

Flaura and Fauna Survey

Proposed dam development

Lot 4 Oldfield Rd, Treeton



Report by
Chris Mulcahy (BEnv Hons)

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1. Site Details

The subject site is Lot 4 Oldfield Rd, Treeton comprising 49.02Ha (122.55acres). The property is bordered to the north by Oldfield Rd while the western and southern boundaries abut State Forest. The property has two paddocks with 30.3 Ha of the property having been cleared for pasture while 18.7 Ha is retained with native bush comprising predominantly Marri-Jarrah Forest.

The property is north facing with two defined valleys that contribute to overland flow. These two depressions flow north where they join one of the main channels of the Carburnup River.

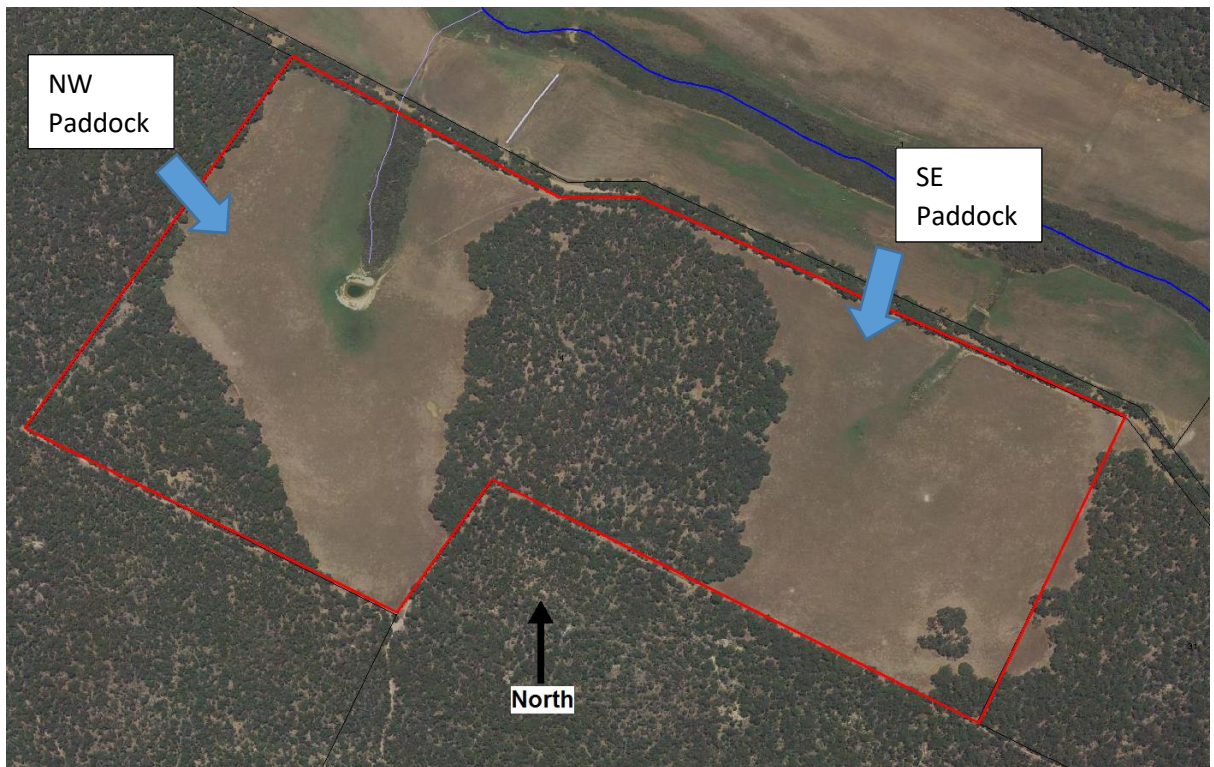


Plate 1. Lot 4 Oldfield Rd

2. Proposed development

Prior to our purchase of the property it was previously used for cattle grazing. Due to the absence of internal fencing, cattle have grazed the riparian vegetation (Area A) and have also been grazing the vegetation dividing the two paddocks (Area C).

The property was purchased in September 2016 to establish an intensive horticulture venture, primarily growing blueberries and finger limes. It is proposed to develop up to a minimum of 5 Ha of blueberries and 3 ha of finger limes. There may also be the opportunity to further expand the operation to include various other fruit or nut crops and seasonal vegetables depending on water availability. Livestock will also be kept on the property to maintain pasture within and outside the orchard areas. A small apiary will be established to assist with cross pollination of the orchard.

A house and shed are proposed to be established on the north west paddock and there are longer term plans to establish 2 or 3 chalets on the south eastern paddock to promote eco-tourism and agri-tourism.

All development will have 30m buffers from external boundaries and crops will be developed with a minimum 30m buffer from the watercourse in accordance with Water Quality Protection Note #6 Vegetation buffers to sensitive water resources and the AMRSC policy 11 Intensive Agriculture.

The proposed clearing is required to develop a dam to supply water for the proposed orchard, house, stock water and for firefighting purposes detailed in Section 5 of this report. The NW paddock has the only suitable site for a gully wall dam with the ability to store enough water to support the proposed orchard. Despite the NW paddock having the only suitable site for a gully wall dam it will not be able to store enough water to meet all of the orchard requirements, therefore, a smaller soak is also required on the SE paddock to make up for the shortfall in storage from the gully wall dam. Licenses for both dams have been applied for with Department of Water and Environmental Regulation under the *Rights in Water and Irrigation Act 1914* (application numbers: 20258, 20259 and 20260).

3. Flora

The property has significant areas of remnant bush with 38% of the property retained with native vegetation. In order to confirm the area to which the proposed clearing relates, the areas of native vegetation have been divided into three areas A, B & C (Figure 2).

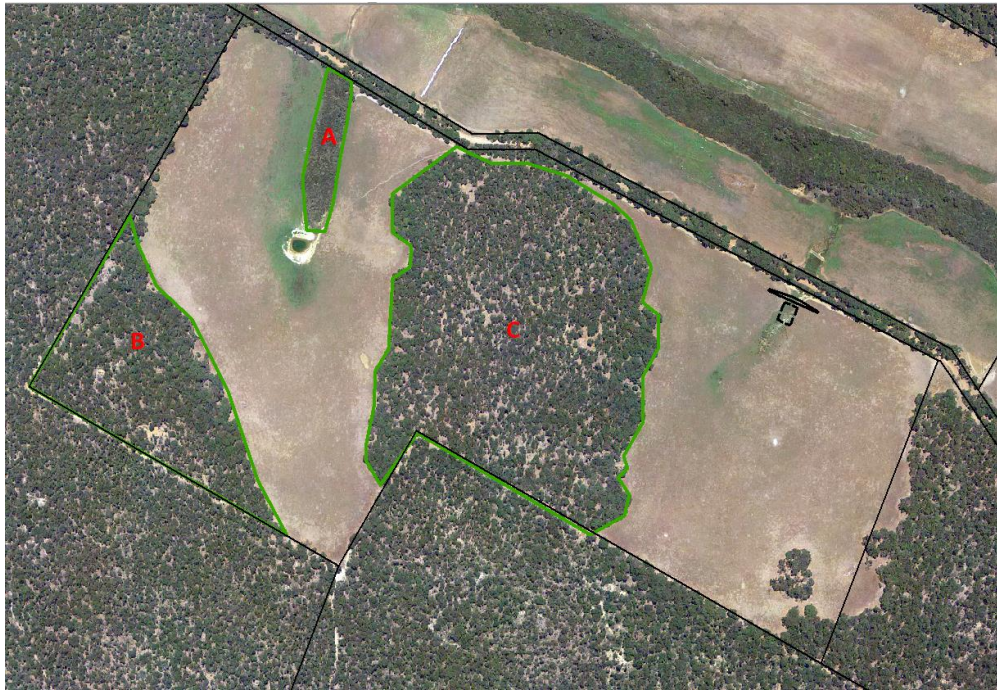


Figure 2. Native vegetation areas A, B & C

Area A

Has 0.8Ha of riparian vegetation and the proposed clearing will cover 0.59Ha (Figure 3).



Figure 3. Section of Area A proposed to be cleared 0.59Ha (red cross hatched) and proposed dam site overlaid.

Area A contains an isolated section of riparian vegetation with an upper storey consisting of predominantly *Taxandria linearifolia*. There are 31 *Corymbia calophylla* (Marri) trees with a base diameter at chest height (1.5m above ground) ranging from <150 to 1500mm, 2 *Eucalyptus patens* (Blackbutt) with base diameter of 200 - 250mm and 6 *Eucalyptus marginata* (Jarrah) with base diameter ranging from 100 to 800mm (see Table 1 for details and Figure 4 for locations). The understorey consists of *Lepidosperma tetraquetrum* and *Lepidosperma gladiatum* (coastal Sword sedge) within the centre of the creek line. Kikuyu, Guilford grass and pasture weeds are present on the outer sections of the creek line. Cattle have been accessing this area which has resulted in degradation of the bed and banks of the creek line and compaction (pugging) of the soil. *Juncus kraussii* (Sea Rush) are present surrounding the creek line within pasture areas (Image 1).

The creek line will be fenced off post dam development to prevent cattle accessing the creek line and to allow regeneration of understorey species. Once fenced the creek line and the proposed dam will be revegetated with native reeds and rushes.

Waypoint	Easting	Northing	species	diameter (mm)	comments
243	331428.416	6253114.9	<i>Eucalyptus marginata</i> (deceased)	800	2 small hollows ~200mm diameter
			<i>Corymbia calophylla</i>	200	
			<i>Corymbia calophylla</i>	150	
245	331436.353	6253106.301	2 x <i>Corymbia calophylla</i>	150	
246	331436.684	6253098.364	<i>Corymbia calophylla</i>	150	
247	331434.369	6253079.512	<i>Corymbia calophylla</i>	200	
248	331432.715	6253074.221	<i>Eucalyptus patens</i>	200	
249	331431.062	6253067.606	<i>Corymbia calophylla</i>	200	
			<i>Corymbia calophylla</i>	100	
250	331430.069	6253060.661	2 x <i>Corymbia calophylla</i>	150	
251	331428.085	6253037.51	2 x <i>Corymbia calophylla</i>	150	
252	331438.999	6253123.499	<i>Eucalyptus marginata</i>	300	half alive half deceased no hollows
			<i>Corymbia calophylla</i>	200	
253	331442.968	6253130.775	2 x <i>Corymbia calophylla</i>	300	
			<i>Corymbia calophylla</i>	150	
			<i>Corymbia calophylla</i> (deceased)	100	
254	331440.984	6253137.059	<i>Eucalyptus marginata</i> (deceased)	150	
			<i>Eucalyptus marginata</i>	200	
255	331444.952	6253141.359	<i>Corymbia calophylla</i>	300	
256	331447.267	6253152.604	<i>Corymbia calophylla</i>	200	
257	331461.158	6253166.825	<i>Corymbia calophylla</i>	450	
258	331452.559	6253182.369	6 x <i>Corymbia calophylla</i>	200	
259	331411.218	6253055.038	2 x <i>Eucalyptus marginata</i> (deceased)	300	1 snapped ~10m above ground, 1 no hollows
			<i>Eucalyptus marginata</i>	100	
			<i>Eucalyptus marginata</i>	200	
260	331417.502	6253069.26	<i>Corymbia calophylla</i>	800	half alive half deceased
261	331410.226	6253083.481	2 x <i>Corymbia calophylla</i>	150	
			<i>Corymbia calophylla</i>	200	
262	331402.288	6253102.333	<i>Corymbia calophylla</i> (deceased)	1500	snapped in half ~12m above ground
			<i>Eucalyptus patens</i>	250	
263	331436.353	6253167.486	<i>Corymbia calophylla</i> (deceased)	900	small hollows <150mm diameter

Table 1. List and location of Marri, Jarrah and Blackbutt species in Area A



Figure 4. Location of Marri – yellow, Jarrah – red, Blackbutt – orange with the proposed dam footprint overlaid.

There are 3 deceased Marri trees (Waypoint 260, 262 & 263) and 1 deceased Jarrah tree (Waypoint 243) with a base diameter exceeding 500mm and small hollows <200mm in diameter (pictured Image 4 -8). There are another 4 deceased Jarrah trees with base diameter <300mm with no hollows (Waypoints 252, 254 & 259) and 1 deceased Marri with a based diameter of 100mm also without significant hollows (Waypoint 253).

Area B

Area B is high quality native wet Sclerophyll Forest and is a typical canopy forest dominated by Marri, Jarrah, Blackbutt and Sheoak. The

quality of vegetation is very good with numerous trees with hollows in excess of 300mm diameter and very good multi-storey habitat. There is no intent to clear any of this vegetation and this area is fenced off to prevent cattle grazing.

Area C

This area has experienced impacts from selective logging which has resulted in the absence of middle and understorey species that would be expected to occur within a Jarrah-Marri Forest. Despite this there are still numerous Marri and Jarrah trees in this area with hollows in excess of 300mm. This area along with Area B and the surrounding State Forest provide abundant opportunity for tree nesting species such as possums and Cockatoo species. This area has not been adequately fenced resulting in cattle grazing on understorey species. Sheoak and banksia species (*Banksia grandis*) are still present in limited numbers. Again, there is no intention to clear this section and this will also be fenced to protect the vegetation from cattle. A proposed burn is planned for this area in May/June with the aim of germinating the seed bank prior to winter rain.

4. Fauna

During the surveys *Calyptorhynchus baudinii* (Baudins Cockatoo), *Calyptorhynchus latirostris* (Carnabys Cockatoo) and *Calyptorhynchus banksii naso* (Forest Red-Tailed Black Cockatoo) were observed flying through the property. Whilst there were numerous sightings of these species traversing the property there was no evidence of any nesting sites for either species in area A. Both areas B & C have the most suitable nesting sites with many hollowed Marri and Jarrah trees with base trunk diameters over 500mm and approximately 1 tree every 50-100m with a base diameter over 1000mm with tree hollows exceeding 300mm.

There is no evidence of Black Cockatoo nests within any of the tree hollows in Area A, the largest hollows are <200mm diameter (waypoint 243, 259, 262 & 263) which may be too small for cockatoo nesting. Weekly surveys have been conducted over the last 18 months during sunset, and monthly night surveys have been completed over the months September 2017 - to August 2018.

The monthly 2-3 hour night surveys during the September– August period did not identify any evidence of arboreal marsupials within Area A, however, there was evidence of Kangaroo passage within the creek line.

Daily inspections also provided limited evidence of marsupial skats on the floor of the creek line with the exception of Kangaroo skats, there has been regular sightings of foxes and their skats where also evident. It is possible that the distance from Area A and the surrounding vegetation may reduce the likelihood of possums and arboreal marsupials nesting in this area, there are more suitable areas with connecting vegetation nearby that do not require marsupials to traverse the paddock.

Daily surveys also checked for the presence of *Hydromys chrysogaster* (Water Rat – Rakali). This species was not observed potentially due to the absence of permanent water within the riparian zone.

Quacking frogs, Rattling or ticking frogs and Moaning Frogs have been heard via audible survey within Area A.

There are significant numbers of Western Grey Kangaroos and Emus across the property and in the surrounding State Forest.

There is no riparian vegetation downstream of Area A that provides a riparian corridor with the main channel of the Carburnup River. A search of EPBC act species identified that Balstons Pygmy Perch may occur within the vicinity of the property, however, the lack of connecting riparian vegetation would likely limit their ability to navigate the 150m of grass lined creek between the Carburnup River and Area A. There is also a road culvert immediately downstream of Area A that has a 1m rise over a 2m length. This is likely too high for Balstons Pygmy Perch to negotiate as they have limited burst speed and generally require a gradient of >1:20. The increased flow velocity created by the concrete culverts smooth surface could also make it difficult for this species to navigate (Image 11 & 12).

EPBC Act species

Appendix A has a list of potential species registered under the EPBC Act that may frequent the property and the surrounding areas. This list is quite extensive and based on a 2Km radius. A number of species identified are unlikely to be present due to lack of suitable habitat for some of the species.

5. Water Demand

In order to provide sufficient water to irrigate the orchard a dam is proposed to be developed on the NW paddock and a smaller soak dam is proposed to be constructed on the SE paddock.

Estimated Water Demand

5 ha of blueberries @ 4,500kL/Ha = 22,500kL

3 Ha of finger limes @ 4,800kL/Ha = 14,400kL

140 sheep @ 1.5kL/head = 210kL

or 25 steers @ 9kL/head = 225kL

0.2 Ha of domestic garden and lawn @ 7,500kL/Ha = 1,500kL

Fire fighting purposes = 1,000kL

Total water demand = 39,625kL

6. Dam locations and capacities

In order to meet the irrigation demands for the property one gully wall dam is proposed to be constructed on the NW paddock which will be reliant of surface water flows. A second dam/excavation is also proposed to be constructed on the SE paddock that will be groundwater dependant (Figure 2.).

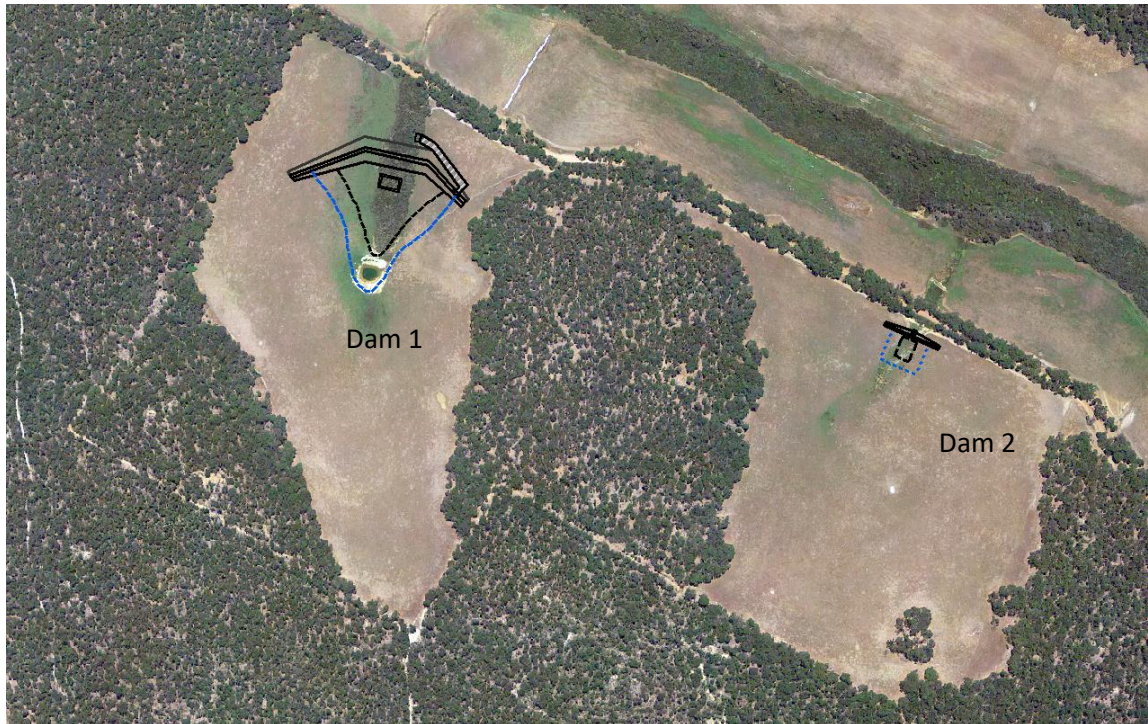


Figure 2. Dam Locations

Dam1 – NW Paddock - surface water

The proposed gully wall dam will be located on the NW Paddock with an estimated total storage capacity of 45,691kL see attached dam location Figure 3.

Dimensions:

Wall Height = 5m

Freeboard = 1m

Wall Length = 230m

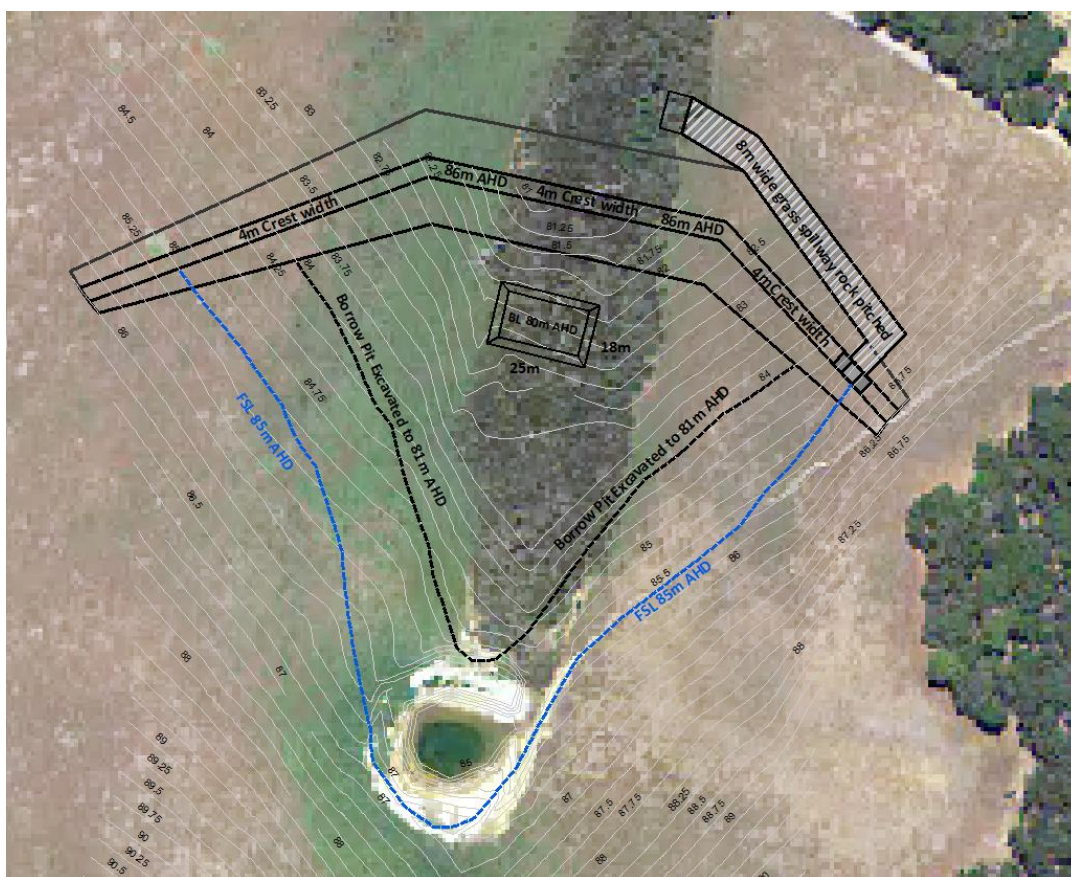
Water width = 190m

Tailwater = 150m

Surface area = 15,663m²

Excavated volume = 11,833m³

Storage volume = 33,858m³



The proposed gully wall dam located on the NW paddock will have a total storage capacity of 45,691kL which is not sufficient to meet the total irrigation demand of 39,625kL, as detailed in Section 3. As a general rule 20% of the water stored in the dam is to be retained to ensure dam health and integrity. Gully wall dams should not be left empty as this can cause the dam wall to crack which can lead to failure of the dam when winter flows commence. Therefore ~9,138kL of water will be retained in the dam at all times. Likewise, the dam will lose stored water to evaporation, it is expected evaporation loss will account for another 20% of dam storage, 9,138kL.

This leaves 27,414kL available for irrigation water and a 12,210kL deficit for irrigation needs. This deficit is proposed to be accessed from the second dam/excavation located on the SE paddock.

Dam 2 – SE Paddock - groundwater

The dam/excavation proposed to be located on the SE paddock will have an estimated storage capacity of 5,050kL (Figure 4). The excavation will

be reliant on groundwater seepage and recharge from the surficial aquifer in order to meet the irrigation shortfall. A groundwater licence for 12,500kL will be required from the Department of Water and Environmental Regulation.

Dimensions:

Wall Height = 2m

Freeboard = 0.5m

Maximum depth = 7m

Wall Length = 70m

Water width = 45m

Tailwater = 40m

Surface area = 1658m²

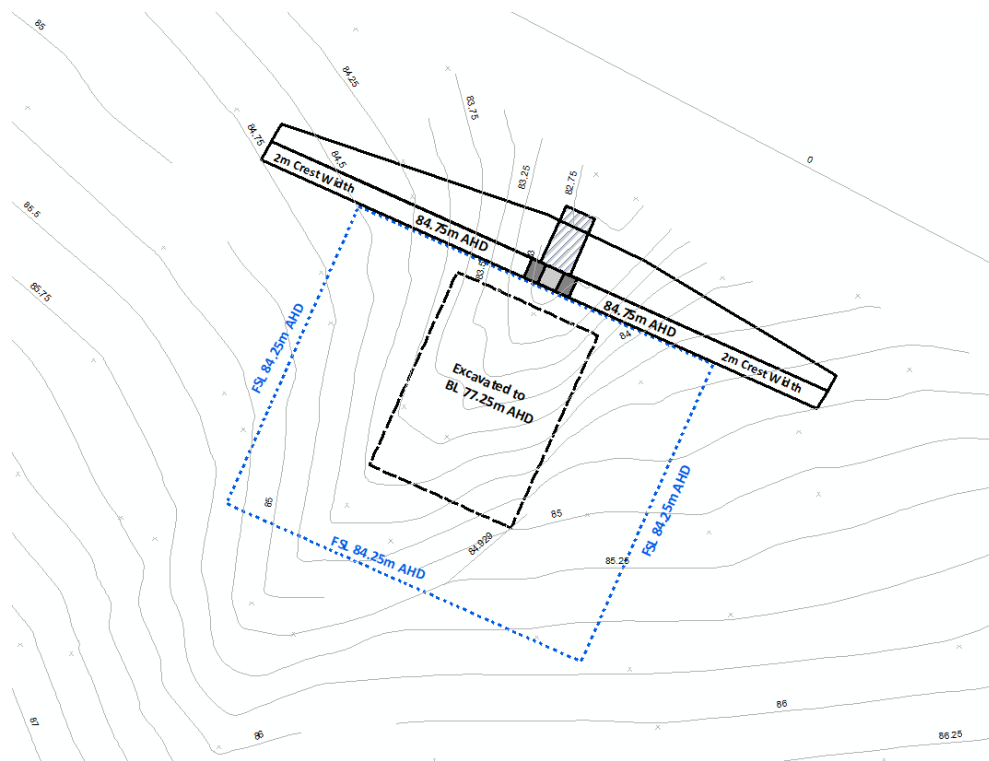


Figure 4. Excavation on the SE Paddock – Dam 2

7. Rights in Water and Irrigation Act 1914

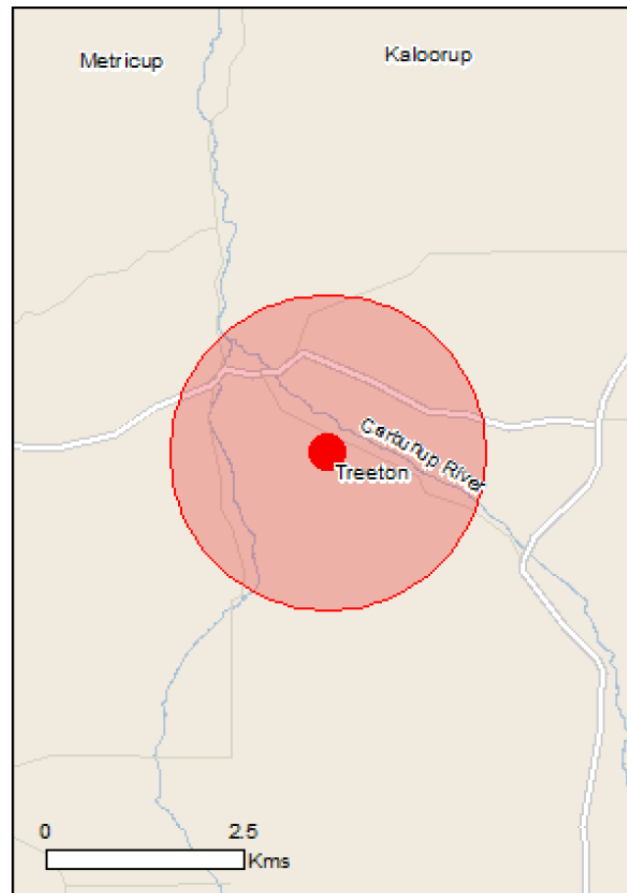
Application for approval under the *Rights in Water and Irrigation Act 1914* is currently under assessment with the Department of Water and Environmental Regulation (Application numbers: 20258, 20259 and 20260).

8. Summary

The proposed clearing is critical to the viability of the proposed developments on the property and I trust the information provided will assist in the assessment of the proposed clearing. The proposed dam works are scheduled to take place between January and April 2019, however, if contractor availability is limited it may be required to be completed during the 2020 summer season.

Appendix A

EPBC Act Protected Matters Report – list of potential species



This map may contain data which are
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Species	Predominant Habitat	Presence
<i>Botaurus poiciloptilus</i> (Australasian Bittern)	Coastal and subcoastal areas	Unlikely due to lack of suitable habitat
<i>Calidris ferruginea</i> (Curlew Sandpiper)	Sheltered intertidal mudflats and also at the muddy margins of terrestrial wetlands.	Unlikely due to lack of permanent water
<i>Calyptorhynchus banksii</i> (Forest Red-tailed Black-Cockatoo)	Eucalyptus woodland, Jarrah & Marri Forest	Observed flying through the area, nests evident in Area B & C and adjoining State Forest
<i>Calyptorhynchus baudinii</i> (Baudins Cockatoo)	Eucalyptus woodland, Jarrah & Marri Forest	Observed flying through the area, nests evident in Area B & C and adjoining State Forest
<i>Calyptorhynchus latirostris</i> (Carnabys Cockatoo)	Eucalyptus woodland with Wandoo and Salmon Gum and also frequent Jarrah & Marri Forest	Observed flying through the area, nests evident in Area B & C and adjoining State Forest
<i>Numenius madagascariensis</i> (Eastern Curlew)	Intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons.	Unlikely due to lack of permanent water
<i>Engaewa reducta</i> (Dunsborough Burrowing Crayfish)	Seasonal wetlands where the water table remains within 2m of the surface, sandy soils and dense vegetation of Myrtaceous shrubs	No evidence of burrows or soil chimneys.
<i>Nannatherina balstoni</i> (Balston's Pygmy Perch)	Coastal streams, lakes, ponds and swamps, where the water is dark and acidic	Unlikely due to lack of connecting riparian vegetation, No sightings of this species during surveys of the subject site
<i>Dasyurus geoffroii</i> (Chuditch)	Woodlands, dry sclerophyll forests, riparian vegetation, beaches and deserts	Not sighted in surveys, no evidence of skats. Riparian vegetation likely too isolated to support Chuditch
<i>Pseudocheirus occidentalis</i> (Western Ringtail Possum)	Peppermint (<i>Agonis flexuosa</i>) woodland and eucalypt forests	Not sighted in surveys, no evidence of skats. Riparian vegetation likely too isolated to support Ringtail possums

Westralunio carteri (Carters Freshwater Mussel)	Freshwater mussels can be found in freshwater streams, rivers, billabongs, ponds, wetlands and lakes inland from the coast. They are most common in areas with muddy, silty and sandy bottoms and flowing permanent water.	Not sighted in surveys, the lack of permanent water is likely to prevent their presence at the site.
Banksia nivea subsp. Uliginosa (Swamp Honeypot)	Clay over laterite in thick scrub, in winter wet southern and Scott ironstones	Not sighted in surveys, most likely to occur in nearby swamps in the surrounding State Forest
Banksia squarrosa subsp. Argillacea (Whicher Range Dryandra)	Winter-wet clays in open to tall shrubland. Some populations occur on lateritic gravel pits and not ironstone	Not sighted in surveys, could potentially occur in the surrounding State Forest
Caladenia hoffmanii (Hoffman's Spider-orchid)	Occurs between Geraldton and the Murchison River, and an isolated population in the Pingaring area. Has a habitat preference for clay, sandy clay or clay loam with laterite on rocky hillsides and ridges, or in winter-wet flats	Not sighted in surveys.
Drakaea micrantha (Dwarf Hammer-orchid)	Usually found in cleared fire breaks or open sandy patches that have been disturbed, and where competition from other plants has been removed	Not sighted in surveys, lack of sandy soils makes the subject site unsuitable.
Gastrolobium papilio (Butterfly-leaved Gastrolobium)	Confined to a single location on the edge of the Whicher Range south-west of Busselton. It inhabits very shallow red sandy-clay soil over ironstone in winter wet flats	Not sighted in surveys.
Lambertia echinata subsp. Occidentalis (Western Prickly Honeysuckle)	Occurs in winter-wet shrubland over shallow sands over ironstone at the base of the Whicher Range. It occurs entirely within the Shrublands on southern Swan Coastal Plain Ironstones ecological community	Not sighted in surveys
Sphenotoma drummondii (Mountain Paper-heath)	Stony or shallow soils over granite or quartzite. Steep rocky slopes, crevices of rocks	Not sighted in surveys. Unlikely to occur due to lack of suitable habitat.

Apus pacificus (Fork-tailed Swift)	Migratory	Not sighted in surveys
Motacilla cinereal (Grey Wagtail)	Migratory	Not sighted in surveys
Actitis hypoleucos (Common Sandpiper)	Migratory, found in coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores.	Not sighted in surveys
Calidris acuminata (Sharp-tailed Sandpiper)	Migratory	Not sighted in surveys
Calidris ferruginea (Curlew Sandpiper)	Migratory Shorebird. Sheltered intertidal mudflats and also at the muddy margins of terrestrial wetlands	Not sighted in surveys
Calidris melanotos (Pectoral Sandpiper)	Mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores	Not sighted in surveys
Numenius madagascariensis (Eastern Curlew)	Intertidal mudflats and sandflats, often with beds of seagrass, on sheltered coasts, especially estuaries, mangrove swamps, bays, harbours and lagoons	Not sighted in surveys
Pandion haliaetus (Osprey)	Coast and in terrestrial wetlands of tropical and temperate Australia and off-shore islands, occasionally ranging inland along rivers, though mainly in the north of the country	Not sighted in surveys
Tringa nebularia (Common Greenshank)	Coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	Not sighted in surveys
Actitis hypoleucos (Common Sandpiper)	Coastal or inland wetlands, both saline or fresh. It is found mainly on muddy edges or rocky shores	Not sighted in surveys
Ardea alba (Great Egret)	Shallow water, particularly when flowing, but may be seen on any watered area, including damp grasslands	Not sighted in surveys

Ardea ibis (Cattle Egret)	Grasslands, woodlands and wetlands, and is not common in arid areas	Not sighted in surveys
Haliaeetus leucogaster (White-bellied Sea-Eagle)	Coastal and near coastal areas of Australia	Not sighted in surveys
Merops ornatus (Rainbow Bee-eater)	Open forests, woodlands and shrublands, and cleared areas, usually near water.	Not sighted in surveys

Appendix B

Images of vegetation within subject site



Image 1. View of the vegetation looking down stream.



Image 2. Typical vegetation within the creek line.



Image 3. Degraded understory.



Image 4. Hollow in Jarrah tree (Waypoint 243).



Image 5. Jarrah tree (Waypoint 243).



Image 6. Side view of Jarrah tree (Waypoint 243).



Image 7. Deceased Marri (Waypoint 262).



Image 8. Waypoint 259 & 260.



Image 9. Side view of area proposed to be cleared (Waypoint 263 in foreground, Waypoint 243 centre image and Waypoint 262 right hand side).



Image 10. Typical size of Marri trees within creek line (chest height diameter 200mm Waypoint 249).



Image 11. Culvert looking upstream towards Lot 4 Oldfield Rd.



Image 12. Looking downstream from the road culvert towards the main channel of the Carbunup River.

Appendix C

Crop Irrigation Calculator

View calculation

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Blueberries

Calculation date	Crop name	Crop location	Soil type	Irrigation efficiency	Irrigation proportion / Effective area of shade	Area
5 Apr 2018	Blueberries	Cowaramup	Clay/Loam	0.7	1.05	1 Ha

	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Vol (Megalitres)	4.49	1.01	0.89	0.5	0.21	0	0	0	0	0	0.37	0.61	0.89
Vol (Megalitres/Ha)	4.49	1.01	0.89	0.5	0.21	0	0	0	0	0	0.37	0.61	0.89

Print

Close

View calculation

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Citrus

Calculation date	Crop name	Crop location	Soil type	Irrigation efficiency	Irrigation proportion / Effective area of shade	Area
5 Apr 2018	Citrus	Cowaramup	Clay/Loam	0.7	1.05	1 Ha

	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Vol (Megalitres)	4.78	1.01	0.89	0.7	0.3	0	0	0	0	0	0.37	0.61	0.89
Vol (Megalitres/Ha)	4.78	1.01	0.89	0.7	0.3	0	0	0	0	0	0.37	0.61	0.89

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