



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 7563/2
Permit Holder:	Commissioner of Main Roads Western Australia
Duration of Permit:	From 26 February 2018 to 26 February 2034

The Permit Holder is authorised to clear native vegetation subject to the following conditions of this Permit.

PART I – CLEARING AUTHORISED

1. Purpose for which clearing may be done

Clearing for the purpose of road construction and upgrades including associated activities.

2. Land on which clearing is to be done

Great Northern Highway road reserve (PINs 1233233, 1258680, 11727263, 11727264, 11727265 and 11819629), Muchea;
Great Northern Highway road reserve (PINs 1338948, 1338949, 11320250, 11320253, 11513726, 11726209, 11726211, 11756006, 11756034, 11756040 and 11756041), Chittering;
Sugar Gum Drive road reserve (PIN 11086676), Chittering;
Blue Gum Way road reserve (PIN 11086892), Chittering;
Blue Plains Road road reserve (PIN 11513729), Chittering;
Maddern South Road road reserve (PINs 11429047 and 11726213), Chittering;
Reserve Road road reserve (PINs 11726219 and 11201126), Muchea;
Wandena Road road reserve (PIN 11726212), Muchea;
Old Gingin Road road reserve (PIN 11727261), Muchea;
Un-named road reserves (PINs 1338950 and 1338953) Chittering;
Lot M1264 on Diagram 5369, Muchea;
Lot M1909 on Diagram 11298, Chittering;
Lot 607 on Deposited Plan 409232, Muchea;
Lot 320 on Deposited Plan 409232, Muchea;
Lot M1957 on Diagram 13411, Chittering;
Lot 612 on Deposited Plan 409237, Chittering;
Lot 325 on Deposited Plan 409237, Chittering;
Lot 1 on Diagram 25838, Muchea;
Lot 321 on Deposited Plan 409233, Muchea;
Lot 7 on Diagram 42945, Muchea;
Lot 6 on Diagram 53408, Chittering;
Lot 8 on Diagram 54332, Muchea;
Lot 9 on Diagram 57633, Muchea;
Lot 22 on Diagram 76077, Muchea;
Lot 604 on Deposited Plan 409229, Muchea;
Lot 317 on Deposited Plan 409229, Muchea;
Lot 302 on Diagram 96028, Muchea;
Lot 80 on Diagram 96040, Muchea;
Lot 81 on Diagram 96040, Muchea;

Lot 611 on Deposited Plan 409236, Lower Chittering;
Lot 324 on Deposited Plan 409236, Lower Chittering;
Lot 13 on Plan 13680, Lower Chittering;
Lot 83 on Deposited Plan 28306, Chittering;
Lot 201 on Deposited Plan 34420, Chittering;
Lot 202 on Deposited Plan 34420, Chittering;
Lot 203 on Deposited Plan 34420, Chittering;
Lot 204 on Deposited Plan 34420, Chittering;
Lot 105 on Deposited Plan 42252, Chittering;
Lot 850 on Deposited Plan 42736, Chittering;
Lot 851 on Deposited Plan 42736, Chittering;
Lot 77 on Deposited Plan 43751, Chittering;
Lot 9500 on Deposited Plan 50560, Chittering;
Lot 18 on Deposited Plan 59611, Chittering;
Lot 16 on Deposited Plan 59609, Chittering;
Lot 17 on Deposited Plan 59610, Chittering;
Lot 609 on Deposited Plan 409234, Muchea;
Lot 322 on Deposited Plan 409234, Muchea;
Lot 610 on Deposited Plan 409235, Muchea;
Lot 323 on Deposited Plan 409235, Muchea;
Lot 601 on Deposited Plan 409226, Muchea;
Lot 314 on Deposited Plan 409226, Muchea;
Lot 11141 on Deposited Plan 188697 (Crown Reserve 209), Muchea;
Lot 14764 on Deposited Plan 34420 (Crown Reserve 48484), Chittering;
Lot 14767 on Deposited Plan 34420, Chittering; and
Lot 500 on Deposited Plan 63597 (Crown Reserve 40350), Muchea.

3. Area of clearing

The Permit Holder must not clear more than 53 hectares of native vegetation within the combined areas cross-hatched yellow on attached Plan 7563/2a, Plan 7563/2b and Plan 7563/2c.

4. Period within which clearing is authorised

The Permit Holder shall not clear any native vegetation after 26 February 2023.

5. Application

This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.

6. Type of clearing authorised

This Permit authorises the Permit Holder to clear native vegetation for the activities described in condition 1 of this Permit to the extent that the Permit Holder has the power to carry out works involving clearing for those activities under the *Main Roads Act 1930* or any other written law.

PART II – MANAGEMENT CONDITIONS

7. Avoid, minimise and reduce the impacts and extent of clearing

In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:

- (a) avoid the clearing of native vegetation;
- (b) minimise the amount of native vegetation to be cleared; and
- (c) reduce the impact of clearing on any environmental value.

8. Dieback and weed management

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

- (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the combined areas cross-hatched yellow on attached Plan 7563/2a, Plan 7563/2b and Plan 7563/2c;
- (b) clean earth-moving machinery of soil and vegetation prior to entering the area cross-hatched red on attached Plan 7563/2d;
- (c) ensure that no *dieback* or *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- (d) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

9. Fauna management – black cockatoo nesting trees

- (a) Prior to undertaking any clearing of *black cockatoo nesting trees* outside the period 1 March to 31 May, the Permit Holder shall engage a *fauna specialist* to conduct a *fauna survey* of those trees to identify any that are being utilised by *Calyptorhynchus latirostris* (Carnaby's cockatoo) or *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo).
- (b) Where a *black cockatoo nesting tree(s)* being utilised by Carnaby's cockatoo or forest red-tailed black cockatoo is identified, the Permit Holder shall monitor the *black cockatoo nesting tree(s)* to determine when the chick(s) has fledged; and
- (c) The Permit Holder shall not clear a *black cockatoo nesting tree* identified as being utilised by Carnaby's cockatoo or forest red-tailed black cockatoo until the chick(s) has fledged.

10. Fauna management – artificial black cockatoo nest hollows

- (a) By 31 May following the commencement of clearing, the Permit Holder shall install at least 13 artificial black cockatoo nest hollows.
- (b) The design and placement of the artificial black cockatoo nest hollows must be determined based on the guidelines provided in Schedule 1 and where possible should:
 - (i) be located close to *black cockatoo nesting trees* authorised to be cleared under this Permit; and
 - (ii) on land owned by the Permit Holder.
- (c) The Permit Holder must monitor and maintain the installed artificial black cockatoo nest hollows for a period of at least ten years.
- (d) Monitoring and maintenance must be undertaken in accordance with the guidelines provided in Schedule 2.

11. Revegetation

- (a) By 26 February 2024, the Permit Holder must establish at least 52 *Eucalyptus wandoo* within the combined areas cross-hatched yellow on attached Plan 7563/2a, Plan 7563/2b and Plan 7563/2c.
- (b) The Permit Holder must monitor the survival of the *Eucalyptus wandoo* established at least once every two years.
- (c) Within 12 months of monitoring identifying that less than 52 *Eucalyptus wandoo* remain, the Permit Holder must establish additional *Eucalyptus wandoo* to ensure at least 52 *Eucalyptus wandoo* remain.

12. Offset

The Permit Holder must fund the purchase of the area cross-hatched red on attached Plan 7563/2e for inclusion in the conservation estate managed by the Department of Biodiversity, Conservation and Attractions.

PART III – RECORD KEEPING AND REPORTING

13. Record keeping

The Permit Holder must maintain the following records:

- (a) In relation to clearing:
 - (i) the location where 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;
 - (ii) the date(s) that clearing occurred;
 - (iii) the date that each *black cockatoo nesting tree* was cleared;
 - (iv) the size of the area cleared (in hectares); and
 - (v) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 7 of this Permit.

- (b) In relation to condition 9:
 - (i) the location of the *black cockatoo nesting tree(s)* identified as being utilised by Carnaby's cockatoo or forest red-tailed black cockatoo 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;
 - (ii) the evidence by which it was determined the *black cockatoo nesting tree(s)* was being utilised including the date of that determination; and
 - (iii) the evidence by which it was determined the chick(s) had fledged including the date of that determination.

- (c) In relation to condition 10:
 - (i) the date that each artificial black cockatoo nest hollow was installed;
 - (ii) the location where each artificial black cockatoo nest hollow was installed recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
 - (iii) a photo of each installed artificial black cockatoo nest hollow;
 - (iv) a description of how the design and placement of each artificial black cockatoo nest hollow was determined based on the requirements of condition 10(b);
 - (v) the dates when each artificial black cockatoo nest hollow was monitored;
 - (vi) the methodology and results of the artificial black cockatoo nest hollow monitoring;
 - (vii) the dates when each artificial black cockatoo nest hollow was maintained; and
 - (viii) a description of the maintenance activities undertaken for each artificial black cockatoo nest hollow.

- (d) In relation to condition 11:
 - (i) the date that at least 52 *Eucalyptus wandoo* were first established;
 - (ii) the location where at least 52 *Eucalyptus wandoo* were first established recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
 - (iii) the dates when the survival of the *Eucalyptus wandoo* were monitored;
 - (iv) the number of surviving *Eucalyptus wandoo* recorded during each monitoring event;
 - (v) the dates when any additional *Eucalyptus wandoo* were established to meet condition 11(c); and
 - (vi) the location where any additional *Eucalyptus wandoo* were established to meet condition 11(c) recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees.

14. Reporting

- (a) The Permit Holder must provide to the *CEO* on or before 30 June of each year, a written report:
 - (i) of records required under condition 13 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 has been undertaken, a written report confirming that no clearing under this permit has been undertaken, must be provided to the *CEO* on or before 30 June of each year.
- (c) Prior to 26 November 2033, the Permit Holder must provide to the *CEO* a written report of records required under condition 13 of this Permit where these records have not already been provided under condition 14(a) of this Permit.

Definitions

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

black cockatoo nesting tree/s: means trees that have a diameter, measured at 1.5 metres from the base of the tree, of 50 centimetres or greater (or 30 centimetres or greater for *Euclayptus salmonophloia* or *Eucalyptus wandoo*) that contain hollows suitable for nesting by Carnaby's cockatoo or forest red-tailed black cockatoo;

CEO: means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*;

dieback means the effect of *Phytophthora* species on native vegetation;

fauna specialist: means a person who holds a tertiary qualification specializing in environmental science or equivalent, and has a minimum of 2 years work experience in fauna identification and surveys of fauna native to the region being inspected or surveyed, or who is approved by the *CEO* as a suitable fauna specialist for the bioregion, and who holds a valid fauna licence issued under the *Wildlife Conservation Act 1950*;

fauna survey: means a field-based investigation of the biodiversity of fauna;

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

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; 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 Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or
- (c) not indigenous to the area concerned.



Emma Bramwell
A/ MANAGER
CLEARING REGULATION

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

26 February 2018

Schedule 1

How to design and place artificial hollows for Carnaby's cockatoo



Artificial hollows for Carnaby's cockatoo



How to design and place artificial hollows for Carnaby's cockatoo

Artificial hollows can be used to help conserve the threatened Carnaby's cockatoo by enabling the cockatoos to breed in areas where natural hollows are limited.

A wide variety of artificial hollow designs have been used with mixed success. Evidence suggests that, while the hollow must meet some basic requirements, other factors such as proximity to existing breeding areas may be more important in determining the success of artificial hollows. Before using this information sheet to construct or install an artificial hollow, you should refer to the criteria listed in the separate information sheet; *When to use artificial hollows for Carnaby's cockatoo*.

This information sheet contains broad guidelines for the design and placement of artificial hollows for Carnaby's cockatoo.

Below are three examples of successful artificial hollows used by Carnaby's cockatoo for nesting. Artificial hollows made from a natural log with cut side entrance (left), white industrial pipe with top entrance (centre) and natural log with natural side entrance (right).



Photos by Christine Groom (left and right) and Rick Dawson (centre)

Walls

The walls of the artificial hollow need to be constructed from a material that is;

- Durable enough to withstand exposure to elements for an extended period of time (i.e. 20+ years).
- Able to simulate the thermal properties of a natural tree hollow.
- Not less than 380 mm in internal diameter.
- Preferably 1.2 m deep overall and 1m deep to top of substrate/nesting material.

Successful artificial hollows have been constructed from sections of salvaged natural hollow, black and white industrial pipe. When using non-natural materials care must be taken to ensure there are no toxic residues and that the materials are safe to ingest.

Base

The base of the artificial hollow must be;

- Able to support the adult and nestling(s).
- Durable enough to last the life of the nest.
- Free draining.
- At least 380 mm in diameter.
- Covered with 200 mm of sterile, dry, free draining material such as charcoal, hardwood woodchips or wood debris.

Do not use:

- Saw dust or fibre products that will retain moisture.

Example materials that could be used for artificial hollow bases include heavy duty stainless steel, galvanised or treated metal (e.g. Zinalume ®), thick hardwood timber slab or marine ply (not chipboard or MDF). The base material must be cut to size to fit internally with sharp or rough edges ground away or curled inwards and fixed securely to the walls.



Carnaby's cockatoo eggs in an artificial hollow.
Photo by Rick Dawson

Entrance

The entrance of the artificial hollow must;

- Have a diameter of at least 270 mm).
- Preferably be top entry which will minimise use by non-target species.

Top entry hollows are unattractive to nest competitors such as feral bees, galahs and corellas. Side entry hollows have been successful in areas where feral bees are not a problem and where galahs and corellas are deterred.

Ladder

For artificial hollows made of non-natural materials, or of processed boards, it is necessary to provide a ladder to enable the birds to climb in and out of the hollow easily.

The ladder must be;

- Securely mounted to the inside of the hollow.
- Made from an open heavy wire mesh such as WeldMesh™ with mesh size of 30 - 50 mm, or heavy chain.

Do not use:

- A material that the birds can chew.
- Galvanized because the birds may grip or chew the ladder and ingest harmful compounds.

If using mesh for the ladder, the width will depend on the curvature of the nest walls. A minimum width of about 60 - 100 mm is recommended.

Sacrificial chewing posts

For artificial hollows made of non-natural materials, or of processed boards, it is necessary to provide sacrificial chewing posts. The birds chew material to prepare a dry base on which to lay their egg(s).

The sacrificial chewing posts must:

- Be made of untreated hardwood such as jarrah, marri or wandoo
- Be thick enough to satisfy the birds' needs between maintenance visits.
- Extend beyond the top of the hollow as an aid to see whether the nest is being used.
- Be placed on the inside of the hollow.
- Be attached in such a way that they are easy to replace e.g. hook over the top of hollow or can slide in/out of a pair of U bolts fitted to the side of the hollow.



Bottom of an artificial hollow showing ladder that is fixed to the wall and a chewed sacrificial post which is 200 mm from the floor.

Photo by Rick Dawson

It is recommended that at least two posts are provided. Posts 70 x 50 mm have been used, but require replacing at least every second breeding season when the nest is active. Birds do vary in their chewing habits and therefore the frequency at which the chewing posts require replacement will also vary.

Mountings

The artificial hollows must be mounted such that:

- The fixings used will last the duration of the nest e.g. galvanized bracket or chain fixed with galvanized coach screws.
- It is secured by more than one anchor for security and stability.
- It is positioned vertically or near vertically.

Placement

Sites should be chosen within current breeding areas and where they can be monitored, but preferably not conspicuous to the general public. It is important that artificial hollows are placed where they will be accessible for future monitoring and maintenance. For more detail refer to the separate information sheet; *When to use artificial hollows for Carnaby's cockatoo*.

The height at which artificial hollows should be placed is variable. The average height of natural hollows in dominant tree species in the area is a good guide. Natural hollows used by Carnaby's cockatoos have been recorded as low as 2 m above the ground. If located on private property the hollows can be placed lower to the ground so they are accessible by ladder or a rope and pulley system can be used. Where public access is possible artificial hollows should be placed at least 7 m high (i.e. higher than most ladders) and on the side of the tree away from public view to reduce the chance of interference or poaching.

Carnaby's cockatoo show no preference for aspect of natural hollows, however, it may still be beneficial to place artificial hollows facing away from prevailing weather and where they receive the most shade and protection.

Artificial hollows to be placed in trees require:

- Accessibility of the tree for a vehicle, elevated work platform or cherry picker.
- A section of trunk 2-3 m long suitable for attaching the hollow

If necessary, artificial hollows may be placed on poles, but this may result in excessive exposure to sun during very hot weather. When erected on poles there should be"

- A hinge at the bottom of the pole that can be secured when the pole is in the upright position.
- Access for a vehicle to assist raising the pole.

Safety

Care needs to be taken when placing artificial hollows to ensure safety is considered at all times. Artificial hollows are heavy and require lifting and manoeuvring into position up to 7 m above the ground.

Maintenance and monitoring

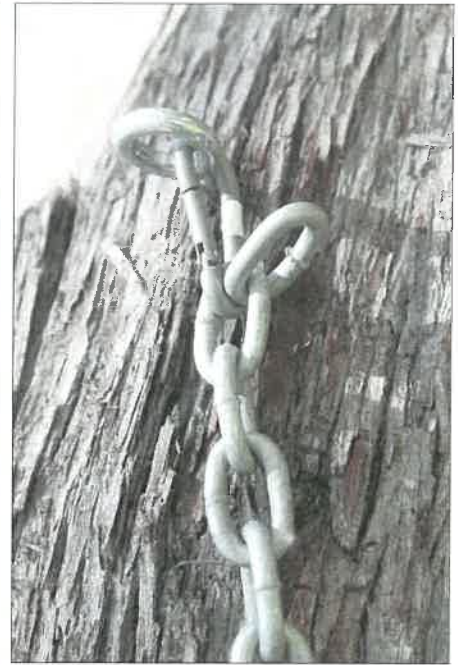
Once artificial hollows have been placed they require monitoring and maintenance to ensure they continue to be useful for nesting by Carnaby's cockatoo. It is important to monitor artificial hollows to determine use by Carnaby's cockatoo, other native species as well as pest species. By undertaking monitoring the success of the design and placement of artificial hollows can be determined and areas for improvement identified for future placement of artificial hollows.

Monitoring can also assess whether any maintenance is required. Without regular maintenance artificial hollows are unlikely to achieve their objective (that is, they will fail to provide nesting opportunities for threatened cockatoos). Therefore it is important to continue a regime of regular maintenance while the artificial hollow is required. It may be several (to many) decades until a natural replacement hollow is available.

For further advice on monitoring and maintenance of artificial hollows please refer to the separate information sheet; *How to monitor and maintain artificial hollows for Carnaby's cockatoo*.



Carnaby's cockatoo female prospecting an artificial hollow.
Photo by Rick Dawson



Example fixing for artificial hollow
Photo by Christine Groom

Acknowledgements

This information sheet is a joint initiative of Birdlife Australia, the Western Australian Museum and the Department of Parks and Wildlife. Many individuals have contributed to its preparation. Special acknowledgement is made for the contributions of Ron Johnstone from the WA Museum, Alan Elliott from the Serpentine-Jarrahdale Land care Centre and Denis Saunders. This updated version was compiled by Rick Dawson (Department of Parks and Wildlife).

Other information sheets in the series: Artificial hollows for Carnaby's cockatoo

- How to design and place artificial hollows for Carnaby's cockatoo
- How to monitor and maintain artificial hollows for Carnaby's cockatoo

Information sheets available on the *Saving Carnaby's cockatoo* webpage:

<http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/208-saving-carnaby-s-cockatoo>

Schedule 2

How to monitor and maintain artificial hollows for Carnaby's cockatoo



Artificial hollows for Carnaby's cockatoo



How to monitor and maintain artificial hollows for Carnaby's cockatoo

It is important to monitor and maintain artificial hollows after they have been erected. Monitoring ensures that the effectiveness of the artificial hollow can be determined. It also means that problems with pest species or any maintenance requirements can be identified and resolved.

Without regular maintenance, artificial hollows are likely to fail to achieve their objective (that is, they will fail to provide nesting opportunities for threatened cockatoos). Therefore it is important to continue a regime of regular maintenance while the artificial hollow is required. It may be several (to many) decades until a natural replacement hollow is available.

Monitoring should be undertaken in order to detect:

- Use by Carnaby's cockatoo
- Maintenance requirements
- Use by other native species
- Use by pest species (e.g. feral bees, galahs, corellas etc.)



Carnaby's cockatoo female prospecting an artificial hollow.
Photo by Rick Dawson

How do I monitor artificial hollows?

Before undertaking monitoring of artificial hollows for Carnaby's cockatoo it is recommended that you seek advice from BirdLife Australia, the WA Museum or the Department of Parks and Wildlife. It is also important to contact Parks and Wildlife, Wildlife Licensing Section, to determine if a scientific licence is required (wildlifelicensing@dpaw.wa.gov.au).

Monitoring artificial hollows requires keen observation and naturalist skills. It is often not possible to observe evidence of breeding directly (i.e. nestlings or eggs) and inferences must be made based on observation. There are many techniques available to monitor artificial hollows. A combination of several is likely to achieve the best results.

Looking for signs of use

Cobwebs covering the entrance to the hollow will indicate that the hollow has not been used recently. This would also apply to other light debris that may have fallen to cover the opening partially. Signs of recent use or interest in the hollow include evidence of chewing.

Observing parent behaviour around the hollow

The behaviour of parent birds around a hollow will indicate an approximate age of young in the nest.

Parent behaviour	Approximate age/stage of young
Prospecting for hollow	Unborn
Male only seen out of hollow	Egg or very young nestling (< 3 - 4 weeks)
Both parents seen entering/exiting the hollow	Nestling(s) have hatched (> 3 - 4 weeks)

Observing feeding flocks

Flocks of all male birds indicate that the females are incubating eggs. When flocks are mixed it suggests the birds have either not laid yet or that the nestlings have hatched and no longer require brooding (approximately 3 - 4 weeks old).

Tapping

When females are sitting on eggs they will usually respond to tapping at the base of their tree (or pole) by appearing at the entrance or flying from the hollow opening. This is not a guarantee of breeding activity, but an indication that it is possibly occurring in the hollow.

Observing insect activity around nest

The faecal matter produced by nestlings in a nest attracts insects, especially flies and ants. The type and number of these insects will help indicate how old any nestlings present may be. Factors such as temperature and humidity will also affect insect activity and so observations of insect activity should only be used as supporting evidence for other indications of age/use. Blowflies around a nest usually indicate that a death has occurred.

Listening for nestlings

With experience it is possible to determine if one or two nestlings are present and a broad estimate of age based on the type and loudness of noises they make.

Looking inside the nest

This can be achieved either with the aid of a telescopic pole and camera or mirror, or with the use of a ladder or other climbing equipment. This method can obtain the most detailed monitoring information for artificial hollows. However it is also the most time consuming and difficult to organise. Special equipment is likely to be needed depending on the height and positioning of artificial hollows. There are also safety issues associated with ladder or rope climbing options to reach nests to undertake observations.

How often should I monitor artificial hollows?

The minimum frequency of monitoring and the techniques used will be determined by the aims of the monitoring and the resources available. It is important to limit disturbance to breeding birds and this should be considered when determining the techniques used and frequency.

How do I maintain artificial hollows?

Artificial hollows require maintenance to ensure they continue to have the greatest chance of them being used by Carnaby's cockatoos. Periodic maintenance checks should be undertaken at least every two years, preferably annually. These checks should be undertaken prior to the breeding season which is between July and January with breeding occurring later in this period in southern areas. It is important to maintain a regime of regular maintenance as long as the artificial hollow is required. It may take several (to many) decades until a natural replacement hollow is available.

Maintenance checks should assess the following as a minimum:

- Condition of chewing posts (if present)
- Condition of attachment points
- Condition of hollow bases
- Stability of tree or pole used to mount the artificial hollow



Artificial hollow base needing repair.
Photo by Christine Groom

Repairing hollows

Any problems identified during maintenance checks should be addressed, and any repairs required done, as soon as possible. If breeding is currently occurring, maintenance may need to be delayed if it is likely to disturb the parents or nestling. Likely maintenance needs include replacement of chewing posts (frequently) or nest bases (occasionally) and repairing of any cracks (infrequently). Maintenance concerns regarding the security of attachment points or the stability of the tree or pole should be addressed as a priority for safety reasons.

For artificial hollows known to be used, spare chewing posts should be taken into the field when undertaking maintenance checks.

Monitoring of artificial hollows:

Monitoring aim	Frequency of visits	Monitoring techniques
To determine possible use by Carnaby's cockatoo	At least once during peak breeding season (i.e. between September and December)	<ul style="list-style-type: none"> • Observing behaviour of adults around hollow • Tapping to see if female will flush from hollow (best undertaken between 10am and 3pm when females most likely to be sitting) • Listening for nestlings • Looking for evidence of chewing • Looking inside nest
To confirm use by Carnaby's cockatoo	At least two visits during peak breeding season (i.e. between September and December)	<p>To observe at least two of the following:</p> <ul style="list-style-type: none"> • Breeding behaviour of adults around hollow or evidence of chewing • Female flushed from hollow • Noises from nestlings in hollow <p>Or to observe:</p> <ul style="list-style-type: none"> • Nestlings or eggs in nest
To determine nesting success by Carnaby's cockatoo	The more visits, the better. Preferably fortnightly visits between July and December. As a minimum, at least 3 visits spread throughout breeding season.	<ul style="list-style-type: none"> • Looking inside nest to observe eggs or nestlings.
To determine use by any species	As often as possible.	<ul style="list-style-type: none"> • Inspection from ground as a minimum. • Looking inside nest for detailed observations.
To determine maintenance requirements	At least every two years and preferably annually if hollow fitted with sacrificial chewing posts, can be longer if without.	<ul style="list-style-type: none"> • A basic maintenance check can be undertaken from the ground. A ladder or elevated work platform will be required for a comprehensive check and to replace sacrificial chewing posts

Acknowledgements

This information sheet is a joint initiative of Birdlife Australia, the Western Australian Museum and the Department of Parks and Wildlife. Many individuals have contributed to its preparation. The updated version was compiled by Rick Dawson (Department of Parks and Wildlife) with assistance from Denis Saunders.

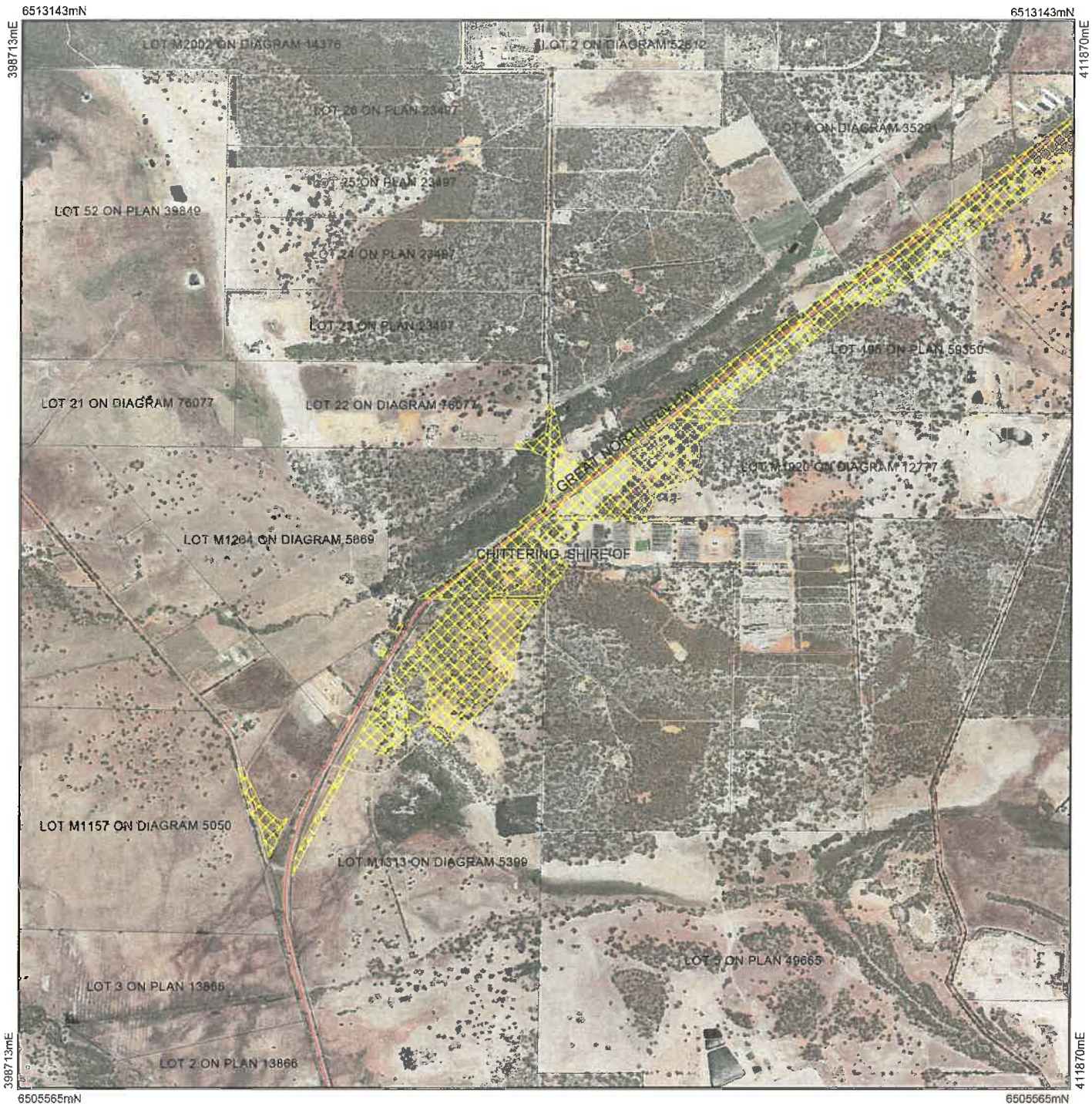
Other information sheets in the series: Artificial hollows for Carnaby's cockatoo

- *How to design and place artificial hollows for Carnaby's cockatoo*
- *How to monitor and maintain artificial hollows for Carnaby's cockatoo*




Information sheets available on the *Saving Carnaby's cockatoo* webpage:

<http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-animals/208-saving-carnaby-s-cockatoo>

Plan 7563/2a



Legend

-  Imagery
-  Clearing Instruments Activities
-  Local Government Authority



(Approximate when reproduced at A4)
 UTM Zone 50S
 World Geodetic System 1984

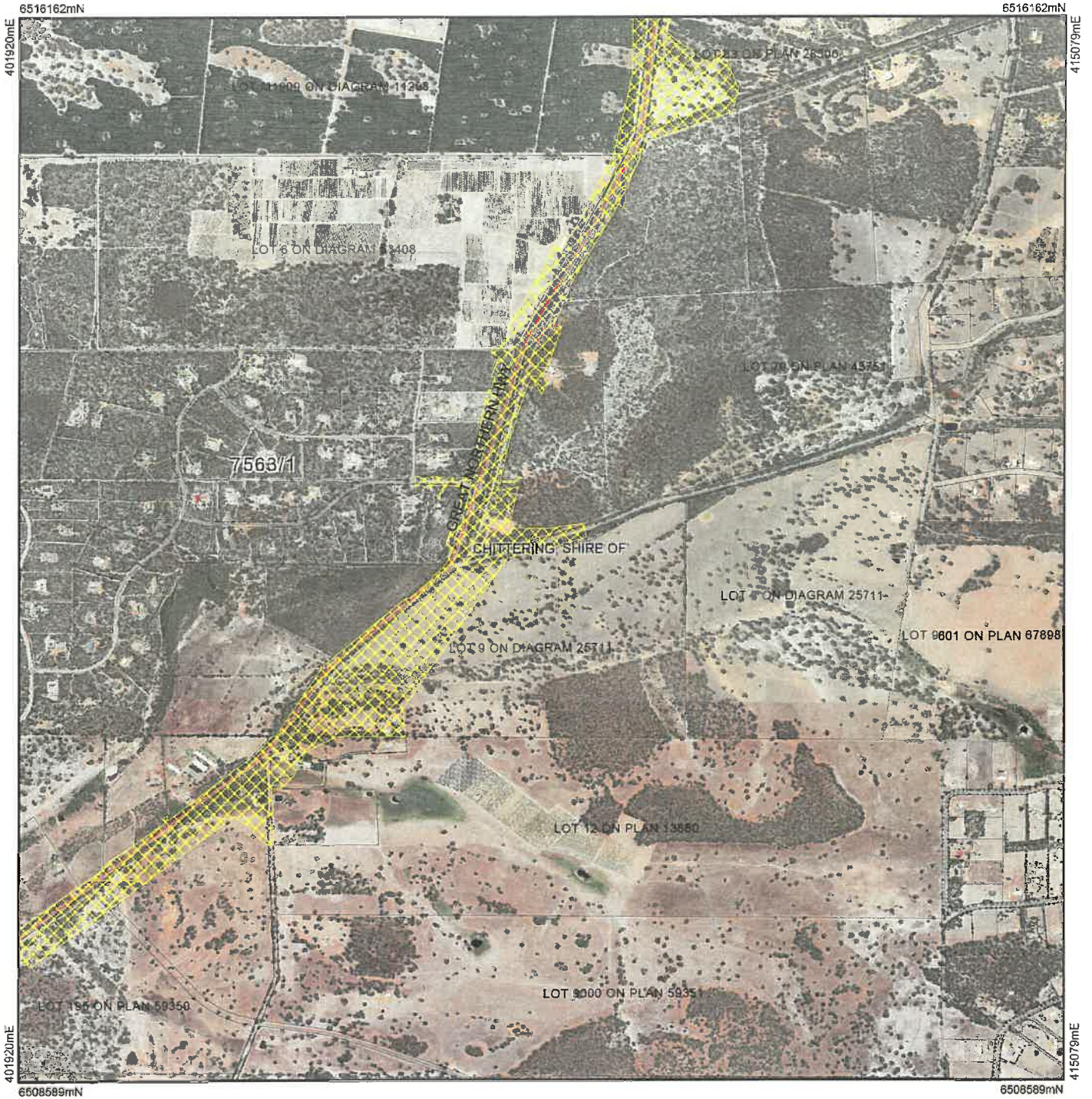
E Bramwell Date 26/02/18
E BRAMWELL

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






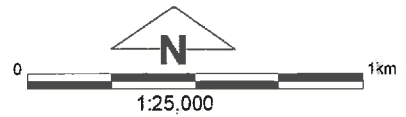
GOVERNMENT OF
 WESTERN AUSTRALIA
 WA Crown Copyright 2017

Plan 7563/2b



Legend

-  Imagery
-  Clearing Instruments Activities
-  Local Government Authority

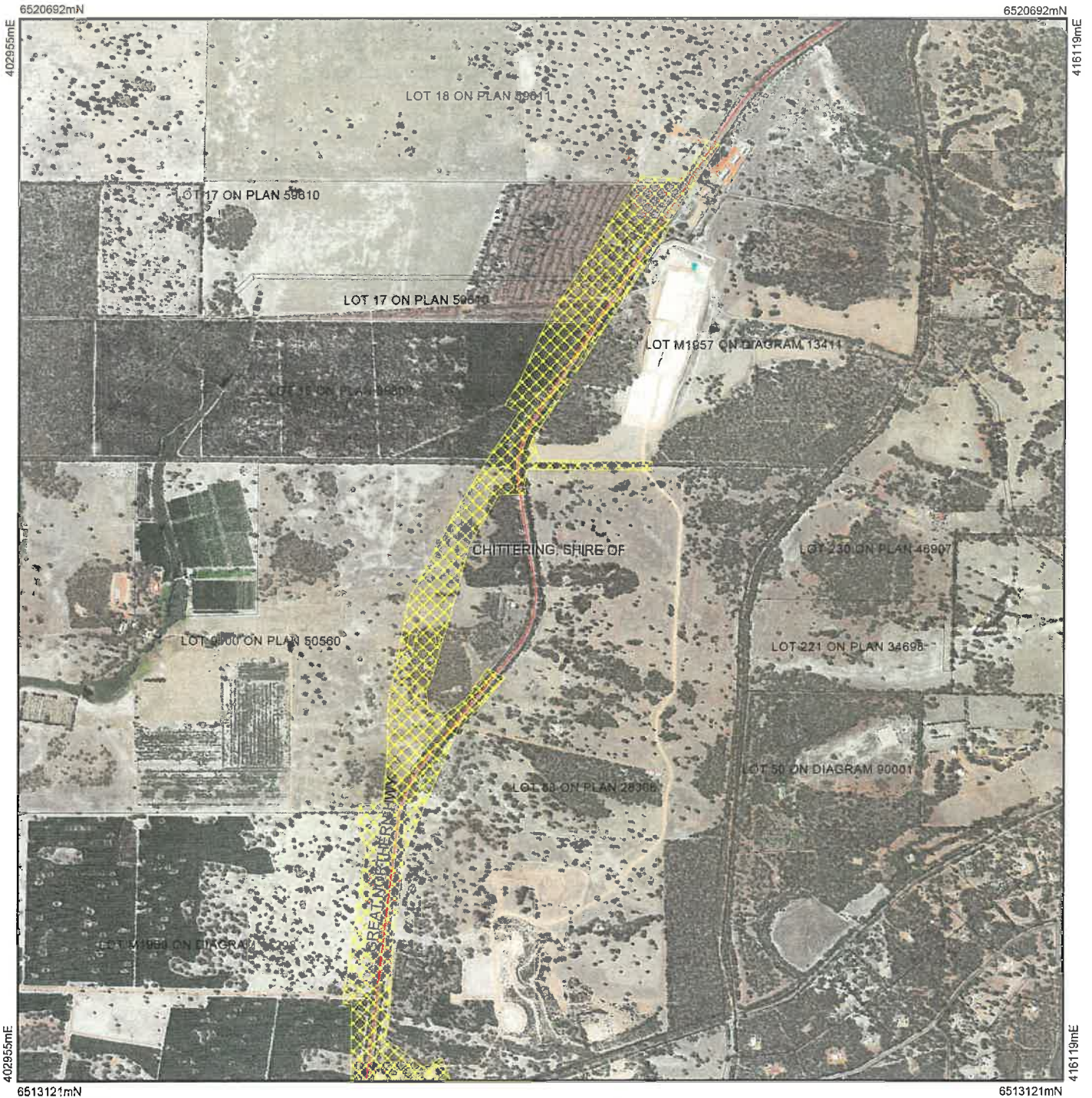


(Approximate when reproduced at A4)
UTM Zone 50S
World Geodetic System 1984




E Bramwell
E BRAMWELL Date *26/02/18*

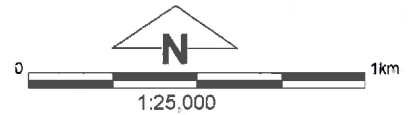
Officer with delegated authority under section 20 of the Environmental Protection Act 1986

Plan 7563/2c



Legend

-  Imagery
-  Clearing Instruments Activities
-  Local Government Authority



(Approximate when reproduced at A4)

UTM Zone 50S

World Geodetic System 1984

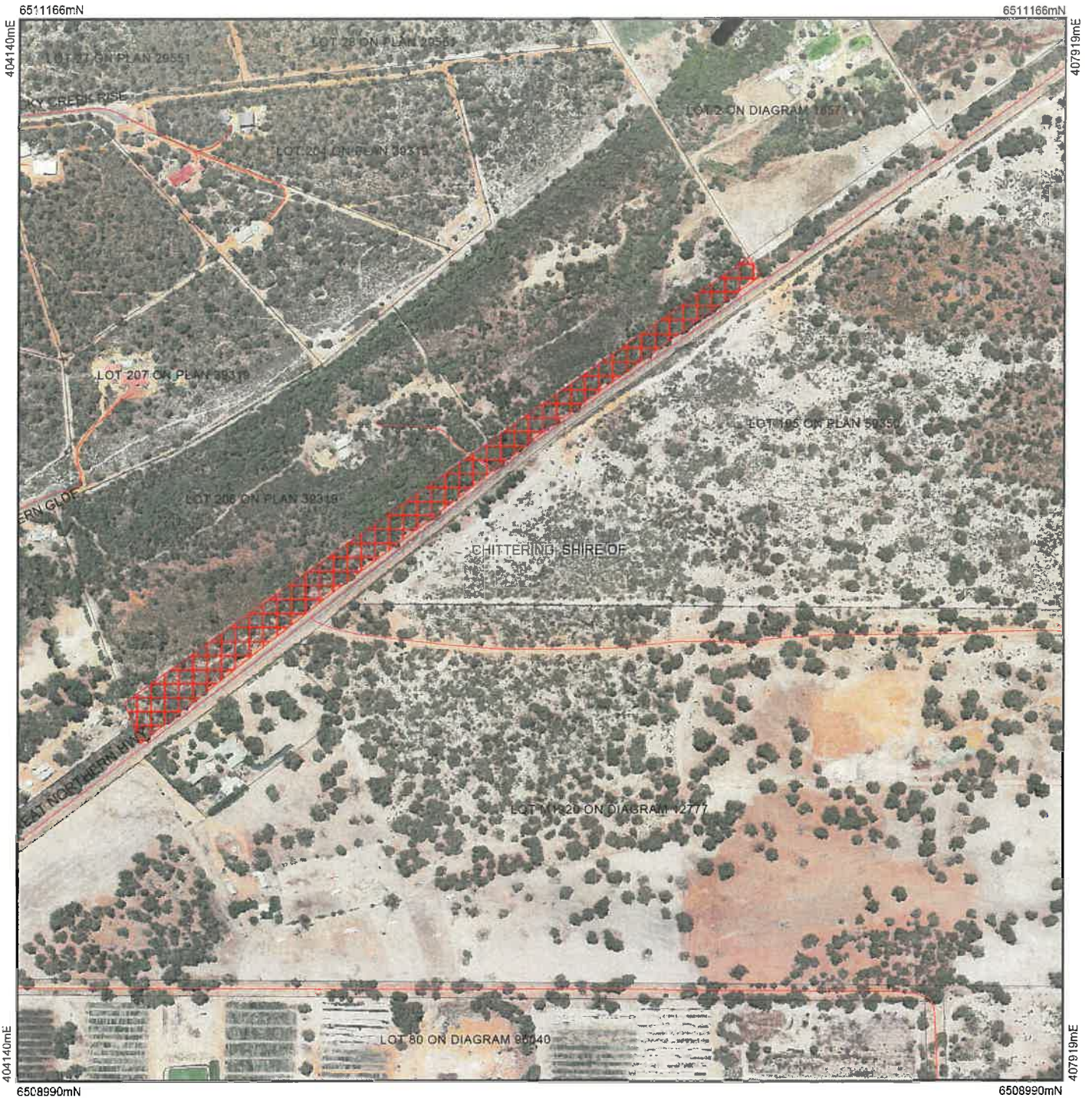
E Branwell Date *26/02/18*
E BRANWELL

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







GOVERNMENT OF
WESTERN AUSTRALIA
WA Crown Copyright 2017

Plan 7563/2d



Legend

-  Imagery
-  Roads
-  Local Government Authority
-  Clearing Instruments Conditions



(Approximate when reproduced at A4)
 UTM Zone 50S
 World Geodetic System 1984

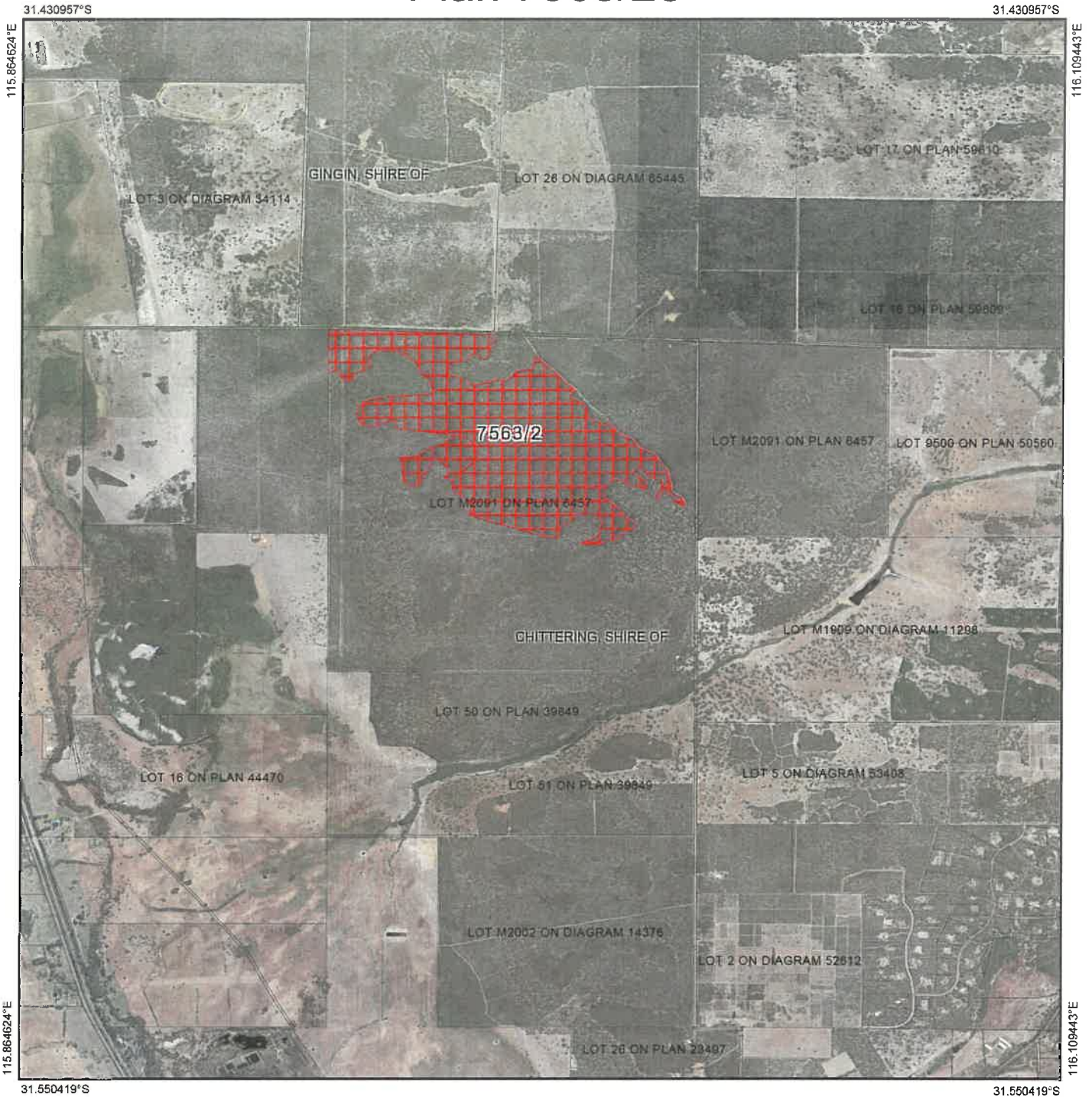
E Branwell
E BRANWELL Date 26/02/18

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






GOVERNMENT OF
 WESTERN AUSTRALIA
 WA Crown Copyright 2017

Plan 7563/2e



Legend

-  Imagery
-  Local Government Authority
-  Clearing Instruments Conditions



1:40,000

(Approximate when reproduced at A4)

GDA 94 (Lat/Long)

Geocentric Datum of Australia 1994

E Branwell Date *26/02/18*
E BRANWELL

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



GOVERNMENT OF
 WESTERN AUSTRALIA
 WA Crown Copyright 2018



1. Application details

1.1. Permit application details

Permit application no.: 7563/2
Permit type: Purpose Permit

1.2. Applicant details

Applicant's name: Commissioner of Main Roads Western Australia

1.3. Property details

Properties: Great Northern Highway road reserve (PINs 1233233, 1258680, 11727263, 11727264, 11727265 and 11819629), Muchea;
Great Northern Highway road reserve (PINs 1338948, 1338949, 11320250, 11320253, 11513726, 11726209, 11726211, 11756006, 11756034, 11756040 and 11756041), Chittering;
Sugar Gum Drive road reserve (PIN 11086676), Chittering;
Blue Gum Way road reserve (PIN 11086892), Chittering;
Blue Plains Road road reserve (PIN 11513729), Chittering;
Maddern South Road road reserve (PINs 11429047 and 11726213), Chittering;
Reserve Road road reserve (PINs 11726219 and 11201126), Muchea;
Wandena Road road reserve (PIN 11726212), Muchea;
Old Gingin Road road reserve (PIN 11727261), Muchea;
Un-named road reserves (PINs 1338950 and 1338953) Chittering;
Lot M1264 on Diagram 5369, Muchea;
Lot M1909 on Diagram 11298, Chittering;
Lot 607 on Deposited Plan 409232, Muchea;
Lot 320 on Deposited Plan 409232, Muchea;
Lot M1957 on Diagram 13411, Chittering;
Lot 612 on Deposited Plan 409237, Chittering;
Lot 325 on Deposited Plan 409237, Chittering;
Lot 1 on Diagram 25838, Muchea;
Lot 321 on Deposited Plan 409233, Muchea;
Lot 7 on Diagram 42945, Muchea;
Lot 6 on Diagram 53408, Chittering;
Lot 8 on Diagram 54332, Muchea;
Lot 9 on Diagram 57633, Muchea;
Lot 22 on Diagram 76077, Muchea;
Lot 604 on Deposited Plan 409229, Muchea;
Lot 317 on Deposited Plan 409229, Muchea;
Lot 302 on Diagram 96028, Muchea;
Lot 80 on Diagram 96040, Muchea;
Lot 81 on Diagram 96040, Muchea;
Lot 611 on Deposited Plan 409236, Lower Chittering;
Lot 324 on Deposited Plan 409236, Lower Chittering;
Lot 13 on Plan 13680, Lower Chittering;
Lot 83 on Deposited Plan 28306, Chittering;
Lot 201 on Deposited Plan 34420, Chittering;
Lot 202 on Deposited Plan 34420, Chittering;
Lot 203 on Deposited Plan 34420, Chittering;
Lot 204 on Deposited Plan 34420, Chittering;
Lot 105 on Deposited Plan 42252, Chittering;
Lot 850 on Deposited Plan 42736, Chittering;
Lot 851 on Deposited Plan 42736, Chittering;
Lot 77 on Deposited Plan 43751, Chittering;
Lot 9500 on Deposited Plan 50560, Chittering;
Lot 18 on Deposited Plan 59611, Chittering;
Lot 16 on Deposited Plan 59609, Chittering;
Lot 17 on Deposited Plan 59610, Chittering;
Lot 609 on Deposited Plan 409234, Muchea;
Lot 322 on Deposited Plan 409234, Muchea;
Lot 610 on Deposited Plan 409235, Muchea;
Lot 323 on Deposited Plan 409235, Muchea;
Lot 601 on Deposited Plan 409226, Muchea;
Lot 314 on Deposited Plan 409226, Muchea;
Lot 11141 on Deposited Plan 188697 (Crown Reserve 209), Muchea;
Lot 14764 on Deposited Plan 34420 (Crown Reserve 48484), Chittering;
Lot 14767 on Deposited Plan 34420, Chittering; and

Colloquial name: Lot 500 on Deposited Plan 63597 (Crown Reserve 40350), Muchea.
Local Government Authority: Great Northern Highway Upgrade Muchea to Wubin Stage 2 – Muchea North
Shire of Chittering

1.4. Application

Clearing area (ha)	No. trees	Method of clearing	Purpose category:
53		Mechanical Removal	Road construction or upgrades

1.5. Decision on application

Decision on Application: Final Amendment

Decision Date: 26 February 2018

Reasons for Decision: This clearing permit amendment gives effect to the determination of the Minister for Environment (Minister) to partly allow appeals C015 of 2017 to the extent that the Minister has requested the Department of Water and Environmental Regulation to amend Clearing Permit CPS 7563/1 in respect to requiring the permit holder to avoid and minimise clearing where possible and record and report on its effort in this regard.

The precise wording of the amendment was determined by the Delegated Officer.

The clearing impact assessment for this clearing permit amendment is consistent with the assessment undertaken for application CPS 7563/1.

2. Site Information

Clearing Description The clearing permit amendment relates to the proposed clearing of 53 hectares of native vegetation (within a 248.45 hectare footprint) for the purpose of upgrading Great Northern Highway between SLK 38.6 (near Old Gingin Road) and SLK 51.4 (near Sandalford Drive).

The applicant has advised that a planning review identified various deficiencies in the section of highway under application including sharp crests and sags, tight bends, uneven surfaces and unforgiving roadside areas with trees close to the seal edge. Due to the age and condition of the road, the planned works will largely involve the construction of a new road adjacent to the existing road, with some sections of online reseal and widening. The proposed alignment is predominantly to the east of the existing road with a section between (approximately) SLK 48.2 and SLK 50.4 constructed to the west (Arup Jacobs Joint Venture, 2017).

Vegetation clearing will be required for the following activities:

- construction of approximately 3.7 kilometres of dual carriageway from the end of the Perth – Darwin National Highway (Swan Valley Section) [also referred to as Northlink]. Each carriageway will be a 9 metre wide seal on an 11 metre wide formation;
- construction of approximately 5.7 kilometres of single carriageway with a 10 metre wide seal on a 12 metre wide formation;
- construction of approximately 1.4 kilometres of four lane carriageway with two 3.5 metre wide northbound and southbound lanes, separated by a minimum 4.65 metre median;
- widening of approximately 2 kilometres of the existing road;
- realignment of the intersections at Old Gingin Road, Reserve Road, Wandena Road, Maddern South Road and Sugar Gum Drive;
- construction of access roads with consolidated access to the highway to service properties near Reserve Road, Sugar Gum Drive, at approximately SLK 48.8 and opposite the Chittering Roadhouse;
- provision of new intersections to link the existing highway (retained as a local access road) to the new sections of the highway;
- construction and realignment of private driveways;
- upgrade and installation of culverts;
- removal of redundant, existing road reserve fence and installation of new road reserve fence;
- installation of signage and line markings and removal of redundant signage;
- installation of safety barriers where required;
- relocation of utilities within the road reserve corridor (communications and power); and
- installation of road lighting (Arup Jacobs Joint Venture, 2017).

Laydown areas, vehicle turnaround bays and other ancillary areas required for construction of the permanent works will be located in previously cleared (paddock) areas, where practicable (Arup Jacobs Joint Venture, 2017).

Vegetation Description Four Hedde vegetation complexes are mapped over the application area including:

- Mogumber Complex South which is described as an open woodland of *Corymbia calophylla* (marri), with some admixture of *Eucalyptus marginata* (jarrah) and a second storey of *Eucalyptus todtiana* (pricklybark) - *Banksia attenuata* - *Banksia menziesii* - *Banksia ilicifolia*;
- Moondah Complex which is described as a low closed to low open forest of *B. attenuata* - *B. menziesii* - pricklybark - *B. prionotes* on slopes, open woodland of marri - *Banksia* species in valley;

- Reagan Complex which is described as vegetation ranging from low open woodland of *Banksia* species and pricklybark to closed heath depending on the depth of soil; and
- Coonambidgee Complex which is described as vegetation ranging from a low open forest and low woodland of pricklybark - *B. attenuata* - *B. menziesii* - *B. ilicifolia* with localised admixtures of *B. prionotes* to an open woodland of marri - *Banksia* species (Hedde et al., 1980).

Vegetation Condition

Pristine; pristine or nearly so, no obvious signs of disturbance (Keighery, 1994).

To

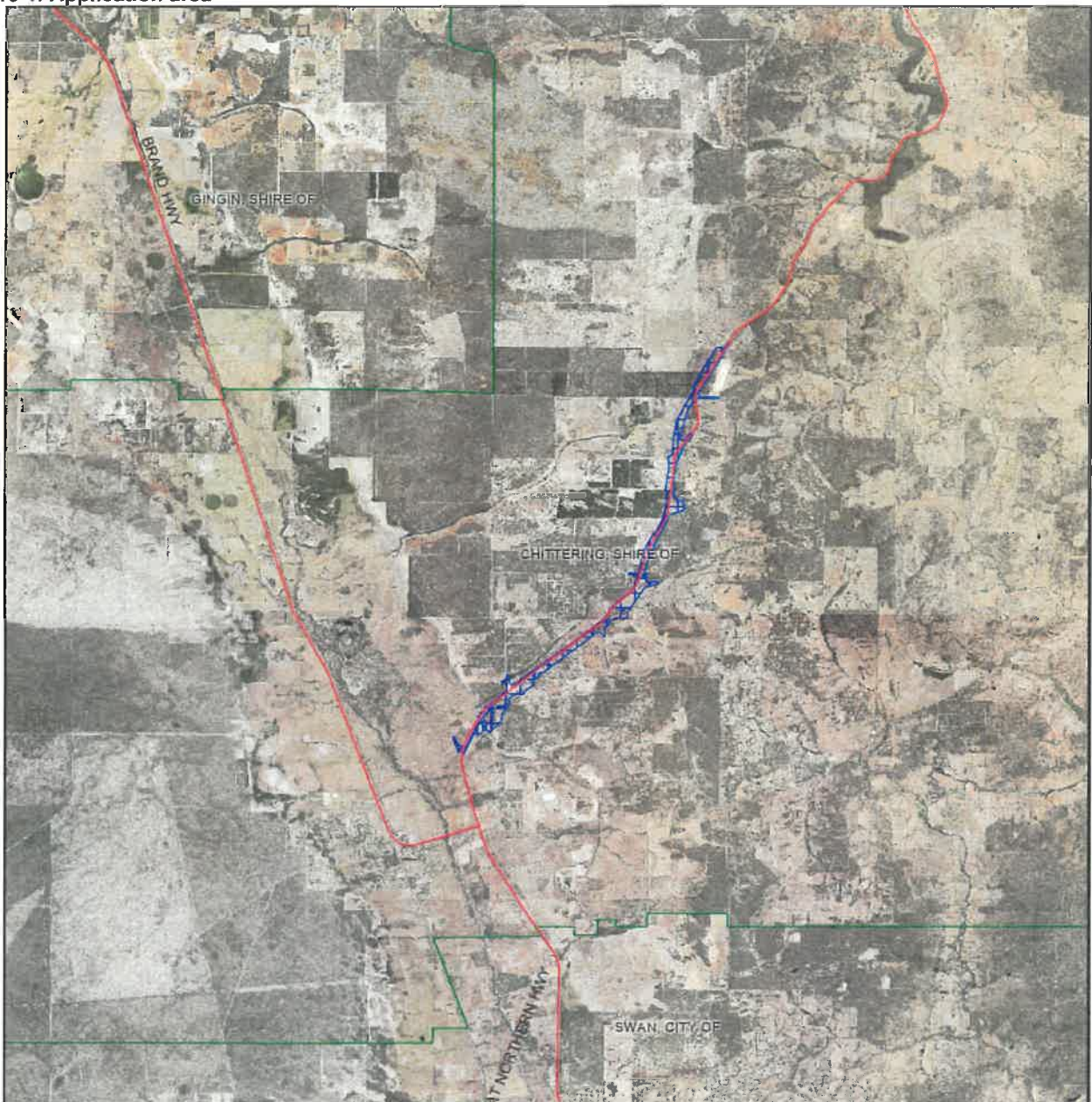
Completely Degraded; no longer intact, completely/almost completely without native species (Keighery, 1994);

Vegetation condition was determined by surveys undertaken by Phoenix Environmental Sciences:

- pristine = 2 per cent
- excellent = 8 per cent
- very good = 17 per cent
- good = 8 per cent
- degraded = 7 per cent
- completely degraded = 58 per cent (Arup Jacobs Joint Venture, 2017).

Areas in completely degraded condition included paddocks, roads and other infrastructure, and cleared and revegetated non-indigenous woodlands (Arup Jacobs Joint Venture, 2017).

Figure 1: Application area



3. Assessment of application against clearing principles

The clearing permit amendment was assessed against the 10 clearing principles outlined in Schedule 5 of the *Environmental Protection Act 1986*. The assessment has not changed since the assessment of application 7563/1, and can be found in the Decision Report for application CPS 7563/1.

Planning instruments and other relevant matters.

The clearing permit amendment was assessed against planning instruments and other relevant matters. The assessment has not changed since the assessment of application CPS 7563/1, and can be found in the Decision Report for application CPS 7563/1.

4. References

- Arup Jacobs Joint Venture (2017). Great Northern Highway Muchea to Wubin Upgrade Stage 2 – Main Roads Western Australia – Muchea North SLK 38.6-51.4 – Environment – Purpose Permit to Clear Native Vegetation – Supporting Information. Unpublished report prepared for Main Roads Western Australia. GNH-CN03-EN01-RPT-0004 Revision 5, 10 April 2017 (DWER Ref: A1413784-90).
- Hedde, E.M., Loneragan, O.W., and Havel, J.J. (1980) Vegetation Complexes of the Darling System, Western Australia. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.
- Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.