Government of Western Australia
Department of Water and Environmental Regulation

Licence

Licence number	L9111/2018/1
Licence holder	City of Kalamunda
Registered business address	2 Railway Road Kalamunda WA 6076
DWER file number	DER2017/002141
Duration	12/06/2020 to 11/06/2040
Date of issue	12/06/2020
Premises details	Walliston Transfer Station 155 Lawnbrook Road West Walliston WA 6076 Legal description - Lot 5 on Diagram 14851

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	**Assessed design capacity**
Category 57 – Used tyre storage (general): premises (other than premises within category 56) on which used tyres are stored.	150 tyres at any one time.
Category 62: Solid waste depot: premises on which waste is stored, or sorted, pending final disposal or re-use.	30,000 tonnes per annual period.

This licence is granted to the licence holder, subject to the attached conditions, on 12 June 2020, by:

Tracey Hassell
Digitally signed by Tracey Hassell
Date: 2020.06.12 15:51:06 +08'00'

Tracey Hassell
A/MANAGER WASTE INDUSTRIES
REGULATORY SERVICES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Interpretation

In this licence:

(a) the words ‘including’, ‘includes’ and ‘include’ in conditions mean “including but not limited to”, and similar, as appropriate;

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice means the version of the standard, guideline, or code of practice in force at the time of granting of this licence and includes any amendments to the standard, guideline or code of practice which may occur from time to time during the course of the licence;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This licence requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this licence.

Licence conditions

The Licence Holder must ensure that the following conditions are complied with:

Works

1. The Licence Holder must construct the infrastructure:

(a) in accordance with the corresponding design and construction requirements; and

(b) at the corresponding infrastructure location; and

(c) within the corresponding timeframe,

as set out in Table 1.

Table 1: Design and construction requirements

	Infrastructure	Design and construction requirements	Infrastructure location (refer to Schedule 1)	Timeframe
1	Surface water management system	Must include construction of drains, bunds and/or pipes that are capable of directing uncontaminated stormwater away from waste storage areas	Area cross-hatched blue in Schedule 1 - Figure 2	By 30 June 2023
2	Hardstand for a portion of the community recycling area	Must be sealed with asphalt or bitumen to create an impermeable surface Must be constructed to form a continuous surface capable of preventing infiltration of surface water to underlying soils	Area depicted in Schedule 1 - Figure 3	
3	Access road	To be sealed, or constructed with a material that does not result in dust being raised from the surface when a vehicle moves over it.	As depicted in Schedule 1 - Figure 3	

2. The Licence Holder must within 30 calendar days of an item of infrastructure required by condition 1 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 1; and

(b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.

3. The Environmental Compliance Report required by condition 2, must include as a minimum the following:

(a) Certification by a qualified, competent civil or structural engineer that the infrastructure specified in condition 1 have been constructed in accordance with the relevant requirements in condition 1;

(b) Plans for each of the items of infrastructure or component(s) thereof (as constructed) specified in condition 1; and

(c) Be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

Infrastructure and equipment

4. The Licence Holder must ensure that the site infrastructure and equipment listed in Table 2 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 2.

Table 2: Infrastructure and equipment requirements

Site infrastructure and equipment	Operational requirement	Infrastructure location (refer to Schedule 1)
Site fencing or walling	1.8 m high security fence with access to the facility through lockable gated entry/exit points.	As depicted in Schedule 1 - Figure 3
Sealed road surfaces[1]	To be maintained to sufficiently prevent dust lift-off from vehicle movements	As depicted in Schedule 1 - Figure 3
Community drop off area[1]	Must be sealed with asphalt or bitumen to create an impermeable surface	As depicted in Schedule 1 - Figure 3
Waste storage bins	Be capable of containing waste and leachates.	The areas marked 1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 27 and 29 in Schedule 1 - Figure 2
Oil storage tanks/IBCs	To consist of a 5,000 L tank, and two 1,000 L intermediate bulk containers (IBCs) To be stored in a manner that prevents stormwater entering the tanks/IBCs, and prevents any spills of liquid from entering the environment.	The area marked 15 in Schedule 1 - Figure 2
Fire extinguishers	A minimum of five class ABE extinguishers on the Premises with signage	Not depicted
Water tank	20,000 L tank with pump and hose located on-site at all times.	Not depicted
Water cart	Must be capable of spraying water to dampen roadways and waste stockpiles.	Not depicted
Surface water system[1]	Capable of directly uncontaminated stormwater away from waste storage areas	Area cross-hatched in blue in Schedule 1 - Figure 2

Site infrastructure and equipment	Operational requirement	Infrastructure location (refer to Schedule 1)
Signage	Clear signage at the entrance of the facility: • Identifying waste acceptance types • Emergency contact phone numbers • Stating that speeds are to be kept at ≤15 km/hr • Stating no asbestos is accepted.	Not depicted

Note 1: Once constructed in accordance with condition 1

Waste acceptance and processing

5. The Licence Holder must only accept onto the premises waste of a waste type, which does not exceed the corresponding rate at which waste is received, and which meets the corresponding acceptance specification set out in Table 3.

Table 3: Types of waste authorised to be accepted onto the premises

Waste type	Rate at which waste is received	Acceptance specification
Inert waste type 2	150 tyres (whole or baled) stored at the Premises at any one time	Limited to tyres only
Inert waste type 1	Not more than 30,000 tonnes of Solid Waste per annual period for storing, or sorting, pending final disposal or re-use.	Limited to glass, e-waste, aluminium/steel cans, mixed construction waste, scrap metals
Putrescible waste		Limited to mixed residential refuse, cardboard and paper, beds and mattresses.
Hazardous wastes		Limited to oils, gas bottles, fluorescent tubes, fire extinguishers and car batteries.
Green waste		None specified

6. The Licence Holder must ensure where waste does not meet the acceptance criteria set out in condition 5, it is removed from the premises by the delivery vehicle or, where that is not possible, stored in a quarantined storage area or container and removed to an appropriately authorised facility as soon as practicable.

7. The Licence Holder must ensure that the waste types specified in Table 4 are only subjected to the corresponding processes, subject to the corresponding process limits and/or specifications.

Table 4: Waste processing

Waste type	Process(es)	Process limits and/or specifications
All	Delivery and removal	All vehicles delivering or removing putrescible waste streams must be covered.
All	Acceptance and storage	All wastes are to be stored in the areas designated in Figure 2 in Schedule 1. No wastes other than those depicted in Figure 2 in Schedule 1 are permitted.
Inert Waste Type 2 (tyres only)	Storage and removal off-site	Tyres must be removed from the tyre drop-off area by the end of each working day and stored within the tyre storage area Depicted in Schedule 1 Tyres are to be stored 18 m from any combustible materials or walls, 6 m from any non-combustible materials or walls, to a maximum height of 3.7 m and area of 60 m^2 for the stockpile of whole tyres, and a maximum of four individual tyre stockpiles are to be grouped with a minimum separation distances of 2 m between stockpiles.
Putrescible waste	Storage	All putrescible waste (excluding green waste and beds/mattresses) is to be stored in an enclosed container.
Hazardous Wastes	Storage	All waste oils must be stored in Oil storage tanks or IBCs as described in Table 2. All hazardous wastes must be stored on hardstand surface capable of containing spills.
Green Waste	Storage and processing including mulching	Mulching of green waste may only occur Monday to Friday (excluding Public Holidays) between 7:00am to 5:00pm

Operational controls

8. The Licence Holder must immediately capture any firewater used to extinguish a fire at the Premises and remove it offsite by a carrier licensed under the *Environmental Protection (Controlled Waste) Regulations 2004*.

9. The Licence Holder must immediately recover, or remove and dispose of, spills of environmentally hazardous materials including fuel, oil, or other hydrocarbons, whether inside or outside an engineered containment system.

10. The Licence Holder must ensure that all material used for the recovery, removal, and/or disposal of fire water or environmentally hazardous materials is stored in an impermeable container prior to disposal at an appropriately authorised facility.

11. The Licence Holder must take all practicable measures to prevent stormwater run-off becoming contaminated by the activities and operations undertaken at the Premises.

Clearing

12. The Licence Holder must not clear more than 0.15 hectares of native vegetation within the area cross-hatched yellow on Figure 4 (Plan 8733/1) in Schedule 1

13. The Licence Holder must have regard to the following principles in determining the amount of native vegetation to be cleared as authorised by this Licence;

(a) avoid the clearing of native vegetation;

(b) minimise the amount of vegetation to be cleared; and

(c) reduce the impact of clearing on any environmental value.

14. When undertaking any clearing or other activity authorised under this Licence, the Licence 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 area to be cleared;

(b) ensure that no known dieback or 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.

15. The Licence Holder must conduct clearing in a slow progressive manner towards surrounding remnant vegetation to allow fauna to escape the clearing activity

16. Prior to undertaking any clearing authorised under this Licence:

(a) the area cross-hatched yellow on Figure 4 (Plan 8733/1) in Schedule 1 must be inspected by a fauna specialist who must identify black cockatoo breeding trees; and

(b) each black cockatoo breeding tree identified must be inspected by a fauna specialist for evidence of current or past breeding use by Carnaby's cockatoo (*Calyptorhynchus latirostris*), Baudin's cockatoo (*Calyptorhynchus baudinii*), and forest red-tailed black cockatoo (*Calyptorhynchus banksia naso*).

17. Where a black cockatoo breeding tree(s) with evidence of current breeding use by Carnaby's cockatoo, Baudin's cockatoo or forest red-tailed black cockatoo is identified and cannot be avoided that tree(s) must be monitored by a fauna specialist to determine when it is no longer in use for that breeding season.

18. Any black cockatoo breeding tree(s) with evidence of current breeding use by Carbany's cockatoo, Baudin's cockatoo or forest red-tailed black cockatoo must not be cleared whilst it is in use for that breeding season as determined by the fauna specialist under condition 15.

19. Where a black cockatoo breeding tree(s) with evidence of past breeding use by Carnaby's cockatoo, Baudin's cockatoo or forest red-tailed black cockatoo is identified and cannot be avoided that tree(s) must only be cleared;

(a) outside the black cockatoo breeding seasons; or

(b) later the same day of the inspection required by condition 16 (a); or

(c) later the same day of a repeat inspection undertaken by a fauna specialist if that inspection does not identify evidence of current breeding use.

20. For each black cockatoo breeding tree with evidence of current or past breeding use by Carnaby's cockatoo, Baudin's cockatoo or forest red-tailed black cockatoo identified, that cannot be avoided the Licence Holder must install an artificial black

cockatoo nest hollow.

21. Each artificial black cockatoo nest hollow required by condition 20 of this Licence must:

(a) be installed within the area cross-hatched red on Figure 4 (Plan 8733/1) in Schedule 1 being a portion of Lot 5 on Deposited Plan 14851;

(b) be designed and placed in accordance with the guidelines provided in Schedule 2; and

(c) be monitored and maintained in accordance with the guidelines provided in Schedule 3, for a period of at least ten years.

Monitoring

22. The Licence Holder must record the total amount of waste accepted onto the premises, for each waste type listed in Table 5, in the corresponding unit, and for each corresponding time period, as set out in Table 5.

Table 5: Waste accepted onto the premises

Waste type	Unit	Time period
Waste Inputs – As specified in Table 3	m^3 and calculated tonnes – using the methods outlined in the Western Australian Government Gazette, Perth, Friday, 28 June 2019 No. 97	Each load arriving at the Premises.

23. The Licence Holder must record the total amount of waste removed from the premises, for each waste type listed in Table 6, in the corresponding unit, and for each corresponding time period set out in Table 6.

Table 6: Waste removed from the premises

Waste type	Unit	Time period
Waste Outputs – Waste type as defined in the Landfill Definitions	m^3 and calculated tonnes – using the methods outlined in the Western Australian Government Gazette, Perth, Friday, 28 June 2019 No. 97	Each load leaving or rejected from the Premises.

Records and reporting

24. The Licence Holder must maintain accurate and auditable books including the following records, information, reports, and data required by this licence:

(a) the calculation of fees payable in respect of this licence;

(b) the works conducted in accordance with condition 1 of this licence;

(c) any maintenance of infrastructure that is performed in the course of complying with condition 4 of this licence;

(d) monitoring programmes undertaken in accordance with conditions 22 and 23 of this licence; and

(e) complaints received under condition 28 of this licence.

25. The Licence Holder must maintain accurate and auditable books for activities done pursuant to clearing of native vegetation authorised under this Licence including;

(a) 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;

(b) The date the area was cleared;

(c) The size of the area cleared (in hectares);

(d) Actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 13;

(e) Actions taken to minimise the risk of the introduction and spread of weeds and dieback in accordance with condition 14; and

(f) Actions taken in accordance with condition 15.

26. The Licence Holder must maintain accurate and auditable books for activities done pursuant to fauna management pursuant to condition 17 including;

(a) The date each artificial black cockatoo nest hollows were installed;

(b) The location of each artificial black cockatoo nest hollow installed, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;

(c) A photo of each artificial black cockatoo nest hollow installed;

(d) The dates each artificial black cockatoo nest hollow installed was monitored;

(e) A description of the monitoring methodology employed for each artificial black cockatoo nest hollow installed;

(f) A description of the monitoring observations for each artificial black cockatoo nest hollow installed;

(g) The date(s) each artificial black cockatoo nest hollow installed was maintained; and

(h) A description of the maintenance activities undertaken for each artificial black cockatoo nest hollow installed

27. The books specified under conditions 24, 25 and 26 must:

(a) be legible;

(b) if amended, be amended in such a way that the original version(s) and any subsequent amendments remain legible and are capable of retrieval;

(c) be retained by the licence holder for the duration of the licence; and

(d) be available to be produced to an inspector or the CEO as required.

28. The Licence Holder must record the following information in relation to complaints received by the licence holder (whether received directly from a complainant or forwarded to them by the Department or another party) about any alleged emissions from the premises:

(a) the name and contact details of the complainant, (if provided);

(b) the time and date of the complaint;

(c) the complete details of the complaint and any other concerns or other issues raised; and

(d) the complete details and dates of any action taken by the licence holder to investigate or respond to any complaint.

29. The Licence Holder must:

(a) undertake an audit of their compliance with the conditions of this licence during the preceding annual period; and

(b) prepare and submit to the CEO by no later than 30 days after the end of that annual period an Annual Audit Compliance Report in the approved form.

30. The Licence Holder must submit to the CEO by no later than 30 days after the end of each annual period, an Annual Environmental Report for that annual period for the conditions listed in Table 7, and which provides information in accordance with the corresponding requirement set out in Table 7.

Table 7: **Annual Environmental Report**

Condition	Requirement
8,9 and 10	Details of any fires or spills at the premises over the previous year, measures taken to put out the fire or contain the spill, and actions taken to store and remove materials used.
22 and 23	Waste inputs and outputs for the annual period
12 to 21	All clearing activities undertaken during the annual period. If no clearing authorised under this Licence has been undertaken during the annual period, confirmation that no clearing under this licence has been undertaken.

Definitions

In this licence, the terms in Table 8 have the meanings defined.

Table 8: Definitions

Term	Definition
ACN	Australian Company Number
Annual Audit Compliance Report (AACR)	means a report submitted in a format approved by the CEO (relevant guidelines and templates may be available on the Department's website).
annual period	a 12-month period commencing from 1 January 31 December in the same year.
black cockatoo breeding tree(s)	means trees that have a diameter, measured at 1.5 metres from the base of the tree, of 50 centimetres or greater.
books	has the same meaning given to that term under the EP Act.
CEO	means Chief Executive Officer of the Department. "submit to / notify the CEO" (or similar), means either: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 or: info@dwer.wa.gov.au
Department	means the department established under section 35 of the *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
dieback	means the effect of Phytophthora species on native vegetation.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
Environmental compliance report	means a report to satisfy the CEO that the conditioned infrastructure has been constructed in accordance with the Licence.
EP Act	*Environmental Protection Act 1986* (WA)
EP Regulations	*Environmental Protection Regulations 1987* (WA)
fill	means material used to increase the ground level, or fill a hollow

Term	Definition
licence	refers to this document, which evidences the grant of a licence by the CEO under section 57 of the EP Act, subject to the specified conditions contained within.
licence holder	refers to the occupier of the premises, being the person specified on the front of the licence as the person to whom this licence has been granted.
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.
Premises	refers to the premises to which this licence applies, as specified at the front of this licence and as shown on the premises maps (Figures 1, 2 and 3) in Schedule 1 to this licence.
prescribed premises	has the same meaning given to that term under the EP Act.
Qualified, competent civil or structural engineer	means a person who: (a) holds a Bachelor's degree recognised by the Institute of Engineers; (b) has a minimum of five years of experience working in a supervisory role of civil or structural engineering; and (c) is employed by an independent third party external to the Works Approval Holder's business or is otherwise approved in writing by the CEO to act in this capacity.
waste	has the same meaning given to that term under the EP Act.
weed/s	means any plant; • That is a declared pest under section 22 of the Biosecurity and Agriculture Management Act 2007; • Published in a Department of Biodiversity, Conservation and Attractions Regional Weed Rankings Summary, regardless of ranking; or • Not indigenous to the area concerned.

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in red in the map below (Error! Reference source not found.**), and excludes the area cross hatched in red.**

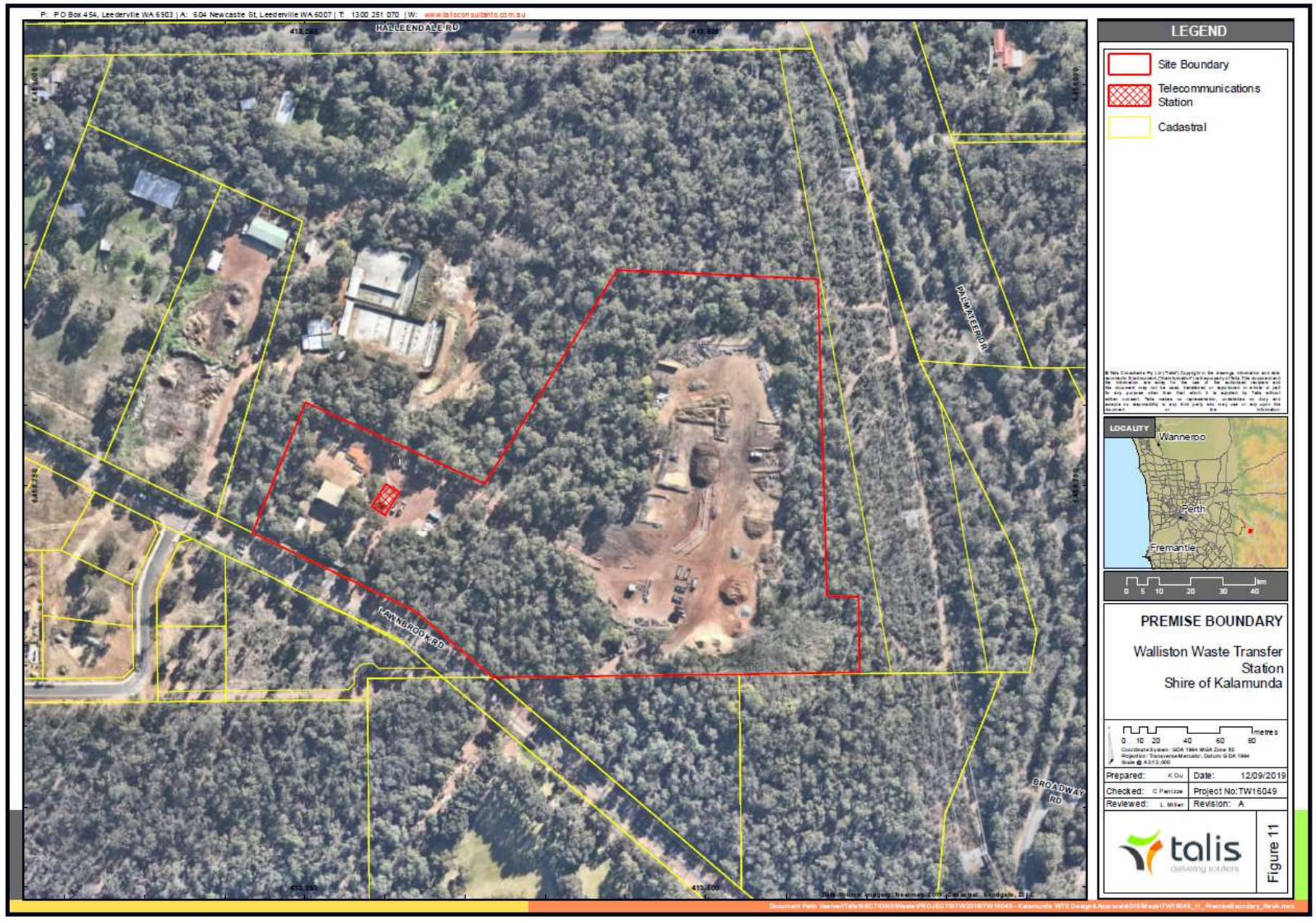

Figure 1: Map of the boundary of the prescribed premises

The specific waste acceptance and storage areas and location of the P1 PDWSA are shown in Figure 2

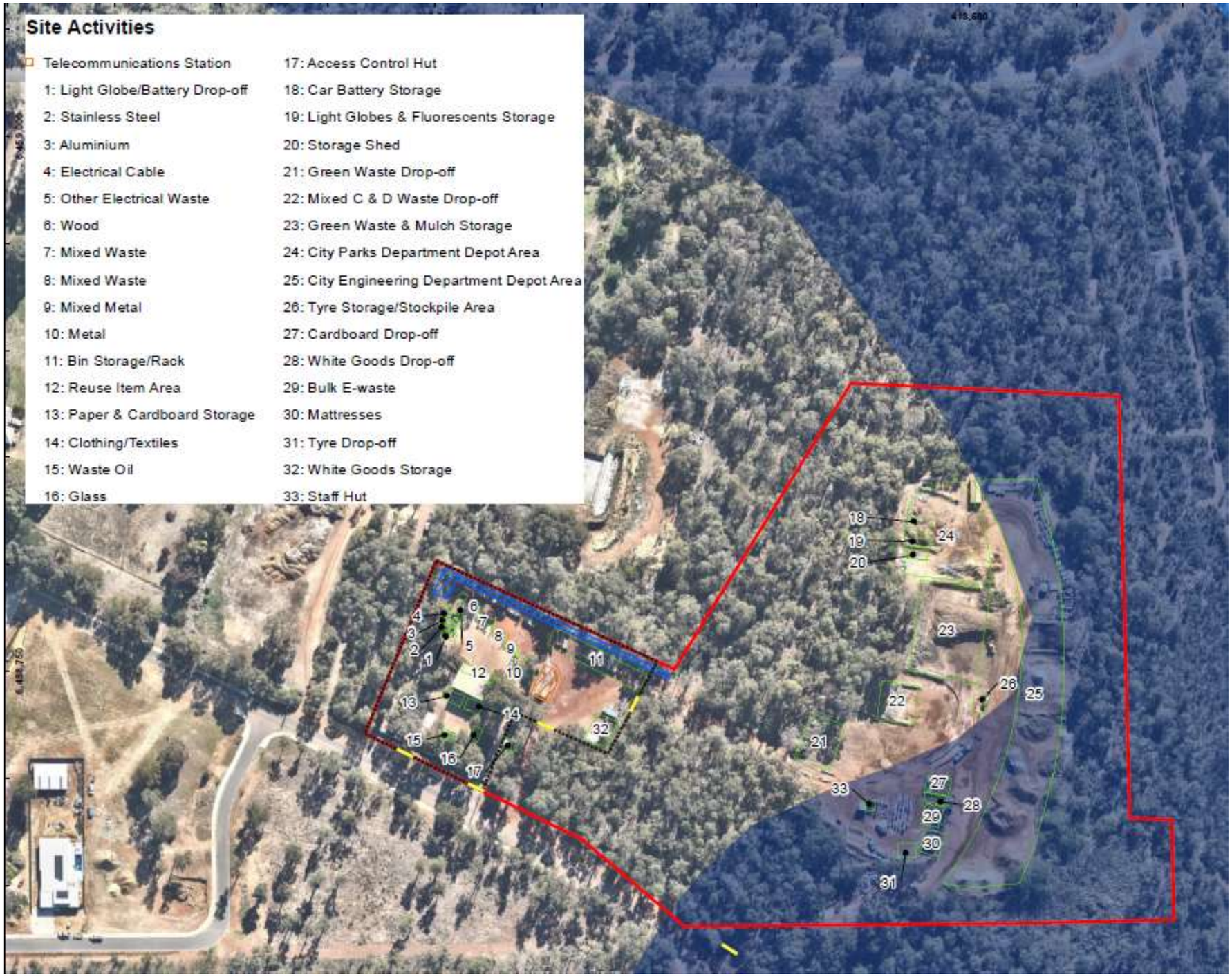

Figure 2: Waste storage and acceptance and PDWSA

Figure 3 depicts the general locations of activities at the premises and the proposed access road. The red line depicts the lot boundary, and not the Premises boundary.

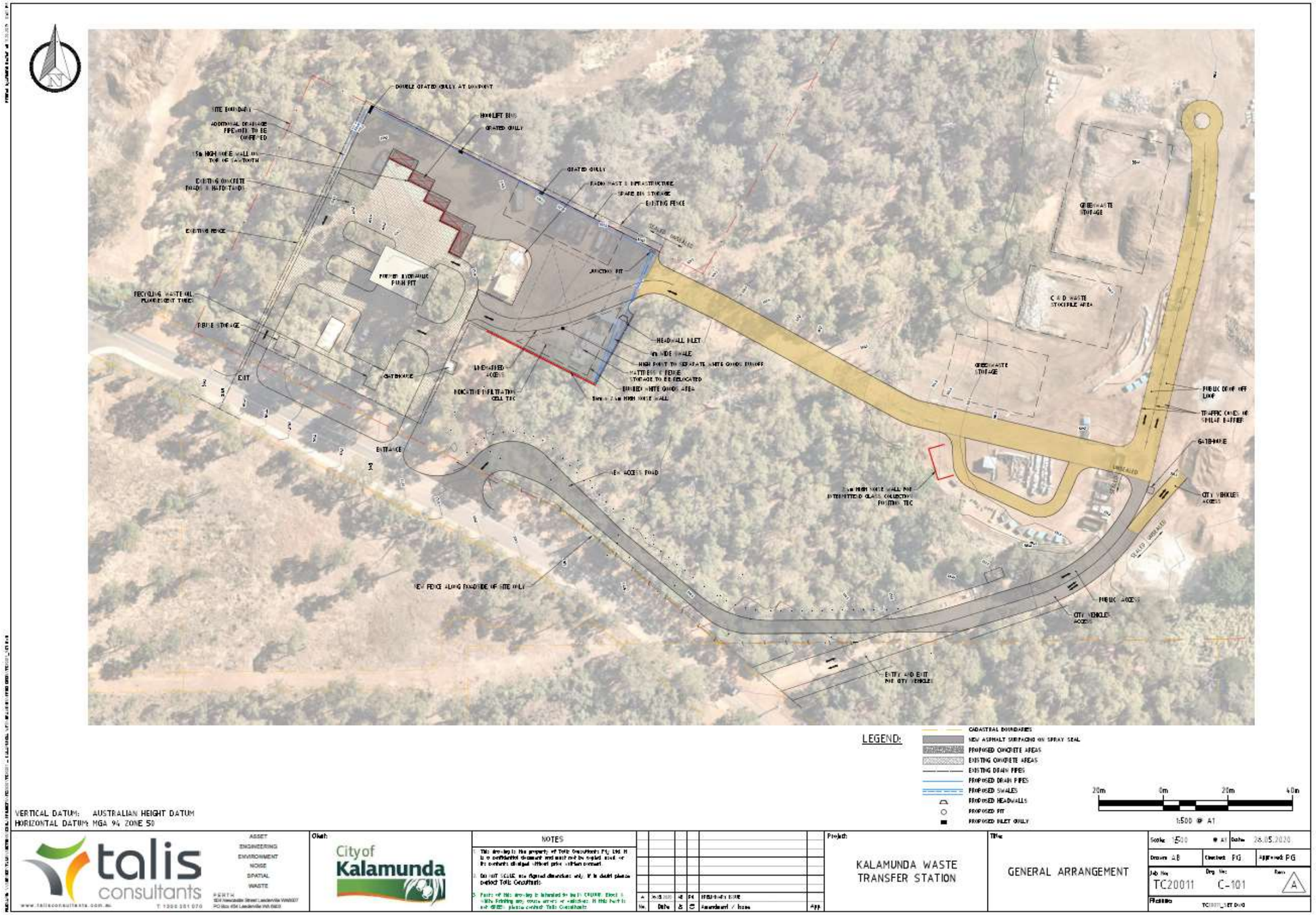

Figure 3: Site activities and proposed roadway

The areas subject to clearing conditions are depicted in Figure 4 below

Figure 4: Clearing Plan 8733/1

Premises boundary

The premises boundary is defined by the coordinates in Table 9.

Table 9: Premises boundary coordinates (GDA94)

Easting	Northing	Zone
413204.10	6458727.18	50J
413241.09	6458806.47	
413361.77	6458745.07	
413442.22	6458886.40	
413569.42	6458876.32	
413574.54	6458680.50	
413593.60	6458679.44	
413595.19	6458634.45	
413366.78	6458630.73	
413319.02	6458671.42	
Excluding		
413294.67	6458739.51	50J
413301.28	6458753.76	
413306.55	6458751.38	
413307.37	6458746.08	
413302.50	6458735.80	

Schedule 2: How to design and place artificial hollows for Carnaby's cockatoo

Department of Parks and Wildlife

Fauna notes

Artificial hollows for Carnaby's cockatoo

birdlife AUSTRALIA

WATER CORPORATION

museum

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)

Page 1 of 5

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. Zincalume ®), 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.

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.

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

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*.

Example fixing for artificial hollow
Photo by Christine Groom

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

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

Further information **Last updated 28/04/2015**

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Schedule 3: How to monitor and maintain artificial hollows for Carnaby's cockatoo

Department of Parks and Wildlife

Fauna notes

Artificial hollows for Carnaby's cockatoo

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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.

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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)	• 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)	To observe at least two of the following: • Breeding behaviour of adults around hollow or evidence of chewing • Female flushed from hollow • Noises from nestlings in hollow Or to observe: • 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.	• Looking inside nest to observe eggs or nestlings.
To determine use by any species	As often as possible.	• 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.	• 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

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