



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 10340/1
Permit Holder:	City of Swan
Duration of Permit:	15 September 2024 to 15 September 2029

ADVICE NOTE

Monetary contribution to the Offsets Fund

The monetary contribution to the Offsets Fund referred to in condition 8 of this permit is intended to contribute towards the purchase and conservation, in perpetuity, of at least 5.80 hectares of native vegetation that comprises high-quality foraging habitat for threatened black cockatoo species

The permit holder is authorised to clear *native vegetation* subject to the following conditions of this permit.

PART I – CLEARING AUTHORISED

1. Clearing authorised (purpose)

The permit holder is authorised to clear *native vegetation* for the purpose of road construction

2. Land on which clearing is to be done

Henley Street/Brooklands Drive Road reserve (PIN 1141980), Henley Brook

Henley Street Road reserve (PIN 1141982), Henley Brook

Lot 208 on Diagram 99645, Henley Brook

Lot 210 on Deposited Plan 29101, Henley Brook

Lot 215 on Deposited Plan 33261, Henley Brook

Lot 221 on Deposited Plan 405951, Henley Brook

Lot 251 on Diagram 93205, Henley Brook

Lot 500 on Diagram 89786, Henley Brook

Lot 800 on Deposited Plan 424384, Henley Brook

Unnamed road reserve (PIN 12569179, 12627694, 12627695, 12633595, 12702983)

3. Clearing authorised

The permit holder must not clear more than 2 hectares of *native vegetation* within the area cross-hatched yellow in Figure 1 of Schedule 1.

PART II – MANAGEMENT CONDITIONS

4. Avoid, minimise, and reduce impacts and extent of clearing

In determining the *native vegetation* authorised to be cleared under this permit, the permit holder must apply the following principles, set out in descending 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.

5. Weed and dieback management

When undertaking any clearing authorised under this permit, the permit holder must take the following measures to minimise the risk of introduction and spread of *weeds* and *dieback*:

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

6. Directional clearing

The permit holder must conduct clearing activities in a slow, progressive manner in the direction of adjacent vegetation from to allow fauna to move into adjacent *native vegetation* ahead of the clearing activity.

7. Erosion management

To reduce the potential for wind and water erosion, the permit holder must commence road construction activities no later than two (2) months after undertaking the authorised clearing activities.

8. Offset – monetary contributions to the Offsets Fund

Prior to undertaking any clearing authorised under this permit, the permit holder must provide documentary evidence to the *CEO* that funding of \$129,862 has been transferred to the Department of Water and Environmental Regulation for the purpose of acquisition, establishing or maintaining native vegetation as an environmental offset for the clearing activities authorised under this permit.

PART III - RECORD KEEPING AND REPORTING

9. Records that must be kept

The permit holder must maintain records relating to the listed relevant matters in accordance with the specifications detailed in Table 1.

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	<ul style="list-style-type: none"> (a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to GDA2020, expressing the geographical coordinates in Eastings and Northings; (c) the date that the area was cleared; (d) the date that road construction activities were commenced; (e) the size of the area cleared (in hectares); and (f) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 4; and (g) actions taken to minimise the risk of the introduction and spread of <i>weeds</i> and <i>dieback</i> in accordance with condition 5;

10. Reporting

The permit holder must provide to the *CEO* the records required under condition 9 of this permit when requested by the *CEO*.

DEFINITIONS

In this permit, the terms in Table 2 have the meanings defined.

Table 2: Definitions

Term	Definition
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the <i>Environmental Protection Act 1986</i> .
clearing	has the meaning given under section 3(1) of the EP Act.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.
fill	means material used to increase the ground level, or to fill a depression.

Term	Definition
dieback	means the effect of <i>Phytophthora</i> species on native vegetation.
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
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.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
weeds	means any plant – <ul style="list-style-type: none"> (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i>; 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.

END OF CONDITIONS



Ryan Mincham
MANAGER
NATIVE VEGETATION REGULATION

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

23 August 2024

Schedule 1

The boundary of the area authorised to be cleared is shown in the map below (Figure 1).



Figure 1: Map of the boundary of the area within which clearing may occur

The areas cross-hatched yellow indicate the areas authorised to be cleared under the granted clearing permit.



Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 10340/1
Permit type:	Purpose permit
Applicant name:	City of Swan
Application received:	15 September 2023
Application area:	2 hectares of native vegetation
Purpose of clearing:	Road construction
Method of clearing:	Mechanical
Property:	Henley Street/Brooklands Drive Road reserve (PIN 1141980), Henley Brook Henley Street Road reserve (PIN 1141982), Henley Brook Lot 208 on Diagram 99645, Henley Brook Lot 210 on Deposited Plan 29101, Henley Brook Lot 215 on Deposited Plan 33261, Henley Brook Lot 221 on Deposited Plan 405951, Henley Brook Lot 251 on Diagram 93205, Henley Brook Lot 500 on Diagram 89786, Henley Brook Lot 800 on Deposited Plan 424384, Henley Brook Unnamed road reserve (PIN 12569179, 12627694, 12627695, 12633595, 12702983)
Location (LGA area/s):	City of Swan
Localities (suburb/s):	Henley Brook

1.2. Description of clearing activities

The City of Swan (the applicant) proposes to construct and upgrade parts of the Henley Brook Avenue which is reserved under the Metropolitan Region Scheme as an 'Outer Regional Road'. The road is identified as a key transport connection in the Western Australia Planning Commission (WAPC) endorsed Swan Urban Growth Corridor Sub-regional Structure Plan 2009. The corridor is a part of the Network City, which is a state government community planning strategy for the Perth and Peel regions to cater for Perth's projected population growth (WAPC, 2009)

The vegetation proposed to be cleared is distributed across various properties in the City of Swan (see Figure 1, Section 1.5). The application is to selectively clear two (2) hectares of native vegetation for the purpose of extending Henley Brook Avenue from its current alignment near Gngangara Road to south of Henley Street. This clearing permit application is an extension of CPS 9953/1 which covers the northern section of the proposed works.

Historical clearing has occurred within the application area between 1950s and the 1990s for the creation of the road alignment and urban development, with some remnant vegetation retained. Replanting of native trees over the cleared areas was carried out in the 1980s. Trees within the proposed clearing area are identified as regrowth or self-seeded from nearby planted trees and naturally occurring trees (PGV, 2024b).

1.3. Decision on application

Decision:	Granted
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Decision date: 23 August 2024

Decision area: 2 hectares of native vegetation, as depicted in Section 1.5, below.

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (DWER) advertised the application for 21 days and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix B), relevant datasets (see Appendix G.1), the findings of a vegetation and fauna survey (see Appendix F), the clearing principles set out in Schedule 5 of the EP Act (see Appendix C), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration that the proposed clearing for the extension and widening of the road which will improve road safety and is an integral part of state planning to cater for Perth's population growth. The Delegated Officer considered the following:

- The proposed clearing will remove approximately 0.64 ha of vegetation comprising significant foraging habitat for the Threatened Carnaby's (*Zanda latirostris*), Forest Red-tail (*Calyptorhynchus banksi naso*) and Baudin's (*Zanda baudinii*) black cockatoos. A monetary offset contribution to the Part V Offset Fund for the acquisition, management and in perpetuity protection of 5.80 ha vegetation containing high quality foraging habitat for threatened black cockatoo species is considered to be acceptable in counterbalancing the significant residual impact and has been placed as a condition on the permit.
- Clearing of native vegetation can exacerbate wind erosion and promote deposition of sediment and dust to nearby vegetation.
- Clearing may introduce and spread weeds and dieback into adjacent vegetation, which could impact on the quality of the adjacent vegetation and its habitat values.

After consideration of the available information and the applicant's minimisation and mitigation measures (see Section 3.1), the Delegated Officer determined that the proposed clearing is unlikely to lead to appreciable water and land degradation, or have long-term adverse impacts on threatened black cockatoo species. The impacts on the environmental values listed above can be minimised and managed to unlikely lead to an unacceptable risk to these values. The applicant has suitably demonstrated avoidance and minimisation measures, with the offset considered to be appropriate in counterbalancing the impacts to habitat for threatened Black cockatoo species (see Section 4).

The Delegated Officer decided to grant a clearing permit subject to conditions to:

- avoid, minimise to reduce the impacts and extent of clearing
- take hygiene steps to minimise the risk of the introduction and spread of weeds and dieback
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity
- commence road construction and associated works within two (2) months of authorised clearing to mitigate erosion risk
- provision of a monetary contribution to the Part V Offset Fund to counterbalance the significant residual impact of the loss of foraging habitat for three threatened black cockatoo species.

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 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the polluter pays principle
- 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)
- *Planning and Development Act 2005* (WA) (P&D Act)
- *Soil and Land Conservation Act 1945* (WA)

Relevant policies considered during the assessment include:

- *Environmental Offsets Policy* (2011)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)
- *Environmental Offsets Guidelines* (August 2014)
- 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 applicant submitted that the design and location of the road project was selected to minimise environmental impacts. The applicant considered changing the alignment of the road to avoid the clearing of a larger amount of native vegetation which would also further maintain ecological corridor function, however, housing to the west and east of the application area limited the applicant's capacity to modify the road alignment. To minimise and avoid clearing, the applicant has committed to the retention of trees located on the edge of the road works.

To mitigate the potential impacts of clearing, the applicant has prepared a Construction Environmental Management Plan (CEMP) which includes measures to avoid and mitigate impacts on land and water resources (PGV Environmental (2023c). These include:

- adherence to the Water Quality Protection Notices (WQPN) regarding potential impacts to a Public Drinking Water Source Area (PDWSA)
- the City will not use recycled drainage rock and recycled road base due to the proximity of the PDWSA
- installation of box culverts at St Leonards creek crossing to minimise potential impacts on local hydrology. The applicant has acquired a Bed and Banks permit for the implementation of this mitigation measure.

To mitigate the loss of foraging habitat for the three threatened black cockatoo species, the proponent has committed to the landscaping planting of median strips, roundabouts and proposed drainage basins with species that provide suitable foraging habitat for black cockatoos. A rehabilitation and revegetation management plan which included landscape planting was submitted with the application, with the revegetation planting proposed to commence after all associated road works are completed, approximately two years after authorised clearing takes place.

After consideration of avoidance and mitigation measures, it was determined that the proposed clearing would have a significant residual impact through the loss of 0.64 ha of foraging habitat for threatened black cockatoo species. In accordance with the Government of Western Australia's *Environmental Offsets Policy* and *Environmental Offsets Guidelines*, an offset to counterbalance the significant residual impact was determined to be necessary and has been conditioned on the clearing permit. The nature and suitability of the offset provided are summarised in Section 4.

The Delegated Officer was satisfied that the applicant has undertaken reasonable measures to avoid and minimise potential impacts of the proposed clearing on environmental values.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix C) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, land and water resource values.

The assessment against the clearing principles (see Appendix D) identified that the impacts of the proposed clearing present a risk to biological values and land and water resources. The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

3.2.1. Biological values - Clearing Principles (a) and (b).

Assessment

A vegetation survey performed over the application area (PGV, 2023a) identified the vegetation as comprising a mixture of planted and naturally occurring *Eucalyptus camaldunensis* (River Red Gum), *E. rudis* (flooded gum), *E. gomphocephala* (tuart), *E. marginata* (jarrah), *Corymbia calophylla* (marri), banksias (*Banksia attenuata* and *B. menziesii*), *Acacia saligna* (Orange wattle) and *Adenanthos cynorum* (Woolly bush) over native and non-native weeds. The vegetation is mostly in Degraded (Keighery, 1994) condition, with parts of the application area (especially in the northern section), comprised of cleared areas which are void of native vegetation. Some of the vegetation that occurs along the creek and has been highly modified and does not represent riparian vegetation. Given the condition of the vegetation, it is unlikely to support a high-level of flora and fauna diversity, however, clearing can spread weeds and dieback into nearby vegetation and reduce the quality of habitat within these areas. A weed and dieback management condition has been imposed on the permit to mitigate this potential impact.

Several conservation significant fauna species have been recorded from the local area (10 km radius of the application area), with many of the records historical given ongoing development within the metropolitan area. Several migratory birds, including the Peregrine falcon, have been previously recorded within the local area and may use the vegetation in the application area in transit. The vegetation within the application area is unlikely to represent significant habitat for any migratory bird species. Of all invertebrate species, based on the number of records which are within proximity to the application area, the Carnaby's black cockatoo (*Zanda latirostris*) Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) and Quenda (*Isoodon fusciventer*) are the most likely to occur within the application area and surrounds.

Quenda

There are 366 records of the Priority 4 Quenda in the local area. The most recent record was made in 2021, approximately 750 metres from the application area.

Quenda are known to inhabit and forage in areas that contain tall and dense vegetation, with most of the records within the local area from reserves and Bush Forever sites located approximately 1.5 to 2 km north and west of the application area. Although quenda may disperse into and use the application area, the condition of the vegetation and its location within close proximity of urban development would indicate that the application area does not provide significant habitat for quenda. The clearing of vegetation within the application area is unlikely to impact on the conservation or persistence of quenda in the local area. Potential impact on any quenda individuals present during clearing can be avoided by conducting clearing in a slow, directional manner towards nearby vegetation.

Black cockatoos

The application area is within the modelled distribution area for the Carnaby's and Forest red-tailed black cockatoo, and at the edge of the modelled distribution for the Baudin's black cockatoo (*Zanda baudinii*). Although the vegetation proposed to be cleared is in predominantly Degraded (Keighery, 1994) condition, approximately 0.64 ha of the vegetation comprises marri, jarrah, tuart and banksia which provide primary and secondary foraging habitat, as well as potential roosting habitat for threatened black cockatoo species. The vegetation has been assessed as having good foraging quality for Black cockatoo species, with foraging debris found in the application area, indicating the use of the vegetation for foraging by black cockatoo species (PGV, 2023b). The application area is not a part of a mapped formal ecological linkage, however, the vegetation proposed to be cleared, typical of roadside vegetation, contributes to ecological corridors which facilitate the movement of fauna in the area, including black cockatoo species.

Impacts on black cockatoo habitat can be considered in terms of breeding habitat, night roosting habitat, and foraging habitat. Black cockatoos will generally forage up to 12 kilometres from an active breeding site (DSEWPac 2012; DPaw 2013). Following breeding, they will flock in search of food, usually within six kilometres of a night roost (DSEWPac 2012; DPaw 2013) but may range up to 20 kilometres (Commonwealth of Australia 2017). Black cockatoo night roosts are usually located in the tallest trees of an area, and in close proximity to both a food supply and surface water (Commonwealth of Australia 2017). Flocks will use different night roosts, often for weeks, or until the local food supply is exhausted. Flocks show some fidelity to night roosts with sites used in most years to access high-quality feeding sites. However, not all-night roosts are used in every year (DPaw 2013).

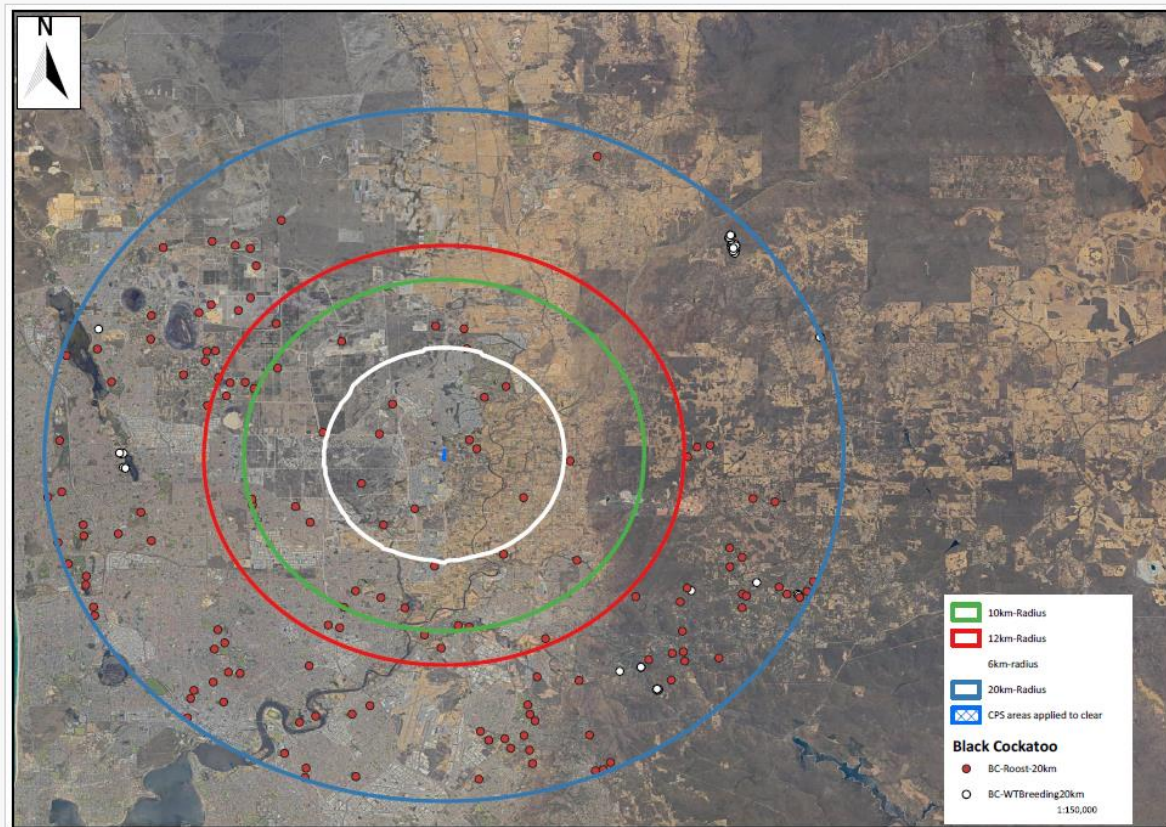


Figure 2. Location of black cockatoo breeding and roosting records within 20 km of the application area.

Breeding and roosting

The application area is located within the modelled distribution of all three threatened black cockatoo species. Records of all three species occur within the local area, including 10 records of confirmed roosting sites within the local area. The closest confirmed breeding site for white tailed black cockatoos (Baudin's or Carnaby's cockatoo) is recorded 15 kilometres from the application area, whereas the closest mapped breeding site for the Forest red-tailed black cockatoo is recorded 22 kilometres from the application area.

The black cockatoo habitat assessment conducted across the application area (PGV Environmental, 2023b) identified suitable foraging and potential breeding habitat within the survey area. A total of 13 trees proposed to be cleared met the definition of potential breeding habitat as they have a Diameter at Breast Height (DBH) larger than 500 mm. These comprise of seven planted Tuarts (*Eucalyptus gomphocephala*), four Marri (*Corymbia calophylla*), one Flooded gum (*Eucalyptus rudis*) and Flooded gum/River Red-gum hybrid (*Eucalyptus rudis* x *E. camaldulensis*). No hollows nor evidence of roosting were observed within any of the trees (PGV Environmental, 2023b). Being near to water sources, tall tuart, marri and flooded gum may provide roosting habitat for black cockatoos.

Foraging

The Swan Coastal Plain is used by black cockatoos primarily for foraging resources although breeding range is increasingly shifting to parts the tuart forest of the Swan Coastal Plain (Johnstone and Kirkby, 2016). Vegetation used for foraging for black cockatoos is dominated by *Banksia* spp. and tuart (*Eucalyptus gomphocephala*) woodlands, as well as marri (*Corymbia calophylla*), with jarrah (*Eucalyptus marginata*) in the east (DCCEE, 2022). The black cockatoo habitat assessment (PGV, 2023b) identified eight species recognised as foraging habitat for black cockatoos, namely *C. calophylla* (marri), *Banksia attenuata*, *B. menziesii*, *Eucalyptus marginata* (jarrah), *E. gomphocephala* (tuart), *E. rudis* (flooded gum) and a hybrid of *E. rudis* x *E. camaldulensis*.

Evidence of foraging by the Carnaby's and Forest red-tailed black cockatoos was observed during the habitat assessment (see Appendix F). The survey identified a total of 0.64 ha of vegetation within the application area which comprised of high-quality foraging habitat for threatened black cockatoo species.

The recovery plan for threatened black cockatoos indicates that the limiting factor to population growth is adult and chicks' survival which relates to availability of food resources near to breeding hollows. Sufficient food close to nesting areas (~12km) and its extension is required for breeding birds to be able to forage and return to feed nestlings,

particularly during the breeding seasons. If the nesting area is not close enough to adequate food or water supplies, black cockatoos will not be able to successfully raise young. Although the nearest confirmed breeding site is approximately 15 km from the application area, the removal of native vegetation within the application area contributes to the cumulative loss of foraging habitat for the Carnaby's, Baudin's and FRT black cockatoos and is considered a significant residual impact. An offset is required to counterbalance the loss of 0.64 ha of high-quality foraging habitat.

Conclusion

Based on the above assessment, the proposed clearing will not result in a significant impact on quenda. The potential impact on any individual present during clearing can be mitigated by undertaking clearing in a slow and directional manner. The proposed clearing will result in a significant residual environmental impact through the loss of 0.64 hectares of high-quality foraging habitat for threatened black cockatoo species.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- weed and dieback management.
- slow and directional clearing to allow any fauna individuals to move into nearby vegetation ahead of clearing
- offsets – provision of a monetary contribution to the Part V Offset Fund.

3.2.2. Land and water resources - Clearing Principles (f), (g), (i) and (j)

Assessment

Water resources

The application area lies within *the* Swan and Mirrabooka Groundwater Areas proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act). It is also within the Priority 2 (P2), P3 and P3* areas of a public drinking water source area (PDWSA) which are managed as the 'Gnangara Underground Water Pollution Control Area'. The priority areas are managed to minimise water quality risk. P2 areas are normally assigned over rural land, P3 areas over urban land, and P3* areas are special priority areas where the increased risks to water quality and additional best management practices are required. The Perth metropolitan area often falls within the special priority (P3*) areas. Activities within these areas, including native vegetation clearing and road constructions, can potentially impact the quality of the underground water unless best practice conditions are implemented to minimise and mitigate the potential impacts.

Advice received from the department's Water Source Protection Planning (WSPP) branch indicates that road construction within Henley Brook is considered compatible with the land use in P2, P3, and P3* areas. Given the purpose of clearing within this area, Condition 37 of the Water Quality Protection Notice (WQPN) 25 (DWER, 2021) is recommended be applied. Condition 37 of the WQPN 25 specifies that recycled drainage rock and recycled road base are not to be used for road and associated structures construction in the PDWSAs, Wellhead Protection Zones (WHPZ) and Reservoir Protection Zones (RPZs) (DWER, 2023a)

Waste Authority (2018) defines the recycled materials as follows:

- recycled drainage rock means a uniformly blended mixture of coarse-grained aggregate typically between 20 and 27 mm in particle size consisting of a mixture of rock, brick and other similar rubble material produced from the crushing and screening of C&D waste. This material does not contain concrete.
- recycled road base means a uniformly blended mixture of coarse and fine aggregate typically less than 19 mm in particle size consisting largely of concrete produced from the crushing and screening of C&D waste.

The City of Swan confirmed that they will not use recycled drainage rock and recycled road base in the project associated with the proposed clearing permit to avoid impacts on the PDWSA (PGV, 2023c).

The application area is on the Perth Surficial Swan and Mirrabooka aquifer where the depth to groundwater from the natural surface ranges from approximately 3 to 5 m (DoW, 2015 in PVG, 2023c). Clearing and road construction works are not expected to excavate to a depth of more than 3 m. The City has advised they will not be extracting

groundwater for dust suppression and dewatering purposes, therefore, clearing will not intercept the groundwater resources. Given this, clearing is unlikely to directly impact the quality of groundwater in the area.

The southern end of the road extension work site passes through a 'Multiple Use' palusplain wetland and crosses over a portion of St Leonard Creek. As such, the proposed clearing may impact on the quality of surface water and an environment associated with a watercourse and wetland. However, it is noted that the wetland in this location is highly modified and largely cleared of native vegetation and the creek has been highly modified into a drain for the surrounding land (PGV, 2023b). The proposed clearing and road construction is not expected to further modify the condition of the mapped wetland and drainage. The City has committed to the installation of box culverts under the road at the creek crossing to ensure the hydrological function of the creek line is maintained. The City has acquired a licence to interfere with Bed and Banks and will construct the crossover of the creek line in accordance with the requirements of the licence.

The soils in parts of the application area may be susceptible to wind and water erosion, subsurface acidification, flood risk, waterlogging and nutrient exports. Clearing of native vegetation may exacerbate the risks unless appropriate management measures are applied. The City addressed the risks and laid out the mitigation plan in a Construction Environmental Management Plan (CEMP) submitted with the application (PGV, 2023b).

Wind erosion:

The application area is prone to wind. The removal of native vegetation from the surface could exacerbate the risk of wind erosion. Loose soils can be deposited to nearby environments through the dispersion of dust and sediment, which can impact the quality of nearby vegetation and / or surface waters. To address the potential impacts, the applicant has committed to applying measures to suppress dust during and after clearing. Limiting the time for the surface area's exposure to wind can also mitigate this potential impact and is required as a condition (PGV, 2023c)

Subsurface acidification:

The application area is mapped as having a high to moderate risk of degradation due to acid sulphate soils. The City will perform an investigation of acid soils occurrence pursuant to the *Contaminated Sites Act 2006*. If Acid Sulphate Soils (ASS) are found to be of significant risk, and if there is any dewatering or excavation into the ASS soils required, the City will prepare a separate Acid Sulphate Soils Management Plan (PGV, 2023b). However, most of the application area and surrounds are cleared of vegetation. Removal of limited amount of vegetation from this area is unlikely to create or exacerbate the risk of subsurface acidification. Subsurface acid sulphate soils (ASS) normally occur below 3 m from the natural surface. The proposed clearing and road construction do not require excavation of soils to a depth greater than that of the acid soils layers. Therefore, any subsurface ASS, if occurring, is unlikely to be exposed to the surface.

Conclusion

Based on the above assessment and the applicants' commitments detailed above, the proposed clearing is not expected to impact the attributes of the mapped multiple use palusplain, or impact on- or off-site hydrology and water quality. The Delegated Officer has determined based on the above assessment that the proposed clearing is considered acceptable in relation to these environmental values.

Conditions

To address the potential impacts of clearing on the land and water resources, the following conditions are placed on the permit:

- commence road construction activities within two (2) months of authorised clearing

3.3. Relevant planning instruments and other matters

The Henley Brook Avenue roadworks is reserved under the Metropolitan Region Scheme (MRS) as an 'Outer Regional Road'. The MRS is the statutory land use planning scheme for the Perth Metropolitan Region which reserves, zones lands and controls development on reserved and zoned land. The MRS reflects the agreed strategic direction for land within the metropolitan region and is a catalyst for changes to planning controls at the local level and subsequent local area planning. The road is identified as a key transport connection in the WAPC endorsed Swan Urban Growth Corridor Sub-Regional Structure Plan that has been prepared in 2009 to cater for urban development and population growth in the City of Swan's urban growth corridor. In turn, the Swan urban growth corridor has been identified as a critical development front to accommodate the growth of the Perth metropolitan region (WPAC, 2009).

The properties within which clearing is proposed are owned and managed by the City of Swan and zoned appropriately for the purpose. Part of the application area is proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act). Given that the construction will not use groundwater for dust suppression and dewatering purposes, no groundwater will be extracted. Therefore, a 5C licence to extract groundwater is not required. The proponent, however, has acquired a Bed and Banks permit under the RIWI Act (Instrument No. PMB209058(1)) to install box culverts in the St Leonards Creek crossing.

The application area is within the Priority 2 (P2), P3 and P3* ¹ areas of a Public Drinking Water Source Area (PDWSA) which are managed as the 'Gnangara Underground Water Pollution Control Area'. As discussed in Section 3.2.2, to manage the potential impact of road constructions on the PDWSA the applicant is committed to adhere to the best practice stipulated under Departmental Water Quality Protection Notes. The commitments are incorporated in the CEMP.

The application area is not mapped within any Aboriginal Cultural Heritage sites. However, there are few historical and registered Aboriginal Cultural Heritage sites within 1 km radius of 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.

4 Suitability of offsets

Significant residual impact and proposed offsets

Through the detailed assessment outlined in Section 3.2 above, the Delegated Officer has determined that the following significant residual impact remains after the application of the avoidance and mitigation measures summarised in Section 3.1:

- loss of 0.64 ha of significant foraging habitat for threatened black cockatoo species.

The applicant considered a range of offset options to counterbalance the significant residual impacts of the clearing. These include:

- revegetation of 2.39 ha of Degraded to Completely Degraded (Keighery, 1994) condition vegetation within the road and other reserves adjacent to the application area. The applicant provided a Revegetation Management Plan (City of Swan, 2024b) to the Department in support of this offset proposal. Having reviewed this proposal, the Department determined the proposed offset plan to be unsuitable given the proposed revegetation sites are within road reserves identified for future road development which increases the risk that the revegetation will be impacted in the future.
- rehabilitation, management and conservation in perpetuity of part of Lot 801 on Deposited Plan 419737, Stock Road, Bullsbrook (2.39 ha in area size), which is currently not reserved as a road reserve. Upon further investigation, the applicant was informed that the Department of Planning, Lands and Heritage (DPLH) intends to construct a road on Lot 801 for the future Bullsbrook Intermodal Terminal. Given this, the proposed offset is not considered suitable.
- management and conservation in perpetuity of a portion of a park located near to the impact area, measuring 4.92 ha in area. The proposed offset site is currently vegetated and zoned for the purpose of conservation, which reduces the risk of future impact to the environmental values within this site. On that basis, the proposed offset was not considered suitable.

The applicant has continued to search for potential offset sites within the City of Swan and not been successful in identifying sites that would be suitable in accordance with the Government of Western Australia's *Environmental Offsets Policy* and *Environmental Offsets Guidelines*. Given the above and noting the challenges associated with identifying suitable offsets within the local area, the applicant proposed to make a monetary contribution to the Part V Offsets Fund.

¹ Priority 3* (P3*) areas are defined in areas that are changed from P1 or P2 as a result of government-approved strategic planning and only occur for urban developments in the Metropolitan Region Scheme. P3* areas are a variation of the P3 management approach and are designed to address the increased water quality risks and cumulative impact resulting from the approved land use intensification (see Special circumstances and WQPN 38: Priority 3* (P3*) areas). P3* areas aim to exclude some of the more 'risky' commercial and light industrial land uses which are otherwise appropriate in P3 areas. The department does not support P1 or P2 areas being rezoned to industrial

Consideration of suitability of financial offset

In considering the suitability of an offset, the Department will require an applicant to demonstrate that they have followed a hierarchy of preferred offset outcomes when proposing offsets. Of the preferred offset outcomes, a monetary contribution to the Part V Offsets Fund is the least preferred option in most situations. In considering whether a monetary offset is appropriate, the Department will take into account the following:

- the applicant's effort to follow the hierarchy of offset types which include the use of existing strategic offset program, local or regional revegetation and rehabilitation, and land acquisition and placing a security over them.
- necessity of clearing
- the magnitude of the significant residual impact
- the ability to find suitable land for offsets and any associated constraints i.e. land tenure.

The Delegated Officer noted that:

- the applicant had considered various offset options as mentioned above, having had regard to the hierarchy of offset preferences
- the applicant had continued searching for available land within the City of Swan and has not identified sites that would meet the offset requirements.
- the magnitude of significant residual impact is relatively small (0.64ha)
- ongoing searches for other suitable and more preferred offsets will delay approvals for this project which of strategic importance within the City of Swan.

Given the above, the Delegated Officer considers that a monetary contribution to the Part V Offsets Fund is an acceptable offset to counterbalance the loss of 0.64 ha of foraging habitat for threatened black cockatoo species. The funds provided will be pooled with other offset fund contributions to deliver larger, more strategic land acquisition offsets which will deliver a conservation benefit for threatened black cockatoo species.

To counterbalance the significant residual impacts to 0.64 ha of black cockatoo foraging habitat, the applicant will be required to provide a monetary contribution to fund the purchase of 5.80 ha of vegetation that provides high-quality foraging habitat for threatened black cockatoo species. While the site to be purchased using offset funds has not been confirmed, it will comprise high-quality foraging habitat for threatened black cockatoo species and be located as close in proximity to the application area as possible.

The size of the offset required was determined using the Western Australia Environmental Offsets Assessment Guide and the Offset Calculator. The amount of the monetary contribution is calculated based on the 'rate per hectare' value selected from a table of land values in different LGAs, provided to the Department by Landgate. In the assessment of the proposed offset, the Delegated Officer considered the prospects of acquiring land containing similar or better-quality foraging vegetation via the Part V Offsets Fund and determined that a per-hectare land value, in this instance, is appropriate and is consistent with the *WA Environmental Offsets Policy (2011)*. Given the uncertainty surrounding the site for acquisition, the Delegated Officer determined that the unimproved land value in the Shire of Chittering (the highest of the 10-hectare unimproved land values in the areas of interest) was appropriate for use in determining a suitable monetary contribution.

Based on unimproved land values for the Shire of Chittering, a 10-hectare parcel would have a market value of \$22,390 per hectare. Therefore, a monetary contribution of \$129,862 will be required to fund the acquisition of 5.80 hectares of vegetation of high-quality foraging value for threatened black cockatoo species.

The Delegated Officer considers that this adequately counterbalances the significant residual impacts listed above. The justification for the values used in the offset calculation is provided in Appendix E.

End

Appendix A. Additional information provided by applicant

During assessment, the Department requested for further information on two occasions (DWER, 2023b, 2024). The applicant, via PGV Environmental provided the information and clarification (PGV Environmental, 2024a; 2024b, 2024c; 2024d). Excerpts of the information requested and provided are below.

Requested Information	Summary of comments / provided information	Consideration of comment
<p><i>Confirmation of black cockatoo foraging area.</i></p> <p>The Department sought further clarification and justification of the 0.64 ha of foraging habitat impacted by the proposed clearing as identified by the proponent. Further clarification of the other trees and plants species present within the application area is required.</p>	<p>The identification of the trees occurring within the application is provided. The extent of tree species suitable for foraging by the threatened black cockatoo species is 0.64 ha. The remaining trees are mostly exotic trees and flooded gums which are not listed as foraging habitat. (PGV 2023b, PGV 2024a, 2024b)</p>	<p>The provided information and clarification support the assessment of the extent of foraging habitat occurring within the application area.</p>
<p><i>Further clarification on the nature of the planted Eucalypts tree species presents within the application area.</i></p> <p>The application documents had referred to the trees as planted. The Department sought to ascertain whether the planted trees should be included in the assessment of the clearing permit as native vegetation or not.</p>	<p>Larger tuart and Eucalypt trees were planted approximately in 1985 by landowners. They do not appear to be planted under the Environmental Protection Act 1986 or other written law. The trees do not appear to have been planted for biodiversity and conservation purposes (PGV, 2024a). Upon further review and advice from DWER, the trees, however, are included in the clearing permit application (PGV, 2024b).</p>	<p>Given the uncertainty in the nature of the planting of the Eucalypt trees within the application area, the Department applies the precautionary principle and considers the 'planted' and self-seeded vegetation to meet the definition of native vegetation under the EP Act. The vegetation is therefore included in the application area.</p>
<p><i>Identification of satisfactory environmental offsets.</i></p> <p>Based on assumptions, the department considers the significant residual impacts of the proposed clearing include approximately 2 hectares of native vegetation that provides suitable habitat for black cockatoos.</p>	<p>The applicant applied to clear 2 hectares of native vegetation, of which to 0.64 ha of vegetation is identified as suitable for foraging habitat by the black cockatoo species. This comprises of the significant residual impact to be offset. A rehabilitation and revegetation plan was submitted as an offset (PGV, 2024c).</p>	<p>The provided information and clarification support the assessment of the extent of foraging habitat occurring within the application area. A review of the rehabilitation and revegetation plan indicated that it was considered unsuitable for offset. Other offset options were considered, as discussed in Section 4 and Appendix E.</p>

Appendix B. Site characteristics

B.1. Site characteristics

Characteristic	Details
Local context	<p>The area proposed to be cleared is part of an expansive tract of native vegetation in the intensive land use zone of Western Australia. It is surrounded by large areas which have disturbed through rural activities.</p> <p>Spatial data indicates the local area (10-kilometre radius from the centre of the area proposed to be cleared) retains approximately 23.05 per cent of the original native vegetation cover.</p>

Characteristic	Details
Ecological linkage	There are no mapped ecological linkages within the application area. Vegetation within roadsides contributes to the ecological corridors which connect fragmented patches of vegetation within the local area.
Conservation areas	There are no mapped conservation areas within the application area.
Vegetation description	<p>A survey was performed over the application area in May 2023 in support of the clearing permit application. The survey identified the vegetation comprises of some areas which are bare and Completely Degraded (PGV, 2023b). At the central part of the application area, vegetation comprises of mixture of planted trees such as River Red Gums (<i>Eucalyptus camaldulensis</i>) and Tuart (<i>Eucalyptus gomphocephala</i>) and scattered remnant native Jarrah (<i>Eucalyptus marginata</i>), Banksia trees (<i>Banksia attenuata</i>, <i>B. menziesii</i>) and Marri (<i>Corymbia calophylla</i>) trees. The southern part of the site mostly contains the introduced River Red Gum (<i>E. camaldulensis</i>), some native Flooded Gum (<i>E. rudis</i>) and many hybrid <i>E. camaldulensis</i> X <i>E. rudis</i> trees.</p> <p>Photographs of the vegetation and excerpt of the survey are available in Appendix F.</p> <p>Some of the vegetation identified in the survey is consistent with the mapped Southern River Complex (42), which is described as open woodland of <i>Corymbia calophylla</i> (marri), <i>Eucalyptus marginata</i> (jarrah), <i>Banksia sp</i> with fringing woodland of <i>Eucalyptus rudis</i> (flooded gum), <i>Melaleuca raphiophylla</i> (Swamp Paperbark) along creek beds.</p> <p>The mapped vegetation type retains approximately 18.4 per cent of the original extent (Government of Western Australia, 2019) while the local area retains 23.05 per cent of its pre-European extent.</p>
Vegetation condition	<p>A vegetation survey over the application area indicated that the vegetation within the proposed clearing area is mostly in Completely degraded condition (Keighery, 1994) due to the historical removal of native vegetation in the area. Some native trees have regrown and self-seeded from the seeds dropped by the native trees planted in the area. The regrowth indicates its ability to regenerate and retain some basic condition, consistent with the description for the Degraded condition (Keighery, 1994). The vegetation conditions are described by Keighery (1994) as follows:</p> <ul style="list-style-type: none"> • 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. <p>To</p> <ul style="list-style-type: none"> • 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. <p>The full Keighery (1994) condition rating scale is provided in Appendix D.</p> <p>Representative photos are available in Appendix F.</p>
Climate and landform	The City of Swan experiences a Mediterranean climate with warm dry summers and wet cool winters. Peak rainfall periods are between May and September. The mean rainfall is approximately 155 mm between the months of June – July. The mean maximum temperature is in January recorded as 33 degrees Celsius, and the mean minimum temperature is in late July recorded as 9 degrees Celsius.
Soil description	<p>The application area is mapped across four different soil types, these are:</p> <ul style="list-style-type: none"> • 212Bs__Ja – Jandakot low dunes. Slopes <10% and generally more than 5m relief. Grey sand over pale yellow sands generally underlain by humic and iron podsols; Banksia spp. Low open woodland with a dense shrub layer.

Characteristic	Details
	<ul style="list-style-type: none"> • 212Bs__Ya – Flat, poorly drained complex landscape; soils include shallow sand over limestone or ferruginous pan, deep leached sand, and saline soils; dense <i>Melaleuca spp</i> along drainage lines. • 212Bs__J – Poorly drained depressions. Humus podzols. Scattered <i>M. preissiana</i>, <i>E. rudis</i>, and <i>Banksia ilicifolia</i> with a dense shrub layer. • 212Bs__VC – Variable soils associated with drainage lines.
Land degradation risk	The mapped soils are highly susceptible to land degradation from waterlogging, subsurface acidification and phosphorous export risks. Wind and water erosion risks are also significant.
Waterbodies	The application area crosses the Bennett Brook consanguineous wetland, which is a 'Multiple Use' Palusplain wetland. It also crosses a highly modified creek.
Hydrogeography	The application site is mapped within the Swan River System Surface Water Area and Irrigation Districts, the Mirrabooka, and Swan Groundwater Area, and a P2, P3, and P3 Gngangara Underground Water Pollution Control public drinking water source areas (PDWSA).
Flora	A total of 55 conservation significant flora records occur in the local area, including seven threatened flora species and 48 priority flora species. Of the 55 conservation significant flora species recorded, 23 of these flora species occurred on at least one of the four soil types listed above that are found within the application area. Only one species occurred within one kilometre of the application area, recorded as <i>Verticordia lindleyi subsp. lindleyi</i> .
Ecological communities	There are no mapped threatened ecological communities (TEC) within the application area. The closest TEC is mapped as the Banksia Woodlands of the Swan Coastal Plain, recorded approximately 550 metres east of the application area.
Fauna	<p>A total of 33 conservation significant fauna records occurs in the local area. The nearest record is Carnaby's black cockatoo, approximately 200 metres from the application area. There are 10 confirmed black cockatoo roosting sites within 10 kilometres of the application area.</p> <p>A black cockatoo habitat assessment conducted across the application area recorded suitable foraging and potential breeding habitat within the survey area (PGV Environmental, 2023).</p>

B.2. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
Vegetation complex					
Swan Coastal Plain - South River Complex	58,781.48	10,832.18	18.43	940.36	1.60
Local area					
10km radius			23.05	-	-

*Government of Western Australia (2019)

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

B.3. Flora analysis table

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
<i>Amanita fibrillopes</i>	3	N	Y	Y	4.01	1	Y
<i>Anigozanthos humilis</i> subsp. <i>chrysanthus</i>	4	N	Y	Y	6.31	1	Y
<i>Cyathochaeta teretifolia</i>	3	N	Y	Y	7.44	1	Y
<i>Drosera micra</i>	1	N	Y	Y	8.23	2	Y
<i>Drosera x badgerupii</i>	2	N	Y	Y	5.76	1	Y
<i>Tetradlea pilifera</i>	3	N	Y	Y	3.59	1	Y
<i>Trithuria occidentalis</i>	T	N	Y	Y	2.90	1	Y
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	4	N	Y	Y	0.48	1	Y

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

B.4. Fauna analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix G.1), and biological survey information, impacts to the following conservation significant fauna required further consideration.

Species name	Conservation status		Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
	WA	EPBC					
<i>Australotomurus morbidus</i> (cemetery springtail, Guildford springtail)	P3	-			9.29	1	Y
<i>Calidris ferruginea</i> (curlew sandpiper)	CR	CR & MI	Y	Y	8.50	1	Y
<i>Calidris ruficollis</i> (red-necked stint)	MI	MI	Y	Y	8.50	2	Y
<i>Calonectris leucomelas</i> (streaked shearwater)	MI	MI	N	N	8.80	1	Y
<i>Calyptorhynchus banksii naso</i> (forest red-tailed black cockatoo)	VU	VU	Y	Y	0.15	49	Y
<i>Ctenotus gemmula</i> (Swan Coastal Plain subpopulation) (jewelled southwest Ctenotus (Swan Coastal Plain subpopulation))	P3	-	N	N	6.84	2	Y
<i>Dasyurus geoffroyi</i> (chuditch, western quoll)	VU	VU	N	N	3.19	9	Y
<i>Falco peregrinus</i> (peregrine falcon)	OS	-	Y	Y	3.11	12	Y

Species name	Conservation status		Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
	WA	EPBC					
<i>Glareola maldivarum</i> (oriental pratincole)	MI	MI	Y	Y	8.50	1	Y
<i>Hydroprogne caspia</i> (Caspian tern)	MI	MI	Y	Y	10.00	1	Y
<i>Idiosoma sigillatum</i> (Swan Coastal Plain shield-backed trapdoor spider)	P3	-	Y	Y	9.90	1	Y
<i>Isoodon fusciventer</i> (quenda, southwestern brown bandicoot)	P4	-	N	Y	0.74	366	Y
<i>Ixobrychus flavicollis australis</i> (southwest subpopulation)(black bittern (southwest subpopulation))	P2	-	Y	Y	9.95	1	Y
<i>Limosa lapponica</i> (bar-tailed godwit)	MI	MI	Y	Y	8.50	2	Y
<i>Neelaps calonotos</i> (black-striped snake, black-striped burrowing snake)	P3	-	N	N	4.67	16	Y
<i>Notamacropus eugenii derbianus</i> (tamar wallaby)	P4	-	Y	Y	4.00	6	Y
<i>Notamacropus Irma</i> (western brush wallaby)	P4	-	Y	Y	3.81	10	Y
<i>Plegadis falcinellus</i> (glossy ibis)	MI	MI	Y	Y	1.32	4	Y
<i>Pluvialis squatarola</i> (grey plover)	MI	MI	Y	Y	8.50	1	Y
<i>Synemon gratiosa</i> (graceful sunmoth)	P4	-	Y	Y	2.81	4	Y
<i>Thalasseus bergii</i> (crested tern)	MI	MI	Y	Y	6.47	2	Y
<i>Tringa glareola</i> (wood sandpiper)	MI	MI	Y	Y	8.50	1	Y
<i>Tringa nebularia</i> (common greenshank)	MI	MI	Y	Y	8.50	2	Y
<i>Zanda baudinii</i> (Baudin's cockatoo)	EN	EN	Y	Y	2.56	11	Y
<i>Zanda latirostris</i> (Carnaby's cockatoo)	EN	EN	Y	Y	0.22	1264	Y
<i>Zanda sp.</i> 'white-tailed black cockatoo' (white-tailed black cockatoo)	EN	EN	Y	Y	1.60	19	Y

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

B.5. Land degradation risk table

Risk categories	Land Unit 1	Land unit 2	Land unit 3	Land unit 4
Wind erosion	H1: 50-70% of map unit has a high to extreme wind erosion risk	H1: 50-70% of map unit has a high to extreme wind erosion risk	M1: 10-30% of map unit has a high to extreme wind erosion risk	L2: 3-10% of map unit has a high to extreme wind erosion risk
Water erosion	L1: <3% of map unit has a high to extreme water erosion risk	L1: <3% of map unit has a high to extreme water erosion risk	H1: 50-70% of map unit has a high to extreme water erosion risk	H2: >70% of map unit has a high to extreme water erosion risk
Salinity	L1: <3% of map unit has a moderate to high salinity risk or is presently saline	M1: 10-30% of map unit has a moderate to high salinity risk or is presently saline	L1: <3% of map unit has a moderate to high salinity risk or is presently saline	L1: <3% of map unit has a moderate to high salinity risk or is presently saline
Subsurface Acidification	H2: >70% of map unit has a high subsurface	H2: >70% of map unit has a high subsurface	H2: >70% of map unit has a high subsurface	H2: >70% of map unit has a high subsurface

	acidification risk or is presently acid	acidification risk or is presently acid	acidification risk or is presently acid	acidification risk or is presently acid
Water logging	L1: <3% of map unit has a moderate to very high waterlogging risk	H2: >70% of map unit has a moderate to very high waterlogging risk	H2: >70% of map unit has a moderate to very high waterlogging risk	H2: >70% of map unit has a moderate to very high waterlogging risk
Phosphorus export risk	H2: >70% of map unit has a high to extreme phosphorus export risk	M1: 10-30% of map unit has a high to extreme phosphorus export risk	H2: >70% of map unit has a high to extreme phosphorus export risk	H2: >70% of map unit has a high to extreme phosphorus export risk

Appendix C. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p><u>Principle (a):</u> "Native vegetation should not be cleared if it comprises a high level of biodiversity."</p> <p><u>Assessment:</u></p> <p>Although the application area contains foraging habitat for threatened black cockatoo species, the vegetation proposed to be cleared is in Degraded to Completely Degraded (Keighery, 1994) condition that is unlikely to support high level of biodiversity. .</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (b):</u> "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."</p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared contains significant foraging habitat for threatened black cockatoo species, within which there is previous evidence of foraging.</p>	At variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (c):</u> "Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."</p> <p><u>Assessment:</u></p> <p>Given the Completely Degraded to Degraded condition of the vegetation, it is unlikely that the application area support threatened flora species. No record of threatened flora species is known from the application area. .</p>	Not likely to be at variance	No
<p><u>Principle (d):</u> "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."</p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared does not contain species indicative of a threatened ecological community.</p>	Not likely to be at variance	No
Environmental value: significant remnant vegetation and conservation areas		
<p><u>Principle (e):</u> "Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."</p> <p><u>Assessment:</u></p> <p>The extent of native vegetation in the local area is less than the 30% threshold set by the national objectives and targets for biodiversity conservation in Australia. However, it is within the Metropolitan Region</p>	Not likely to be at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
<p>Scheme which is subject to the EPA modified objective of 10% vegetation retention within a constrained area.</p> <p>The vegetation proposed to be cleared is not considered to be part of a significant ecological linkage in the local area.</p>		
<p><u>Principle (h):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>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.</p>	Not likely to be at variance	No
Environmental value: land and water resources		
<p><u>Principle (f):</u> <i>“Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</i></p> <p><u>Assessment:</u></p> <p>A number of watercourses or wetlands are mapped within the application area, however they have been heavily modified for the road constructions over the time. Survey over the application area did not identify vegetation in the application area as representative of riparian ecosystems.</p>	May be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>The mapped soils are highly susceptible to wind and water erosion waterlogging, subsurface acidification and nutrient export. Noting the limited extent of clearing, the condition of the roadside vegetation proposed to be cleared and the nature of roadworks, removal of the vegetation is unlikely to result in appreciable land degradation if appropriate land management is in place.</p>	May be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (i):</u> <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.”</i></p> <p><u>Assessment:</u></p> <p>Given watercourses, wetlands and Public Drinking Water Sources Areas are recorded within the application area, the proposed clearing may impact surface or ground water quality.</p>	May be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u></p> <p>Parts of the application area are within soil units mapped as having risks to waterlogging and flooding. However, much of the native vegetation have been historically cleared and the area modified for urban development including with the construction of drainage structures to avoid flooding. The limited clearing is not likely to exacerbate the risk of flooding.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.2, above.</i>

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.

Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Measuring vegetation condition for the Southwest 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. Offset calculator value justification

Calculation	Score (Area)	Rationale
Conservation significance		
Description	0.64 ha of vegetation in Degraded condition (Keighery, 1994) proposed to be cleared is identified as of high-quality for foraging by all three Threatened black cockatoo species.	The proposed clearing will remove 0.64 ha of vegetation identified as foraging habitat for all three threatened black cockatoo species
Type of environmental value	Species (flora / fauna)	
Conservation significance of environmental value	Rare/Threatened – Endangered	The highest conservation status of the Carnaby's, Forest Red-tail and Baudin's black cockatoos is used for the calculation.
Landscape-level value impacted	yes/no	
Significant impact		

Description	The loss of 0.64 ha of vegetation suitable for foraging by all three Threatened black cockatoo species	The conservation status of the Carnaby's and Baudin's black cockatoo is the highest among the three threatened black cockatoo species impacted by the clearing and is used for the calculation.
Significant impact (hectares) / Type feature	0.64	The extent of vegetation identified as suitable species for foraging by all three black cockatoo species
Quality (scale) / Number	7.00	The value assigned reflects the vegetation condition, the site context and threatening processes of the impacted area in accordance with the WA Environmental Offsets Calculator / Metric Guides. The vegetation proposed to be removed is in Degraded to Completely Degraded (Keighery, 1994) condition due to historical clearing and infestation of weeds commonly found in roadside vegetation. The vegetation, however, has a Good to High foraging values due to the tree species, the presence of foraging debris indicating current and past foraging by black cockatoos, as well as its proximity to roosting sites and water sources.
Rehabilitation credit		
N/A	N/A	No revegetation or rehabilitation action is proposed
Offset		
Description	Monetary contribution to the Part V Offset Fund for the acquisition and protection of land containing foraging habitat for threatened black cockatoos	The applicant has endeavoured to identify alternate offsets in the form of local rehabilitation and revegetation, as well as acquisition / protection of lands containing high-quality foraging vegetation. The proposed offsets, however, were assessed by the Department as being unsuitable given the constraints detailed under section 4 of the Decision Report. Given the above, the applicant proposed for a monetary contribution to the Part V Offsets Fund
Proposed offset (area in hectares)	5.80	The extent of land containing the vegetation suitable for foraging by threatened Black-cockatoo species required as an offset to counterbalance the SRI.
Current quality of offset site	8	The quality value reflects the expected quality of vegetation suitable for offsetting within the Shire of Chittering. This is based on the Department's understanding of land potentially available and the Department's previous experience in delivering land acquisitions.
Future quality WITHOUT offset	8	No change to the input value. In the absence of specific site information that might indicate threatening processes, it is reasonable to assume no change in quality in the absence of the offset.
Future quality WITH offset	8	No change to the input value. As monetary contributions do not generally account for management actions that would improve site quality, it is reasonable to assume no change in quality.
Time until ecological benefit	1 year	No change to ecological values is expected, therefore the minimum value is used in the calculation.
Confidence in offset result	90%	The Department is confident that an acquisition will occur; monetary contributions for offsets with low likelihood of being acquitted will generally not be accepted.
Duration of offset implementation	20 years	As the acquired land will be incorporated into the conservation estate, it will be protected in perpetuity. The maximum value is therefore applied.
Time until offset site secured	3 years	This accounts for the delay in finding a property, conducting due diligence and negotiating the acquisition with DBCA.

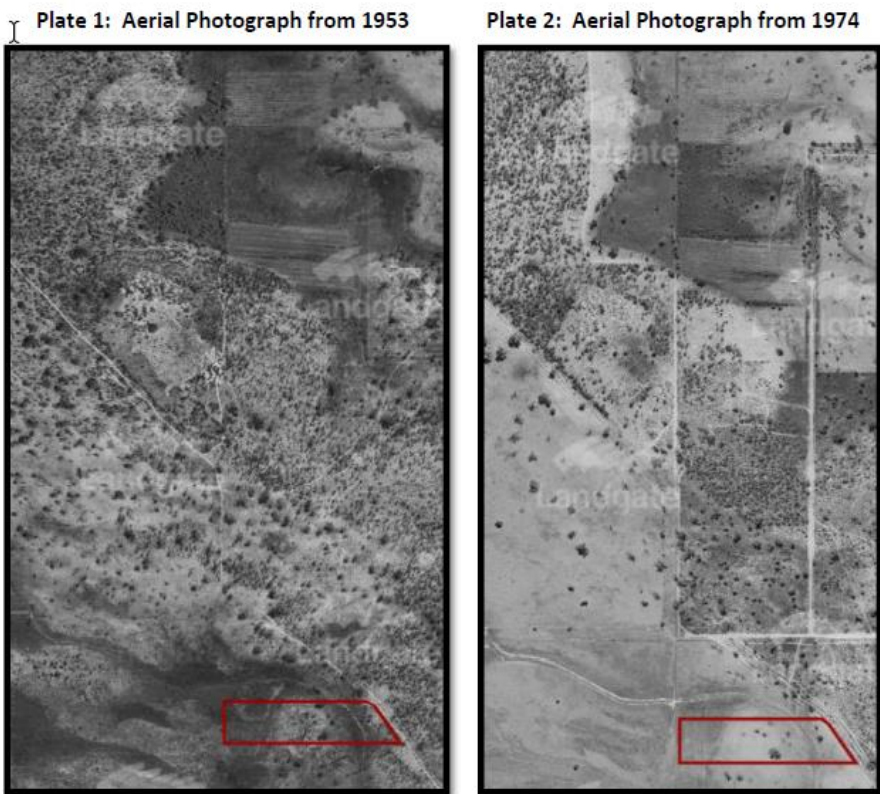
Risk of loss WITHOUT offset	15%	Land zoned 'rural' is typically acquired as an offset. 15% is a conservative risk of loss score that can be applied for this zoning. It is consistent with most direct offsets accepted by the Department.
Risk of loss WITH offset	5%	As the acquired land will be incorporated into the conservation estate, the lowest risk of loss score is therefore applied.

Appendix F. Biological survey information excerpts (PGV, 2023b)

In response to a DWER request for further information, the applicant commissioned PGV International to undertake a Black Cockatoo Habitat Assessment, with the report submitted in support of the application. The excerpt of the survey (PGV, 2023b) is provided below:

Background information regarding land use in the area

The earliest available historical aerial photograph of the site is from 1953 and shows the area contains native vegetation that appears to have been impacted and parkland cleared with a track through the central part (Plate 1). The alignment of the proposed extension of Henley Brook Avenue is partially aligned with a cleared track. There is significant clearing undertaken between 1953 and 1965 on much of the proposed road works site (Landgate, 2023) (Plate 2). Some remnant trees have been retained within the site.



Additional clearing is evident from the photograph from 1995 (Plate 3), after which a number of trees were planted within the area as observed in the photograph from 2008 (Plate 4).

Plate 3: Aerial Photograph from 1995



Plate 4: Aerial Photograph from 2008



Vegetation

The survey identified that vegetation on the site is in Completely Degraded (Keighery, 1994) condition due to the removal of native vegetation from historical clearing. The survey, however, also identified native tree species including Tuart, Marri, Jarrah, River Red Gums and Banksia that have regrown or sprouted from the seeds of the planted tree species in the area. The regrowth indicates the ability to regenerate and maintain some basic structure closer to the definition of 'Degraded' (Keighery, 1994) condition

The types of vegetation occurring in the application area is summarised in Table 1 below.

Table 1. Types of vegetation at sections of application area

Vegetation type in each area	Photograph
<p>The road reserve in the northern part of the site is mostly cleared and does not contain native vegetation but is dominated by weeds including non-native Geraldton Wax (<i>Chamelaucium uncinatum</i>). A few <i>Acacia saligna</i> (Orange Wattle) shrubs and <i>Adenanthos cygnorum</i> (Woolly Bush) occur in the northern half.</p>	

The vegetation in the central part of the site is a mixture of planted trees such as River Red Gums (*Eucalyptus camaldulensis*) and Tuart (*Eucalyptus gomphocephala*) (Plate 6) and scattered remnant native Jarrah (*Eucalyptus marginata*), Banksia trees (*Banksia attenuata*, *B. menziesii*) (Plate 7) and Marri (*Corymbia calophylla*) trees. Most of the Marri trees are young (Plate 8), however several large trees also occur.



The southern part of the site mostly contains the introduced River Red Gum (*E. camaldulensis*), some native Flooded Gum (*E. rudis*) and many hybrid *E. camaldulensis* X *E. rudis* trees (Plate 9).



Black cockatoo habitat

The survey identified that part of the application area contained vegetation that is suitable for foraging by threatened Black cockatoo species. Suitable species identified on site are listed in Table 2 below.

Table 2. Foraging species for black cockatoos on the site

Species	Common Name	Carnaby's Black Cockatoo	Forest red-tailed Black Cockatoo
<i>Corymbia calophylla</i>	Marri	✓	✓
<i>Banksia attenuata</i>	Candlestick Banksia	✓	
<i>Banksia menziesii</i>	Firewood Banksia	✓	
<i>Corymbia calophylla</i>	Marri	✓	✓
<i>Eucalyptus gomphocephala</i>	Tuart	✓	
<i>Eucalyptus marginata</i>	Jarrah	✓	✓
<i>Eucalyptus rudis</i>	Flooded Gum	✓	✓
<i>Eucalyptus rudis</i> x <i>E. camaldulensis</i>	Hybrid Flooded Gum	✓	✓



Figure 3. Evidence of foraging by Forest red-tailed (right) and Carnaby's (left) black cockatoos on site (PGV, 2023b)

Appendix G. Sources of information

G.1. GIS databases

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

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- 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)
- Hydrography – Inland Waters – Waterlines

- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation Statistics
- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available
- Soil Landscape Mapping – Systems
- Wheatbelt Wetlands Stage 1 (DBCA-021)

Restricted GIS Databases used:

- 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)

G.2. References

City of Swan (2023a). Clearing permit application CPS 10340/1 and supporting information. Received 15 September 2023. (DWER Ref: DWERDT836873).

City of Swan (2023c) *Supporting information for clearing permit application CPS 10340/1 – Revegetation Management Plan*, received 15 September. (DWER Ref: DWERDT858285)

Commonwealth of Australia (2001) *National Objectives and Targets for Biodiversity Conservation 2001-2005*, Canberra.

Department of Environment and Conservation (DEC) (2007) *Framework for mapping, classification and evaluation of wetlands in Western Australia*, Department of Environment and Conservation, Atrium, Perth.

Department of Environment and Conservation (DEC) (2008). *Forest Black cockatoo (Baudin's cockatoo) (Calyptorhynchus baudinii) and forest red-tailed back cockatoo (Calyptorhynchus banksii naso) Recovery Plan*. Department of Environment and Conservation, Perth, Western Australia.

Department of Environment Regulation (DER) (2013). *A guide to the assessment of applications to clear native vegetation*. Perth. Available from: https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Guidelines/Guide2_assessment_native_veg.pdf.

Department of Parks and Wildlife (Parks and Wildlife) (2013). *Carnaby's black cockatoo (Calyptorhynchus latirostris) Recovery Plan*. Department of Parks and Wildlife, Perth, Western Australia.

Department of Primary Industries and Regional Development (DPIRD) (2019). *NRInfo Digital Mapping. Department of Primary Industries and Regional Development*. Government of Western Australia. URL: <https://maps.agric.wa.gov.au/nrm-info/> (accessed in April 2024).

- Department of Water and Environmental Regulation (2021). *Water quality protection note 25. Land use compatibility tables for public drinking water sources area*. Dated August 2021.
- Department of Water and Environmental Regulation (DWER) (2023a). *PDWSA Advice under Rights in Water and Irrigation Act 1914 for clearing permit application CPS 10340/1*, received 6 November 2023 (DWER Ref: DWERDT861507).
- Department of Water and Environmental Regulation (DWER) (2023b). *Request for further clarification. Clearing Permit Application CPS 10340/1*. Email dated 31 January 2024. DWER Reference: DWERDT898406.
- Department of Water and Environmental Regulation (DWER) (2024a). *Request for further information. Clearing Permit Application CPS 10340/1. Dated 14 November 2023. DWER Reference: DWERDT864682*.
- Department of Water and Environmental Regulation (DWER) (2019). *Procedure: Native vegetation clearing permits*. Joondalup. Available from:
https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.PDF.
- Environmental Protection Authority (EPA) (2016). *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment*. Available from:
http://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.pdf.
- Environmental Protection Authority (EPA) (2016). *Technical Guidance – Terrestrial Fauna Surveys*. Available from:
https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Terrestrial%20Fauna%20Surveys-Dec-2016.pdf.
- Government of Western Australia (2019) *2018 South West Vegetation Complex Statistics. Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions, Perth,
<https://catalogue.data.wa.gov.au/dataset/dbca>
- Government of Western Australia. (2019) *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019*. WA Department of Biodiversity, Conservation and Attractions. <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>
- Hedde, E. M., Loneragan, O. W., and Havel, J. J. (1980) *Vegetation Complexes of the Darling System, Western Australia*. In Department of Conservation and Environment, Atlas of Natural Resources, Darling System, Western Australia.
- Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.
- Mattiske, E.M. and Havel, J.J. (1998) *Vegetation Complexes of the South-west Forest Region of Western Australia*. Maps and report prepared as part of the Regional Forest Agreement, Western Australia for the Department of Conservation and Land Management and Environment Australia.
- Molloy, S., Wood, J., Hall, S., Wallrodt, S. and Whisson, G. (2009) *South West Regional Ecological Linkages Technical Report*, Western Australian Local Government Association and Department of Environment and Conservation, Perth.
- Northcote, K. H. with Beckmann G G, Bettenay E., Churchward H. M., van Dijk D. C., Dimmock G. M., Hubble G. D., Isbell R. F., McArthur W. M., Murtha G. G., Nicolls K. D., Paton T. R., Thompson C. H., Webb A. A. and Wright M. J. (1960-68) *Atlas of Australian Soils*, Sheets 1 to 10, with explanatory data. CSIRO and Melbourne University Press: Melbourne.
- PGV Environmental (2023a). Assessment of the ten-clearing principal. Supporting letter for clearing permit application CPS 10340/1. Received 15 September 2023. DWER Ref DWERDT858284
- PGV Environmental (2023b). Henley Brook Avenue Road Works. Black cockatoo habitat assessment. Prepared for City of Swan. Report date 28 June 2023. DWER Ref DWERDT858282
- PGV Environmental (2023c). *Henley Brook Avenue Extension. Construction Environmental Management Plan. Prepared for City of Swan* (Report No. 2023-761 dated 29 August 2023). Submitted in support of clearing permit application CPS 10340/1. Received 15 September. (DWER Ref: DWERDT858283).

- PGV Environmental (2024a). *Response to the Request for Further Information (RFI) for the clearing permit application CPS 10430/1*. Received 12 January 2024. (DWER Ref: DWERDT890464)
- PGV Environmental (2024b). *Response to the Request for Further Information (RFI) for the clearing permit application CPS 10430/1*. Received 27 March 2024. (DWER Ref: DWERDT925847)
- PGV Environmental (2024c). *Henley Brook Avenue Extension. Revegetation Management Plan. Environmental* Prepared for City of Swan. Submitted in support of clearing permit application CPS 10340/1. Report date 24 May 2024. Received 7 June 2024. DWER Ref: DWERDT960711.
- Schoknecht, N., Tille, P. and Purdie, B. (2004) *Soil-landscape mapping in South-Western Australia – Overview of Methodology and outputs* Resource Management Technical Report No. 280. Department of Agriculture.
- Shah, B. (2006) *Conservation of Carnaby's Black-Cockatoo on the Swan Coastal Plain, Western Australia*. December 2006. Carnaby's Black-Cockatoo Recovery Project. Birds Australia, Western Australia.
- Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2001) *Native Vegetation in Western Australia, Extent, Type and Status*. Resource Management Technical Report 249. Department of Agriculture, Western Australia.
- Valentine, L.E. and Stock, W. (2008) *Food Resources of Carnaby's Black Cockatoo (Calyptorhynchus latirostris) in the Gnangara Sustainability Strategy Study Area*. Edith Cowan University and Department of Environment and Conservation. December 2008.
- Western Australian Herbarium (1998-). *FloraBase - the Western Australian Flora*. Department of Biodiversity, Conservation and Attractions, Western Australia. <https://florabase.dpaw.wa.gov.au/> (Accessed 10 November 2023)
- Western Australian Planning Commission (WAPC) (2005) *Guideline for the Determination of Wetland Buffer Requirements*. Prepared for the Department for Planning and Infrastructure on behalf of the Western Australian Planning Commission.
- Western Australian Planning Commission (WAPC) (2009) *Swan Urban Growth Corridor. Sub-Regional Structure Plan*. Prepared for the Department for Planning and Infrastructure on behalf of the Western Australian Planning Commission.