representing the Traditional Owner s have not given permission with regard to the Proposal and its impact on their traditional use of their homelands

In terms of archeological and mythological values, the Scoping Study conducted a Desktop Survey which identified five (5) registered and four (4) other indigenous heritage sites within 100 m of the Project Area (total of nine sites). Two of the Registered Sites are the Young River and Oldfield River, and a third site, Boyatup Hill is registered as a 'Protected Area' under Section 19 of the Aboriginal Heritage Act. All of the recorded sites are listed in Table 10 of GHD (2012).

Appendix I, p 2 of the Scoping Study notes that 'there are no other Aboriginal heritage sites or places affected by (the Proposal) as it is currently planned". Yet Appendix I, p 3 states that "several sections of the State Barrier Fence Esperance Extension Proposal are yet to be subject to rigorous archaeological and ethnographic enquiries ……".

Like the reliance on desktop surveys for flora and fauna, we are concerned that the assessment of impact on Indigenous heritage values has been largely reliant on desktop studies. The Proposal has the potential to significantly restrict the traditional use and access to country by Aboriginal People. It should be subject to full and public environmental assessment.

Attachment 10: Ability of current processes to address proposal's potential environmental impacts

This referral raises numerous significant potential environmental impacts which can only be addressed through formal environmental impact and cannot be managed through other Government processes and approvals. The following highlights a number of these potential impacts and prevailing approaches to their management.

1. **Impact on the dispersal of seed by emus across vast distances. –** Little information has been provided by the Proponent as to significance of this potential impact. Current information indicates that the movement of emus is a key ecological process. The proponent is unlikely to assess this potential impact unless required to under formal environmental assessment.
2. **Impact on predator-prey relationships by preventing the movement of dingoes.** – As indicated in Attachment 5, dingoes are likely to help maintain balanced fauna populations and reduce predation by cats and foxes. The Scoping Paper for the Proposal indicates that 'The fence has the potential for alteration of predator behaviour such as preferential predation along fence lines and increased predation on native species' (GHD, 2012). This is a complex issue and can only be addressed through well-designed, peer-reviewed research and environmental impact assessment.
3. **Impact on conservation-significant species.** The Proposal has a largely unknown impact on some or all of the eleven (11) fauna species listed as endangered or vulnerable under the Environment Protection and Biodiversity Conservation Act that are occur along the route of the Proposal (Table 1). A key requirement is to conduct professional fauna surveys along the Proposal Area to establish which of these species occur in the vicinity of the Proposal, and how the Barrier will impact on their movements, populations and home ranges. The Scoping Paper for the Proposal states that 'Further surveys will be required to determine the presence of significant species along the alignment, or within areas of habitat that will be fragmented.' (GHD, 2012). These surveys must be conducted to determine the extent and significance of the Proposal's impact on conservation-significant species. Only formal environmental impact assessment can be used to ensure that these studies are conducted and the results used to establish the environmental acceptability of the Proposal (or not) , or modify the Proposal accordingly.
4. **Impact on ecological connectivity.** The proposal is inherently designed to reduce ecological connectivity, including between the Great Western Woodlands and bushland remnants in the south coast agricultural zone. Whilst Part V (Clearing Regulations) of the Environmental Protection act can address direct impacts on vegetation, it cannot adequately address the scale and impact of loss of ecological connectivity across the entire south-west of Australia. This needs to be address through formal environmental impact assessment.
5. **Potential reduction in capacity to adapt to climate change.** The Proposal is located in a crucial part of the Great Western Woodlands on the interface with the south coast agricultural zone. Regardless of the location of the final alignment, there is peer-reviewed research which indicated that this part of the Great Western Woodlands is critical for adaptation of flora and fauna in the face of climate change (Prober *et al* 2011) and (See Attachment 5).
6. **Impact on protected conservation areas and the Great Western Woodlands.** As described in Attachment 7 (significant areas), the Proposal occurs within an area of outstanding botanical richness and turnover (Burgman 1988). Further, the Proposal area occurs within 100 metres of eight (8) nature reserves and one (1) national park (GHD, 2012, p 15). An assessment of the environmental impact on these public conservation assets should occur in the public arena via formal environmental assessment.

7. **Impact on cultural values – Traditional Owners.** The Proposal has the potential to significantly impact on the use and access to country by Traditional Owners. For example, the Ngadju People have only recently granted Native Title Rights over their traditional homelands, including approximately one-third of the area in which the Proposal is located. Knowledge and documentation of their spiritual and archaeological connections to Country (in agency records) is likely to be scarce, and difficult to incorporate into agency decision-making processes. Formal environmental assessment will ensure that these environmentally-based cultural values can be given due regard in an open public process.
8. **Impact on cultural values – local occurrences of species.** The Proposal has the potential to significantly impact on local occurrences of fauna, including conservation significant species. There is scant information on the local distribution of species along the Proposal Area as demonstrated in Attachment 5 and the proponent's Scoping paper (GHD, 2012). Anecdotal evidence gathered by the Non-Government Sector, including Gondwana Link, of the general presence of some conservation significant species within the Proposal Area is included in Table 1, Attachment 5. The assessment of the Proposal's likely impact on these cultural values is only possible within Part IV of the Environmental Protection Act 1986.

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Attachment 11: Don’t Fence them in.

(Separately bound copy included)

Attachment 12

Report for the State Barrier Fence Esperance Extension Scoping Study, by consultants GHD (GHD, 2012).

(Hardcopy not provided due to size. Copy included on CD)

DON'T FENCE THEM IN

THE EXTENSION AND UPGRADE OF THE WA STATE BARRIER FENCE

A BARRIER TO COMMON SENSE

THE EXTENSION AND UPGRADE OF THE WA STATE BARRIER FENCE

A BARRIER TO COMMON SENSE

The WA Government is beginning a massive infrastructure project which will harm wildlife in and adjoining the Great Western Woodlands. The project was announced in April 2010, without any public consultation or independent environmental or economic assessment or review of alternatives. The existing 1,170 km State Barrier Fence is being substantially modified, and a 160 km extension is already being constructed. A further extension, of up to 730kms, is planned to cross woodlands and wildlife habitats from east of Ravensthorpe to Cape Arid, east of Esperance (see map on page 3). A small number of farmers have lobbied for the construction of the fence to stop emus, dingoes, other native wildlife and feral dogs from entering their properties. The WA Minister for Agriculture, Terry Redman, has already committed over $5 million to support construction of this Extension. The full cost of the proposed fence is unclear, but would likely run to tens of millions of dollars for construction, with significant ongoing maintenance costs.

The State Barrier Fence causes significant deaths amongst migrating emus

The program of State Barrier Fence upgrades and extensions should not continue. The program is cruel, unscientific and uneconomic. Instead, funding already allocated should be redirected to developing alternative solutions which equitably support both the environment and agriculture.

This document has been published by Gondwana Link, Pew Environment Group Australia, The Wilderness Society, The Conservation Council of Western Australia, BirdLife Australia, and the Wildflower Society of Western Australia to raise awareness of the ecological impacts of the proposed upgrades and extensions to the State Barrier Fence. Published December 2012, Perth Western Australia.

THE STATE BARRIER FENCE EXTENSION: CRUEL, UNSCIENTIFIC AND UNECONOMIC

This document presents the case for an open and independent examination of the proposal to extend, upgrade and maintain WA's State Barrier Fence, particularly the proposed Esperance extension. It also exposes severe failings in the processes within the WA government that have enabled this proposal to reach an advanced stage.

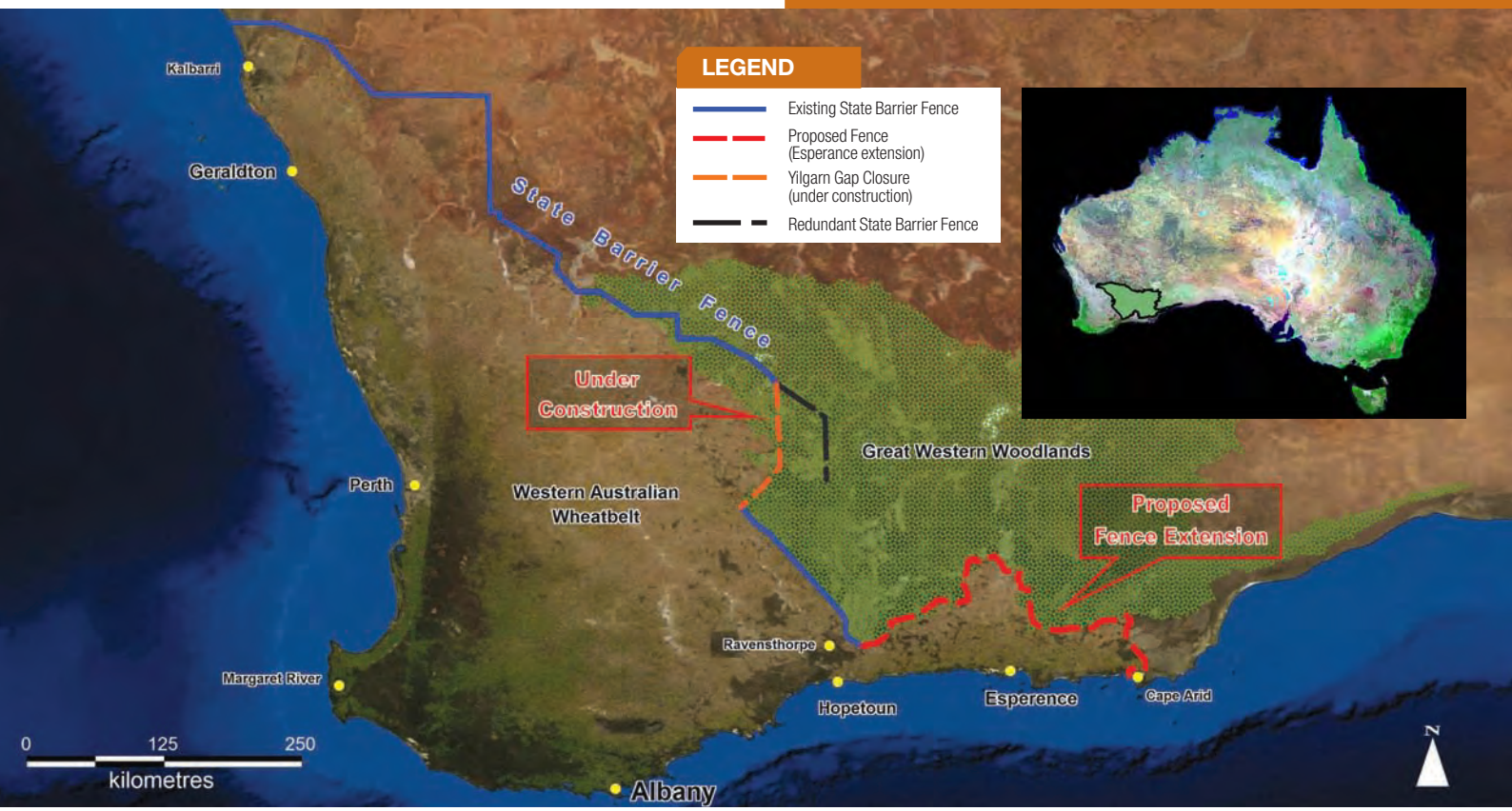
The core issue is whether 21st century agriculture is prepared to coexist with Australia's native wildlife or whether it sees a future where agriculture is somehow barricaded against the natural flows and rhythms of the continent, with native wildlife dealt with cruelly through industry-led but taxpayer-funded "invasive species" programs.

The government proposal to significantly upgrade and extend the current Barrier Fence shows that much agricultural thinking in WA remains trapped in its 19th century origins. It also highlights how important policy can be hijacked by vote-winning exercises that have little or no public policy merit.

As a result of these failings, the WA Government has committed to an extended and upgraded fence without a thorough evaluation of options, impacts or even costs. An initial review by The Wilderness Society, Gondwana Link and Pew Environment Group has highlighted the following points of concern.

Existing and proposed sections of the State Barrier Fence would significantly restrict wildlife movement across the south west of Australia

Existing and proposed sections of the State Barrier Fence would significantly restrict wildlife movement across the south west of Australia



1. THE FENCE CAUSES THE AGONISING DEATHS OF TENS OF THOUSANDS OF NATIVE ANIMALS

It is well documented that the existing State Barrier Fence cuts off and concentrates the flow of tens of thousands of emus during migration years, leading to agonising deaths from starvation, poisoning or shooting. It has been reported that:

> *"since the completion of the upgraded emu barrier fence across the northern and north-eastern extremities of the wheatbelt in the mid-1960s, significant movements of emus onto the fence have occurred in the following years: 1969, 1971, 1976 (at least 90 000 starving birds destroyed), 1989 (50 000 birds congregated), 1994, 1998, 2002 (50 000 birds)".*[1]

A website commemorating the centenary of the State Barrier Fence (1901- 2001) contains this first-hand account of the 1976 emu migration:

> *"One Sunday morning there were 4000 emus reported to be congregated at the Ajana spur fence. By the time I arrived there in the late afternoon there were approximately 10,000 emus there and by Monday morning there were about 20,000 in the mob. That is the type of numbers we had to deal with. Shooting was the only answer, so we shot emus eight days a week. They were so thick that we often shot 20 to 30 per shotgun shot. It was slaughter."* [2]

Other native animals, including kangaroos and wallabies also suffer and die when caught in the fence. While no records appear to exist, it is estimated (based on initial counts of bones in wires of the existing fence) that 1-2 native animals per km are entangled each year in the existing State Barrier Fence. If this estimate is correct, then about 1,755 native animals are killed per year.[3] Animals caught by the legs often hang upside down and survive for some weeks before they die. Despite this, the manager of the fence, WA's Department of Agriculture and Food (DAFWA), appears to have no policy or guidelines on preventing animal cruelty along the fence, either in regard to the occasional mass death of migrating emu flocks or the ongoing wildlife "bycatch" through entanglement. This suggests government disregards community expectations on animal cruelty. [4]

East of Lake Varley this kangaroo was trapped in agony for weeks.

2. THE FENCE TARGETS NATIVE WILDLIFE

Limited information is publicly available, but it appears that four native and one invasive species are targeted by the State Barrier Fence and its proposed extensions: the dingo, emu, Western Grey kangaroo, Red kangaroo and feral dog. "Wild dogs" is the catch-all term used by Government to describe both dingoes and feral dogs, to bolster its case for the fence.

Wildlife species are protected in Western Australia, yet no research appears to have been undertaken to quantify the impact of the proposed fence on vulnerable native species, including small mammals whose habitat will be fragmented and compromised. The one scoping study recently made available (GHD 2012) makes only general and largely unsubstantiated statements about wildlife impacts. If valid research has been undertaken it needs to be made publicly available, preferably through peer-reviewed science journals.

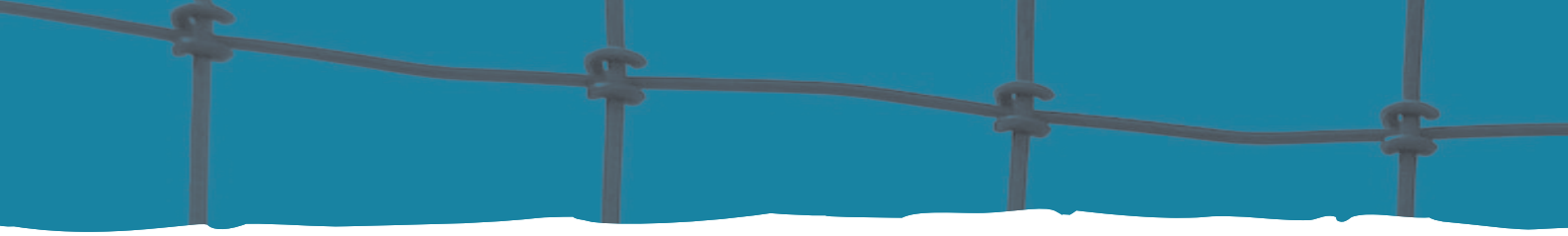
3. THE PROPOSAL FOR EXTENSION IGNORES THE IMPORTANT ECOLOGICAL ROLES OF TARGET SPECIES

With the exception of feral dogs, the species being targeted are native wildlife, and each plays a distinct and important ecological role in the wider region, as summarised below.

Emus are key dispersers of seed. Emus may exert a *"powerful influence"* over the diversity of vegetation by carrying large amounts of seed while moving long distances (Noble 1975:983). The germination of seeds of some species is also helped by passage through the digestive system of an emu and deposition in droppings (Noble 1975; Noble and Whalley 1978). Chalwell and Ladd (2005: 446) comment that *"With the restriction of the range of emus as a result of agricultural development, a key seed disperser has been lost"*. By restricting emu movement, it is likely the fence extension will adversely affect the health, resilience and diversity of the region's native vegetation communities (see also climate change discussion below).

Male emu separated from his chicks on the State Barrier Fence (Photo by Andrew Hobbs).

Dingoes help maintain balanced population levels. While maintaining movement and migratory patterns is ecologically important, the imbalance of large native herbivores – kangaroos and emus – due to increased availability of water and feed can be both ecologically and agriculturally damaging. Dingoes, as top order predators, have an important role in restoring and maintaining balanced populations, and have been shown to play a part in in controlling populations of native herbivores (Terborgh et al 1999; Letnic et al 2011a). Studies on both sides of the Eastern Australian Dingo Fence have shown that numbers of kangaroos and emus are greatly reduced in the presence of dingoes (Caughley et al 1980; Letnic et al 2009). Any ecological assessment of the fence proposal needs to consider how it would affect the balance between predators, such as dingoes, and grazers such as kangaroos and emus.



Dingoes reduce predation by cats and foxes. Dingoes are the top predator in the landscape (excluding humans), and intact and functioning packs of dingoes can play an important role in reducing cat and fox predation on wildlife (Ritchie and Johnson 2007; Letnic et al 2011a; Letnic et al 2011b). By preying on cats and foxes and excluding them from hunting sites dingoes are likely to protect small- to medium-sized mammals (Letnic 2009, 2011a), such as Woylies, which persist precariously in the Great Western Woodlands. Mammals of this size have been disproportionately threatened since European colonisation, and so are now of great conservation importance (Burbidge and McKenzie, 1989). Many details of these ecological interactions are not yet well understood, so opportunities for investigating them at various scales and in different ecological regions are important. The interface of the WA agricultural zone and the Great Western Woodlands presents an opportunity for large-scale scientific investigations into the role of top-order predators, native and invasive, in the landscape. [5]

These scientific findings about dingoes counter the WA Environment Minister's extraordinary statement, issued in support of the proposed fence, that *"wild dogs caused considerable damage to the environment, preyed on native wildlife and destroyed habitats"* (see joint media release, WA Ministers for Agriculture and Environment, 5 April 2010).

4. THE EXTENSION WILL CAUSE UNACCEPTABLY HIGH IMMEDIATE AND LONG-TERM ECOLOGICAL DAMAGE

The existing and proposed State Barrier Fence slices through an area of biologically rich bushland and has many ecological impacts. Some of these are listed below.

The extension will fragment natural ecosystems. While the final route for the Esperance fence extension is yet to be determined, one proposed route would slice through thousands of hectares of intact habitat in the Great Western Woodlands, with up to 300 000 ha of natural woodland left as isolated "remnant bush" in an agricultural zone. This would create significant ecological and management problems in the many smaller bushland areas that would be created. Clearing and scrub-rolling of vegetation along the fence would further degrade and fragment habitat for the smaller species to which the fence itself is not a barrier (Brooker, Brooker and Cale 1999). Even if the Esperance fence extension is placed on farm boundaries to the greatest extent possible, it will slice through a number of river valleys and areas of vegetation on public land, inevitably causing significant fragmentation.

The degrading impacts of fragmentation include:

- an increase in weed infestations, plant disease and fire risk associated with the creation of new access routes to habitats previously relatively undisturbed;
- a reduction of core habitats of high quality and an increase in disturbed habitat of lower environmental value and ecological viability;
- a decline in species-rich communities of habitat specialists in favour of simplified vegetation communities, usually composed of more common "generalist' coloniser species which tolerate disturbed habitats (Radford, Williams and Park 2007); and
- isolation of populations, reducing their genetic vigour over time and their ability to access food and water and survive events such as fire: a well-recognised cause of local extinctions (McArthur and Wilson, 1967).

The likely long term effects of large-scale fences on biological populations in other locations have been noted, with Hayward and Kerley (2009) stating that, *"It is clear that fencing has an inherent risk of leading to a collapse of evolutionary level processes".* [6]

The proposal for extension ignores the importance of connectivity. The principles of connectivity of habitats, populations and processes are now part of best scientific practice in conservation biology and restoration ecology, yet the State Barrier Fence aims to reduce ecological connectivity. For example, the southward movement of tens of thousands of emus in certain seasons is one of Australia's greatest examples of wildlife migration, yet the fence is specifically designed to cut off these migrations.

While the Australian Government is a signatory to and has supported the Convention on the Conservation of Migratory Species of Wild Animals, the Convention is largely focused on migrations that cross international boundaries. There has been little parallel action in Australia to legally protect our own migratory species and processes.

The fence counters major regional and national efforts to re-establish landscape connectivity,[7] and conflicts with objectives of the Federal Government's National Wildlife Corridors Plan.

The extension undermines adaptation to climate change. With intense international focus on restoring ecological connectivity to enable species and genetic material to move in response to climate change, there can be no justification for deliberately preventing the movement of species across their original range. It is particularly unwise to do so for a key species like the emu, with its seed dispersal functions.

Nineteen leading scientists have worked with climate change data for the Great Western Woodlands to develop a conceptual framework for assessing the risk and effectiveness of various management options (Prober et al 2011). They identified relative intactness as one of the attributes that will enable the Great Western Woodlands to survive climate change better than more fragmented areas. Their predictions clearly identify the small 'jagged edge' habitat areas immediately north of the Esperance agricultural area as critical for maintaining the habitats of the Great Western Woodlands in the face of climate change (Prober et al 2011: see Fig 3, p 232, which gives high, medium and low range scenarios for 2030, 2050 and 2070). Alarmingly, the proposed Esperance fence extension dissects this crucial part of the Great Western Woodlands.

The extension will damage the values and integrity of the Great Western Woodlands, a key part of an internationally-recognised biodiversity hotspot. The Great Western Woodlands are now recognised as the largest remaining temperate woodland on earth. They have gained this status due to the loss or degradation of other major woodlands, such as Africa's Sahel and the box woodlands of eastern Australia. However, the Great Western Woodlands themselves have suffered, and will continue to suffer, some loss of habitat through development of high-value mining projects. The rate of cumulative impacts has increased in the past decade, and the proposed fence will significantly add to this, for little if any economic benefit.

The location of the proposed fence, and the southern extent of the Great Western Woodlands, are within the internationally recognised south-west biodiversity hotspot. One of the definitive works on botanical richness and species turnover in the hotspot (Burgman 1988) involved survey and sampling of areas just north of the Esperance fence extension. It found extremely high levels of species richness and turnover, and that *"rare plants in this region exist in small geographic patches"*. It was recommended that *"reserves must include replicates of habitats at intervals no greater than 15 km simply to accommodate the more common mallee species"* (Burgman 1988, pages 426-7). This systematic, science-based approach to providing basic levels of protection to the species of the area has not been implemented. Regardless of the route chosen for the proposed fence, it will damage plant species and communities worthy of high levels of protection.

The extension will cause further vegetation loss. Earlier proposals for the Esperance fence extension favoured a route largely inland from the farm boundaries, across the intact habitat of the Great Western Woodlands. If this was to proceed, we estimate that up to 8 000 hectares of natural vegetation would be permanently cleared or modified, making it one of the largest single land clearing proposals in WA in the past decade. Government was recently presented with a preferred route that would more closely follow farm boundaries, but given the fence would still need to cross river valleys and other natural areas it is still likely some 1 000 - 2 000 ha of clearing could occur (GHD 2012). This remains unacceptably high.

The proposal for extension ignores the presence of significant species. The woodland affected by the Esperance fence extension currently provides vital, relatively intact habitat for threatened wildlife; any new disturbance would diminish their survival prospects. From current knowledge it appears that at least four mammal species declared endangered or vulnerable - the Chuditch, Numbat, Dibbler and Dayang - are present or likely to be present along the proposed routes of the fence, along with bird species such as western whipbird, carnaby's cockatoo and western ground parrot.[8] Other species of endangered and vulnerable fauna probably hold on in small pockets. Botanically, all that is known about this part of WA is that it is exceptionally rich, supports many species listed nationally as endangered and is characterised by fine-scale endemism. Botanical surveys in the region have been minimal, with the few surveys undertaken invariably uncovering new or poorly recorded species. This localised occurrence of both plants and animals makes the fence an inherently high-risk development, even if it largely uses existing cleared lines around the farm boundaries. For example, the few remaining populations of a Priority One species, *Eucalyptus misella*, have already been damaged by agricultural clearing followed by bulldozing and chaining by the Department of Environment and Conservation (DEC) of habitat adjoining farmland in the North Cascades area, north-east of Esperance (see map on page 3). To avoid further serious damage to this and other species, comprehensive survey work over a number of different seasons is needed along any proposed fence line.

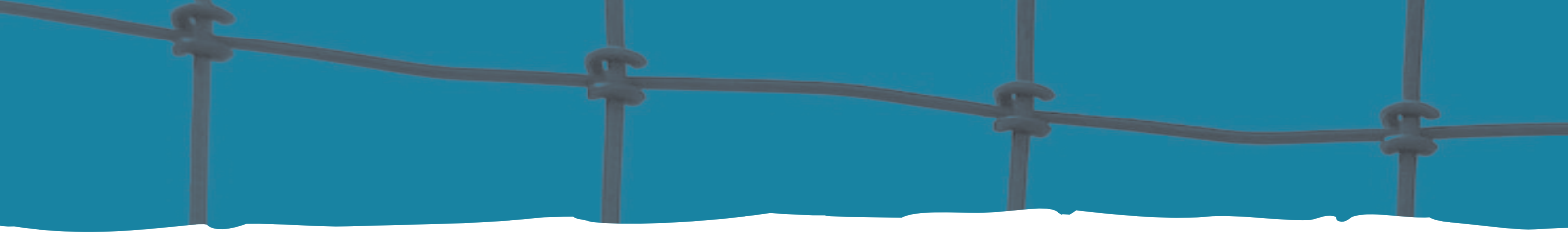
5. NO EVALUATION OF THE EXISTING STATE BARRIER FENCE HAS BEEN UNDERTAKEN

The proposed extension of the State Barrier Fence (the "Esperance fence extension") would run from east of Ravensthorpe to Cape Arid, east of Esperance, along the southern interface between farmland and the Great Western Woodlands. The State Barrier Fence, historically known as the Rabbit-proof Fence, currently stretches about 1, 170 km, between the Pilbara and Ravensthorpe. The WA Government is already constructing a 160km extension in the Yilgarn area, south of Southern Cross (see map on page 3), and is now proposing the Esperance fence extension. The existing fence is 110 year old infrastructure which failed its original purpose, to exclude rabbits from agricultural land. Its benefits have never been objectively evaluated and its ecological impacts have never been assessed, yet the WA Government is planning to lengthen it by around 40 per cent.

6. THERE HAS BEEN INADEQUATE ECONOMIC ANALYSIS OF THE EXTENSION

The WA Government is implementing a policy that assumes the unquestioned right to use public funds, and damage community assets, for private benefit. Serious flaws in the claimed economic benefits of the fence are summarised below.

No evidence-based economic analysis or justification is available. Virtually all the information relating to the "problems" to be solved by the fence appears to be anecdotal and largely sourced from potential beneficiaries. Furthermore, a brief consultant's report commissioned by DAFWA (URS 2007) outlining the economic argument from an agricultural perspective used this anecdotal information as the basis for a cost-benefit analysis that appears sub-standard and without objectivity.



Nonetheless, in July 2012 the Esperance Shire Council circulated material to its farm ratepayers in support of a referendum on the fence, claiming a favourable cost-benefit ratio of 1:2, apparently based on the 2007 URS report (see end of section 6, 'Poor government process', for further details).

It is understood that in early 2012 DAFWA staff conducted an internal analysis which suggested a cost-benefit ratio barely above break-even (J. Ruprecht, pers. comm. May 2012). The assumed costs and geographic extent across which benefits were estimated are not known. As estimated construction costs have increased greatly since 2007, and probably again since May 2012, it is assumed the ratio is now negative even from a purely agricultural perspective.

However, these estimates are inadequate for a matter of significant public importance, which involves a substantial transfer of public funds to the private sector. Independent cost-benefit analysis, which also assesses other options, needs to be undertaken and published.

There are likely to be few beneficiaries of the extension – but how few? It is uncertain how far any agricultural benefit from the fence will extend into the agricultural area. The area of farmland and number of farmers the Esperance fence extension will benefit may have been grossly overstated in farmer workshops and meetings, and in material supplied to Esperance ratepayers. Agricultural damage from dingoes and emus in the Esperance area is not well documented and appears to be almost totally anecdotal. Any data which may exist has certainly not been made publicly available.

In the Ravensthorpe area the existing State Barrier Fence channels wildlife into farmland, but the damage appears restricted to a very small number of farms. Farmer experience over many years from a 120 km gap in the existing State Barrier Fence south of Southern Cross is that any benefit arising from the extension may well be limited to the width of 1-2 farms.

The alleged wider community benefit needs to be documented and discussed publicly. Additionally, significant equity issues exist in relation to farmers elsewhere in WA who also adjoin public lands and who have already financed the construction of their own boundary fences.

Other options were not reviewed openly, if at all. If the public are to fund the building of the Esperance fence extension, they deserve to see hard evidence that a range of options have been considered and/or tried.

The use of Livestock Guardian Dogs (LGDs) may be one such option. A recent survey of 150 livestock producers across Australia found that 65.7% reported that predation ceased after obtaining LGDs, and a further 30.2% reported a decrease of predation (van Bommel and Johnson 2012). The survey suggested *"The cost of obtaining a LGD is returned within 1–3 years after the dog starts working".* The authors of the survey concluded that *"Provided a sufficient number of LGDs are used, they can be as effective in protecting livestock from predators in Australia when ranging freely on large properties with large numbers of livestock as they are in small-scale farming systems. LGDs can provide a cost-effective alternative to conventional predator control methods in Australia's extensive grazing enterprises, potentially reducing or eliminating the need for other forms of control."*

Given this impressive and very positive result, perhaps the farmer advocates for extending the State Barrier Fence need to show some persistence in their use of LGDs, before any decision to spend tens of millions of dollars of taxpayer funds building and maintaining the extension.

An independent analysis of the value of marginal agricultural lands is needed. The jagged southern boundary between cleared agricultural land and the Great Western Woodlands reflects the collapse of an earlier poorly planned government program, in which large areas of uncleared public land were allocated to agriculture with minimal regard to agricultural viability or environmental impacts (Bradby et al 1984).

Various soil and agricultural studies in these areas have subsequently documented serious concerns with the long-term viability of particular areas (see, for example, Scholz and Smolinski 1996). In the Cascades area, north-west of Esperance, a number of farmers holding more recently allocated lands (up to 1982) adjoining the proposed Fence received *ex gratia* payments from the State Government because the soil types originally allocated to them were not suitable for agriculture. Indeed, within five years of the land being allocated to agriculture, the Commissioner for Soil and Land Conservation was refusing farmers permission to clear large areas of the newly allocated blocks.

Given this, there would seem to be a case for a government-funded restructure of activities on marginal areas to rationalise the agricultural boundary southwards. In the process of the restructure, a range of other techniques could be employed to help manage the interaction between agriculture and wildlife, including changed crop and livestock regimes.

7. POOR GOVERNMENT PROCESS INCREASES CONCERNS

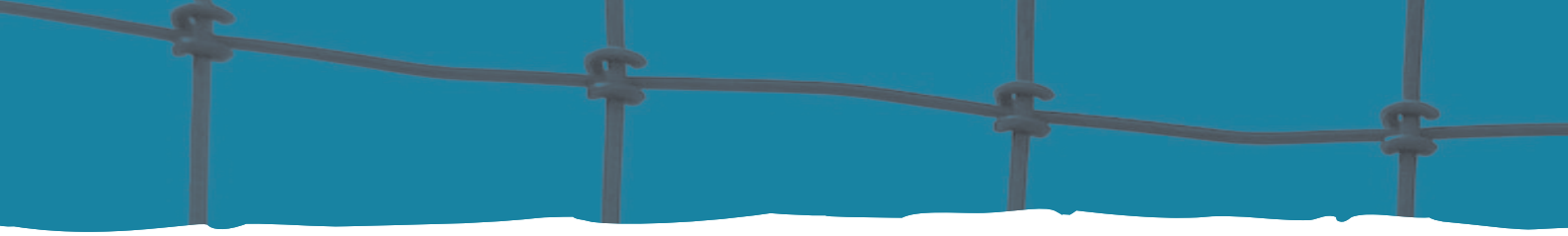
Poor government process has led to many of the failings of the Esperance fence extension proposal, as summarised below.

Public policy formulation has been distorted by political pressure. Current State Government support for the Esperance fence extension is a recent response to campaigning by a small number of farmers. Despite all the issues raised by the proposal, the government has committed public funds to the fence construction and upgrade, including approximately $5 million from the Royalties for Regions program (see joint media release, WA Ministers for Agriculture and Environment, 5 April 2010).

Political pressure is distorting public policy formulation in other ways:

- The proposal is not supported by long-standing government policy on the management of wild dogs. DAFWA's policy on Wild Dog Management in WA's Rangelands (DAFWA, undated) makes no mention of the State Barrier Fence, or any improvements or extensions to the fence to control wild dogs. The last public evaluation of the effectiveness and efficiency of the Wild Dog Program in WA was published in 2003 and made no reference or recommendations in relation to the State Barrier Fence (Wild Dog Evaluation Panel, 2003).
- On a number of occasions DAFWA staff have clearly stated that they are under political direction to ensure construction of the fence extensions, not provide advice on its efficacy or cost-benefit. It is clear that they see the extensions as having little scientific or economic rationale. Similarly, we understand DEC staff have been instructed that construction of the fence is government policy and they are not to publicly discuss views or information that question the decision to construct the fence, thereby making the government's wildlife protection department complicit in construction of a fence designed specifically to harm wildlife.

The situation in WA mirrors that recently discussed nationally by Jennifer Westacott from the Business Council of Australia: *"We now have major policies unravelling before our eyes because the process was poor, the architecture was wrong …, the assumptions flawed, the consultation disingenuous, and the communication, at best, opaque"* (Westacott, 2012).



Westacott has called for *"a mandatory code that prohibits them [Ministerial staff] from directing public servants"*, on the basis that the current approach *"cultivates and rewards … reticence and timidity – not the tough thinking we need to deal with complex challenges."*

Recognition of Traditional Owners has been late and limited. The Esperance fence extension cuts across the land of the Ngadju and Esperance Nyungar peoples. Their native title claims are subject to lengthy and ongoing legal challenge by the WA government, whose consultation process over the fence is only now, belatedly, commencing with the legal representative bodies of the native title claimants. This is 5-6 years after government officers started providing assistance to local farmers to get political support for fence construction.

It is likely that the WA Government will try to limit its consultation process to the avoidance of the small number of specific heritage sites across the area, rather than proper consideration of the impact of this development on the integrity of an entire cultural landscape and associated native title rights.

The WA Minister for Agriculture has failed to refer the proposal for environmental assessment. It is disturbing that, some years after the WA Government committed funds to the project, there has been no similar commitment to ensure the proposal is subject to independent assessment under the WA Environmental Protection Act and the federal Environmental Protection and Biodiversity Conservation Act (the "EPBC Act"). Referrals are expected of all other major industries, such as mining, and infrastructure developments in WA. Moreover, the Minister's failure to refer the proposal further undermines the government's claim to legitimate use of public funds.

Biased information was provided to local ratepayers to garner their support. In seeking ratepayer support for a Shire loan of $1.76 million as a contribution to the Esperance fence extension, the Shire of Esperance conducted a referendum of rural ratepayers in August 2011. Only information supporting the fence proposal was provided to ratepayers. The information provided by Council (letter to rural ratepayers, 27 July 2011) included statements that:

- *"once established the fence would provide a non-lethal barrier";*
- *"The WA Department of Environment and Conservation suggests there is little adverse impact on non-target native species. None of the larger terrestrial species in the region are migratory";*
- *"total project cost is estimated at $10.5 million"; and*
- *"a cost benefit analysis … indicated that $2 would be gained by the community for every $1 spent on construction and maintenance of the fence".*

As this document has shown, there is no validity to the first two statements, we estimate the cost estimate as closer to $20 million and there has been no independent, comprehensive cost-benefit analysis.

Of the 1350 ballot papers distributed, only 54% were returned, with 67% of those that were returned supporting the fence (Council Minutes, 23 August 2011). That is, only 36% of rural ratepayers have confirmed their support for the fence.

CONCLUSION

There are challenges to managing landscapes that have both agricultural and conservation values - this is common world-wide. Farmers and other landholders need assistance in dealing with these challenges in humane, science-based and cost-effective ways. The construction of large fences to exclude wildlife, as occurred in the 19th and early 20th centuries, is not a best practice approach to landscape and wildlife management. Instead, current scientific knowledge and practice needs to be applied to equitably manage the interface between agricultural land and natural areas in south-western Australia.

The WA Government is failing to do this.

Ministers have committed funds to a huge project and the purchase of construction materials before options and issues were considered in open processes. The government is now attempting to force all viewpoints into a politically charged and polarizing "consultation" process, restricted to just a few limited options of fence design and alignment, and underpinned by a lethal disregard for the wellbeing of iconic Australian wildlife. It has wrongly constrained the advice of its conservation agency to within the boundaries of its misconceived agricultural objectives.

The proposed expansion of the existing Barrier Fence would be a tragic imposition on one of Australia's most biologically rich and intact landscapes. Instead of proceeding lockstep with the approaches used unsuccessfully in WA in 1902, it is time to explore better options.

RECOMMENDATION

The program of State Barrier Fence upgrades and extensions should not continue. The program is cruel, unscientific and uneconomic. Instead, all funding allocated should be redirected to developing alternative solutions which equitably support both the environment and agriculture.

Lapwire installed at the base of the fence can further restrict movement of wildlife such as Echidnas

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IMAGES: Frank Rijavec, Andrew Del Marco, Graeme Chapman, Andrew Hobbs, Department of Agriculture and Food Western Australia

ENDNOTES

[1] The URS report on the proposed Esperance fence extension (2007) correctly identifies the nomadic nature of emus. Like many birds inhabiting the arid and semi-arid zones of Australia, emus need to track resources as resource availability varies substantially across space and with time. When the path of this movement is intercepted by a barrier, such as the proposed fence, the result can be the accumulation in small areas of many thousands of animals. This leads to local degradation and regularly to the starvation of large numbers of birds. URS report that *"since the completion of the upgraded emu barrier fence across the northern and north-eastern extremities of the wheatbelt in the mid 1960s, significant movements of emus onto the fence have occurred in the following years: 1979, 1971, 1976 (at least 90 000 starving birds destroyed), 1989 (50 000 birds congregated), 1994, 1998, 2002 (50,000 birds)"*. For the Esperance fence extension to fulfil its stated function then these numbers will be drastically increased. The death and distress caused to these many hundreds of thousands of animals due to the restriction of their movement is a significant animal welfare issue.

[2] http://pandora.nla.gov.au/pan/43156/20040709-0000/agspsrv34.agric.wa.gov.au/programs/app/barrier/pests/emu migration.htm [accessed 14 March 2012]

[3] Calculation based on an average of 1.5 native animals for every kilometre of the existing 1,170 km State Barrier Fence.

[4] In a web search the only relevant guidelines found were developed by the NSW Department of Agriculture for the Commonwealth. These have subsequently been removed from their website (see http://www.environment.gov.au/biodiversity/invasive/publications/humane-control.html, accessed May 15, 2012)

[5] Studies such as that of Letnic (2009) on both sides of the eastern Australian Dingo Fence have shown small native mammals to be in greater abundance in the presence of dingoes. Currently, large amounts of money are required for feral animal control in the region, in particular, control of red foxes to protect native wildlife. In 2003, across Australia over $5 000 000 was spent just in labour costs for fox control programs, with one of the most intensive regions of activity being south-west WA (Reddiex et al 2004). Further funds are spent on materials such as poison baits, for instance through the Red Card for Rabbits and Foxes program. We acknowledge that the crossing of dingoes with feral dogs is a problem in the region and has exacerbated difficulties in livestock management. Nevertheless, both lethal controls and excessive interference with dingo territories is likely to increase problems (Claridge et al, 2009).

[6] Connectivity is important at a variety of spatial and temporal scales; it allows adequate space for individuals and populations to meet their daily ecological needs, allows movement of animals in accordance with seasonal change, allows long term shifts of populations of organisms with changing environments (e.g. climates), retreat from areas subject to disturbance, recolonisation following local extinction and exchange of genes within populations and between meta populations.

[7] Gondwana Link in south-western Australia, and national initiatives such as The Great Eastern Ranges Initiative (NSW), Habitat 141 (Victoria) and Trans-Australia Eco-Link.

[8] Species listed as endangered or vulnerable under the EPBC Act that occur along the route of the proposed Esperance fence extension are listed overleaf.

Species listed as endangered or vulnerable under the EPBC Act that occur along the route of the proposed Esperance Extension.

SPECIES	PRESENCE	EPBC STATUS
Carnaby's Black-Cockatoo *Calyptorhynchus latirostris*	Present	Endangered
Western Ground Parrot *Pezoporus wallicus subsp. flaviventris*	Eastern end	Critically Endangered
Woylie *Bettongia penicillata ogilbyi*	Sighted in Great Western Woodlands in recent years	Endangered
Dibbler *Parantechinus apicalis*	Likely on western end	Endangered
Red-tailed Phascogale *Phascogale calura*	Likely on western end	Endangered
Western Bristlebird *Dasyornis longirostris*	Likely on western end	Vulnerable
Malleefowl *Leipoa ocellata*	Common	Vulnerable
Western Whipbird (eastern) *Psophodes nigrogularis leucogaster*	Common on western end	Vulnerable
Chuditch, Western Quoll *Dasyurus geoffroii*	Present	Vulnerable
Numbat *Myrmecobius fasciatus*	Likely	Vulnerable
Dayang, Heath Rat *Pseudomys shortridgei*	Likely on western end	Vulnerable

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Department of Agriculture and Food, WA

Report for State Barrier Fence Esperance Extension

Scoping Study

September 2012

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking services and preparing the Report ("Assumptions"), including (but not limited to):

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Contents

Table Index

Figure Index

Appendices

Acronyms

ACMC	Aboriginal Cultural Material Committee
AHA	Western Australian Aboriginal Heritage Act (1972)
ASRIS	Australian Soils Resource Information System
ASS	Acid Sulphate Soil
BOM	Bureau of Meteorology
CALM	Department of Conservation and Land Management
DAFWA	Department of Agriculture and Food Western Australia
DEC	Department of Environment and Conservation
DIA	Department of Indigenous Affairs
DoW	Department of Water
DRF	Declared Rare Flora
EERG	Esperance Extension Reference Group
EMP	Environmental Management Plan
EP Act	Environmental Protection Act 1986
EPA	Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation
ESA	Environmentally Sensitive Area
ESP2	Recherche Bioregion
FESA	Fire & Emergency Services Authority of Western Australia
HCWA	Heritage Council of Western Australia
MAL1	Eastern Mallee Bioregion
MNES	Matters of National Environmental Significance
NMDSG	Northern Mallee Declared Species Group
PASS	Potential Acid Sulphate Soils
PCA	Planning Constraints Analysis
PCA	Planning Criteria Assessment
PEC	Priority Ecological Community
PEIA	Preliminary Environmental Impact Assessment
PF	Priority Flora
PMST	*EPBC Act* 1999 Protected Matters Search Tool
RDSG	Ravensthorpe Declared Species Group
RIWI	Rights in Water and Irrigation Act
SBF	State Barrier Fence
TEC	Threatened Ecological Community
TFD	Threatened Flora Database

UCL	Unallocated Crown Land
VHS	Vegetative Health Service
WAHERB	Herbarium of Western Australia
WAPC	Western Australian Planning Commission
WONS	Weeds of National Significance

Executive Summary

The Department of Agriculture and Food Western Australia (DAFWA) is supporting the proposed construction of an extension to the State Barrier Fence (SBF) which was initiated by the Northern Mallee (NMDSG) and Ravensthorpe Declared Species Groups (RDSG). An overview of the alignment options provided by DAFWA, on the behalf of the NMDSG and RDSG, is the basis for this study. This extension will extend from this point to the east of Esperance.

This Scoping Study defined the option of Least Constraint and has recommended that this Option is accepted as the preferred alignment. A combination of desktop and field investigations was used to quantify and define the aspects of Least Constraint. This work included:

- Field investigation to determine the status and extent of vegetation and fauna potentially impacted;
- Desktop assessment of Landuse and Planning policy documents (Federal, state and regional);
- Desktop assessment of natural resource matters listed along the alignment as held by the Department of Environment, Environmental Protection Authority and Department of Sustainability, Environment, Water, Population and Communities);
- Desktop assessment of registered Aboriginal Heritage matters listed for each alignment;
- Desktop assessment of extent of dieback and propensity for the spread of dieback in the area.

The least constrained alignment is generally located within the unallocated crown land that is at the interface with the agricultural land. This means that the alignment is usually within areas of scrub-rolled vegetation. These areas will require minimal clearing of native vegetation and largely avoid impacts on undisturbed vegetation along with the associated indirect impacts, such as the introduction of weed species and dieback and increases in erosion and soil degradation. The innermost option also reduces habitat fragmentation by avoiding transecting large tracts of native vegetation, which reduces impacts on wildlife corridor connectivity. The approximate clearing footprint of this option is 1057 ha.

There is one 'no-go' area that is recommended to be avoided in the final alignment of the Least Constrained option. This no-go area is Boyatup Hill and is a highly significant aboriginal heritage site.

The Least Constrained alignment has a coastal endpoint, separating agricultural land from the west end of the Cape Arid National Park. While this end point has a number of environmental sensitivities including dieback and priority flora, these aspects may be managed with careful planning and management plans.

The information and detail presented in this Report provides sufficient detail for the next phase of this Project, that is, the state and federal approvals that will be required prior to construction. It is recommended that this Project is referred to the Environmental Protection Authority under Section 38 of the *Environmental Protection Act* 1986 and that an application to clear native vegetation is prepared. Archaeological and ethnographic investigations are recommended to be commissioned in anticipation of an application under Section 18 of the *Aboriginal Heritage Act 1972* being lodged.

It is further recommended that an application to refer the Project under the *Environmental Protection Biodiversity and Conservation Act 1999* is lodged.

1. Introduction

1.1 Purpose

The Department of Agriculture and Food Western Australia (DAFWA) is supporting the proposed construction of an extension to the State Barrier Fence (SBF) which was initiated by the Northern Mallee (NMDSG) and Ravensthorpe Declared Species Groups (RDSG). An overview of the alignment options provided by DAFWA, on the behalf of the NMDSG and RDSG, as the basis for this study and can be seen in Figure 1a. The current SBF's most southerly point is at Jerdacuttup. This extension will extend from this point to the east of Esperance.

This scoping study will compare and assess the various options within the study alignment in regards to their potential to provide optimum vermin control and minimal environmental and social impact. This study will also consider the land area impacted, land tenure and possible land acquisition requirements including the need to acquire areas as offsets for environmental impacts. These constraints will be assessed as part of this study and will lead to GHD providing a least constrained alignment.

This scoping study will assist DAFWA in the identification of the need for further environmental investigations before a final alignment can be determined. It is GHD's assumption that this Project will require further approvals and that this document will provide a basis for further reports. The works have no commencement date at this time.

The preferred alignment is presented in this report as the least constrained in terms of environmental, cultural and social impact. Final determination of the alignment will be determined by DAFWA in partnership with the EERG. Once this final alignment is approved by all stakeholders, the approvals process required will be facilitated by DAFWA, including a transparent and considered community consultation programme.

1.2 Project Background

The State Barrier Fence (SBF) has been established in Western Australia since 1901. For the last 111 years it has been a physical barrier designed to protect Western Australia's agricultural resources from vermin and predators. It was originally constructed to protect the state from invasive rabbits. This failed for various reasons and, its most significant role today is the exclusion of emu's and it is currently being upgraded to wild dog exclusion standard.

The SBF originates at the Zuytdorp Cliffs north of Kalbarri and runs southwards along the perimeter of the agricultural region to Jerdacuttup in the Ravensthorpe Shire. The existing fence is currently approximately 1170 km. The Zuytdorp Cliffs provide a strong geographical barrier preventing vermin and predators from entering at the most northern point of the SBF. At present, there is no physical barrier in place at the most southern point to stop the migration of vermin around the fence.

The Esperance extension aims to complete the physical barrier presented by the SBF from coast to coast and increase the resilience of vermin control in the associated agricultural areas.

The Esperance extension will be between 500 km and 730 km, depending on the finally chosen alignment. It will broadly run along the interface between agricultural and vacant crown lands in a broad arc from Jerdacuttup to the coast to the east of Esperance. The fence will mostly consist of a fabricated netting fence at a minimum above ground height of 1.35 m with an angled skirt Appendix A. This design

allows for through movement of native fauna while excluding emu's and wild dogs, which are the fauna of concern. The fence will contain a number of gates so that there is no length of fence greater than 10 km without access. These gates will be on those roads accessed by the DEC and DAFWA when required, or by individuals authorised to access the non-public roads. Public roads will require the installation of road grids in order to allow continued use of these roads by the public. Additional baiting may be required at these points to maintain the effectiveness of the fence.

The fence will be located in the centre of a 20m wide cleared area. This gives a possible total Project Area of between 1000 and 1460ha depending on the length of the chosen alignment. A large proportion of the fence is expected to be constructed adjacent to existing cleared tracks/roads which may be used as the 10m buffer on one side of the alignment, potentially reducing the Project impact from clearing requirements. For the purpose of this scoping study the study alignment options will be assessed for 100m either side of the Project Area to ensure all significant factors affecting the fence are considered and to provide options for the detailed work required to establish alignment for the SBF that will be constructed. The final alignment will be chosen by DAFWA in partnership with the Esperance Extension Reference Group following community consultation and the approvals process (see section 9).

1.3 Scope of Works

DAFWA contracted GHD to undertake this study to identify the expected primary environmental impacts of the Esperance extension of the SBF and recommend an alignment option (s) for the purposes of consultation and to inform the next phase of planning. In order to complete this task a comprehensive study of the Project Area was undertaken. The preparation of this scoping study included the following:

- A relevant literature and database review;
- Project meetings with client on the 8th and 15th May 2012 and 15th June 2012;
- A site assessment conducted in May 2012 with a GHD botanist, ecologist and environmental scientist, which included:
  - Identification and listing of native plants and weed species;
  - Assessment of fauna habitat values and impacts;
  - Landform and waterways ground truthing;
  - Notes of any additional significant impact.
- A desktop dieback survey with Mr Jeremy Spencer - DEC accredited dieback interpreter; and
- A desktop heritage survey with Mr Brad Goode - Consultant anthropologist.

GHD understands that this Report is to be presented to the Esperance Extension Reference Group (EERG) for consideration and consultation leading to the final determination of the optimum alignment to be taken into the approval process.

This document will include sufficient desktop and site information such that, should the decision be made, referral under s38 of the *Environmental Protection Act 1986* may be made.

1.4 Limitations

This assessment is a scoping study to determine the least constrained alignment for the Esperance Extension of the SBF; it is not a full impact assessment. Prior to further works and referral to gain

environmental approvals the route preferred by the EERG and DAFWA will need to be confirmed. Referral advice will determine what work is required to enable complete assessment of the Project .

The desktop assessments used a variety of spatial and online resources where the responsibility for the accuracy of such data remains with the issuing authority, not with GHD. The Project Area has been very poorly studied with little systematic survey data available. Desktop studies were based on broad-scale information sources.

The field survey was a reconnaissance survey aimed at determining the major flora and fauna issues and ground truthing physical aspects associated with the various study alignment options. Due to lack of access in certain areas further survey is required to comprehensively assess the bio-physical landforms. A fauna and flora list was compiled during the field surveys. This was not a comprehensive list but rather focussed on key species identified in the desktop assessment. Complete flora and fauna surveys can require multiple surveys at different times of year and over a period of a number of years to enable observation of all species present. Some flora species, such as annuals, are only available for collection at certain times of the year and others are only identifiable at certain times (such as when they are flowering). Additionally, climatic and stochastic events (such as fire) may affect the presence and abundance of plant species. Species that have a very low abundance are more difficult to locate, due to above factors.

This field survey was not conducted at the optimum time of year to record certain flora species, such as annuals, or to obtain the necessary flowering and fruiting material required to identify certain plants. Further surveys undertaken after the rainy season in a year would be expected to record plants that could not be identified or were not found (although possibly present) during this survey.

The fauna assessment was primarily aimed at determining the major fauna habitats associated with the study alignment and looked at the broad scale issues associated with the study alignment. More detailed investigations are required at the next stage of this Project .

As the identified alignment of least constraint does not pass through any private land, there has been no landowner consultation by GHD; this is consistent with the study brief, which only requires consultation in this situation.

2. Methodology

This Chapter describes the method applied in the determining the detail for the study alignment options. Included is discussion of the data sources consulted and the field survey methodology.

2.1.1 Alignment options

The Esperance extension can be dissected into a series of sections and options. These options are not mutually exclusive and in some sections of the Project Area only one option for the alignment exists. The term 'section' refers to a portion of the fence where there is only one route option provided. An 'option' refers to a portion of the study alignment where there is more than one option.

The study alignment options being considered in this study can be further classified according to their distance from the border between agricultural lands and UCL. The options have been assigned a letter according to this classification under the following criteria:

Option A – The outermost route

Option B - The median route between A and C

Option C – The innermost route

Option BC – Where options B and C merge

The study alignment options as provided to GHD by DAFWA are mapped at Figure 1a.

The Project Area is extensive and diverse. Consequently, the natural features within this Project Area will also range in terms of their size and physiological and biological diversity. For example, creeks and waterways will range in terms of their flow regimes, gradient and extent. These features whilst not insurmountable, do have implications for this study in terms of design requirements and in the consideration of disposal of sacrificial materials in high flows.

Alternate considerations included in this study were the suitability and viability of 'wings' to divert fauna, specifically the mass migration of emu's away from waterways (Appendix A). These diversion "wings" curve the fence back towards itself in a large arc. It is understood however that these 'wings' will not always be appropriate as a 'default' solution for all crossings, for example on the smaller waterways.

2.2 Desktop assessment

A desktop assessment was carried out to establish the significant environmental, socio-cultural and land planning constraints. A large proportion of the information was supplied directly by DAFWA through a digital data licensing agreement (Appendix B). Appendix C has a complete table of data received, this includes data regarding:

- Registered Aboriginal Sites;
- Contours;
- DEC Fuel Modified Areas (chained or burnt);
- Infrastructure;
- Land Tenure;
- Land Use;

- Alignment options;
- Rainfall isohyets;
- Soil;
- Threatened Ecological Communities;
- Vegetation; and
- Waterways.

Other information accessed included:

- Bureau of Meteorology Australia
  - Climate data
- Department of Environment and Conservation
  - Native Vegetation Map Viewer
  - FloraBase
- Department of Mines and Petroleum
  - Geological maps
- Environmental Protection Authority

  Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA, 2004a);

  Guidance Statement 56: *Assessment of Environmental Factors for Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b);
- CSIRO
  - Australian Soil Resource Information System (ASRIS)
- South Coast Natural Resource Management Group

  P.cinnamomi distribution maps

2.2.1 GIS

The integrated Geographic Information Systems (GIS) component of the assessment comprised data procurement and storage, data display and data queries as required for the desktop assessment. Spatial data relevant to the options assessment was provided by DAFWA. The data was stored in ESRI shapefile format and presented to the Project team via ArcReader published map files (.pmf). Where necessary, spatial intersections of the options and the various datasets were conducted and the results were exported to tables so that the desktop assessment could consider the options in terms of environmental and tenure concerns

2.3 Planning study

The planning desktop study analysed the study alignment options from a statutory planning viewpoint. This viewpoint provides the basis from which decision-makers can determine the next phase of work, if land tenure or land use appears incompatible with the proposed infrastructure.

The scope of investigation regarding land tenure and landforms along the corridor was 10 metres either side of the centreline of the study alignment options and sections. Specifically, this land tenure and landform investigation encompassed the following statutory planning components:

- Cadastral lot identification;
- Land tenure;
- Current use of land (based on an aerial survey);
- Zoning of land under the relevant local government local planning scheme;
- Analysis of relevant local and state planning policy.; and
- Approval time frame including potential risks (time & money) associated with land tenure.

These investigations are included in a excel spread sheet (PDF) that is contained in Appendix D of this report, while a summary is presented in section 7 of this report.

2.4 Landform Assessment

To assess the study alignment options a site reconnaissance survey was completed between the 22nd and 24th May. Prior to the field survey, a desktop study of aerial photographs and relevant data was undertaken. This information was assessed in regards to a number of features which could influence the least constrained alignment option. The features considered significant in regards to the construction and maintenance were targeted during the site visit.

These included:

- Granite Outcrops;
- Soft sand/salt flats;
- Water features;
- Steep gradients; and
- Road crossings.

The target areas and features were highlighted on maps produced by the GIS team from the data acquired from DAFWA. During the site assessment the GPS locations of these features, photographs and descriptive notes were taken. The features were then considered based on the degree of constraint they may have in terms of their environmental, physical, social and cost implications.

2.5 Flora and Fauna Assessment

Experienced and qualified GHD ecologists undertook the survey of the Project Area between the 22 May and 29 May 2012. The site was traversed by vehicle using roads, firebreaks and other cleared areas adjacent to the study alignment. Key sites were selected on the basis of previous vegetation mapping (Beard, 1973), geology and soils mapping, access and aerial photography.

The flora and fauna surveys were Level 1 surveys conducted with reference to:

- Environmental Protection Authority (EPA) Guidance Statement No. 51: *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004a);

- EPA Guidance Statement. 56: *Assessment of Environmental Factors for Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004b);
- DEC and the EPA's *Technical Guide Terrestrial Biological Surveys as an Element of Biodiversity Protection:* Position Statement No. 3 (EPA, 2002).

The survey targeted key areas and sites of concern (such as areas containing conservation significant communities or species). Representative sites were surveyed to allow the remainder of the assessment to be extrapolated based on aerial photography, landform and previous surveys.

The flora and fauna survey included:

- Opportunistic collection and identification of flora species present on the site. Any conservation significant species identified in the field were way-pointed and their sub-population size estimated;
- Confirmation of species identification using resources at the WA Herbarium;
- Electronic mapping using aerial photography to delineate vegetation units, vegetation condition, water courses and conservation significant species observed;
- Ground-truthing of key areas to verify the information gathered from the desktop survey;
- Assessment of the potential fauna habitat present;
- Determination of suitable habitat for significant fauna; and
- An inventory of the vertebrate fauna species in the Project Area through opportunistic recording of species.

2.5.1 Limitations

This assessment was a scoping study in order to determine the least constrained alignment for the extension to the SBF; it was not a comprehensive impact assessment. Potential impacts from the extension have been discussed to some extent but a full assessment of impacts has not been undertaken. Prior to further works and referral to gain environmental approvals further studies and impact assessments will be required.

The desktop assessments used a variety of spatial and online resources where the responsibility for the accuracy of such data remains with the issuing authority, not with GHD.

The Project Area has little specific survey data available and therefore the desktop studies drew from broad-scale information sources.

This field survey was a Level 1 survey only, designed to obtain a broad scale understanding of the main flora and fauna issues in the Project Area. A detailed, Level 2 survey, will be required at a later stage for the purposes of gaining the required environmental approvals. The present survey was not conducted at the optimum time of year to record certain flora species, such as annuals, or to obtain the necessary flowering and fruiting material required to identify certain plants. Further surveys undertaken during optimal conditions (generally in spring) would be required to record plants that could not be identified during this survey. The fauna assessment was primarily aimed at determining the major fauna habitats associated with the study alignment; more detailed investigations are required at the next stage of this Project .

2.6 Heritage Assessment

Brad Goode (Brad Goode & Associates Consulting Anthropologists & Archaeologists) was contracted to complete a desktop study and risk assessment in regards to Aboriginal Heritage. A search of the Department of Indigenous Affairs (DIA) Aboriginal Sites register was conducted for the study and the information assessed. Site significance and future management was assessed in relation to Western Australian *Aboriginal Heritage Act 1972* (AH Act) and DIA guidelines. Traditional land owners groups, protocol and processes required to engage with the aforementioned groups were identified. The heritage assessment was undertaken for a 200 m corridor (100 m either side of the centre line of the identified options).

2.7 Dieback Assessment

Jeremy Spencer (Great Southern Bio logic) was contracted to complete a desktop and risk assessment of the Project Area in regards to Dieback *Phytophthora cinnamomi* distribution. In order to determine the likely extent of known infestations within the Project Area, an assessment and comparison of relevant GIS data sets was undertaken. This data was used to assess the extent of potentially susceptible vegetation across the Project Area. Maps illustrating the known distribution of *P. cinnamomi* infestations and the extent of potentially susceptible areas across the Project Area were created. Recommendations regarding the appropriate management and mitigation of *P. cinnamomi* during construction and maintenance were provided.

3. Regional Context

This Chapter describes the broad environmental region of the Project Area. Included is a discussion on the broad vegetation types, fauna and climate.

3.1 Bioregion

The Western Australian Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 85 bioregions based on biological and geographic/geological attributes. The southern section of the Project Area is within the Recherche subregion (ESP2) of the Esperance bioregion, which is characterised by proteaceous scrub and mallee heaths on sandplain overlying Eocene sediments, rich in endemics (Comer *et al.*, 2001). Vegetation types in this area are diverse and include heath, coastal dune scrub, mallee, mallee-heath and granite heath (Comer *et al.*, 2001). Known ecosystem values within the Recherche subregion, which may occur within the Project Area, include (Comer *et al.*, 2002):

- The scrub heath on deep sand with *Banksia* and *Lambertia,* and *Banksia* scrub heath of the Esperance sandplain;
- Threatened fauna, including the Western Ground Parrot, Malleefowl, Carnaby's Cockatoo, Peregrine Falcon, Australasian Bittern, Chuditch, Red-tailed Phascogale, Black-footed Rock-wallaby, Heath Rat, Dibbler and the reptiles *Parasuta spectabilis bushi, Phyllodctylus* sp. Cape Le Grand and Carpet Python;
- Short range endemic and threatened invertebrates (for example *Atelomstic melindae, A.anacita, A sarahae, Epicliosoma sarahae)*
- Threatened flora species;
- Priority Ecological Communities;
- Granite hills and outcrops at Cape Arid; and
- Extensive salt lakes

The northern section of the Project Area is located within the Eastern Mallee subregion (MAL1) of the Mallee bioregion. This subregion is gently undulating; predominately mallee over myrtaceous-proteaceous heaths on duplex (sand over clay) soils (Comer *et al.*, 2002). This area includes mallee on sand plains, samphire around small salt lakes, mallee and patches of woodland on clay, and scrub-heath on sandstone (Comer *et al.*, 2002). Known ecosystem values within the Eastern Mallee subregion, which may occur within the Project Area, include (Comer *et al.*, 2002):

- Rare fauna including, Western Whipbird (highly unlikely; while found on the Esperance sandplain it is more likely to occur in the Fitzgerald River-Ravensthorpe area), Western Ground Parrot, Malleefowl, Cape Barren Goose, Slender-billed Thornbill, Chuditch, *Parasuta spectabilis bushi;*
- Rare ecosystems and plant assemblages of the Russell Range;
- Granite outcrops, which are likely to be significant as refugia; and
- Salt lake systems which are likely to have a high level of species diversity.

3.2 The Great Western Woodlands

The Great Western Woodlands is a continuous band of native vegetation that stretches north and east from the edge of the wheatbelt, covering almost 16 million hectares. The woodlands cover much of the UCL within the Project Area, and the study alignment runs along the edge of the woodlands for much of its length.

The Great Western Woodlands is an internationally significant area of great biological richness. It is the largest remaining intact Mediterranean climate woodland on earth (DEC, 2010). The woodlands are still in excellent biological condition but are under increasing pressure from pest animals, weeds and bushfires. The conservation strategy (DEC, 2010) for the Great Western Woodlands includes priorities for retaining the composition, structure and function of native ecosystems and to minimise clearing within the woodlands.

The Great Western Woodlands is an ecologically significant area and impacts on the woodlands should be avoided where possible. The greatest impacts on the woodlands from the SBF extension would be expected where the outermost alignments cross large areas of remnant vegetation. Impacts could be avoided by utilising the outside extents of the UCL, adjacent to the agricultural land.

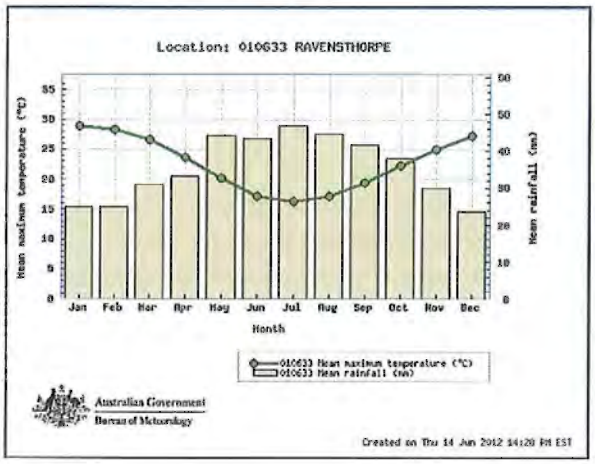
3.3 Climate

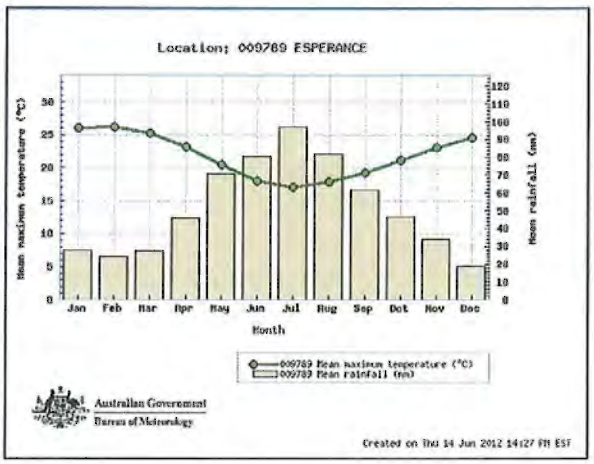
The Project Area has a Mediterranean climate with warm dry summers and cool wet winters. The Bureau of Meteorology (BoM, 2012) data for the Ravensthorpe and Esperance weather stations shows the region receives between 425 and 616 mm of rainfall per year (Table 1 and Plate 1).

Table 1 BOM recorded climatic data for Ravensthorpe and Esperance

Station (Station Number)	Mean annual minimum temperature range (°C)	Mean annual maximum temperature range (°C)	Annual rainfall (mm)	Annual rain days
Ravensthorpe (070633)	6.7 (July) 14.6 (February)	16.3 (July) 28.9 (February)	425.8	74
Esperance (009789)	8.3 (July) 16.1 (February)	17.1 (July) 26.2 (February)	616.3	90.8

Plate 1 **BOM graphs of mean maximum temperature and mean rainfall for Esperance and Ravensthorpe**





4. Social and Planning

This Chapter describes the social and planning context for the Project Area.

4.1 Land Use

The Project Area is situated between the towns of Ravensthorpe, Norseman and Esperance. Broadacre agricultural land is the predominant landuse that borders the study alignment options. To the west is predominately Unallocated Crown Land (UCL) that is covered by natural vegetation. Fire breaks have been established by the DEC at the agricultural and UCL land interface. The Project Area borders a number of Nature Reserves and National Parks.

In order to allow public access through the fence, it is recommended that a number of gates should be included in the alignment of least constraint. These gates should be positioned so that access is available at every road intersection and every 10km's if a road intersection does not occur.

4.2 Land Tenure

Each parcel of land in the Project Area is given legal status under the *Transfer of Land Act 1893*. The intention of the *Transfer of Land Act 1893* is to provide a system of land administration in Western Australia that provides certainty of land ownership. Land within the SBF Project Area may have land tenure vested with specific people or authorities. The scope of investigations regarding land tenure includes:

- Private land tenure;
- Land tenure vested in local government or state government agencies. Note National Parks and Nature Reserves are vested in the Conservation Commission of Western Australia and managed on their behalf by DEC; and
- Unallocated crown land.

4.3 State Planning Policy

The following state planning policies are relevant to this study and the core objectives have guided the planning assessment of the study alignment.

4.3.1 State Planning Policy No. 2 – Environmental and Natural Resource Policy

State Planning Policy No 2 defines the principles and considerations that represent good and responsible planning in terms of environment and natural resource issues. The policy is supplemented by more detailed planning policies. There are three main objectives of the policy:

- Integrate environment and natural resource management with broader land use planning and decision-making;
- Protect, conserve and enhance the natural environments; and
- Promote and assist in the wise and sustainable use and management of natural resources.

The policy contains a range of objectives for environmental and natural resource areas that includes water resources, air quality, soils and biodiversity, agricultural and rangelands, minerals and natural resources and energy efficiency. These policy positions have been taken into account in the consideration of the study alignment options and sections in this study. Notably, the intent of the policy is to protect, wherever possible, the existing natural environment.

4.3.2 State Planning Policy No. 2.5 – Agricultural and Rural Land Use Planning

State Planning Policy No 2.5 recognises the ongoing decline of productive farm land and the considerations that are required in order to protect these lands.

The key objectives of the policy are:

- Minimise fragmentation of rural agricultural land;
- Plan and provide for rural settlement where it can benefit and support existing communities and have access to appropriate community services and infrastructure;
- Minimise the potential for land use conflict by providing adequate separation distance between potential conflicting land uses; and
- Encourage careful management of natural resources by discouraging development and/or subdivision that may result in land or environmental degradation.

The policy also recognises that land degradation has also contributed to the reduction of land available for agriculture.

One of the core objectives of the SBF is to preserve and protect agricultural resources from declared animals. The construction of the Esperance extension will be in keeping with this specific objective of the planning policy.

4.3.3 Statement of Planning Policy 2.6: State Coastal Planning Policy

State Coastal Planning Policy No 2.6 recognises that the Western Australian coast is one of the State's greatest assets in terms of its environmental, economic, social and cultural resources. The south coast is recognised as having significant environmental and recreational values. This policy requires that people can continue to access the coast should the endpoint of the fence be located at the coast.

4.3.4 Planning Approval

Under the *Planning and Development Act 2005* (P&D Act), so called section 6 bodies are enabled to undertake a "public work" or take land for the purposes of public work without obtaining development approval from the responsible authority under the relevant planning scheme. DAFWA has a strong basis for being considered a section 6 body. The SBF may be considered "Public Works" under section 2 of the *Public Works Act 1902* subsection (y) as, "any building or structure of whatsoever kind which, in the opinion of the Governor, is necessary for any public purpose". If this is possible it would remove the need for the submission of development applications under the two local planning schemes that cover the Project Area, that is, the Shire of Esperance and the Shire of Ravensthorpe. GHD recommends that DAFWA considers having the SBF classified as a "Public Works".

The Western Australian Planning Commission (WAPC) Planning Bulletin 94: *http://www.planning.wa.gov.au/publications/1080.asp* has further information that may be relevant.

4.3.5 Regional Planning Policy

In addition to the State Planning policies, regional planning policies must also be taken into account. The documents of particular significance are those published by South Coast NRM where natural resource and coastal assets are identified and aspirations for their future are articulated.

Specifically, these reports are:

- South Coast NRM Southern Prospects. This Strategy document presents the aspirations and community expectation for the next five years of natural resource management; and
- Southern Shores. – This document brings together community aspiration and research to provide direction in order to contribute to the maintenance of the natural assets and lifestyle values of the coast in order that it is protected for current and future generations to enjoy.

4.4 Reserves and Conservation Areas

There is one reserve managed by the Department of Environment and Conservation (DEC) that occurs within the Project Area. A number of reserves and conservation areas are located adjacent to the Project Area. While many of the reserves are significant in a subregional context, the majority found along the study alignment have been categorised by DEC by using International Union for Conservation of Nature (IUCN) conservation categories. Of the nine reserves that fall into IUCN categories eight are within Ia and one is within II. Table 2 lists these reserves and the distance from the closest point to a section to the section.

- Category Ia are strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphic features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring.
- Category II protected areas are large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities.

Table 2 Reserves and Conservation areas within 100 m of the study alignment

Alignment		Reserves and Conservation Areas						
Section	Option	Distance (m)	Reserve No.	Category	Class	IUCN	Legal Area	Name
6	C	0.00	7510	Nature Reserve	C	1a	1008	Un-named
28	B	9.99	6975	Nature Reserve	A	1a	7082	Beaumont Nature Reserve
30	B	9.99	9172	Nature Reserve	A	1a	1670	Clyde Hill Nature Reserve
29		10.03	6975	Nature Reserve	A	1a	7082	Beaumont Nature Reserve
14		21.28	5975	Nature Reserve	A	1a	11571	Un-named
27	B	28.97	9897	Nature Reserve	A	1a	609	Mount Ney Nature Reserve
8	BC	34.04	7999	Nature Reserve	C	1a	131	Un-named
1		57.81	186	Nature Reserve	A	1a	7139	Cheadanup Nature Reserve
34	C	88.28	9500	Nature Reserve	A	1a	839	Niblick Nature Reserve
26	B	89.18	9897	Nature Reserve	A	1a	609	Mount Ney Nature Reserve
36	BC	2581.72	3067	National Park	A	2	278184	Cape Arid National Park

While this table takes into account existing reserves; proposed future conservation reserves as outlined in DEC's statuary South Coast Regional Management Plan (1992-2002) and the draft (but not yet released by the Minister) Esperance and Recherche Parks and Reserves Management Plan were not assessed in this Study.

4.5 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared by a notice under Section 51B of the *Environmental Protection Act 1986.* A search of DEC's online Native Vegetation Viewer and the data provided by DAFWA show that one section and one option of the study alignment transect an ESA.

The first ESA (1183) that exists within the Project Area is located in section 1. The second ESA (2742) is associated with the Salmon Gums Reserve and is located on option 18B. The Project Area is less 400m to one ESA however the Fence is very unlikely to impact this ESA. The nearest distance to other ESA's is shown in Table 3.

Table 3 ESA's occurring within 1km of the Project Area

Alignment		ESA	
Section	Option	Feature ID	Nearest distance (m)
1		1883	0.0
18	B	2742	0.0
36	BC	3949	380.8
2	B	2171	442.1
1		1919	625.2
2	B	2171	657.6
37	C	3949	860.5

5. Bio-Physical Environment

5.1 Geology

The Geological Survey of Western Australia, *Geology and mineral resources of the Southern Cross Esperance region*, 1:100,000,000 scale map (Vanderhor, 2000) indicates that the study alignment traverses two major Geological Regions; The Yilgarn Craton and The Albany Fraser Orogeny. The Bremer Basin tectonic unit also exists within the coastal section of the SBF (Table 4).

Table 4 Geological units present in the Project Area

Region	Complex	Geological Age	Stratigraphy
Yilgarn Craton		Archaean	Archaean granite with narrow strips of greenstone. Gneiss. Chert, Felsic, mafic and ultramafic volcanics, Overlying permian sediments including coal.
Albany – Fraser Orogeny (Stage 1)	Biranup Complex	Mesoproterozoic	Gneisses and schists derived from sedimentary and granitic rocks and metamorphosed mafic and ultramafic rocks.
Albany – Fraser Orogeny (Stage II)	Noralup Complex	Mesoproterozoic	Granite and gneisses derived from granitic and sedimentary rock.
Bremer Basin		Eocene	Siltstone, silty sandstone and spongolite.

The geological features of the two IBRA classified regions (Beard,1973) are distinct:

- The **Recherche (ESP2)** consists of sandplain containing Proterozoic gneiss and granite along with Eocene sediments and more recently limestone. This sandplain is fractured by outcrops of granite and quartzite which form ranges throughout this region.

- The **Eastern Mallee (MAL1)** region comprises of calcrete in the both the modular and sheet forms along with outcrops of metamorphosed sandstone overlying the granitic base layers.

The main geological landform that effects the construction costs of the SBF are granite outcrops. These can be seen in photographs 1-3 (Appendix E). Granite outcrops are difficult from engineering and cost perspectives and may also have Aboriginal Heritage matters associated with them. While these aspects may be managed either through construction methods or by way of the necessary approvals, alternate options for the Fence are recommended to avoid these features. A detailed description of the geology of this region can be found in Appendix F.

5.2 Topography and soils

The general topography of the Project Area is that of an undulating plateau which becomes smoother and decreases in elevation towards the south (Myer, 1995). Typical landforms include sand plains, low hills and ridges, breakaways, granitic domes, salt lakes and dune fields. The final alignment will traverse many different soil types.

The soils of the Recherche (ESP2) bioregion consist mainly of yellow duplex soils. The gently undulating plains are dominated by sands of varying depth over clay and contain laterite in varying amounts. According to Beard (1973), the southern coastal portion of the plains soil consists of an upper horizon of sand that is bleached and often coarser than further inland. The granite domes throughout the area lack a soil covering but may have granite rubble, sand and humus.

Further north in the Eastern Mallee (MAL1) bioregion, the dominant soil type is that of calcareous clays and loams as duplex soils. Numerous saltpans (pan fields) can be found within the loamy plains. Although a surface layer of sand occurs in this region; it is shallower than ESP2, irregular in depth and contains calcareous nodules.

The soils and topography of the area have been classified further into 25 subsystems according to the ASRIS classifications (ASRIS, 2012). A table containing this information can be found in Appendix F.

5.2.1 Acid Sulphate Soils

Acid Sulphate Soils (ASS) are soils that contain iron sulphides which, when exposed to atmospheric oxygen in the presence of water, form sulphuric acid. ASS forms in protected low energy environments such as barrier estuaries, coastal lakes and coastal alluvial valleys and commonly occurs in low-lying coastal lands such as Holocene marine muds and sands. When exposed to air through disturbance, these soils are prone to produce sulphuric acid and may mobilise arsenic, iron, aluminium, manganese and other heavy metals present in the soil. The release of these reaction products can be detrimental to biota, human health and built infrastructure.

The presence of ASS has been a recognised issue of concern in WA since 2003. The DEC and the WAPC have released guidance notes on ASS covering the requirements for assessment and management of sites where ASS is identified.

Proponents of developments that involve the disturbance of soil or the change of groundwater levels in areas susceptible to ASS are required to conduct desktop and field based investigations. Adequate investigations are required prior to soil disturbance to determine the potential risks and to allow for the formulation of appropriate management strategies.

Mapping of ASS in the Project Area has been undertaken by ASRIS (2012). The ASRIS mapping (Plate 2) indicates that the Project Area has three different probability levels of ASS occurrence. The majority of the Project Area falls into the category of 'Extremely Low Probability'. The areas associated with wetlands (Peak Charles, Lake Gilmore, Salmon Gums and Lake Dundas) fall into the category of 'High Probability' as shown on the ASRIS map.

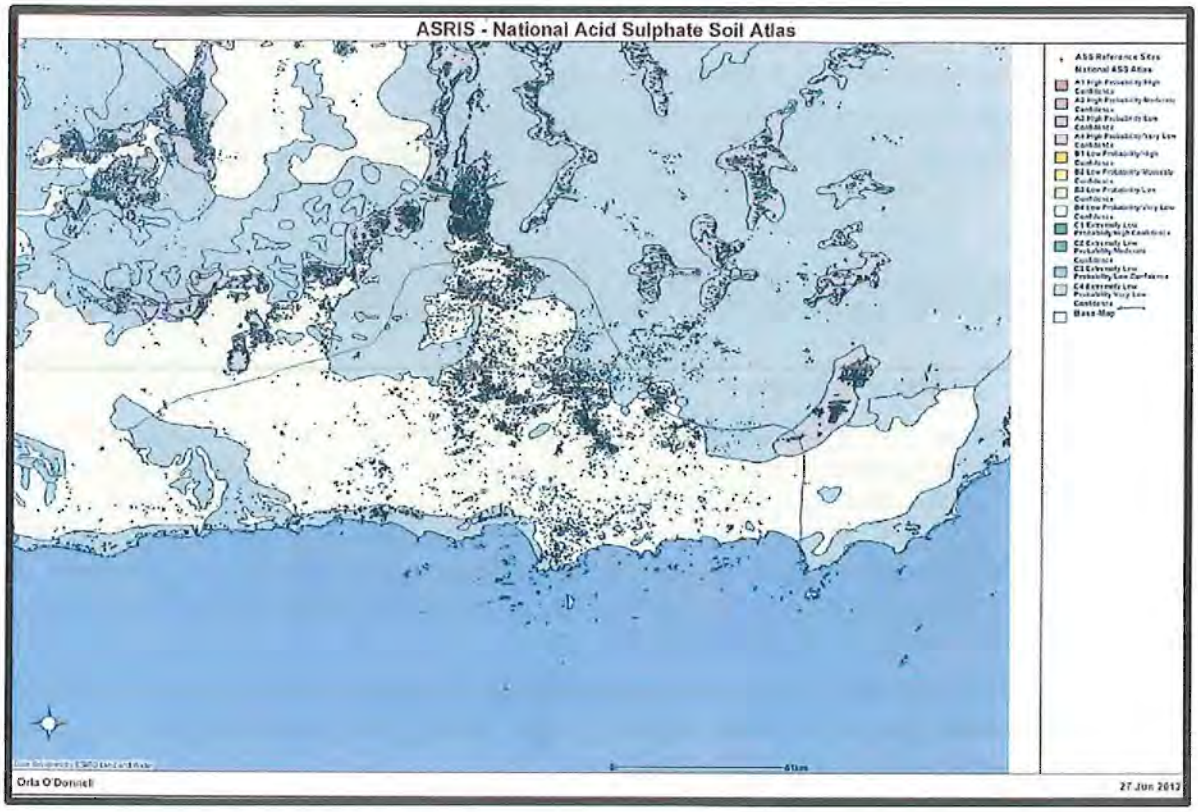
Wetland areas of the study alignment sections occur within a high acid sulphate risk zone. The need to complete an acid sulphate soil investigation in those areas is dependent on the method used to construct the fence; in particular how the fence posts are driven into the soil.

GHD understands that the materials used for the Esperance extension are likely to be similar to those for Yilgarn extension:

"The 'Yilgarn Gap' fence is to have Galvanised 2.4 driver in angle strainers with 3.2m struts, strut base plate and ground anchors at 300 m intervals (or as required at corners, roadways etc) unless specified otherwise;"

If this approach to construction of the fence is applied, with the implication of minimal exposure of potential acid sulphate soils, further work on the risk of disturbance of ASS is unlikely to be required.

Plate 2 ASRIS (2012) map of ASS soil probability in the Project Area



5.3 Hydrogeology and Hydrology

5.3.1 Surface Waters

The Project Area traverses five rivers and a further two identified drainage lines. The watercourses are not in areas proclaimed under the *Rights in Water and Irrigation* (RIWI) *Act* 1914 (Table 7) and therefore Bed and Banks Permits will not be required if the fence crosses these watercourses.

Due to the low relief and sandy soils of the region much of the surface water found along the study alignment is ephemeral in nature (photograph 4; Appendix E). The Project Area includes granite outcrops that are an important water source for local vegetation located in the run-off areas from the granite outcrops.

The construction and maintenance of the fence is not expected to have any long term effects on surface water hydrology. However, there may be minor short term impact during the construction phase due to

the required clearing and earthworks. Crossing a waterway will increase the cost of the fence, both for construction and ongoing maintenance. The depth, width and rate of flow in a waterway are the most significant factors affecting these costs. Each section of the final alignment that crosses a surface water feature will need to be visually inspected by the contractor in order to obtain an accurate cost estimate.

The use of "wings" is recommended on all of the surface water features listed in Table 7. It is further recommended that DAFWA prepares and implements an Environmental Monitoring Plan (EMP) for construction activities and that this may include the use of temporary erosion control measures to stabilise the banks.

Table 5 Surface Water bodies present within the Project Area

Name	Feature	Alignment
Oldfield River	River	Section 1
Young River	River	Option 2A, 2B
Unknown	Drainage channel	Option 4A
Lort River	River	Option 8A, 8B, 8C
Unknown	Drainage channel	Option 33C
Thomas River	River	Section 38
Kennedy Creek	River	Section 38

5.3.2 Wetlands

Wetlands of International Significance are listed under the Ramsar Convention which is an International treaty that covers the conservation of internationally important wetlands. The Environment Protection and Biodiversity Conservation (EPBC) Protected Matters Search Tool (PMST) indicated that there are no Ramsar listed sites located in the vicinity of the study alignment; however some wetlands of subregional significance occur along the alignment, these wetlands are listed in Table 6. There are no Nationally Important Wetlands within the Project Area. The nearest Nationally Important Wetland is the Lake Warden system which is approximately 50km from the closest point of the study alignment. No geomorphic wetlands mapped by DoW were found to occur within the Project Area (Dow, 2012).

The alignments also cross the Kumarl Lake King wetland and Lake Halbert wetland, however these wetlands are not formally registered as wetlands of significance under the *EPBC* search tool nor Nationally Important Wetland listing, hence the 'None listing. They have been listed however as known wetlands that will be crossed by the Fence.

Table 6 Wetlands which the study alignment crosses.

Name	Feature	Alignment	Significance
Peak Charles	Salt lake plain	Option 11A, 11B	Subregional
Kumarl Lake King	Salt lake plain	Options 13A, 13B ,Section 14	None
Salmon Gums	Salt lake plain	Section 16	Subregional
Lake Halbert	Salt lake plain	Options 22A, 22B, 23A, 23B, 24A, 24B	None

5.3.3 Groundwater

Groundwater in WA is protected and managed under the *Rights in Water and Irrigation Act 1914*. The western areas of the Esperance extension are located within the Kondinin-Ravensthorpe Groundwater area. (DoW, 2012) The construction and maintenance of the fence will not require the abstraction of groundwater or major ground disturbance. Therefore the impact of the construction and maintenance of the fence on groundwater is expected to be negligible.

A summary of the Geographic Data Atlas queries undertaken for the Project Area is provided in Table 7. No proclaimed areas were identified within the Project Area and so approvals from the Department of Water (DoW) will not be required for crossings of waterways, including creeks.

Table 7 Department of Water Geographic Data Atlas queries

Aspect	Details	Results
RIWI Groundwater Areas	Groundwater areas proclaimed under the *Rights in Water and Irrigation Act 1914.*	Kondinin-Ravensthorpe Groundwater
RIWI Surface Water Areas	Surface water areas proclaimed under the *Rights in Water and Irrigation Act 1914.*	None present
RIWI Irrigation District	Irrigation Districts proclaimed under the *Rights in Water and Irrigation Act 1914.*	None present
RIWI Rivers	Rivers proclaimed under the *Rights in Water and Irrigation Act 1914.*	None present
Public Drinking Water Source Areas (PDWSA)	PDWSAs is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the *Metropolitan Water Supply, Sewage and Drainage* (MWSSD) *Act* 1909 or the *Country Area Water Supply* (CAWS) *Act 1947.*	None present
Waterway Management Areas	Areas proclaimed under the *Waterway Conservation Act 1976.*	None present

5.4 Contaminated Sites

A search of the online DEC Contaminated Sites Database (DEC 2012) indicated that there are no registered contaminated sites within, or adjacent to the study alignment. The works associated with the construction and maintenance is not expected to result in any land contamination.

5.5 Vegetation and Flora

Vegetation and flora were assessed both through desktop and a field based assessment. The following is drawn from the full report, which is reproduced in Appendix G.

5.5.1 Broad Vegetation Types

The Project Area occurs within a gently undulating plain with protruding granite domes and lake systems. Beard (1973) discusses the relationship of soils, lakes and vegetation within the Esperance region and has mapped broad vegetation types. In the southern portion of the Project Area the upper horizon of sand is bleached and often coarser than further inland. The vegetation in this area consists of scrub-heath and mallee-heath. In western sections the shallower profiles often contain a band of pea ironstone at the base of the sand layer. *Eucalyptus tetragona* (mallee) dominates in these areas. Further inland the surface layer of sand is shallower, of irregular depth, laterite is absent and mallee is the dominant vegetation.

Even further inland calcareous soils begin to appear, first in patches and then the mallee gives way to *Eucalyptus oleosa* woodlands. The surface soil here is pink, loamy with a fluffy or floury texture, and overlies calcareous nodules or limestone. In the east, near the coast, the *Eucalyptus cooperana* mallee zone grows on a thin red soil over limestone. On Mt Ragged and the adjoining hills in the east of the Project Area there is only a thin layer of sand and humus over rock. The hills are surrounded by a belt of sand possibly derived from disintegration of the quartzite and supporting heath vegetation. The granite domes throughout the area are often largely bare of soil but may have granite rubble, sand and humus in patches that support vegetation (Beard, 1973).

Much of the Project Area contains lake systems and these systems support various vegetation complexes. The lakes on the Esperance plain occur in three zones of differing character. On the more southern portion they are ephemeral small rounded depressions. Few are open lakes, with most are covered with vegetation, either *Melaleuca* scrub in sandy areas, or *Eucalyptus occidentalis* woodland or mallee if on clay (Beard, 1973). Where the vegetation changes from heath to mallee a change is also present in the shape and salinity of the lakes; they change from fresh too salty and from circular to oval in shape. Most are oriented in an east-west direction and in areas they become very thickly clustered, separated by well-vegetated ridges of sand. The lakes are dry for most of the year and carry sparse populations of *Halosarcia* (samphire). Further inland the lakes are salty, more irregularly scattered and generally more circular. They are often associated with granite outcrops (Beard, 1973).

5.5.2 Vegetation Extent

A vegetation type is considered under-represented if there is less than 30% of its original distribution remaining. From a purely biodiversity perspective, and not taking into account any other land degradation issues, there are several key criteria now being applied to vegetation (EPA, 2000). These are detailed below:

- The "threshold level" below which species loss appears to accelerate exponentially at an ecosystem level is regarded as being at 30% of the pre-European/pre-1750 extent for the vegetation type;
- 10% of the pre-European/pre-1750 extent for the vegetation type is regarded as being a level representing *Endangered*; and
- Clearing which would put the threat level into the class below should be avoided.

Such status can be delineated into five (5) classes:

- *Presumed Extinct*: Probably no longer present in the bioregion
- *Endangered**: <10% of pre-European extent remains
- *Vulnerable**: 10-30% of pre-European extent exists
- *Depleted**: >30% and up to 50% of pre-European extent exists
- *Least Concern*: >50% pre-European extent exists and subject to little or no degradation over a majority of this area.

* Or a combination of depletion, loss of quality, current threats and rarity gives a comparable status

The extent of the vegetation types mapped by Beard (1973) within the Project Area has been determined by the Government of Western Australia (2011) (Table 8). This indicates that the majority of the mapped vegetation types that occur within the Project Area are described as *Least Concern*. Three vegetation types (47, 1516, 2048) are *Depleted* and two vegetation types (512, 4801) are *Vulnerable*. These are highlighted in the Table 8.

Table 8 Broad Vegetation Types and Extent (After: Government of Western Australia, 2011)

Vegetation Association	Vegetation Description	Pre-European extent statewide (ha)	Current extent statewide (ha)	% remaining	% Pre-European extent in IUCN Class I-IV Reserves
9	Medium woodland; coral gum (*E. torquata*) & goldfields blackbutt (*E. le soufii*)	240509.33	235161.94	97.78	1.26
10	Medium woodland; red mallee group	145676.38	144160.85	98.96	0.45
42	Shrublands; mallee & acacia scrub on south coastal dunes	310084.5	295859.61	95.41	44.79
47	Shrublands; tallerack mallee-heath	1033054.74	372046.82	36.01	17.57
125	Bare areas; salt lakes	3492381.05	3269266.1	93.61	7.2
128	Bare areas; rock outcrops	329836.18	283024.14	85.81	14.95

Vegetation Association	Vegetation Description	Pre-European extent statewide (ha)	Current extent statewide (ha)	% remaining	% Pre-European extent in IUCN Class I-IV Reserves
129	Bare areas; drift sand	95286.17	63838.18	67	43.65
482	Medium woodland; merrit & red mallee	1628465	1612407.2	99.01	8.83
486	Mosaic: Medium woodland; salmon gum & red mallee / Shrublands; mallee scrub *Eucalyptus eremophila*	436130.37	254277.54	58.3	4.86
512	Shrublands; mallee scrub, *Eucalyptus eremophila* & Forrest's marlock (*E. forrestianna*)	237886.07	61978.71	26.05	2.4
516	Shrublands; mallee scrub, black marlock	607434.26	332304.86	54.71	24.07
519	Shrublands; mallee scrub, *Eucalyptus eremophila*	2333413.58	1418019.52	60.77	10.49
552	Shrublands; *Casuarina acutivalvus* & *Calothamnus* (also *Melalueca*) thicket on greenstone hills	33908.73	31506.82	92.92	0.89
924	Shrublands; mallee scrub, *Eucalyptus eremophila* & red mallee	107608.05	59929.4	55.69	22.64
925	Shrublands; mallee scrub, red mallee	5152.66	3780.93	73.38	1.84
1047	Shrublands; *Eucalyptus incrassata* mallee-heath	220297.22	186621.59	84.71	54.85
1516	Shrublands; mallee scrub, black marlock & Forrest's marlock	126686.24	58191.45	45.93	19.87
1519	Shrublands; mallee scrub, *Eucalyptus eremophila* & *Banksia*	3290.12	3290.12	100	
2048	Shrublands; scrub-heath in the Mallee Region	322219.98	158398.71	49.16	7.6

Vegetation Association	Vegetation Description	Pre-European extent statewide (ha)	Current extent statewide (ha)	% remaining	% Pre-European extent in IUCN Class I-IV Reserves
3106	Medium woodland; salmon gum & Dundas blackbutt	52660.8	51574.58	97.94	5.93
4048	Shrublands; scrub-heath in the Esperance Plains including Mt Ragged scrub-heath	50400.59	30021.61	59.57	47.59
4801	Shrublands; heath with scattered *Nuytsia floribunda* on sandplain	58196.27	6304.65	10.83	3.32

The vegetation types that were determined to be *Depleted* or *Vulnerable* were further assessed to determine which Options or Sections they occurred in, and the extent to which they may be impacted for each of these Options or Sections (Table 9). For all Options and Sections, excepting Section 38, the amount of clearing required for each of these *Depleted* or *Vulnerable* vegetation types was less than 0.1 % of the remaining vegetation extents. Section 38 contains approximately 0.3 % of the remaining "Shrublands; heath with scattered Nuytsia floribunda on sandplain". This vegetation type is of particular concern as there is only 10.83 % of the pre-European extent remaining across the State. If further clearing of this vegetation type occurs it may drop below 10 % and be considered *Endangered*.

All of these calculations would be overestimates of the potential impact on these vegetation types as it has been assumed that clearing will be required for the entire alignment, with no consideration given to existing cleared or disturbed areas.

Table 9 Amount of *Depleted* or *Vulnerable* Vegetation Types Within the Options: includes the percentage of current extent remaining within option

Vegetation Association	Vegetation Description	Section Number	% of Pre-European extent remaining	Current extent statewide (ha)	Area (ha) of vegetation within option (20m width)	% of current extent within option
47	Shrublands; tallerack mallee-heath	1	36.01	372046.82	44.528	0.012
		7			4.598	0.001
		2A			1.268	0.000
		2B			2.318	0.008
		8A			1.737	0.009
		8B			0.021	0.009
		8C			0.007	0.000
512	Shrublands; mallee scrub, Eucalyptus eremophila & Forrest's marlock (E. forrestianna)	1	26.05	61978.71	31.481	0.051
		2A			26.544	0.043
		2B			42.153	0.068
		4C			23.005	0.037
		6C			37.903	0.061
		8C			3.168	0.005
1516	Shrublands; mallee scrub, black marlock & Forrest's marlock	25	45.93	58191.45	1.356	0.002
		23A			12.416	0.021
		23B			21.521	0.037
		24A			31.067	0.053
		24B			35.767	0.061
2048	Shrublands; scrub-heath in the Mallee Region	1	49.16	158398.71	1.831	0.001
4801	Shrublands; heath with scattered Nuytsia floribunda on sandplain	38	10.83	6304.65	18.408	0.292
		35C			3.181	0.050

5.5.3 The Great Western Woodlands

The Great Western Woodlands is a continuous band of native vegetation that stretches north and east from the edge of the wheatbelt, covering almost 16 million hectares. The woodlands cover much of the Unallocated Crown Land (UCL) within the Project Area, and the SBF extension runs along the edge of the woodlands for much of its length.

The Great Western Woodlands is an internationally significant area of great biological richness. It is the largest remaining intact Mediterranean climate woodland on earth (DEC, 2010). The woodlands are still in excellent biological condition but are under increasing pressure from pest animals, weeds and bushfires. The conservation strategy (DEC, 2010) for the Great Western Woodlands includes priorities for retaining the composition, structure and function of native ecosystems and to minimise clearing within the woodlands.

The Great Western Woodlands is an ecologically significant area and impacts on the woodlands should be avoided where possible. The greatest impacts on the woodlands from the SBF extension would be expected where the innermost alignments cross large areas of remnant vegetation. Impacts could be avoided by utilising the outside extents of the UCL, adjacent to the agricultural land.

5.5.4 Threatened and Priority Ecological Communities

Ecological communities are defined as 'naturally occurring biological assemblages that occur in a particular type of habitat' (English and Blythe, 1997). TECs are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. *Presumed Totally Destroyed, Critically Endangered, Endangered and Vulnerable*.

The DEC maintains a list of TECs which have been endorsed by the Minister for the Environment (April 2012). DEC listed ecological communities are given special consideration in environmental impact assessments and have special status under the land clearing regulations of the *Environmental Protection Act 1986* (EP Act). The EPA's position on TECs states that proposals that result in the direct loss of TECs are likely to require formal assessment. Some TECs are also protected under the EPBC Act.

An EPBC Act Protected Matters Search was undertaken for the Project Area (DSEWPaC, 2012). No EPBC Act listed TECs were indicated to occur within the search area.

A DEC TEC database search indicated that the closest recorded TEC ("Russell Range mixed thicket complexes") occurs 18 km to the east of Section 32A of the study alignment, and should not be impacted by this Project.

The DEC search indicated a number of PECs that occur within the broader area, with the closest PEC approximately five km from the study alignment. Additionally, the DEC's list of PECs within the South Coast area was examined to determine any other PECs that have the potential to occur within the area. A number of the PECS within the general area are not likely to occur in the Project Areas as they are endemic to specific landforms, such the flora associations of individual mountains or ranges.

During the Level 1 survey the PECs that may occur within the general area were considered to determine the likelihood of their occurrence in the Project Area. This Level 1 survey did not indicate the occurrence of any PECs; however, many of the PECs are poorly described and further detailed survey work, including floristic analysis, is required to confirm these results.

5.5.5 Vegetation Condition

Much of the Project Area contained undisturbed vegetation in excellent condition. There was little evidence of weed invasion across the Project Area and generally the structural levels remained intact.

5.5.6 Low Fuel Modified Buffer Strip

DEC currently maintains a low-fuel modified buffer strip, most recently installed in the 1990's by the then Bush Fires Board (now FESA), which runs in UCL/agricultural land interface. At the edge of the buffer the DEC utilises existing roads (where possible) or a 10 m access track. These roads or tracks are used as the base to subsequently maintain a low fuel zone varying in size, but averaging up to 50 m in width. This low fuel zone is scrub-rolled and then subject to a fuel reduction burn of any accumulative vegetation material, preferably within the same or following year. The buffer is generally re-treated approximately every 10 years, depending on factors such as risk to key infrastructure, private property assets, vegetation type, seed maturity cycles and viability and fuel loads. The access tracks innermost to the agricultural lands are maintained more frequently, either by grading or chemical application.

The low fuel modified buffer strip has been mapped at Figure 2 from datasets provided by the DEC. The innermost option of the study alignment generally lies within the low fuel modified buffer strip. In the northern section of the study alignment, from around Ainsworth Rd, west of Salmon Gums, to McCrea Rd, east of Salmon Gums the low fuel modified buffer strip does not occur. This means that the fence alignment in this area will require clearing of undisturbed vegetation along the UCL, which is currently in pristine – excellent condition. In some sections of this area a narrow cleared track runs along the interface between the UCL and the agricultural land which could be utilised as part of the clearing required for the fence. However, clearing of undisturbed vegetation along the edge of the UCL will still be required.

The buffer strip is, as expected, in lower condition than the undisturbed vegetation bordering this strip. However, while the vegetation within the buffer strip has been impacted by the scrub-rolling and burning, the older regrowth areas still show good diversity of species and low weed invasion. The buffer strips that have been treated more recently are still dominated by disturbance specialist species and the undisturbed vegetation structure has been heavily impacted.

If the scrub-rolled areas were allowed to regrow, it would be expected that the vegetation structure would become in good condition over time. However, regeneration will not be allowed as the process of scrub-rolling and burning in some sections to maintain the buffer strip will continue.

5.5.7 Flora Species Diversity

A *NatureMap* search (DEC, 2012c) indicated more than 1500 flora taxa previously collected within a broad area with a buffer 20 km of the study alignment. The diversity recorded within the *NatureMap* searches reflects the high diversity of the general area. The Esperance region is known for its high diversity of flora species and the SBF crosses a large variety of vegetation types, meaning a large number of flora species would be expected to occur across and near the Project Area.

5.5.8 Conservation Significant Flora

Flora species considered to be significant are listed under the EPBC Act and the *Wildlife Conservation Act 1950* (WC Act). Any activities that are deemed to have a significant impact on species that are recognised by the WC Act and/or the EPBC Act can trigger referral to the EPA and/or the DSEWPaC.

The DEC also maintains a list of Priority Listed Flora species which are species that are not currently protected under the WC Act. Priority flora may be rare or threatened, but cannot be considered for declaration as rare flora until adequate surveys have been undertaken of known sites and the degree of threat to these populations have been clarified. Special consideration is often given to sites that contain Priority flora species, despite them not having formal legislative protection.

Desktop searches of the EPBC Act Protected Matters database (DSEWPaC, 2012), DEC's rare flora databases and the *NatureMap* database with a very general 20 km buffer (DEC, 2012c) indicate that there are 14 Threatened (Declared Rare) Plant Species and 145 Priority species recorded within the area. The DEC records indicate that 61 species occur within 1 km of the study alignment (Figure 3). However, these records should not be considered to be exhaustive. The Project Area is very large and contains a number of areas that have been very poorly studied. In addition the majority of flora surveys would have occurred in areas with good access (such as along roads) or where surveys would have been required for previous Project s (such as road developments). The lack of records of significant species in some sections of the study alignment (particularly the areas that cut through the UCL) reflects a lack of surveys, not necessarily a lack of significant species along these areas.

5.5.9 Weeds

A desktop search of the EPBC Act Protected Matters database (DSEWPaC, 2012) indicated the presence or potential presence of four environmentally significant invasive flora species within the Project Area. These include:

- * *Asparagus asparagoides* Bridal Creeper
- **Carrichtera annua* Ward's Weed
- **Lycium ferocissimum* African Boxthorn
- **Tamarix aphylla* Athel Tree (although it is not currently regarded as an issue in the Esperance district according to the DEC).

During the field survey the Project Area was assessed for the presence of weed species. Generally the weeds recorded were weeds of the agricultural areas, such as pasture grasses and weedy daises. The majority of the introduced species were located directly adjacent to the disturbed areas, such as roads and paddocks.

Weed invasion of native vegetation was minimal in both the scrub-rolled vegetation and the undisturbed vegetation. The only recorded area of significant weed invasion within the native vegetation was in Section 38, where bridal creeper (*Asparagus asparagoides*) has invaded remnant vegetation. This Section is along the boundary of Cape Arid National Park which is a concern for its potential impacts on the conservation values of the National Park. Bridal creeper is a serious environmental weed and is on the list of WONS.

Weed invasion has the potential to be a serious issue associated with the construction of the SBF extension. Where the fence will be built through remnant vegetation that has not been previously disturbed there is the potential for the construction of the fence to lead to increased weed invasion. To reduce the risk of weed invasion it would be preferable to construct the SBF in areas of existing disturbance, such as along firebreaks. Particular consideration to weed control should be given in areas with high environmental significance, such areas near the Cape Arid National Park.

5.6 Fauna

5.6.1 Habitat

An assessment of the potential impacts of the Esperance extension on fauna has been conducted by DAFWA: *Advice on the Ecological effects of the Esperance Extensions on Native Wildlife* (DAFWA, 2012). These overall impacts, that are applicable to all the fence options, are not covered in detail within the flora and fauna report in Appendix G. Rather, the Flora and Fauna report prepared for this Project compares potential fauna impacts from the various study alignment options, determines measures to minimise potential impacts and discusses further works required to assess the overall fauna impacts.

The dominant fauna habitat types located along the study alignment included:

- Woodlands;
- Salt lakes;
- Shrub/Heath-lands;
- Creeks;
- Rocky outcrops; and
- Coastal dunes.

Areas that have high value as fauna habitat include rocky outcrops and creeks, as they provide shelter and resource availability.

5.6.2 Habitat Linkages

Ecological linkage is defined as a series of patches of native vegetation which act as stepping stones of habitat to facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape (EPA, 2009). Habitat linkages are particularly important within the agricultural zone of the Project Area where broad scale clearing has occurred. In this area small patches of vegetation can be significant as areas of contiguous habitat linking remnant vegetation. The UCL to the north of the study alignment is still in very good condition and offers excellent habitat linkage.

5.6.3 Habitat Fragmentation

The fence will be a barrier for large, flightless fauna species that are be too big to pass through the fence mesh and cannot pass over the fence. The 20 metres of cleared area at the fence may also be a barrier for those species that will not cross open ground.

None of the fauna species for which the fence will be a barrier are truly migratory. However, even for the non-migratory species the fence may prevent animals accessing resources, such as water and habitat. This is especially relevant in the areas where the fence causes fragmentation within remnant habitat and where animals may be isolated from areas within their existing range.

Where the fence fragments habitat and isolates fauna populations there is the risk that these small populations will be unviable into the future. If re-colonisation is prevented due to the barrier effect of the fence, the species may become locally extinct. In the longer term, isolation of populations may also alter gene flow within the meta-population and consequently reduce long-term viability of the population. These issues are particularly pertinent to the small-medium species that are unable or unlikely to pass

through the fence and which may be threatened by other factors (DAFWA, 2012). DEC advise that habitat fragmentation may have a significant impact on Chuditch, given their large home range of up to 15km^2. Malleefowl may also be impacted as well as other priority taxa including the southern brown bandicoot, the western brush wallaby and the tammar wallaby. Referral under the EPBC Act may be required if these species are impacted as a result of the extent to which habitats are fragmented as a result of the Fence.

Potentially impacted significant species are discussed further in Appendix.

Climatic variation and long-term climatic changes will impact on fauna as the distribution of fauna species will change as resources contract and move in response to these changes (DAFWA, 2012). The SBF overall may have a significant impact on fauna populations in the future if it reduces the connectivity of habitat that would allow some species to adapt to climatic change.

5.6.4 Fauna diversity

A *NatureMap* search (DEC, 2012c) indicated 219 fauna taxa have been previously collected within around 20 km of the Project Area. The *NatureMap* records show that *Scincidae* (21 taxa), *Meliphagidae* (15 taxa) and *Anatidae* (11 taxa) are the most species rich families that have been recorded within this area.

Given the large Project Area and the variety of landforms and habitats that the study alignment crosses the number of species expected to occur within this area will be extensive.

5.6.5 Conservation Significant Fauna

The conservation of fauna species and their significance status is currently assessed under both Commonwealth and State Acts. The Acts include the Commonwealth EPBC Act and State WC Act.

From the searches of the *NatureMap* database (DEC, 2012c) and the EPBC Act Protected Matters Search Tool (DSEWPaC, 2012) a number of protected fauna species were identified as potentially occurring within the survey area, including:

- *Pezoporus wallicus* subsp. *flaviventrus* (Ground Parrot): Endangered (EPBC Act) Schedule 1 – Critically Endangered (WC Act);
- *Botaurus poiciloptilus* (Australasian Bittern): Endangered (EPBC Act) Schedule 1 – Endangered (WC Act);
- *Calyptohynchus latirostris* (Carnaby's Black Cockatoo): Endangered (EPBC Act) Schedule 1 – Endangered (WC Act);
- *Parantechinus apicalis* (Dibbler): Endangered (EPBC Act) Schedule 1 – Endangered (WC Act);
- *Cereopsis novaehollandiae* subsp. *grisea* (Cape Barren Goose): Vulnerable (EPBC Act) Schedule 1 – Vulnerable (WC Act);
- *Leipoa ocellata* (Malleefowl): Vulnerable (EPBC Act) Schedule 1 – Vulnerable (WC Act);
- *Dasyurus geoffroii* (Chuditch): Vulnerable (EPBC Act) Schedule 1 – Vulnerable (WC Act);
- *Thalassarche chrysostoma* (Grey-headed Albatross): Endangered (EPBC Act) Schedule 1 – Vulnerable (WC Act);
- *Ardeotis australis* (Australian Bustard): Priority 4;

- *Morelia spilota* subsp. *imbricata* (South-west Carpet Python): Priority 4;
- *Thinornis rubricollis* (Hooded Plover): Priority 4;
- *Isoodon obesulus* subsp. *fusciventer* (Quenda): Priority 5;
- *Macropus eugenii* subsp. *derbianus* (Tammar Wallaby, WA subsp.): Priority 5; and
- *Falco peregrinus* (Peregrine Falcon): Schedule 4.

It should be noted that some species that appear in the EPBC Act Protected Matters Search Tool are often not likely to occur within the specified area, as the search provides a general guidance to matters of national significance that require further investigation. The records from the DEC searches of threatened fauna provide more accurate information for the general area; however some records of sightings or trappings can be dated and often misrepresent the current range of threatened species.

There are a number of shorebirds listed under the EPBC protected matters listing that may utilise some of the inland lake systems at certain times during the year. The State Barrier Fence is unlikely to impact this use of these waterways.

Some significant species have a distribution that may include the Project Area but were not found in the data received from the DEC and EPBC searches, these species include;

- *Bettongia penicillata ogilbyi* (Woylie): Endangered (EPBC Act) Schedule 1 – Endangered (WC Act);
- *Platycercus icterotis xanthogenys* (Western Rosella – inland subspecies): Schedule 1 – Vulnerable (WC Act);
- *Lerista viduata:* Priority 1;
- *Acanthophis antarcticus* (Southern Death Adder): Priority 3
- *Paroplocephalus atriceps* (Lake Cronin Snake): Priority 3;
- *Burhinus grallarius* (Bush Stonecurlew): Priority 4;
- *Atelomastic anancita* (millipede): Threatened
- *Atelomastic sarahae* (millipede): Threatened
- *Epicyliosoma sarahae,* (Sarah's millipede): Threatened;
- *Calamanthus campestris montanellus* (Rufous field wren (western wheatbelt): Priority 4.
- *Pomatostomus supercilisosus ashbyi* (White browed babbler (western wheatbelt): Priority 4.
- *Macropus irma* (Western Brush Wallaby): Priority 4; and
- *Oreoica gutturalis gutturalis* (Crested Bellbird – southern): Priority 4.

The Western Mouse and Heath Mouse may also occur in this area.

5.6.6 Feral Animals

The *NatureMap* search (DEC, 2012) and the EPBC Act Protected Matters Search Tool (DSEWPaC, 2012) indicated that a number of feral animals may occur within 20 km of the Project Area. These include:

- **Capra hircus* (Goat);
- **Felis catus* (Feral Cat);

- **Oryctolagus cuniculus* (European Rabbit);
- **Rattus rattus* (Black Rat)
- *Streptopelia senegalensis* (Laughing Turtle-Dove)
- **Sus scrofa* (Pig);
- *Equus ferus* (Horse);
- *Camelus dromedaries* (Camel); and
- **Vulpes vulpes* (Red Fox);

According to DEC advice there is little if any presence of goats and pigs in the Project Area. However, there has been sightings and evidence of horses and camels in the UCL to the north of Project Area.

The SBF is aimed at preventing the movement of wild dogs but may also impact on the movement of other large feral and native animals. There is the potential for the exclusion of wild dogs from the agricultural area to change the predator-prey relationships within the farmland, leading to increases in populations of cats and foxes through the absence of competition and predation from wild dogs. However, little information is available on the population dynamics of these species and impacts are hard to predict without detailed, ongoing studies.

5.6.7 Impacts on species

The clearing required for the fence will reduce the amount of habitat and resources available for fauna species. This is particularly relevant for the areas of restricted and high value fauna habitat and for habitat of significant species. The south-eastern area of the study alignment contains large tracts of potential Carnaby's Black Cockatoo feeding habitat and potential breeding habitat for this species occurs in the north of the Project Area. Impact on these areas should be minimised and clearing of this habitat avoided.

The fence also has the potential to create a barrier and cause habitat fragmentation. Some of the significant species that may occur in the area, such as the Western Brush Wallaby, Malleefowl, Bandicoot and Tammar Wallaby, are unlikely to pass over or through the fence. If small populations of these species are isolated by the fence these populations may become unviable or susceptible to predation by cats and foxes. It is recommended that habitat fragmentation be minimised wherever possible.

Further surveys will be required to determine the presence of significant species along the final alignment, or within areas of habitat that will be fragmented.

5.6.8 Risk from Fauna Interactions with the Fence

The potential risks to wildlife from the Esperance extension were assessed by the Vertebrate Pest Research Section of DAFWA (2012b). The risk for large mammals, but also for other birds (particularly nocturnal species), bats, reptiles and smaller mammals includes potential collisions and entrapment with fences, which invariably leads to mortality. Entanglements with fences for smaller wildlife may result in entrappment in upper wires (especially barbed wires for birds and bats), ensnarement under fences and lower wires and entanglement against electrified wires (DAFWA, 2012).

While fences are a permanent collision and entanglement risk to wildlife, the risk is greatest immediately after construction of a new fence (DAFWA, 2012) when fauna are adapting to the new feature in the

landscape. Thus, risks will be minimised where the fence is constructed along existing fencelines or disturbed vegetation. On this basis the fence design planned for the Yilgarn Extension where these considerations have been addressed (see Section 5.2.1) is recommended to be continued for this extension.

5.7 Dieback

Dieback (*Phytophthora cinnamomi*) is found throughout the southern extent of WA in areas with susceptible plant species (Dieback Working Group, 2010). Dieback can persist and have significant impact under favourable conditions within the 400mm to 600mm rainfall zone. The accepted range of *Phytophthora* across Western Australia is restricted to the southern and western regions where average annual rainfall is greater than 600mm.

Areas that contain susceptible vegetation within the accepted range of the disease are considered to be at risk of infestation by *Phytophthora* and will require appropriate management to mitigate this risk. These areas will require a detailed field assessment for the presence of *Phytophthora* and to demarcate disease and hygiene category boundaries in the field. Areas that have been assessed as uninterpretable and that are located within the accepted range of the disease should be further assessed using detailed field based floristic survey data to qualify the uninterpretable classification. Areas that are confirmed as uninterpretable will require no further assessment and basic vehicle hygiene will be appropriate for the mitigation of risk. Any areas that are considered to contain susceptible vegetation will require a field based assessment. (Spencer, 2012)

A large proportion of the Project Area is considered to be at negligible risk of infestation as it is north of the 400mm isohyet and basic hygiene principles are considered suitable for management in these regions.

Two areas of the study alignment are considered potentially susceptible to infestation as they are located within the 400mm to 600mm rainfall zone; this includes eight sections and 25 options (Appendix H). The first portion that is potentially susceptible extends from the end of the existing SBF in a north easterly direction for approximately 80km to the intersection of the study alignment with Neds Corner road. The second portion runs in a south easterly direction from Mt. Ridley for approximately 220km towards the endpoint of the study alignment on the South Coast.

The vegetation in these areas has been classified according to Spencer (2012) as:

- Uninterpretable due to significant disturbance or a lack of susceptible species;
- Requiring survey if the vegetation comprises susceptible species and there is no known *Phytophthora*; or
- Infested.

The distribution of *Phytophthora* across the Project Area identified 16 positive recoveries of *Phytophthora* from soil and tissue samples and strategic mapping of infestations associated with the western side of the Cape Arid National Park has been carried out by the DEC. Of the positive sample results, 1 is located within 700m of the study alignment and 6 are located within 100m of the study alignment. All of these six positive recoveries are located in section 38 adjacent to the Cape Arid National Park. This indicates that there are infestations of *Phytophthora* intersecting with the study alignment within this section and operational hygiene will be required during Project planning, construction and maintenance.

5.7.1 Report

The detailed Flora and Fauna report that provides the supporting information for this study is presented in Appendix G of this Report. The Flora and Fauna report includes the results of the field investigations undertaken for this work and is sufficiently detailed to inform the next phase of work.

6. Heritage

6.1 European Heritage

A search of the Heritage Council of WA (HCWA) website identified no heritage sites near the Project Area (HCWA, 2012) Therefore no European heritage sites are expected to be impacted by the construction and maintenance of the Esperance extension.

6.2 Indigenous Heritage

Where an activity may disturb an Aboriginal site or an object an application for permission to disturb those sites will need to be submitted under Section 18 of the *Aboriginal Heritage Act 1972* (AH Act). This requirement includes all land in the state where sites are found, not just areas on the Aboriginal Heritage Site Register.

Where an area of land is to be disturbed, even if it has been previously disturbed, it is advisable that a detailed anthropological and archaeological heritage survey is undertaken to find out if there are any sites or objects of significance in the area. If any are found, permission to disturb must be obtained. Brad Goode & Associates Consulting Anthropologists & Archaeologists entire report can be located at Appendix I and the following is based on that report.

A search of the Department of Indigenous Affairs (DIA) Aboriginal Sites Register conducted on the 28th May 2012 revealed 10 Aboriginal heritage sites/places to be located within the 100m survey corridor (Table 10). The DIA inquiry system separates "registered Aboriginal sites" and "other heritage places" into two categories. Five registered Aboriginal sites were identified by the inquiry system to occur along the study alignment together with four "other heritage places".

Table 10 Aboriginal Heritage Sites within 100m of Project Area

Registered Aboriginal Sites					Alignment	
Name	**Site ID**	**Status**	**Access**	**Site type**	**Section**	**Option**
Reserve Stone Arrangement	2396	Registered Site	Closed	Ceremonial Myth, Manmade structure	24	A/B
Thomas River Station	2641	Registered Site	Open	Artefacts/ Scatter		
Boyatup Hill 1-5	2642	Registered Site	Open	Painting/Artefacts/ Scatter	35	B
Young river	26264	Registered Site	Open	Myth	2	A/B
Old field River	26265	Registered Site	Open	Myth	2	A/B
Other Heritage Sites						
Name	**Site ID**	**Status**	**Access**	**Site type**	**Section**	**Option**
Mt Ridley Salt Lake	2393	Lodged awaiting assessment	Open	Artefacts/ Scatter	23	B
Mt Ridley Salt Lake	2394	Lodged awaiting assessment	Open	Artefacts/ Scatter	23	B
Hawes Hill	2685	Insufficient information	Open	Artefacts/ Scatter	38	
Granite Outcrop South of Hawes Hill	17991	Lodged awaiting assessment	Open	Artefacts/ Scatter	38	

All Aboriginal heritage sites should be avoided where possible by choosing alternative route options.

- Of the registered sites the most significant site, 'Boyatup Hill 1-5' (ID 2642), occurs along the granite outcrop present at option 35A. This site is listed as being a 'Protected Area' (PA #31, W561.1-5) under section 19 of the AH Act. It is recommended that this site be avoided and that the alignment be located to ensure that this protected site is not impacted upon.
- The extent of the Reserve Stone Arrangement (ID2396) is unknown. It is a closed site and permission is required from the site informants to access the site file to further define the extent of this site. Consultation and field verification will be required should work proceed in the vicinity of this site.

- The crossing of the mythological sites; Oldfield River and Young River, is unavoidable with the study alignment options. If the 'wing' option is constructed at these waterways, then any impact on flow and the waterway itself is unlikely and therefore may not require application under Section 189 of the AH Act. Consultation with the site informants is recommended to ensure the informants are aware of the nature of works occurring at these sites.
- The Thomas River Station site (photograph 5, Appendix E) has the potential to be impacted by the Esperance extension and further archaeological verification may be required should work proceed in the vicinity of this site.

Several sections of the study alignment have not been subject to archaeological and ethnographic enquiries and further study is required along the entire length of the Project Area to ensure no Aboriginal heritage sites are affected. (Goode, 2012)

7. Alignment Assessment

The selection of the least constrained alignment involved consideration of a range of constraints (Appendix J). These constraints were determined for the sections of the study alignment where no alternative options were available as well as for the sections where there were options. A summary description of the constraints considered and their interpretation follows:

- **Biophysical constraints**

These include physical landforms which affect the construction and maintenance costs of the fence as they can be technically difficult, costly and have environmental implications. Granite outcrops, salt lakes and river and road crossings are the most limiting landforms which were considered in the determination of the least constrained alignment (Appendix J).

- **Flora and Fauna Constraints**

Gaps in Significant Flora Records: Areas that contained a number of records of significant flora species within one km of the study alignment were marked as high concern.

It may be possible to avoid impact on the significant flora species by refinement of the alignment following detailed surveys, and it is considered that mitigation measures may reduce the risk level of the constraint.

For this constraint there were no areas marked as low concern. This is because an absence of records does not necessarily mean that significant flora is not located in an area; rather that surveys may not have been conducted. Additionally, conservation significant flora species are known to occur within all habitat types present along the study alignment. Detailed flora surveys are required before the absence or otherwise of significant flora species can be determined within the unsurveyed areas.

Fragmentation of Native Vegetation: Sections that cross areas of remnant vegetation or fragment fauna corridors, such as waterways or existing reserves, were marked as high concern. Equally, sections that run alongside cleared areas and do not fragment vegetation were marked as low concern.

Vegetation Condition: (particularly in relation to scrub-rolling of vegetation): The Project Area contains two broad categories of vegetation condition:

1. Undisturbed vegetation that has not been previously cleared. This was generally in Pristine to Excellent condition. Options with undisturbed vegetation were ranked as highly constrained.
2. Vegetation that has been cleared or scrub-rolled in the past (photograph 6; Appendix E). The condition of these areas was considered to be Completely Degraded to Very Good (scrub-rolled). Options that occur in these areas were considered to be less constrained than those in undisturbed vegetation.

Some sections contained both areas of remnant vegetation and areas of scrub-rolled vegetation and these areas were considered to be of moderate concern.

In some areas it is possible to adjust the study alignment to align with areas that have been scrub-rolled. These areas were identified during this study and included in the least confined option.

Fauna Habitat Values: The fauna habitat values of the options were ranked from high to low, comparative to one another. The areas with the highest fauna habitat values (and hence of the highest concern) included areas of rocky outcrops. These outcrops provide refugia for conservation significant species and may be areas with potential Cockatoo feeding or breeding habitat. Areas that contain remnant vegetation were considered to have moderate habitat value, while areas that were cleared or within scrub-rolled vegetation were considered to have the lowest habitat value.

- **Dieback**

The Spencer report in Appendix H identified the risk of dieback associated with each of the sections within the Project Area. The constraint is considered to be greater for those areas with moderate to high risk of dieback than areas categorised as low risk. Areas of negligible risk are considered to have the lowest constraining factors, while rivers and drainage lines are considered to be constraining factors as they may act as vectors for the dispersal of dieback.

- **Social Heritage**

The Goode report identified areas that are constrained in terms of Aboriginal heritage (Appendix I). The biophysical factors which are associated with Aboriginal heritage sites include rivers and granite outcrops. The lands covered by the options have not been completely surveyed for heritage sites for much the same reasons as they have not been fully surveyed for flora. Further work will need to be done at the detailed alignment selection stage to avoid sites or to obtain section 18 approvals to disturb.

- **Planning**

Planning Criteria Assessment of Options

A Planning Criteria Assessment (PCA) was utilised to provide a comparison between the differing options within the study alignment based on planning and land tenure considerations; biophysical constraints are not considered. PCA is a process whereby entities that differ in character or content are assessed, compared and critiqued against each other in a consistent manner. This is done by assigning scores to constraints using a rating table (Table 11).

Table 11 PCA Rating Table

Multi Criteria Analysis	
1	Least Constrained
10	
20	Moderately Constrained
40	
999	Highly Constrained

The PCA gave a numerical value to each criterion under two headings:

1. Land Tenure; and
2. Zoning and reserves.

The criteria for land tenure and zoning & reserves were developed by the GHD Project team[1]. The PCA score that was assigned to each land tenure within the Project Area is shown in Table 12.

Table 12 Land Tenure: Planning Constraints Assessment

Land Tenure		
No'	PCA Heading	PCA Score
1	Private - Broad acre	20
2	Private - Town	40
3	Reserve - Local Government/ Department of Planning	10
4	Reserve - Main Roads Western Australia & Roads vested in local governments.	10
5	Reserve – Department of Environment and Conservation.	40
6	Reserve – Public Transport Authority/Department of Transport	20
7	Unallocated Crown Land	1

Table 13 shows the zoning and reserves criteria that were considered. The Project Area contains two local government authorities (LGA); Shire of Esperance and the Shire of Ravensthorpe.

Each LGA has a local planning scheme, which zones and reserves land for certain purposes – local planning schemes are given statutory power under the *Planning and Development Act 2005*. In order to reduce the complexity the analysis only considers the zones and reserves impacted by the study alignment. The PCA score given for zones and reserves was allocated based on the intent of the zone. Consideration of the likelihood of obtaining planning approval within the zone was disregarded as it has been recommended that DAFWA progress the Esperance extension as a "Public Works" as discussed in Section 4.3 of this report.

[1] These critera ratings may be reviewed by DAFWA and the EERG.

Table 13 Zoning & Reserves: Planning Constrains Analysis

Zoning & Reserves		
No.	PCA Title	PCA Score
1	Public Use	40
2	Public Use - Built Environment	999
3	Major Road	999
4	Minor Road	10
5	Nature Reserve or National Park	40
6	Reserve - General	20
7	Rural - Broadacre	40
8	Rural - Undeveloped	20

8. Least Constrained Alignment

The least constrained alignment (Figure 1b) was identified through a consideration of the previously outlined constraints (Section 7). The constraints table in Appendix J was created using data acquired from both desktop studies and the field survey. The innermost option was chosen wherever the outer option's constraints were greater than or equal to those of the innermost option. The outermost option was chosen only when the limiting factors were less than those of the innermost option. In some sections a slight alteration of the innermost option provided by DAFWA was chosen to avoid a constraint. The least constrained alignment has been mapped in Figures 2 and 3 with the physical, social and environmental constraints shown.

This report and its findings will be reviewed by the Esperance Extension Reference Group (EERG) in partnership with DAFWA to determine the preferred alignment. Once a preferred alignment is selected by DAFWA, community consultation will be undertaken and additional investigations will be required to describe the constraints (particularly heritage, flora and fauna). Subject to the findings of these surveys, the final alignment may be further refined.

8.1.1 Innermost Option

The least constrained alignment generally follows the innermost option, which is within UCL at the interface with the agricultural land. This means that the alignment is usually within areas of scrub-rolled vegetation. These areas will require minimal clearing of native vegetation and this will largely avoid impacts on undisturbed vegetation along with the associated indirect impacts, such as the introduction of weed species and dieback and increases in erosion and soil degradation. The innermost option also reduces habitat fragmentation by avoiding transecting large tracts of native vegetation, which reduces impacts on wildlife corridor connectivity.

Selection of an alignment that abuts the agricultural area also reduces the potential problem of isolating large areas of vegetation within the agricultural land. These areas could harbour wild dog populations and/or provide refuges for dogs that may cross the fence.

The innermost option is supported by DEC (Tiedemann, K. pers comm., 2012) as this minimises disruptions to the existing fire mitigation program and offers the easiest and safest option for implementing any bushfire suppression strategy (Appendix K). Also the outer options have implications in terms of fire management measures around the fence as these options would not fall within DEC's existing fire management areas. Similarly, safe access in the event of a major bushfire would also be a risk for the outer options. Use of the inner option would allow DEC to incorporate the area of clearing used for the SBF into the required buffer distance for the low fuel modified buffer strip. If this were to occur, the scrub-rolled area would not be increased after the fence clearing was undertaken, that is, the existing 50m wide scrub rolled area would be made up of 30 m wide scrub-rolled area and 20 m cleared fence reserve

The major disadvantage of the innermost option is the increased length (Appendix L) of the fence, which will have associated increases in construction costs. However, the increases in costs will be partially offset by "reduced" costs due to easier access for additional surveys, construction and maintenance.

The innermost option reduces the area of clearing of undisturbed vegetation (that has not been scrub-rolled). Clearing of vegetation may trigger requirements for offsets under Federal/State environmental

legislation. The provision of environmental offsets (if required) would require further discussions with DSEWPaC, EPA and DEC. However, other Project s that are clearing Black Cockatoo feeding habitat are required to provide offsets at a 1:6 ratio (i.e. each hectare of feeding habitat cleared requires six hectare of remnant vegetation as an offset). The costs associated with offsets for outermost options may mitigate the costs of additional fence length associated with the preferred innermost option.

8.1.2 Deviations from the innermost option

In some sections of the least constrained alignment, the intermediate or outermost option has been chosen to avoid constraints. In option 4C (see Figure 2 and Figure 3) of the least constrained alignment, it is recommended that the alignment deviates from the given route to follow the previously chained area. This not only reduces clearing but eliminates a sharp angle which could potentially cause bottlenecking of fauna (DAFWA, 2012b).

The northern area of the alignment, north of Salmon Gums, is not currently scrub-rolled by DEC. In this area there is no disturbed low-fuel modified buffer within which to place the alignment. The SBF extension could be placed along the firebreak/track that is located on the inner edge of the UCL to reduce clearing, but clearing of undisturbed vegetation could not be avoided, without utilising some agricultural land.

In these sections the extent of vegetation clearing has been considered in selecting the least constrained option. As such, the shortest option that avoids other constraints has been selected. This is the case in Section 13, where the inner Option 13C (83 km) would require substantially more clearing of native vegetation than 13B (14 km). Option 13C has other constraints, including its proximity to the Coolgardie-Esperance Highway, which were also considered.

This also occurs in section 15, where the inner option 15C would be 32 km, compared to 9 km for 15B. The most significant constraint for the outer options in this area is the fragmentation of native vegetation, as a large area of UCL will be on the inside of the fenceline. However, within this area there are already a number of patches of remnant vegetation, including reserves, within the agricultural land. These areas when combined with the new areas may be of high value as remnant vegetation within the agricultural land that can provide habitat for native flora and fauna. The impacts of habitat fragmentation by the fence could also be reduced in this area by providing appropriate mitigation measures. For example, it may be possible to include fauna crossings of the fence, such as suspended ropes for arboreal mammals. While it is recognised that these areas could harbour populations of wild dogs and emus, control measures (other than relocating the alignment) could be implemented. For example, dogging could be carried out within the remnant vegetation areas to remove the wild dog populations.

8.1.3 Creek Crossings

The SBF has five major creek crossings and two drainage lines (Table 5). Creek crossings create a number of cost issues during design, construction and maintenance of a fence. Creek crossings are highly constrained due to their association with heritage and dieback risk. Waterways often contain significant flora species and a number of the waterways crossed have records of Threatened and Priority species. Creeks have significance as fauna corridors and in this area the creeks provide important linkages between the UCL and areas of remnant vegetation within the agricultural land. Additionally, the chance of birds and bats colliding with the fence is likely to be high near or across water points.

Each creek crossing will require individual assessment and design. The design of the fence panels which cross the creeks requires an in situ assessment; this assessment will need to take into account the slope of the banks, the maximum and minimum creek water heights and the rate of flow. Often the fence panel which crosses the creek is sacrificial in nature and can be easily replaced if damaged. An agreement to ensure that any sacrificial material is removed from the riparian zone may be required.

Due to the ephemeral and varying nature of flow in many of the waterways, the fence is required to be functional with the differing water levels. The fence panel needs to allow the movement of non-target species beneath the fence and be tall enough to ensure that target species cannot cross the fence when the volume of water in the creek is high.

To reduce the constraints associated with waterways, a "wings" feature has been proposed by considered in (Appendix A) in these areas so that fencing is not required across the waterway. To decrease the number of undesirable fauna entering through this "gap" in the fence alternative methods of control should be used at an increased intensity in comparison to fenced areas. These may include a suite of protection measures such as targeted 'dogging' and baiting. By utilising "wings", constraints can be diminished and/or eliminated. In section one, an ESA is present within the Project Area, at the centre of the creek line of the Oldfield River. This can be avoided by the use of "wings". The Oldfield River, along with the Young and Thomas Rivers, are areas of mythological importance in Aboriginal heritage and "wings" would be more appropriate than a fence through the rivers.

While the "wings" may require extra clearing there is no need for road access and therefore a much narrower strip of vegetation will be cleared than in other parts of the fence. Also, as maintained access tracks are not required on either side of the "wings", vegetation can regrow along the "wings" after construction is completed.

The use of "wings" could also help mitigate the overall impact of the fence as a barrier to fauna movement by allowing a fauna corridor from the UCL to remnant vegetation patches within the agricultural land. Concentrating control methods, such as dogging, within the "wings" could be used to ensure that wild dogs and other targeted feral species are excluded, while still allowing the movement of native fauna along the waterway connections.

8.1.4 Road crossings

The least constrained alignment crosses roads of varying importance throughout the Project Area (Appendix D). The most significant road crossing is located in Section 14 where the study alignment transects the Coolgardie-Esperance Highway. Prior to work commencing on this Highway, consultation with Main Roads WA will be required. It is recommended that diversion "wings" are utilised on either side of the highway to divert the target fauna away from traffic. A grid may be considered to be constructed on the highway to dissuade the target fauna from migrating through to the agricultural areas along the highway. The frequency and intensity of baiting may be increased along this section to decrease the risk of public harm due to collisions with target fauna crossing the highway if the grids and diversionary wings are not adequate.

Grids are also recommended on all public roads including Cascade Road, Parmango and Fisheries Road.

As part of this scoping study the number of gates necessary along the alignment of least constraint has been assessed and can be seen on maps (1-6) in Figure 5.

Table 12 has been developed on the assumption that gates will be installed on private roads and grids on major public roads on the Least Constrained option.

Table 14 Number of Gates required for Alignment of Least constraint.

Feature	Alignment of Least Constraint
Road Grids (Main Roads and Shire Roads)	6
Road intersection Gates	23
Access Gate	49

Gate permits will be required for all gates across road reserves. A number of conditions apply in order to gain a gate permit and these conditions are available from the Shire of Esperance.

In the interest of the safety of motorists, wildlife signage should be clearly shown on roads and tracks intersecting the fence, where wildlife may pass through.

8.1.5 South Coast End Point Approach Options

The southern portion of the Project Area, west of Cape Arid National Park, is highly constrained principally due to the environmental sensitivities that occur along the alignment and the extent to which dieback occurs and potentially spread. (Figure 2 and Figure 3).

This study considers two endpoint options, both of which terminate immediately west of Cape Arid National Park. There are several routes that the alignment can take through the southern portion to reach the two endpoints (Figure 4). Two cross through the UCL in a south eastern direction, while two follow the agricultural and UCL interface. In the more northern parts the innermost options have the least number of constraints. In the more southern parts the innermost option (option 35C) traverse Cockatoo feeding habitat and the highly significant Aboriginal heritage site (Boyatup Hill 1-5). This entire area is also of moderate to high risk of dieback and therefore highly constrained.

Boyatup Hill has been described as a "no-go" area in the heritage report prepared for this study (Appendix I). If the innermost options are chosen in this part then it is recommended that the alignment be adjusted to ensure that the buffer of this heritage site is not encroached upon. The innermost option (option 35C) contains one angle less than 90° and 5 angles of 90° which not only are problematic in the construction of the fence but also affect the dispersal of fauna along the fence boundary. According to the advice given by DAFWA (2012b)) angles of 90° and greater are predicted to decrease the number of kangaroo collisions with the fence. Opportunities to refine the alignment to reduce the number of angles or the angle itself may be determined during the detailed survey.

The other routes proposed which transect the UCL will require a large amount of clearing that goes through possible Cockatoo feeding habitat. Due to lack of information, further study will be needed for this to be confirmed. This option will also fragment the area leaving a large area of remnant vegetation to the west of the fence. Both of these routes converge at 36BC where two endpoint options exist: the coastal endpoint and the median diversion wing.

8.1.6 Coastal Endpoint

The first endpoint, referred to as the "coastal endpoint", terminates on a granite outcrop on the southern WA coastline. Although this endpoint option echo's the highly effective barrier of the Zuytdorp Cliffs to the migration of target species, it contains many physical, planning, social and environmental constraints. Section 38 of the study alignment (Figures 2 and 3) alone contains three Aboriginal heritage sites (one registered, two other). Two of these sites are associated with granitic outcrops, which are difficult to avoid without encroaching into the Cape Arid National Park.

Three flowing water bodies traverse the study alignment in this section. Not only are these are more challenging in terms of design, construction and maintenance, they are important migration corridors for many species and are commonly associated with Aboriginal heritage. One of these water bodies, Thomas River, is also Aboriginal heritage site. If this option is chosen the utilisation of previously described "wings" (diagram in Appendix A) is recommended at each creek crossing.

The topography of the southern portion of this area is that of low undulating hills which increase in severity as the study alignment moves southwards towards the constantly changing sand dune landscape. The construction and maintenance of the fence in an undulating landscape is costly as it must manoeuvre around difficult angles and the length is increased compared with that in flat topography. The sand dune area poses many difficulties for the construction of a viable fence, as the dunes can shift and change over time. This can result in effective gaps in the fence being created that target species can use to migrate through to the agricultural areas to the west of the fence and locating the fence in mobile sand dunes is not recommended. This end-point potentially impacts vehicle movement along the coast and access points will be need to be planned in the final design.

If these above matters are readily addressed and receive the necessary approvals, then the coastal endpoint is the recommended end point for the State Barrier Fence.

8.1.7 Median diversion wing

The second option provided by DAFWA, is the use of a diversion wing, referred to as "median wing endpoint", which terminates the SBF north east of the coastal endpoint. This endpoint option has fewer limiting factors as compared to the coastal endpoint. The main constraints of this endpoint are concerned with the previously described limiting factors of the options taken to get to this point either through the highly constrained option 35C or cutting through the UCL. This endpoint is considered to be moderately constrained compared to the northern wing and coastal endpoints.

8.1.8 Alternate endpoint - North wing endpoint

Both of the endpoint options provided by DAFWA (Figure 4) would be costly, challenging to manage and difficult to obtain approvals for. In view of the complexities and challenges associated with the coastal endpoint an alternate endpoint has been put forward for consideration. This option is the extension of the fence in an eastwards direction from Parmango road in section 31 to the north western corner of Cape Arid National Park. At this point a diversion wing could be incorporated to direct the target fauna away from the national park in a northern direction. This option is referred to as "northern wing endpoint". GHD appreciates that this option has not be reviewed by the EERG and wider community and consultation is therefore required.

This endpoint will require clearing as the UCL will be dissected by the extension of the fence in an east-west direction (option 31B). Although the area to south of the alignment will be isolated from the north

less fragmentation of the landscape will occur as non-target fauna will potentially have the ability to migrate between the more southern sections of UCL and Cape Arid National Park.

This end point may potentially be viewed as discounting the concerns landholders on the eastern end of the Project Area. However, in putting forward this end point for consideration, GHD understands that the Cape Arid National Park is currently aerially baited four times a year on the sandplain areas. The DEC would support an increased baiting programme where this endpoint be nominated, with the caveat that the DEC would not be able to fund this additional work. An increase in these baiting and alternative barrier methods could be implemented along with existing management regimes within the Park. These alternatives to fence methods include undertaking dogging, baiting and upgrading farm fences activities as per the established barrier fence standards.

This endpoint could potentially decrease the overall impact and cost of the fence as the length (and therefore cost) will be decreased. It will also avoid many of the limiting factors present in the more southern endpoints; biophysical, environmental, heritage and dieback.

8.1.9 Clearing Footprint

This investigation included an assessment of the area to be cleared for each alignment option. From this assessment the total area of vegetation to be cleared may be determined. The clearing footprint for each section of fence was determined by way of a combination of desktop and field investigations.

The values showing the area to be cleared are presented in Table 13, Appendix C. These values may be immediately transferred to the nominated approval process, either section 38 of the EP Act or the application to clear native vegetation.

On the assumption that the Least Constrained alignment is preferred, the total approximate clearing area is 1057 ha as shown in Table 15.

Table 15 Approximate clearing footprint, Least Constrained Alignment (excluding the Northern wing endpoint).

Scrub-Roll	Sum of Length (km)	Approximate clearing footprint (Ha)
Within Scrub-roll	361.33	723.12
Outside Scrub-roll	166.89	334.15
TOTAL	528.23	1057

8.1.10 Cost Component

The parameters required to determine the costs that are likely to be associated with the construction of the least constrained fence are shown in Table 13. These parameters include the total length of the fence, the number of river crossings, the total number of gates (at intersections and at 10km intervals) and finally the areas that are particularly challenging in terms of constructing a fence, specifically the number of granitic outcrops.

Table 16 Parameters associated with the construction of the Least Constrained Alignment

Least Constrained Alignment	
Total Length (km)	560.74
River crossings	2
Gates (road intersection)	26
Gates (10km)	49
Hwy Grids	1
Road Grids	5

Therefore the parameters for the options considered for the final alignments have also been determined and are shown in Appendix L.

The costs associated with the final alignment must not only consider the direct cost of infrastructure and construction, but must also factor in the costs for the investigations, approvals process and potential requirement for offsets that may be associated with the preferred alignment. In broad terms, the greater the area of vegetation that will be required to be cleared, will likely incur greater cost in terms of the level of detail for surveys, time in terms of the approval process and the purchase of offsets particularly where the federal environmental act, EPBC Act is invoked.

The cost of any required offset is difficult to estimate as these are determined by the regulating authorities. As a guide, to offset an area of cockatoo habitat may require a minimum of six times the land area of similar environmental value, ie for one hectare of clearing an offset area of six hectares may be required.

Further, the DSEWPaC has recently issued advice that from December 2012, proponents will be charged for the assessment process, a cost currently not recovered by the agency. The cost is dependent on the extent to which assessment is required.

8.1.11 Future Consultation

The GHD brief did not call for consultation unless the least constrained alignment passed through private land; in which case GHD was to consult with the affected landowner. As the least constrained alignment does not do this, consultation was not required.

The consultation component of this Study did however require that the outcomes of the investigations and their implications were presented to the EERG for consideration, including any alternate alignment options that may have emerged during the study. Following this consultation, this study proceeded to finalise the preferred alignment.

The least constrained alignment emerged as the preferred alignment and as such consultation with the Environmental Protection Authority (EPA) as to the preferred approach to referral is warranted. There is sufficient information in this report to complete this initial referral to the EPA if agreement is made on this Report's recommendation. This Report acknowledges that the Coastal endpoint may be preferred by the EERG and acknowledges that while there are challenges in completing this end of the alignment, the impacts are identifiable and may be managed.

9. Approvals

9.1.1 Commonwealth Approvals

The key relevant State (WA) and Commonwealth Environmental Legislation are outlined in Table 17.

Table 17 Key relevant environmental Legislation

Legislation		Responsible Government agency	Aspect
State Legislation			
Aboriginal Heritage Act 1972	AHA	Department of Indigenous Affairs	Archaeological and ethnographic sites
Agricultural and Related Resources Protection Act 1976	ARRP Act	Department of Agriculture, Western Australia	Weeds and feral animals
Conservation and Land Management Act 1984	CALM Act	Department of Environment and Conservation	Management of contaminated sites
Contaminated Sites Act 2003	CS Act	Department of Environment and Conservation	Management of contaminated sites
Country Areas Water Supply Act 1946	CAWS Act	Department of Water	Potable water supply
Environmental Protection Act 1986 (Part IV)	EP Act	Department of Environment and Conservation	Environmental impact assessment and management
Environmental Protection Act 1986 (Part V)	EP Act	Department of Environment and Conservation	Works Approvals and Licenses for Prescribed Premises
Environmental Protection (Noise) Regulations 1997	EP Regulations	Department of Environment and Conservation	Noise standards
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	EP Act	Department of Environment and Conservation	Clearing of native vegetation
Heritage of Western Australia Act 1990	HWA Act	Heritage Council of Western Australia	European heritage protection
Land Administration Act 1997	LA Act	Department of Regional Development and Lands	Administration of State Land
Rights in Water and Irrigation Act 1914	RIWI Act	Department of Water	Access to and use of water resources; protection and management of river flows and

Legislation		Responsible Government agency	Aspect
			drainage
Soil and Land Conservation Act 1945	SLC Act	Department of Agriculture	Protection of soil and prevention/management of soil erosion
Wildlife Conservation Act 1950	WC Act	Department of Environment and Conservation	Protection of native wildlife
Commonwealth Legislation			
Environment Protection and Biodiversity Conservation Act 1999	EPBC Act	Department of Sustainability, Environment, Water, Population and Communities (formerly Department of Environment, Water, Heritage and Arts)	Rare flora and fauna
Native Title Act 1993	NT Act	National Native Title Tribunal	Native title

Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth EPBC Act provides legislative protection for Matters of National Environmental Significance (MNES), including all nationally threatened fauna and flora species and ecological communities. DSEWPaC maintains the Protected Matters Search Tool Database, which is used to assist in identifying MNES that may occur within a designated area. A query of the EPBC Act Protected Matters Search Tool (Department of Sustainability, Environment, Water, Population and Communities, 2012b) (with a 10 km buffer around the Project) was undertaken; an overview of the search results and comments on the implications for the Project are shown in Table 18.

The trigger for referral under the EPBC Act is potential impacts to Threatened species. This includes the loss of black cockatoo feeding habitat, something that is likely as part of the Project. Detail on the MNES and the trigger species is further discussed in the Flora and Fauna Report included at Appendix G.

It is recommended that once a final alignment has been determined an EPBC Act referral is submitted.

Table 18 Summary of Matters of National Environmental Significance present near the Project Area

Matters of National Environmental Significance	Present	Impact
World Heritage Places	0	
National Heritage Places	2	None
Ramsar Wetlands	None	None
Threatened Species	Yes – 44 threatened species potentially occur in Project Area.	The potential impacts are species dependent and require further assessment to determine whether individual species occur along the final alignment. Impacts may include habitat loss and barrier to movement.
Threatened ecological communities	None	
Listed Migratory Species	Yes – 36	**Minimal**: The loss of habitat given it is located in a narrow strip largely adjoining adjacent cleared areas or within areas that are regularly chained cleared for fire management the loss of habitat is unlikely to be a significant impact to any migratory species. Furthermore, the migratory species are birds and the fence will not cause a barrier to their movement.
Great Barrier Reef Marine Park	No	None
Commonwealth marine areas	No	None
Nuclear Actions	No	None

9.2 State approvals

9.2.1 Environmental Assessment and Approval (Environmental Protection Authority)

Project s may require referral to the EPA under Part IV of the *Environmental Protection Act 1986* if the Project may have significant environmental impacts. The EPA evaluates a proposal to determine the extent of the impact, and is dependent upon the following factors:

- The extent and consequence of impacts on biophysical aspects;
- The environmental values of the areas affected;
- The extent of emissions and their potential to unreasonably interfere with the health, welfare, convenience, comfort or amenity of people;
- The extent and rigour to which potential impacts have been investigated and described in the referral, and the confidence in the reliability of predicted impacts;
- The extent to which the proposal implements the principles of sustainability;
- The ability of decision-making authorities to place conditions on the proposals to ensure required environmental outcomes are achieved;
- The likely level of public interest and the extent to which the proponent has consulted with interested parties and responded to the issues raised.

If the EPA decides that an assessment needs to be made of the referred Project , it will set a level of assessment and require the Project proponent to provide information that will allow the EPA to assess the Project and make recommendations to the Minister for Environment. It is the Minister who approves of the Project and sets the conditions to apply, not the EPA.

The Project is in an area that has high biodiversity and is known to host several conservation significant species. The Project has received a high level of community interest, including from conservation groups. Due to the Project location, the requirement to clear vegetation in a diverse environment, the potential presence of conservation significant species and known community interest, it is expected the Project will require referral to and formal assessment by the EPA.

Table 19 provides a summary evaluation of the significance of impacts from the SBF.

Table 19 Summary of EPA Referral Matters

Matter	Comment
Native remnant vegetation	Least constrained alignment requires some clearing of native vegetation. However, the amount of clearing has been reduced through selection of alignments that currently undergo fire management. This involves chain clearing and burning of an up to 100 m wide area along the edge of the UCL. The fence will be largely located in such areas.

Rare flora and fauna species and threatened communities	Desktop investigations and field surveys have identified the potential for a number of Federal and State conservation significant species to occur. During the field investigation Black Cockatoos were observed feeding near the Project Area. Habitat (feeding) is recorded in the Cape Arid section of the alignment.
Wetlands	There are several salt lakes that occur in the Project Area. These lakes will be avoided where possible.
Watercourses and rivers	Several ephemeral watercourses occur along the least constrained alignment.
Estuaries and inlets	None
Coastlines and near shore marine areas	The south coast end-point may impact on near coastal land. No impacts in coastal waters.
Catchments with special requirements	None
Contaminated soils	None
Noise and vibration	Construction phase – minor noise impacts, but limited sensitive receptors impacted.
Public Drinking Water Source Areas	None
Aboriginal heritage	Desktop investigations identified 5 registered and 4 other Heritage sites within 100m of the Project Area. The land has not been fully searched for sites and others may be present.
European cultural heritage	None
Adjacent land uses	Compatible with current land uses, Project does not require changes to local planning schemes.

9.2.2 Native vegetation clearing permits (Department of Environment and Conservation)

The clearing of native vegetation in Western Australia usually requires a clearing permit under Part V of the EP Act. If the Project is formally assessed under Part IV of the EP Act a clearing permit is not required. However, should the EPA determine the Project does not warrant formal assessment; a clearing permit will be required.

9.2.3 Beds and Banks Permits (Department of Water)

As the rivers and waterways are not proclaimed there is no requirement for a Bed and Banks permit.

9.2.4 Aboriginal Heritage Sites (Department of Indigenous Affairs)

All aboriginal heritage sites throughout the state are protected under the *Aboriginal Heritage Act 1972*. It is an offence under that Act to disturb a site. Sites are widely defined and include single shards from the making of rock tools through to major landscape features of ethnographic significance to aboriginals.

Projects can disturb sites without fear of prosecution provided a Section 18 approval to disturb is obtained under the Act. The normal practice is for surveys to be conducted over areas likely to be disturbed by the Project and identified sites avoided where possible; Section 18 applications are only made where avoidance is not possible.

10. Recommendations

The following recommendations are provided to assist in the implementation of the Project.

10.1 Referral

Recommendation 1

That the Least Constrained alignment be referred to the EPA under Section 38 of the EP Act and that preparation of an application to clear native vegetation commences.

Recommendation 2

Referral under the EPBC Act is undertaken once the matters of national environmental significance are known and potential offset areas identified.

10.2 Biophysical

Recommendation 3

Fence "wings" should be used at major waterway crossings to minimise impacts on the environmental and social values of the waterways. Minor waterways are fenced as per the required fence specifications,

Recommendation 4

Consideration is given to ways in which the values of the waterways can be enhanced during this Project For example, it may be possible to work with groups, such as local natural resource management groups, to fence and rehabilitate along the banks from the "wings" down into the agricultural land. This would provide fauna habitat corridors in enhanced condition between the UCL and remnant vegetation patches within the farmlands. Agreements to remove sacrificial material may also be established such that material does not accumulate at the waterway.

Recommendation 5

DAFWA prepares and implements an Environmental Management Plan (EMP) for construction activities that sets out how environmental issues will be managed during the construction of the fence.

10.3 Social and Planning

Recommendation 6

Conservation areas, reserves and environmentally significant areas be avoided if changes are made to the least constrained alignment identified in this report.

Recommendation 7

Ethnographic and archaeological investigations occur along the final alignment to ensure that the required Section 18 approval has been issued under the *Aboriginal Heritage Act 1972*.

Recommendation 8

Consultation with DEC is recommended to determine the fire management issues associated with the selected alignment for the Esperance extension. This should include a discussion of access rights along the fence and locations of gates required by DEC for fire mitigation or bushfire suppression work.

Recommendation 9

Road grids are established where major roads are crossed by the Fence. Main Roads WA is to be consulted during the development of the construction and environmental management plans.

10.4 Heritage

10.4.1 Indigenous Heritage

Recommendation 10

Specific recommendations made for each registered site identified to be intersected by the Esperance extension, outlined in Appendix I are given consideration before the Project proceeds to construction.

Recommendation 11

Where previously recorded archaeological sites may be impacted by the fence and the actual extent of the site is not defined, the extent should be established in the field to ensure that the Project is compliant with the AH Act.

Recommendation 12

The fence be planned (if required) to avoid the recorded sites, and any others identified in the field, and section 18 applications only be made where there is no reasonable alternative. The No Go area identified at Boyatup Hill is avoided.

Recommendation 13

Where ethnographic sites as recorded by DIA are liable to be intersected by the fence, consultations are conducted with the named DIA site informants and Native Title Claimants (see Native Title Claims Extant over the Project Area, page 21-22).

Recommendation 14

Significant parts of the State Barrier Fence Esperance Extension proposal have not been subject to rigorous archaeological and ethnographic studies and it is recommended that there is consultation with the appropriate representative bodies and/or Native Title Claim groups and appropriate studies are undertaken in order to identify all archaeological and ethnographic sites that may be impacted by the proposal.

10.5 Flora and Fauna

Recommendation 15

Detailed flora and fauna surveys and impact assessment may be required once the final alignment has been determined to accurately complete the assessment against the Ten Clearing principles. The flora surveys should include mapping of significant flora locations along the chosen alignment and consideration of whether the location of the alignment can be refined to avoid impacts on these species.

Recommendation 16

Where significant impacts on flora and vegetation are identified, consideration should be given to mitigation measures, such as the creation of habitat corridors and moving the SBF into existing cleared areas. Where residual impacts are significant environmental offsets should be considered and may be required.

Recommendation 17

Animal ethic issues associated with the entire fenceline will need to be considered in more detail by DAFWA. The following issues should be taken into consideration:

- Choice of construction materials and physical structure of the fence: The fence needs to be designed to reduce wildlife impacts, for example, avoiding use of barbed wire and low electrical wires and choosing high visibility construction materials.
- The reduction in number and acuteness of angles along the fence.
- Management implications, including humane dispersal or destruction in the case of any build up of numbers of animals against the fence.

10.5.1 Dieback

Recommendation 18
In areas of Negligible Risk, the Project should apply basic disease hygiene principles.

Recommendation 19
Low Risk Project Areas determined to be uninterpretable should be re-assessed using detailed vegetation data developed from associated on-ground floristic surveys, to determine actual interpretability of these areas.

Recommendation 20
Areas of Moderate to High Risk will require further detailed field interpretation to determine disease distribution along the final study alignment. A detailed on-ground Phytophthora assessment should be undertaken within a 100m corridor of the proposed final alignment to demarcate in the field actual disease distribution boundaries and associated hygiene management categories. The assessment should be undertaken by a DEC accredited interpreter with relevant experience in identifying Phytophthora within vegetation associations of the South Coast and Great Southern regions. The assessment should be performed in accordance with "Phytophthora cinnamomi and the disease caused by it- Volume 2: Interpreters Guidelines for Detection, Diagnosis and Mapping, (CALM, 2001)".

10.6 Cost Component Assessment

Recommendation 21
The cost component items listed in Table 16 and Appendix L are considered in estimating the overall budget for the preferred alignment.

10.7 Community Consultation

Recommendation 22

The EERG and DAFWA consider the appropriateness of a 'whole of community' approach to the assessment of the alignment options based on the data provided in this Scoping study by way of a Multi-Criteria Analysis.

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Southern Shores
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Figures

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1

DAFWA Provided Alignment Options

- No Alternative Option Provided
- A
- B
- BC
- C

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number	61-28161
Revision	0
Date	04 Sep 2012

Alignment Options

Figure 1a

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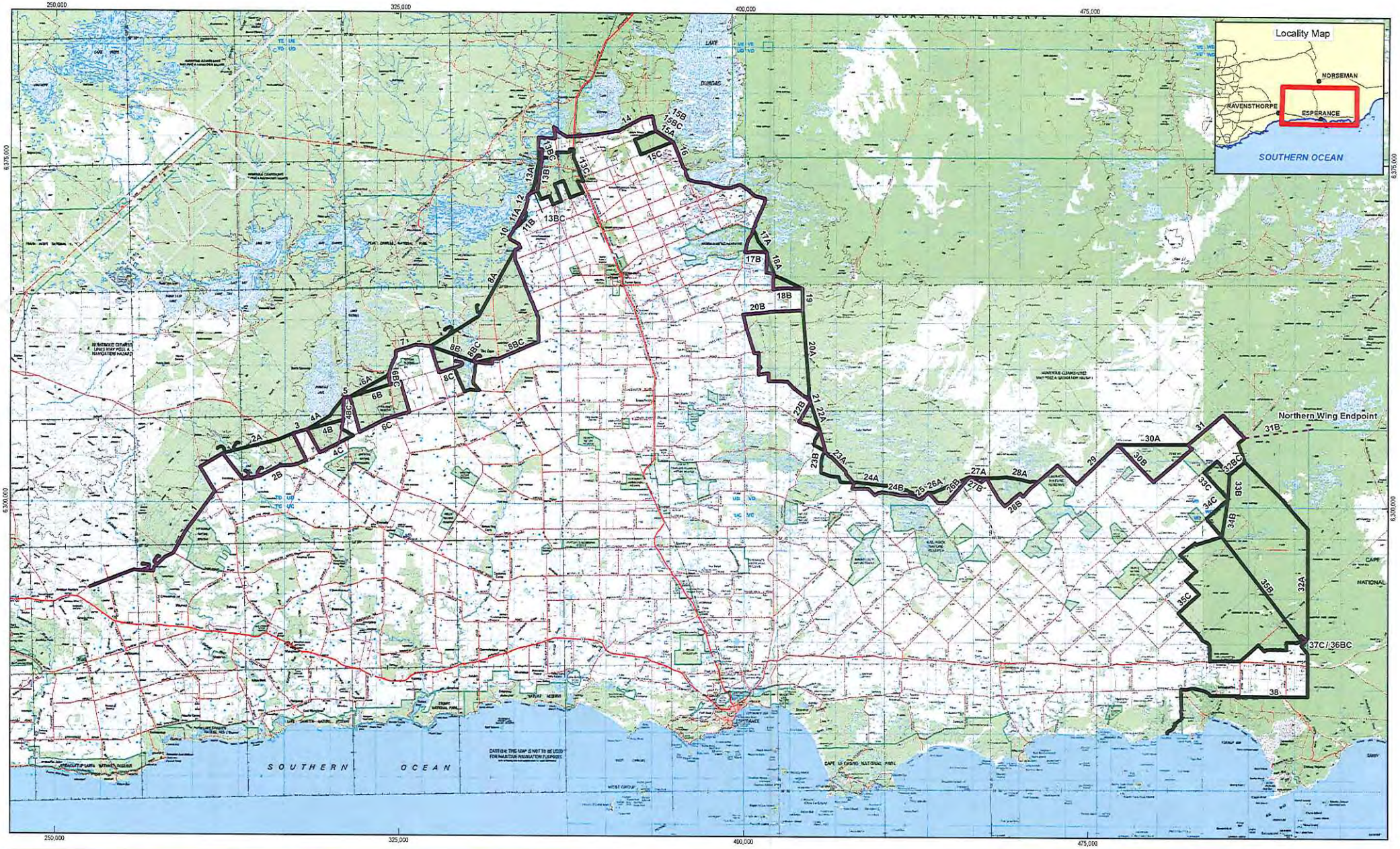

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment (560.74 km)
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- 2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number	61-28161
Revision	0
Date	04 Sep 2012

Project Overview

Figure 1b

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Data source: GA: NatMap 250.ecw - 2007, Geodata Topo Series 3 - 2006; DAFWA: DAFWA Provided Alignment Options - 20120509; GHD: GHD Least Constrained Constrained Alignment - 20120702, GHD Proposed Endpoint. Created by: erice

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Aboriginal Heritage - Registered
- Aboriginal Heritage - Other
- DEC Estate
- Environmentally Sensitive Areas and ID
- 2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Map Sheet 1 of 6

Environmental Constraints Conservation and Heritage

Figure 2

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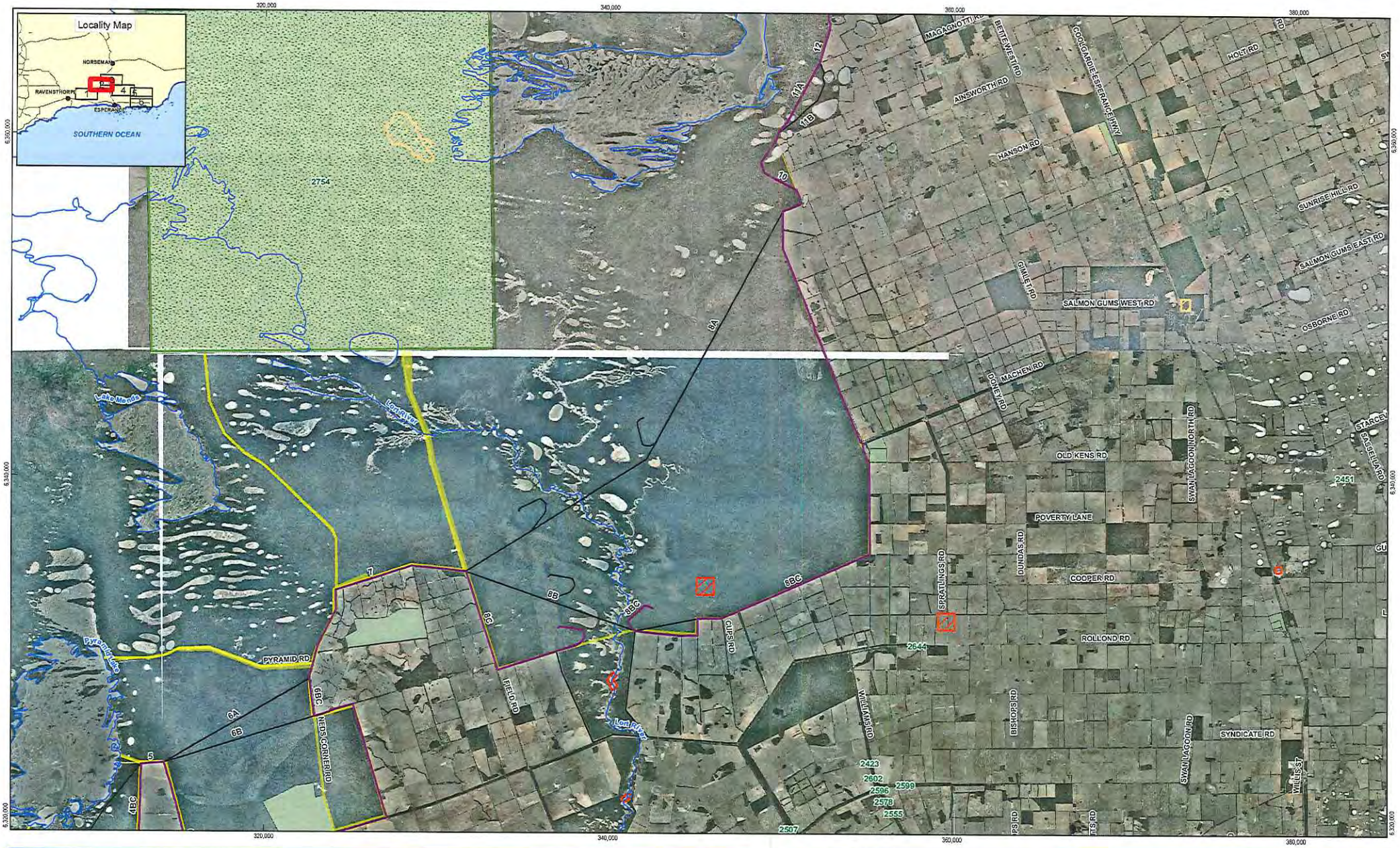

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Aboriginal Heritage - Registered
- Aboriginal Heritage - Other
- DEC Estate
- Environmentally Sensitive Areas and ID
- 2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Map Sheet 2 of 6

Environmental Constraints Conservation and Heritage

Figure 2

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Data source: GA: Geodata Topo Series 3 - 2006; DAFWA: DAFWA Provided Alignment Options - 20120509, Images - 2007-2008; Landgate: Roads - 20120509; DEC: DEC Estate - 20120613, Environmentally Sensitive Areas - 201206, DEC Chainage - 20120509; DIA: Aboriginal Heritage - Registered - 20120613, Aboriginal Heritage - Other - 20120613; Brad Goode Consulting: Aboriginal Heritage - 201206; GHD: Least Constrained Alignment - 20120621, GHD Proposed Alignment Option 1 - 20120621; DOW: Hydrography - 20120508, Created by: erice

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1:200,000 (at A3)

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Aboriginal Heritage - Registered
- Aboriginal Heritage - Other
- DEC Estate
- Environmentally Sensitive Areas and ID
- 2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Map Sheet 3 of 6

Environmental Constraints Conservation and Heritage

Figure 2

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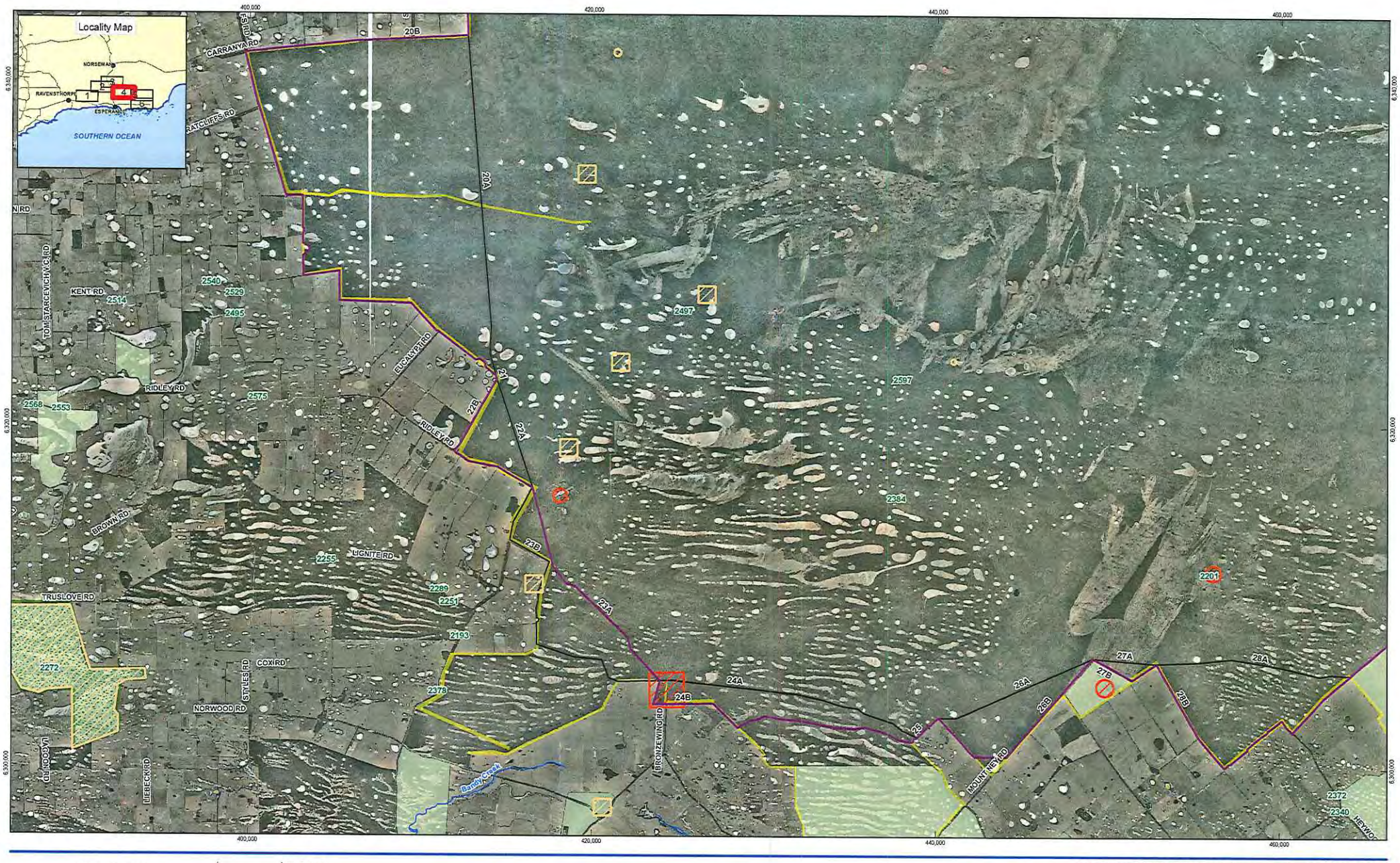

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Aboriginal Heritage - Registered
- Aboriginal Heritage - Other
- DEC Estate
- Environmentally Sensitive Areas and ID
- 2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Map Sheet 4 of 6

Environmental Constraints Conservation and Heritage

Figure 2

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0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Aboriginal Heritage - Registered
- Aboriginal Heritage - Other
- DEC Estate
- Environmentally Sensitive Areas and ID

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Map Sheet 5 of 6

Environmental Constraints Conservation and Heritage

Figure 2

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Aboriginal Heritage - Registered
- Aboriginal Heritage - Other
- DEC Estate
- Environmentally Sensitive Areas and ID
- 2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Map Sheet 6 of 6

Environmental Constraints Conservation and Heritage

Figure 2

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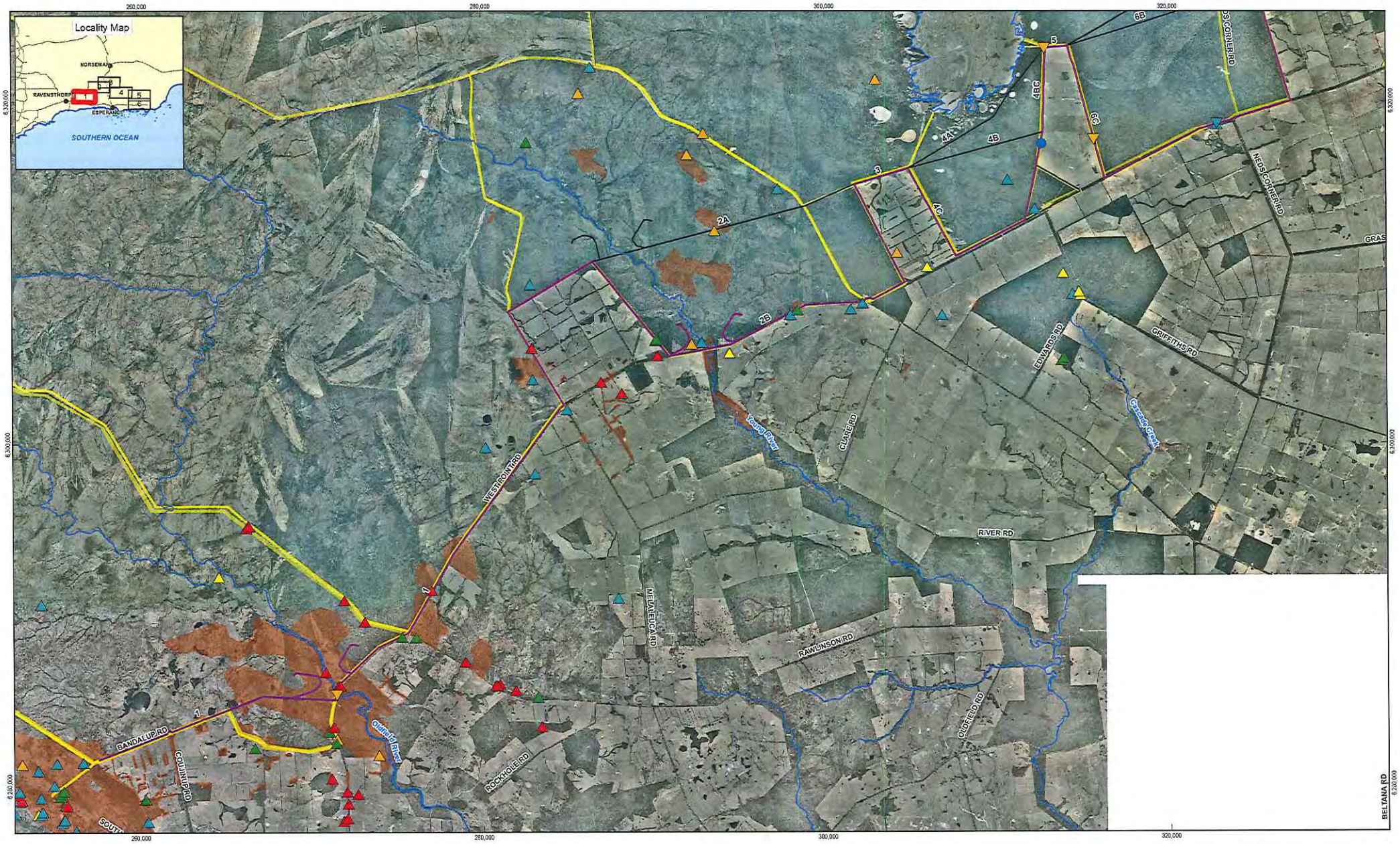

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

GHD Priority Flora
- P1
- P3
- P4

Threatened (Declared Rare) & Priority Flora
- (T) Threatened Rare Flora - Extant Taxa; T
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa
- Priority 3 - Poorly Known Taxa
- Priority 4 - Rare Taxa
- Priority 5 - Conservation Dependent Taxa
- DEC Sample Sites - Dieback Present

2A Section Number with Option letter

GHD Survey June 2012
- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area
- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1

- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Priority Ecological Community
- Areas Susceptible to Dieback

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Environmental Constraints Flora and Dieback

Map Sheet 1 of 6

Figure 3

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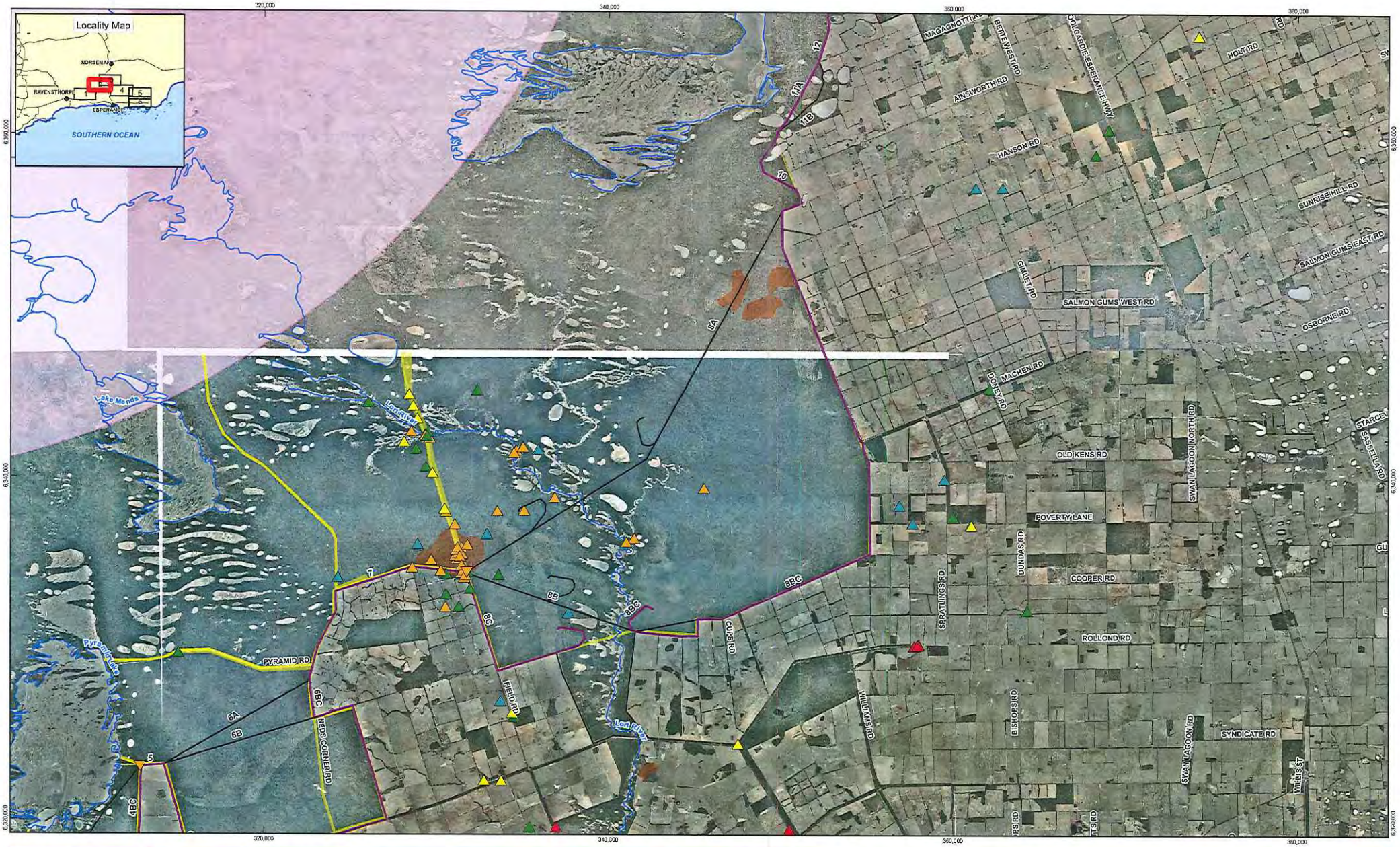

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

GHD Priority Flora
- P1
- P3
- P4

Threatened (Declared Rare) & Priority Flora
- (T) Threatened Rare Flora - Extant Taxa; T
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa
- Priority 3 - Poorly Known Taxa
- Priority 4 - Rare Taxa
- Priority 5 - Conservation Dependent Taxa
- DEC Sample Sites - Dieback Present

2A Section Number with Option letter

GHD Survey June 2012
- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area
- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1

- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Priority Ecological Community
- Areas Susceptible to Dieback

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Environmental Constraints Flora and Dieback

Map Sheet 2 of 6

Figure 3

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Data source: GA: NatMap 250.ecw - 2007; Geodata Topo Series 3 - 2006; DAFWA: DAFWA Provided Alignment Options - 20120509; Images - 2007-2009; Landgate: Roads - 20120509; DEC: Areas Susceptible to Dieback - 20120613, Dieback Sample Sites - Dieback Present - 201206, Threatened (Declared Rare) & Priority Flora - 20120522, DEC Chainage - 201206, Priority Ecological Community - 20120523; GHD: Least Constrained Alignment - 20120621, GHD Proposed Alignment Option 1 - 20120621, GHD Survey June 2012, GHD Priority Flora - 20120705; DOW: Hydrography - 20120508. Created by: erice

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

GHD Priority Flora
- P1
- P3
- P4

Threatened (Declared Rare) & Priority Flora
- (T) Threatened Rare Flora - Extant Taxa; T
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa
- Priority 3 - Poorly Known Taxa
- Priority 4 - Rare Taxa
- Priority 5 - Conservation Dependent Taxa
- DEC Sample Sites - Dieback Present

2A Section Number with Option letter

GHD Survey June 2012
- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area
- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1

- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Priority Ecological Community
- Areas Susceptible to Dieback

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Environmental Constraints Flora and Dieback

Map Sheet 3 of 6

Figure 3

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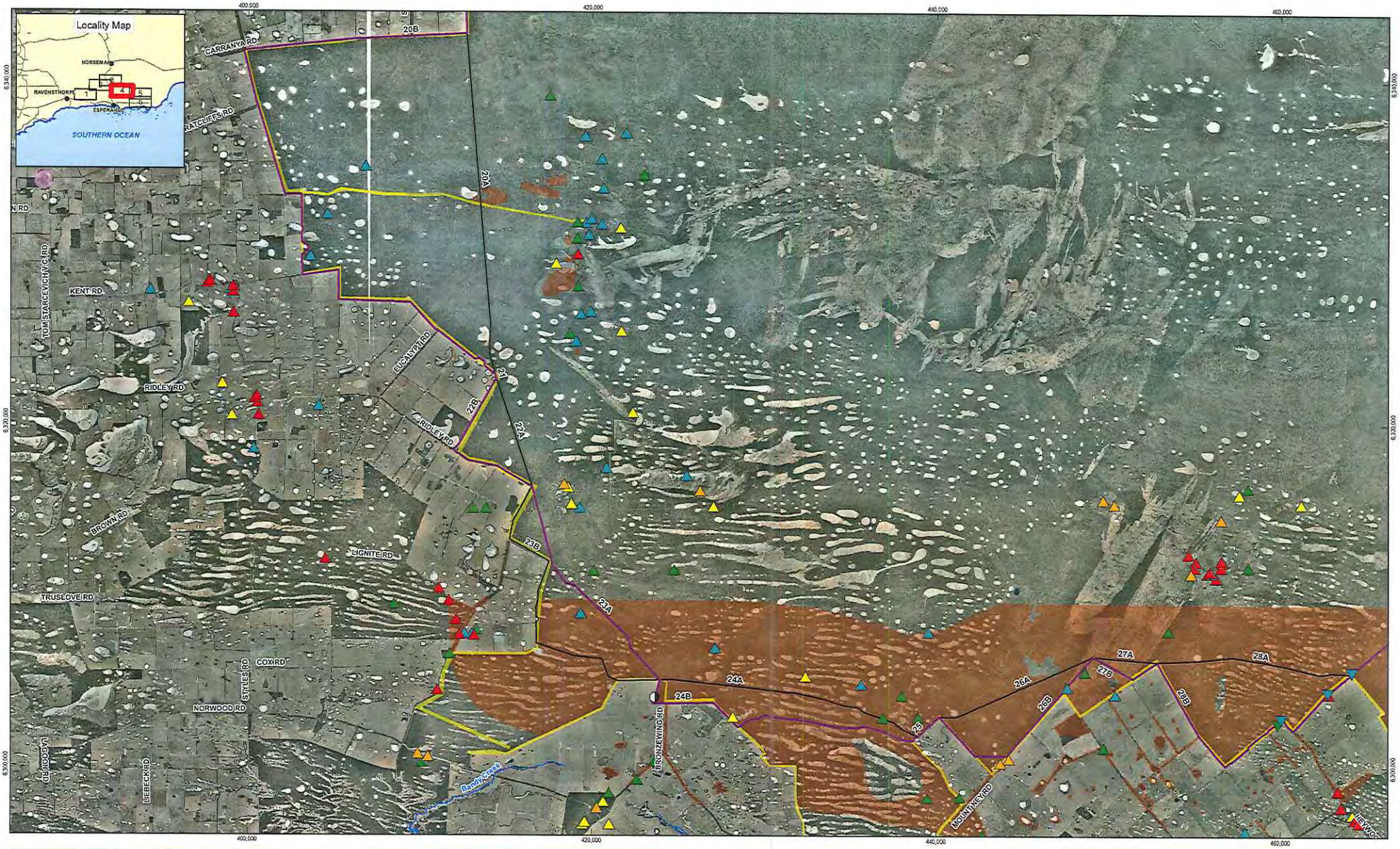

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

GHD Priority Flora
- P1
- P3
- P4

Threatened (Declared Rare) & Priority Flora
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- Priority 5 - Conservation Dependent Taxa
- DEC Sample Sites - Dieback Present

2A Section Number with Option letter

GHD Survey June 2012
- Drainage Line
- Potential Cockatoo breeding trees
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- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Priority Ecological Community
- Areas Susceptible to Dieback

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Environmental Constraints Flora and Dieback

Map Sheet 4 of 6

Figure 3

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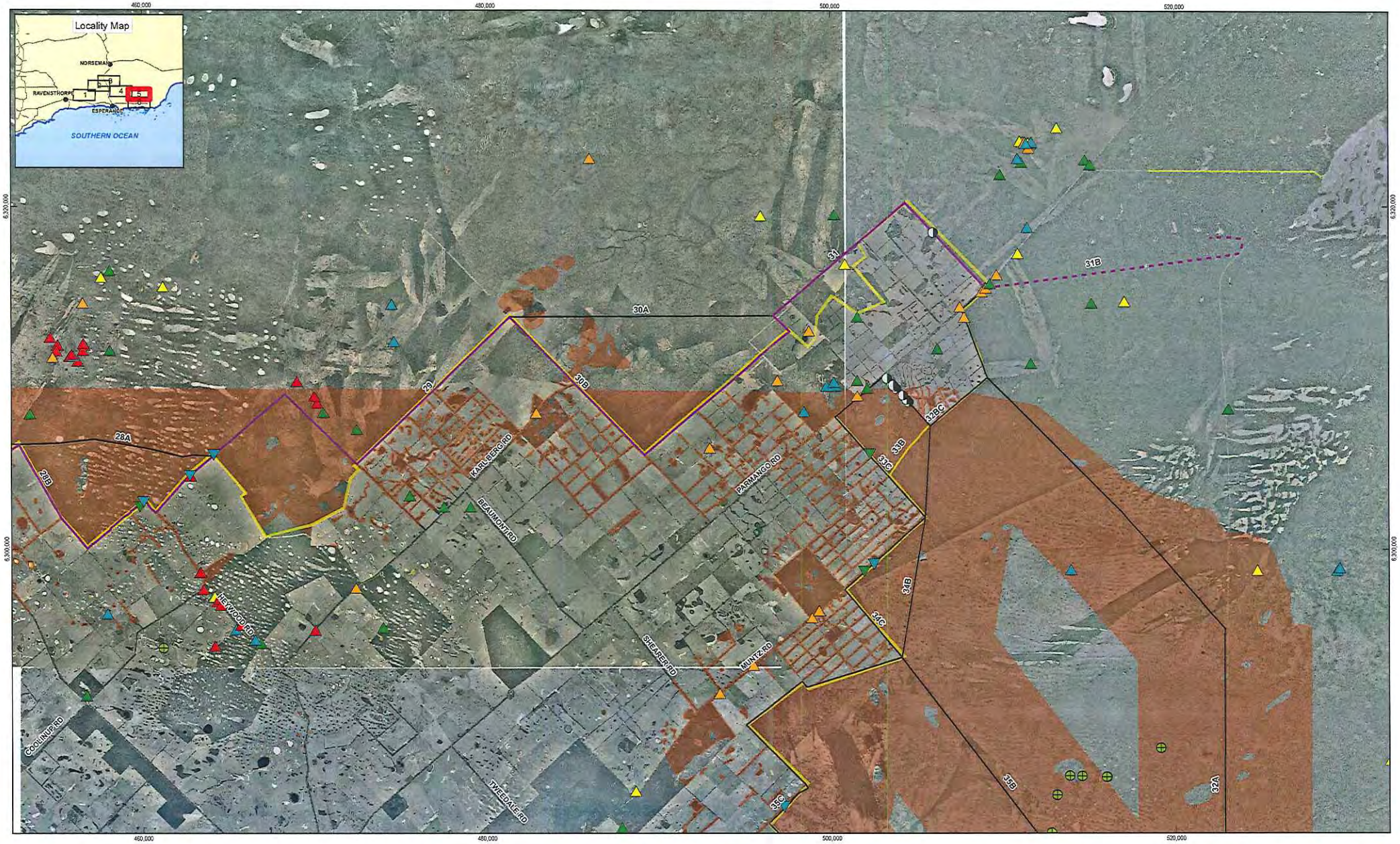

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N

LEGEND

GHD Priority Flora
- P1
- P3
- P4

Threatened (Declared Rare) & Priority Flora
- (T) Threatened Rare Flora - Extant Taxa; T
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa
- Priority 3 - Poorly Known Taxa
- Priority 4 - Rare Taxa
- Priority 5 - Conservation Dependent Taxa
- DEC Sample Sites - Dieback Present

2A Section Number with Option letter

GHD Survey June 2012
- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area
- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1

- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Priority Ecological Community
- Areas Susceptible to Dieback

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Environmental Constraints Flora and Dieback

Map Sheet 5 of 6

Figure 3

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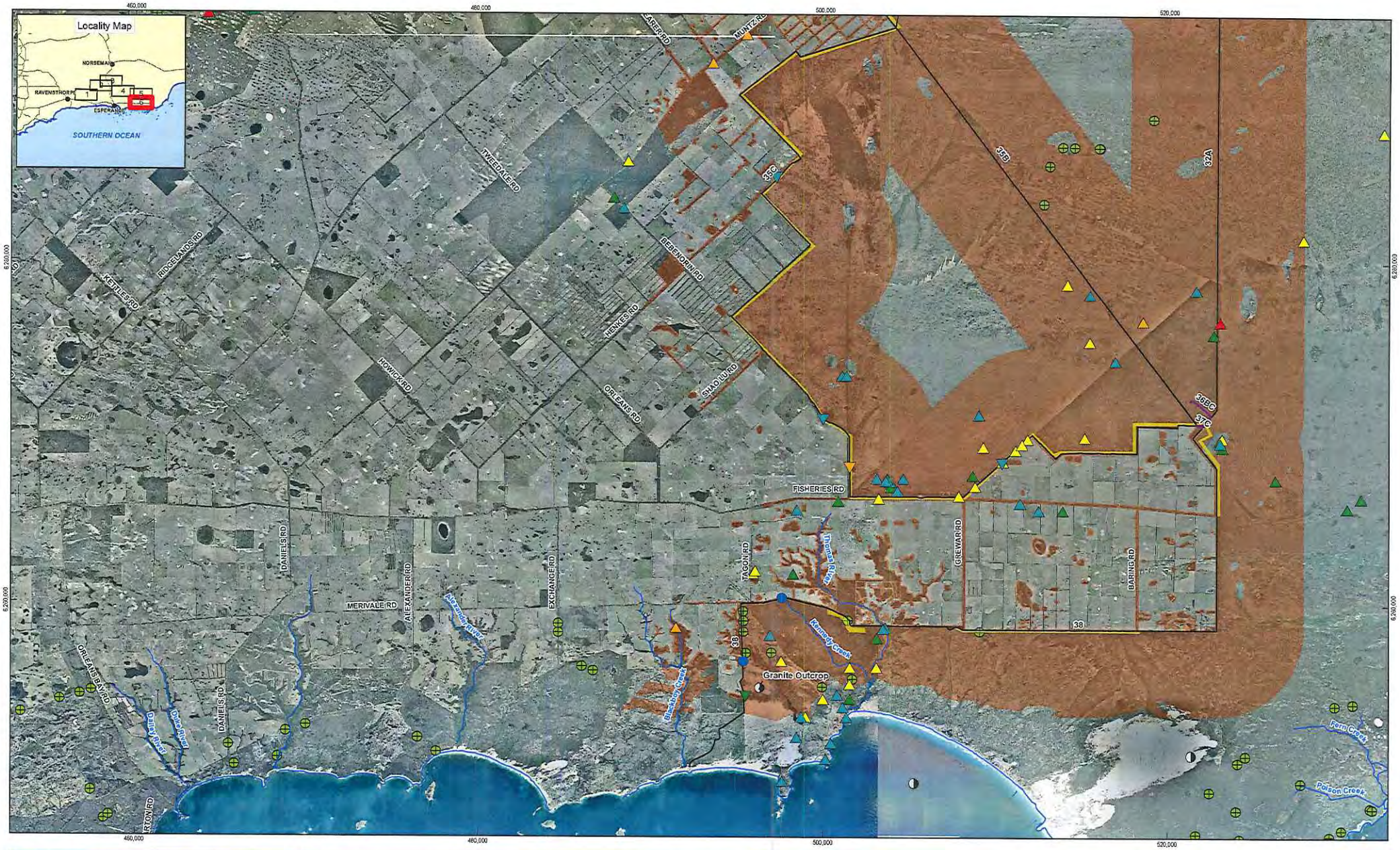
Data source: GA: NatMap 250,ecw - 2007; Geodata Topo Series 3 - 2006; DAFWA: DAFWA Provided Alignment Options - 20120508, Images - 2007-2009; Landgate: Roads - 20120508; DEC: Areas Susceptible to Dieback - 20120613, Dieback Sample Sites - Dieback Present - 201206, Threatened (Declared Rare) & Priority Flora - 20120522, DEC Chainage - 201206, Priority Ecological Community - 20120523; GHD: Least Constrained Alignment - 20120621, GHD Proposed Alignment Option 1 - 20120621, GHD Survey June 2012, GHD Priority Flora - 20120705; DOW: Hydrography - 20120508. Created by: erice

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au



1:200,000 (at A3)

0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

GHD Priority Flora
- P1
- P3
- P4

Threatened (Declared Rare) & Priority Flora
- (T) Threatened Rare Flora - Extant Taxa; T
- Priority 1 - Poorly Known Taxa
- Priority 2 - Poorly Known Taxa
- Priority 3 - Poorly Known Taxa
- Priority 4 - Rare Taxa
- Priority 5 - Conservation Dependent Taxa
- DEC Sample Sites - Dieback Present

2A Section Number with Option letter

GHD Survey June 2012
- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area
- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography
- DEC Chainage
- Priority Ecological Community
- Areas Susceptible to Dieback

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Environmental Constraints Flora and Dieback

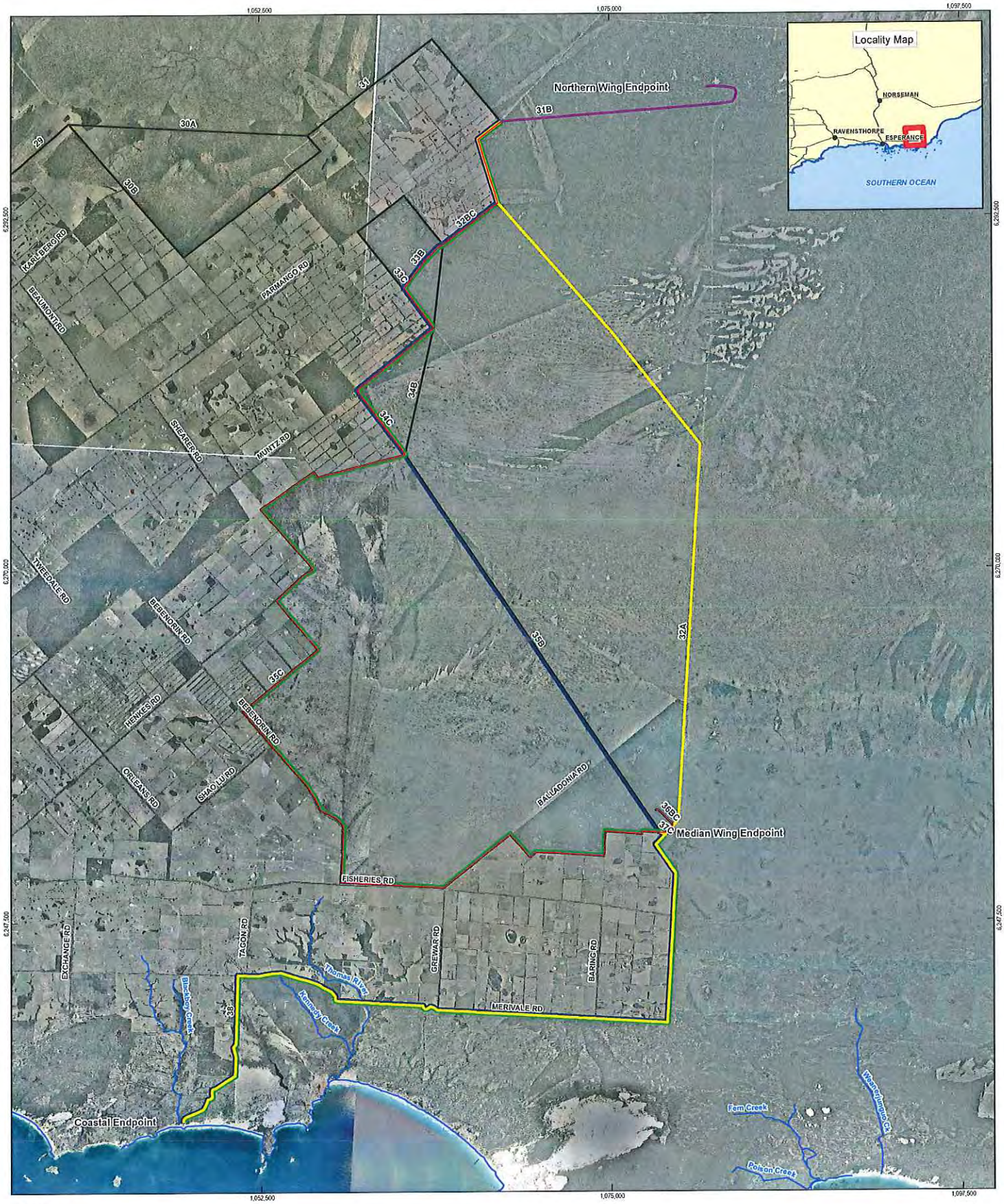
Map Sheet 6 of 6

Figure 3

G:\61\28161\GIS\Maps\MXD\6128161_G007_Fig3_Rev0.mxd

Data source: GA: Natmap 250.ecw - 2007; Geodata Topo Series 3 - 2008; DAFWA: DAFWA Provided Alignment Options - 20120508, Images - 2007-2009; Landgate: Roads - 20120509; DEC: Areas Susceptible to Dieback - 20120613, Dieback Sample Sites - Dieback Present - 201206, Threatened (Declared Rare) & Priority Flora - 20120522, DEC Chainage - 201206, Priority Ecological Community - 20120523; GHD: Least Constrained Alignment - 20120621, GHD Proposed Alignment Option 1 - 20120621, GHD Survey June 2012, GHD Priority Flora - 20120705; DOW: Hydrography - 20120508. Created by: erice

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au



Data source: GA: ItatMap Geodata Topo Series 3 - 2006, DAFWA: DAFWA Provided Alignment Options - 20120509, Images - 2007-2009, GHD: Least Constrained Alignment Options - 20120619, Landgate: Roads - 20120509, DOW: Hydrography - 20120508. Created by: erice

1:200,000 (at A3)

0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- Grids - Major Public Roads
- Gates - Road Intersections

GHD Survey June 2012

- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number	61-28161
Revision	0
Date	04 Sep 2012

Cost component assessment map

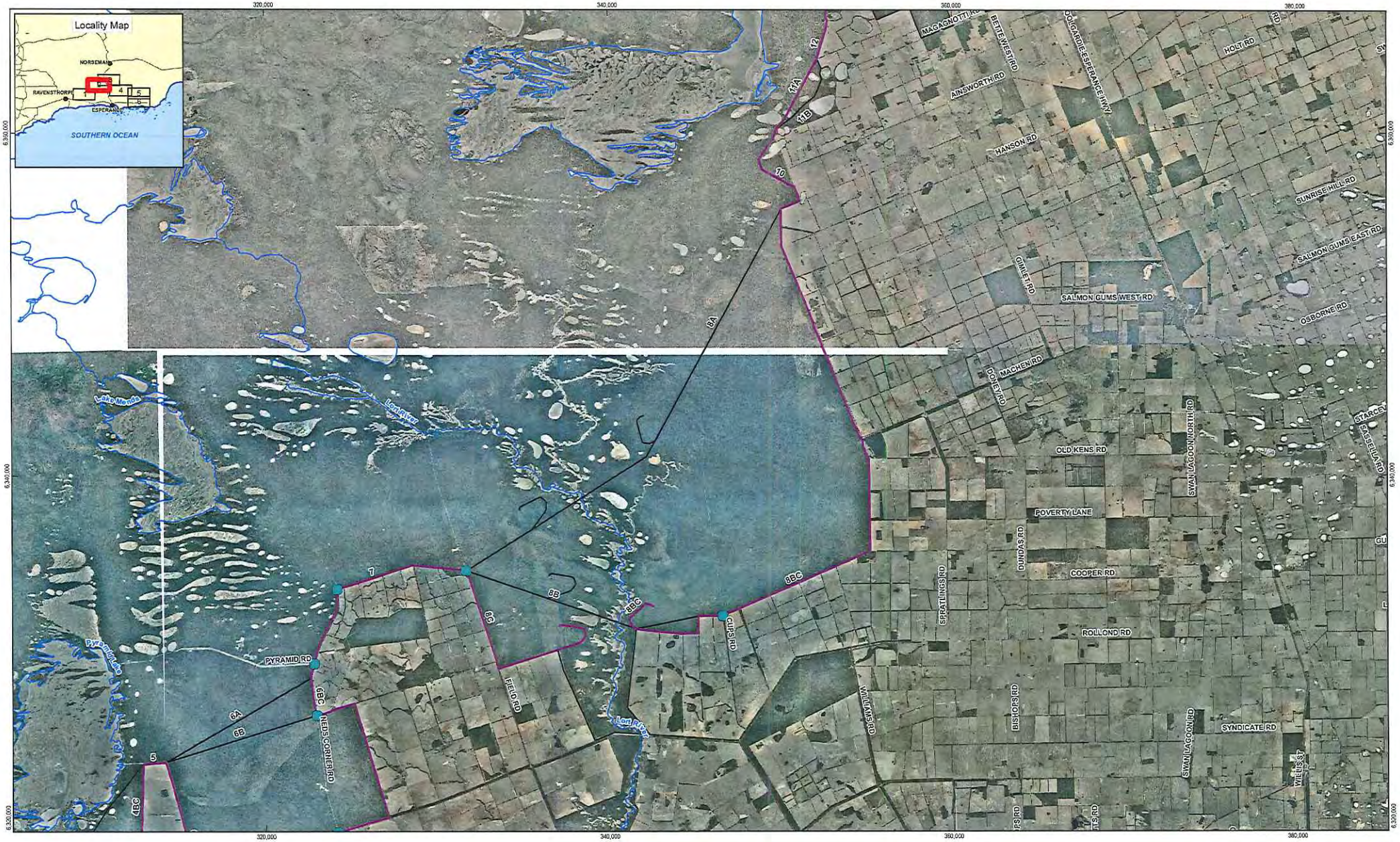
Map Sheet 1 of 6

Figure 5

G:\61\28161\GIS\Maps\MXD\28161_G006_Fig5_Rev0.mxd

Data source: GA: NatMap 250.ecw - 2007; Geodata Topo Series 3 - 2008; DAFWA: DAFWA Provided Alignment Options - 20120509, Images - 2007-2009; Landgate: Roads - 20120509; GHD: Least Constrained Alignment - 20120621, GHD Proposed Alignment Option 1 - 20120621, GHD Survey June 2012, Grids - Major Public Roads - 20120903, Gates - Road Intersections - 20120903; DOW: Hydrography - 20120506. Created by: erce

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au



1:200,000 (at A3)

0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- Grids - Major Public Roads
- Gates - Road Intersections

GHD Survey June 2012

- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area
- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number	61-28161
Revision	0
Date	04 Sep 2012

Cost component assessment map

Map Sheet 2 of 6

Figure 5

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1:200,000 (at A3)

0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- Grids - Major Public Roads
- Gates - Road Intersections

GHD Survey June 2012

- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Cost component assessment map

Map Sheet 3 of 6

Figure 5

G:\61\28161\GIS\Maps\MXD\612816_G008_Fig5_RevO.mxd

Data source: GA: NatMap 250.ecw - 2007; Geodata Topo Series 3 - 2008; DAFWA: DAFWA Provided Alignment Options - 20120509, Images - 2007-2009; Landgate: Roads - 20120509; GHD: Least Constrained Alignment - 20120821, GHD Proposed Alignment Option 1 - 20120821, GHD Survey June 2012, Grids - Major Public Roads - 20120903, Gates - Road Intersections - 20120903; DOW: Hydrography - 20120508. Created by: erice

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

1:200,000 (at A3)

0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- Grids - Major Public Roads
- Gates - Road Intersections

GHD Survey June 2012

- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

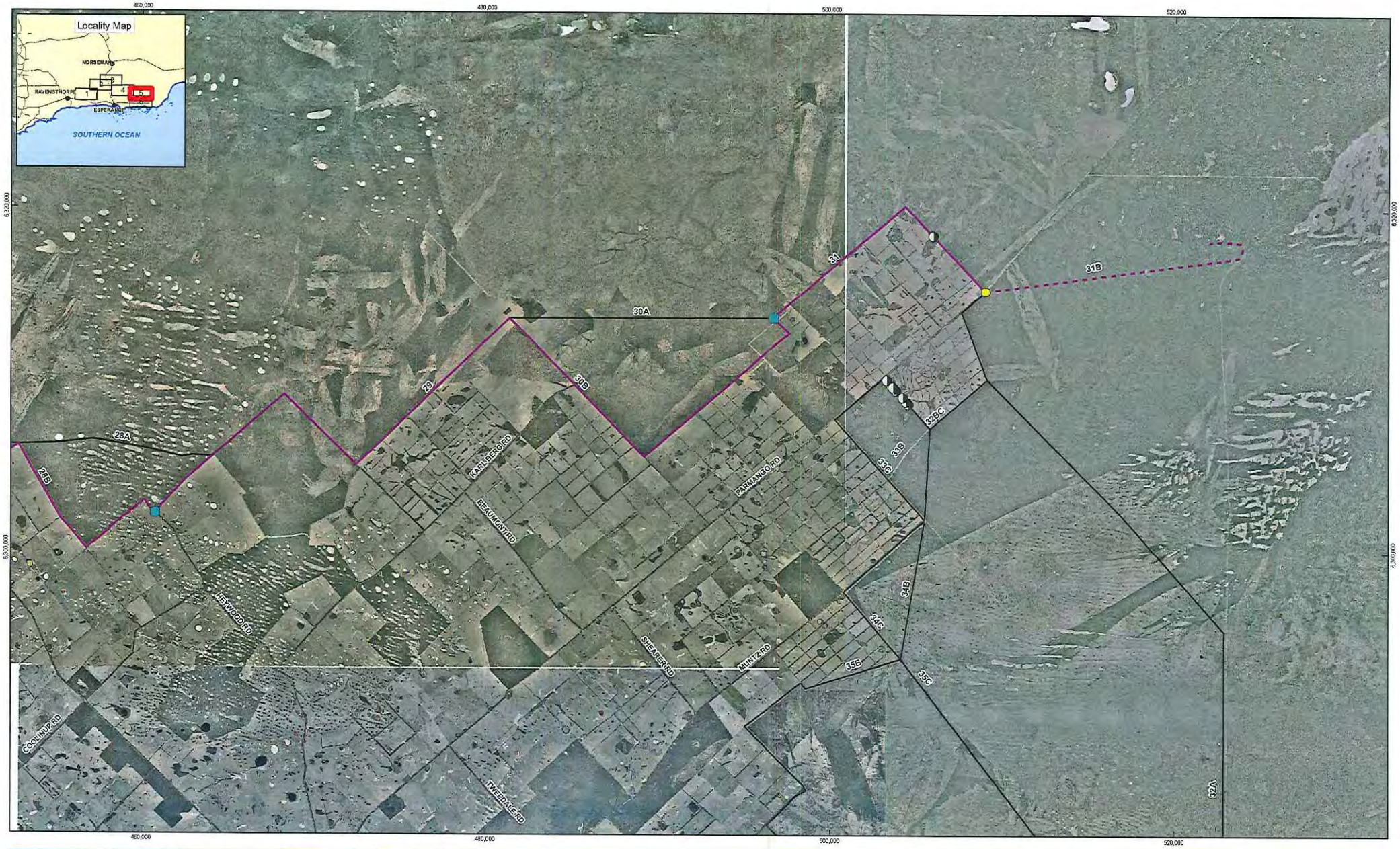
Job Number 61-28161
Revision 0
Date 04 Sep 2012

Cost component assessment map

Map Sheet 4 of 6

Figure 5

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au



1:200,000 (at A3)

0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- Grids - Major Public Roads
- Gates - Road Intersections

GHD Survey June 2012

- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Cost component assessment map

Map Sheet 5 of 6

Figure 5

G:\61\28161\GIS\Maps\MXD\6128161_G008_Fig5_RevC.mxd

Data source: GA: NatMap 250.ecw - 2007; Geodata Topo Series 3 - 2006; DAFWA: DAFWA Provided Alignment Options - 20120509, Images - 2007-2009; Landgate: Roads - 20120509; GHD: Least Constrained Alignment - 20120621, GHD Proposed Alignment Option 1 - 20120621, GHD Survey June 2012; Grids - Major Public Roads - 20120903, Gates - Road Intersections - 20120903; DOW: Hydrography - 20120508. Created by: erice

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

1:200,000 (at A3)

0 1 2 4 6 8 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 51

N

LEGEND

- Grids - Major Public Roads
- Gates - Road Intersections

GHD Survey June 2012

- Drainage Line
- Potential Cockatoo breeding trees
- Rocky Area

- GHD Least Constrained Alignment
- GHD Proposed Endpoint Option 1
- DAFWA Provided Alignment Options
- Hydrography

2A Section Number with Option letter

Department of Food and Agriculture of Western Australia
State Barrier Fence Scoping Study

Job Number 61-28161
Revision 0
Date 04 Sep 2012

Cost component assessment map

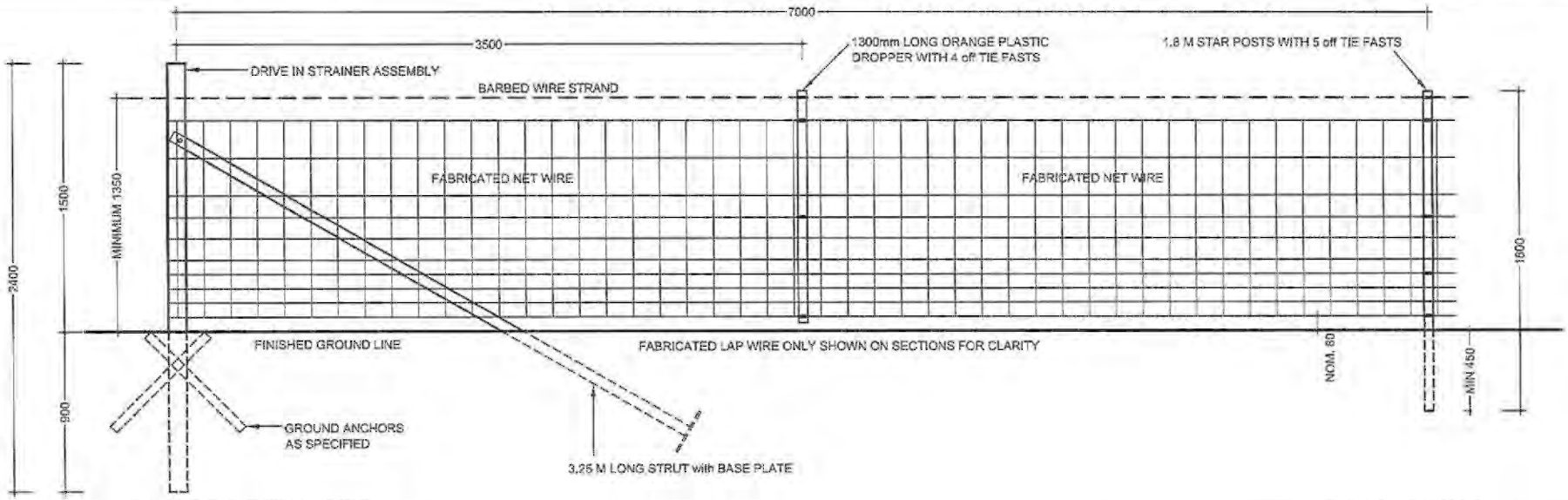
Map Sheet 6 of 6

Figure 5

239 Adelaide Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E permail@ghd.com.au W www.ghd.com.au

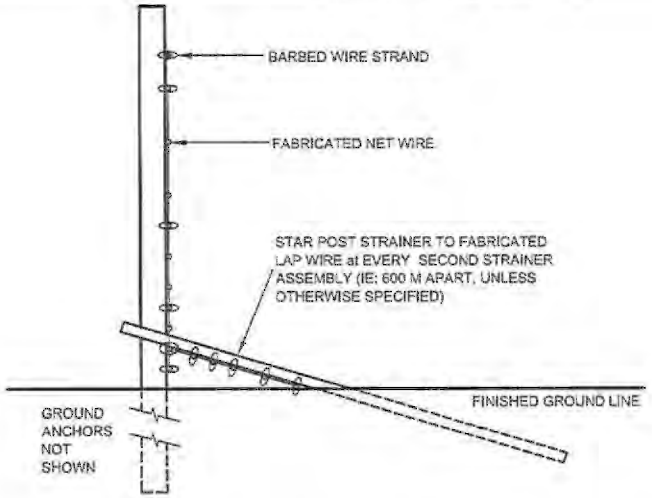
Appendix A

Fence Specifications

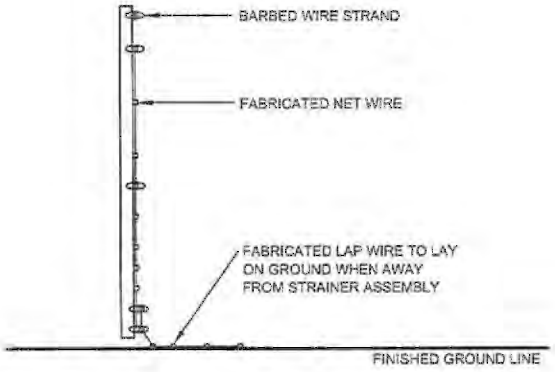


TYPICAL ELEVATION

DIAGRAM 1



LAP WIRE - END VIEW at STRAINER ASSEMBLY



LAP WIRE - END VIEW away from STRAINER ASSEMBLY (at ORANGE PLASTIC DROPPER POSITION)

DIAGRAM 2

NOTE:

DO NOT SCALE ANY DRAWINGS.

READ DRAWINGS IN CONJUNCTION WITH ATTACHED TENDER SPECIFICATIONS.

GERALDTON DRAFTING SERVICES

PAUL CONNOLLY ARCHITECTURAL DRAFTSMAN

63 GREGORY ST GERALDTON W.A. 6530

PHONE (08) 99642244

PROJECT

STATE BARRIER FENCE
FABRICATED FENCE DESIGN for the
DEPARTMENT of AGRICULTURE and FOOD
WESTERN AUSTRALIA

DRAWING	STATE BARRIER FENCE ELEVATION SECTIONS
COPYRIGHT	
JOB No.	2626
DRAWN	PC
CHECKED	
DATE	23MAR2011
SCALE	DIAGRAMMATIC
DRAWING No.	A01
REV.	

Appendix B

Approvals

04 May 2012

Our ref: 61/28161/13848

Ken McCrackan
Manager, State Lands South East
Department of Regional Development and Lands
140 William Street
Perth WA 6000

State Barrier Fence - Esperance Extention
Access for fieldwork

GHD Pty Ltd wish to gain access to the land, previously described to you in map form, between the 21st and 28th May 2012. Access is needed for the purpose of site assessment for a scoping study of the State Barrier Fence Esperance Extension. A team of three employees (Erin Lynch, Meranda Toner and Orla O'Donnell) will be undertaking the fieldwork which will include vegetation, flora and fauna surveys, waterways and landuse ground truthing. A four wheel drive vehicle will be used where possible to gain access to the areas to carry out the following activities:

- Vegetation, flora and fauna surveys will consist of opportunistic collection and identification of flora species within target site areas. Fauna will be assessed by opportunistic searching. Any conservation significant species will be identified in field. Data will be recorded utilising photography and GPS co-ordinates
- Waterways and landuse ground truthing will mainly involve identifying, recording (photography and GPS Co-ordinates) and mapping features along the proposed alignments.

GHD Pty Ltd is committed to ensuring that all requirements to access the land are met and that no negative impacts will occur on any part of the Site due to this assessment. We are happy to comply with any further requirements which will ensure the access is granted.

Yours Sincerely

Fionnuala Hannon
Project Manager
61 8 97210711

DIGITAL DATA LICENSING AGREEMENT

THIS AGREEMENT is made the 30th day of April 2012

BETWEEN

Western Australian Agriculture Authority ABN 18 951 343 745 a body corporate under the *Biosecurity and Agriculture Management Act 2007* of 3 Baron-Hay Court, South Perth Western Australia 6151 , represented by the Chief Executive Officer of the Department of Agriculture and Food as authorised by the authority ("WAAA").

AND

The person named in Item 1 of the Schedule (hereinafter called the 'Licensee').

WHEREAS:

A. WAAA has in its possession and is the owner of the copyright over certain information held in digital form (hereinafter called the "Information") described in Item 2 of the Schedule;

B. The Licensee wishes to make use of the Information for purposes described in Item 3 of the Schedule; and

C. WAAA and the Licensee wish to enter into a licensing agreement for mutual benefit.

IT IS HEREBY AGREED as follows:

1. WAAA will supply one copy of the Information to the Licensee.

2. Copyright over the Information shall at all times remain the property of WAAA.

3. The Information may be used by the Licensee to enhance or support products developed by the Licensee for the project described in the schedule, Item 3.

4. The Information shall not be on-sold in digital form to any other party.

5. Before any product developed by the Licensee by using the Information in any way is released there shall be consultation between the Licensee and WAAA or its nominated representative sufficient to ensure to the satisfaction of WAAA that appropriate interpretation and integrity of the Information has been carried out and maintained. Copies of products developed shall be supplied if specified in the schedule, Item 6.

6. The Licensee shall not release any product developed using the Information, except for the project described in the schedule, Item 3.

7. All products produced by the Licensee using the Information under this Agreement shall bear markings acknowledging that WAAA is the owner of the copyright of that information, and WAAA is the source of the supplied information or works.

8. WAAA and all its respective servants, agents and workers shall not be held liable for any action, claim, suit or demand arising from the use of the Information by the Licensee.

IN CONSIDERATION:

9. The Licensee shall pay to WAAA the sum of money prescribed in Item 4 of the Schedule to this Agreement (hereinafter called the "Agreed Sum").

10. The Agreed Sum shall be paid to and received by WAAA before the Information is released.

TERM AND TERMINATION:

11. The licence established under this Agreement shall terminate one year after it is made, unless otherwise specified in Item 5 of the Schedule.

12. This Agreement may be terminated by either party by the giving of notice in writing to this effect to the other party, upon receipt of which this Agreement is deemed to be terminated, such notice becoming effective at the time it would be expected to be received if delivered by surface mail.

13. Upon the termination of this Agreement, either by the efflux of time, or the giving of notice, or the failure of either party to abide by the terms and conditions of the Agreement, the Licensee shall forthwith return the Information to WAAA including any copies of the Information made by the Licensee and held on the Licensee's systems and records, and where such copies are held in electronic form these shall be erased or otherwise destroyed.

GOVERNING LAW:

14. This Agreement shall be governed under the laws of Western Australia.

SCHEDULE

Item 1: Name GHD

Address Res: 10 Victoria Street

Post: PO Box 1009

Bunbury WA 6231 .....

Contact: Fionnuala Hannon

Telephone 9721 0700

Item 2: Description of Information

The following spatial datasets have been provided as ESRI shape files for the Esperance and Ravensthorpe Shires:

Department of Indigenous Affairs - AboriginalSites.shp

DAFWA - EspContour_2m.shp

DAFWA - RaveContour_2m.shp

DEC chained Area:

Fuel__modified_buffer_burnt.shp

Fuel_modified_buffer_unburnt.shp

pburn_scrub_rolling.shp

scrub_rolling.shp

UCL_Pyramid_Rd_2009.shp

UCL_Tom_Brown.shp

Infrastructure:

Western Power - Power: Distribution_Lines_MGA_z50_polyline.shp

Railways_Public.shp

Landgate - wa_roads.shp

Landgate - Cities_and_Towns.shp

Land Tenure:

Landgate - PARCEL_POLY.shp

Landgate - RESERVES.shp

Landgate - VCROWN_LAND.shp

DAFWA - PROPERTY_POLY.shp

State barrier Fence:

DAFWA - Proposed_Alignment_sections.shp

DAFWA - Existing: StateBarrierFence.shp

DAFWA - Rainfall_Isohyte_1975_2005.shp

DAFWA - Region_Soil_cen_R007002.shp

DEC - Priority_Flora - Geocoded_Sites.shp

DEC - TEC, PEC : tec_pec-boundaries_20-06-08.shp

tec-pec_sites_20-06-08.shp

DAFWA - NATIVEVEGETATION_EXTENT.shp

DOW - Waterways - Linear_Hierarchy.shp

Landgate - Aerial Photography:

Ravensthorpe_2930_Jan_2007_Mosaic.ecw

Oldfield_3030_Jan_2007_Mosaic.ecw

Northover_3031_Jun_2008_Mosaic.ecw

Moolyall_2931_Mar_2008_Mosaic.ecw

Lort_3131_Mar_2008_Mosaic.ecw

Peak_Charles_3132_Jan_2007_Mosaic.ecw

Dundas_3232_Jan_2009_Mosaic.ecw

Cowalinya_3332_Jan_2009_Mosaic.ecw

Scadden_3231_Jan_2008_Mosaic.ecw

Burdett_3331_Jan_2008_Mosaic.ecw

Beaumont_3431_Jan_2008_Mosaic.ecw

Buraminya_3531_Jan_2009_Mosaic.ecw

Sandy_Bight_3530_Jan_2009_Mosaic.ecw

Howick_3430_Recherche_3429_Jan_2007_Mosaic.ecw

Item 3: Purpose of Use of Information

Data is to be used for the scoping study for the alignment of the Esperance Extension of the State Barrier Fence

Item 4: Consideration inclusive of GST (in words and in figures)

na

Item 5. Extension of License beyond one year.

n/a

Item 6. Copies of Products
Not Required

Executed as an Agreement.

Signed on behalf of the Western Australian Agriculture Authority by the Chief Executive Officer of the Department of Agriculture and Food, as authorised by the Authority in the presence of:

_____	_____
Signature	Signature of witness
_____	_____
Name	Name of witness (Please Print)
	3 Baron-Hay Court, South Perth
	Address of Witness

Signed for and on behalf of the Licensee by:	**in the presence of:**
_____	_____
Name (Please Print)	Witness
_____	_____
Title	Name (Please Print)
_____	_____
Signed	Address

OR, IF A COMPANY

The Common Seal of the Licensee was affixed with authority to this contract by:	**in the presence of:**
_____	_____
Name (Please Print)	Witness
_____	_____
Title	Name (Please Print)
_____	_____
Signed	Address

Important Instructions:

Please arrange for two signed original copies of the digital data license agreement to be posted back to the following address;

Attention: Jeff Watson
Department of Agriculture and Food
Locked Bag No.4
Bentley Delivery Centre
Bentley WA 6983

Department of Environment and Conservation

RETURN APPLICATION TO:
Department of Environment and Conservation
Wildlife Licensing Section
Locked Bag 30 Bentley Delivery Centre, Western Australia, 6983
Fax (08) 9334 0278

REGULATION 4 AUTHORITY

APPLICATION TO ENTER DEPARTMENT OF ENVIRONMENT AND CONSERVATION LANDS AND/OR WATERS FOR THE PURPOSE OF UNDERTAKING RESEARCH

APPLICABLE TO REGULATIONS 8, 10, 12, 18 AND 31 OF THE CONSERVATION AND LAND MANAGEMENT REGULATIONS 2002

- Please complete ALL sections of this application.
- Please allow 20 working days to process application

1. Name of Applicant:

Surname TONER Given Names MERANDA BREE

Address 239 ADELAIDE TCE, PERTH, WA

Phone Contact – Work: 08 6222 8461

Home: 0404 486 747

Fax No. 618 6444 8461

Postcode: 6004

email: mtoner@ghd.com.au

2. Department/Institution/Company/School/Club etc.

GHD PTY LTD

(A letter of support from the Head of your organisation should be attached to this application)

3. Names of other participants MEGAN DILLY, ORLA O'DONNELL, ERIN LYNCH

4. Which **DEC LAND / WATER** (e.g. .. National Park, Nature Reserve, Marine Park, State Forest) will research be undertaken in? Along the edges of the following parks/ (Details of name/s, number/s and actual location/s) reserves (See attached map)

CAPE ARID NATIONAL PARK, CHEADANUP NATURE RESERVE, LEDA NATURE RESERVE, SALMON GUMS NATURE RESERVE, Rock ICAU N.R., BEAUMONT GROUP N.R, CLYDE HILL N.R, NIBLICK N.R, CAICE GILMORE,

5. Purpose of project: Scoping study for the state Barrier Fence Esperance Extension: Field survey to determine potential social + environmental issues for the proposed fence-line

6. Applicants are required to submit a copy of their research proposal (including any maps of the proposed study sites) with this application.

In accordance with DEC Flora licence
Meranda Toner: licence # SL009872 (expiry 30/01/13)
Erin Lynch: licence # SL009868 (expiry 30/01/13)

7. If you propose to collect specimens, state common and scientific name/s:

(a) Species to be taken Unknown plant species

(b) Parts to be taken Small ~~per~~ sample for identification

(c) Purpose of samples Identification of species

(d) Quantity to be collected One part of each plant not identifiable in field

(e) Where will the specimens be lodged? Lodgement of any priority/other significant species as per DEC Flora licence conditions

(f) Method of collection scientific

8. Who will supervise the work? Meranda Toner

9. Starting and finishing date: 21st May to 28th May 2012

10. Are vehicles / vessels to be used on the National Parks/Nature Reserves/Marine Parks? If so, give details including make, type, registration number, vessel call sign and marine radio type (27 mHz or Mar VHF)

Hire 4x4 (rego details unknown at present)

11. Nature and location of proposed accommodation: Esperance/Ravensthorpe (to be confirmed)

12. Will the study sites be reference marked? If so, how? No permanent markings, only GPS co-ordinates taken

13. How long will the reference marks remain: None

13.1 When will the reference markers be removed:

N/A

Please read and sign the following declaration:

I AGREE THAT:

I will comply with the provisions of the Wildlife Conservation Act and Regulations and the Conservation and Land Management Act and Regulations and all conditions applicable to the issue of this Authority.

Signature of Applicant

10/05/2012

Appendix C

Data Received from DAFWA

DAFWA

DRAFT

Dataset list

Full Folder path- orignal	Full Folder path- moved to	Theme	Date ddmmyyyy	Description	Custodian	Source	Metadata Y/N	Received
List the folder path from the project number down to account for any client data that is not saved within the GIS directory or possible sub jobs eg data in the import area or client	This is where the data has been moved to in the "master" directory structure	This is a one or two word description of the data eg CO2 sampling	The date the datset was created. If unkown its the date the data was received	One or two sentences describing the data and any important things	The intellectual owner of the data eg GHD, Landgate	This is where the data has been sourced from eg Worley may have created data for OPR, source is Worley	Has metadata been created	Date received
BIOTA								
G:\61\28161\Client Data\Esperance_SBF\Vector_Data\Threatened_Ecological_Communities\Priority_Flora_DEC	G:\61\28161\GIS\Data\Biota\Threatened_Ecological_Communities\Priority_Flora_DEC\	Flora	3/04/2012	Threatened and Priority Flora	DEC	DAFWA	Y	8/05/2012
G:\61\28161\Client Data\Esperance_SBF\Vector_Data\Threatened_Ecological_Communities\Threatened_Ecological_Communities\TEC2008	G:\61\28161\GIS\Data\Biota\Threatened_Ecological_Communities\Threatened_Ecological_Communities\TEC2008\	Ecology	23/06/2012	Threatened Ecological Communities Buffers	DEC	DAFWA	Y	8/05/2012
G:\61\28161\Client Data\Esperance_SBF\Vector_Data\Threatened_Ecological_Communities\Threatened_Ecological_Communities\TEC2008	G:\61\28161\GIS\Data\Biota\Threatened_Ecological_Communities\Threatened_Ecological_Communities\TEC2008\	Ecology	23/06/2008	Threatened Ecological Communities Sites	DEC	DAFWA	Y	8/05/2012
G:\61\28161\Client Data\Esperance_SBF\Vector_Data\vegetation	G:\61\28161\GIS\Data\Biota\vegetation\	Ecology	10/04/2012	Native Vegetation	DAFWA	DAFWA	N	8/05/2012
BOUNDARIES								
CLIMATOLOGY								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Rainfall_Isohytes	G:\61\28161\GIS\Data\Climatology\Rainfall_Isohytes\	Rainfall Isohytes	3/04/2012	Rainfall Isohytes in ESP resion	DOW	DAFWA	N	8/05/2012
ECONOMY								
ELEVATION								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Contours	G:\61\28161\GIS\Data\Elevation\Contours\	Contours	30/03/2012	2 metre contours of Ravensthorpe region	Unknown	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Contours	G:\61\28161\GIS\Data\Elevation\Contours\	Contours	30/03/2012	3 metre contours of Esperence region	Unknown	DAFWA	N	8/05/2012
ENVIRONMENT								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\DEC_Chained_Area	G:\61\28161\GIS\Data\Environment\DEC_Chained_Area\	Fire Breaks created by DEC	30/03/2012	Fire break area created through burning	DEC	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\DEC_Chained_Area	G:\61\28161\GIS\Data\Environment\DEC_Chained_Area\	Fire Breaks created by DEC	30/03/2012	Fire break area created not through burning	DEC	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\DEC_Chained_Area	G:\61\28161\GIS\Data\Environment\DEC_Chained_Area\	Fire Breaks created by DEC	30/03/2012	Fire break line with buffer attributes	DEC	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\DEC_Chained_Area	G:\61\28161\GIS\Data\Environment\DEC_Chained_Area\	Fire Breaks created by DEC	30/03/2012	Fire break Area	DEC	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\DEC_Chained_Area	G:\61\28161\GIS\Data\Environment\DEC_Chained_Area\	Fire Breaks created by DEC	30/03/2012	Fire break line	DEC	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\DEC_Chained_Area	G:\61\28161\GIS\Data\Environment\DEC_Chained_Area\	Fire Breaks created by DEC	30/03/2012	Fire break line	DEC	DAFWA	N	8/05/2012
FARMING								
GEOSCIENTIFIC								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Soil	G:\61\28161\GIS\Data\Geoscientific\Soil\	Soils	30/03/2012	Soil descriptions	DAFWA	DAFWA	N	8/05/2012
HEALTH								
IMAGERY AND BASE MAPS								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/01/2008	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/01/2009	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/01/2008	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/01/2009	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/01/2009	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/01/2007	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/03/2008	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	1/03/2008	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	Jun-08	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	Jan-07	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	Jan-07	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	Jan-07	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	Jan-09	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Imagery		ECW Aerial Photo	Jan-08	ECW Aerial Photo	Landgate	DAFWA	N	8/05/2012
INLAND WATERS								
G:\61\28161\Client Data\Esperance_SBF\Vector_Data\Waterways	G:\61\28161\GIS\Data\InlandWaters\Waterways\	Rivers	3/04/2012	Rivers in Esp Region	Landgate	DAFWA	N	8/05/2012
INTELLIGENCE MILITARY								
LOCATION								
OCEANS								
PLANNING CADASTRE								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Land_Tenure	G:\61\28161\GIS\Data\PlanningCadastre\Land_Tenure	Cadastre	3/04/2012	Cadastre	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Land_Tenure	G:\61\28161\GIS\Data\PlanningCadastre\Land_Tenure	Cadastre	17/04/2012	Cdastre	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Land_Tenure	G:\61\28161\GIS\Data\PlanningCadastre\Land_Tenure	Cadastre	3/04/2012	Cadastral Reserves	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Land_Tenure	G:\61\28161\GIS\Data\PlanningCadastre\Land_Tenure	Cadastre	3/04/2012	Crown Land	Landgate	DAFWA	N	8/05/2012
SOCIETY								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Aboriginal_sites	G:\61\28161\GIS\Data\Society\Aboriginal_sites\	Society - Aboriginal Heritage	30/03/2012	All Aboriginal Heritage sites (Includes	DIA	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Infrastructure\Towns	G:\61\28161\GIS\Data\Society\Towns\	Cities and town locations	10/04/2012	Cities and Towns within the ESP region	Landgate	DAFWA	N	8/05/2012
STRUCTURE								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Proposed_Alignment	G:\61\28161\GIS\Data\Structure\Proposed_Alignment\	Barrier Fence	30/032012	Alignment Options	DAFWA	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Proposed_Alignment	G:\61\28161\GIS\Data\Structure\Proposed_Alignment\	Barrier Fence	30/032012	State Barrier Fence	DAFWA	DAFWA	N	8/05/2012
TRANSPORTATION								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Infrastructure\Railway	G:\61\28161\GIS\Data\Transportation\Railway\	Railway lines	4/04/2012	Single Railway line	Landgate	DAFWA	N	8/05/2012
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Infrastructure\Roads	G:\61\28161\GIS\Data\Transportation\Roads\61\28161_LGate_Roads_20120509.shp	Road lines	30/03/2012	Roads in Esp region	MRWA	DAFWA	N	8/05/2012
UTILITIES								
N:\AU\Bunbury\Projects\61\28161\GIS\Esperance_SBF\Vector_Data\Infrastructure\Power	G:\61\28161\GIS\Data\Utilities\Power\	Power Lines	3/04/2012	Distribution Power lines in Esperance Region	Western Power	DAFWA	N	8/05/2012

Appendix D

Planning

GHD

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
0	145	1		12049	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	145	1		12049	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	145	1		12049	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	146	1		3826	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	146	1		3826	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	149	1		4480	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	149	1		4480	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	145	1		12049	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	146	1		3826	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	146	1		3826	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	149	1		4480	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
3198227	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
3198227	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
3198227	147	1		32366	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	147	1		32366	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	147	1		32366	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	149	1		4480	1	Private - Broadacre	20	7	40	Rural - Broadacre
3198227	149	1		4480	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	145	1		12049	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	146	1		3826	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	149	1		4480	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	145	1		12049	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	145	1		12049	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	145	1		12049	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	145	1		12049	7	Unallocated Crown Land	1	9	1	No Zone
3164945	146	1		3826	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	146	1		3826	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	147	1		32366	7	Unallocated Crown Land	1	9	1	No Zone
3164945	148	1		2747	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	149	1		4480	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	149	1		4480	7	Unallocated Crown Land	1	9	1	No Zone
3164945	149	1		4480	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	148	1		2747	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	149	1		4480	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	148	1		2747	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	149	1		4480	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	147	1		32366	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	160	2	A	12758	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	160	2	A	12758	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	160	2	A	12758	7	Unallocated Crown Land	1	9	1	No Zone
3164945	159	2	A	2752	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	155	2	A	2747	1	Private - Broadacre	20	7	40	Rural - Broadacre

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164945	155	2	A	2747	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	156	2	A	2790	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	157	2	A	458	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	160	2	A	12758	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	160	2	A	12758	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	160	2	A	12758	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	160	2	A	12758	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	160	2	A	12758	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	160	2	A	12758	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	160	2	A	12758	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	157	2	A	458	7	Unallocated Crown Land	1	7	40	Rural - Broadacre
3164945	160	2	A	12758	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	159	2	A	2752	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	155	2	A	2747	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	159	2	A	2752	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	156	2	A	2790	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	155	2	A	2747	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	160	2	A	12758	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	156	2	A	2790	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	157	2	A	458	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	160	2	A	12758	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	157	2	A	458	1	Private - Broadacre	20	7	40	Rural - Broadacre
1210940	152	2	B	17196	3	Reserve - LG/DOP	10	4	10	Minor Road
1206940	152	2	B	17196	3	Reserve - LG/DOP	10	4	10	Minor Road
3198227	152	2	B	17196	3	Reserve - LG/DOP	10	4	10	Minor Road
0	152	2	B	17196	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	153	2	B	2747	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	154	2	B	3928	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	150	2	B	2790	7	Unallocated Crown Land	1	9	1	No Zone
3198227	151	2	B	7149	1	Private - Broadacre	20	7	40	Rural - Broadacre
3198227	151	2	B	7149	7	Unallocated Crown Land	1	9	1	No Zone
3198227	152	2	B	17196	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	153	2	B	2747	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	152	2	B	17196	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1210940	152	2	B	17196	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	153	2	B	2747	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	154	2	B	3928	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	153	2	B	2747	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3198227	154	2	B	3928	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	150	2	B	2790	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	151	2	B	7149	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	150	2	B	2790	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	154	2	B	3928	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	150	2	B	2790	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	150	2	B	2790	7	Unallocated Crown Land	1	4	10	Minor Road
3164945	151	2	B	7149	1	Private - Broadacre	20	7	40	Rural - Broadacre
3198227	152	2	B	17196	4	Reserve - MRWA/LG	10	4	10	Minor Road

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3198227	153	2	B	2747	4	Reserve - MRWA/LG	10	4	10	Minor Road
3198227	154	2	B	3928	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	152	2	B	17196	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	152	2	B	17196	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	152	2	B	17196	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	153	2	B	2747	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	152	2	B	17196	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	151	2	B	7149	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	151	2	B	7149	7	Unallocated Crown Land	1	7	40	Rural - Broadacre
3164945	152	2	B	17196	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	152	2	B	17196	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	151	2	B	7149	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	19	3		3259	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	19	3		3259	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	19	3		3259	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	19	3		3259	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	19	3		3259	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	19	3		3259	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	19	3		3259	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	22	4	A	10834	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	25	4	B	8106	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	25	4	B	8106	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	25	4	B	8106	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	25	4	B	8106	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	25	4	B	8106	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	25	4	B	8106	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	25	4	B	8106	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	24	4	BC	4932	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206940	23	4	C	18944	4	Reserve - MRWA/LG	10	4	10	Minor Road
1206740	23	4	C	18944	4	Reserve - MRWA/LG	10	4	10	Minor Road
1206940	23	4	C	18944	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	23	4	C	18944	7	Unallocated Crown Land	1	7	40	Rural - Broadacre
3164945	23	4	C	18944	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
1206740	23	4	C	18944	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	23	4	C	18944	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	23	4	C	18944	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	23	4	C	18944	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	23	4	C	18944	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	23	4	C	18944	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	27	5		1328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	27	5		1328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	27	5		1328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	27	5		1328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	27	5		1328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	27	5		1328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	30	6	A	9788	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	31	6	B	9153	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207030	32	6	BC	2190	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	32	6	BC	2190	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	32	6	BC	2190	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	32	6	BC	2190	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	32	6	BC	2190	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	32	6	BC	2190	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	32	6	BC	2190	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207030	33	6	C	29107	4	Reserve - MRWA/LG	10	4	10	Minor Road
1206940	33	6	C	29107	4	Reserve - MRWA/LG	10	4	10	Minor Road
1206940	33	6	C	29107	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207030	33	6	C	29107	4	Reserve - MRWA/LG	10	4	10	Minor Road
1206940	33	6	C	29107	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1209450	33	6	C	29107	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	33	6	C	29107	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207030	34	7		13345	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207020	34	7		13345	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	34	7		13345	7	Unallocated Crown Land	1	9	1	No Zone
0	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	9	1	No Zone
3164945	34	7		13345	7	Unallocated Crown Land	1	9	1	No Zone
3164945	34	7		13345	7	Unallocated Crown Land	1	9	1	No Zone
1207030	34	7		13345	3	Reserve - LG/DOP	10	8	20	Rural - Undeveloped
0	34	7		13345	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	34	7		13345	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	174	8	A	15442	7	Unallocated Crown Land	1	9	1	No Zone
3164945	174	8	A	15442	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	174	8	A	15442	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	174	8	A	15442	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	174	8	A	15442	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	174	8	A	15442	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	174	8	A	15442	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	174	8	A	15442	7	Unallocated Crown Land	1	7	40	Rural - Broadacre
3164945	169	8	A	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	172	8	A	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	170	8	A	4465	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	170	8	A	4465	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	173	8	A	8982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	174	8	A	15442	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	174	8	A	15442	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	170	8	A	4465	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	169	8	A	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	170	8	A	4465	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	169	8	A	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164945	173	8	A	8982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	172	8	A	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	173	8	A	8982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	172	8	A	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	174	8	A	15442	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	170	8	A	4465	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	170	8	A	4465	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	36	8	B	3648	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	36	8	B	3648	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	36	8	B	3648	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	166	8	B	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	168	8	B	4965	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	168	8	B	4965	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	36	8	B	3648	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	36	8	B	3648	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	36	8	B	3648	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	166	8	B	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	166	8	B	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	168	8	B	4965	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	168	8	B	4965	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	168	8	B	4965	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	168	8	B	4965	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	36	8	B	3648	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	36	8	B	3648	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	36	8	B	3648	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	168	8	B	4965	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	36	8	B	3648	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	36	8	B	3648	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	167	8	B	5482	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	40	8	BC	31886	7	Unallocated Crown Land	1	9	1	No Zone
0	40	8	BC	31886	7	Unallocated Crown Land	1	9	1	No Zone
0	40	8	BC	31886	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	40	8	BC	31886	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	40	8	BC	31886	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	40	8	BC	31886	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164945	40	8	BC	31886	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	40	8	BC	31886	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre
1208710	40	8	BC	31886	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	40	8	BC	31886	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	162	8	BC	2547	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206940	163	8	C	15661	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164945	163	8	C	15661	7	Unallocated Crown Land	1	9	1	No Zone
1206940	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	161	8	C	4603	7	Unallocated Crown Land	1	7	40	Rural - Broadacre
3164945	161	8	C	4603	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	161	8	C	4603	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	164	8	C	9623	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	164	8	C	9623	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	165	8	C	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	164	8	C	9623	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	161	8	C	4603	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	161	8	C	4603	1	Private - Broadacre	20	7	40	Rural - Broadacre
1208710	161	8	C	4603	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	161	8	C	4603	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	164	8	C	9623	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	165	8	C	3804	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	164	8	C	9623	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	164	8	C	9623	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208710	161	8	C	4603	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	161	8	C	4603	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	164	8	C	9623	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	163	8	C	15661	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	161	8	C	4603	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	43	10		6935	7	Unallocated Crown Land	1	9	1	No Zone
0	43	10		6935	7	Unallocated Crown Land	1	9	1	No Zone
0	43	10		6935	7	Unallocated Crown Land	1	9	1	No Zone
0	43	10		6935	1	Private - Broadacre	20	7	40	Rural - Broadacre

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
0	43	10		6935	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	43	10		6935	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	43	10		6935	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164945	43	10		6935	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	43	10		6935	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	43	10		6935	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	45	11	A	4721	7	Unallocated Crown Land	1	9	1	No Zone
0	45	11	A	4721	7	Unallocated Crown Land	1	9	1	No Zone
0	45	11	A	4721	7	Unallocated Crown Land	1	9	1	No Zone
0	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	45	11	A	4721	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	46	11	B	5261	7	Unallocated Crown Land	1	9	1	No Zone
0	46	11	B	5261	7	Unallocated Crown Land	1	9	1	No Zone
0	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	46	11	B	5261	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	50	12		3956	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	56	13	A	10029	7	Unallocated Crown Land	1	9	1	No Zone
0	56	13	A	10029	7	Unallocated Crown Land	1	9	1	No Zone

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
0	56	13	A	10029	7	Unallocated Crown Land	1	9	1	No Zone
0	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	9	1	No Zone
3164945	56	13	A	10029	7	Unallocated Crown Land	1	9	1	No Zone
3164945	56	13	A	10029	7	Unallocated Crown Land	1	9	1	No Zone
3164945	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	56	13	A	10029	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	57	13	B	6977	7	Unallocated Crown Land	1	9	1	No Zone
0	57	13	B	6977	7	Unallocated Crown Land	1	9	1	No Zone
0	57	13	B	6977	7	Unallocated Crown Land	1	9	1	No Zone
0	57	13	B	6977	7	Unallocated Crown Land	1	9	1	No Zone
0	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	9	1	No Zone
3189179	57	13	B	6977	7	Unallocated Crown Land	1	9	1	No Zone
3189179	57	13	B	6977	7	Unallocated Crown Land	1	9	1	No Zone
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	57	13	B	6977	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	51	13	BC	1649	7	Unallocated Crown Land	1	9	1	No Zone
0	51	13	BC	1649	7	Unallocated Crown Land	1	9	1	No Zone
0	51	13	BC	1649	7	Unallocated Crown Land	1	9	1	No Zone
0	51	13	BC	1649	7	Unallocated Crown Land	1	9	1	No Zone
0	51	13	BC	1649	7	Unallocated Crown Land	1	9	1	No Zone
0	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164945	51	13	BC	1649	7	Unallocated Crown Land	1	9	1	No Zone
3164945	51	13	BC	1649	7	Unallocated Crown Land	1	9	1	No Zone
3164945	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	58	13	BC	3082	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164945	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	51	13	BC	1649	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	58	13	BC	3082	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	58	13	BC	3082	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	58	13	BC	3082	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	58	13	BC	3082	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	58	13	BC	3082	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
1206840	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
1206820	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
1206820	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
1195620	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	1	Private - Broadacre	20	7	40	Rural - Broadacre
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197652	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3197652	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3197652	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197652	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197652	60	13	C	41515	1	Private - Broadacre	20	7	40	Rural - Broadacre
3197652	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road
3197652	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3197652	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road
3197652	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road
3197652	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road
3197652	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road
3197652	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road
1206820	60	13	C	41515	1	Private - Broadacre	20	7	40	Rural - Broadacre
1206820	60	13	C	41515	1	Private - Broadacre	20	7	40	Rural - Broadacre
3189179	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3189179	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3189179	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3189179	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3189179	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3189179	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3189179	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
1195520	60	13	C	41515	1	Private - Broadacre	20	7	40	Rural - Broadacre
1209940	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
1208680	60	13	C	41515	7	Unallocated Crown Land	1	9	1	No Zone
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	4	Reserve - MRWA/LG	10	3	999	Major Road
1209940	60	13	C	41515	1	Private - Broadacre	20	7	40	Rural - Broadacre
1208680	60	13	C	41515	1	Private - Broadacre	20	7	40	Rural - Broadacre
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	60	13	C	41515	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197652	65	14		34915	4	Reserve - MRWA/LG	10	4	10	Minor Road
1206810	65	14		34915	4	Reserve - MRWA/LG	10	4	10	Minor Road
1206810	65	14		34915	4	Reserve - MRWA/LG	10	4	10	Minor Road

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
1206810	65	14		34915	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207380	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
1195580	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
1209910	65	14		34915	7	Unallocated Crown Land	1	9	1	No Zone
0	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197652	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197652	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197652	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206810	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206810	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206810	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207380	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1195580	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1195580	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1209910	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	65	14		34915	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
1206790	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	67	15	A	4593	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	66	15	B	4472	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	64	15	BC	166	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	64	15	BC	166	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	64	15	BC	166	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	64	15	BC	166	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	64	15	BC	166	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	64	15	BC	166	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	64	15	BC	166	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207400	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
1207470	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207470	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207400	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3189179	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	76	15	C	15992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207430	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207430	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206790	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	72	16		34500	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207430	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164954	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	77	17	A	5800	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207430	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207430	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207430	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	70	17	B	9992	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207320	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207320	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	78	18	A	11996	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207320	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207320	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207320	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	79	18	B	15823	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	84	19		4875	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	84	19		4875	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	84	19		4875	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	84	19		4875	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	84	19		4875	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
0	129	20	A	19954	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	129	20	A	19954	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	129	20	A	19954	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164954	129	20	A	19954	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	129	20	A	19954	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	129	20	A	19954	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1201490	144	20	B	42490	1	Private - Broadacre	20	7	40	Rural - Broadacre
1201490	144	20	B	42490	1	Private - Broadacre	20	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	144	20	B	42490	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	143	21		230	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	143	21		230	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	143	21		230	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	143	21		230	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	143	21		230	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	131	22	A	6652	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	131	22	A	6652	4	Reserve - MRWA/LG	10	4	10	Minor Road
1209560	131	22	A	6652	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	131	22	A	6652	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	131	22	A	6652	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	131	22	A	6652	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	131	22	A	6652	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1209560	131	22	A	6652	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	131	22	A	6652	4	Reserve - MRWA/LG	10	4	10	Minor Road
1209560	131	22	A	6652	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208310	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
1209560	86	22	B	9982	7	Unallocated Crown Land	1	9	1	No Zone
1208310	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	86	22	B	9982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	86	22	B	9982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	86	22	B	9982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	86	22	B	9982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1209560	86	22	B	9982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
1207560	86	22	B	9982	4	Reserve - MRWA/LG	10	4	10	Minor Road
1209560	86	22	B	9982	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	136	23	A	14091	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	136	23	A	14091	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	136	23	A	14091	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	136	23	A	14091	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	136	23	A	14091	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	136	23	A	14091	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	136	23	A	14091	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	136	23	A	14091	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	136	23	A	14091	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	90	23	B	19182	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	90	23	B	19182	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	90	23	B	19182	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	90	23	B	19182	4	Reserve - MRWA/LG	10	4	10	Minor Road
1207560	90	23	B	19182	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	90	23	B	19182	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1207560	90	23	B	19182	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	90	23	B	19182	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	90	23	B	19182	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	90	23	B	19182	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	90	23	B	19182	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	127	24	A	15534	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	127	24	A	15534	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	127	24	A	15534	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	127	24	A	15534	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	127	24	A	15534	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	127	24	A	15534	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	127	24	A	15534	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	127	24	A	15534	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
0	96	24	B	17887	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197604	96	24	B	17887	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	96	24	B	17887	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1208900	96	24	B	17887	7	Unallocated Crown Land	1	9	1	No Zone
3164954	96	24	B	17887	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1208900	96	24	B	17887	7	Unallocated Crown Land	1	9	1	No Zone
1208900	96	24	B	17887	7	Unallocated Crown Land	1	9	1	No Zone
3164954	96	24	B	17887	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	96	24	B	17887	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	96	24	B	17887	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	96	24	B	17887	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1194170	100	25		1732	1	Private - Broadacre	20	7	40	Rural - Broadacre
3164954	100	25		1732	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	100	25		1732	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	100	25		1732	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	100	25		1732	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	100	25		1732	5	Reserve - DEC	40	5	40	Nature Reserve or National Park

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3197959	126	26	A	9698	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	126	26	A	9698	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	126	26	A	9698	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	126	26	A	9698	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	126	26	A	9698	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	126	26	A	9698	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	126	26	A	9698	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	126	26	A	9698	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	126	26	A	9698	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	101	26	B	12579	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	101	26	B	12579	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	101	26	B	12579	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	101	26	B	12579	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197959	101	26	B	12579	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	101	26	B	12579	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	101	26	B	12579	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	101	26	B	12579	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	101	26	B	12579	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	101	26	B	12579	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	101	26	B	12579	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	101	26	B	12579	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	101	26	B	12579	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	125	27	A	3724	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	125	27	A	3724	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	125	27	A	3724	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	103	27	B	4330	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	103	27	B	4330	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197959	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	103	27	B	4330	4	Reserve - MRWA/LG	10	4	10	Minor Road

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
0	124	28	A	11387	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	124	28	A	11387	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	124	28	A	11387	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	124	28	A	11387	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	124	28	A	11387	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	124	28	A	11387	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	124	28	A	11387	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	124	28	A	11387	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	124	28	A	11387	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
0	105	28	B	17392	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	105	28	B	17392	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1210550	105	28	B	17392	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	105	28	B	17392	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1210550	105	28	B	17392	4	Reserve - MRWA/LG	10	4	10	Minor Road
	105	28	B	17392	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	105	28	B	17392	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	105	28	B	17392	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	105	28	B	17392	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	105	28	B	17392	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
0	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	107	29		23755	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	123	30	A	15292	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	123	30	A	15292	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	123	30	A	15292	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	123	30	A	15292	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3197638	109	30	B	23668	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	109	30	B	23668	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197638	109	30	B	23668	4	Reserve - MRWA/LG	10	4	10	Minor Road
3164954	109	30	B	23668	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	109	30	B	23668	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	109	30	B	23668	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	109	30	B	23668	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	109	30	B	23668	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
0	120	31		23022	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197638	120	31		23022	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	120	31		23022	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197638	120	31		23022	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	120	31		23022	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	120	31		23022	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	120	31		23022	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3164954	120	31		23022	5	Reserve - DEC	40	5	40	Nature Reserve or National Park

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
3164954	120	31		23022	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3164954	120	31		23022	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
0	137	32	A	45412	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	137	32	A	45412	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	137	32	A	45412	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	137	32	A	45412	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	137	32	A	45412	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	119	32	BC	4357	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	119	32	BC	4357	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	119	32	BC	4357	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	119	32	BC	4357	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	133	33	B	5337	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3198017	113	33	C	15573	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3198017	113	33	C	15573	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	113	33	C	15573	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	134	34	B	8290	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3200139	115	34	C	11436	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3200139	115	34	C	11436	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	115	34	C	11436	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	135	35	B	29056	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	135	35	B	29056	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	135	35	B	29056	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	135	35	B	29056	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
3197548	117	35	C	66311	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197548	117	35	C	66311	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1208200	117	35	C	66311	4	Reserve - MRWA/LG	10	4	10	Minor Road
1208200	117	35	C	66311	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197548	117	35	C	66311	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	117	35	C	66311	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	138	36	BC	2582	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	138	36	BC	2582	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	138	36	BC	2582	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	138	36	BC	2582	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	138	36	BC	2582	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	138	36	BC	2582	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	121	37	C	328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	121	37	C	328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	121	37	C	328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	121	37	C	328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	121	37	C	328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	121	37	C	328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	121	37	C	328	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Property ID	ID1	Section	Option	Length	Tenure ID	Tenure Name	Tenure PCA Score	Zone ID	Zone PCA Score	Zone Title
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206680	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1208200	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
1208200	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
1208200	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
1202270	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1202270	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1202270	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
1202270	141	38		52256	1	Private - Broadacre	20	7	40	Rural - Broadacre
1202270	141	38		52256	1	Private - Broadacre	20	7	40	Rural - Broadacre
1202150	141	38		52256	1	Private - Broadacre	20	5	40	Nature Reserve or National Park
1202150	141	38		52256	1	Private - Broadacre	20	5	40	Nature Reserve or National Park
1202150	141	38		52256	1	Private - Broadacre	20	5	40	Nature Reserve or National Park
3168091	141	38		52256	1	Private - Broadacre	20	7	40	Rural - Broadacre
3168091	141	38		52256	1	Private - Broadacre	20	7	40	Rural - Broadacre
3197932	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197932	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197932	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197932	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197536	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
3197536	141	38		52256	4	Reserve - MRWA/LG	10	4	10	Minor Road
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped
1206680	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1206680	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1206680	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1206680	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1206680	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
1206680	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
3206141	141	38		52256	5	Reserve - DEC	40	5	40	Nature Reserve or National Park
0	141	38		52256	7	Unallocated Crown Land	1	8	20	Rural - Undeveloped

Appendix E

Site Photographs

Photograph 1: Granite outcrop east of the study alignment at Section 38.

Photograph 2: Granite outcrop west of the study alignment section 38

Photograph 3: Granite outcrop at coastal endpoint of section 38

Photograph 4: Salt lake area

Photograph 5: Thomas river (taken in Northern direction) section 38

Photograph 6: Chain pulled area along Field road option 8BC

Appendix F

Geology and soil subsytems

GHD

ASRIS soil subs	Classification	Description	Topography	Geology	Soils
Oldfield 4 Subsystem	provisional	Very gently undulating plain increasing to gently undulating rises near creeklinesGrey shallow sand duplex soils usually alkaline with minor grey shallow loamy duplex soils, reddish brown non-cracking clays and bare rock	Very gently undulating plain increasing to gently undulating rises near creeklines	deeply weathered and eroded Archean granite and gneiss	Grey shallow sand duplex soils usually alkaline with minor grey shallow loamy duplex soils, reddish brown non-cracking clays and bare rock
Ney 4 Subsystem	current	Moderately inclined to steep slopes and sandsheets on headlands. Colluvium of sediments & granite and gneiss. Bare rock with areas of pale deep sand and grey deep sandy duplex soils. Some isolated clumbs of heath	Moderately inclined to steep slopes and sandsheets on headlands	Tertiary sediments and colluvium of granite and gneiss over shallow bedrock	Bare rock with areas of pale deep sand and grey deep sandy duplex soils
Merivale 5 Subsystem	provisional	Gently inclined scarp about 40m relief covered by dunes & sand sheets. Pallinup formation, and overlying deposits of Quaternary sands. Pale deep sands and grey shallow sandy duplex soils. Shrubland of Banksia, Acacia and Melaleuca species.	Gently inclined scarp approximately 40m in relief. dunes and sand sheets cover most of the scarp.	Tertiary marine sediments of the Pallinup formation, and overlying deposits of Quaternary sands	Pale deep sands and grey shallow sandy duplex soils
Scaddan 1 Subsystem	current	Alkaline solonetzic duplex soils.	Level to gently undulating plain with areas of gilgai microrelief. Drainage is generally poorly developed and usually internal	Tertiary marine sediments with aeolian carbonate rich deposits in places	Alkaline grey shallow sandy duplex soils with associated pale deep sands and minor deep sandy duplexes, ironstone gravel soils and non-cracking clays
Halbert 1 Subsystem	provisional	Gently to undulating plain with many small playas. Lunettes and sand dunes are common on eastern side of lakes. Alkaline grey deep and shallow sandy duplex & associated salt lake soils, pale deep sands and calcareous loamy earths	Gently undulating to undulating plain with many small playas. Lunettes and sand dunes are common on eastern side of lakes	Tertiary sediments. Lacustrine sediments with gypsum and salt in lakes. Bedrock is deep	Alkaline grey deep and shallow sandy duplex soils with associated salt lake soils, pale deep sands and calcareous loamy earths
Scaddan 4 Subsystem	current	Red alkaline gradational soils.	Level plain or plateau of low relief and poor drainage Gilgia microrelief is common	Tertiary marine sediments with aeolian carbonate rich deposits in places	Alkaline grey shallow sandy duplex soils associated calcareous loamy earths and grey non-cracking clays and minor deep sands and irontone gravel soils
Salmon Gums 2 Subsystem	provisional	Very gently inclined scarp with exterani drainage via a well developed network of incipient streamsAlkaline grey shallow sandy duplex soils and calcareous loamy earths with minor non-cracking clays and bare rock	Very gently inclined scarp with exterani drainage via a well developed network of incipient streams	Thin Tertiary sediments with additions of calcareous aeolian material over weathered bedrock	Alkaline grey shallow sandy duplex soils and calcareous loamy earths with minor non-cracking clays and bare rock
Salmon Gums 4 Subsystem	provisional	Gently inclined to moderately inclined slopes and crests of very low relief occurring in upper landscape positionsAlkaline grey shallow sandy duplex soils and duplex sandy gravels	Gently inclined to moderately inclined slopes and crests of very low relief occurring in upper landscape positions	Thin Tertiary sediments with small outcrops of granite gneiss bedrock	Alkaline grey shallow sandy duplex soils and duplex sandy gravels
Salmon Gums 1 Subsystem	provisional	Level plain or plateau of low relief and poor external drainage and extensive Gilgia microreliefAlkaline grey shallow sandy duplex soils and calcareous loamy earths with minor non-cracking clays	Level plain or plateau of low relief and poor external drainage and extensive Gilgia microrelief	Thin Tertiary sediments with additions of calcareous aeolian material over weathered bedrock	Alkaline grey shallow sandy duplex soils and calcareous loamy earths with minor non-cracking clays

ASRIS soil subs	Classification	Description	Topography	Geology	Soils
Halbert 3 Subsystem	provisional	Gently undulating plain. Tertiary sediments with lacustrine sediments in many small lakes. Alkaline grey shallow and deep sandy duplex soils with associated calcareous loamy earths and pale deep sands. Mallee / Melaleuca understorey.	Gently undulating plain	Tertiary sediments with lacustrine sediments in many small lakes	Alkaline grey shallow and deep sandy duplex soils with associated calcareous loamy earths and pale deep sands
Scaddan 7 Subsystem	current	Soil complex, S1 + S4.	Slightly elevated (upper landscape position) gently undulating plain	Thin Tertiary marine sediments over Proterozoic granite and gneiss bedrock	Alkaline grey shallow sandy duplex soils and associated Alkaline red shallow loamy duplex soils
Wittenoom 2 Subsystem	provisional	Hillslopes. Granite & gneiss & colluvium. Alkaline grey shallow sandy and loamy duplex soils with pale deep sands, minor non-cracking clays & shallow gravels. Mallee heath & shrubland. Some woodland of E. occidentalis in damp areas.	Gently inclined to moderately inclined slopes of hills	Proterozoic granite and gneiss and associated colluvium	Alkaline grey shallow sandy and loamy duplex soils with associated pale deep sands, minor non-cracking clays and shallow gravels
Wittenoom 1 Subsystem	provisional	Moderately inclined to steeply inclined crests and slopes of hills. Proterozoic granite and gneiss and associated colluvium. Bare rock and associated stony soils. Mostly devoid of vegetation, some shrubland of broombush and heath	Moderately inclined to steeply inclined crests and slopes of hills	Proterozoic granite and gneiss and associated colluvium	Bare rock and associated stony soils
Buraminya 7 Subsystem	provisional	Level to gently undulating plain. Weathered Tertiary sediments & granite and gneiss. Alkaline grey shallow sandy duplex soils and Calcareous loamy earth with minor non-cracking grey clays. Mallee woodland of Eucalypts eremophilia	Level to gently undulating plain	Tertiary sediments of granite and gneiss basement rocks at depth	Alkaline grey shallow sandy duplex soils and Calcareous loamy earth with minor non-cracking grey clays
Wittenoom 2 Subsystem	provisional	Hillslopes. Granite & gneiss & colluvium. Alkaline grey shallow sandy and loamy duplex soils with pale deep sands, minor non-cracking clays & shallow gravels. Mallee heath & shrubland. Some woodland of E. occidentalis in damp areas.	Gently inclined to moderately inclined slopes of hills	Proterozoic granite and gneiss and associated colluvium	Alkaline grey shallow sandy and loamy duplex soils with associated pale deep sands, minor non-cracking clays and shallow gravels
Wittenoom 3 Subsystem	provisional	Gently inclined lower slopes and plains of hills. Sediments plus shallow colluvium of granite and gneiss. Alkaline grey shallow sandy and loamy duplex soils with pale deep sand, minor shallow gravels. Mallee / Melaleuca.	Gently inclined lower slopes and associated plains of hills	Tertiary sediments and colluvium of granite and gneiss over shallow bedrock	Alkaline grey shallow sandy and loamy duplex soils with associated pale deep sand, minor shallow gravels
Buraminya 2 Subsystem	provisional	Gently sloping plain. Tertiary sediments over undulating basement rock of granite and gneiss. Calcareous loamy earths and associated alkaline grey shallow sandy duplex soils. Mallee shrubland and woodland E.? redunca & E. uncinata	Gently sloping plain	Tertiary sediments over undulating basement rock of granite and gneiss that occasionally outcrop	Calcareous loamy earths and associated alkaline grey shallow sandy duplex soils
Buraminya 1 Subsystem	current	Level to very gently undulating plain. Tertiary sediments and aeolian material (local or from interior). Grey non-cracking clays with alkaline grey shallow sandy duplex soils and calcareous loamy earths. Woodland of Eucalyptus oleosa	Level to very gently undulating plain	Tertiary sediments and aeolian material derived locally or from the arid interior	Grey non-cracking clays with associated alkaline grey shallow sandy duplex soils and calcareous loamy earths
Halbert 2 Subsystem	provisional	Large level saline playas with associated lunettes on the eastern edges of lakesSalt lake soils with associated calcareous loamy earths, pale deep sands and other soils	Large level saline playas with associated lunettes on the eastern edges of lakes	Tertiary sediments with lacustrine sediments in many small lakes	Salt lake soils with associated calcareous loamy earths, pale deep sands and other soils

ASRIS soil subs	Classification	Description	Topography	Geology	Soils
Halbert 5 Subsystem	provisional	Plain with many small playas. Lacustrine sediments / weathered Tertiary sediments. Calcareous loamy earths and alkaline grey shallow sandy duplex soils with associated salt lake soils. Mallee of Eucalyptus redunca, E. uncinata & others.	Gently undulating to undulating plain with many small playas	Tertiary sediments with lacustrine sediments in many small lakes	Calcareous loamy earths and alkaline grey shallow sandy duplex soils with associated salt lake soils
Ney 2 Subsystem	provisional	Gently inclined to moderately inclined hillslopes. Proterozoic granite and gneiss and associated colluvium. Grey deep sandy duplex soils and pale deep sands with minor shallow gravel and grey non-cracking clays. Heath and shrubland	Gently inclined to moderately inclined hillslopes	Proterozoic granite and gneiss and associated colluvium	Grey deep sandy duplex soils and pale deep sands with minor shallow gravel and grey non-cracking clays
Ney 1 Subsystem	provisional	Moderately inclined to steeply inclined crests and slopes of hills. Proterozoic granite and gneiss and associated colluvium. Bare rock and associated shallow sands. Mostly devoid of vegetation, some broombush shrubland and heath	Moderately inclined to steeply inclined crests and slopes of hills	Proterozoic granite and gneiss and associated colluvium	Bare rock and associated shallow sands
Esperance 6 Subsystem	current	Red-brown to grey brown alluvial sands.	Level plain with occasional subdued sandsheets	deep tertiary sediments of the Pallinup formation overlying proterzoic granite and gneiss	Alkaline grey deep sandy duplex soils and grey deep sandy (gravelly) duplex soils with associated pale deep sands
Esperance 2 Subsystem	current	Gravelly yellow mottled duplex soils, (30-80 cm sand over gravel).	Gently undulating sandsheet and minor subdued dunes with swales and soaks	Quaternary aeolian sand overlying Tertiary sediments of the Pallinup formation	Pale deep sands with associated grey deep sandy duplex (gravelly) soils
Ney 3 Subsystem	provisional	Gently inclined lower slopes of hills and associated rises. Tertiary sediments and colluvium of granite and gneiss over shallow bedrock. Grey deep sand duplex soils and pale deep sands with minor shallow gravel. Mallee heath and shrubland	Gently inclined lower slopes of hills and associated rises	Tertiary sediments and colluvium of granite and gneiss over shallow bedrock	Grey deep sand duplex soils and pale deep sands with minor shallow gravel