

CROOKWELL 2 WIND FARM



Crookwell Road Landscape Management Plan

Prepared for:

CROOKWELL DEVELOPMENT PTY LTD

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DOCUMENT CONTROL

ITEM	DETAIL
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1.1 Introduction

Green Bean Design Pty Ltd (GBD) has been commissioned by Crookwell Development Pty Ltd (CDPL) to prepare the Crookwell Road Landscape Management Plan (Crookwell Road LMP) for the approved and constructed Crookwell 2 Wind Farm (C2WF). The Crookwell Road LMP has been prepared in response to, and addresses, the Crookwell 2 Wind Farm Project Approval, Conditions of Approval (CoA) and specifically Landscaping Requirements Condition C37 of the CoA.

The approval process for the C2WF requires preparation of a landscape management plan to '*reasonably and feasibly screen the visual impact of the wind turbines located along Crookwell Road (between Pejar Road and the northern boundary of the site)*'.

The Crookwell Road LMP has been prepared with regard to the Roads and Maritime Services publication 'Landscape guideline' April 2008. All landscape works along the Crookwell Road corridor shall be installed in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers, and the RMS Landscape guideline Section 3.3 Safety guidelines for clear zones and sight distances.

1.2 Crookwell Road LMP scope of works

In accordance with Condition of Approval, the Crookwell Road LMP scope includes:

- identification of the relevant Condition of Approval
- a description of the Condition of Approval inferred objectives
- a record of consultation undertaken by CDPL and GBD
- identification of plant species and planting locations to address the Condition of Approval, including fast growing species where appropriate
- preparation of planting plans
- provision of a maintenance programme for the landscape works.

1.3 Condition of Approval - Condition C37

Condition C37 is set out in full below.

Prior to the commencement of operation, the Applicant must prepare a Roadside Landscape Management Plan for Crookwell Road. The Roadside Landscape Management Plan is to reasonably and feasibly screen the visual impact of the wind turbines located along Crookwell Road (between Pejar Road and the northern boundary of the site). The Roadside Landscape Management Plan is to be developed in consultation with the RMS, Council and land owners abutting Crookwell Road as bounded by the site. The Roadside Landscape Management Plan must include, but not be limited to:

(a) identification of locations for plantings along Crookwell Road that will visually screen sections of the Crookwell II Wind Farm. Locations of plantings are not to compromise sight lines or clear zones, in accordance with the Austroads Guide to Road Design (as amended by RMS supplements), unless RMS agrees otherwise;

(b) identification of species to be utilised that will provide effective screening from the road. Use of fast-growing species is encouraged, where appropriate; and

(c) details of the maintenance program.

The Roadside Landscaping Management Plan is to be implemented within six months of commencement of operation.

1.4 Consultation

In accordance with the requirements of Condition C37, CDPL and GBD have carried out consultation with:

- Associated landowners
- Upper Lachlan Shire Council
- Roads and Maritime Services and
- C2WF Community Consultation Committee (CCC).

CDPL and GBD have carried out consultation with associated landowners with regard to planting locations and plant species proposed for screen planting. Comments and requests provided by associated landowners have been incorporated into the Crookwell Road LMP, including the selection of preferred plant species as well as locations for specific plant species to be installed.

Whilst the proposed Crookwell Road LMP landscape works will be located on private land, copies of the draft Crookwell Road LMP have been previously provided to the Upper Lachlan Shire Council and Roads and Maritime Services in June 2018 for review and comment. No comments from either the Upper Lachlan Shire Council or Roads and Maritime Services have been received.

The draft Crookwell Road LMP was presented to the C2WF CCC on the 6th June 2018. The draft plan was well received with the CCC identifying the Canadian Poplar (*Populus x canadensis*) as the preferred non-native fast growing tree species to be incorporated into the landscape works.

1.5 Crookwell Road LMP

Site inspections identified and confirmed the location of 7 wind turbines alongside the Crookwell Road corridor. The 7 wind turbines are situated to the east of the road corridor and are set back at various distances between 150 metres to 390 metres from the road corridor. The closest turbine to the Pejar Road intersection with Crookwell Road is around 890 metres, and the closest to the northern site boundary is around 1.48 kilometres. The section of Crookwell Road between the Pejar Road intersection and the northern boundary of the site is approximately 5.5 kilometres in length and climbs south to north through approximately 50 metres in elevation. The signposted speed limit is 100 km/hr along this section of Crookwell Road, with a short section of temporary 60 km/hr either side of the wind farm construction compound.

There are various sections of established tree planting alongside the road corridor, generally comprising eucalypt and pine tree planting. The approximate locality of this planting is illustrated in **Figure 1**. The general intent and approach to addressing the CoA is to infill tree planting to gaps within the existing planting. Tree planting utilises both native and non-native species. Non-native species have been selected to achieve a faster growing screen where possible as well as addressing landowner requirements.

1.6 Planting schedule

A list of trees and shrub species have been compiled for the purpose of screening alongside the Crookwell Road corridor. Nominated native tree planting has been sourced from the NSW Department of Environment and Heritage, Bioregions of NSW, South Eastern Highlands Bioregion:

<https://www.environment.nsw.gov.au/resources/nature/southEasternHighlands.pdf>

Table 2 – Planting schedule

Scientific name	Common name	Mature height (m)	Pot size	Plant spacing	Quantity
TREES					
<i>Cupressus x leylandii</i> 'Leightons Green' **	Leyland cypress	up to 15	200mm	1.5m cts	572
<i>E. dives</i>	Broad-leaved Peppermint	up to 20	Tube	7m cts	67
<i>E. melliodora</i>	Yellow Box	up to 20	Tube	7m cts	66
<i>E. blakelyi</i>	Blakely's Red Gum	up to 25	Tube	7m cts	67
<i>E. albens</i>	White Box	up to 25	Tube	7m cts	49
<i>Populus x canadensis</i> 'Evergreen 65-1' **	Canadian Poplar	Up to 20	200mm	2.5m cts	1,073
SHRUBS					
<i>Acacia falciformis</i>	Broad leaved hickory	up to 8	Tube	as shown on figures	213
<i>A. implexa</i>	Hickory Wattle	up to 12	Tube	as shown on figures	181
<i>Bursaria spinosa</i>	Native Blackthorn	up to 5	Tube	as shown on figures	145
<i>Kunzea ericoides</i>	Burgan	up to 4	Tube	as shown on figures	32

** Non-native plant species

Refer to **Figure 1** for the landscape works key plan and **Figures 2 to 8** for the landscape plans illustrating planting areas CR1 to CR11.

1.7 Timing and implementation for landscape works

The implementation of landscape works should generally not occur in areas that are likely to be subject to future earthworks or construction activities. However, site landscape preparation work should commence as soon as practically possible after construction works have been completed and integrated with site rehabilitation works that will stabilise disturbed areas and commence revegetation. Ideally landscape planting should occur in late autumn and/or winter months.

To facilitate successful plant establishment:

- groundwork and site preparation should not be carried out whilst site conditions are subject to water logging or excessive soil moisture
- plant installation should not occur during cold periods or at times when frost is likely to occur before or following planting and
- plant installation should not occur during or prior to expected periods of extreme heat.

The appointed landscape contractor and/or landowner will undertake the following tasks, including but not limited to:

- conduct site inspection/verification to located all planting areas
- order plant stock and associated materials
- isolate livestock from planting areas and deep rip planting areas to 500mm depth
- mark out fencing locations for landowner approval and install. Provide maintenance access points to planting areas as necessary
- undertake weed/grass spraying as necessary to planting areas
- install planting in accordance with drawings
- plants to be installed with staking and standard tree guards as necessary and
- all plants to be watered on installation with ongoing watering as necessary to achieve plant establishment within the maintenance period.

1.8 Inspection of landscape works

An inspection program for all planting areas shall be implemented. Site inspections shall be carried out at 3 monthly intervals for the duration of the 24-month maintenance period. The site inspections will determine and verify the establishment and growth of plantings, as well as the state of associated fencing and/or plant protection measures. A number of typical locations shall be identified to photograph the landscape works at each 3 monthly site inspection. These locations shall be re-photographed during each site inspection and provided to the Department of Planning and Environment together with a summary report on the establishment and growth of planting at 6 monthly intervals during the maintenance period.

1.9 Maintenance

All areas subject to landscape works shall be inspected to identify any required actions during the maintenance period. **Table 3** outlines the key elements to be inspected and tasks to be undertaken during the maintenance period.

Table 3 – Landscape maintenance tasks

Landscape element	Maintenance action
Planting	<p>Inspection:</p> <p>Check for dead or missing plants</p> <p>Check for pest damage</p> <p>Action:</p> <p>Replace missing or dead plants with the same species type and size as originally installed</p> <p>Identify pest (insect/vertebrate) and action accordingly</p>
Weeds	<p>Inspection:</p> <p>Check planting area for weed growth and or infestation</p> <p>Action:</p> <p>Undertake weed control</p>
Fences	<p>Inspection:</p> <p>Check for any damage</p> <p>Action:</p> <p>Make repairs as necessary</p>
Stakes and tree guards	<p>Inspection:</p> <p>Check for any damage and/or missing stakes or tree guards</p> <p>Action:</p> <p>Make repairs and/or replace as necessary</p>

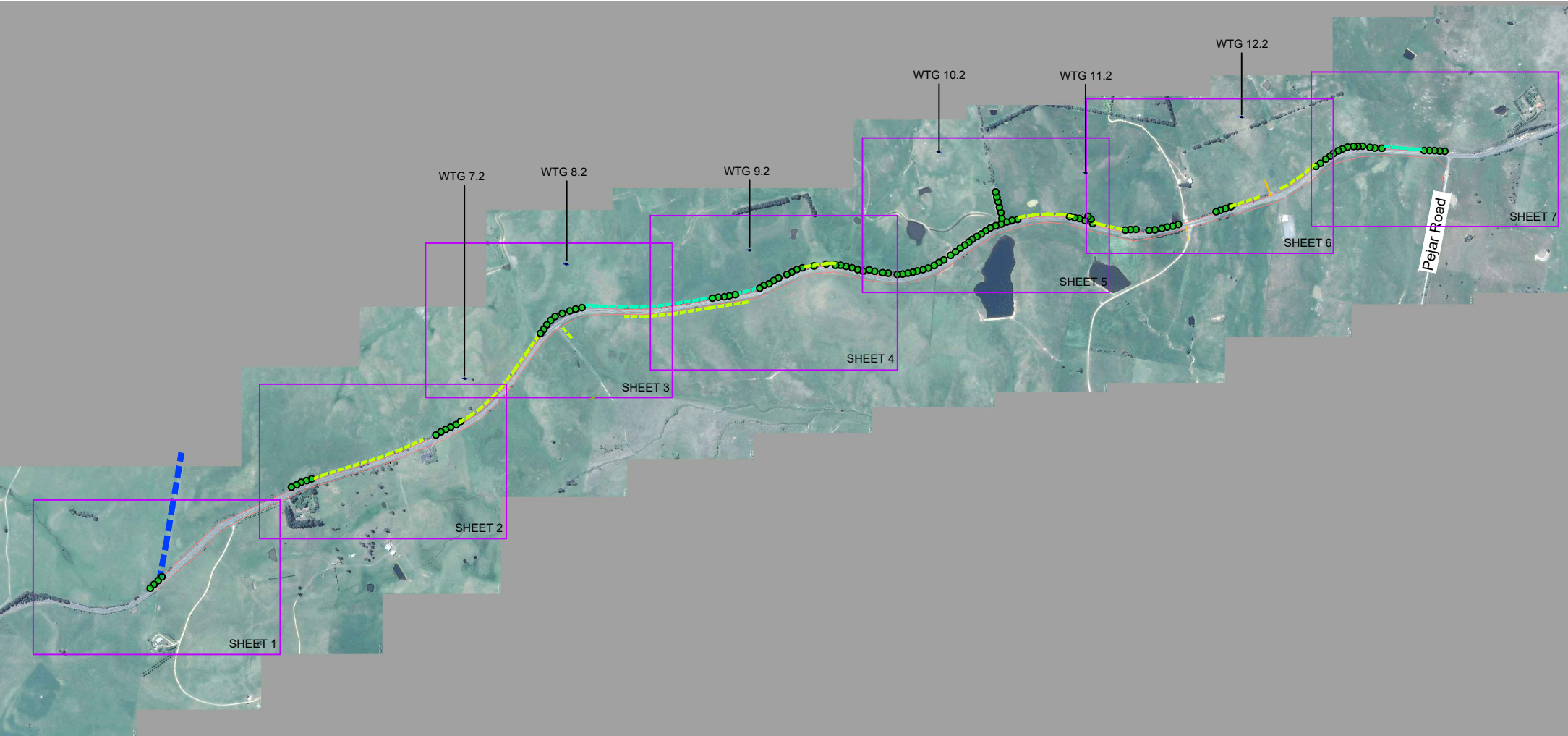
2.0 Outcome based plant establishment

At the completion of the 24-month maintenance period a final site inspection shall be carried out to review and verify successful plant establishment. Successful plant establishment will be determined by not less than 90% of plants being recorded as established across each planting area CR1 to CR11.

Where planting areas contain less than 90% of established plants the following actions will be undertaken:

- All missing or dead plants shall be replaced with the same species and sizes as originally installed.
- Where plants have visibly not achieved a rate of growth consistent with the majority of same plant species, these plants shall be removed and replaced with the same plant species and size as originally installed.
- Where areas of planting are considered to have been impacted by conditions beyond the control of CDPL, then measures shall be discussed with DPE to resolve any residual impact and/or seek alternative approaches to achieve the requirements of the relevant CoA.

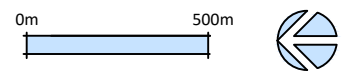
Appendix A – Landscape Plans Sheets 1 to 8



- Crookwell 2 Wind Farm northern site boundary (indicative location)
- Existing tree planting with screening potential
- WTG Wind turbine generator
- 3 metre wide tree and shrub planting area (indicative location)
- Cupressus x leylandii tree planting Single row (indicative location)
- RMS road boundary (indicative location)

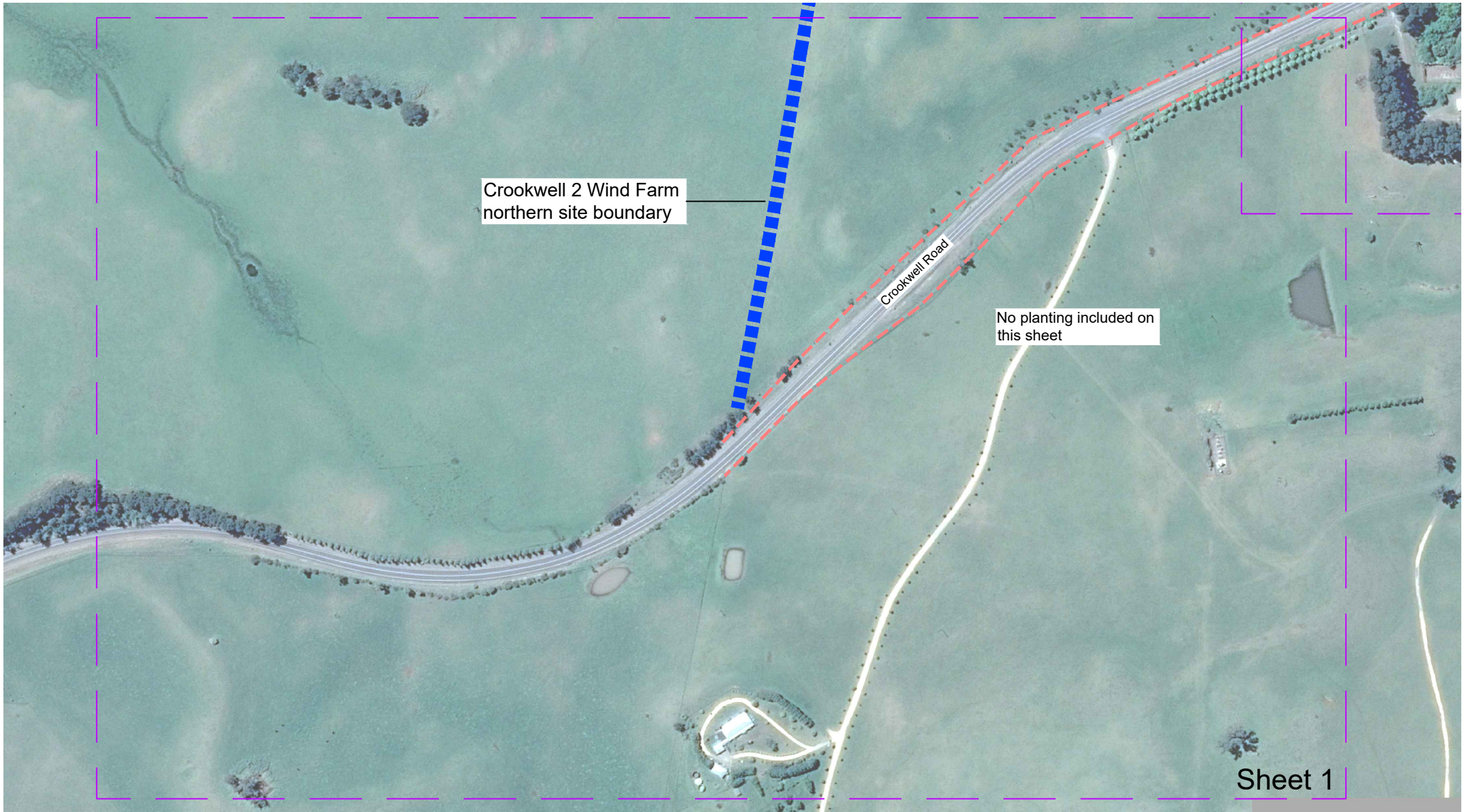
All planting to be installed outside of the Roads and Maritime Services (RMS) road boundary.

All planting to be offset from edge of closest Crookwell Road travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers.



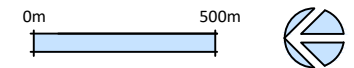
Crookwell 2 Wind Farm Crookwell Road - Landscape Management Plan

Figure 1 Key Plan
C2WF Crookwell Road
Landscape Management Plan



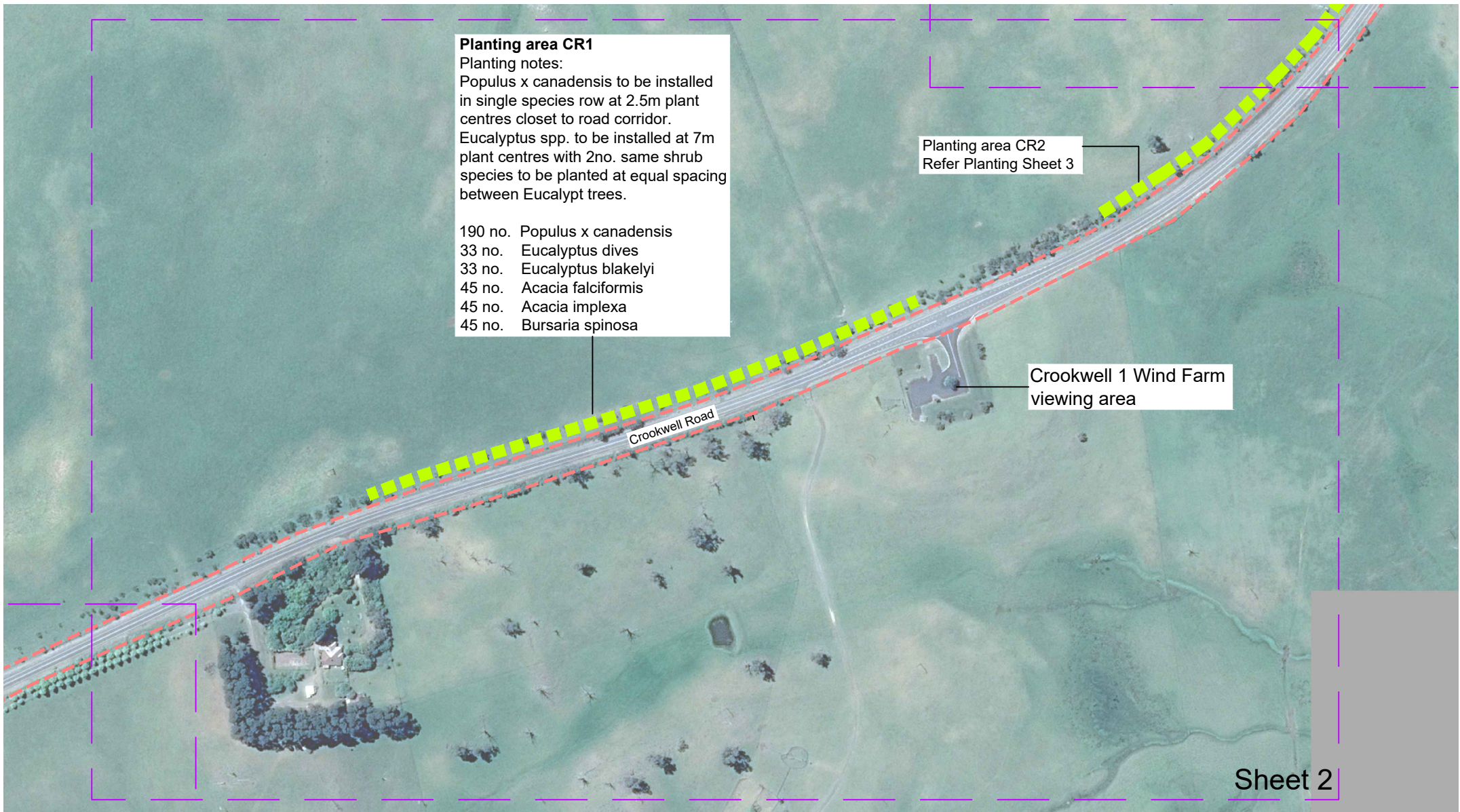
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All planting to be offset from Crookwell Road edge of closest travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers.



Crookwell 2 Wind Farm Crookwell Road - Landscape Management Plan

Figure 2 Landscape Plan Sheet 1
C2WF Crookwell Road
Roadside Landscape Management Plan



Planting area CR1
 Planting notes:
 Populus x canadensis to be installed in single species row at 2.5m plant centres closet to road corridor.
 Eucalyptus spp. to be installed at 7m plant centres with 2no. same shrub species to be planted at equal spacing between Eucalypt trees.

190 no. Populus x canadensis
 33 no. Eucalyptus dives
 33 no. Eucalyptus blakelyi
 45 no. Acacia falciformis
 45 no. Acacia implexa
 45 no. Bursaria spinosa

Planting area CR2
 Refer Planting Sheet 3

Crookwell 1 Wind Farm viewing area

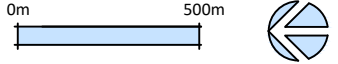
Crookwell Road

Sheet 2

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■ ■ ■ ■ ■ 3 metre wide planting area comprising 2 rip lines at 1.5 metres apart

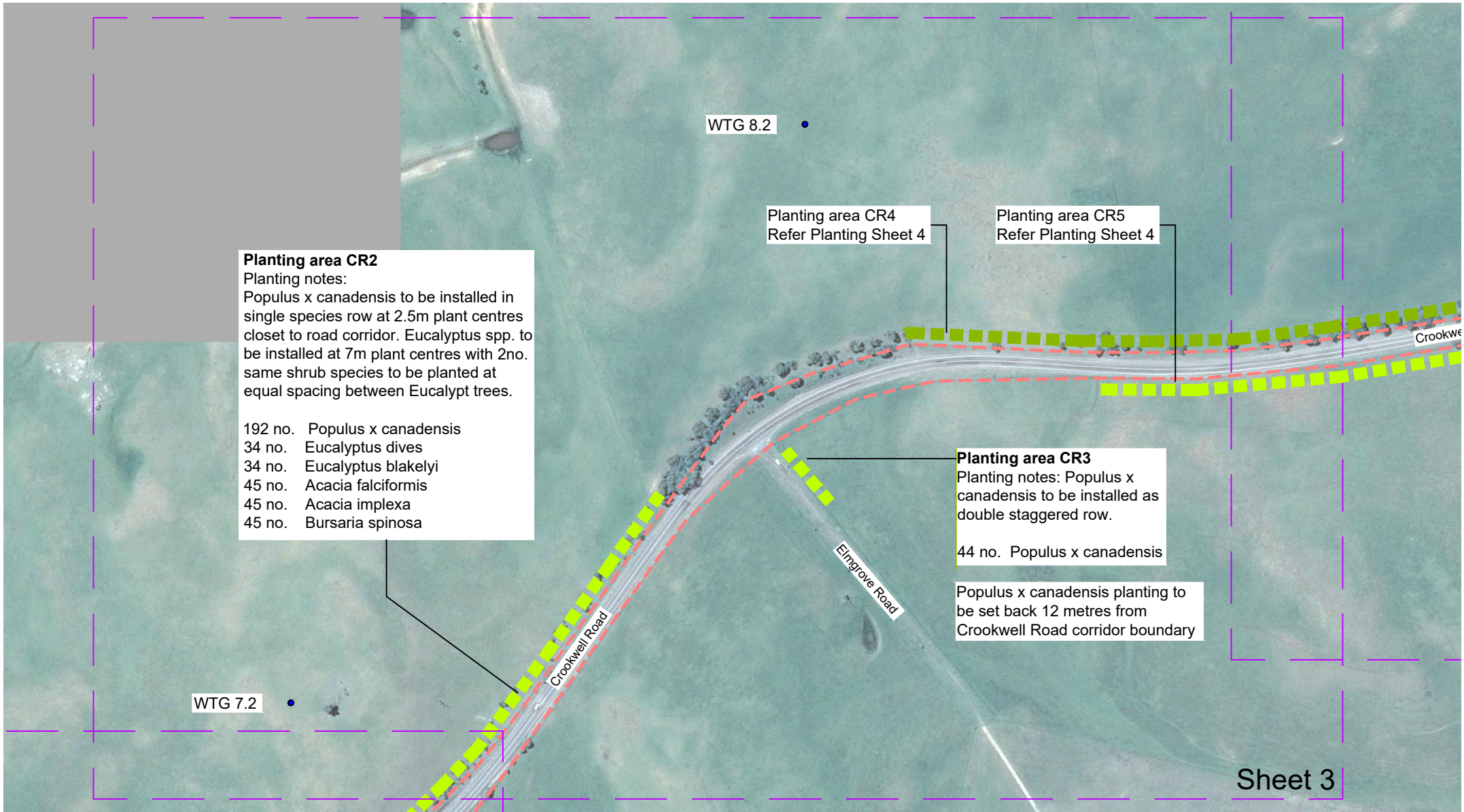
All planting to be offset from edge of Crookwell Road closest travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers





Eucalypt tree planting to be installed in a single row of 7 same species .

Figure 3 Landscape Plan Sheet 2
 C2WF Crookwell Road
 Roadside Landscape Management Plan

**Crookwell 2 Wind Farm
 Crookwell Road - Landscape Management Plan**



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-  3 metre wide planting area comprising 2 rip lines at 1.5 metres apart
-  2 metre wide planting area comprising 1 rip line

All planting to be offset from edge of Crookwell Road closest travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers

Eucalypt tree planting to be installed in a single row of 7 same species .

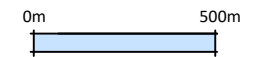
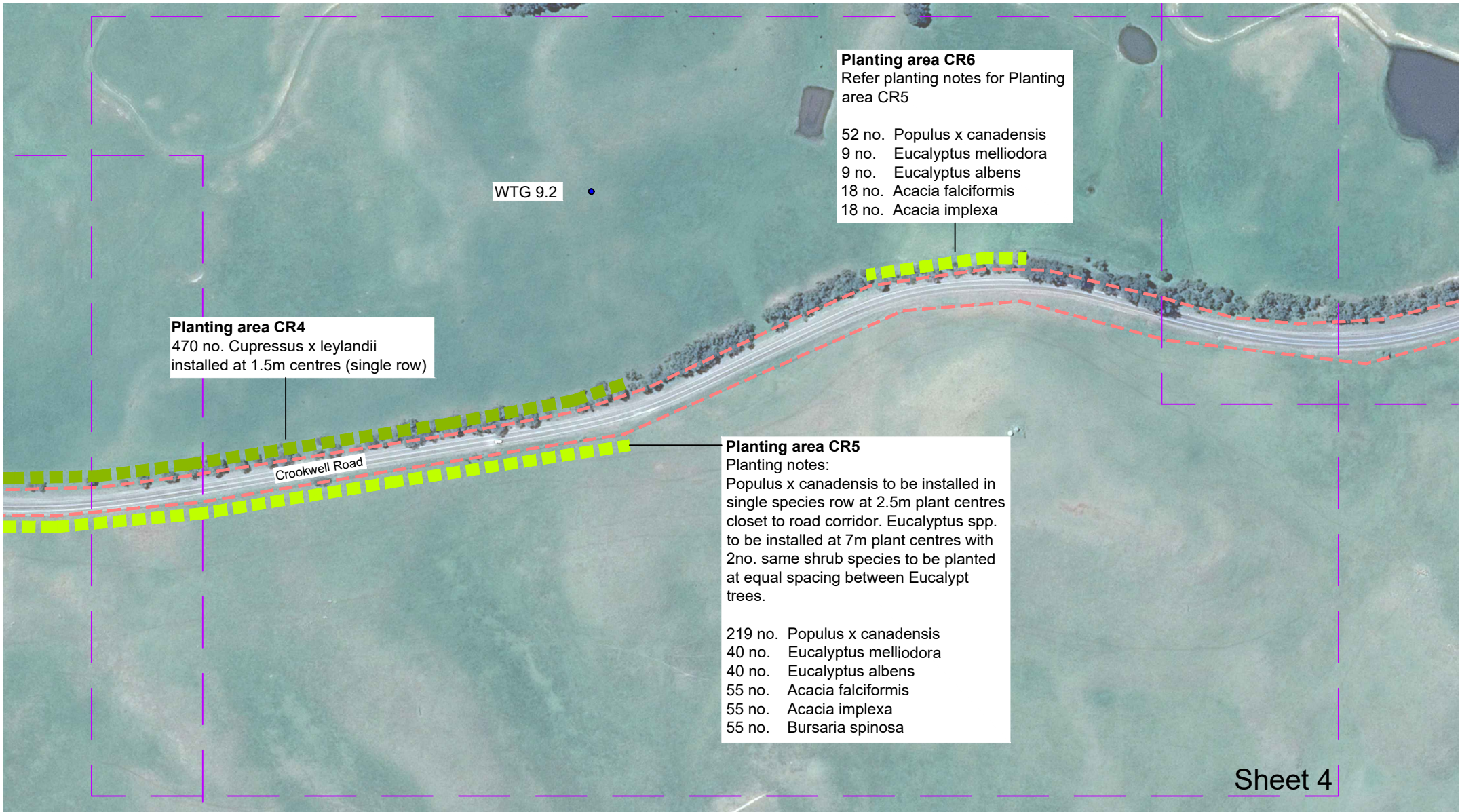


Figure 4 Landscape Plan Sheet 3
 C2WF Crookwell Road
 Landscape Management Plan

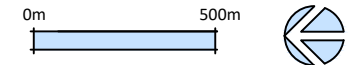
Crookwell 2 Wind Farm Crookwell Road - Landscape Management Plan



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- 3 metre wide planting area comprising 2 rip lines at 1.5 metres apart
- 2 metre wide planting area comprising 1 rip line

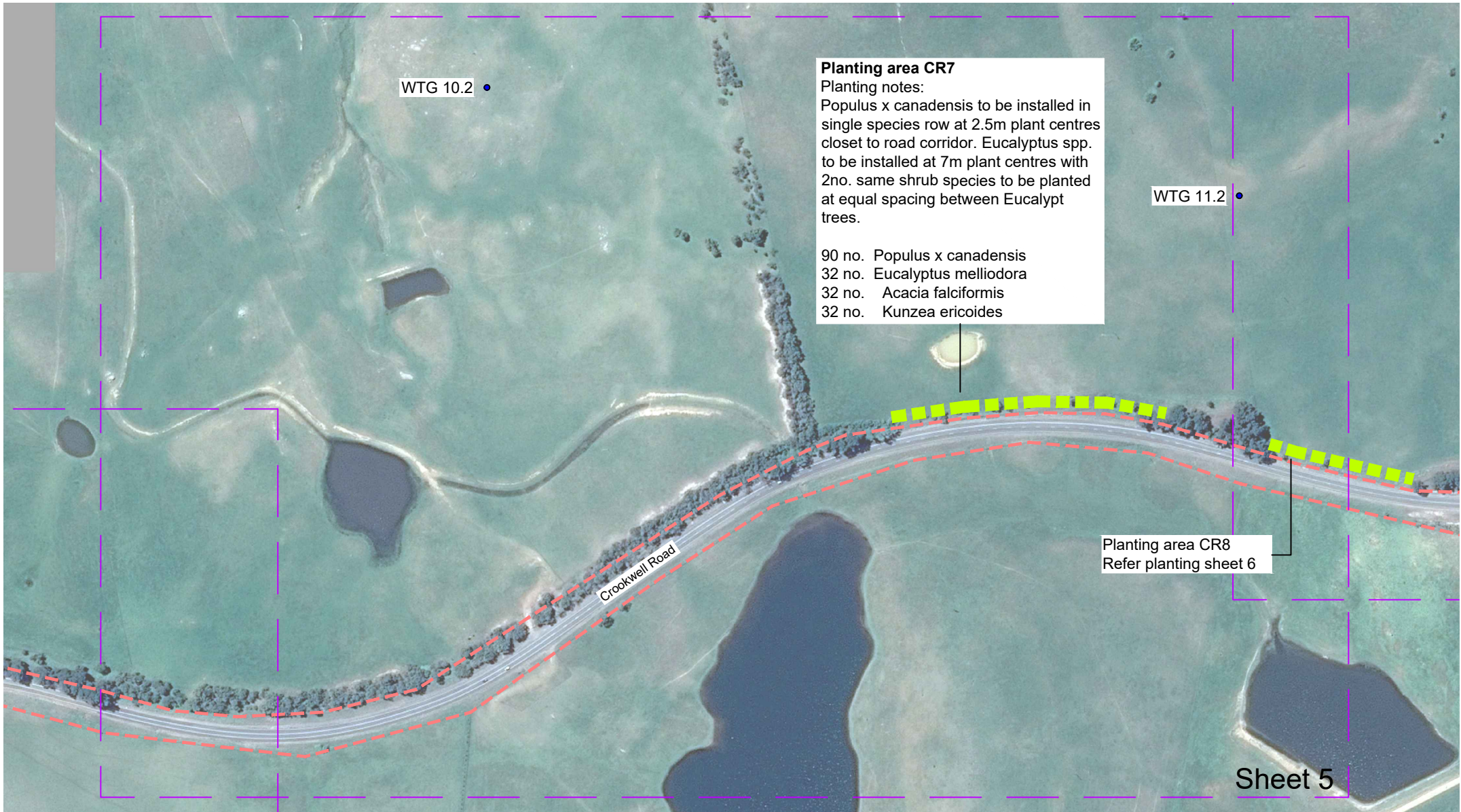
All planting to be offset from edge of Crookwell Road closest travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers



Eucalypt tree planting to be installed in a single row of 7 same species .

Figure 5 Landscape Plan Sheet 4
C2WF Crookwell Road
Roadside Landscape Management Plan

Crookwell 2 Wind Farm Crookwell Road - Landscape Management Plan



WTG 10.2

WTG 11.2

Planting area CR7
 Planting notes:
 Populus x canadensis to be installed in single species row at 2.5m plant centres closet to road corridor. Eucalyptus spp. to be installed at 7m plant centres with 2no. same shrub species to be planted at equal spacing between Eucalypt trees.

90 no. Populus x canadensis
 32 no. Eucalyptus melliodora
 32 no. Acacia falciformis
 32 no. Kunzea ericoides

Planting area CR8
 Refer planting sheet 6

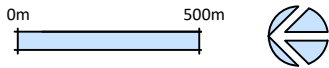
Crookwell Road

Sheet 5

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■ ■ ■ ■ 3 metre wide planting area comprising 2 rip lines at 1.5 metres apart

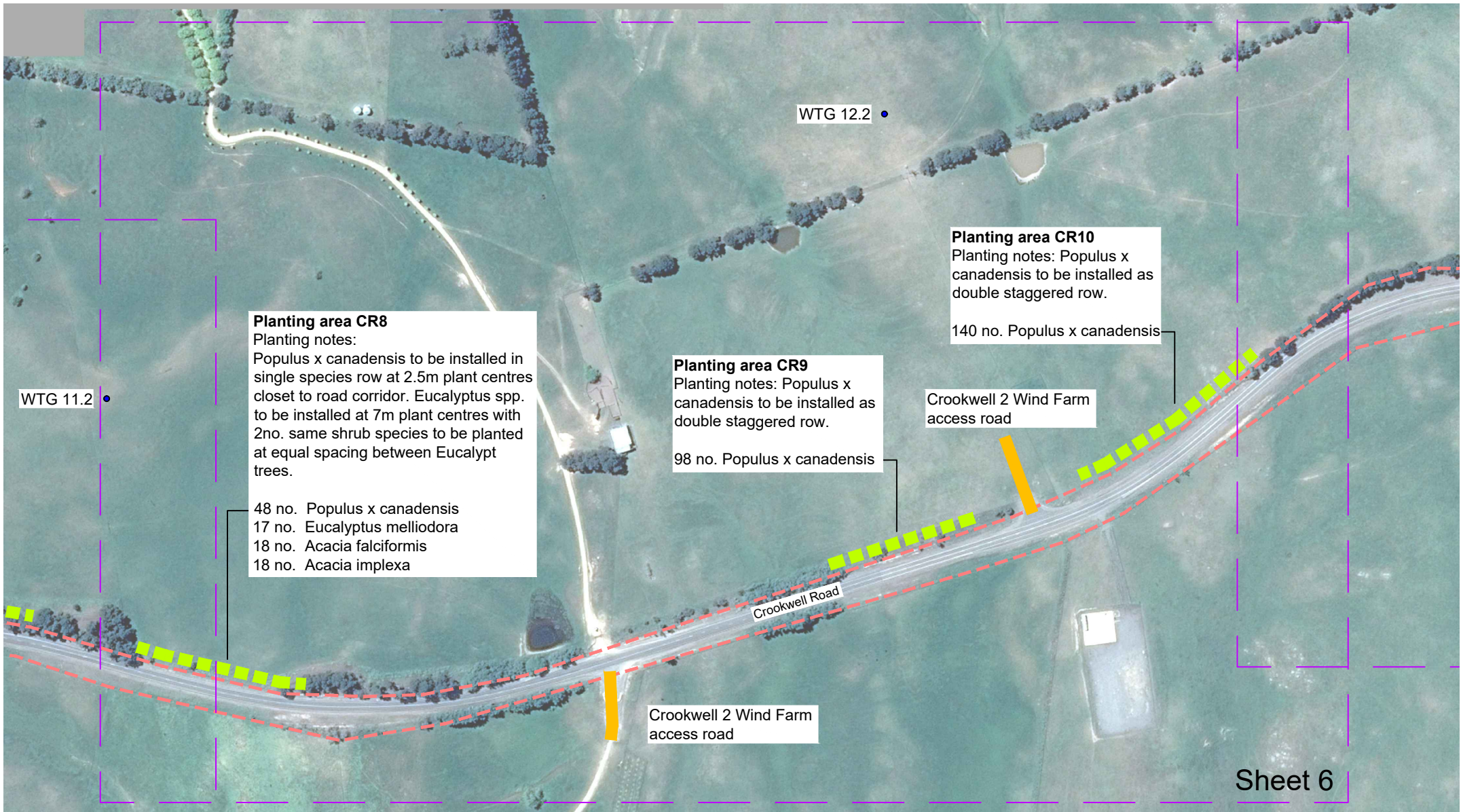
All planting to be offset from edge of Crookwell Road closest travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers



Eucalypt tree planting to be installed in a single row of 7 same species .

Figure 6 Landscape Plan Sheet 5
 C2WF Crookwell Road
 Roadside Landscape Management Plan

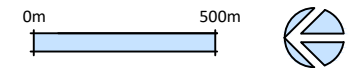
**Crookwell 2 Wind Farm
 Crookwell Road - Landscape Management Plan**



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■ ■ ■ ■ ■ 3 metre wide planting area comprising 2 rip lines at 1.5 metres apart

All planting to be offset from edge of Crookwell Road closest travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers





Eucalypt tree planting to be installed in a single row of 7 same species .

Figure 7 Landscape Plan Sheet 6
C2WF Crookwell Road
Roadside Landscape Management Plan

Crookwell 2 Wind Farm Crookwell Road - Landscape Management Plan



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-  3 metre wide planting area comprising 2 rip lines at 1.5 metres apart
-  2 metre wide planting area comprising 1 rip line

All planting to be offset from edge of Crookwell Road closest travel lane in accordance with Austroads Guide to Road Design Part 6 Roadside Design, Safety and Barriers

Eucalypt tree planting to be installed in a single row of 7 same species .



Crookwell 2 Wind Farm Crookwell Road - Landscape Management Plan

Figure 8 Landscape Plan Sheet 7
C2WF Crookwell Road
Roadside Landscape Management Plan