GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 8869/1
Permit Holder:	Bio Growth Partners Pty Ltd
Duration of Permit:	20 October 2020 – 20 October 2025

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 conducting a mechanical bushfire fuel reduction trial.

2. Land on which clearing is to be done

Lot 5320 on Plan 91378, Worsley

3. Area of Clearing

The Permit Holder must not clear more than 55.65 hectares of native vegetation within the area hatched yellow on attached Plan 8869/1.

4. 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

5. 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.

6. Dieback and weed control

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

7. Vegetation management

(a) A minimum retention rate of 10 m^2/ha *basal area* is required within the combined areas cross-hatched yellow on Plan 8869/1.
(b) Within one month of clearing, the Permit Holder must *rehabilitate* any *log landings* established within native vegetation by scarifying the soil surface to reduce compaction and facilitate natural regeneration.

8. Fauna management – Black cockatoos

(a) Prior to undertaking any clearing authorised under this permit within the combined areas cross-hatched yellow on Plan 8869/1, the permit holder must engage a *fauna specialist* to conduct a *fauna survey* of the permit area to identify *black cockatoo habitat tree/s*;
(b) Where *black cockatoo habitat tree/s* are identified under condition 7(a), the permit holder must engage a *fauna specialist* to map *black cockatoo habitat tree/s* within the permit area.
(c) Each *black cockatoo habitat tree* identified must be inspected by a *fauna specialist* for *evidence* of current or past breeding use by *black cockatoo species*.
(d) The permit holder must ensure that no clearing of *black cockatoo habitat tree/s* identified within the combined areas cross-hatched yellow on Plan 8869/1 occurs.
(e) Where *black cockatoo habitat tree/s* are identified within the combined areas cross-hatched yellow on Plan 8869/1 and those trees show *evidence* of current or past breeding use by *black cockatoo species*, the permit holder must ensure that no clearing occurs within 10 metres of those trees.
(f) Prior to undertaking clearing authorised under this permit within the combined areas cross-hatched yellow on Plan 8869/1, the permit holder must provide the results of the *fauna survey* in a report to the *CEO*.
(g) The *fauna survey* report must include the following;
  (i) the methodology, used to survey the permit area;
  (ii) the location of any fauna species listed in condition 7(a), if identified, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  (iii) the name and amount of each fauna species identified;
  (iv) the location of the *black cockatoo habitat tree/s* 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) a description of the *black cockatoo habitat tree/s* identified, including the:
    (1) species of *black cockatoo habitat tree/s*; and
    (2) condition of the *black cockatoo habitat tree/s*.
  (vi) whether the *black cockatoo habitat tree/s* identified show current or past use by *black cockatoo species*; and
  (vii) a photo of each *black cockatoo habitat tree* identified with current or past use by *black cockatoo species*; and

9. Directional clearing

The permit holder must conduct clearing activities in a slow, progressive manner (e.g. from west to east) to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

PART III - RECORD KEEPING AND REPORTING

10. Records must be kept

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

(a) In relation to the clearing of native vegetation authorised under this Permit:
  (i) the 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;
  (ii) the date that the area was cleared;
  (iii) the size of the area cleared (in hectares);
  (iv) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 5 of this Permit;
  (v) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 6 of this Permit; and
  (vi) Actions taken in accordance with condition 8 of this Permit.

(b) In relation to vegetation management pursuant to condition 7 of this Permit:
  (i) monitoring undertaken to ensure that the minimum *basal area* specified under conditions 7(a) is retained;
  (ii) number of *log landings* established and their location, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings; and
  (iii) the date(s) the *log landings* were rehabilitated.

11. 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 10 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 20 July 2025, the Permit Holder must provide to the *CEO* a written report of records required under condition 10 of this Permit where these records have not already been provided under condition 11(a) of this Permit.

DEFINITIONS

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

basal area is the method of expression of tree cover density in an area where the total area of tree trunk, measured at average adult human breast height, is expressed as square metres per hectares of land area;

black cockatoo habitat tree means trees that have a diameter, measured at 150 centimetres from the base of the tree, of 50 centimetres or greater (or 30 centimetres or greater for *Eucalyptus salmonophloia* or *Eucalyptus wandoo*)

black cockatoo species means one or more of the following species:
(a) *Calyptorhynchus lateriosis* (Carnaby's cockatoo);
(b) *Calyptorhynchus baudinii* (Baudin's cockatoo); and/or
(c) *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo).

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

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

environmental specialist: means a person 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, or who is approved by the CEO as a suitable environmental specialist.

evidence means showing chew marks or scratchings on the habitat tree representative of the species being surveyed, the presence of the species entering or leaving the habitat tree, and/or the presence of chicks/young.

fauna specialist 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 fauna identification and surveys of fauna native to the region being inspected or surveyed, or who is approved by the CEO as a suitable fauna specialist for the bioregion, and who holds a valid fauna licence issued under the *Biodiversity Conservation Act 2016*.

fauna survey means a field-based investigation, including a review of established literature, of the biodiversity of fauna and/or fauna habitat of the permit area and where conservation significant fauna are identified in the permit area, also includes a fauna survey of surrounding areas to place the permit area into local context.

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

log landing/s means an area established for the purpose of stockpiling commercially harvested trees, to enable loading for collection;

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;

remedial action/s means for the purpose of this Permit, any activity that is required to ensure successful re-establishment of *understorey* to its pre-clearing composition, structure and density, and may include a combination of soil treatments and *revegetation*.

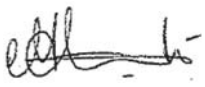
rehabilitate/ed/ion means actively managing an area containing native vegetation in order to improve the ecological function of that area;

thinned/ing describes a silvicultural activity to promote the growth of selected trees by removing competing trees;

understorey means, for the purpose of this Permit, all native vegetation that does not include trees to be *culled* or subject to harvest;

weed/s means any plant -

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

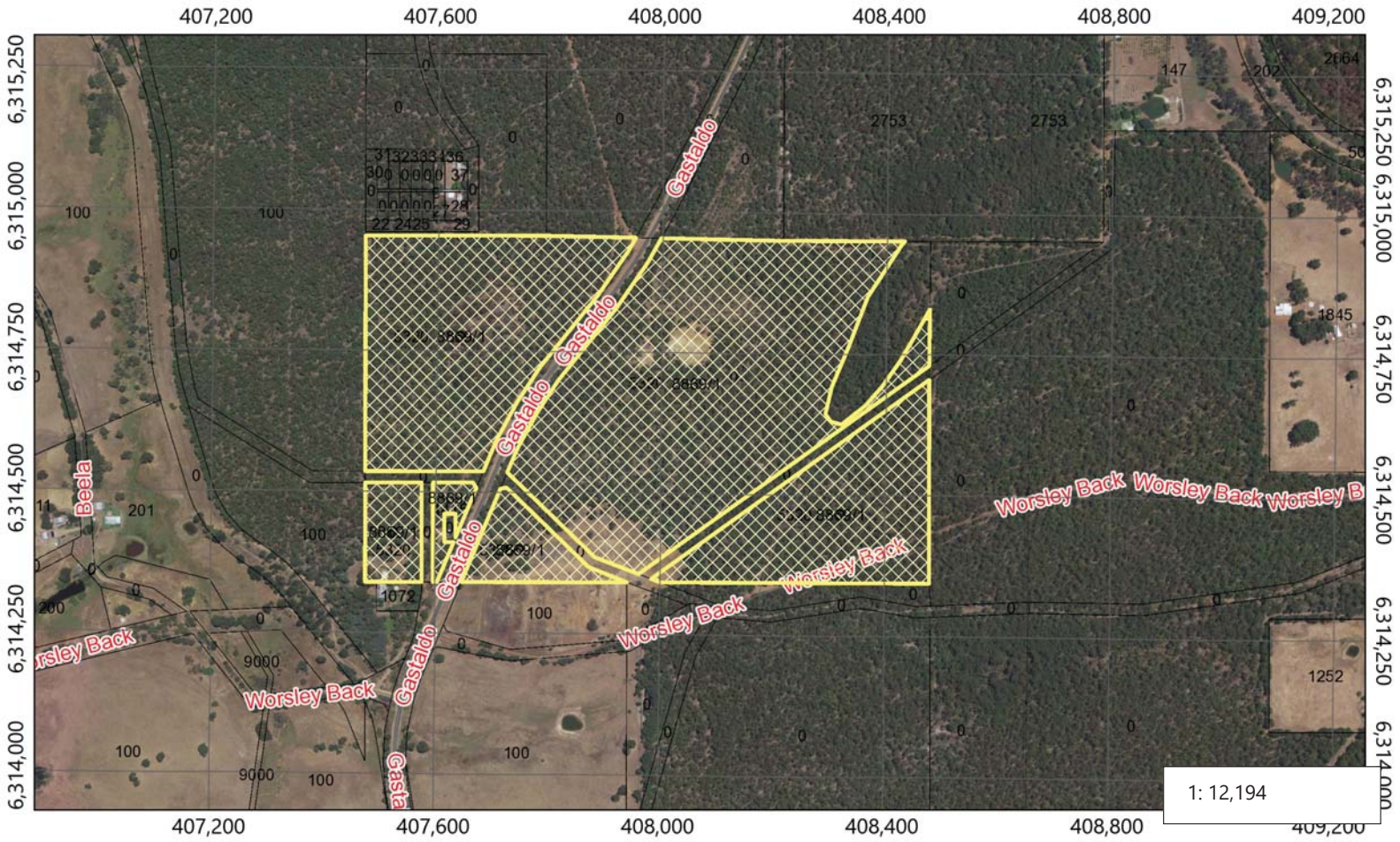


Meenu Vitarana
A/MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

25 September 2020

Plan 8869/1



Legend

- CPS areas approved to clear
- Roads - State Roads
- Roads - Major Roads
- Roads - Minor Roads
- Cadastre

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

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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 8869/1
Permit type:	Purpose permit
Applicant name:	Bio Growth Partners Pty Ltd
Application received:	9 April 2020
Application area:	52.76 hectares of native vegetation
Purpose of clearing:	Bushfire fuel load reduction trial
Method of clearing:	Mechanical
Property:	Lot 5320 on Deposited Plan 91378
Location (LGA area/s):	Collie
Localities (suburb/s):	Worsley

1.2. Description of clearing activities

The proposed clearing area is 52.76 hectares of native vegetation distributed across six areas separated by roads (see Figure 1, Section 1.5). Vegetation within this area will be selectively thinned by the applicant for the purpose of conducting a mechanical bushfire fuel reduction trial in conjunction with the Shire of Collie. The application area is currently heavily stocked with immature trees with an average diameter at breast height (DBH) of 16-25 centimetres due to previous logging, and as such the clearing will target the removal of less vigorous and/or suppressed trees to allow larger trees to develop and "return the forests to a natural state prior to European settlement", whilst reducing ladder fuels and crown cover to make it more difficult for fires to establish and be maintained (Bio Growth Partners, 2020a). As part of the trial, after thinning has occurred the Shire of Collie will undertake burning of some areas to assess the effectiveness of the thinning as a fire mitigation technique, however the proposed burning activities have not been specifically assessed under this clearing permit.

The application area currently has an average basal area of approximately 30 m^2 per hectare (Bio Growth Partners, 2020a), and a minimum basal area of 10 m^2 per hectare will be retained. As such, the subsequent reduction in basal area corresponds to a loss of approximately 637 trees with DBH of 20 centimetre per hectare, or a total of approximately 33,588 trees to be cleared (based on formula described in Bettinger et al. (2017)). The applicant has advised that an experienced tree marker sourced from the Forest Products Commission will be utilised to obtain the final basal area target (Bio Growth Partners, 2020a). Furthermore, the applicant has advised that all habitat trees and "legacy elements", including senescing Marri trees, will be marked and retained, as will mature individuals of second storey species such as large grasstrees (*Xanthorrhoea preissii*) and *Banksia* spp., to ensure diversity is maintained (Bio Growth Partners, 2020a).

A mechanical feller buncher will be utilised to conduct the clearing (BioGrowth Partners, 2020b), following which all extracted material will be chipped, taken off-site, and possibly sold for use as a fuel source (Bio Growth Partners Pty Ltd, 2020a). Sapling stumps will be poisoned to prevent the stumps from coppicing after harvest, to ensure that the forest does not rapidly return to a high fuel state due to re-sprouting growth (Bio Growth Partners Pty Ltd, 2020a). All coarse woody debris (CWD) will be retained except that within 20 metres of boundaries, which will be either removed for chipping or pulled into the interior to reduce bushfire risk (BioGrowth Partners, 2020a).

1.3. Decision on application and key considerations

Decision:	Granted
Decision date:	25 September 2020
Decision area:	52.76 hectares of native vegetation 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 the Department of Water and Environmental Regulation (DWER) on 9 April 2020. DWER advertised the application for public comment and no submissions were 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 C), relevant planning instruments, and any other pertinent matters they deemed relevant to the assessment (see Section 3).

In particular, the Delegated Officer has determined that:

- the clearing is unlikely to impact roosting or breeding habitat for black cockatoo species given that all trees with a diameter at breast height of greater than 50 centimetres will be retained;
- the proposed clearing may impact black cockatoo foraging habitat, however given the extent of suitable foraging habitat within the local area and that retained vegetation is likely to grow to replace much of this cleared habitat, the impacts to foraging habitat are not likely to be significant;
- the reduction in crown cover resulting from the proposed clearing may impact upon habitat for the Western ringtail possum, however given the extent of suitable habitat within the local area and that the reduction in canopy cover is likely to be temporary, the impacts to Western ringtail possum habitat are not likely to be significant;
- the proposed clearing is unlikely to impact other conservation significant terrestrial and arboreal conservation significant fauna given that all trees with a diameter at breast height of greater than 50 centimetres will be retained, the majority of coarse woody debris will be retained, a minimum basal area of 10 m^2 per hectare will be retained and a condition has been placed on the permit to require that clearing is undertaken in a slow progressive manner;
- the proposed clearing area may provide suitable habitat for priority flora species *Lomandra whicherensis*, however given the nature of the clearing and that this species is abundant within the local area, any clearing of this species within the application area is considered unlikely to have a signficant impact on this species;
- the implementation of suitable weed and dieback management condition are appropriate to mitigate the impact of spreading weeds into the adjacent Harris River State Forest and other native vegetation (see Section 3.2.3);
- the implementation of a management condition to rehabilitate log landings is appropriate to mitigate the risk of land degradation (see Section 3.2.4); and
- the applicant has suitably demonstrated avoidance and minimisation measures (see Section 3.1)

In determining to grant a clearing permit subject to conditions, the Delegated Officer found that the proposed clearing is not likely to lead to an unacceptable risk to the environment.

The Delegated Officer also had regard for the purpose of the clearing, taking into consideration that the trial is likely to reduce fire risk as well as improve understanding of the efficiacy of mechanical fuel reduction as a bushfire mitigation technique.

1.5. Site map

Figure 1. Map of the application area. The areas cross-hatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

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; and
3. the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Country Areas Water Supply Act 1947* (WA) (CAWS Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)

The key guidance documents which inform this assessment are:

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

3. Detailed assessment of application

3.1. Avoidance and mitigation measures

The applicant has prepared a *Mechanical Fuel Reduction Management Plan* (Bio Growth Partners, 2020a) and *Timber Harvest Plan* (Bio Growth Partners, 2020b) in accordance with the *Silviculture Guideline for Jarrah Forest* (Department of Parks and Wildlife 2014) to inform the targets and implementation of the proposed clearing. In these plans the applicant has stated they will undertake the following avoidance and mitigation measures:

- Mechanical Fuel Reduction Management Plan:
    - Retention of large mature trees which are likely to have or the potential to form hollows suitable for black cockatoos;
    - Retention of senescing marri trees;
    - Retention of an even cover of trees, as best is practical, to provide both seed for regeneration and a cover to maintain forest values;
    - Retention of mature individuals of second storey species such as large grasstrees and *Banksia* spp. to ensure diversity is maintained; and
    - Vehicle movements associated with any tree harvesting are preferred to be undertaken in drier soil conditions, and will be required to arrive at the harvest area clean of soil and plant material.
- Timber Harvest Plan:
    - Extraction tracks, tracks and plantation roads will be closed when weather conditions may cause significant soil damage or erosion resulting in turbid run-off. If harvesting operations are stopped due to soil damage or erosion, they will not recommence until soil conditions improve;
    - Roads will be located on alignments and grades that provide required access standards without compromising road safety, water quality and other environmental values;
    - All culverts and road drains shall be kept clear of soil or logging debris that may prevent flow of water;
    - Log extraction will cease when soil is saturated and/or runoff occurs;
    - Landings inside harvest area will be located no less than 50 metres from watercourses and wetlands or areas likely to impact on integrity of watercourses, rivers, wetlands and drainage lines and only on slopes less than 8 degrees;
    - Machine operations will be kept to a minimum within 20 metres of any waterway;
    - Machinery activity must not occur within 5 metres of the saturated zone of any waterway;
    - No harvesting debris is to enter, or trees are harvested into, any dams or riparian zones;
    - Contractor will provide wash-down facilities in the event that soil borne pathogens & noxious weeds are present;
    - Harvesting machinery will be washed down before leaving property to prevent spread of soil borne pathogens and noxious weed seeds;
    - Retained habitat trees are considered to be exclusion zones and are to be free of any activity during harvesting;

- Riparian zones are considered to be exclusion zones and are to be free of any activity during harvesting.

During the assessment, DWER sent a letter to the applicant requesting further avoidance measures, to which the applicant responded with the following;

- In response to DWER's request to retain a basal area of 10 m^2/ha of stems within the portion of the application area located within Zone C of the Wellington Dam Catchment Area designated under the *Country Areas Water Supply Act 1947* (CAWS Act), the applicant advised that they will retain an average basal area of 10 m^2/ha of stems over the whole application area (Bio Growth Partners, 2020c);
- In response to DWER's request to avoid a minor non-perennial watercourse and surrounding vegetation mapped within the north-eastern corner of the application area, the applicant agreed to exclude this from the application area. The exclusion of this area allows for a 30-50 metre buffer of vegetation surrounding this watercourse to be retained. As a result, the application area was reduced from 55.65 hectares to 52.76 hectares.

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 B) and considered whether the clearing poses a risk to environmental values. The assessment against the Clearing Principles is contained in Appendix C.

This assessment identified that the clearing may pose a risk to the environmental values of biological values (fauna and flora), conservation areas and water and land degradation, 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 (fauna) – Clearing Principle (b)

Assessment: The application area is likely to provide breeding, roosting and foraging habitat for three Threatened black cockatoo species *Calyptorhynchus baudinii* (Baudin's cockatoo), *Calyptorhynchus latirostris* (Carnaby's cockatoo) and *Calyptorhynchus banksii naso* (Forest red-tailed black cockatoo). Given that the applicant has committed to retaining all potential black cockatoo breeding trees (i.e. *Eucalyptus* sp. with a trunk diameter at breast height (DBH) greater than 50 centimetres (DotEE, 2013)), the proposed clearing is unlikely to have a significant impact on black cockatoo breeding habitat. As Carnaby's cockatoos have also been demonstrated to prefer larger roosting trees (Le Roux, 2017) and it is considered likely that this is also the case for other black cockatoo species, the proposed clearing is also unlikely to significantly impact roosting habitat. Thinning of Jarrah forests can result in improved growth of retained trees due to reduced competition for resources between tree individuals (DPAW, 2014), and as such, combined with the retention of larger trees, the proposed clearing may increase the capacity for development of larger trees with a greater propensity to develop black cockatoo breeding hollows within the application area.

It is acknowledged that the proposed clearing may result in a reduction of black cockatoo foraging habitat, as all three black cockatoo species utilise jarrah and marri trees for foraging (DotEE, 2013). However, given the extent of similar native vegetation remaining within the local area, the Jarrah Forest IBRA Bioregion and representative vegetation complexes, it is considered that the reduction in foraging habitat is not likely to be significant in the local context. It is also considered that over time, retained trees will grow and fill in the gaps left by cleared trees, and therefore some of this foraging habitat will eventually be restored.

Vegetation within the application area may also provide suitable habitat for the other following threatened, priority and other specially protected arboreal and volant fauna species (Bradshaw, 2015):

- *Pseudocheirus occidentalis* (Western ringtail possum) (Threatened);
- *Falsistrellus mackenziei* (Western false pipistrelle) (Priority 4); and
- *Phascogale tapoatafa wambenger* (South-western brush-tailed phascogale) (Conservation Dependent).

Given that reduced hollow availability represents the most significant threat to the brush-tailed phascogale (Rhind, 1996) and Western false pipistrelle (Armstrong et al., 2017) the proposed clearing is unlikely to have significant impacts to these species, as all trees with DBH greater than 50 centimetres (i.e. trees more likely to contain and develop hollows) will be retained. Increased numbers of mature trees resulting from the thinning (DPaW, 2014) may ultimately result in greater hollow availability for these species in the future and the resultant decrease in "clutter" may also benefit the Western false pipistrelle (Webala et al., 2011).

While hollow bearing trees and other habitat features suitable for use by Western ringtail possums (i.e. riparian vegetation, coarse woody debris and large *Xanthorrhoea preissii*) (Wayne et al., 2000) will be retained, it is noted

that the reduction in crown cover resulting from the proposed clearing may result in reduced suitability of the application area as Western ringtail possum habitat (DPaW, 2014b). Given that some of this canopy is expected to restore over time, as well as the presence of suitable habitat within the local area, the impacts to Western ringtail possum habitat are not considered to be significant.

Vegetation within the application area is also likely to provide suitable habitat for the following other threatened and priority terrestrial fauna species (Bradshaw, 2015):

- *Bettongia penicillata ogilbyi* (Woylie) (Threatened);
- *Dasyurus geoffroii* (Chuditch) (Threatened);
- *Setonix brachyurus* (Quokka) (Threatened);
- *Isoodon fusciventer* (Quenda) (Priority 4); and
- *Notamacropus irma* (Western brush wallaby) (Priority 4).

Given that a minimum basal area of 10 m^2/ha will be retained, the majority of coarse woody debris will be retained and the presence of abundant suitable habitat within the local area, it is considered that the proposed clearing is unlikely to have a significant impact upon the persistence of the above terrestrial fauna species.

Clearing will be required to be conducted in a slow, progressive manner to allow fauna to move into adjacent native vegetation ahead of the clearing activity, reducing impacts to individual terrestrial and arboreal fauna.

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:

- A survey of black cockatoo habitat trees (i.e. trees with DBH greater than 50 centimetres) is required to be undertaken and a survey report submitted to DWER prior to clearing. All black cockatoo habitat trees are required to be retained. If trees with signs of use by black cockatoos are identified, no clearing is to take place within a 10 metre radius of these trees.
- Clearing activities are required to be conducted in a slow, progressive manner to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

3.2.2. Environmental value: biological values (flora) – Clearing Principles (a) and (c)

Assessment: One threatened and three priority understorey/second-storey flora species mapped within the local area are recorded within the same mapped soil types and vegetation associations that are present within the application area. Of these species, *Grevillea rara* (Threatened) and *Pultenaea skinneri* (Priority 4) tend to be associated with creek lines and winter wet depressions respectively (Western Australian Herbarium, 1998-) and *Stylidium acuminatum subsp. acuminatum* (Priority two) grows in lateritic soils on hillslopes and in valleys (Wege, 2010). Based on topography and watercourse mapping, these features are unlikely to be present within the application area and as such, the likelihood of these species occurring within the application area and being impacted by the proposed clearing is considered to be low.

Lomandra whicherensis (Priority 3) is a small grass that tends to be associated with lateritic or gravelly soils (Western Australian Herbarium, 1998-) and has been recorded within the soil and vegetation types that are mapped within the majority of the application area, and as such may occur within the application area. Given the growth pattern of this species, the proposed clearing with a mechanical feller buncher would be unlikely to target the removal of this species, although some individuals could still be disturbed during the clearing process. *Lomandra whicherensis* is relatively abundant within the local area (RPS, 2011 and Western Australian Herbarium, 1998-) and as such any clearing of this species within the application area would be unlikely to impact the conservation status of this species. It is also expected that, given the nature of the clearing disturbance to this species there would be a capacity for this species to regenerate over time.

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

3.2.3. Environmental value: conservation areas – Clearing Principle (h)

Assessment: Harris River State Forest is located immediately north and east of the application area and it is considered that the proposed clearing may have an impact on the environmental values of this area by increasing the potential to introduce dieback and weeds into the State Forest. Mitigation measures proposed by the applicant are likely to minimise these impacts. Considering the abundance of habitat and ecological linkages in the local area, the proposed clearing is not likely to result in reduced connectivity of natural areas for biota.

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: Weed and dieback management conditions required to mitigate impacts to the adjacent remnant vegetation.

3.2.4. Environmental value: water and land degradation – Clearing Principles (g) and (i)

Assessment: The mapped soil types within the application area are moderately susceptible to phosphorus export and highly susceptible to wind erosion, subsurface acidification and soil compaction. As the proposed clearing involves thinning and not complete removal of vegetation, the proposed clearing is considered unlikely to result in significant phosphorus export, wind erosion or subsurface acidification soil impacts. Stockpiling cleared materials on log landings may result in compaction of underlying soils. A condition to ensure that log landings are rehabilitated to prevent soil compaction is likely to mitigate these impacts, given the relatively small areas required for log landings.

Given the nature of the clearing, the multiple mitigation measures committed to by the applicant in the Timber Harvest Plan (Bio Growth Partners, 2020b) to reduce erosion and run-off (see Section 3.1 above) during clearing, and that undisturbed buffer areas of at least 30 metres will occur between nearby mapped watercourses and the application area, it is unlikely that the proposed clearing will result in deterioration of surface water. Given the hydrogeology of the application area, it is unlikely that the proposed clearing will impact upon groundwater.

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: The permit holder is required to rehabilitate all log landings.

3.3. Relevant planning instruments and other matters

Other relevant authorisations required to undertake the proposed clearing include:

- A Crown Land Suppliers licence issued under the *Biodiversity Conservation Act 2016* (BC Act) is likely to be required for the commercial use of products of the proposed clearing; and
- A flora processing licence issued by DBCA under the BC Act is likely to be required by the applicant to process the cleared products into mulch.

The application area is zoned as “Public Purposes Local Government” under the Shire of Collie Local Planning Scheme No. 5 (Shire of Collie, 2016).

The Shire of Collie advised DWER that they had engaged Bio Growth Partners to clear native vegetation within the application area for the mechanical fuel reduction trail, and therefore supported the clearing (Shire of Collie, 2020). The Shire advised that there are potential significant cost savings to be achieved through mechanical bushfire fuel reduction (as opposed to purely conducting prescribed burning), and this trial was to be undertaken to determine the suitability of using this method of bushfire mitigation. The Shire advised that Shire officers had identified that vegetation within the application area required bushfire mitigation and thus the application area was considered a suitable property in which to undertake the trial.

The Department of Fire and Emergency Services and The Shire of Collie have performed an initial calculation of fuel loads and fire prediction at the site, with the following results (Bio Growth Partners, 2020a):

- Overall fuel hazard: High
- Total fuel quantity: ~25 t/ha
- Based on the 99% weather conditions for Collie (2002-2011) the following fire behaviour can be expected:
  - Forest Fire Danger Index (FFDI): 33.7, T: 3.4, RH 17%, Wind: 24km/hr, Wind Direction; NNW
  - Fuel moisture content (FMC): 5 %
  - Fire rate of spread (FROS); 1300-1550 m/hr
  - Flame Height: 12.5-14.2 m
  - Max spotting: 2160-2625 m

- Headfire intensity:>15000 kW/m

Due to the high fire hazard it was considered that the vegetation currently present within the application area proposes a significant risk to neighbouring state assets, including S32 Worsely Refinery, the neighbouring St David's Catholic church and the town of Collie, especially the rural/urban interface (Bio growth Partners, 2020a).

A similar mechanical bushfire fuel reduction trail was undertaken in a jarrah forest site approximately 17 kilometres from the application area as part of the Federally funded National Bushfire Mitigation Programme. Plots subjected to thinning treatments reportedly had a lower fire intensity when burnt than control plots (Shire of Collie, personal communication, August 28 2020). As such, it is considered that the proposed clearing is also likely to result in the intended reduced fire risk.

An approximately 13 hectare portion of the application area is mapped within the Wellington Dam Catchment Area designated under the *Country Areas Water Supply Act 1947* (CAWS Act). The proposed clearing site is located within Zone C, a medium salinity risk part of the catchment, where DWER Policy and Guidelines for the "Granting of Licences to Clear Indigenous Vegetation" (Department of Water, 2010) provide for the grant of a licence for silvicultural thinning subject to:

- the endorsement of an appropriate Forest Management Plan (FMP); and
- retention of a minimum basal area.

Assessment of the Forest Management Plan and the Timber Harvest Plan indicates that the thinning treatment is consistent with expectations for Mechanical Fuel Load Reduction for bushfire mitigation purposes and meets CAWS Act objectives for the management of remnant native forest areas in a sustainable manner (DWER, 2020). However, DWER noted that Bio Growth Partners Pty Ltd (2020a) had stated a basal area of 8-14m^2 per hectare would be retained, whereas a minimum basal area of 10 m^2 per hectare would be required to be retained in order to satisfy CAWS Act requirements. (DWER 2020). The applicant was accordingly asked to retain a minimum basal area of 10 m^2 per hectare in this portion of the application area mapped within the Wellington Dam Catchment Area, however the applicant advised they would commit to retaining a minimum basal area of 10 m^2 over the entirety of the application area (Bio Growth Partners, 2020c).

No Aboriginal heritage sites are mapped within 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

DWER request for information	Summary of applicant response	Consideration of response
Modification of the application area to exclude a mapped watercourse and associated riparian vegetation. DWER included a map of a proposed modified application area.	The applicant agreed to the modified application area	Impacts to the watercourse and surrounding riparian vegetation have been adequately avoided.
Request to retain a minimum basal area of 10 m^2/ha in a portion of the application area within the Wellington Dam Catchment Area	The applicant agreed to retain a minimum basal area of 10 m^2/ha within the Wellington Dam Catchment Area	Impacts to the Wellington Dam Catchment water supply have been adequately mitigated.
Requirement to undertake a black cockatoo habitat tree assessment to confirm that trees with a DBH of 50 cm or greater will be retained.	The applicant requested that rather than complete the habitat tree assessment prior to the permit being issued, that the habitat tree survey be required as a permit condition to be undertaken prior to clearing.	DWER agreed to condition the permit with a requirement to undertake a habitat tree survey and submit the survey report to DWER prior to clearing.
Applicant was asked what basal area they would be retaining in areas of the application area outside the Wellington Dam Catchment Area	The applicant advised they planned to retain a minimum basal area of 10 m^2/ha in the entirety of the application area	The proposed retained basal area is considered to be sufficient to maintain habitat for fauna

Appendix B – 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 C.

1. Site characteristics

Site characteristic	Details
Local context	The proposed clearing area is part of an expansive tract of native vegetation. It is surrounded by native vegetation to the west, north, east and south-east, and cleared agricultural land to the south-west. Spatial data indicates the local area (10 kilometre radius of the proposed clearing area) retains approximately 75.5 per cent of the original native vegetation cover.
Vegetation description	A flora survey provided by the applicant (Bio Growth Partners Pty Ltd 2020d) indicates the vegetation within the proposed clearing area consists of *Eucalyptus marginata subsp. marginata* (jarrah) trees with occasional *Corymbia calophylla* (marri), *Eucalyptus pilularis* (blackbutt), *Allocasuarina fraseriana* (sheoak) and *Banksia grandis* (Bull Banksia) trees. Understorey species include *Hibbertia hypercoides*, *Hakea lissocarpha*, *Banksia* spp., *Hypocalymma angustifolium*, *Xanthorrhoea gracilis*, *Drosera glandulidera* and *Loxocarya cinerea*. Vegetation within the application area is described as heavily stocked with few mature trees and many stumps heavy harvesting in the past. Vegetation is described as "immature" with a mean diameter at breast height over bark of 16-25 cm (Bradshaw 2015) (e.g. Figures 3 and 4, Appendix E). However, a few larger trees with hollows suitable for fauna were found to be present throughout the area.

Site characteristic	Details
	This is consistent with the mapped vegetation types: • Dwellingup, D1, described as open forest of *Eucalyptus marginata subsp. marginata-Corymbia calophylla* on lateritic uplands in mainly humid and subhumid zones (53.52 ha); and • Yarragil Yg1, described as open forest of Eucalyptus marginata subsp. marginata-Corymbia calophylla on slopes with mixtures of Eucalyptus patens and Eucalyptus megacarpa on the valley floors in humid and subhumid zones (2.13 ha). (Mattiske and Havel 1998). Excerpts from the flora survey (Bio Growth Partners, 2020d) and photographs of representative vegetation (Shire of Collie, 2020a) are presented in Appendix E. It should be noted that the flora survey was not undertaken in accordance with EPA (2016) guidance for flora surveys and as such did not undertake a desktop study of flora likely to occur within the application area nor undertake targeted survey methods for these species, and as such the presence of these species within the application cannot be ascertained.
Vegetation condition	A flora survey provided by the applicant (Bio Growth Partners Pty Ltd 2020c) indicates the vegetation within the majority of the proposed clearing area is in Very Good condition, described as "Vegetation structure altered, with obvious signs of disturbance" (Keighery, 1994), with evidence of disturbance from fire and past logging. The survey found no weeds and noted there was very little edge effect of weeds into the bush along the Gestaldo Road easement. Aerial imagery indicates an area near the south-western corner of the application area appears to be completely cleared of native vegetation and can therefore be described as Completely Degraded, described as "The structure of the vegetation is no longer intact and the area is completely or almost completely without native species" (Keighery, 1994). The full Keighery condition rating scale is provided in Appendix E, below.
Soil description	The soil is mapped as: • Dwellingup ironstone gravel divides phase (majority of site): The soil parent material is laterite, soils are gravels with some sands (Mapping unit: 255DpDWi); and • Yarragil upstream valleys phase (4.35 ha area NE of site): Relief 5-20 m, slopes 3-10%. Valley floor is broader than downstream phase. Soil parent material is mainly laterite. Soils are gravels and sands. (Mapping unit: 255DpYGu).
Land degradation risk	The land degradation risk categories that apply to the 255DpDWi subsystem are (Schoknecht et al., 2004; DAFWA,2017): • Water Erosion: <3% of map unit has a high to extreme water erosion risk; • Wind Erosion: >70% of map unit has a high to extreme wind erosion risk; • Salinity: <3% of map unit has a moderate to high salinity risk or is presently saline; • Subsurface Acidification: >70% of map unit has a high subsurface acidification risk; • Subsurface compaction: >70% of the map unit has a high subsurface compaction risk; • Flood risk: <3 of the map unit has a moderate to high flood risk; • Water logging: <3% of map unit has a moderate to very high waterlogging risk; and • Phosphorus export: 10-30% of map unit has a high to extreme hazard. The land degradation risk categories that apply to the 255DpDWi subsystem are (Schoknecht et al., 2004; DAFWA,2017): • Water Erosion: 10-30% of map unit has a high to extreme water erosion risk • Wind Erosion: >70% of map unit has a high to extreme wind erosion risk;

Site characteristic	Details
	• Salinity: <3% of map unit has a moderate to high salinity risk or is presently saline; • Subsurface Acidification: >70% of map unit has a high subsurface acidification risk; • Subsurface compaction: >70% of the map unit has a high subsurface compaction risk; • Flood risk: 3-10% of the map unit has a moderate to high flood risk ; • Water logging: 10-30% of map unit has a moderate to very high waterlogging risk; and • Phosphorus export: 30-50% of map unit has a high to extreme hazard.
Waterbodies	A minor, non-perennial tributary of the Collie River and an associated 30-50 metre buffer of vegetation incises the north-eastern corner of the application area. A perennial tributary of the Collie River is mapped approximately 300 metres west of the application area, and two other minor non-perennial tributaries are mapped approximately 175 metres south-east and 250 metres south of the application area.
Conservation areas	The closest mapped conservation area is Harris River State Forest, immediately adjacent (north and east) to the application area.
Climate and landform	Groundwater Salinity (Total Dissolved Solids): 500-1000 mg/L. Mean Rainfall: 1100 millimetres Evapotranspiration: 700 millimetres Topography: 240-255 metres AHD Hydrogeology: Rocks of low permeability, fractured and weathered rocks - local Aquifers. Granitoid lithology.

2. Flora, fauna and ecosystem analysis

One threatened flora, seven priority flora, eight threatened fauna, five priority fauna and three other specially listed fauna species are mapped within the local area (i.e. within a 10 kilometre radius of the clearing area). No threatened or priority ecological communities are mapped within the local area.

Of these species and communities, with consideration for the site characteristics set out above and relevant datasets (see Appendix F), the following conservation significant flora and fauna species may be impacted by the clearing.

Flora Species	Listing	Closest record to application area (km)	No of records in local area	Suitable soil type?	Suitable vegetation type?	Are surveys adequate to identify?
Grevillea rara	T	6.8	2	Y	Y	N
Lomandra whicherensis	P3	2.8	9	Y	Y	N
Pultenaea skinneri	P4	6	5	Y	Y	N
Stylidium acuminatum subsp. acuminatum	P2	4.9	2	Y	Y	N
Fauna Species	**Listing**	**Closest record to application area (km)**	**No of records in local area**	**Suitable habitat features**	**Other info**	**Are surveys adequate to identify?**
Bettongia penicillata ogilbyi (Woylie)	T	4.0	41	Y	-	N
Pseudocheirus occidentalis (Western Ringtail possum)	T	1.6	34	Y	-	N
*Calyptorhynchus baudinii** (Baudin's cockatoo)	T	2.6	91	Y	• Within breeding range of all three species • Closest confirmed white tailed black cockatoo breeding site approx. 32km SW of application area • Closest confirmed red tailed black cockatoo breeding site approx. 34km NNW of application area • Closest roost site approx. 10.7 km NW of application area • Mapped as a Black Cockatoo feeding area (Jarrah Forest)	N
*Calyptorhynchus latirostris** (Carnaby's cockatoo)	T	7.5	1	Y		N
Calyptorhynchus banksii naso (Forest red-tailed black cockatoo)	T	2.8	29	Y		N
Dasyurus geoffroii (Chuditch)	T	2.7	55	Y	-	N
Setonix brachyurus (Quokka)	T	0.25	173	Y	-	N
Falsistrellus mackenziei (Western false pipistrelle)	P4	6.2	1	Y	-	N
Isoodon fusciventer (Quenda)	P4	1.3	77	Y	-	N
Notamacropus irma (Western brush wallaby)	P4	0	1	Y	-	N
Phascogale tapoatafa wambenger (South-western brush-tailed phascogale)	CD	3.1	16	Y	-	N

*An additional 3 records of "*Calyptorhynchus* sp. 'white-tailed black cockatoo'" were mapped within the local area, which may be either of these two species.

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					
Jarrah Forest	4,506,660.25	2,399,838.15	53.25	1,673,614.25	37.14
Vegetation complex					
Dwellingup D1	208,490.90	181,038.81	86.83	171,561.01	82.29
Yarragil Yg1	80,202.95	64,927.06	80.95	59,063.57	73.64

Appendix C – 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 significant flora, fauna and/or habitats.	May be at variance	Yes: Refer to Section 3.2.1 and Section 3.2.2 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 may contain significant habitat for conservation significant fauna.	May be at variance	Yes: Refer to Section 3.2.1 above.
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: The proposed clearing area is unlikely to contain habitat for flora species listed under the BC Act.	Not likely to be at variance	Yes: Refer to Section 3.2.2 above.
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 indicative of a threatened ecological community.	Not likely to be at variance	No
Environmental values: significant remnant vegetation and conservation areas		

Assessment against the Clearing Principles	Variance level	Is further consideration required?
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 the mapped vegetation type and native vegetation in the local area is consistent with the national objectives and targets for biodiversity conservation in Australia. Vegetation in the proposed clearing area is not considered to be part of a significant ecological linkage in the local area.	Not likely to be at variance	No
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 may have an impact on the environmental values of adjacent conservation areas.	May be at variance	Yes: Refer to Section 3.2.3 above.
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: No watercourses or associated vegetation are mapped within the application area.	Not likely to be at variance	No
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 moderately susceptible to phosphorus export and highly susceptible to wind erosion and subsurface acidification. Noting the nature of the proposed clearing (i.e. thinning) and the management measures committed to by the applicant, the proposed clearing is not likely to have an appreciable impact on land degradation.	Not likely to be at variance	Yes: Refer to Section 3.2.4 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 nature of the clearing (i.e. thinning) and the management measures committed to by the applicant, the clearing is unlikely to impact the quality of water in nearby watercourses or underlying groundwater.	Not likely to be at variance	Yes: Refer to Section 3.2.4 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: Given the nature of the clearing (i.e. thinning) and the mapped soils and topographic contours in the surrounding area, the proposed clearing is not likely to contribute to increased incidence or intensity of flooding or waterlogging.	Not likely to be at variance	No

Appendix D – 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 South West and Interzone Botanical Province (Keighery, 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.
Very Good	Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix E – Biological survey information excerpts / photographs of the vegetation

Table 1: Flora & Fauna Survey - Lot 5320 on Deposited Plan 91378, Gestaldo Rd, Worsely, Shire of Collie (Bio Growth Partners, 2020d)

	Sample Plot No																		
Aattributes Checked	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#13	#14	#15	#16	#17	#18	#19	#20
Weed Species							Road Verge												
Feral Fauna																			
- Evidences of Foxes												Bones						Bones	
- Evidences of Rabbits																			
- Evidences of Dogs																			
- Evidences of Cats																			
- Evidences of Pigs																			
- Evidences of Horses/Cattle/Sheep																			
Native Fauna & Fungi																			
- Evidences of Termites		Mounds		Mounds								Mounds						Mounds	
- Evidences of Birds						Heard Sounds							Heard Sounds			Heard Sounds			
- Evidences of Kangaroos					Visual on Kangaroos														
Native Fauna & Fungi Habitat																			
- Areas of trees	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree	Open Tree
- Areas of dense undersorey vegetation																			
- Tree hollows in old Mature Trees			Yes					Yes											
- Perches for Hunting																			
- Dead Vegetation for fungi/invertebrate habitat	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Large fallen logs on ground			Yes				Yes			Yes	Yes		Yes	Yes	Yes				
- Granite or other natural rock outcrops																			
- Moss beds for fungi habitat																			
- Wetlands or waterways																			
Vegetation Health																			
- Numerous tree stumps (not from Logging)																			
- Dead or dying species		E.rudis insect dieback							E.rudis insect dieback										
- Heavy leaf/stem damage by insects																			
- Diseases/pests suspected																			
- Drought lowering of groundwater table																			
- Flooding/rise in groundwater table																			
Miscellaneous Disturbance Factors																			
- Evidence of Salinisation																			
- Erosion																			
- Service Corridors (Utiliies Infrastructure)																			
- Mining/Extraction					Gravel Pit Clearing	Gravel Pit Clearing							Gravel Pit Clearing						
- Evidence of past logging	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees	No Large Trees
- Previous clearing (may be partially cleared)		Yes													yes				
- Overgrazing (rabbits,stock,kangaroos)																			
- Firewood collection (recent activity)																			
- Dope plants/equipment																			
- Soil movement (dumping/removal)																			
- Rubbish dumping (household, construction, garden)																			
- Proliferation of tracks (walk trails, firebreaks)		Yes					Yes			Yes	Yes					Yes			
- Off-road vehicle use (4WD, trail bikes, push bikes)						Yes							Yes					Yes	Yes
- Vandalism (damage to plants)																			
- Revegetation with non-endemic species																			
Fire Disturbance Factors																			
- Reduced range of tree ages	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Fire scars high up stem (evidence of hot burns)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Major trunk damage																			
- Tree suckering from trunk and branches																			
- Amount of leaf litter reduced																			
- Large fallen logs almost burnt through		Yes			Yes			Yes	Yes						Yes				
- Time since last fire (estimated)	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs	< 20 yrs

Table 1 (continued): Flora & Fauna Survey - Lot 5320 on Deposited Plan 91378, Gestaldo Rd, Worsely, Shire of Collie (Bio Growth Partners, 2020d)

	Sample Plot No																		
Vegetation Condition																			
- Prstine																			
- Excellent																			
- Very Good (Veg structure altered. Due to fires & historical Logging activities)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- Good																			
- Degraded																			
Social Significance Values																			
- Evidence of Community/Passive/Education interest																			
- Landscape amenity (area screens/conflicting land use)																			
- Scenic features (eg. High point in landscape)																			
- Indigenous/European Heritage (Cultural/Historic)																			
Management Recommendations	**Xanthorhorea's present on site to monitor for Phytophora, Low weeds present, Fire scars evident, Good leaf build up on forest floor, Very few old habitat trees, No established mid-storey, Disturbed site reflected of being a gravel collection resserve**																		
Site information																			
- Topographic position	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland	Upland
- Slope	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat	Flat
- Surface soil	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam	Red Loam
- Drainage	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well	Well
Bushland Plant Survey																			
- Trees (10 - 30m) coverage of 10-30%																			
- *Eucalyptus marginarta (Jarrah)*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- *Corymbia calophylla (Marri)*										Yes								Yes	
- *Eucalyptus pilularis (Blackbutt)*		Yes	Yes										Yes						
- *Allocasuarina fraseriana (Sheoak)*					Yes					Yes					Yes				
- *Banksia grandis (Bull Banksia)*								Yes						Yes					
- Trees (< 10m i.e. Saplings) coverage of 5-10%																			
- *Eucalyptus marginarta (Jarrah)*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
- *Corymbia calophylla (Marri)*										Yes								Yes	
- *Eucalyptus pilularis (Blackbutt)*		Yes	Yes										Yes						
- *Allocasuarina fraseriana (Sheoak)*					Yes					Yes					Yes				
- *Banksia grandis (Bull Banksia)*								Yes						Yes					
- Shrubs (1 - 2 m) coverage of 5-10%																			
- *Xanthorrhoea preissii*																			
- *Macroxamia riedlei*																			
- Shrubs (< 1m) coverage of 30-50%																			
- *Hibbertia hypercoides*		Yes		Yes	Yes	Yes		Yes		Yes			Yes	Yes	Yes			Yes	Yes
- *Hakea lissocarpha*	Yes		Yes	Yes		Yes		Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes
- *Banksia species*	Yes	Yes	Yes	Yes	Yes		Yes		Yes		Yes			Yes	Yes	Yes		Yes	
- *Hypocalymma angustifolium*			Yes			Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes		Yes		Yes
- Grasses (< 1m) coverage of 05-10%																			
- *Xanthorrhoea gracilis*	Yes	Yes			Yes			Yes			Yes					Yes			
- Herbs coverage 05-10%																			
- *Drosera giandulidera*		Yes	Yes	Yes		Yes				Yes							Yes		
- Sedges 05-10%																			
- *Laxocarya cinerea*	Yes			Yes	Yes														

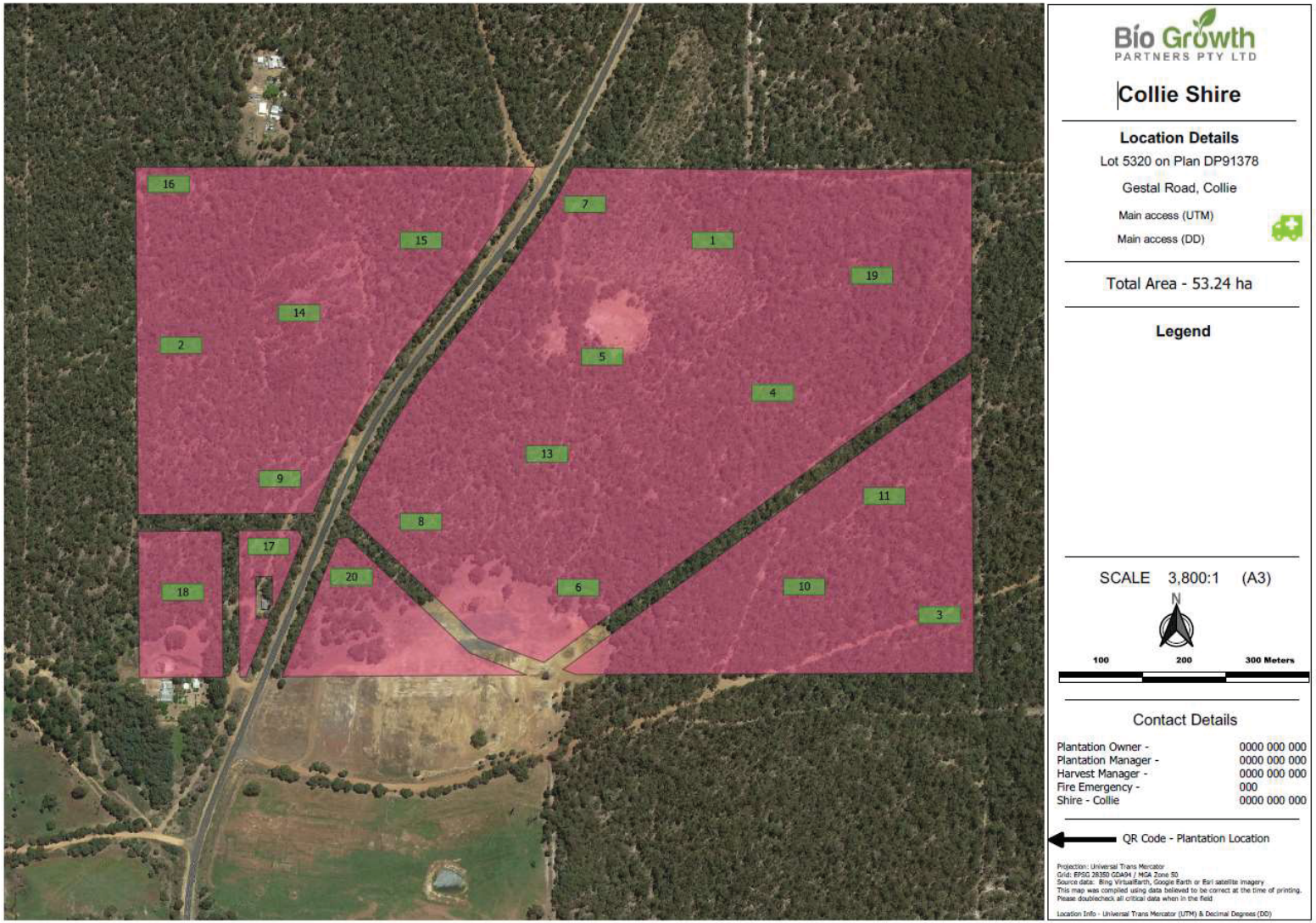

Figure 2: Map of survey plots (Bio Growth Partners, 2020d)

Figure 3: Photograph of representative vegetation within the application area (Shire of Collie, 2020)

Figure 4: Photograph of representative vegetation within the application area (Shire of Collie, 2020)

Appendix F – 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)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrogeology Statewide
- IBRA Vegetation Statistics
- Regional Parks (DBCA-026)
- Soil and Landscape Mapping – Best Available (DPIRS-027)

Restricted GIS Databases used:

- Hydrography – Inland Waters - Waterlines
- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

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