GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 8654/1
Permit Holder:	Shire of Halls Creek
Duration of Permit:	12 August 2020 to 12 August 2030

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 upgrades and the construction and expansion of six material extraction pits.

2. **Land on which clearing is to be done**
   Lot 63 On Plan 220788, Ord River
   Lot 62 On Plan 216499, Sturt Creek
   Lot 350 On Plan 64837, Ord River
   Lot 116 On Plan 220788, Ord River
   Lot 112 On Plan 238205, Sturt Creek
   Water Feature (PIN 1115562), Sturt Creek
   Duncan Road Reserve (PIN 11710892), Ord River

3. **Area of Clearing**
   The Permit Holder must not clear more than 61.3 hectares of native vegetation within a 230 hectare envelope in the areas cross-hatched yellow, red, light blue and green on attached Plan 8654/1a, Plan 8654/1b, Plan 8654/1c, Plan 8654/1d, Plan 8654/1e, Plan 8654/1f, Plan 8654/1g, Plan 8654/1h, and Plan 8654/1i.

4. **Period in which clearing is authorised**
   The Permit Holder shall not clear any native vegetation after 12 August 2025.

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.

PART II –MANAGEMENT CONDITIONS

6. **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.

7. Fauna management – greater bilby

(a) Up to one week prior to undertaking clearing of areas cross hatched pink on Plan 8654/1j and Plan 8654/1k, these areas shall be inspected by a *fauna specialist* to identify greater bilby (*Macrotis lagotis*) individuals and burrows.

(b) Where a greater bilby individual(s) is captured, clearing shall only occur after relocation of the greater bilby individual(s) by a *fauna specialist* to a pre-selected release site endorsed by the Department of Biodiversity, Conservation and Attractions.

(c) Where a greater bilby burrow(s) is identified, clearing shall only occur after the burrow has been excavated in accordance with the procedure outlined in Appendix 1.

(d) The Permit Holder shall ensure the following information is recorded:

(i) the boundaries of the inspections undertaken on each date, 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 location of each greater bilby individual and burrow identified, 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 gender of each greater bilby individual identified;

(iv) the location where each greater bilby individual was relocated, 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;

(v) the date each greater bilby individual was relocated;

(vi) the date each greater bilby burrow was excavated; and

(vii) the name, qualifications and work experience of the *fauna specialist*.

8. Fauna management – direction of clearing

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

9. Flora management

(a) Prior to undertaking any clearing authorised under this Permit within the combined areas cross-hatched red and light blue on Plan 8654/1a, Plan 8654/1b, Plan 8654/1c, Plan 8654/1e, Plan 8654/1f, Plan 8654/1g, Plan 8654/1h, and Plan 8654/1i, the Permit Holder must engage a *botanist* to conduct a *targeted flora survey* of areas identified to be suitable habitat within the permit area for the presence of *Eriachne armitii, Rorippa eustylis, Trachymene villosa* and *Triodia roscida*.

(b) The Permit Holder shall ensure that no clearing occurs within 10 metres of any *Eriachne armitii, Rorippa eustylis, Trachymene villosa* or *Triodia roscida* individuals identified through the surveys required by condition 9(a), unless the clearing is done in accordance with a Flora Management Plan required under condition 10 which has been approved by the *CEO*;

(c) Within two months of undertaking any clearing authorised under this Permit within the combined areas cross-hatched red and light blue on Plan 8654/1a, Plan 8654/1b, Plan 8654/1c, Plan 8654/1e, Plan 8654/1f, Plan 8654/1g, Plan 8654/1h, and Plan 8654/1i, the Permit Holder must provide the results of the *targeted flora survey* in a report to the *CEO*; and

(d) If any *Eriachne armitii, Rorippa eustylis, Trachymene villosa* or *Triodia roscida* are identified within the combined areas cross-hatched red and light blue on Plan 8654/1a, Plan 8654/1b, Plan 8654/1c, Plan 8654/1e, Plan 8654/1f, Plan 8654/1g, Plan 8654/1h, and Plan 8654/1i, the *targeted flora survey* report must include the following:

(i) the location of each *Eriachne armitii, Rorippa eustylis, Trachymene villosa* and *Triodia roscida* identified through the surveys required by condition 9(a), either as the location of individual plants, or where this is not practical, the areal extent of the population and an estimate of the number of plants, 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) map/s showing the location of any identified populations cleared and the remaining population; and

(iii) the methodology used to survey the permit area.

10. Flora Management Plan

Where clearing within 10 metres of individuals of *Eriachne armitii, Rorippa eustylis, Trachymene villosa* and *Triodia roscida* identified in condition 9(a) is unavoidable, the Permit Holder must prepare and submit a Flora Management Plan to the *CEO* for approval. The management plan must contain the following:

(a) The results of the surveys carried out in accordance with condition 9;
(b) Details of the Permit Holder's attempts to avoid and minimise impacts to *Eriachne armitii, Rorippa eustylis, Trachymene villosa* and *Triodia roscida* identified through the surveys required by condition 9(a); and
(c) Proposed methods of minimising, mitigating and/or offsetting the residual impacts to *Eriachne armitii, Rorippa eustylis, Trachymene villosa* and *Triodia roscida* identified through the surveys required by condition 9(a).

11. 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 known *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.

12. Retain vegetative material and topsoil, revegetation and rehabilitation

The Permit Holder shall:

(a) retain the vegetative material and topsoil removed by clearing authorised under this Permit and stockpile the vegetative material and topsoil in an area that has already been cleared.
(b) within 6 months following completion of extractive activities, *revegetate* and *rehabilitate* the area hatched light blue and green on attached Plan 8654/1c, 8654/1d, 8654/1e, 8654/f, 8654/g and 8654/i by:
    (i) re-shaping the surface of the land so that it is consistent with the surrounding 5 metres of uncleared land; and
    (ii) laying the vegetative material and topsoil retained under condition 12(a) on the cleared area
(c) within 24 months of laying the vegetative material and topsoil on the cleared area in accordance with condition 12(b) of this Permit:
    (i) engage an *environmental specialist* to determine the species composition, structure and density of the area *revegetated* and *rehabilitated*; and
    (ii) where, in the opinion of an *environmental specialist*, the composition structure and density determined under condition 12(c)(i) of this Permit will not result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area, *revegetate* the area by deliberately *planting* and/or *direct seeding* native vegetation that will result in a similar species composition, structure and density of native vegetation to pre-clearing vegetation types in that area and ensuring only *local provenance* seeds and propagating material are used.
(d) Where additional *planting* or *direct seeding* of native vegetation is undertaken in accordance with condition 12(c)(ii) of this permit, the Permit Holder shall repeat condition 12(c)(i) and 12(c)(ii) within 24 months of undertaking the additional planting or direct seeding of native vegetation.
(e) Where a determination by an *environmental specialist* that the composition, structure and density within areas *revegetated* and *rehabilitated* will result in a similar species composition, structure and density to that of pre-clearing vegetation types in that area, as determined in condition 12(c)(i) and 12(c)(ii) of this permit, that determination shall be submitted for the *CEO's* consideration. If the *CEO* does not agree with the determination made under condition 12(c)(ii), the *CEO* may require the Permit Holder to undertake additional *planting* and *direct seeding* in accordance with the requirements under condition 12(c)(ii).

PART III - RECORD KEEPING AND REPORTING

13. Record keeping

The Permit Holder must maintain the following records in relation to the clearing of native vegetation authorised under this Permit:

(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 or decimal degrees;
(b) the date(s) that the area was cleared;
(c) the direction in which clearing was udnertaken;
(d) the size of the area cleared (in hectares);
(e) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 6 of this Permit;
(f) the results of the pre-clearance bilby survey provided to the *CEO* in accordance with condition 7 of this Permit;
(g) *targeted flora surveys* provided to the *CEO* in accordance with condition 9 of this Permit;
(h) Flora Management Plan approved by the *CEO* in accordance with condition 10 of this Permit; and
(i) actions taken to minimise the risk of the introduction and spread of *weeds* in accordance with condition 11 of this Permit.
(j) The Permit Holder must maintain the following records in relation to *revegetation* and *rehabilitation* of areas pursuant to condition 12 of this Permit:
    (i) the location of any areas *revegetated* and *rehabilitated*, 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) a description of the *revegetation* and *rehabilitation* activities undertaken;
    (iii) the size of the area *revegetated* and *rehabilitated* (in hectares);
    (iv) the species composition, structure and density of *revegetation* and *rehabilitation*, and
    (v) a copy of the environmental specialist's report.

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 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 30 June of each year.
(c) Prior to 12 April 2030, 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:

botanist means a person who holds a tertiary qualification specialising in environmental science or equivalent, and has a minimum of two (2) years work experience in Western Australian flora identification and undertaking flora surveys native to the bioregion being inspected or surveyed, or who is approved by the *CEO* as a suitable environmental specialist for the bioregion, and who holds a valid flora licence issued under the *Biodiversity Conservation Act 2016*;

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

environmental specialist means a person who is engaged by the Permit Holder for the purpose of providing environmental advice, who holds a tertiary qualification in environmental science or equivalent,

and has experience relevant to the type of environmental advice that an environmental specialist is required to provide under this Permit;

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, and who holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*;

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

local provenance means native vegetation seeds and propagating material from natural sources within 100 kilometres of the area cleared;

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;

planting means the re-establishment of vegetation by creating favourable soil conditions and planting seedlings of the desired species;

priority flora means those plant taxa described as priority flora classes 1, 2, 3, or 4 in the Department of Biodiversity, Conservation and Attractions Threatened and Priority Flora List for Western Australia (as amended from time to time).

regenerate/ed/ion means re-establishment of vegetation from in situ seed banks and propagating material (such as lignotubers, bulbs, rhizomes) contained either within the topsoil or seed-bearing *mulch*;

rehabilitate/ed/ion means actively managing an area containing native vegetation in order to improve the ecological function of that area;

revegetate/ed/ion means the re-establishment of a cover of *local provenance* native vegetation in an area using methods such as natural *regeneration*, *direct seeding* and/or *planting*, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area;

targeted flora survey: means a field-based investigation, including a review of established literature, of the biodiversity of flora and vegetation of the Permit Area, focusing on habitat suitable for flora species which are being targeted. The targeted flora survey must be conducted having regard to *EPA's Technical Guidance – Flora EIA.* Where targeted flora are located, the whole extent of the population should be surveyed, including areas not contained within the Permit Area;

threatened flora means those plant taxa listed as threatened flora under the *Biodiversity Conservation Act 2016*; 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.

Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

20 July 2020

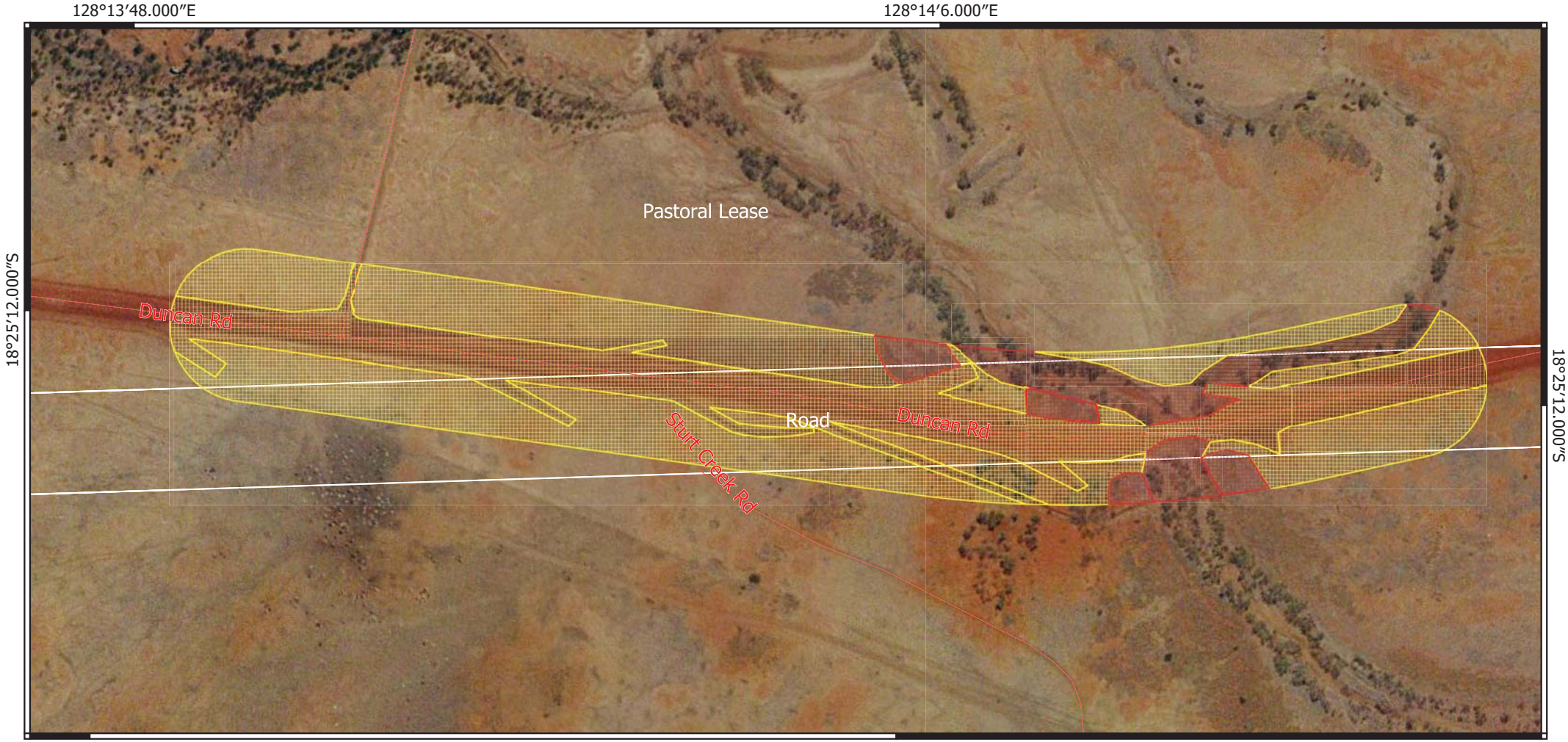
Appendix 1

Burrow Excavation

The following procedures should be followed when excavating greater bilby burrows:

- Burrow excavation requires two people, each with a blunt-nosed shovel and/or garden trowels. It may take up to several hours to excavate a greater bilby burrow, depending on its length and other characteristics.
- To maintain sight of the burrow, place the shovel handle down the burrow entrance as far as possible.
- Slice away the ceiling with the second shovel or trowel, removing the sides and surrounding soils as required.
- Continue to slide the first shovel down into the burrow chamber so the burrow is not lost during excavation.
- Remove the soil with the second shovel or trowel as excavation proceeds and repeat.
- Excavate the burrow slowly and carefully, and stop often to see if a greater bilby is within reach or the end of the burrow is visible (a torch may be required). Be aware that other fauna species may be utilising the burrow.
- Do not collapse the burrow ahead of the shovel or trowel inside the burrow. Feel the shovel contact the other shovel with each stroke to avoid striking a greater bilby.
- Always excavate the burrow to its absolute end – be aware of forks, branches and plugged chambers and ensure all are excavated and inspected.
- If any fauna is observed, it may be either displaced or captured. Note that venomous species may be present in burrows.
- If a juvenile greater bilby is captured, then reunite with mother if possible by direct insertion into the pouch and taping.
- After excavating the burrow, fill in the remaining hole.

Plan 8654/1a



Legend

- CPS areas approved to clear
- CPS areas subject to flora survey conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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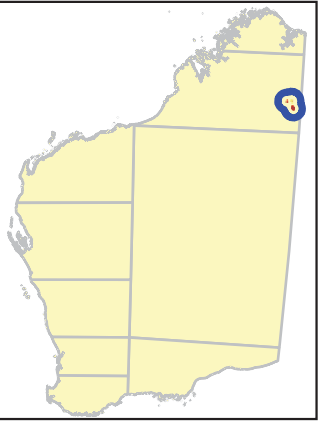

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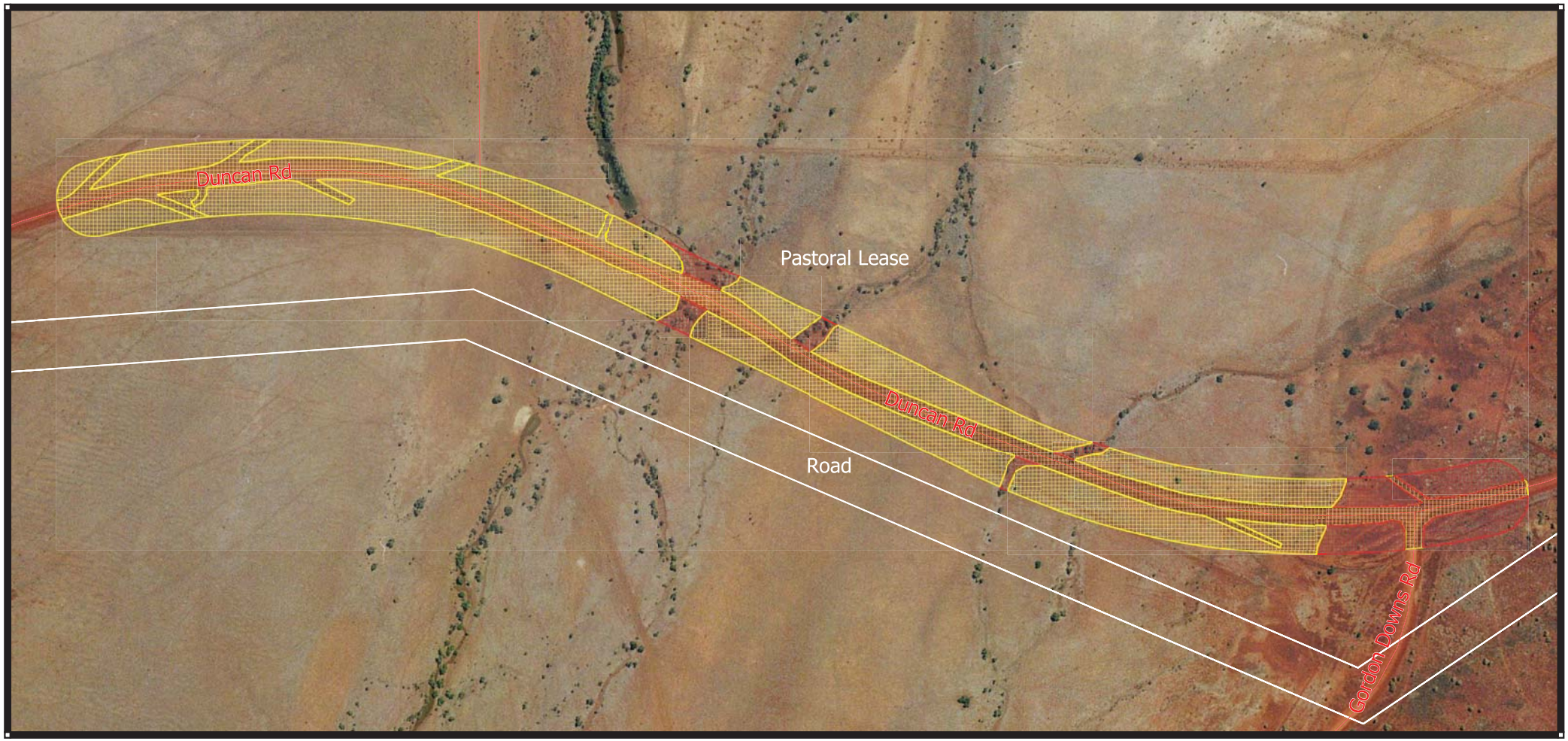

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- Cadastre - LGATE 218

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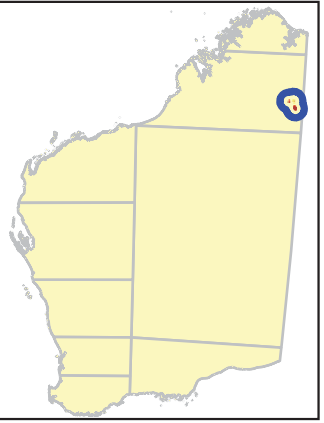

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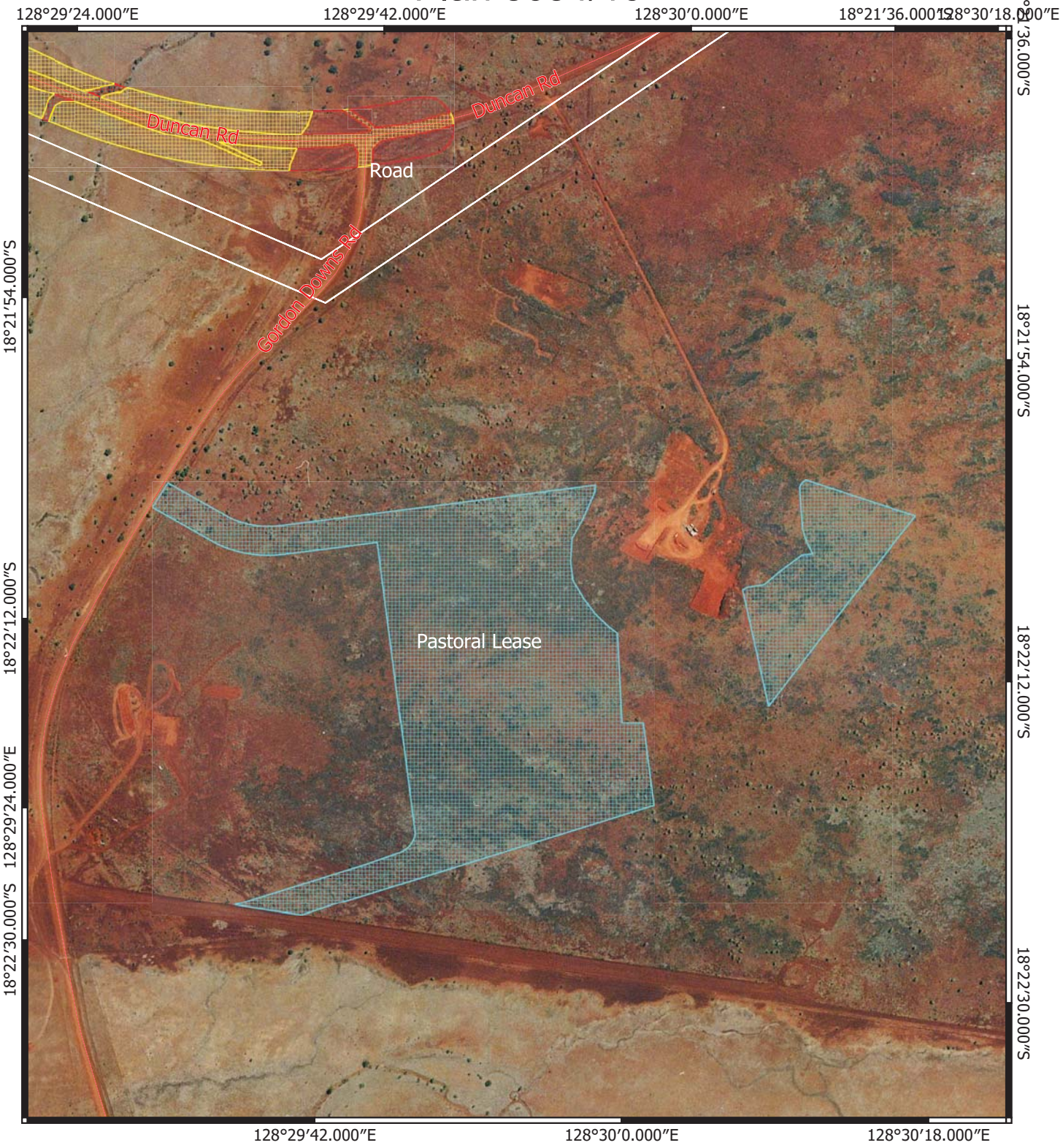

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- CPS areas subjust to flora survey and rehabilitation conditions
- 50 km buffer
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- Cadastre - LGATE 218

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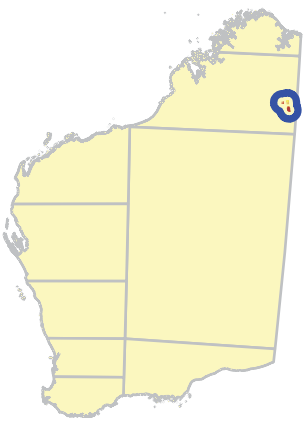

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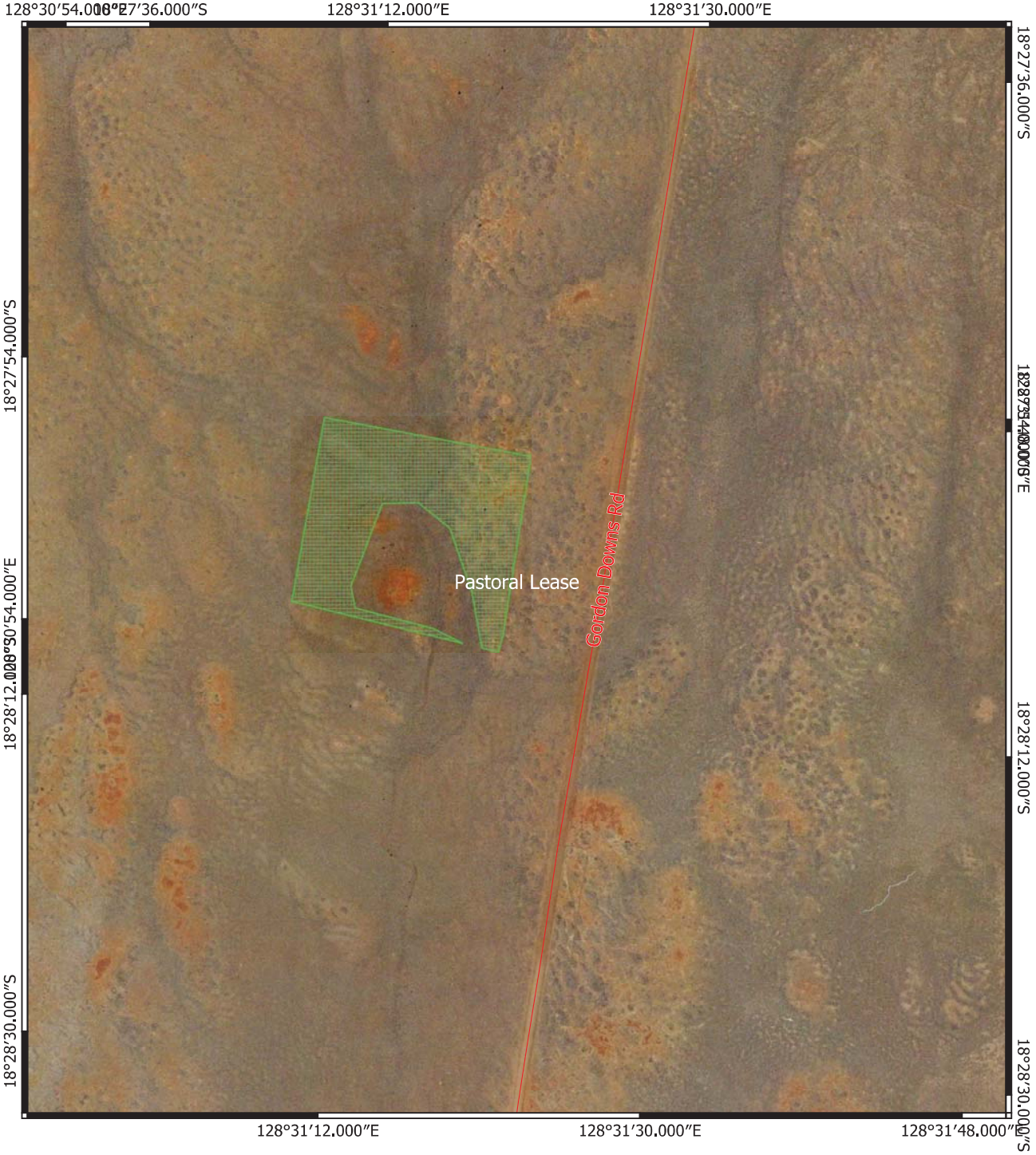

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- CPS areas subject to rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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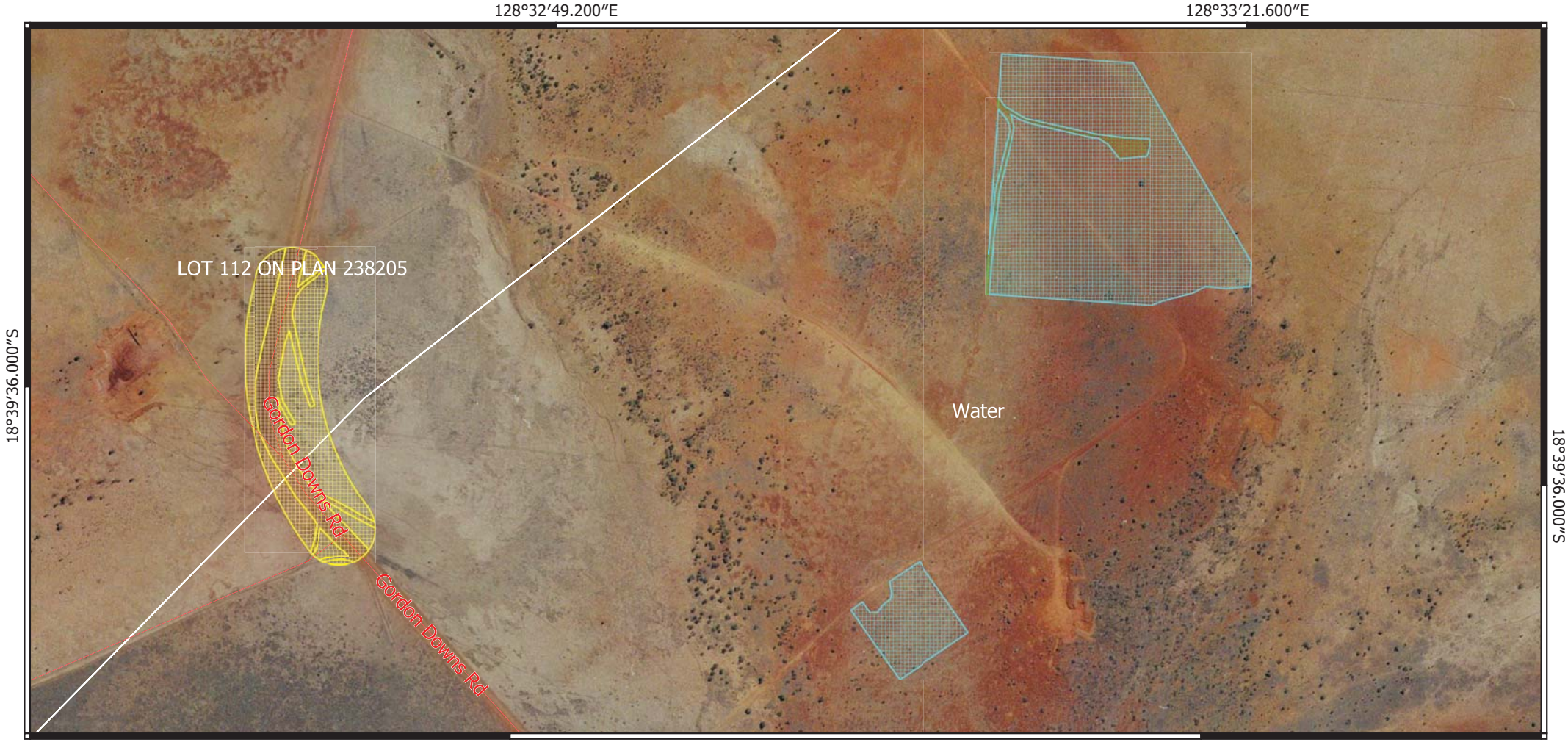

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- CPS areas approved to clear
- CPS areas subject to flora survey and rehabilitation conditions
- CPS areas subject to rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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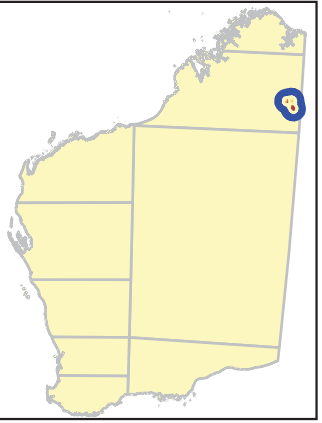

Plan 8654/1f

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- Cadastre - LGATE 218

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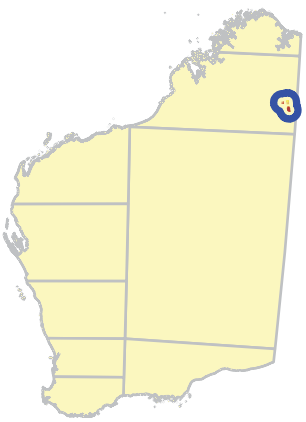

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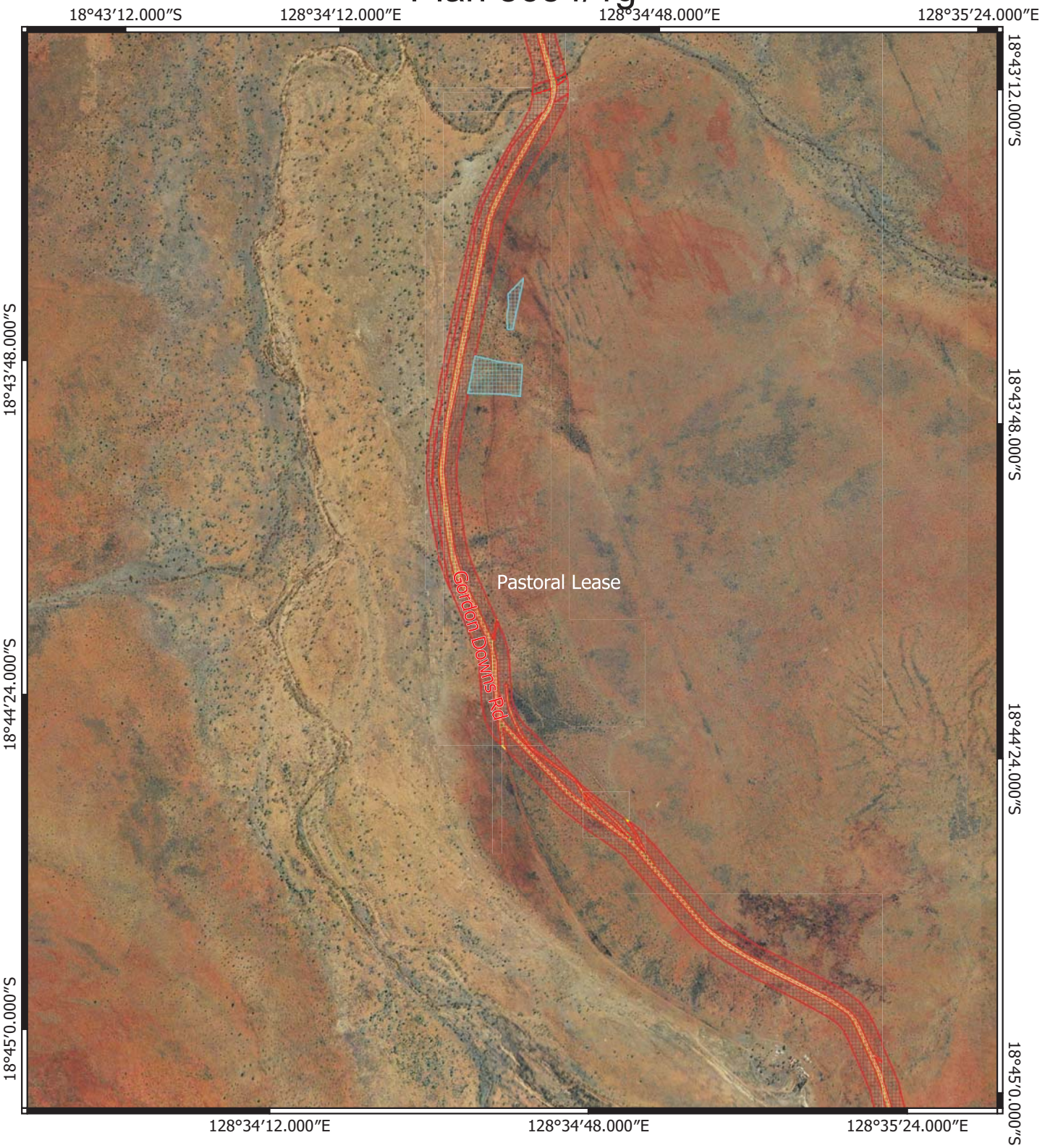

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- 50 km buffer
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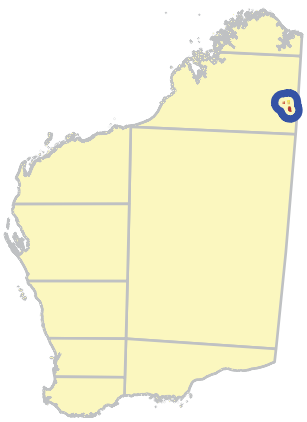

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Plan 8654/1h

Legend

- CPS areas approved to clear
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- CPS areas subject to flora survey and rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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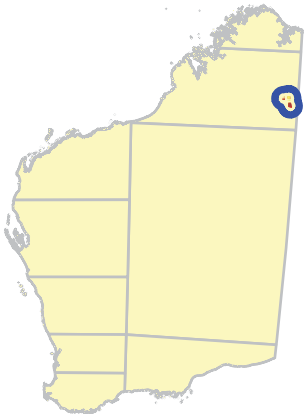

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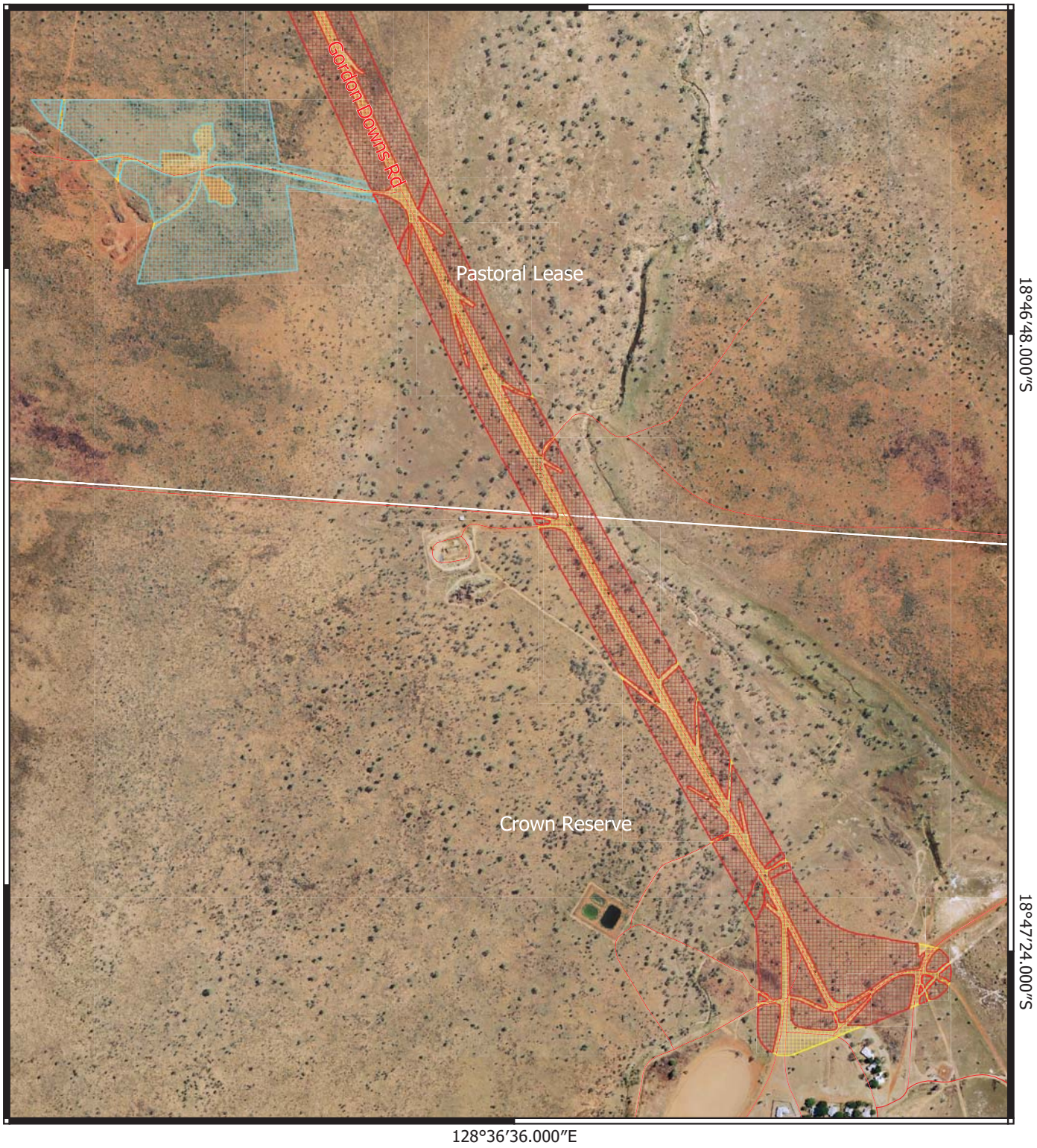

Legend

- CPS areas approved to clear
- CPS areas subject to flora survey conditions
- CPS areas subject to flora survey and rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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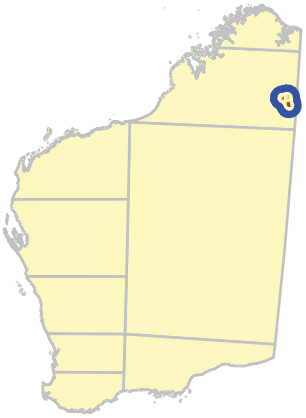

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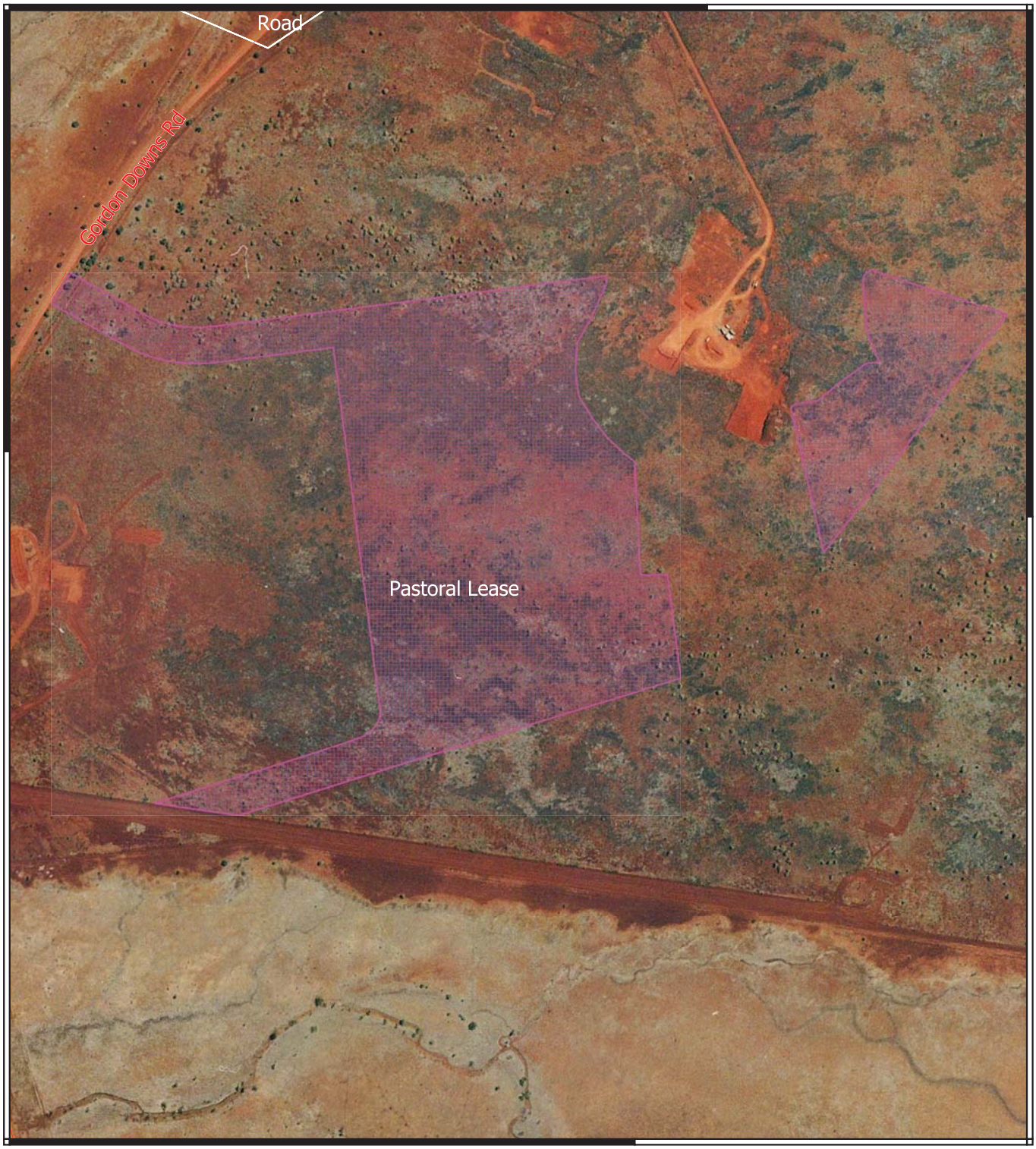

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- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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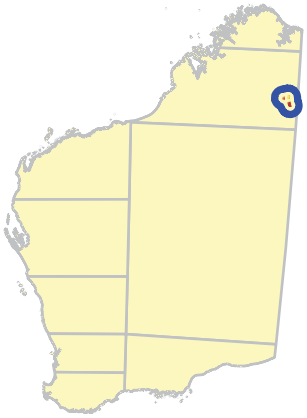

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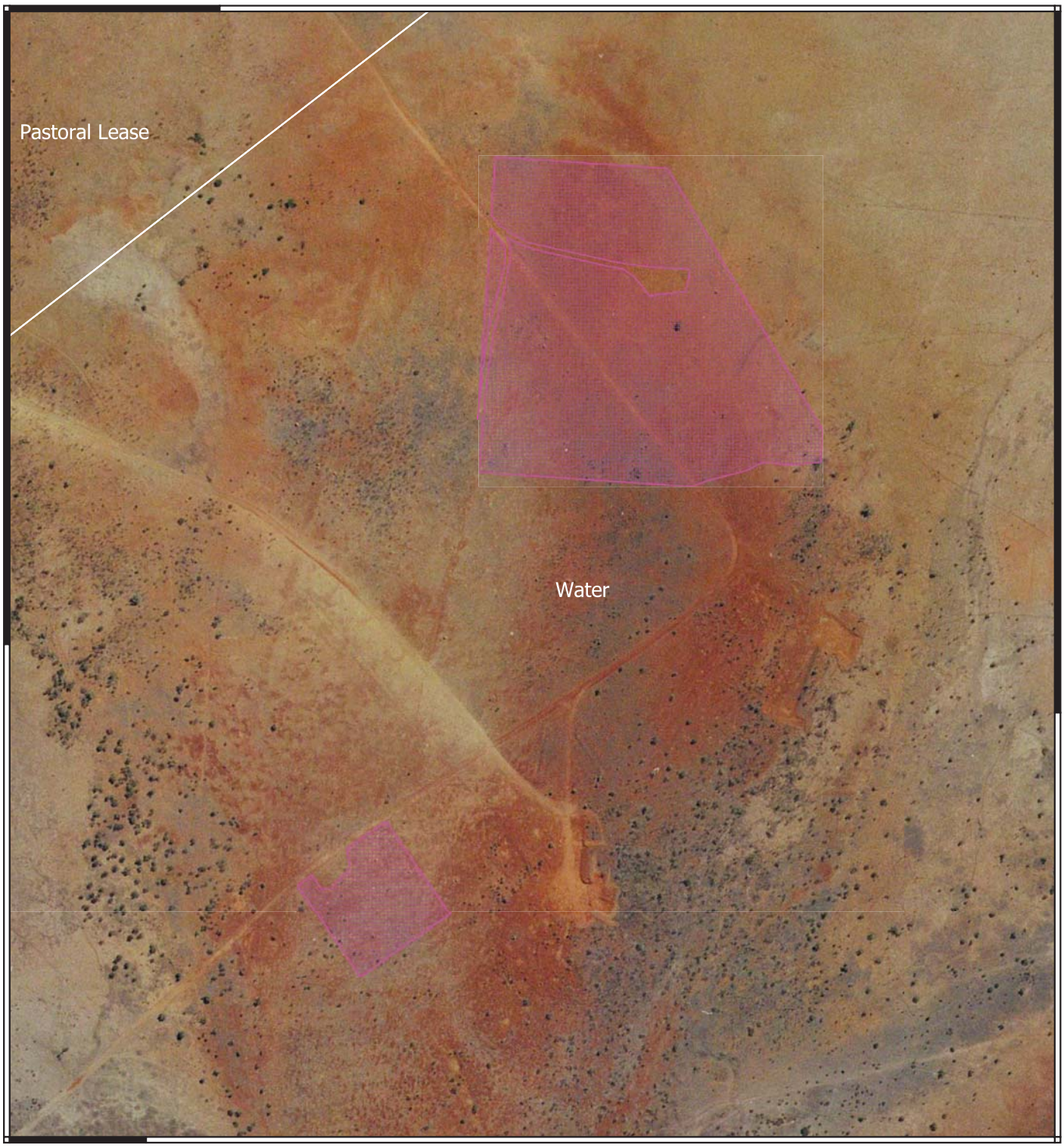
Plan 8654/1k



Legend

- CPS area subject to fauna conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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GOVERNMENT OF WESTERN AUSTRALIA

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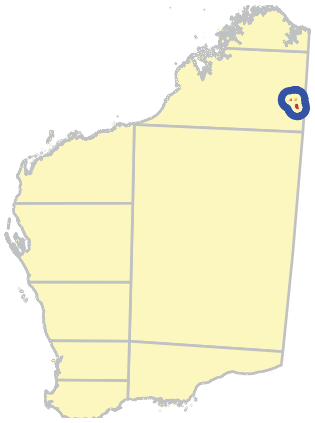


Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1. Application details and outcome

1.1. Permit application details

Permit number:	CPS 8654/1
Permit type:	Purpose permit
Applicant name:	Shire of Halls Creek
Application received:	23 August 2019
Application area:	61.3 hectares (ha) of native vegetation within a 230 hectare envelope
Purpose of clearing:	Road upgrades and extraction activities for associated works
Method of clearing:	Mechanical Removal
Property:	Lot 63 On Plan 220788, Ord River Lot 62 On Plan 216499, Sturt Creek Lot 350 On Plan 64837, Ord River Lot 116 On Plan 220788, Ord River Lot 112 On Plan 238205, Sturt Creek Water Feature (PIN 1115562), Sturt Creek Duncan Road Reserve (PIN 11710892), Ord River
Location (LGA area/s):	Shire of Halls Creek
Localities (suburb/s):	Sturt Creek, Ord River

1.2. Description of clearing activities

The vegetation applied to be cleared is distributed across 10 separate areas, including four areas of road upgrades and six areas for material extraction (see Figure 1, Section 1.5). The clearing permit is for stage 1 upgrades to Duncan and Gordon Downs Road, with upgrades to floodways and areas of material extraction for this stage, and subsequent stages of road upgrades. Duncan and Gordon Downs Road is the only road to access the Ringer Soak Community, and Stage 1 upgrades will reduce the period in which the community is inaccessible by road due to seasonal flooding.

The application was revised during the assessment process in response to a request from the Department of Water and Environmental Regulation (DWER) for further information. The changes included:

- the removal of proposed groundwater bores from the purpose and some areas of proposed road upgrades; and
- an overall reduction in the amount of clearing from 142.67 ha within a 1,505 ha envelope to 61.3 ha within a 230 ha envelope.

1.3. Decision on application and key considerations

Decision:	Granted
Decision date:	20 July 2020
Decision area:	61.3 hectares (ha) of native vegetation within a 230 ha envelope, as depicted in Section 1.5, below.

1.4. Reasons for decision

This clearing permit application was made in accordance with section 51E of the *Environmental Protection Act 1986* (EP Act) and was received by DWER on 23 August 2019. The application was advertised for public comment for 21 days and one submission was received.

In undertaking the assessment, and in accordance with section 51O of the EP Act, the Delegated Officer has given consideration to the Clearing Principles in Schedule 5 of the EP Act (see Appendix D), relevant datasets (see Appendix E), surveys undertaken by the applicant, planning instruments, and any other pertinent matters deemed relevant to the assessment (see Section 3). Consideration of matters raised in the public submission is summarised in Appendix B. The Delegated Officer also took into consideration the purpose of the clearing is to improve access to the Ringer Soak Community, which is current cut off from Halls Creek for extended periods due to flooding. The assessment identified that the proposed clearing will result in the following:

- the potential to have a significant impact on four conservation significant flora species (see Section 3.2.1)
- presence of a Priority 3 Priority Ecological Community (PEC)
- habitat considered suitable for the greater bilby (*Macrotis lagotis*) (see Section 3.2.2)
- may lead to short term impacts to surface water quality through sedimentation and has a risk of land degradation through water erosion (see Section 3.2.3).

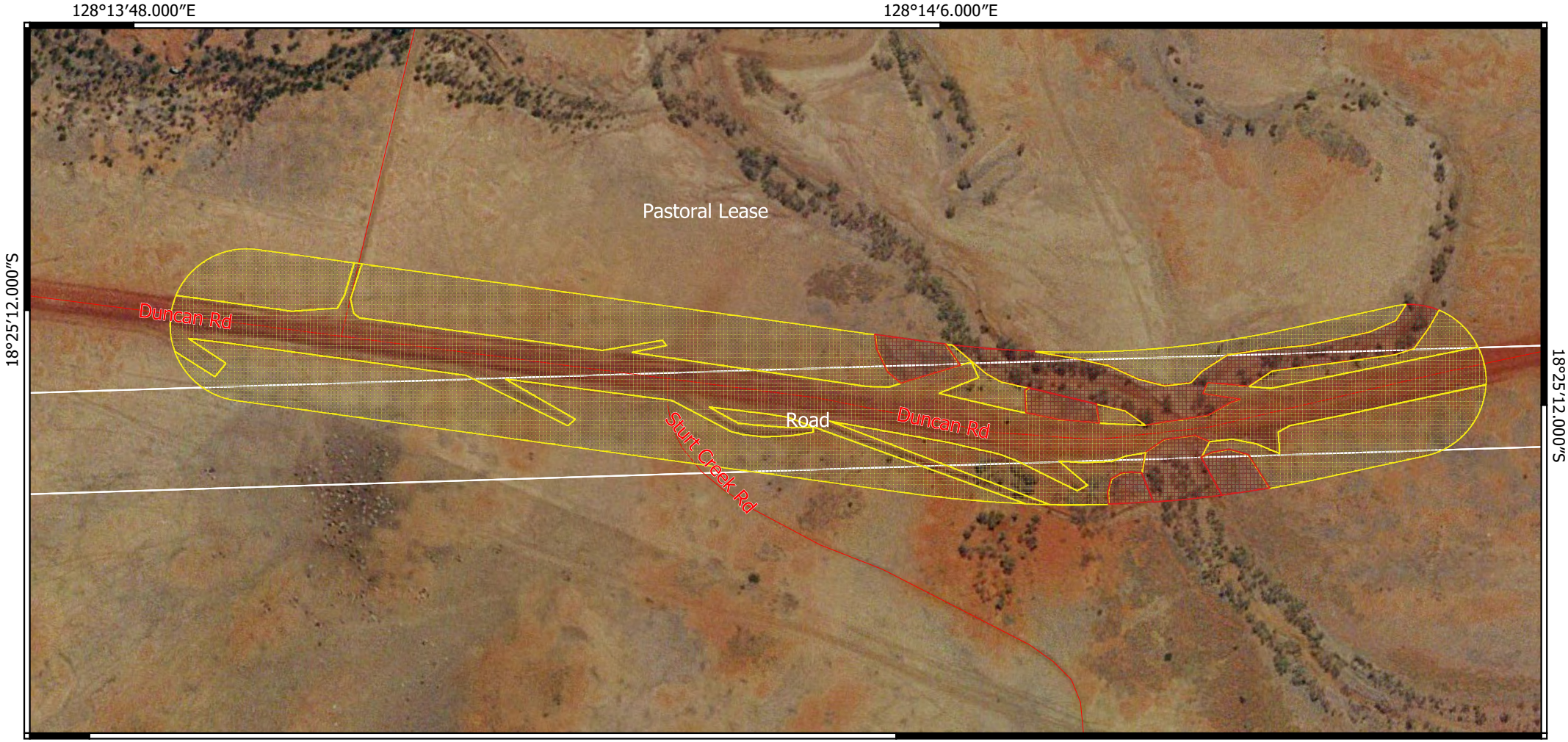
After consideration of the available information, as well as the applicants avoidance and minimisation measures (see Section 3.1), the Delegated Officer determined that with appropriate management conditions, the proposed clearing is not likely to lead to an unacceptable risk to the environment. The Delegated Officer decided to grant a clearing permit subject to conditions to:

- avoid, minimise and reduce the impacts and extent of clearing
- pre-clearance bilby surveys in extractive areas of suitable habitat to minimise the potential impacts to threatened fauna, ensuring that individuals are not impacted during the clearing process (see Section 3.2.2)
- slow, directional clearing to allow fauna to escape into the surrounding vegetation
- take steps to minimise the introduction and spread of weeds to minimise impact to the surrounding vegetation
- pre-clearance flora surveys to determine the presence of conservation significant flora within the application area; if individuals are located and cannot be avoided, a flora management plan will be prepared in consultation with the Department of Biodiversity, Conservation and Attractions (DBCA)
- rehabilitation of areas cleared for material extraction to minimise the long term impacts of the proposed clearing, in particular the PEC
- record keeping and reporting requirements.

1.5. Site map(s)

The areas cross-hatched yellow indicates the areas authorised to be cleared under the granted clearing permit. The areas cross-hatched red indicates areas within which flora surveys must be undertaken prior to clearing. The areas cross-hatched light blue indicates areas within which flora surveys must be undertaken prior to clearing and rehabilitation must be undertaken. The area cross-hatched green indicates the area in which rehabilitation must be undertaken. The areas cross-hatched pink indicate areas in which pre-clearance fauna surveys must be undertaken.

Plan 8654/1a



Legend

- CPS areas approved to clear
- CPS areas subject to flora survey conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

N

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Officer delegated under section 20 of the Environmental Protection Act 1986

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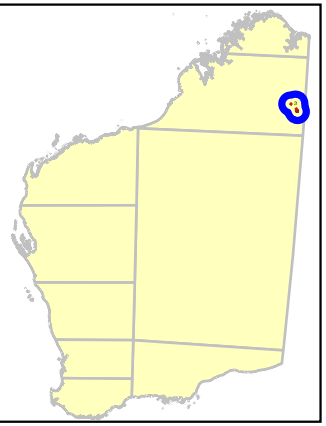

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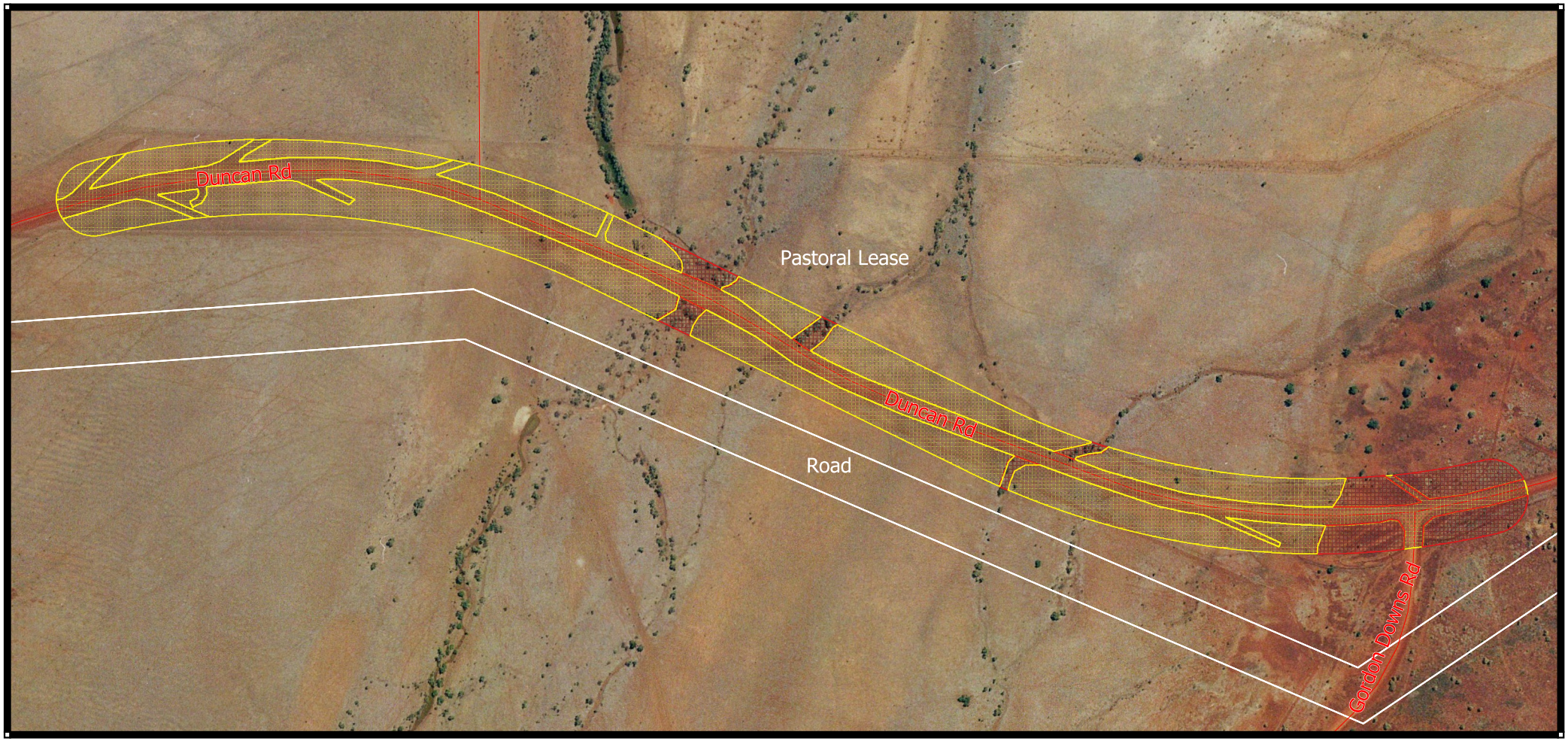

Legend

- CPS areas approved to clear
- CPS areas subject to flora survey conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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Officer delegated under section 20 of the Environmental Protection Act 1986

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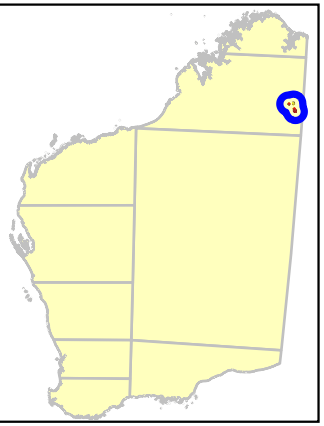

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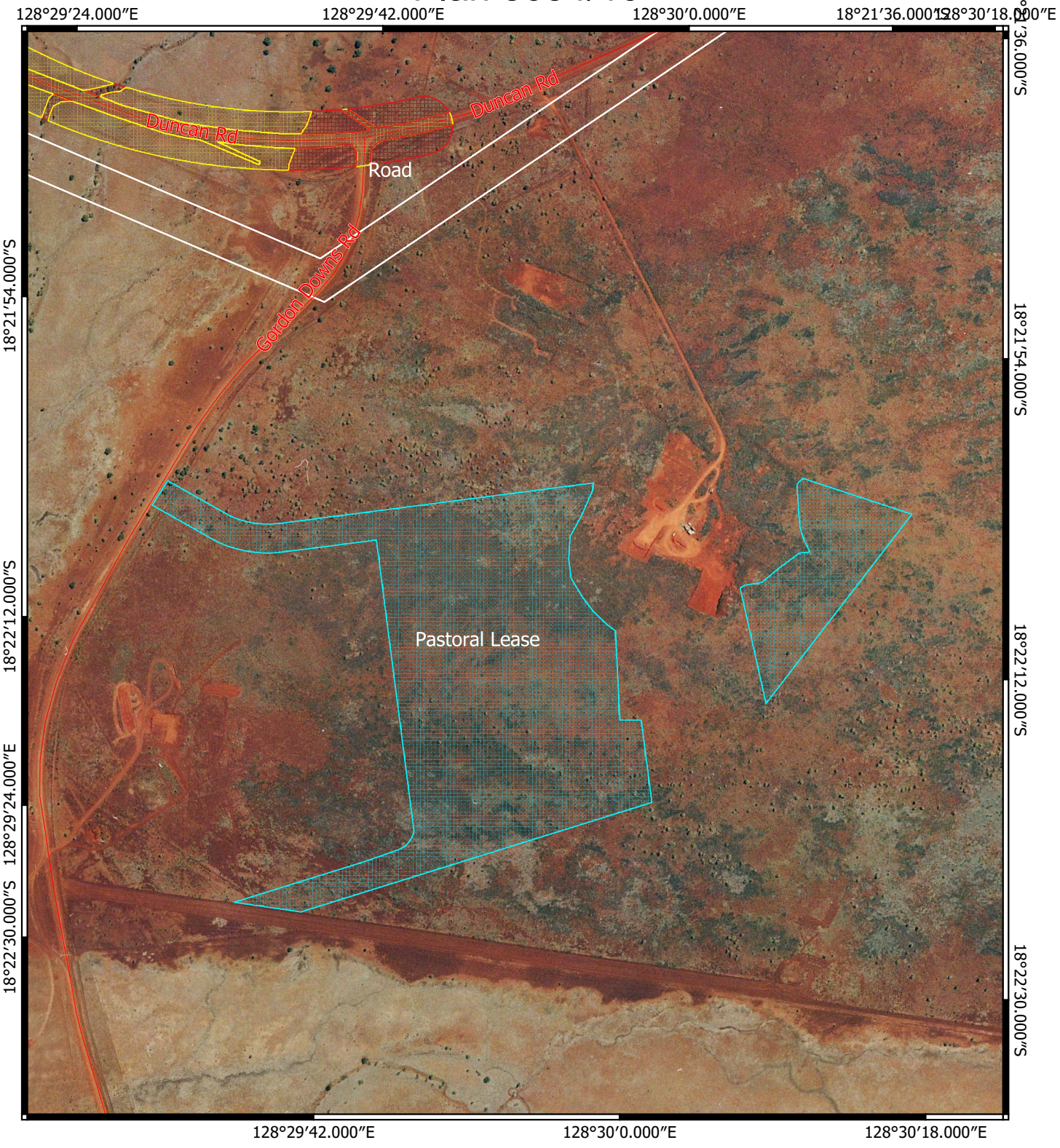

Legend

- CPS areas approved to clear
- CPS areas subject to flora survey conditions
- CPS areas subjust to flora survey and rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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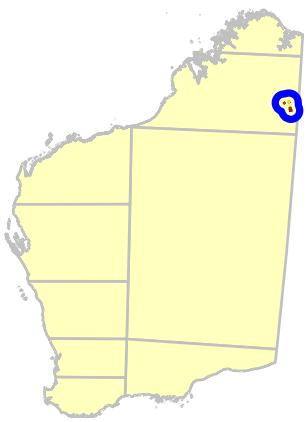

GOVERNMENT OF WESTERN AUSTRALIA

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Draft Plan 8654/1d

Legend

- CPS areas subject to rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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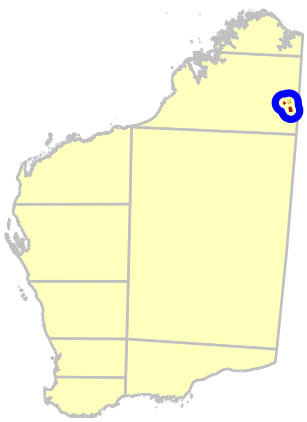

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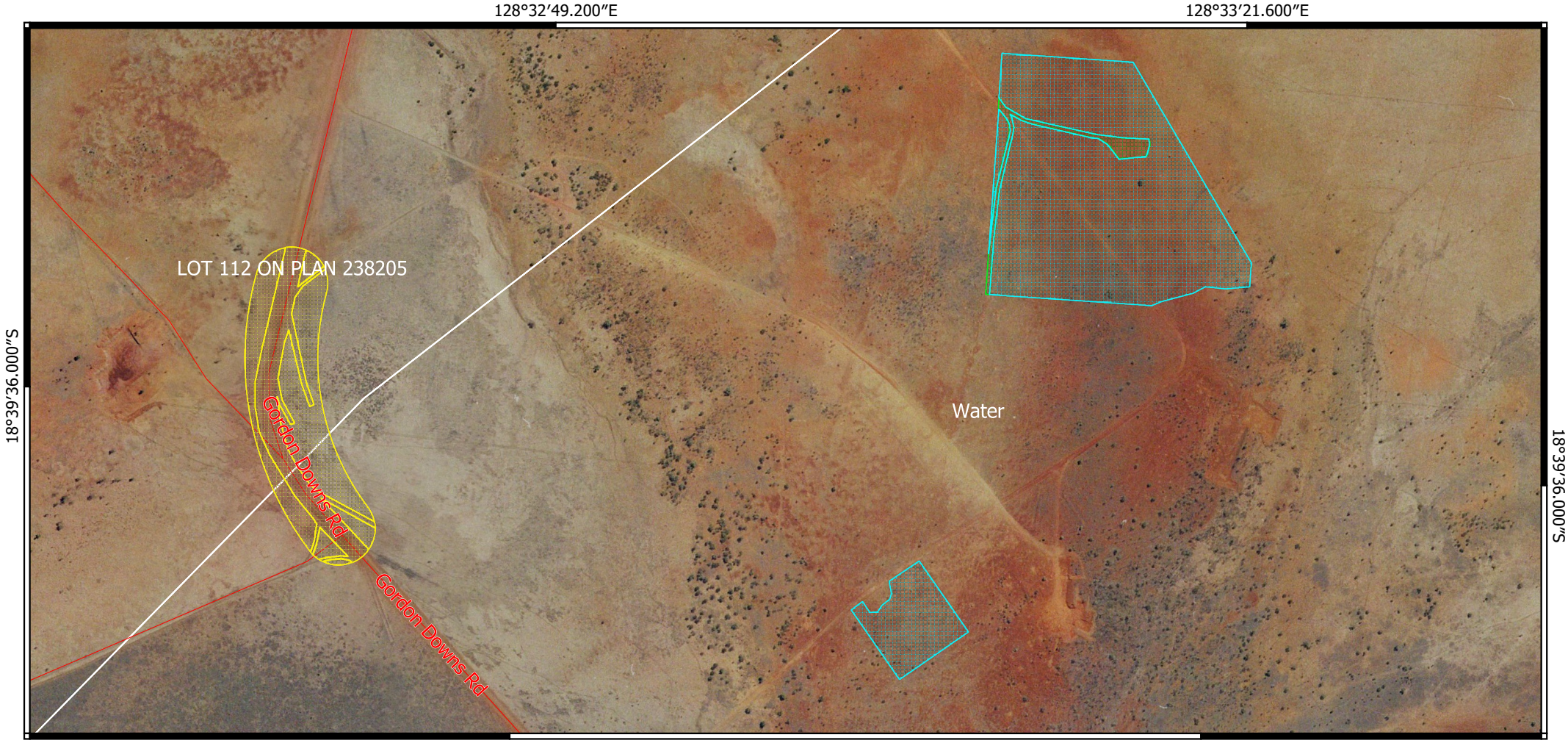

Legend

- CPS areas approved to clear
- CPS areas subject to flora survey and rehabilitation conditions
- CPS areas subject to rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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Officer delegated under section 20 of the Environmental Protection Act 1986

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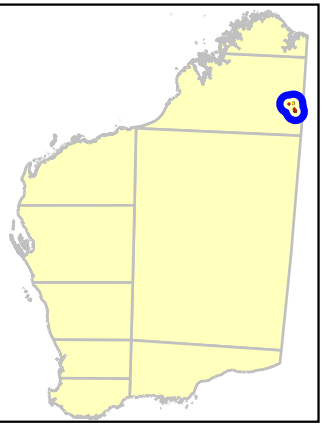

Plan 8654/1f

Legend

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- CPS areas subject to flora survey and rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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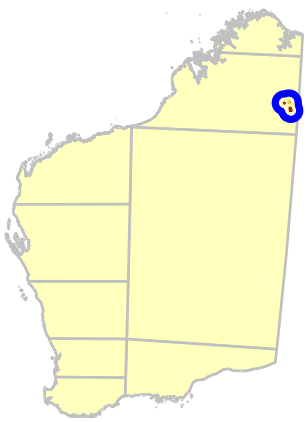

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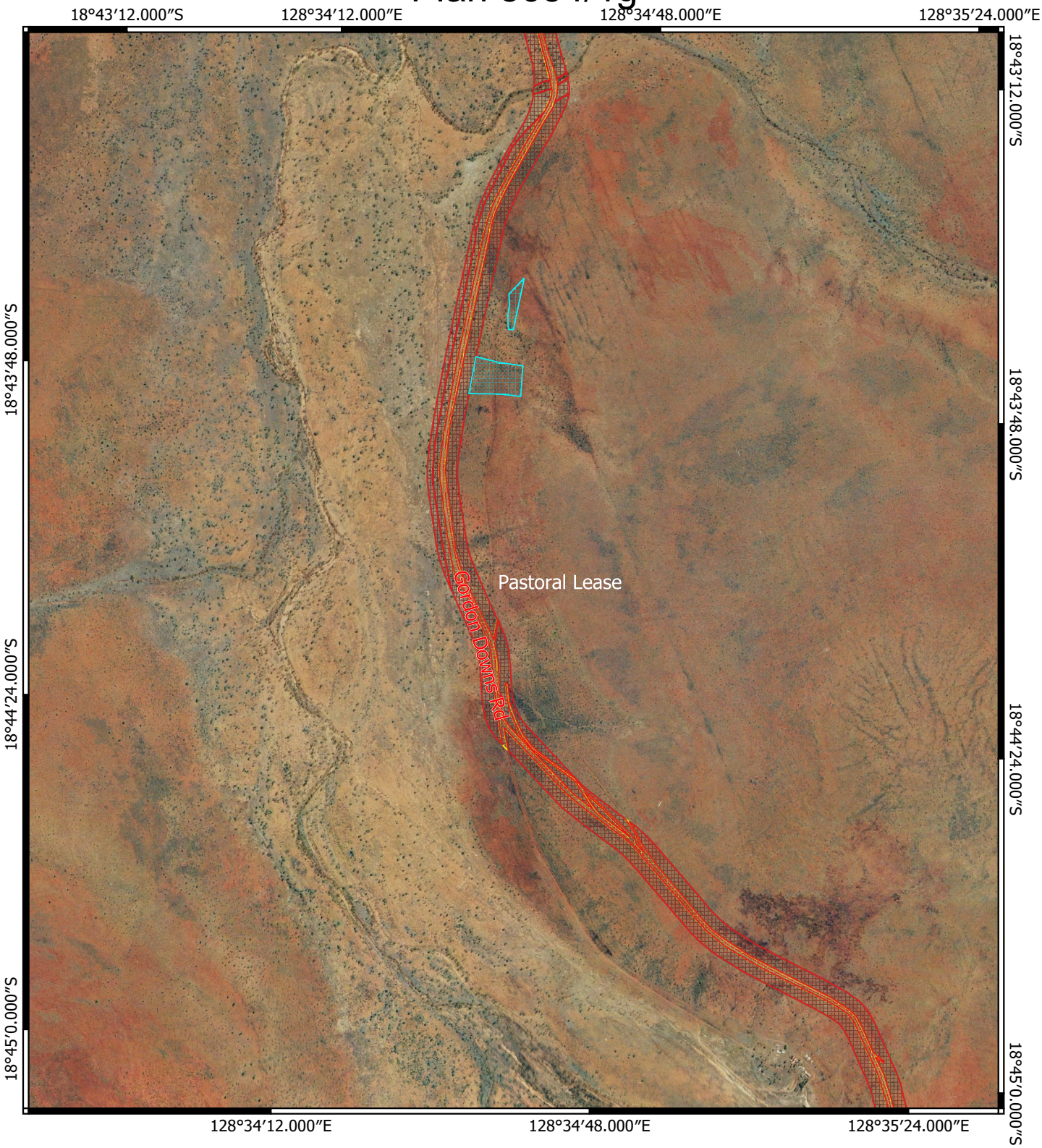

Legend

- CPS areas approved to clear
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- CPS areas subject to flora survey and rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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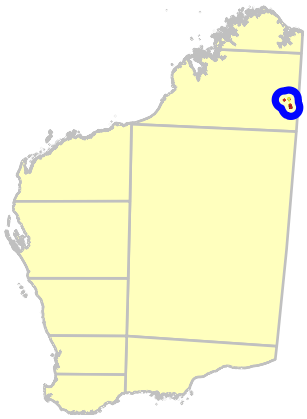

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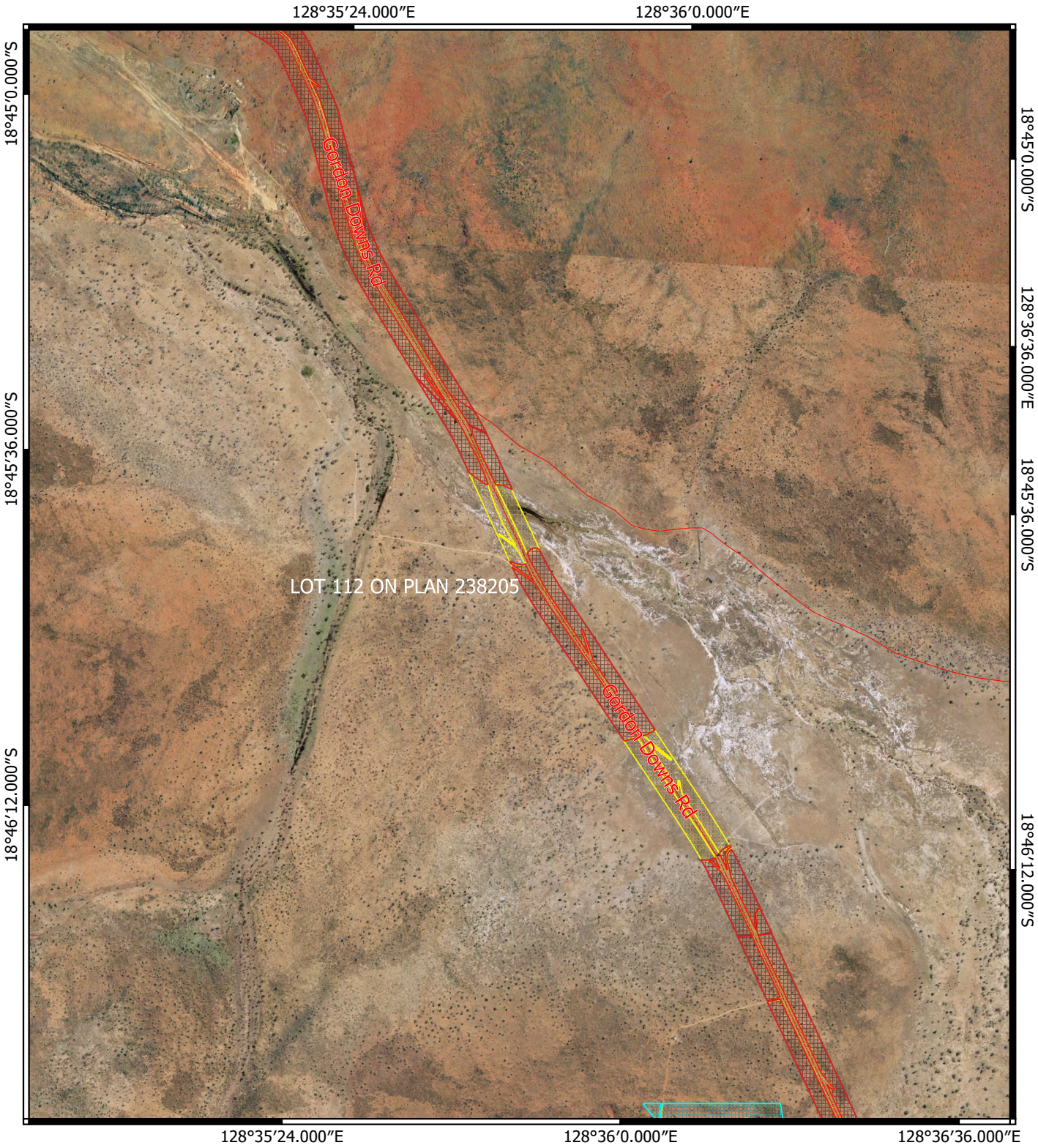

Legend

- CPS areas approved to clear
- CPS areas subject to flora survey conditions
- CPS areas subject to flora survey and rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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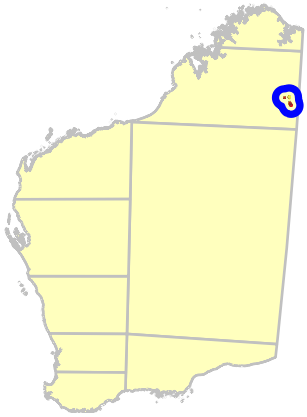

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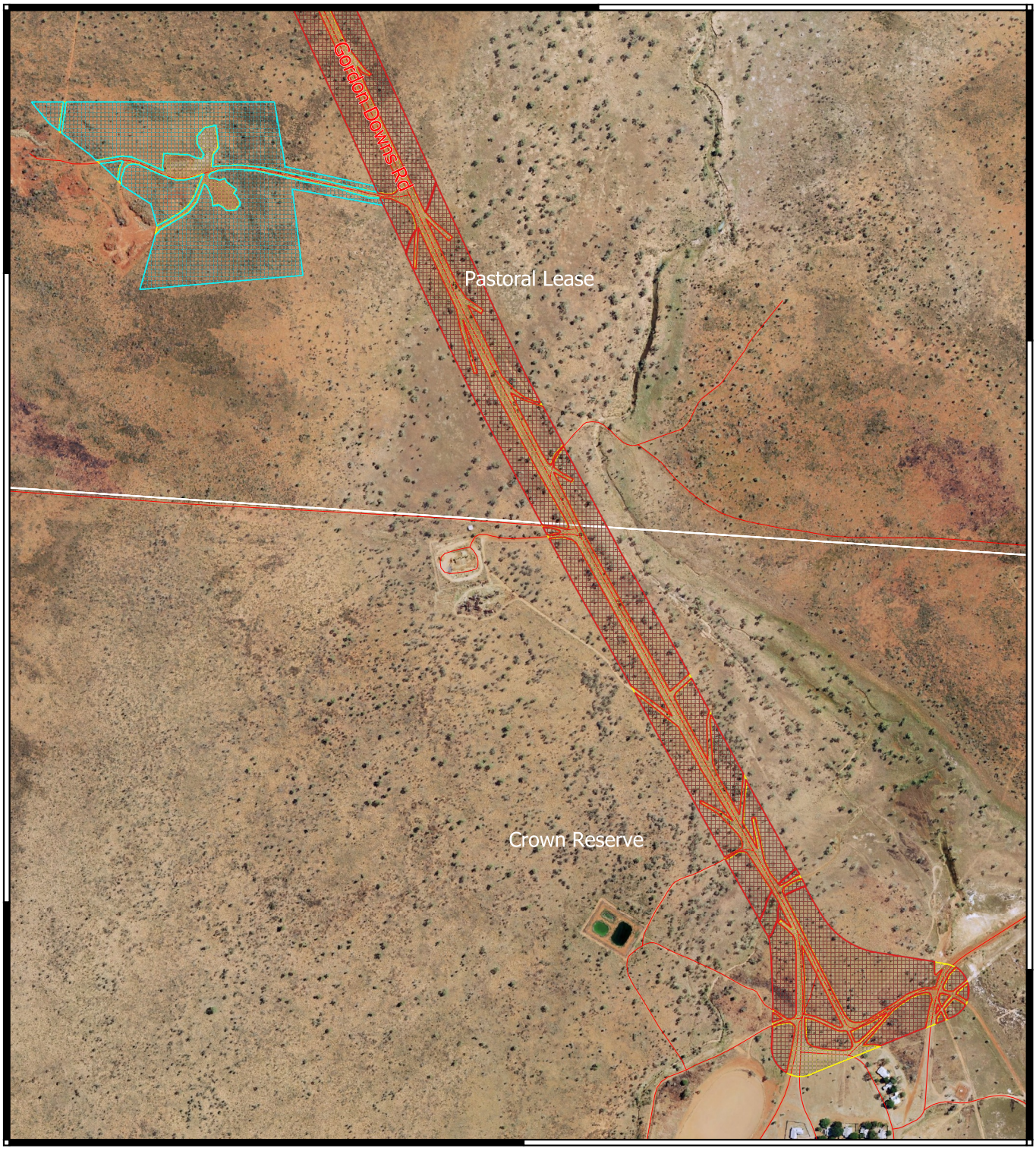
Plan 8654/1i



Legend

- CPS areas approved to clear
- CPS areas subject to flora survey conditions
- CPS areas subject to flora survey and rehabilitation conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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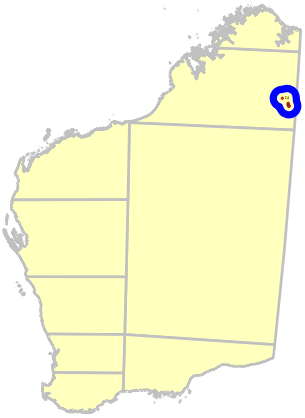

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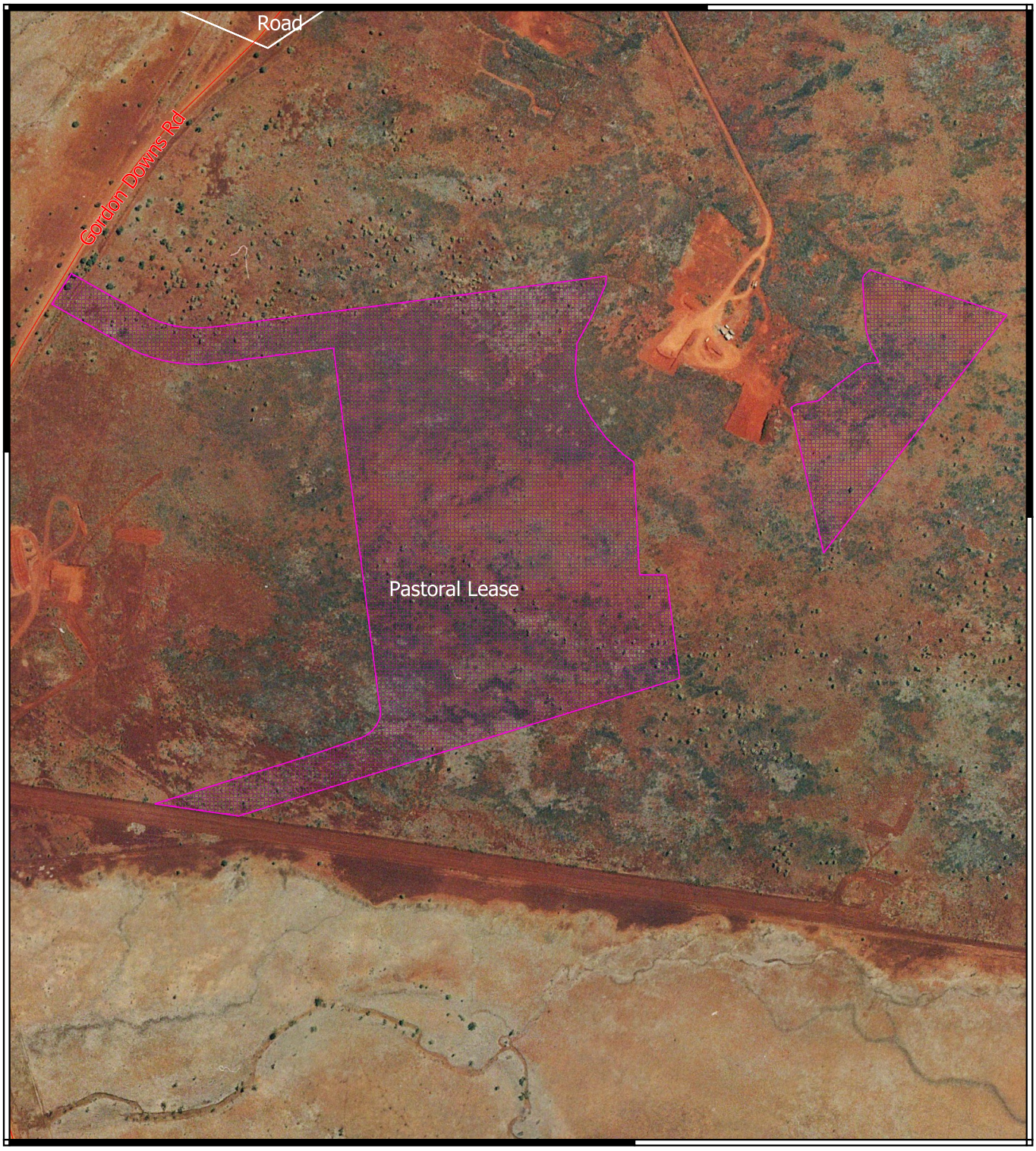

Legend

- CPS area subject to fauna conditions
- 50 km buffer
- Road Centrelines
- Cadastre - LGATE 218

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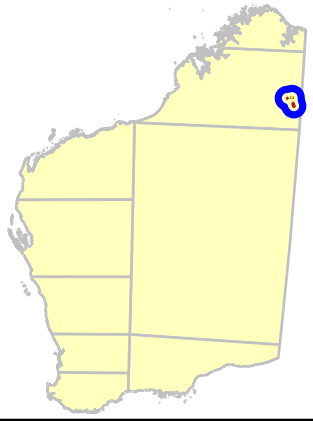

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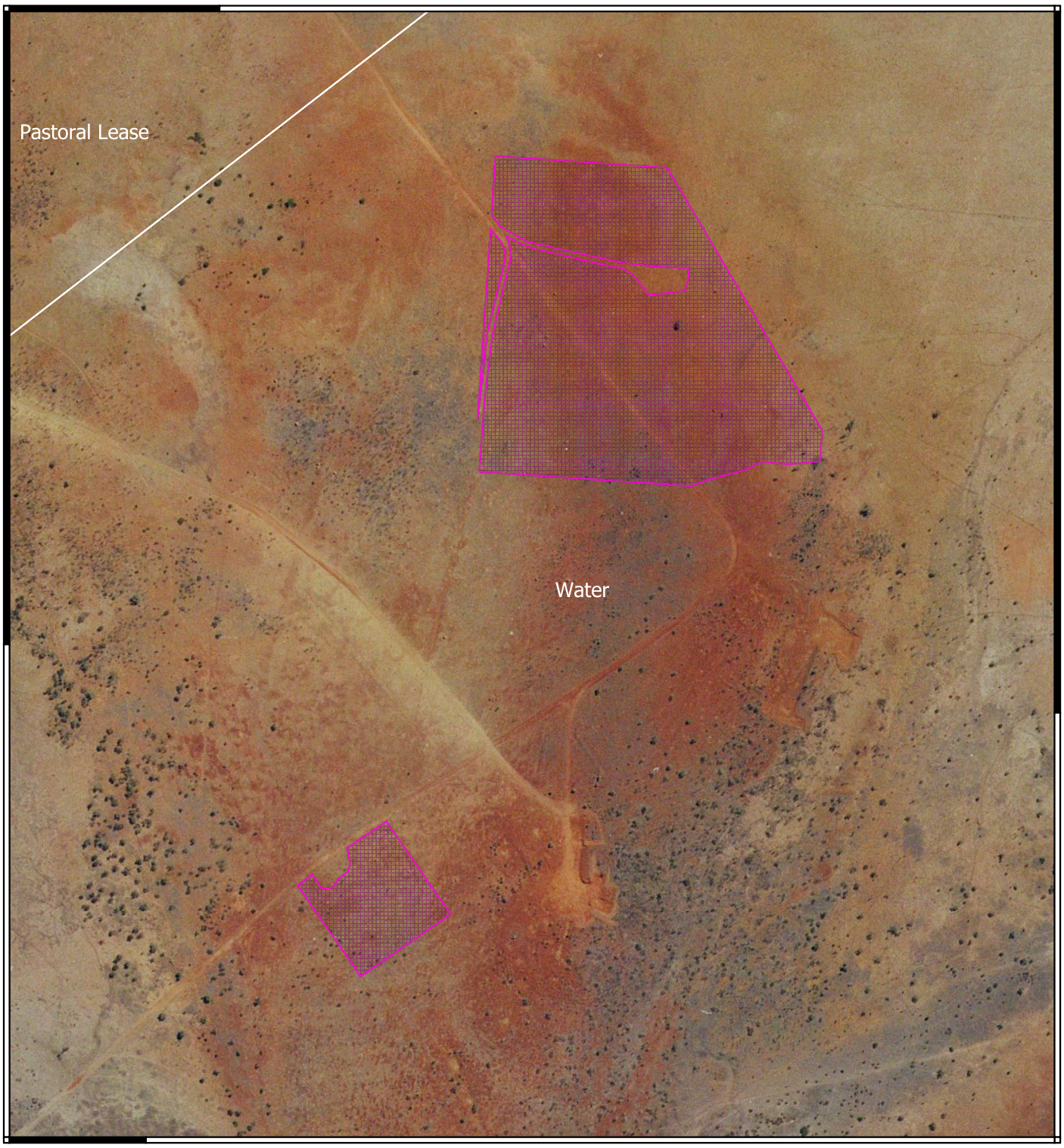

Legend

- CPS area subject to fauna conditions
- 50 km buffer
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- Cadastre - LGATE 218

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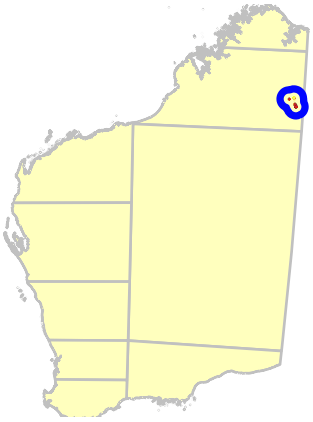

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GOVERNMENT OF WESTERN AUSTRALIA

Officer delegated under section 20 of the Environmental Protection Act 1986

2. Legislative context

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.3), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

1. the precautionary principle;
2. the principle of intergenerational equity;
3. the principle of the conservation of biological diversity and ecological integrity; and
4. the polluter pays principle

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P&D Act)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- Technical guidance – *Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016)
- Technical guidance – *Terrestrial Fauna Surveys for Environmental Impact Assessment* (EPA, 2016)

3. Detailed assessment of application

3.1. Avoidance and mitigation measures

The following evidence was submitted by the applicant to demonstrate that avoidance, and mitigation measures have been applied to the proposed clearing method:

- A reduction in the clearing area from 142.67 ha to 61.3 ha
- Pre-clearance surveys for bilbies
- Pre-clearance targeted flora survey for species which may be significantly impacted by the proposed clearing. Flora Management Plan/s will be prepared and implemented if impacts to conservation significant flora cannot be avoided
- Construction Environment Management Plan (CEMP) prepared, outlining strategies to minimise risk of environmental damage, including:
    - The preparation of a rehabilitation plan
    - Clearing area demarcation
    - Staff training and inductions
    - Limiting vehicle speeds during works
    - Weed mapping
    - Pollution spill procedures
    - Main Road bridge specification to minimise impacts to hydrological regime
    - Limited timeframe for construction (dry season) to minimise erosion
    - Limited scope of works to minimise erosion (reduction in clearing area)
    - Main Roads safety standards (MRWA, 2020a).

This adequately demonstrated that all reasonable efforts had been taken to avoid and minimise potential impacts of the clearing on environmental values.

3.2. Assessment of environmental impacts

In assessing the application in accordance with section 51O of the EP Act, the Delegated Officer has examined the application and site characteristics (Appendix C) and considered whether the clearing poses a risk to environmental values. The assessment against the Clearing Principles is contained in Appendix D.

This assessment identified that the clearing may pose a risk to the environmental values of flora and fauna, and land and water resources, and that these required further consideration. The detailed consideration and assessment of the clearing impacts against the specific environmental values is provided below. Where the assessment found that the clearing presents an unacceptable risk to environmental values, conditions aimed at controlling and/or ameliorating the impacts have been imposed under sections 51H and 51I of the EP Act. These are also identified below.

3.2.1. Environmental value: biological values (flora) – Clearing Principles (a), (c) and (d)

Assessment: Due to the linear nature of the proposed clearing area over a wide range of habitats and the results of surveys undertaken in adjacent areas (Outback Ecology, 2014a; Outback Ecology, 2014b), there is sufficient information to determine the level of biodiversity proposed to be cleared. Based on the level of remnant vegetation remaining in the local area (>99 per cent), the vast majority of the floristic biodiversity within the proposed clearing area is likely to be represented elsewhere in the landscape.

A total of 11 conservation significant flora species have been previous recorded within the local area. Based on the wide range of vegetation types that are proposed to be cleared within the application area, it was determined that suitable habitat for 10 of the flora species may occur within the application area. Due to travel restrictions associated with the COVID-19 pandemic, on-ground surveys to quantify the floristic diversity of the application area, including a targeted flora survey, could not be undertaken. A more detailed desktop assessment, incorporating the results of the fauna habitat survey undertaken in 2020, was provided (MRWA, 2020b). The results of this survey, advice from DBCA and DWER's desktop assessment, were used to determined that of the conservation significant flora recorded as likely to occur within the application area (see Appendix C), the presence of four species may be considered regionally or locally significant:

- *Eriachne armitii* (Priority 1)
- *Rorippa eustylis* (Priority 1)
- *Trachymene villosa* (Priority 1)
- *Triodia roscida* (Priority 1)

The proposed clearing was determined to have the potential to impact these species based on the restricted habitat requirements of *E. armitii*, *R. eustylis* and *Trachymene villosa*, and the small number of *Triodia roscida* records (DBCA, 2020). The remaining seven conservation significant species identified in the desktop assessment are well represented in other states and territories. DBCA (2020) advised that given the priority 3 species identified in the local area occur over a large range and is known from a number of locations, the potential impacts of the proposed clearing are unlikely to be significant to the conservation of the species.

Approximately 27 ha of the development envelope is mapped as Kimberley Vegetation Association 850, a priority 3 PEC. Of this area, approximately 17 ha is proposed to be cleared, of which the majority is located within material extraction areas, which will be rehabilitated post extraction. This community is well represented in the region, with 313,227 ha mapped remaining, of which 87 per cent is within the local area. It was determined that the proposed clearing will not significantly impact this PEC.

Outcome: Based on the above assessment, the Delegated Officer has determined that the proposed clearing is considered **acceptable subject to relevant conditions (see below)** in relation to this environmental value.

Conditions: To address the above impacts, the following conditions will be added to the permit:

- Weed control conditions to minimise impacts to adjacent vegetation
- Pre-clearance surveys for conservation significant flora within areas of suitable habitat, in which the proposed clearing may have significant impact on the species.
- Rehabilitation requirement for areas associated with material extraction to minimise long term impacts of the proposed clearing on biodiversity, including the PEC.

3.2.2. Environmental value: biological values (fauna) – Clearing Principle (b)

Assessment: There is a large proportion of vegetation remaining within the region (>99 per cent), including the local area and the application area is predominately linear in nature. DBCA (2020) advised that the vegetation communities proposed to be impacted are relatively common in the area. The proposed clearing is not likely to contribute to significant habitat for common fauna species. Impacts to individuals may occur as a result of the clearing; undertaking clearing in a slow progressive manner into adjacent remnant vegetation will minimise impacts to individuals.

A total of 26 conservation significant fauna species have been recorded in the local area. Four conservation significant species were recorded during the site assessment: Glossy Ibis (*Plegadis falcinellus*), Little Curlew (*Numenius minutus*), Oriental Pratincole (*Glareola maldivarum*) and Sharp-tailed Sandpiper (*Calidris acuminata*), all listed as Specially Protected under the *Biodiversity Conservation Act 2016* (BC Act) and migratory under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (MRWA, 2020c). Of these, the Glossy Ibis was recorded within the assessment area, and the remaining three recorded outside of the application area during transit between locations (MRWA, 2020c). The four species recorded during the site assessment, and the majority of the conservation significant species identified during the desktop assessment have a very broad distribution and/or are migratory species. Based on the level of remnant vegetation in the area and the broad distribution of the conservation significant fauna species identified in the desktop assessment, it was determined that the vegetation within the proposed clearing area does not contribute to significant habitat for all species. However it

was determined that impacts to the greater bilby (*Macrotis lagotis*) may be significant if found within the application area.

A portion of the proposed clearing area has habitat that was determined to be suitable for the greater bilby, with important foraging species (e.g. *Acacia hilliana*) present and suitable soil types for burrows (Envisage Environmental Services, 2020). A targeted bilby survey of the proposed clearing area did not identify any evidence of bilbies, however noted that areas in which a large extent of clearing is proposed to be undertaken, namely material extraction pits, can provide important bilby habitat (Envisage Environmental Services, 2020). It was determined that due to the narrow, linear nature of the proposed clearing associated with the road upgrade portion of the application, these areas are not considered significant habitat for the bilby.

Based on the level of remnant vegetation within the local area, the proposed clearing will not impact upon an ecological linkage in the landscape.

Outcome: Based on the above assessment, the Delegated Officer has determined that the proposed clearing is considered **acceptable subject to relevant conditions (see below)** in relation to this environmental value.

Conditions: To address the above impacts, the following conditions will be added to the permit:

- Directional clearing to allow for fauna movement into the surrounding remnant vegetation
- Fauna management (bilbies) – pre clearance surveys in significant areas of suitable habitat, namely the material extraction areas in which the habitat was determined to be suitable
- Rehabilitation requirement for areas associated with material extraction to minimise long term impacts of the proposed clearing on biodiversity, including bilby habitat.

3.2.3. Environmental value: land and water resources – Clearing Principles (f), (g), (i) and (j)

Assessment: The application area intersects multiple watercourses and areas of inundation. Based on the rainfall patterns of the area, the proposed clearing may lead to short term impacts to surface water quality through sedimentation and has a risk of land degradation through water erosion. It was determined that this has been suitable addressed with the preparation and implementation of a CEMP, which outlines water quality and land degradation resulting in erosion and sedimentation as a key environmental risk to be managed (MRWA, 2020a). Key mitigation measures outlined in the CEMP are provided in Section 3.1. It is considered the construction of the bridge to MRWA specifications will minimise impacts to the hydrological regime, limiting construction to the dry season, demarcating of the clearing area and the reduction in clearing area will assist to minimise erosion.

Given the purpose of the proposed clearing is for road upgrades to improve river and floodway crossings, along an existing roadway, the end land use will likely result in a lower risk of land degradation and impacts to water quality from the roadway.

Outcome: Based on the above assessment, the Delegated Officer has determined that the proposed clearing is considered **acceptable** in relation to this environmental value.

Conditions: No management conditions required.

3.3. Relevant planning instruments and other matters

Other relevant authorisations required for the proposed land use include an Extractive Industry Licence, issued by the Shire of Halls Creek. As the Shire is the applicant for this clearing permit, DWER determined that local government approvals and licences would be resolved internally; the clearing is consistent with the Shire's Local Planning Scheme.

A licence to abstract water under the *Rights in Water and Irrigation Act 1914* is required for the proposed works; the applicant has two water licences in place for the proposed works, CAW203195(1) and CAW2031197(1).

The closest registered Aboriginal Site of Significance is over 5 km from the application area; it is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972* (WA) and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

Appendix A – Additional information provided by applicant

Summary of comments	Consideration of comment
Provision of a CEMP in response to identified risk of land degradation	Incorporated into applicant mitigation and minimisation response Section 3.1.

Summary of comments	Consideration of comment
Provision of desktop flora assessment	Used to inform impact assessment and site information (see Section 3.2.1 and Appendix C).
Provision of a fauna assessment	Used to inform impact assessment and site information (see Section 3.2.2 and Appendix C).

Appendix B – Details of public submissions

Summary of comments	Consideration of comment
Strategic permit recommended for works	The applicant advised that the later stages are not yet finalised and there are tight timeframes on Stage 1 upgrades, due to remote community access and safety. The applicant has decided to only proceed with proposed clearing as outlined in this report.
Impacts to environmental values – lack of surveys	Surveys were requested, including a flora and vegetation survey and a fauna survey. A fauna survey, including a targeted bilby survey and habitat assessment was provided. Due to travel restrictions an on-ground flora survey could not be undertaken during the optimal time period; pre-clearance surveys for selected species has been conditioned. See Section 3.2 for further details.
No minimisation or mitigation measures supplied	Minimisation and mitigation measures have been provided, see Section 3.1

Appendix C – Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to DWER at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix D.

1. Site characteristics

Site characteristic	Details
Local context	The proposed clearing area spread over a 78 km stretch of road between Halls Creek and Ringer Soak Community. Spatial data indicates the local area (50 km radius of the proposed clearing area) retains over 99 per cent of the original native vegetation cover. There are four areas of road upgrades and six areas of material extraction proposed.
Vegetation description	A desktop flora and vegetation survey indicated that, based on mapped vegetation types, a site inspection and previous surveys associated within some of the proposed clearing area, eight vegetation types exist within the proposed clearing area (MRWA, 2020a). The majority of the proposed clearing area consists of the following four communities: • V01 – Tussock Grassland (14 per cent of vegetation) **Vachellia farnesiana* sparse to isolated shrubs over *Chrysopogon* dominated grasslands and isolated herbs • V03 – Acacia Shrubland over Hummock Grasses (17 per cent of vegetation) *Eucalyptus ?brevifolia* low sparse woodland over *Acacia lysiphloia* and *A. elachantha* tall open shrubland over mixed sparse herbs and *Triodia pungens* open hummock grassland

Site characteristic	Details
	• V05 – Open Woodland over Tussock Grassland (36 per cent of vegetation) – *Corymbia pachycarpa* sparse open woodland over *Acacia colei* and tussock grasses and herbs • V07 – Open Woodland over Hummock Grassland (28 per cent of vegetation) – *Eucalyptus ?brevifolia, Corymbia ?opaca* and *Eucalyptus* sp. open woodland over *Grevillea wickhamii, Acacia lysiphloia, Acacia colei* over *Triodia ?pungens* and assorted herbs. The remaining four vegetation communities are restricted in distribution within the development area, with between 0.3 and 5.3 ha mapped. The full survey descriptions are available in Appendix F. This is broadly consistent with the six mapped pre-European vegetation types which occur in the proposed clearing area (Shepherd *et al*. 2002). The full descriptions are outlined in Appendix F.
Vegetation condition	Based on the information provided in the desktop flora and vegetation survey it was determined that the proposed clearing areas located adjacent to roadside ares in a Poor condition, with areas not located adjacent to human activity in Excellent condition (Trudgen, 1991). The full Trudgen condition rating scale is provided in Appendix E. Representative photos are available in Appendix F.
Soil description	Three soils types have been mapped within the application area (Schoknecht *et al.* 2004): • Geebee System - Lateritic plains with gravelly red soils supporting snappy gum and bloodwood sparse low woodlands over soft spinifex (16 per cent of the application area) • Inverway System - Level upland plains with black cracking clay soils supporting barley Mitchell grass grasslands (62 per cent of the application area) • Winnecke System - Low linear or rounded hills and associated valley floors and marginal sandplains, supporting soft spinifex hummock grasslands or sparse low snappy gum woodlands with spinifex (22 per cent of the application area).
Land degradation risk	The above mapped soil systems predominately have a very low risk of land degradation through wind erosion, salinity, flooding, and phosphorus export risk (DAFWA, 2015). There is a risk of water erosion in the valley floors of the proposed clearing areas.
Waterbodies	The desktop assessment and aerial imagery indicated that the proposed clearing intersects eight watercourses including: • Foster Creek • Button Creek • Six minor, non-perennial rivers, Where Button Creek intersects the proposed clearing area, approximately 9.2 hectares of the development envelope is mapped as subject to inundation. Approximately 4 km north of Ringer Soak Community area, another 4.2 hectares of the development envelope is mapped as subject to inundation,.
Conservation areas	The nearest conservation reserve, Ord River Regeneration Reserve, is located approximately 4 km west of the north-west portion of the proposed clearing area.
Climate and landform	The proposed clearing area occurs within the Ord Victoria Plain and the Tanami bioregions. The Ord Victoria Plain includes ridges, plateaus and undulating plains, with scattered mesas and buttes. The Tanami landscape is mainly featureless sand plains

Site characteristic	Details
	with small areas of alluvial plains, low ridges and stony rises. Sandstone outcrops were noted in the landscape, influencing vegetation types (MRWA 2020b). The proposed clearing area can experience monsoonal rainfall patterns, with rain typically falling between December and March. The highest rainfall experiences in 24 hours is 202.2 mm in January 1959 (BOM 2020b). However, the application area is in a semi-arid region; there is typically a low level of rainfall.

2. Flora, fauna and ecosystem analysis

With consideration for the site characteristics set out above, relevant datasets (see Appendix G), and biological survey information, the following conservation significant flora and fauna species, and ecological communities may be impacted by the clearing.

Species / Ecological Community	Conservation Code	Suitable soil type? (flora, ecological community)	Suitable vegetation type? (flora, ecological community)	Are surveys adequate to identify? (Y, N, N/A)
Atriplex flabelliformis	Priority 3	Yes	Yes	N
Eragrostis confertiflora	Priority 3	Yes	Yes	N
Eriachne armitii	Priority 1	Yes	Yes	N
Euphorbia inappendiculata var. *queenslandica*	Priority 1	Yes	Yes	N
Fimbristylis sieberiana	Priority 3	Yes	Yes	N
Goodenia crenata	Priority 3	Yes	Yes	N
Iotasperma sessilifolium	Priority 3	Yes	Yes	N
Rorippa eustylis	Priority 1	Yes	Yes	N
Trachymene villosa	Priority 1	Yes	Yes	N
Triodia roscida	Priority 1	Yes	Yes	N
Kimberley Vegetation Association 850	Priority 3	Yes	Yes	N
bilby (*Macrotis lagotis*)	Vulnerable	Yes, feeding and burrowing habitat present		Y
glossy ibis (Plegadis falcinellus)	Specially protected	Yes, recorded within the application area		Y
little curlew, little whimbrel (Numenius minutus)	Specially protected	Yes, habitat associated with wetland and watercourses suitable, recorded in close proximity to the application area		Y
Oriental Pratincole (*Glareola maldivarum*)	Specially protected	Yes, habitat associated with wetland and watercourses suitable, recorded in close proximity to the application area		Y
Sharp-tailed Sandpiper (*Calidris acuminata*)	Specially protected	Yes, habitat associated with wetland and watercourses suitable, recorded in close proximity to the application area		Y

3. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	% remaining	Current extent in all DBCA managed land (ha)	% current extent in all DBCA managed land (proportion of pre-European extent)
IBRA bioregion					
Ord Victoria Plain	5,497,881.77	5,497,223.83	99.98	923,567.21	16.8
Tanami	3,016,138.56	3,008,637.04	99.75	0	0
Local Area					
50 km radius	1,554,879	1,554,599	99.98	-	-

Appendix D – Assessment against the Clearing Principles

Assessment against the Clearing Principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The proposed clearing area may contain locally and regionally significant flora species, important habitat for fauna, and vegetation consistent with a priority ecological community.	May be at variance	Yes Refer to Section 3.2.1 above.
Principle (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."* Assessment: The proposed clearing area contains suitable habitat for conservation significant fauna, including the greater bilby (*Macrotis lagotis*).	May be at variance	Yes Refer to Section 3.2.2 above.
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: No threatened flora are recorded within the local area. The proposed clearing area is unlikely to contain habitat for threatened flora species.	Not likely to be a variance	No
Principle (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."* Assessment: The proposed clearing area does not contain species composition indicative of a threatened ecological community listed by the Western Australian Minister for Environment.	Not likely to be a variance	No
Environmental values: significant remnant vegetation and conservation areas		
Principle (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."* Assessment: The extent of native vegetation in the local area is consistent with the national objectives and targets for biodiversity conservation in	Not at variance	No

Assessment against the Clearing Principles	Variance level	Is further consideration required?
Australia. Vegetation in the proposed clearing area is not considered to be part of a significant ecological linkage or remnant in the local area.		
Principle (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."* Assessment: Given the distance to the nearest conservation area, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas.	Not likely to be a variance	No
Environmental values: land and water resources		
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: **T**he proposed clearing area intersects a number of watercourses and mapped areas of inundation. The vegetation proposed to be cleared is associated with a wetland and watercourse.	Is at variance	Yes Refer to Section 3.2.3 above.
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment: The mapped soils are susceptible to water erosion. Noting the proposed clearing intersects a number of watercourses, the proposed clearing may cause land degradation through water erosion.	May be at variance	Yes Refer to Section 3.2.3 above.
Principle (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."* Assessment: Given the number of watercourses the proposed clearing intersects and the climatic conditions of the application area, the proposed clearing may impact surface water quality.	May be at variance	Yes Refer to Section 3.2.3 above.
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: The mapped soils and topographic contours in the surrounding area indicate the area is subject to seasonal flooding. However based on the size of the clearing proposed and the vegetation cover in the surrounding landscape, the proposed clearing is not likely to increase this risk.	Not likely to be at variance	No

Appendix E – Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation's ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

Measuring Vegetation Condition for the Eremaean and Northern Botanical Provinces (Trudgen, 1991)

Condition	Description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Very Poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

Appendix F – Biological survey information excerpts

Mapped vegetation within the application area

Assoc. No	Description	Estimated Clearing	Extent within Dev. Envelope (% Impact)	Extent in 50km Desktop Area (% Impact)
91	Hummock grassland with sparse Eucalypts e.g. bloodwoods & snappy gum *Triodia* spp., *Corymbia dichromophloia, C. opaca, Eucalyptus leucophoia*	14.4 ha	57.9 ha	162,605 ha (>0.01% loss)
848	Hummock grassland with scattered bloodwoods & snappy gum *Triodia* spp., *Corymbia dichromophloia, Eucalyptus leucophloia*	15.6 ha	25.9 ha	190,997 ha (>0.01% loss)
850	Mainly Mitchell grass *Astrebla* spp.	13.7 ha	27.4 ha	271,398 ha (>0.01% loss)
894	Coolibah over ribbon/blue grass (rivers) *Eucalyptus microtheca, Chrysopogon* spp., *Dichanthium* spp.	1.4 ha	15.7 ha	41,873 ha (>0.01% loss)
895	Hummock grassland with scattered shrubs or mallee *Triodia* spp. *Acacia* spp., *Grevillea* spp. *Eucalyptus* spp.	15.5 ha	60.2 ha	141,808 ha (0.01% loss)
1893	Hummock grassland with scattered low trees over dwarf shrubs or mixed short grass and spinifex mixed species, *Triodia* spp.	0.7 ha	2.2 ha	21,154 ha (>0.01% loss)
Cleared Areas		33.7 ha	40.4 ha	N/A
TOTAL		**61.3 ha**	**189.3 ha**	

Mapped soil type within the application area

Land System	Description	Estimated Clearing	Extent within Dev. Envelope (% Impact)	Extent in 50km Desktop Area (% Impact)
Geebee System	Lateritic plains with gravelly red soils supporting snappy gum and bloodwood sparse low woodlands over soft spinifex.	15.7 ha	30.6 ha	210,598 ha (>0.01% loss)
Winnecke System	Low linear or rounded hills, associated valley floors, and marginal sandplains, supporting soft spinifex hummock grasslands or sparse low snappygum woodlands with spinifex.	30 ha	118 ha	201,365 ha (0.02% loss)
Inverway System	Level upland plains with black cracking clay soils supporting barley Mitchell grass grasslands.	15.6 ha	40.7 ha	303,812 ha (>0.01% loss)
Cleared Areas		33.7 ha	40.4 ha	N/A
TOTAL		**61.3 ha**	**189.3 ha**	

Vegetation types within the application area:

Vegetation Type	Associated Land System / Association	Extent in Dev. Envelope	Extent[1] in 50km Desktop Area
Grassland			
V01 – Tussock Grassland **Vachellia farnesiana* sparse to isolated shrubs over *Chrysopogon* dominated grasslands and isolated herbs	Inverway / 850 (Unit 1: 90%)	27 ha	273,431 ha
V02 – Hummock Grassland *Eucalyptus brevifolia* and *Acacia colei* very sparse woodland over *Triodia* sp. open hummock grassland.	Gordon / 842	0.3 ha	597 ha[2]
Shrubland			
V03 – Acacia Shrubland over Hummock Grasses *Eucalyptus ?brevifolia* low sparse woodland over *Acacia lysiphloia* and *A. elachantha* tall open shrubland over mixed sparse herbs and *Triodia pungens* open hummock grassland.	Geebee / 848	32.3 ha	168,478 ha
V04 – Chenopod Shrubland Sparse *Tecticornia* sp. shrubland and tussock grasses.	Winnecke / 895	5.3 ha	6,041 ha
Open Woodland			
V05 – Open Woodland over Tussock Grassland *Corymbia pachycarpa* sparse open woodland over *Acacia colei* and tussock grasses and herbs.	Winnecke / 895	52.9 ha	70,478 ha
V06 – Open Woodland on Sandstone Outcrop *Corymbia ?dichromophloia, Eucalyptus brevifolia, Corymbia ?opaca* sparse open woodland over *Grevillea wickhamii* and *Acacia hilliana* over *Triodia ?pungens, assorted herbs and tussock grasses*	Winnecke / 91	2 ha	130,887 ha
V07 – Open Woodland over Hummock Grassland *Eucalyptus ?brevifolia, Corymbia ?opaca* and *Eucalyptus* sp. open woodland over *Grevillea wickhamii, Acacia lysiphloia, Acacia colei* over *Triodia ?pungens* and assorted herbs.	Winnecke / 91	67.5 ha	130,290 ha[2]
Riparian Vegetation			
V08 – Eucalypt Woodland (riverine) *Corymbia ?opaca* and *Terminalia* sp. open woodland over **Vachellia farnesiana* scattered shrubs over *Chrysopogon fallax* open tussock grassland	Inverway & Winnecke / 894 (Unit 3: 5%)	2 ha	15,191 ha
Cleared Areas		40.4 ha	N/A
TOTAL		**189.3 ha**	

[1] Estimated extent based on closest matching landform types within the associated land system (Schoknecht and Payne 2011; Appendix 4). Note that similar habitats may exist in other land systems.

[2] V02 unit is too small to be mapped in Land System or Pre-European Associations. Therefore, an estimate was obtained using the estimate developed for the Rocky Plains Habitat (consisting of V02 and V07) in the Duncan-Gordon Downs Road Desktop Fauna Assessment (MRWA 2020). The proportion of V02 in relation to V07 mapped in this assessment was applied to the regional extent of the Rocky Plains Habitat. The resulting area is suitably small and roughly reflects the uncommon nature of the V02 vegetation type.

Plate 1. V01 – Tussock Grassland

Almost treeless plains of self-mulching cracking clays (black soil) with occasional clusters of **Vachellia farnesiana* and **Calotropis procera*, usually in disturbed or heavily grazed areas. Typical understorey species includes a variety of grasses, *Chrysopogon* and *Astrebla* sp., with some herbs such as *Gossypium ?australe*, *Cucumis ?melo*.

Area is extensively used for pastoral activity. At the time of the site assessment, most areas were relatively dry, however, this area can become severely waterlogged during periods of heavy rain. This vegetation type is closely aligned with the Inverway System and Association 850. No other Land Systems was found to contain this habitat type.

Plate 2. V02 – Hummock Grassland

Generally comprised of very sparse overstorey of *Eucalyptus brevifolia* over scattered Acacia midstorey (typically *Acacia colei*) over an understorey dominated by spinifex (*Triodia spp.*). Substrate is generally a mixture of sandstone and quartzite.

This vegetation type was found in isolated ‘pockets’ within the Inverway Land System, which mainly consists of dark cracking clays. These pockets were nearly always found at the margins of other Land Systems, or adjacent to drainage lines. This indicates that the cracking clay soils of the Inverway system overlies other land systems.

Plate 3. V03 – Acacia Shrubland over Hummock Grasses

Closely associated with the Geebee System (Unit 1 – upper crests and slopes), this vegetation type consists of very sparse Eucalypt overstorey, dense acacia dominated midstorey (mainly *Acacia colei* and *A. wickhamii*) over understorey of spinifex (*Triodia* sp.). Substrate in this vegetation type consists of sand with a significant fraction of lateritic gravels.

Plate 4. V04 – Chenopod Shrubland

This vegetation type typically occupies a small portion of low-lying areas within valleys of the Winnecke Land System, typically adjacent to the V06 vegetation type (Units 2 and 3 – gently sloping sandplains or valley floors).

Approximately 9% of the landforms associated with Units 2 and 3 was this vegetation type. Generally minimally vegetated, dominated by tussock grasses and samphires (*Tecticornia* spp.). A lack of vegetation may be due to over-grazing.

Plate 5. V05 – Open Woodland over Tussock Grasses

This vegetation type was relatively widespread through the Development Envelope, and is generally associated with the Winnecke System (Units 2 and 3 – gently sloping valley floors and gently sloping sandplain). Overstorey is sparse (generally eucalypts), over scattered acacia midstorey (mainly *Acacia colei*), over an understorey of mixed tussock and hummock grasses. Most areas generally showed red or yellow-red sands.

A small portion of the Inverway System was found to contain similar vegetation (V04; SLK 35.54 Material Area). This area is just north of Sturt Creek, which sits along the border of the Inverway and Winnecke System. It is likely that SLK 35.54 Material area is an inclusion/pocket of the Winnecke System, which could extend under the Sturt Creek System and into the Inverway System.

Plate 6. V06 – Open Woodland on Sandstone Outcrops

This vegetation type is closely aligned with the Winnecke Land System Unit 1 (low linear or rounded hills) and is generally found at upper elevations of the System. There is sparse Eucalypt overstorey cover, with scattered Acacia midstorey (mostly *Acacia colei* and some *A. wickhamii*), over understorey of spinifex (*Triodia* sp.)

Substrate in this vegetation type consists almost entirely of sandstone/quartzite rock outcrops with skeletal soils.

Plate 7. V07 – Open Woodland on Hummock Grassland

Widespread within the Winnecke System, generally on the slopes or low hills. Overstorey is very sparse, consisting of *Eucalyptus/Corymbia* spp. (with some *Cassytha filiformis* vines). Midstorey consists of *Grevillea wickhamii*, *Acacia lysiphloia* over understorey of *Triodia* sp, with herbs such as *Indigofera* sp., *Petalostylis cassioides, Senna notabilis* and *Tephrosia* sp.

Substrate is generally sandstone or lateritic gravels. No quartzite was noted in these areas (it is likely that quartzite becomes more apparent in uplifted areas of the Winnecke Land System, where it pushes through a sandstone upper layer).

Plate 8. V08 – Eucalypt (riverine) woodland

This habitat type was found in a variety of Land Systems, but is most evident in the Inverway System (Unit 3 – Linear tracts with intense braided pattern of small channels). These ephemeral drainage lines are clearly defined and relatively narrow, lined with eucalypts and some shrubs (mainly **Vachellia farnesiana*). Substrate in this habitat typically consists of muddy, clayey sands.

This habitat type is generally distinct from 'riparian habitat' which consists of seasonally inundated marshlands, as opposed to clearly defined drainage lines. Disturbance from cattle (and possibly introduced fauna) was evident in all areas.

Appendix G – References and databases

1. GIS datasets

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- Aboriginal Heritage Places (DPLH-001)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- Hydrography – Inland Waters – Inland Flats
- Hydrographic Catchments – Catchments
- IBRA Vegetation Statistics
- Local Government Authority (LGA) Boundaries (LGATE-233)
- Localities (LGATE-234)
- RAMSAR Sites (DBCA-010)
- Remnant Vegetation

- RIWI Act – Groundwater Areas (DWER-034)
- Soil and Landscape Mapping – Best Available
- Soil and Landscape Quality – Phosphorus Export Risk (DPIRD-010)
- Soil and Landscape Quality – Salinity Risk (DPIRD-009)
- Soil and Landscape Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil and Landscape Quality – Water Erosion Risk (DPIRD-013)
- Soil and Landscape Quality – Water Repellence Risk (DPIRD-014)
- Soil and Landscape Quality – Waterlogging Risk (DPIRD-015)
- Soil and Landscape Quality – Wind Erosion Risk (DPIRD-016)

Restricted GIS Databases used:

- Groundwater and Surface Water Licences (DWER)
- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)
- Threatened Fauna
- Threatened Flora (TPFL)
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