



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS

Area Permit Number: 5668/1
File Number: 2011/006819-1
Duration of Permit: From 6 April 2014 to 6 April 2016

PERMIT HOLDER

Shire of Carnamah

LAND ON WHICH CLEARING IS TO BE DONE

Bunjil-Carnamah Road reserve (PIN 11428847, PIN 11701375 and PIN 11701209), Carnamah
Old Telegraph Road reserve (PIN 11701374), Carnamah

AUTHORISED ACTIVITY

The Permit Holder shall not clear more than 3.6 hectares of native vegetation within the combined areas shaded yellow on attached Plan 5668/1a and Plan 5668/1b and Plan 5668/1c and Plan 5668/1d and Plan 5668/1e.

CONDITIONS

1. Vegetation Management

The Permit Holder shall construct *mountable kerbing* with a maximum 0.5 metre wide road shoulder between Map Grid of Australia (Geocentric Datum of Australia 1994) zone 50 co-ordinates 397584E 6715966N to 397818E 6715973N (both sides of *carriageway*), 398609E 6716034N to 39874E 6716048N (both sides of *carriageway*), 398849E 6716060N to 399230E 6716101N (south side of *carriageway*) and 398863E 6716072N to 399230E 6716101N (north side of *carriageway*).

2. Weed control

When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds*:

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (b) ensure that no *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

3. Records to be kept

The Permit Holder must maintain the following records for activities done pursuant to this Permit:

- (a) In relation to the clearing of native vegetation authorised under this Permit:
 - (i) the species composition, structure and density of the cleared area;
 - (ii) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
 - (iii) the date that the area was cleared; and
 - (iv) the size of the area cleared (in hectares).
- (b) In relation to the vegetation management of areas pursuant to condition 1 of this permit, a description of the vegetation management activities undertaken, including the type of *kerb* installed, the width of the *carriageway*, the width of road shoulder and positions of drainage infrastructure installed.

4. Reporting

- (a) The Permit Holder must provide to the CEO on or before 31 January of each year, a written report:
- (i) of records required under condition 3 of this Permit; and
 - (ii) concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the preceding calendar year.
- (b) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar year, a written report confirming that no clearing under this permit has been carried out, must be provided to the CEO on or before 31 January of each year.
- (c) Prior to 6 January 2016, the Permit Holder must provide to the CEO a written report of records required under condition 3 of this Permit where these records have not already been provided under condition 4(a) of this Permit.

DEFINITIONS

The following meanings are given to terms used in this Permit:

carriageway means that portion of a road or bridge devoted to the use of vehicles, inclusive of shoulders and auxiliary lanes;

fill means material used to increase the ground level, or fill a hollow;

mountable kerbing as described in Main Roads Western Australia "Design of Kerbing" Document No: D11#319262 or its revised version;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

kerb means a line of stone or concrete forming an edge between a pavement and a roadway, so that the pavement is some 15 cm above the level of the road; and

weed/s means any plant -

- (a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
- (b) published in a Department of Parks and Wildlife Regional Weed Summary, regardless of ranking; or
- (c) not indigenous to the area concerned.

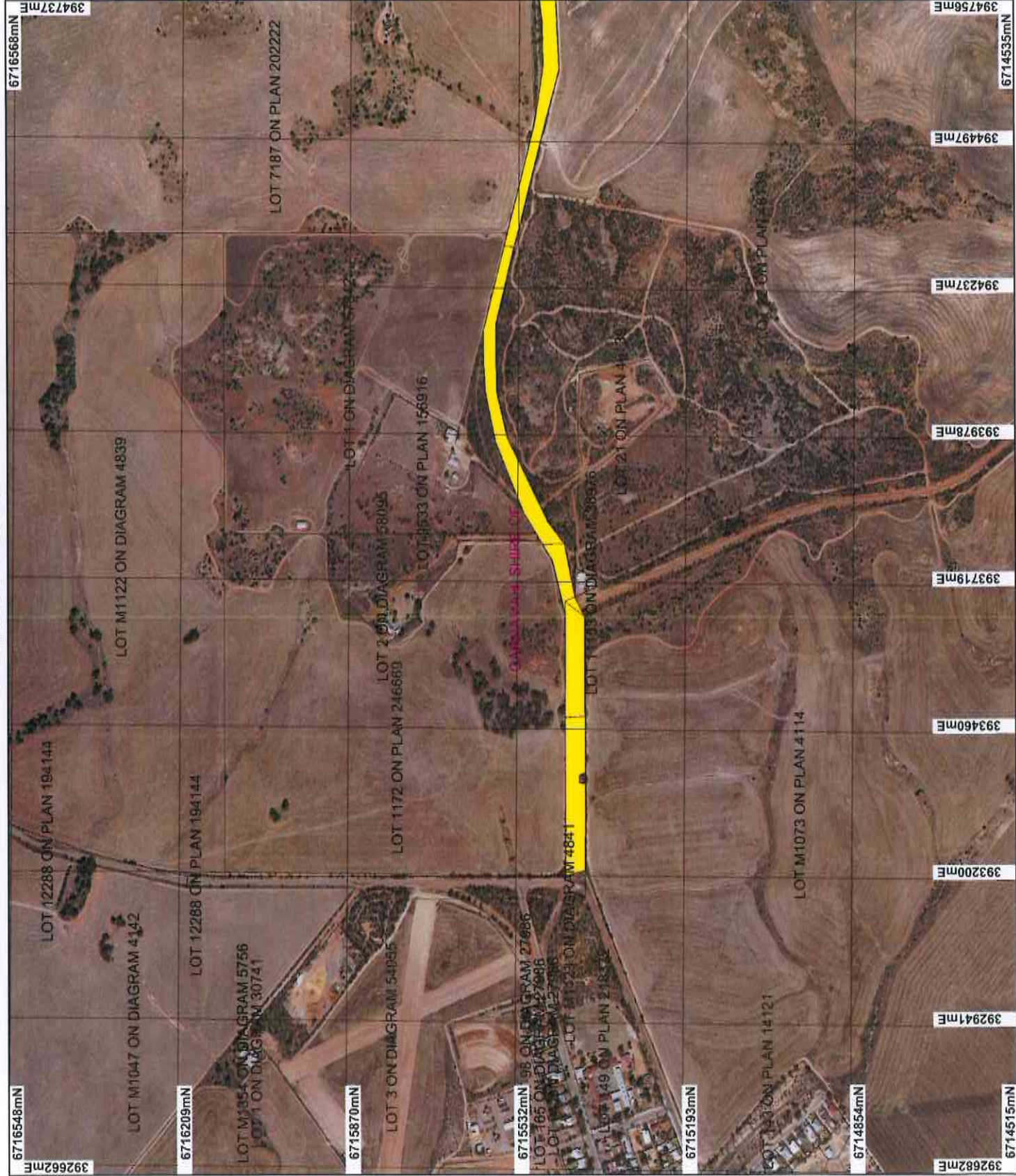


Jane Clarkson
A/MANAGER
NATIVE VEGETATION CONSERVATION BRANCH

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

7 March 2014

Plan 5668/1a



LEGEND

Legend for Environmental Authorities_1

Areas Approved to Clear

■ Carnamah 50cm Orthomosaic - Landgate 2006

■ Cadastre for labelling



0 500 m

Scale 1:3887

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

J. Clarkson Date 7/3/14

J. Clarkson

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

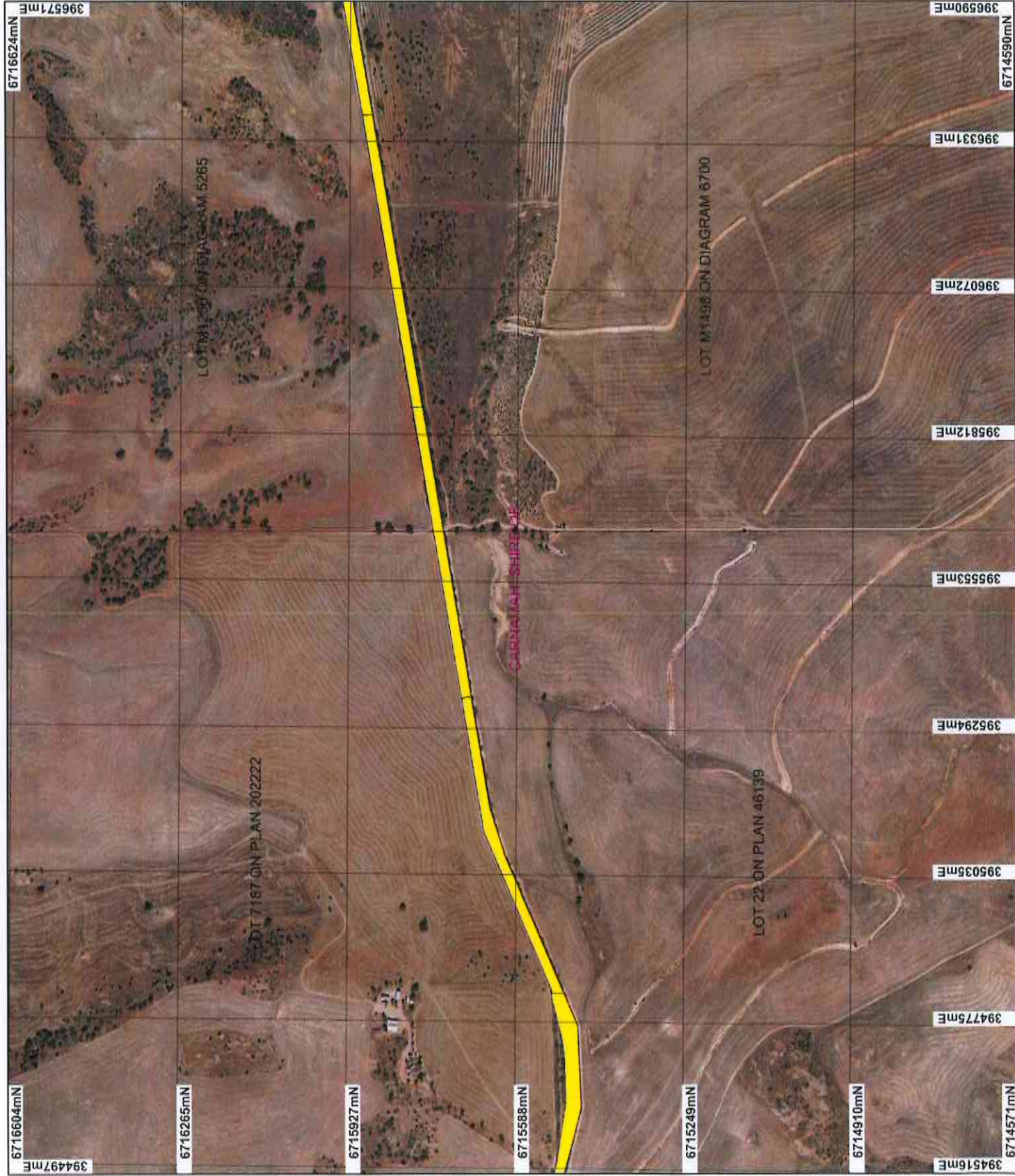
Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



Government of Western Australia
Department of Environment Regulation

WA Crown Copyright 2002

Plan 5668/1b



LEGEND

- Health Department Authorities, 1
- Areas Approved to Clear
- Carnamah 50cm Orthomosaic - Landgate 2006
- Cadastral for labelling



Scale 1:3897
(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Date 7/3/14

J Clarkson

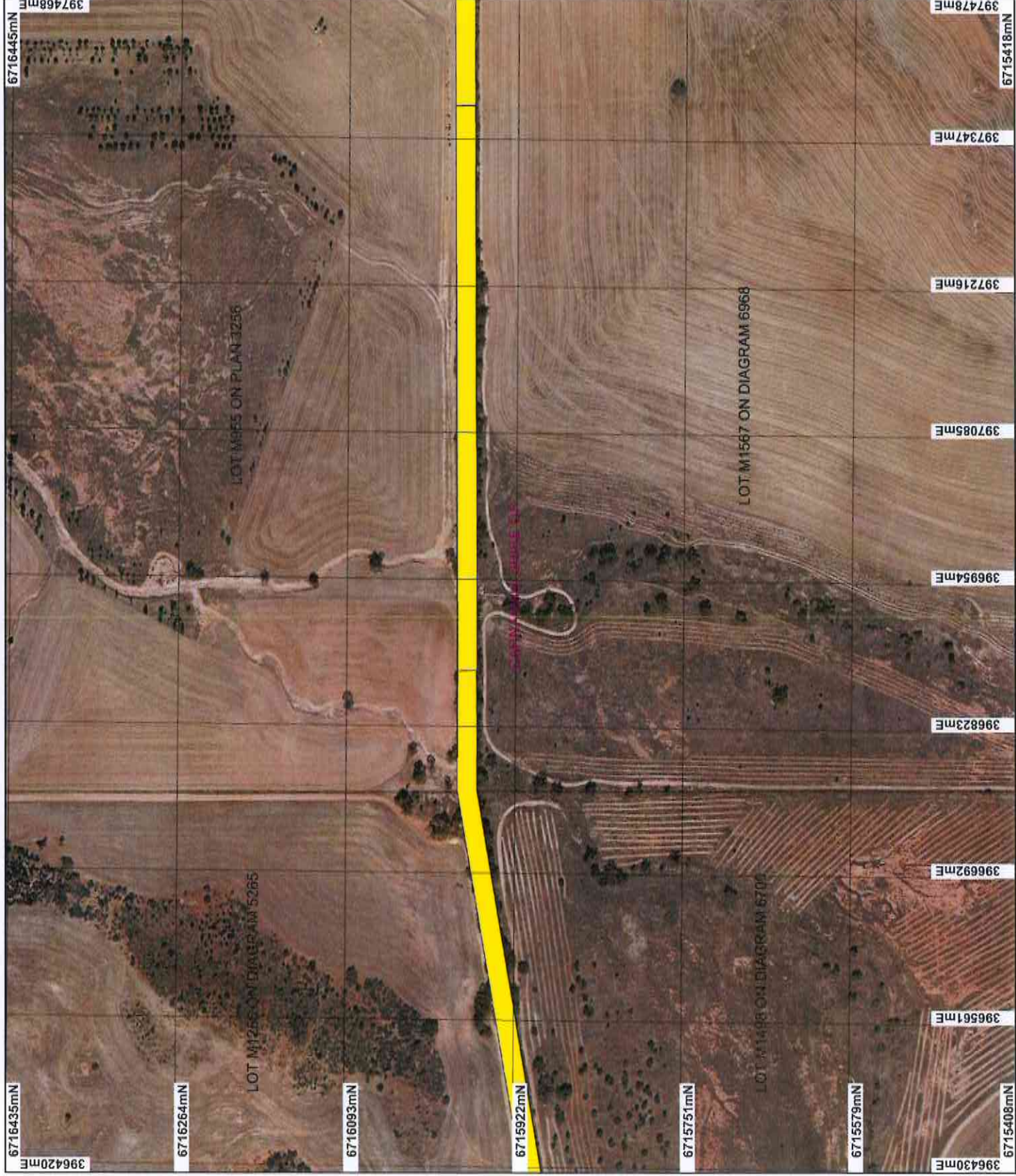
Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



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Plan 5668/1c



LEGEND

- British Geographical Authorities_1
- Areas Approved to Clear
- Camamah 50cm Orthomosaic - Landgate 2006
- Cadastral for labelling



0 150 m

Scale 1:5000

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: this data in this map have not been projected. This may result in geometric distortions or measurement inaccuracies.

J. Clarkson Date 7/3/14

J. Clarkson

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

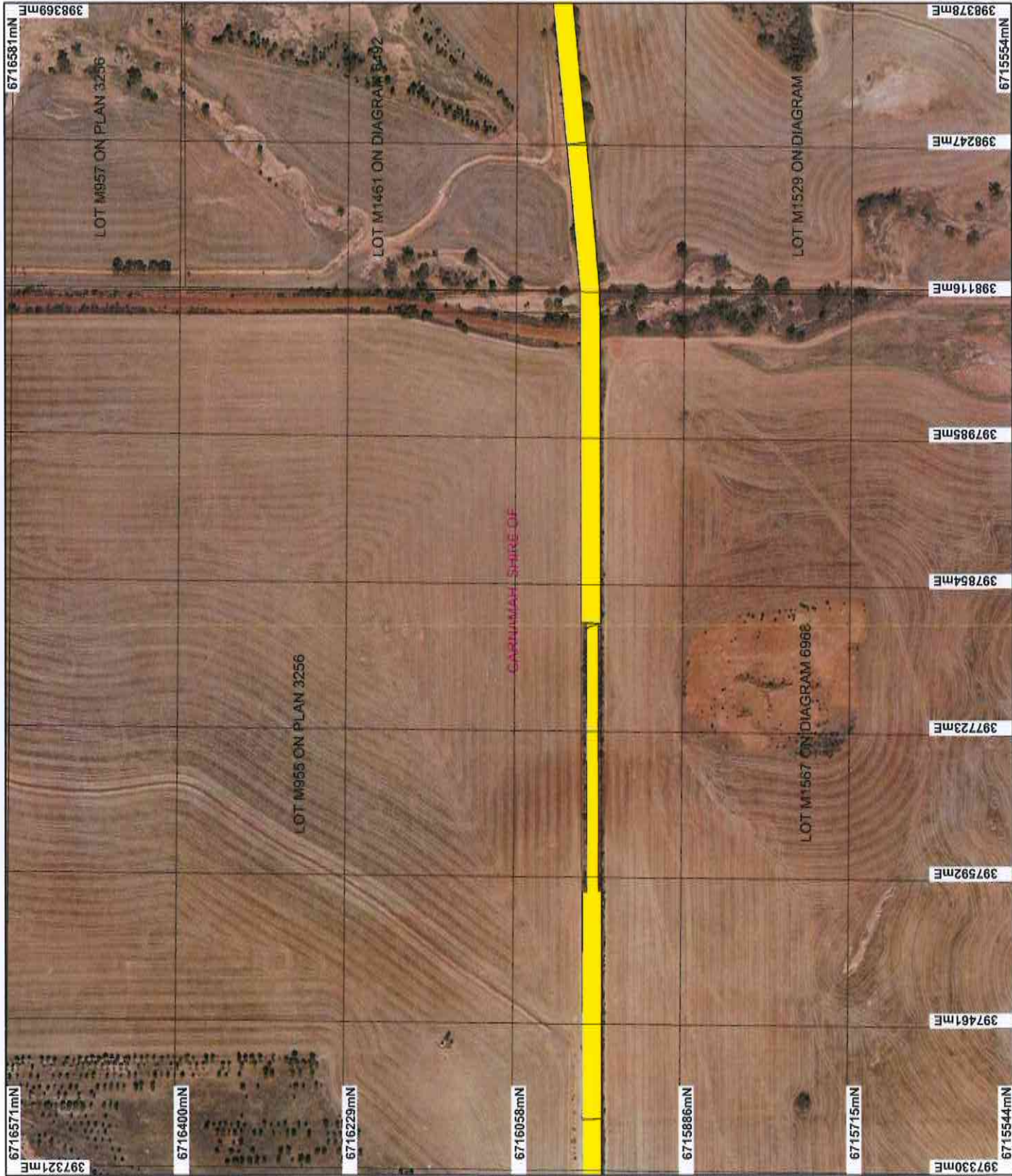
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Department of Environment Regulation

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Plan 5668/1d



LEGEND

Local Government Authorities_1

- Areas Approved to Clear
- Carnumbah 50cm Orthomosaic - Landgate 2006
- Cadastral for labelling



0 50 100 m

Scale 1:5000

(Approximate when reproduced at A4)

Geocentric Datum Australia 1994

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

Allyse Date 7/3/14
Clanston

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

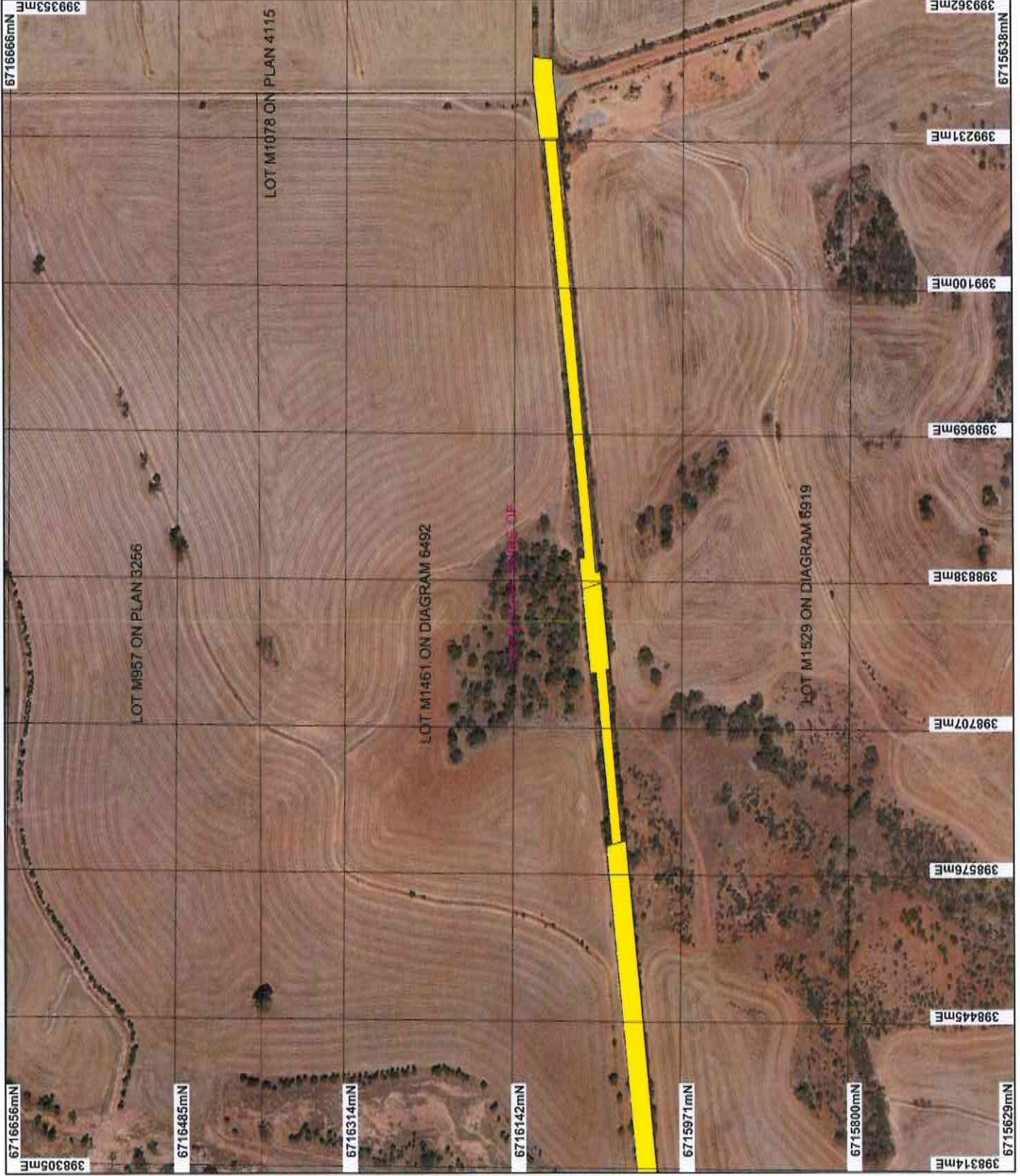
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Department of Environment Regulation

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Plan 5668/1e



LEGEND

- Health Inspection Authorities_1**
- Areas Approved to Clear
- Carnamah 50cm Orthomosaic - Landgate 2006
- Cadastral for labelling



0 150 m

Scale 1:5000

(Approximate when reproduced at A4)

Geocentric Datum Australia 1984

Note: the data in this map have not been projected. This may result in geometric distortion or measurement inaccuracies.

J. Criffison Date 7/2/14

J. Criffison

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

Information derived from this map should be confirmed with the data custodian acknowledged by the agency acronym in the legend.



Government of Western Australia
Department of Environment Regulation
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Clearing Permit Decision Report

Government of Western Australia
Department of Environment Regulation

1. Application details

1.1. Permit application details

Permit application No.: 5668/1

Permit type: Area Permit

1.2. Proponent details

Proponent's name: Shire of Carnamah

1.3. Property details

Property: ROAD RESERVE (CARNAMAH 6517)

Local Government Area: Shire of Carnamah

Colloquial name:

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
3.6		Mechanical Removal	Road construction or maintenance

1.5. Decision on application

Decision on Permit Application: Grant

Decision Date: 6 March 2014

2. Site Information

2.1. Existing environment and information

2.1.1. Description of the native vegetation under application

Vegetation Description	Clearing Description	Vegetation Condition	Comment
The vegetation under application has been mapped as:	Clearing of 3.6 hectares of native vegetation within Bunjil-Carnamah Road reserve, Carnamah, for the purpose of road widening.	Good: Structure significantly altered by multiple disturbance; retains basic structure/ability to regenerate (Keighery 1994)	The vegetation condition was ascertained through a flora survey undertaken of the application area (Borger, 2013).
Beard Vegetation Association 551 which is described as Shrublands; <i>Allocasuarina campestris</i> thicket (Shepherd et al., 2001).		To	
Beard Vegetation Association 352 which is described as Medium woodland; York gum (Shepherd et al., 2001).		Degraded: Structure severely disturbed; regeneration to good condition requires intensive management (Keighery 1994)	

3. Assessment of application against clearing principles

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments Proposal may be at variance to this Principle

The application is to clear 3.6 hectares of native vegetation along Bunjil-Carnamah Road for the purpose of road widening. The section of road under application was assessed by the Roadside Conservation Committee (2013) in 2004 and was given medium roadside conservation value scores at between 5 and 8 out of 12.

The application area is mapped as Beard Vegetation Associations 352 and 551 which retain approximately 17 percent and 19 percent of their pre-European vegetation extent within the Avon Wheatbelt IBRA Bioregion respectively (Government of Western Australia, 2013). Aerial photography (Carnamah 50cm Orthomosaic - Landgate 2006) indicates the local area (10 kilometre radius) is approximately 10 percent vegetated. Given this the application area falls within a highly cleared landscape where any remaining vegetation may contain a high degree of biodiversity.

A flora species listed as endangered under the Wildlife Conservation Act 1950 (WC Act) has been recorded within the application area. A flora survey confirmed the presence of nine specimens of the rare flora species, all in an excellent condition with fruits and flowers present (Borger, 2013). This species is known from 13 populations and approximately eight locations (DPaW, 2013a). The population within the application area is recorded to be in a better condition (Keighery, 1994) than the other identified populations, is increasing in size and is considered significant to the conservation of the species (DPaW, 2013a).

The applicant intends on only taking one individual of the species, however the entire population is likely to be impacted through the secondary impacts of the road construction such as dust, removal of stored seed bank and an alteration to the hydrology of the area.

The flora survey also recorded 369 individuals of a priority 3 flora species across two populations within the road reserve (Borger, 2013). This species is known from 14 populations and approximately 12 locations. Where population data exists, population estimates range from 15 to 100 plants, therefore the populations within the road reserve are the largest and third largest known (DPaW, 2013a). No records of this species are recorded within conservation reserves with the majority fall within road reserves. Given this the two populations within the road reserve are considered significant (DPaW, 2013a). In order to minimise the impact to these populations the applicant has committed to kerbing the road adjacent to these populations and removed them from the application area.

The application area is not likely to form significant breeding and feeding habitat for conservation significant fauna, however as the local area is highly cleared, the unbroken vegetation along Bunjil-Carnamah Road reserve may act as an ecological corridor facilitating the movement of local fauna.

As the application falls within a highly cleared landscape, contains rare flora and may provide a vegetated corridor for fauna it may be at variance to this clearing principle.

Methodology

References:

Borger (2013)
DPaW (2013a)
Keighery (1994)
Roadside Conservation Committee (2013)

GIS Databases:

- Carnamah 50cm Orthomosaic - Landgate 2006
- NWRA Current extent of Native Vegetation
- Pre-European Vegetation
- SAC Bio datasets - Accessed August 2013

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments

Proposal may be at variance to this Principle

The local area (10 kilometre radius) surrounding the application retains approximately 10 percent of its pre-European vegetation. The application area falls within Beard vegetation associations 352 and 551 which retain approximately 17 and 19 percent (Government of Western Australia, 2013) native vegetation respectively. Given this, the proposed clearing falls within a highly cleared landscape where any remaining vegetation may be significant as fauna habitat.

Eight fauna species of conservation significance have been recorded within a 20 kilometre radius of the application area (DEC, 2007-). Three of these are listed as rare or likely to become extinct under the Wildlife Conservation Act 1950, being *Egernia stokesii* subsp. *badia* (western spiny-tailed skink), *Leipoa ocellata* (malleefowl) and *Calyptorhynchus latirostris* (Carnaby's cockatoo). These species are also listed under the Environment Protection and Biodiversity Conservation Act 1999 as endangered, vulnerable and endangered respectively.

The section of road under application was assessed by the Roadside Conservation Committee in 2004. No tree hollows were observed however hollow logs were present on the ground (Roadside Conservation Committee, 2013). The road was given a medium roadside conservation value score (5 to 8 out of 12).

Given the lack of hollow bearing trees and linear nature of the proposed clearing the application area is not likely to form significant habitat for Carnaby's cockatoo or malleefowl. There are two records of the western spiny-tailed skink present within 20 kilometres of the application area from 1935 and 1964. This species is known to persist in remnant patches of vegetation greater than one hectare (DSEWPac, 2013). Given the time since this species has been recorded within the area, the linear nature of the proposed clearing and as a majority of the application area is not mapped within a vegetation association synonymous with this species (DSEWPac, 2013) the application area is not likely to form significant habitat for this species.

Given the habitat preferences of the remaining conservation significant fauna recorded from the local area, details of each record and the linear nature of clearing, the application area is not likely to form significant habitat for these species.

As the application area falls within a highly cleared landscape the unbroken vegetation within the road reserve may act a corridor for fauna moving between remnant patches of vegetation. Given this, the application may be at variance to this clearing principle.

Methodology

References:

DEC (2007-)

DSEWPaC (2013)
Government of Western Australia (2013)
Roadside Conservation Committee (2013)

GIS Databases:
- DEC tenure
- NWRA Current extent of Native Vegetation
- Pre-European vegetation
- SAC Bio datasets - Accessed August 2013

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments Proposal may be at variance to this Principle

The application area has been mapped as Beard vegetation associations 352 and 551 which are described as medium woodland, York gum and shrublands, *Allocasuarina campestris* thicket (Shepherd et al., 2001) respectively. The soil within the application area has been mapped as unit Xd2 which is described as sandy neutral yellow mottled soils containing some ironstone gravels (Northcote et al, 1960 - 1968).

A flora species listed as endangered under the Wildlife Conservation Act 1950 (WC Act) was recorded within the application area in 2012. Further records of this species exist within Bunjil-Carnamah road reserve. The Department of Parks and Wildlife define endangered as species considered to be facing a very high risk of extinction in the wild.

A flora survey of the application area confirmed the presence of nine specimens of the rare flora species, all in an excellent condition with fruits and flowers present (Borger, 2013). This species is known from 13 populations and approximately eight locations (DPaW, 2013a). The population within the road reserve is recorded to be in a better condition (Keighery, 1994) than the other identified populations, is increasing in size and is considered significant to the conservation of the species (DPaW, 2013a).

The applicant intends on taking a maximum of one individual of the species, however the entire population is likely to be impacted through the secondary impacts of the road construction such as dust, removal of stored seed bank and an alteration to the hydrology of the area.

A further three flora species listed as vulnerable, endangered and critically endangered under the WC Act respectively have been recorded within the local area (10 kilometres radius). Given the mapped soil and vegetation type together with information on each record, the application area is not likely to form habitat for these species. None of these species were recorded during the flora survey.

The applicant has committed to avoiding impacts to this species where possible, conducting weed control around the populations and working with the Department of Parks and Wildlife in conserving the population. The application may be at variance to this principle.

Methodology References:
Borger (2013)
Northcote et al (1960 - 1968)
Shepherd et al (2001)

GIS Databases:
- Pre-european vegetation
- SAC Bio datasets - Accessed 04/13
- Soils, Statewide

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments Proposal is not likely to be at variance to this Principle

The threatened ecological community (TEC) "Plant assemblages of the Inering System" has been mapped approximately two kilometres to the south east and north of the application area with further occurrences to the north of the application area.

These occurrences fall within four different soil types (Northcote et al, 2013) and five different vegetation types, including those mapped within the application area.

The Inering System comprises a group of hills stretching from Carnamah to Three Springs - with a particular series of plant assemblages relating to topographic and geological features (CALM, 2002).

A flora survey of the application area did not reveal any vegetation consistent with a TEC (Borger, 2013).

Given the above the application is not likely to be at variance to this clearing principle.

Methodology References:
 Borger (2013)
 CALM (2002)
 Northcote et al (2013)

GIS Databases:
 - SAC Bio datasets - Accessed August 2013
 - Soils, Statewide

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments Proposal is at variance to this Principle

Aerial photography (Carnamah 50cm Orthomosaic - Landgate 2006) indicates the local area (10 kilometre radius) is approximately 10 percent vegetated.

The IBRA Bioregion (Avon Wheatbelt) and the local government authority area (Shire of Carnamah) retain approximately 18 percent and 41 percent of their respective pre-European vegetation extents (Government of Western Australia, 2013).

The application area is mapped as Beard Vegetation Associations 352 and 551 which retain approximately 17 percent and 19 percent of their pre-European vegetation extent within the Avon Wheatbelt IBRA Bioregion respectively.

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 percent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001). As the mapped vegetation associations and local area are significantly below this level, the application falls within a highly cleared landscape.

As a result of Shires modification to the application area including the installation of kerbing, the impact of the proposed clearing will be minimised.

However, as the application still contains highly cleared vegetation complexes in good (Keighery, 1994) condition and falls within a highly cleared Bioregion, the proposed clearing is at variance to this clearing Principle. The remaining length of Bunjil-Carnamah road reserve, between the application area and Shire boundary is also required to be cleared as part of the road upgrade. The Shire has advised that as a result of the future upgrades to the road further clearing of native vegetation may be required and is likely to increase the residual significant impacts of the proposed clearing within the highly cleared landscape. Once the residual significant impacts for the amended project area are identified, environmental offsets may be required for the project in its entirety.

	Pre-European (ha)	Current Extent (ha)	Remaining (%)	Extent in DEC Managed Lands (%)
IBRA Bioregion*				
Avon Wheatbelt	9 517 109	1 732 027	18	10
Shire*				
Shire of Carnamah	287 235	118 548	41	42
Beard Vegetation Association in Bioregion*				
352	630 581	110 128	17	9
551	257,692	50,746	19	7

Methodology References
 Borger (2013)
 Commonwealth of Australia (2001)
 *Government of Western Australia (2013)

GIS Databases:
 - Carnamah 50cm Orthomosaic - Landgate 2006
 - NLWRA, Current extent of Native Vegetation
 - Pre-5668 European Vegetation

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments Proposal may be at variance to this Principle

Four minor non perennial watercourses intersect the application area. Given this the application may involve clearing vegetation growing in association with a watercourse and may be at variance to this clearing principle.

Methodology Impacts to riparian vegetation are however, likely to be minimal.
GIS Databases:
- Hydrography linear

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments **Proposal is not likely to be at variance to this Principle**
As the proposed clearing is relatively small in size, linear in shape, and the land will be compacted and maintained as a road, it is unlikely to result in appreciable land degradation and is not likely to be at variance to this clearing principle.

Methodology GIS Databases:
- Carnamah 50cm Orthomosaic – Landgate 2006

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments **Proposal is not likely to be at variance to this Principle**
The application area lies approximately five kilometres from the Yarra Yarra Lakes Nature Reserve. This is the only conservation area within 20 kilometres of the application area.

The Yarra-Yarra Lakes Nature Reserve is predominantly comprised of a salt lake with minimal fringing vegetation. The application area is separated from the reserve by the Carnamah town site and two kilometres of cleared agricultural land.

Given the above, the application is not likely to be at variance to this clearing principle.

Methodology GIS Databases:
- Carnamah 50cm Orthomosaic
- Landgate 2006 - DEC Tenure

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Comments **Proposal is not likely to be at variance to this Principle**
Ground water salinity levels in the local area have been mapped as saline to hyper saline (Water and River Commission, 2000) at between 14000 and greater than 35000 milligrams of total dissolved solids per litre.

The clearing is not likely to further increase the risk of salinity and is not likely to affect the quality of groundwater as approximately 86 percent of the application area has been mapped as shrublands.

Although the application area crosses minor watercourses, it is unlikely that their flow regime will be impacted as there is likely to be drainage infrastructure related to the existing gravel road already in place. The application is not likely to have further detrimental impact on the quality of surface water.

Given the above the application is not likely to be at variance to this clearing principle.

Methodology References:
Water and River Commission (2000)

GIS Data Sets
- Salinity Statewide
- Hydrography linear (Hierarchical)

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments **Proposal is not likely to be at variance to this Principle**
The applied clearing area lies within an area with an evaporation rate of approximately 2,600 millimetres and a mean annual rainfall of 400 millimetres. Given this and the position of the application area within Western Australia, it is not likely to be at variance to this clearing principle.

Methodology GIS Data Sets
- Evaporation Isopleths
- Rainfall, Mean Annual

Planning Instrument, Native Title, Previous EPA decision or other matter.

Comments

The application is for the purpose of widening of a section of Bunjil-Carnamah Road. Over the next few years the remainder of the road is intended to be maintained (DPaW, 2013b). Given this, the cumulative impacts on rare flora and priority flora within the road reserve may need to be taken into account when developing offsets.

The applicant has applied for a licence to take rare flora from the Department of Parks and Wildlife, Species and Communities Branch. This application is currently under assessment.

No public submissions have been received in response to this application and no aboriginal sites of significance are mapped within the application area.

Methodology References:
DPaW (2013b)

4. References

- Borger, J. (2013) A Targeted Threatened Flora Survey on the Bunjil Carnamah Road from the intersection with Carnamah Perenjori Road and Billeroo Road. Shire of Carnamah 28 October 2013.
- CALM (2002) Interim recovery plan no. 107, Plant assemblages of the Inering System Interim Recovery Plan 2002-2007, Sheila Hamilton-Brown May 2002.
- Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001-2005, Canberra.
- DEC (2007 -) NatureMap: Mapping Western Australia's Biodiversity. Department of Environment and Conservation. URL: <http://naturemap.dec.wa.gov.au/>. Accessed June 2013
- DPaW (2013a) DPaW, Species and Communities Branch flora advice for Clearing Permit Application CPS 5523/1, Shire of Carnamah. Department of Parks and Wildlife, Western Australia (DEC ref A667041)
- DPaW (2013b) Regional advice for Clearing Permit Application CPS 5523/1, Shire of Carnamah. Department of Parks and Wildlife, Western Australia (DEC ref A667041)
- Government of Western Australia (2013) 2012 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of October 2012. WA Department of Environment and Conservation, Perth.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68): 'Atlas of Australian Soils, Sheets 1 to 10, with explanatory data'. CSIRO and Melbourne University Press: Melbourne.
- Shepherd, D.P., Beeston, G.R., and Hopkins, A.J.M. (2001), Native Vegetation in Western Australia. Technical Report 249. Department of Agriculture Western Australia, South Perth.
- Water and Rivers Commission (2000) Water Facts 15, Salinity. June 2000. Water and Rivers Commission, Perth.
- Western Australian Herbarium (1998-) FloraBase - The Western Australian Flora. Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/> (Accessed June 2013).