Report and recommendations of the Environmental Protection Authority

Malaga to Ellenbrook Rail Works

Public Transport Authority of Western Australia

Report 1690

October 2020

Environmental Impact Assessment Process timelines

Date	Progress stages	Time (weeks)
18/02/2020	EPA decided to assess – level of assessment set	
01/05/2020	EPA approved Environmental Scoping Document	10
23/07/2020	EPA accepted Environmental Review Document	12
27/07/2020	Environmental Review Document released for public review	2 days
10/08/2020	Public review period for Environmental Review Document closed	2
09/10/2020	EPA accepted proponent's Response to Submissions	9
15/10/2020	EPA Board considered assessment	1
28/10/2020	EPA provided report to the Minister for Environment	2
02/11/2020	EPA report published	3 days
16/11/2020	Close of appeals period	2

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the Environmental Protection Authority (EPA) decides to assess the proposal and records the level of assessment.

In this case, the EPA met its timeline objective to complete its assessment and provide a report to the Minister.

Dr Tom Hatton
Chairman

26 October 2020

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Summary

This document is an assessment report for Western Australia's Minister for Environment. It describes the outcomes of an Environmental Protection Authority (EPA) environmental impact assessment of the Malaga to Ellenbrook Rail Works (the proposal), located in the City of Swan between the suburbs of Malaga and Ellenbrook. The proponent is the Public Transport Authority of Western Australia.

Proposal

The proposal is to construct and operate a new 13 kilometre dual railway line between the suburbs of Malaga and Ellenbrook. The proposal includes construction of railway tracks and associated rail and road infrastructure including bridges and a dive structure. New railway stations and associated facilities are proposed to be constructed at Malaga, Whiteman Park and Ellenbrook and a potential future station at Bennett Springs East.

Background and Context

The proponent referred the proposal to the EPA on 24 December 2019. The EPA decided to assess the proposal on 18 February 2020 and set the level of assessment at Public Environmental Review.

The proposal was also determined to be a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* to be assessed by an accredited process under the *Environmental Protection Act 1986*.

The EPA approved the Environmental Scoping Document for the proposal on 1 May 2020. On 8 June 2020, the proponent made an application to change the proposal during assessment to amend the development envelope. The application included changes to the defined physical elements of the proposal. The changes were approved under s. 43A of the *Environmental Protection Act 1986* on 22 June 2020. On 2 October 2020, the proponent made a second application to change the proposal during assessment to amend the description of the proposal to include a rail over road bridge at Gnangara Road instead of a road over rail bridge at the same location. The EPA consented to the change to the proposal under s. 43A of the *Environmental Protection Act 1986* on 15 October 2020 on the basis it considers that there is unlikely to be a significant increase in any environmental impact.

The Environmental Review Document was released for public review from 27 July 2020 to 10 August 2020. Five submissions were received.

Public Submissions

Key issues raised in the submissions include:

- potential impacts to groundwater dependent vegetation from construction and the ongoing presence of the dive structure
- potential impacts to Bennett Brook, adjacent wetlands, and groundwater hydrological regimes

- potential to undertake on-ground management activities within Whiteman Park to offset potential significant residual impacts.

The proponent responded to these submissions by addressing the issues raised in the Response to Submissions Report and appending relevant additional information for assessment.

Key Environmental Factors and Relevant Principles

The EPA identified the following key environmental factors during the course of its assessment:

1. **Flora and Vegetation** – direct and indirect impacts from clearing of flora and vegetation including impacts to the Banksia woodlands of the Swan Coastal Plain ecological community, Bush Forever site 304 and groundwater dependent ecosystems.
2. **Terrestrial Fauna** – direct and indirect impacts from clearing and/or degradation of fauna habitat and foraging and potential breeding habitat for black cockatoos and degradation of habitat for Carter's freshwater mussel.
3. **Inland Waters** – impacts from dewatering and disturbance of acid sulfate soils, changes to hydrological flows from the permanent presence of the dive structure impacting groundwater dependent ecosystems, direct and indirect impacts to wetlands, including Bennett Brook, from clearing and ongoing operation of the proposal.
4. **Social Surroundings** – direct and indirect impacts from the construction of the Bennet Brook rail bridge within the Bennett Brook: in toto Aboriginal Heritage site and clearing within two additional Registered sites, and increased noise and vibration from operation of the passenger rail to current and future nearby sensitive receptors, including recreational users.

In identifying the key environmental factors, the EPA had regard to the object and principles set out in s. 4A of the *Environmental Protection Act 1986*. The EPA considered that the following principles were particularly relevant to this assessment:

1. **The precautionary principle** – the proposal has the potential to result in serious or irreversible damage to significant flora, vegetation, wetlands, and terrestrial fauna. The EPA has recommended conditions to ensure that risks are minimised or avoided where possible, and measures are undertaken by the proponent to manage residual impacts.
2. **The principle of intergenerational equity** – the proposal has the potential to impact on the health, diversity, and productivity of a significant ecological community, foraging and potential breeding habitat for an Endangered species of black cockatoo and habitat for two significant aquatic species. The proposal will cross an important mythological site that provides an important north-south ecological linkage. The EPA has recommended conditions to ensure the biological environment is maintained for the benefit of future generations.
3. **The principle of the conservation of biological diversity and ecological integrity** – a significant ecological community, areas of foraging and potential breeding habitat for listed species of black cockatoo, areas of habitat for listed

aquatic fauna and a north-south ecological linkage could be significantly impacted by the proposal. The EPA has recommended conditions to manage the impacts on conservation significant vegetation and fauna so that biological diversity and ecological integrity are maintained.

4. **The principle of waste minimisation** – significant quantities of soil material will be excavated/removed from the proposed Malaga dive structure in an area of high to moderate risk of acid sulfate soils. The proponent proposes to minimise waste by applying the waste hierarchy including treatment of any excavated acid sulfate soils prior to reuse as fill.

Conclusion

The EPA has taken the following into account in its assessment of the proposal as a whole:

- impacts to the key environmental factors
- confidence in the proponent's proposed mitigation measures
- relevant principles of the *Environmental Protection Act 1986* and the EPA's objectives for the key environmental factors of Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings
- the EPA's view that the impacts to the key environmental factors are manageable, provided the recommended conditions are imposed.

Having assessed the proposal, the EPA recommends that the proposal may be implemented subject to conditions.

Recommendations

The EPA recommends that the Minister for Environment notes:

1. The proposal assessed is for the construction and operation of the Malaga to Ellenbrook Rail Works.
2. The key environmental factors identified by the EPA in the course of its assessment are Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings, set out in section 4 of this report.
3. The EPA has recommended that the proposal may be implemented, provided that implementation is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addressed in the conditions include:
    a) maintaining the hydrological regime and water quality in Bennett Brook that supports Aboriginal cultural associations and heritage, Carter's freshwater mussel and the ecological integrity of Bennett Brook (condition 6)
    b) maintaining access to Registered Aboriginal Heritage sites and consulting with Whadjuk Noongar representatives and relevant Registered Knowledge Holder families prior to and during construction of the Bennett Brook rail bridge (condition 7)
    c) implementing measures to avoid direct and indirect impacts to native vegetation, significant fauna and wetlands retained within native vegetation

retention areas or directly adjacent to the development envelope during and following construction (condition 8)

d) preparing and implementing an acid sulfate soils and dewatering management plan to maintain the quality and hydrological regime of groundwater that supports Banksia woodlands of the Swan Coastal Plain and wetlands (condition 9)

e) implementing measures to ensure no impacts to nesting black cockatoos during clearing and to minimise impacts to terrestrial fauna during construction (condition 10)

f) minimising operational noise and vibration impacts on existing noise sensitive receptors (condition 11)

g) implementing offsets to counterbalance impacts to Banksia woodlands of the Swan Coastal Plain ecological community, habitat for Carnaby's cockatoo and forest red-tailed black cockatoo, wetlands, and Bush Forever site 304.

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1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the outcomes of the EPA's environmental impact assessment of the Malaga to Ellenbrook Rail Works (the proposal). The proponent of the proposal is the Public Transport Authority of Western Australia (PTA).

The proposal is to construct and operate a new 13 kilometre (km) dual railway line between the suburbs of Malaga and Ellenbrook. The proposal will extend from the proposed Bayswater to Malaga railway line. The proposal includes the construction of new train stations at Malaga, Whiteman Park and Ellenbrook. A potential future station is included at Bennett Springs East.

The EPA has prepared this report in accordance with s. 44 of the *Environmental Protection Act 1986* (EP Act). This section of the EP Act requires the EPA to prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The assessment report must set out:

(a) what the EPA considers to be the key environmental factors identified during the assessment

(b) the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice, and recommendations in the assessment report as it thinks fit.

The proponent referred the proposal to the EPA on 24 December 2019. The EPA decided to assess the proposal on 18 February 2020 and set the level of assessment at Public Environmental Review with a proponent-prepared Environmental Scoping Document and a two-week public review for the Environmental Review Document (ERD). The EPA approved the Environmental Scoping Document for the proposal on 1 May 2020. The ERD was released for public review from 27 July 2020 to 10 August 2020.

EPA Procedures

The EPA followed the procedures in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* (State of Western Australia 2016) and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2020a).

1.1 Assessment on behalf of the Commonwealth

The proposal was determined to be a controlled action by a delegate of the Commonwealth Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 24 December 2019 as it will, or is likely to have, a significant impact on the following Matter of National Environmental Significance (MNES):

- listed threatened species and communities (s. 18 and s. 18A).

The proposal was assessed as an accredited assessment between the Commonwealth and Western Australian governments.

2. The Proposal

The proponent proposes to construct and operate a 13 km public transport rail line between Malaga and Ellenbrook. The proposal will extend the proposed Bayswater to Malaga railway line. The 463.8 hectare (ha) development envelope is located within the City of Swan between 12 and 22 km north-east of Perth's central business district (Figure 1).

The proposal includes construction of railway tracks and associated infrastructure, new railway stations at Malaga, Whiteman Park and Ellenbrook with provision for a potential future station at Bennett Springs East (Figure 2). Each new station will include intermodal rail, bus, carpark, drop off and active mode (cycling and walking) facilities.

The proposal also includes changes to road infrastructure at road and rail intersections and a dive structure connecting the Bayswater to Malaga railway line to the Malaga to Ellenbrook railway line before Malaga Station. Other works and infrastructure include construction laydown and access areas, principal shared paths, fencing, bridges, and noise walls.

The key characteristics of the proposal are summarised in Tables 1 and 2 below. A detailed description of the proposal is provided in section 2.3 of the ERD (PTA 2020a).

Table 1: Summary of the proposal

Proposal title	Malaga to Ellenbrook Rail Works
Short description	The proposal is to construct and operate a new 13 km dual railway line from Malaga to Ellenbrook in the City of Swan. The proposal includes the construction and operation of new intermodal transit stations at Malaga, Whiteman Park and Ellenbrook, with provision for a potential future station at Bennett Springs East. The proposal includes construction of a principal shared path, bridge infrastructure (including over Gnangara Road), a dive structure, and construction laydown and access areas.

Table 2: Location and proposed extent of physical and operational elements

Element	Location	Proposed extent
Physical elements		
Clearing and disturbance for construction of the railway, stations, principal shared path, dive structure, drainage structures, fencing,	Located within the development envelope as shown in Figures 1 and 2.	Clearing and disturbance of no more than 249 ha of which 152.1 ha is native vegetation that includes: • 10.05 ha of Banksia woodlands of the Swan

Element	Location	Proposed extent
bridges, noise walls, and construction laydown and access areas.		Coastal Plain ecological community • 81.4 ha of Carnaby's cockatoo foraging habitat • 68.1 ha of forest red-tailed black cockatoo foraging habitat • 423 black cockatoo potential breeding trees • 1.9 ha of Conservation Category Wetlands • 0.5 ha of Resource Enhancement Wetland UFI 8678 • 64.7 ha of Bush Forever site 304 of which 17.2 ha is regionally significant vegetation within a 463.8 ha development envelope.

The proponent's ERD (PTA 2020a) provides a summary and overview of the process used to evaluate, compare, and consider alternative route alignments and construction methods for the proposal.

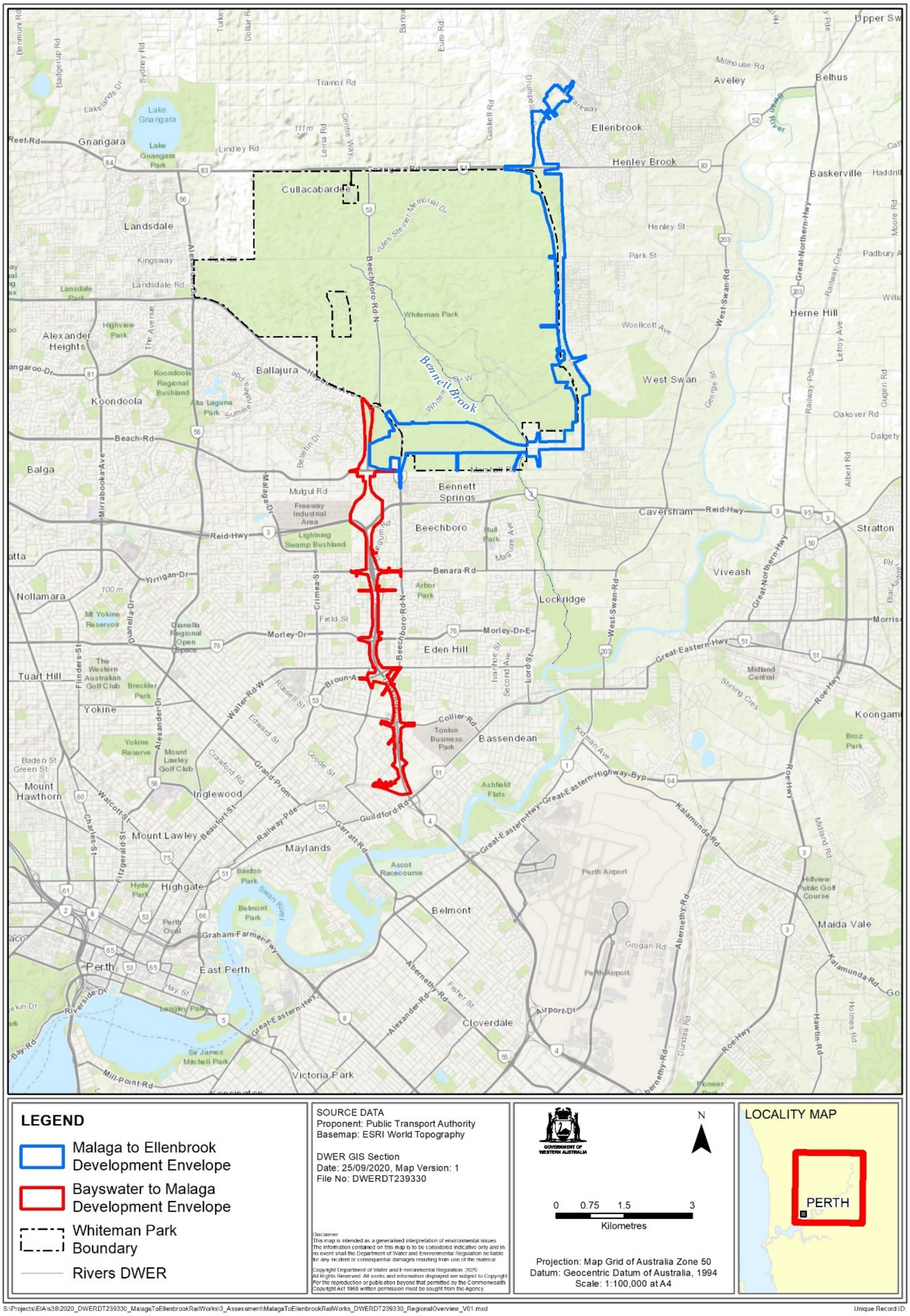

Figure 1: Regional location

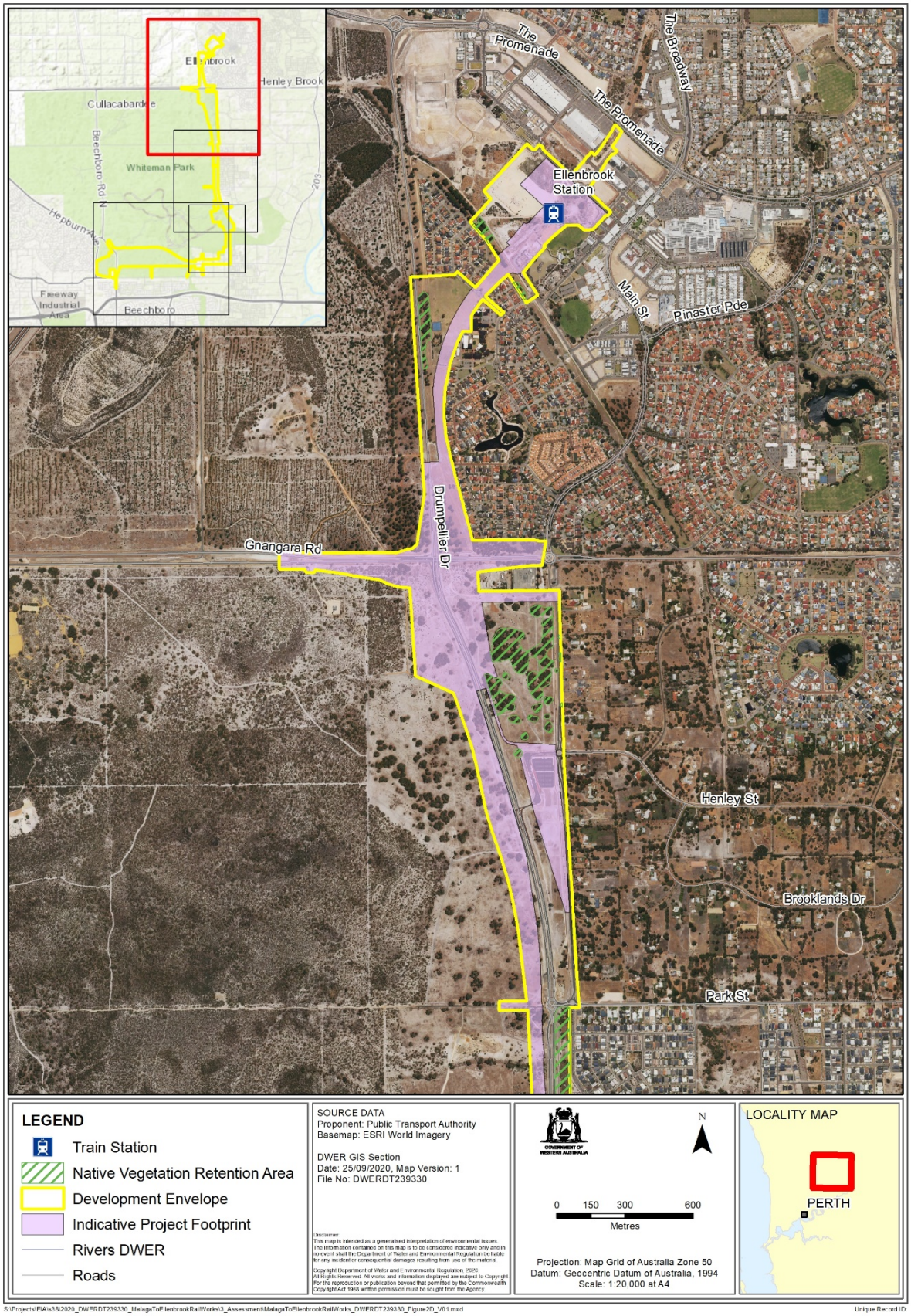

Figure 2a: Proposal development envelope and disturbance footprint

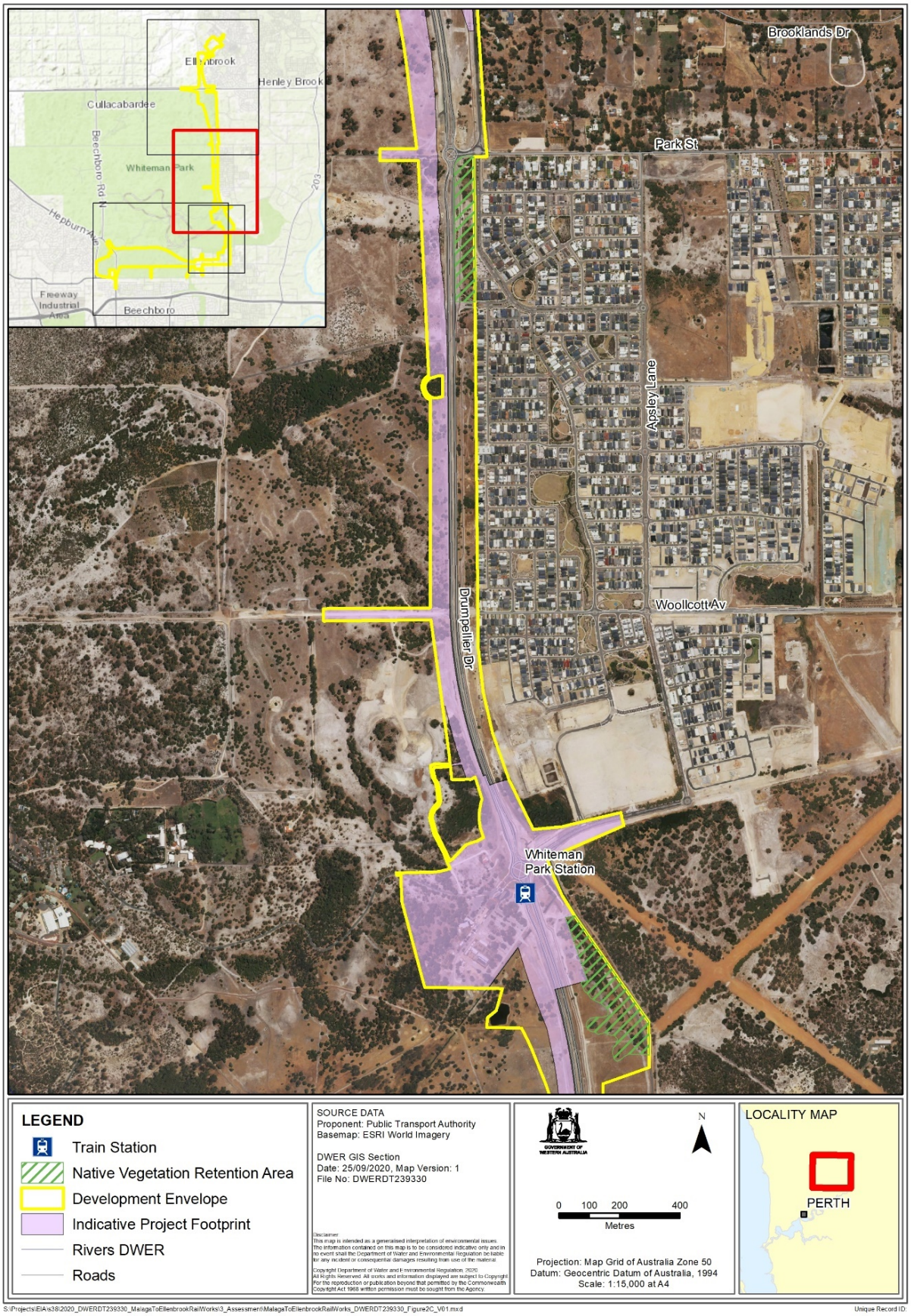

Figure 2b: Proposal development envelope and disturbance footprint

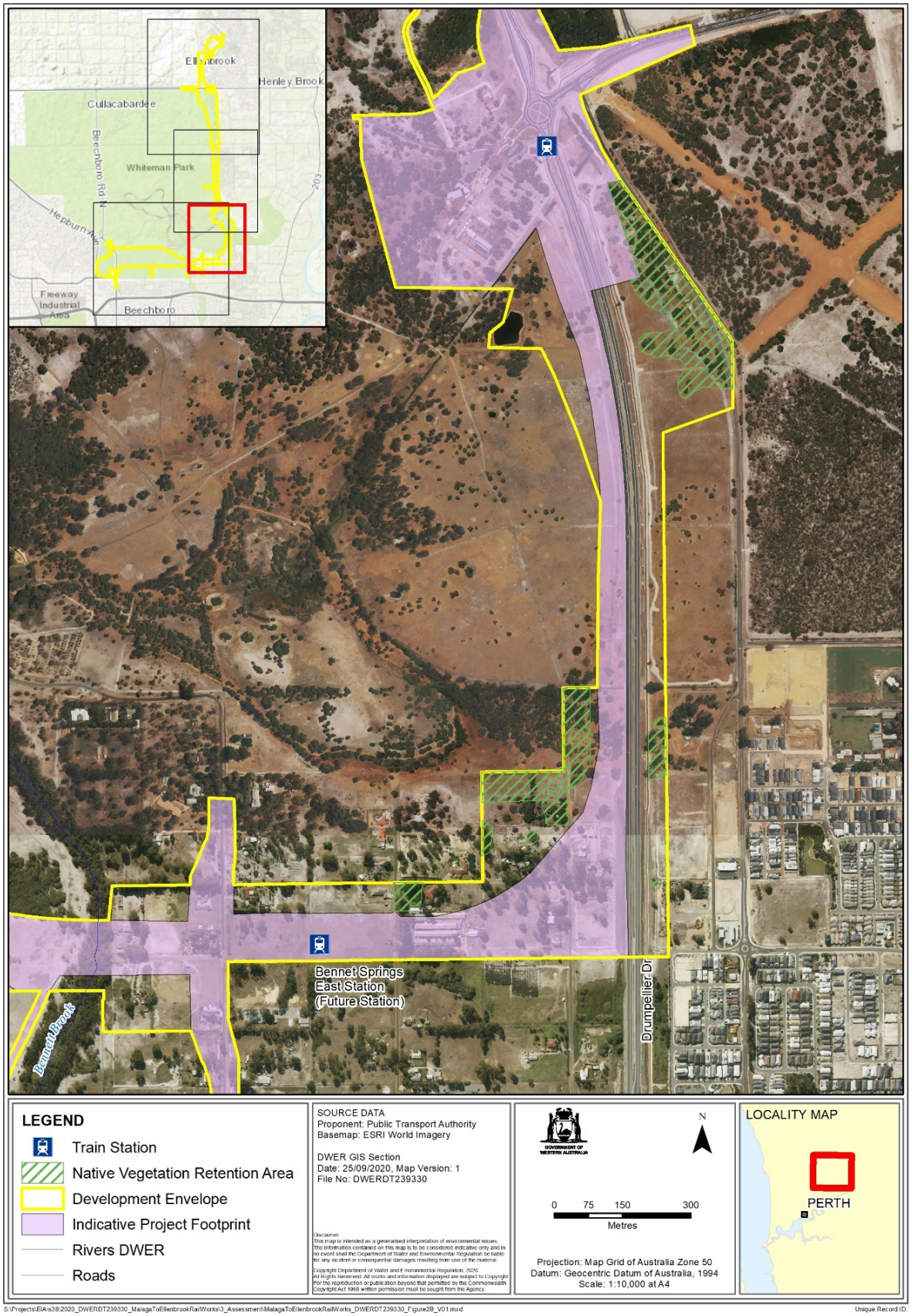

Figure 2c: Proposal development envelope and disturbance footprint

Figure 2d: Proposal development envelope and disturbance footprint

2.1 Changes to the proposal during assessment

The proponent requested the EPA consent to a change to the proposal during assessment on 8 June 2020. The change was to amend the design, construction and alignment of the proposal resulting in a 37.2 ha decrease in the development envelope from 501 ha to 463.8 ha and a 116.9 ha decrease in the disturbance footprint from 365.9 ha to 249.0 ha.

The EPA Chairman, as a delegate of the EPA, concluded that the change was unlikely to significantly increase any impact that the proposal may have on the environment and gave consent under s. 43A of the EP Act to the change on 22 June 2020 (available on the EPA's website at www.epa.wa.gov.au).

The proponent requested a further change to the proposal during assessment on 2 October 2020. The change was requested following project design updates that identified that groundwater is close to the surface where the proposal will intersect with Gnangara Road.

The proposal as referred describes the proposal as rail passing under Gnangara Road (road over rail) before turning north-east to terminate at Ellenbrook Station. The road over rail option required the rail to be constructed below ground level which would have required considerable dewatering. The requested change was to describe the proposal as rail passing *over* Gnangara Road *(rail over road)* before turning north-east to terminate at Ellenbrook Station.

The requested change would result in a change to the vertical height of the proposal in the vicinity of Gnangara Road. The proposed rail over road bridge would be about 9 metres (m) above ground level, compared to a road over rail bridge of about 6.5 m above ground level.

The EPA considers that any potential changes in train noise emissions from a higher elevation can be managed and mitigated using typical and feasible noise mitigation measures, to be included in the proponent's noise and vibration management plan.

The requested change to the proposal would not result in a change to either the development envelope or disturbance footprint and there would be no change in the extent of native vegetation to be cleared. The proposed change would result in less dewatering for bridge construction in terms of volume, extent, and duration and a subsequent reduction in potential indirect impacts to the nearby Banksia woodlands of the Swan Coastal Plain ecological community.

Section 43A of the EP Act provides that the EPA may consent to the proponent changing the proposal without a revised proposal being referred, if the EPA considers that the change is unlikely to significantly increase any impact that the proposal may have on the environment.

The EPA consented to the changes on 15 October 2020 on the basis it considers that the change is unlikely to significantly increase any impact that the proposal may have on the environment.

Tables 1 and 2 above include these changes and the potential impacts have been considered as part of the assessment.

2.2 Context

The proposal is part of the Government of Western Australia's METRONET program of works and forms a component of Perth's long-term public transport network, providing services to the north eastern suburbs.

Under the Metropolitan Region Scheme (MRS), the proposal is in areas zoned for urban development and reserved for parks and recreation. The majority of the proposal's development envelope is comprised of land reserved for Parks and Recreation, with the remaining land reserved for Primary or Other Regional Roads, Public Purpose, Urban or Urban Deferred purposes.

Whiteman Park

The Whiteman Park Strategic Plan 2017–2021 sets out the intended purpose and use of multiple zones within the Whiteman Park boundary. The Marshall Road lands are considered non-essential to the operation and integrity of the park. It is intended that this area be used to provide a buffer and integration with suburban developments to the south (WAPC 2017). Similarly, the Lord Street lands are also considered non-essential to the operation and integrity of the park and provide an important buffer between the park and suburban developments to the east as well as an entry point to the Swan Valley (WAPC 2017).

The EPA notes that while the Marshall Road and Lord Street lands are within the boundary of Whiteman Park, neither form the core of Whiteman Park, being the Whiteman Bushland and Whiteman Village, but rather are important buffers for these two areas.

Bayswater to Malaga Rail Works

The proponent referred part one of the Morley to Ellenbrook Line – the Bayswater to Malaga Rail Works proposal – in November 2019. The proposal was to construct and operate a 9 km dual passenger rail line from the existing Bayswater station on the Midland rail line to Malaga. The proposed rail line was primarily contained within the Tonkin Highway road reserve and included two new stations at Morley and Noranda.

The EPA considered that the likely environmental effects of that proposal were not so significant as to warrant formal assessment because the existing environment was highly modified, and the extent and consequence of the predicted impacts were predicted to be small scale and of short duration.

The EPA was of the view that the potential impacts of the proposal could be adequately managed through implementation of the proposal in accordance with the referral documentation, the proponent's management and mitigation measures and associated legislation.

3. Consultation

The EPA advertised the referral information for the proposal for seven days public comment in February 2020 and received two submissions. One submission requested 'Do Not Assess' and one submission requested 'Assess – Referral Information'.

The proponent consulted with government agencies and key stakeholders during the preparation of the ERD. The agencies and stakeholders consulted, the issues raised, and the proponent's response are detailed in Table 10 of the proponent's ERD (PTA 2020a).

During the public review period for the ERD, the EPA received three agency submissions and two public submissions on the proposal. The key issues raised relate to:

- potential impacts to groundwater dependent vegetation from construction and the ongoing presence of the dive structure at Malaga
- potential impacts to Bennett Brook, adjacent wetlands, and groundwater hydrological regimes
- potential to undertake on-ground management activities within Whiteman Park to offset potential significant residual impacts.

The proponent addressed the issues raised in the Response to Submissions Report (PTA 2020b).

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders about the proposed development. Relevant significant environmental issues identified from this process were taken into account by the EPA during its assessment of the proposal.

4. Key Environmental Factors

In undertaking its assessment of the proposal and preparing this report, the EPA had regard for the object and principles in s. 4A of the EP Act to the extent relevant to the particular matters that were considered.

The EPA considered the following information during its assessment:

- proponent's referral information, ERD and draft management plans
- public comments received on the referral, stakeholder comments received during the preparation of the proponent's documentation and public and agency comments received on the ERD
- proponent's response to submissions raised during the public review of the ERD
- EPA's own inquiries
- *Statement of Environmental Principles, Factors and Objectives* (EPA 2020b)
- relevant principles, policy and guidance referred to in the assessment of each key environmental factor in sections 4.1 to 4.4.

Having regard to the EP Act principles, the EPA considered that the following principles were particularly relevant to its assessment of the proposal:

1. **The precautionary principle** – the proposal has the potential to result in serious or irreversible damage to:
   a) the Banksia woodlands of the Swan Coastal Plain ecological community
   b) groundwater dependent ecosystems and wetland vegetation
   c) conservation significant flora species
   d) habitat for one Endangered and one Vulnerable species of black cockatoo, an Endangered fish, and a Vulnerable invertebrate.

   The EPA has recommended conditions to ensure that risks are minimised or avoided where possible, and the relevant measures are undertaken by the proponent to manage residual impacts.
2. **The principle of intergenerational equity** – the proposal has the potential to impact on the health, diversity, and productivity of significant ecological communities, foraging and potential breeding habitat for an Endangered species of black cockatoo and habitat for two significant aquatic species. The proposal will cross an important mythological site (Bennett Brook: in toto) that also provides an important north-south ecological linkage. The EPA has recommended conditions to ensure the biological environment is maintained for the benefit of future generations.
3. **The principle of the conservation of biological diversity and ecological integrity** – a Priority Ecological Community, areas of foraging and potential breeding habitat for listed species of black cockatoo, areas of habitat for two significant aquatic species and a north-south ecological linkage could be significantly impacted by the proposal. The EPA has recommended conditions to

manage the impacts on conservation significant vegetation and fauna so that biological diversity and ecological integrity are maintained.

4. **The principle of waste minimisation** – significant quantities of soil material will be excavated/removed from the development envelope at the site of the proposed Malaga dive structure in an area of high to moderate risk of acid sulfate soils (ASS) occurring at depth. The proponent proposes to minimise waste by applying the waste hierarchy including treatment of any excavated ASS prior to reuse as fill.

Appendix 2 of this report provides a summary of all the principles and how the EPA considered these principles in its assessment.

Having regard to the above information, the EPA identified the following key environmental factors during the course of its assessment of the proposal:

- **Flora and Vegetation** – direct and indirect impacts from clearing of flora and vegetation including impacts to Bush Forever site 304 (BF 304), Banksia woodlands Priority Ecological Community (PEC)/Threatened Ecological Community (TEC), groundwater dependant ecosystems, wetland vegetation and significant flora.
- **Terrestrial Fauna** – direct and indirect impacts associated with the clearing and/or degradation of fauna habitat and impacts from construction and operation activities.
- **Inland Waters** – potential impacts to the hydrological regimes and water quality of groundwater resources including the Gnangara Underground Water Pollution Control Area and surface water features including Bennett Brook, Conservation Category Wetlands and Resource Enhancement Wetlands from construction and ongoing operation activities.
- **Social Surroundings** – potential construction and operation impacts to social surroundings from the loss or indirect impact to Aboriginal Heritage sites, and noise and vibration.

The EPA considered other environmental factors during its assessment of the proposal. These factors, which were not identified as key environmental factors, are discussed in the proponent's ERD (PTA 2020a). Appendix 3 of this report contains an evaluation of why these other environmental factors were not identified as key environmental factors.

The EPA's assessment of the proposal's impacts on the key environmental factors is provided in sections 4.1 to 4.4. These sections outline whether or not the EPA considers that the impacts on each factor are manageable. Section 8 provides the EPA's recommendation as to whether or not the proposal may be implemented.

Assessment on behalf of the Commonwealth

The EPA assessed the proposal on behalf of the Commonwealth Minister for the Environment as an accredited assessment. The EPA has addressed MNES under each relevant factor and has summarised its assessment of MNES in section 6.

4.1 Flora and Vegetation

The EPA's environmental objective for Flora and Vegetation is *to protect flora and vegetation so that biological diversity and ecological integrity are maintained*.

Relevant Policy and Guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a)
- *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a).

In addition to the relevant current policy and guidance above, the EPA also had regard to the:

- *Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia: Part 2 – National Best Practice Guidelines* (O'Gara et al. 2005)
- *State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan region* (WAPC 2010).

EPA Assessment

The EPA considers that the information provided in the proponent's ERD (PTA 2020a) and Response to Submissions Report (PTA 2020b) is sufficient to enable its assessment of flora and vegetation.

Consistent with the *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a), the EPA has considered the potential direct and indirect impacts, and risks to flora and vegetation.

The EPA considers that the flora and vegetation surveys are mostly consistent with *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016b) and provide sufficient detail to allow the EPA to undertake its assessment.

Existing environment

The development envelope is located in a low-lying area dominated by flat, seasonally waterlogged palusplain wetland. A large extent occurs in areas previously disturbed within the Marshall Road lands and Lord Street lands of Whiteman Park.

Three vegetation complexes occur within the development envelope. The EPA notes that the proposal will not result in a decline in the extent of any Complex by more than 0.5 per cent.

One of the described vegetation types was determined to be the *Banksia woodlands of the Swan Coastal Plain*, which is listed as a TEC under the EPBC Act and a Priority 3 PEC under the *Biodiversity Conservation Act 2016* (BC Act). The community covers an area of 17 ha within the development envelope and 10.05 ha within the disturbance footprint across two patches.

The EPA notes that on 28 July 2020 the Department of Biodiversity, Conservation and Attractions (DBCA) updated its PEC listing for the previously named Banksia dominated woodlands of the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia region PEC. The update aligned the description, area, and condition thresholds with those of the EPBC listed Banksia woodlands TEC of the same name, Banksia woodlands of the Swan Coastal Plain (referred to in this report as the Banksia woodlands PEC/TEC).

Up to 53.6 ha of groundwater dependent ecosystems (GDE) occur within the development envelope consisting of 25.8 ha of wetland vegetation and 27.8 ha of terrestrial vegetation associated with the Banksia woodlands PEC/TEC. The proposal traverses Bennett Brook, a regionally significant creek line that discharges into the Swan Estuary.

A large portion (43.5 per cent) of the development envelope is located within the management boundary of Whiteman Park, zoned as Parks and Recreation in the MRS. BF 304 Whiteman Park lies wholly within the Whiteman Park management boundary. The development envelope intersects 77 ha of BF 304 of which 64.7 ha is within the disturbance footprint. The proponent considers that 17.2 ha of regionally significant vegetation within BF 304 occurs within the disturbance footprint. This vegetation is in Degraded or better condition.

Two of the 374 recorded flora species are listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007* – *Zantedeschia aethiopica* (arum lily) and *Moraea flaccida* (one-leaf Cape tulip).

No flora listed under the EPBC Act or BC Act were recorded within the development envelope. One Priority flora species, *Anigozanthus humilis* subsp. *chrysanthus* (Priority 4) was recorded within the native vegetation retention areas (NVRA) near the proposed Malaga station. It is possible that the species occurs within the disturbance footprint.

Trithuria occidentalis (Critically Endangered under the BC Act and Endangered under the EPBC Act) was considered to have a moderate likelihood of occurring within the development envelope prior to surveys being undertaken. Following surveys, the likelihood of occurrence was considered possible based on the presence of suitable habitat and the proximity of previous records. The species was not recorded during biological surveys. The EPA notes that the proponent has committed to undertake further surveys for the species in late 2020 as suitable habitat dries after winter rains.

Potential impacts

The proposal would directly impact on flora and vegetation through the clearing of 152.1 ha of native vegetation within the 249 ha disturbance footprint. This includes 59.9 ha of vegetation in Degraded to Completely Degraded condition or better.

Based on the results of the surveys and the presence of species likely to occur, the EPA considers the potential impacts to significant vegetation communities from the proposal are the clearing of up to:

- 10.05 ha that is representative of the Banksia woodlands PEC/TEC
- 17.2 ha of regionally significant bushland within BF 304
- 29.5 ha of GDE.

The proposal also has the potential to indirectly impact on flora and vegetation through:

- alteration of hydrological processes and water quality
- fragmentation of a patch of Banksia woodlands PEC/TEC
- the introduction and spread of weeds and disease, including *Phytophthora cinnamomi* dieback
- edge effects.

Mitigation and management

The EPA notes the proponent's application of the mitigation hierarchy to reduce the impacts of the proposal on flora and vegetation by:

- locating the proposal and associated temporary access and laydown areas in highly degraded and disturbed areas as far as practicable
- changing the development envelope to minimise the extent of native vegetation that would be cleared
- identifying multiple areas where native vegetation is to be retained within NVRA, and in which no works will occur
- fencing the Malaga NVRA during construction
- revegetating areas cleared for the proposal, but not required for permanent infrastructure or management access, including within the Bennett Brook riparian zone
- incorporating adequate drainage in the design of the proposal
- implementing standard construction management measures to ensure the risk of indirectly impacting remnant, adjacent vegetation is minimised, including from weeds and disease
- proposing measures within a TEC Management Plan to ensure potential indirect impacts to the Banksia woodlands PEC/TEC are avoided or minimised and monitoring via daily visual inspections during clearing and weekly inspections during construction is undertaken.

Assessment of impacts

Clearing of native vegetation

The proposal would result in the clearing of 152.1 ha of native vegetation within a 463.8 ha development envelope. The EPA acknowledges that the proponent has modified the proposal during the assessment to reduce the extent of native vegetation to be cleared by 161 ha. This includes a reduction in the clearing of the Banksia woodlands PEC/TEC from 23 ha to 10.05 ha. Of the 152.1 ha of native vegetation that will be cleared, 92 ha is in Completely Degraded condition.

The EPA notes that the NVRA cover about 45 ha and will avoid clearing 43 ha of native vegetation, of which 24 ha is in Degraded to Completely Degraded condition or better. The EPA further notes that Whiteman Park covers an area of 3,732 ha, and over half of this is dedicated conservation reserve.

Banksia woodlands PEC/TEC

The proposal would require the clearing of 10.05 ha of vegetation representative of the Banksia woodlands PEC/TEC across two patches. A further 68.5 ha of this ecological community was identified within the wider survey area. The Banksia woodlands PEC/TEC in the development envelope ranges in condition from Degraded to Excellent.

The proposal will fragment the occurrence of the community in the vicinity of the Malaga station and may lead to indirect impacts and degradation of larger occurrences adjacent to the development envelope, including from weeds, dieback, and edge effects.

Patch 1 Malaga

Patch 1 Malaga is a 23.2 ha patch of Banksia woodlands PEC/TEC. The patch occurs where the proposal will adjoin the Bayswater to Malaga railway line and above the proposed Malaga dive structure.

The patch will be dissected and become two smaller patches, one 7.73 ha outside the development envelope (Patch 1a), and one 6.95 ha within the development envelope (Patch 1b). About 8.5 ha of the patch will be cleared.

Fragmentation has been identified as a key threat for the Banksia woodlands PEC/TEC (TSSC 2016). The EPA notes that both Patch 1a and Patch 1b will continue to meet the minimum patch size and condition thresholds for consideration as part of the Banksia woodlands PEC/TEC (Table 3). The EPA further notes that while Patch 1a and Patch 1b may be indirectly impacted by the proposal, these smaller patches are likely large enough to remain viable and representative of the Banksia woodlands PEC/TEC.

Table 3. Vegetation condition and extent of Banksia woodlands PEC/TEC at Patch 1 Malaga

Vegetation condition	Area of Patch 1 Malaga (ha)				
	Total	Disturbance footprint	Patch 1a (outside development envelope)	Patch 1b (within NVRA)	Extent remaining
Excellent	4.10	0.00	0.00	4.10	4.10
Very Good	16.08	6.62	7.14	2.31	9.45
Good	2.75	1.92	0.29	0.54	0.83
Degraded	0.30	0.00	0.30	0.00	0.30
Total	23.23	8.54	7.73	6.95	14.68

Patch 5 Gnangara

Patch 5 Gnangara is a 36.8 ha patch of Banksia woodlands PEC/TEC located 100 m west of the intersection of Gnangara Road and Drumpellier Drive within BF 304. The patch occurs where the rail bridge will be constructed over Gnangara Drive. Up to 1.51 ha of this patch occurs within the disturbance footprint.

The EPA notes that the extent of this patch to be cleared would not result in further fragmentation of the Banksia woodlands PEC/TEC or result in an occurrence becoming isolated. However, clearing would result in the loss of buffer areas that may lead to indirect impacts and degradation of the larger occurrence in this area.

Clearing of Banksia woodlands PEC/TEC

The EPA notes that the loss of 10.05 ha of Banksia woodlands PEC/TEC (8.54 ha from Patch 1 and 1.51 ha from Patch 5) represents a reduction of less than 0.1 per cent of the ecological community within the City of Swan (11,370 ha). The loss contributes to the decline in the geographic distribution of the community and reduces the size of the remaining occurrences. The EPA recognises that while the areas to be cleared represent a small portion of the Banksia woodlands PEC/TEC on a regional scale, clearing and construction activities may introduce an increased risk from indirect impacts to isolated patches, larger occurrences and the remaining extent.

The Banksia woodlands PEC/TEC that would be cleared can be considered habitat critical to the survival of the community (the extent of the loss of Patch 1 Malaga) or buffer zones important for protecting the integrity of the community (the small extent of the loss of Patch 5 Gnangara). The EPA therefore considers that while the loss of 10.05 ha will have a small incremental impact on the regional extent of this community, given the historical impacts that have occurred to the Banksia woodlands PEC/TEC, the EPA considers that a significant residual impact still remains and the proponent should provide an offset to counterbalance this impact. Offsets are further discussed in section 5.

Bush Forever site 304

The proposal would directly impact 64.7 ha of BF 304. This equates to a 2.3 per cent reduction in the extent of BF 304 from 2,801.2 ha to 2,736.5 ha. Within the

disturbance footprint, 17.2 ha is considered regionally significant native vegetation in Degraded condition or better.

The disturbance footprint intersects 4.7 ha of mapped wetlands within BF 304, of which 1.9 ha is associated with Conservation Category Wetland, 0.6 ha of this with Bennett Brook. The EPA notes that BF 304 contains about 336 ha of Conservation Category Wetlands. Impacts to wetlands are assessed in section 4.3.

The EPA notes that the alignment does not fragment areas of regionally significant bushland or extensive areas of remnant vegetation and ensures the ability of the remaining area to retain biodiversity values in the long-term. The areas of regionally significant vegetation that will be cleared occur in areas that are unlikely to exacerbate indirect impacts given the highly disturbed nature of the existing environment. However, indirect impacts have the potential to impact on areas of regionally significant bushland remaining within BF 304.

In considering the impacts to BF 304, the EPA has considered the *State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan region* (SPP 2.8) (WAPC 2010). The EPA notes that SPP 2.8 provides guidance and criteria for decision-making and there is a general presumption against clearing regionally significant bushland. SPP 2.8 also acknowledges that some proposals may result in unavoidable adverse impacts on bushland and considers that all reasonable steps should be taken to avoid and minimise any impacts to bushland.

The EPA considers that the proposal would result in a significant residual impact to 17.2 ha of regionally significant vegetation that would require an offset. Consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia), impact to areas reserved under statute or managed for the purpose of conservation would require an offset. The EPA notes that the vegetation proposed to be cleared is associated with the Banksia woodlands PEC/TEC and wetlands, including Bennett Brook. Therefore, the EPA considers that the vegetation can be considered to have a very high conservation significance and any offset requirement should provide a net gain of at least two-to-one of like-for-like vegetation. Offsets are discussed further in section 5.

Groundwater dependant ecosystems

The EPA notes that groundwater is within 3 m of ground level throughout the development envelope. The proponent has indicated that about 139 ha of terrestrial GDEs occur in the wider area and about 469 ha have been inferred to occur within Whiteman Park. The loss of 15.95 ha of terrestrial GDE represents a loss of 11 per cent of the wider extent and about 3 per cent of the inferred extent within Whiteman Park.

The proposal would impact on 15.95 ha of terrestrial GDE:

- 10.05 ha of Banksia woodlands PEC/TEC – which represents a significant impact
- 5.9 ha of relatively small, isolated patches of Degraded to Completely Degraded vegetation – which is not considered significant at a local or regional scale.

The EPA has recommended that the extent of vegetation to be cleared is controlled through the authorised extent in schedule 1 of the recommended environmental conditions and the proponent offset the potential impact on 10.05 ha of Banksia woodlands PEC/TEC (see section 5).

Flora

The EPA notes that surveys did not identify any conservation significant flora listed under the BC Act in the development envelope. The EPA further notes that the proponent has proposed to undertake additional surveys for the Critically Endangered species *Trithuria occidentalis* because of the proximity of previous records and the occurrence of suitable habitat within the development envelope.

The EPA is of the view that it is unlikely that the species occurs within the development envelope. The EPA notes that if the species is recorded during the additional surveys that the proponent would require authorisation from the Minister for Environment under s. 40 of the BC Act to disturb the species, and that Conditions of Authorisation may be imposed that require the proponent to mitigate or offset the impact.

The EPA notes that the Priority flora species *Anigozanthus humilis* subsp. *chrysanthus* (Priority 4) will be protected in the NVRA near Malaga station, but may also occur within the disturbance footprint. The EPA notes that the species has a relatively wide distribution and is of the view that potential impacts associated with the proposal are not considered significant at a local or regional scale.

Indirect impacts

Potential indirect impacts to significant vegetation retained within, adjacent to, or in close proximity to the development envelope include:

- introduction or spread of disease (*Phytophthora* dieback)
- weed invasion
- hydrological changes.

The EPA supports the proponent's proposed management measures for weeds and disease through the implementation of hygiene measures outlined in the Construction Environmental Management Plan (Appendix U of the ERD) and Threatened Ecological Communities Management Plan (Appendix X of the ERD).

The EPA is of the view that indirect impacts from weeds and disease to native vegetation retained within, adjacent to, or in close proximity to the development envelope can be managed to meet the EPA's objective for Flora and Vegetation and will ensure that biological diversity and ecological integrity are maintained.

Construction dewatering and abstraction have the potential to significantly impact the Banksia woodlands PEC/TEC and other GDEs. An assessment of the potential impacts from dewatering and abstraction on associated environmental values is included in section 4.3.

The EPA considers that the potential impacts to Flora and Vegetation from the construction and ongoing operation of the proposal can be managed provided the proponent:

- ensures there are no direct or indirect impacts to native vegetation within the NVRA within five years that are attributable to the proposal (condition 8-2(1))
- undertakes weed control and management measures to prevent the introduction or spread of weeds (condition 8-1(7)) and implements hygiene protocols to prevent the spread and introduction of *Phytophthora* dieback (condition 8-1(2))
- implements measures to minimise indirect threatening processes, including from grazing, within the Patch 1 Malaga NVRA (condition 8-1(9)) and that indirect threatening processes, including grazing, are managed within the Patch 1 Malaga NVRA for three years following construction to ensure vegetation structure and condition is maintained (condition 8-2(3))
- undertakes weed control and management in BF 304 and the NVRA and within 20 m of the development envelope in BF 304 for five years following construction (condition 8-2(2))
- rehabilitates areas disturbed during construction that are not required for the ongoing operation of the proposal to achieve pre-construction vegetation densities within five years post construction (conditions 8-2(4) and 8-2(5)).

The EPA notes the proponent has proposed to offset the loss of 10.05 ha of Banksia woodlands PEC/TEC through a direct land acquisition and management offset. The EPA has recommended condition 12-8 requiring the proponent to prepare and submit an offset strategy to counterbalance the significant residual impact to 10.05 ha of Banksia woodlands of the Swan Coastal Plain PEC. The proponent will be required to identify an area or areas to be acquired with on-ground management and, managed for conservation purposes that contains Banksia woodlands PEC/TEC. This is further discussed in section 5 (Offsets).

The proponent has further proposed to offset the loss of 17.2 ha of regionally significant vegetation within BF 304 through the implementation of an on-ground management offset within Whiteman Park. The EPA has recommended condition 12-2 requiring the proponent to prepare and submit an On-ground Management Offset Plan to counterbalance the significant residual impact to 17.2 ha of BF 304. The proponent will be required to spatially define and map an area or areas within Whiteman Park, or other suitable location, where on-ground management actions will be implemented. This is further discussed in section 5 (Offsets).

Taking into account the proponent's proposed measures to manage impacts to flora and vegetation, the relatively small loss of Banksia woodlands PEC/TEC at a regional scale (less than 0.1 per cent within the City of Swan) and regionally significant vegetation within BF 304, and the proponent's commitment to offset the proposal's significant residual impacts to the environmental values, the EPA considers that the proposal can be implemented to meet the EPA's objective for Flora and Vegetation.

The EPA acknowledges that the proponent intends to design the proposal to incorporate adequate drainage to maintain existing environmental values as part of the Construction Environmental Management Plan. The EPA further acknowledges the proposed management and monitoring measures as part of the TEC Management Plan.

The EPA considers that the proponent should use its best endeavours during detailed design of the proposal to avoid areas of native vegetation within the disturbance footprint, particularly at Malaga and Whiteman Park stations, noting that extensive areas of previously disturbed or cleared land exist within the development envelope at these locations.

The EPA is of the view that incorporation of water sensitive urban design principles around the Malaga and Whiteman Park stations could result in the retention of areas of native vegetation, particularly vegetation associated with GDE.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a)
- direct impacts to 10.05 ha of the Banksia woodlands PEC/TEC
- fragmentation of the Patch 1 Malaga occurrence of Banksia woodlands PEC/TEC
- direct impacts to areas of GDEs
- direct impacts to BF 304 Whiteman Park
- potential indirect impacts from the spread of weeds and dieback and edge effects
- the proponent's amendments to the development envelope to avoid and minimise impacts to native vegetation and minimise the need for dewatering
- the proponent's proposed management measures to minimise construction impacts.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Flora and Vegetation that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through the authorised extent in Schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- implementation of condition 8 to:
    - ensure that direct and indirect impacts are not greater than expected during and following construction
    - implement hygiene protocols and weed control
    - ensure no impacts to native vegetation within the NVRA
    - implement measures to prevent and manage indirect threatening processes within Patch 1 Malaga NVRA

  - require rehabilitation of areas not required for ongoing operation of the proposal

- implementation of measures to maintain the quality and hydrological regime of groundwater that supports the biological diversity and ecological integrity of Banksia woodlands PEC/TEC through the preparation and implementation of an ASS and Dewatering Management Plan (condition 9)
- implementation of offsets (see section 5, condition 12) to counterbalance the significant residual impact to 10.05 ha of Banksia woodlands of the Swan Coastal Plain PEC and 17.2 ha of BF 304.

4.2 Terrestrial Fauna

The EPA's environmental objective for Terrestrial Fauna is *to protect terrestrial fauna so that biological diversity and ecological integrity are maintained*.

Relevant Policy and Guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016c)
- *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020c)
- *Technical Guidance – Sampling of short range endemic invertebrate fauna* (EPA 2016d)
- *EPA Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region, Advice of the Environmental Protection Authority under section 16(j) of the Environmental Protection Act 1986* (EPA 2019).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016c).

In addition to the above policies and guidelines, the EPA also had regard to the**:**

- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (DPAW 2013)
- Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksia naso*) Recovery Plan (DEC 2008).

EPA Assessment

Consistent with the *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016c), the EPA has considered the potential direct and indirect impacts, and risks to terrestrial fauna.

The proponent completed level 1, level 2, reconnaissance, detailed and targeted fauna surveys including for short-range endemic species, black-stripe minnow and Carter's freshwater mussel and a black cockatoo habitat assessment. The EPA updated its technical guidance for terrestrial vertebrate fauna surveys for environmental impact assessment in June 2020. The EPA considers that the proponent's surveys are consistent with this updated guidance.

Existing environment

The habitat within the development envelope is mostly disturbed or impacted to varying extents. The EPA notes that the diversity of the faunal assemblage is relatively high, particularly considering the highly urbanised nature of the study area. The proposal would involve the clearing of 30.5 ha considered to be of moderate to high value habitat and 158.2 ha of low value habitat.

Four species of conservation significance were recorded within the development envelope:

- Carnaby's cockatoo (*Calyptorhynchus latirostris)* (Endangered under the EPBC Act and BC Act)
- forest red-tailed black cockatoo (*Calyptorhynchus banksii naso)* (Vulnerable under the EPBC Act and BC Act)
- quenda (*Isoodon obesulus subsp. fusciventer)* (Priority 4)
- rainbow bee-eater (*Merops ornatus)* (Marine under the EPBC Act).

Eight other conservation significant fauna species have the potential to occur in the development envelope:

- Baudin's cockatoo (*Calyptorhynchus baudinii*) (Endangered under EPBC Act and BC Act)
- western brush wallaby (*Notamacropus irma*) (Priority 4)
- rakali (*Hydromys chrysogaster)* (Priority 4)
- black-striped snake (*Neelaps calonotos)* (Priority 3)
- jewelled sandplain ctenotus (Ctenotus *gemmula)* (Priority 3)
- peregrine falcon (*Falco peregrinus*) (Other specially protected fauna under the BC Act)
- blackstriped dwarf galaxias/black-stripe minnow (*Galaxiella nigrostriata*) (Endangered under the EPBC Act and BC Act)
- Carter's freshwater mussel (*Westralunio carteri*) (Vulnerable under the EPBC Act and BC Act).

Whiteman Park is home to populations of the western grey kangaroo (*Macropus fuliginosus*). A large population inhabit the Marshall Paddocks which will become fragmented from the main area of Whiteman Park. The western grey kangaroo is not a conservation significant species but is native to the area and considered important to the local community.

Potential impacts

Based on the results of the surveys and the presence of species likely to occur, the EPA considers the potential direct impacts to terrestrial fauna are:

- loss of 188.7 ha of fauna habitat
- loss of 81.4 ha of Carnaby's cockatoo foraging habitat
- loss of 68.1 ha of forest red-tailed black cockatoo foraging habitat
- loss of 423 black cockatoo potential breeding trees.

The proposal has the potential to indirectly impact terrestrial fauna through:

- loss of habitat connectivity from clearing and creation of barriers to fauna movement pathways through terrestrial and aquatic ecosystems
- increased risk of injury and/or mortality during construction
- introduction of light, noise and vibration during construction and operation
- increased predation from feral animals
- habitat degradation of adjacent habitats through weeds, introduction and/or spread of dieback, drainage and altered hydrology
- loss of aquatic/riparian habitat at Bennett Brook if rehabilitation after construction is not successful
- clearing of riparian vegetation within and adjacent to Bennett Brook, may affect water and habitat quality in downstream receiving environments through erosion, siltation, and sedimentation
- short-term reduction of aquatic habitats as a result of dewatering or groundwater abstraction
- contamination or increased nutrients entering habitats from chemical or hydrocarbon spills.

Mitigation and management

The EPA notes the proponent's application of the mitigation hierarchy to reduce the proposal's impacts on terrestrial fauna and their habitat by:

- aligning the railway adjacent to existing road infrastructure (Drumpellier Drive) and utilising cleared areas to minimise habitat fragmentation and edge effects
- constructing a rail bridge crossing over Bennett Brook with the design of the footings outside the brook to not impede on current water flow and maintain hydrology for aquatic ecosystems
- providing two north/south fauna crossings, one at the rail bridge at Bennett Brook and one between Bennett Brook and Beechboro Road North
- incorporating NVRA into the development envelope to protect:
    - 43.5 ha of fauna habitat (of which 13.5 ha is of moderate to high value)
    - 25.6 ha of black cockatoo foraging habitat
    - 201 black cockatoo potential breeding trees
- installing permanent kangaroo fencing along the rail corridor through Marshall Paddocks and where necessary for other portions of the alignment
- revegetating riparian vegetation at Bennett Brook not required for permanent infrastructure or ongoing management of the railway.

The proponent has prepared a Construction Environmental Management Plan (CEMP) which will minimise impacts to terrestrial fauna through:

- inspection of black cockatoo potential breeding trees prior to clearing

- monthly visual inspections of marked breeding tree hollows for signs of disturbance and breeding activity during construction
- temporary protection of active nests, and construction activities restricted to within 10 m of any active black cockatoo nesting trees
- progressive clearing of vegetation to allow fauna to move out of the area
- presence of fauna spotters during clearing activities
- installation of fencing following clearing to limit fauna returning to the area
- inspection of fencing, trenches, and temporary infrastructure for trapped fauna
- provision of soil ramps, egress points and/or fauna refuges that provide suitable shelter from the sun and predators for trapped fauna in open trenches
- implementation of hygiene protocols to minimise impacts to adjacent fauna habitat
- construction of Bennett Brook rail bridge to be undertaken in a manner that manages and avoids impacts to the water course, water quality and potential impacts to downstream populations of Carter's freshwater mussel.

Assessment of impacts

Black cockatoo habitat

Baudin's cockatoo and forest red-tailed black cockatoo are subject to a combined recovery plan (DEC 2008), while Carnaby's cockatoo is subject to a separate recovery plan (DPAW 2013). The recovery plans for the three black cockatoo species outline the key threatening processes. Of relevance to this proposal, and assessed by the EPA, are the loss, degradation and fragmentation of critical foraging habitat and potential breeding trees. The EPA notes the proponent has minimised impacts of the proposal by providing NVRA within the development envelope which will protect some of the black cockatoo habitat and a CEMP will be implemented to minimise impacts to the black cockatoos during construction.

Proximity of foraging habitat and water has been demonstrated to be critical to support roosting and breeding sites. Foraging habitat within 7 km of a breeding site is important to adequately support breeding cockatoos. In the Perth-Peel region, individual night roosts need food and water within 6 km, with overlapping foraging ranges within 12 km, to support roosting sites and maintain habitat connectivity and movement across the landscape (EPA 2019).

The EPA notes the assessment undertaken by the proponent has mapped the 81.4 ha of Carnaby's and Baudin's cockatoo habitat as the same distribution, with the difference being the quality of habitat it provides based on foraging species present. The proponent considered that the foraging habitat quality within the development envelope for Baudin's cockatoo was moderate and below moderate and regional foraging habitat within 10 km of the proposal is likely to offer lower value habitat for the species than the Jarrah forest areas to the east. Whereas the quality and value of the foraging habitat for the Carnaby's cockatoo and forest red-tailed black cockatoo was considered mostly moderate to high within the development envelope.

Based on the information provided and the modelled distribution of the species (proposal being located at the northern extent of species distribution), the EPA considers there will be no significant residual impact to Baudin's cockatoo and has not recommended conditions to offset the loss of Baudin's cockatoo foraging habitat. This is further discussed in section 6 (Matters of National Environmental Significance).

The EPA notes the assessment undertaken by the proponent has mapped the 68.1 ha of forest red-tailed black cockatoo foraging habitat within the 81.4 ha of Carnaby's cockatoo foraging habitat. While it is noted there may be some overlap of foraging habitat, the Carnaby's cockatoo and forest red-tailed black cockatoo have different foraging preferences, such as Banksia woodland for Carnaby's cockatoo, while the forest red-tailed black cockatoo prefers Marri-Jarrah woodland. Given both species were recorded in the development envelope, the EPA has determined to assess the Carnaby's cockatoo and forest red-tailed black cockatoo foraging habitat as separate values and considers the proposal will result in significant residual impacts to both species. To address this, the EPA has recommended conditions 12-1 and 12-8 requiring an offset to counterbalance the significant residual impact to 81.4 ha of Carnaby's cockatoo foraging habitat and 68.1 ha of forest red-tailed black cockatoo foraging habitat. This is further discussed in section 5 (Offsets).

The proponent has advised there are multiple known roosting sites for Carnaby's cockatoo and forest red-tailed black cockatoo within Whiteman Park, with the closest roosting site 380 m from the development envelope in the Gnangara-Pinjar pine plantations. This indicates that the foraging habitat within the development envelope is important to support roosting sites of black cockatoos in the area.

The EPA notes the proponent has sought expert advice from a fauna specialist which suggests the 380 m separation distance from a known roosting site is sufficient to avoid indirect impacts to the black cockatoo roosting habitat from noise, vibration or light pollution from the operation of the rail line.

The EPA notes the proponent's assessment found no evidence (i.e. chew marks or birds inspecting hollows) of black cockatoos breeding within the 40 hollows of the 680 potential breeding trees within the development envelope. Furthermore, all hollows were surveyed and found to not be suitable for breeding as they were either too small, of incorrect angle, too close to the ground, too shallow or a combination of these.

Nevertheless, to avoid potential impacts to the black cockatoos that may be breeding within the development envelope, the EPA has recommended condition 10-1 requiring surveys of potential nesting trees prior to clearing. Should evidence of nesting be found, the proponent shall not disturb or clear the tree, or vegetation within a 10 m radius around the tree, until a qualified terrestrial fauna spotter has verified that the tree is no longer being used by the black cockatoos.

The proponent has proposed to offset the loss of the 423 black cockatoo potential breeding trees within the disturbance footprint. The EPA considers the loss of 423 black cockatoo potential breeding trees to be a significant residual impact and has

recommended conditions 12-1, 12-8 and 12-9(4) for offsets to counterbalance this loss. This is further discussed in section 5 (Offsets).

The proponent has calculated the regional loss of foraging habitat to be 0.7 per cent for the Carnaby's cockatoo and 0.6 per cent for the forest red-tailed black cockatoo based on a 10 km buffer surrounding the proposal. Given the proximity of large areas of intact black cockatoo habitat in Whiteman Park, and the surrounding Bush Forever sites, the EPA considers the extent of the habitat loss from the proposal is unlikely to have a regional impact on the populations of black cockatoos. However given the conservation status of the species and the incremental and historical loss of black cockatoo habitat, the EPA considers that offsets are required to counterbalance the significant residual impact to 81.4 ha of Carnaby's cockatoo foraging habitat, 68.1 ha of forest red-tailed black cockatoo foraging habitat, and 423 black cockatoo potential breeding trees. Offsets are further discussed in section 5.

Carter's freshwater mussel

Carter's freshwater mussel (Vulnerable under the BC Act) is endemic to the south west and known to live in freshwater with greatest densities found under overhanging riparian vegetation near stream banks (TSSC 2018a). Key threatening processes causing a decline of the species are predominately salinity and habitat degradation or direct loss.

The EPA notes Carter's freshwater mussel was not found within the development envelope, and habitat along Bennett Brook within the development envelope did not appear suitable for the species. No direct impact to the Carter's freshwater mussel is expected from the proposal.

The EPA notes that construction of the rail bridge may require clearing of vegetation within and adjacent to Bennett Brook. Clearing has the potential to result in erosion, siltation and sedimentation that may impact water and habitat quality in downstream receiving environments, where the Carter's freshwater mussel was detected. The proponent has prepared a CEMP which indicates construction of the Bennett Brook rail bridge will be planned and undertaken to manage and avoid impacts to the water course and water quality. In addition, the rail bridge over Bennett Brook will not include bridge footings within the bed of the brook. Therefore, it is anticipated the hydrological regime of the brook will not be impacted once the railway is operational. Further, no impacts to native fish movement critical for Carter's freshwater mussel glochidia (larvae) distribution are expected as a result of construction of the rail bridge.

The EPA considers this approach to be acceptable and that it is unlikely the proposal will impact the Carter's freshwater mussel. However, the EPA has recommended condition 6-1 which requires the design and implementation of the proposal to maintain the hydrological regime and water quality in Bennett Brook that supports the Carter's freshwater mussel.

Black-stripe minnow

Black-stripe minnow (Endangered under the BC Act) is a small freshwater fish restricted to ephemeral, acidic wetlands and is endemic to the south west (Ogston

et. al. 2016). The species has a relatively short lifecycle (12 months), breeding between June to September and annually aestivates underground during dry periods. The fish emerges with the first seasonal rains and is known to disperse in years of high rainfall (TSSC 2018b).

There are several key threatening processes for the species. Of relevance to this proposal are habitat modification and loss, filling or draining of wetlands and changes to hydrological regimes (TSSC 2018b).

The proponent's targeted survey, that aligned with and exceeded the recommended survey methods in the conservation advice (TSSC 2018b), found no black-stripe minnow in or adjacent to the development envelope even though suitable habitat was found.

The EPA considers the proposal will have no significant impacts on the black-stripe minnow.

Other significant fauna and kangaroos

The direct loss of 188.7 ha of fauna habitat and habitat fragmentation and degradation has the potential to impact other significant fauna such as the quenda, western brush wallaby, rakali, black-striped snake and the jewelled sandplain ctenotus.

The proponent has advised that the railway development will be fenced to a height of between 1.8 and 2.4 m, the full length of the operating railway. The railway development, and the fencing, will impact the ability of terrestrial fauna to move north-south from Marshall Paddock to the main area of Whiteman Park. The EPA understands the east-west linkage from Whiteman Park to areas of bushland east of Drumpellier Drive has already been severed by the upgrade of Drumpellier Drive and an existing fence preventing fauna from crossing the road.

To address the north-south fragmentation, the proponent has proposed two fauna underpasses for larger animals – one at the Bennett Brook rail bridge and one between Bennett Brook and Beechboro Road North. The fauna crossing at the Bennett Brook rail bridge will be designed so that kangaroos and other large fauna will not be able to access the banks of Bennett Brook but rather cross under the bridge via an appropriately designed box culvert. The Bennett Brook waterway will also retain its ecological linkage as the banks of the brook are not proposed to be permanently impacted by the proposal.

The EPA notes the vegetation at the Malaga station, which includes the Banksia woodlands PEC/TEC, contains moderate to high value fauna habitat. The disturbance footprint proposes to bisect the vegetation and fauna habitat at Malaga station, with vegetation retained to the north of the development envelope and about 10.4 ha of vegetation retained in a NVRA surrounded by the disturbance footprint.

The proponent has advised that the NVRA near the proposed Malaga station provides an area of fauna habitat considered large enough to remain viable in the long-term for quenda, reptiles, invertebrates, and short-range endemic fauna.

However, isolated kangaroos are likely to impact the structure and condition of the Banksia woodlands PEC/TEC within the NVRA. The EPA notes the importance of maintaining the ecosystem within this NVRA for its long-term viability. The EPA has recommended conditions 8-1(9) and 8-2(3) to minimise and manage indirect threatening processes, including grazing within the Patch 1 Malaga NVRA to ensure vegetation structure and condition is maintained.

The EPA notes the proposed temporary construction fencing and permanent fencing on both sides of the railway will minimise impacts to ground-dwelling terrestrial fauna from construction and operation of the railway. To further minimise impacts to terrestrial fauna during construction, the EPA has recommended condition 10-2 requiring the presence of qualified and licenced terrestrial fauna spotters during clearing activities and inspection and management of trenching activities.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016c)
- the application of the mitigation hierarchy to avoid and minimise the clearing of fauna habitats and that most of the proposal is located in a highly modified environment
- the scale and extent of unavoidable impacts to Carnaby's cockatoo and forest red-tail black cockatoo foraging habitat and potential breeding trees
- the potential indirect impacts on the downstream population of the Carter's freshwater mussel
- the recovery plans and conservation advice for conservation significant species
- fragmentation and isolation of fauna habitat at Patch 1 Malaga NVRA
- mitigation measures proposed by the proponent to minimise impacts to terrestrial fauna and maintain the ecological linkage.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Terrestrial Fauna that the impacts to this factor are manageable and would no longer be significant, provided:

- there is control through authorised extent in Schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- the proponent designs and manages the implementation of the proposal to maintain the hydrological regime and water quality in Bennett Brook that supports the Carter's freshwater mussel (condition 6-1)
- indirect threatening processes, including grazing, are minimised and managed within the Patch 1 Malaga NVRA (conditions 8-1(9) and 8-2(3))
- there is a requirement to inspect potential black cockatoo breeding trees prior to clearing to ensure they are not being used for nesting (condition 10-1)
- activities associated with the implementation of the proposal, including clearing and trenching, are undertaken in accordance with condition 10-2

- an offset is provided to counterbalance the significant residual impact of clearing Carnaby's cockatoo and forest red-tailed black cockatoo foraging habitat, and potential breeding trees (see section 5, condition 12).

4.3 Inland Waters

The EPA's environmental objective for Inland Waters is *to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected*.

Relevant Policy and Guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Inland Waters* (EPA 2018).

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Inland Waters* (EPA 2018).

In addition to the relevant current policy and guidance above, the EPA also had regard to the following:

- *SPP 2.2 Gnangara Groundwater Protection* (WAPC 2005)
- *SPP 2.7 Public Drinking Water Source Policy* (WAPC 2003)
- *SPP 2.9 Water Resources* (WAPC 2006)
- *A methodology for the evaluation of specific wetland types on the Swan Coastal Plain Western Australia* (DBCA 2017)
- *Water Quality Protection Note no. 25: Land use compatibility tables for public drinking water source areas* (Department of Water 2016)
- *Identification and investigation of acid sulfate soils and acidic landscapes* (DER 2015a)
- *Treatment and management of soils and water in acid sulfate soil landscapes* (DER 2015b).

EPA Assessment

Consistent with the *Environmental Factor Guideline – Inland Waters* (EPA 2018), the EPA has considered the potential direct and indirect impacts, and risks to inland waters.

Existing environment

Groundwater is generally shallow across the development envelope and is at or near the surface through parts of Marshall Paddock and Whiteman Park. Groundwater in the area of the proposal generally flows in a south-easterly and south-westerly direction towards Bennett Brook and a southerly direction towards the Swan River. A number of potential GDEs occur within or in proximity to the development envelope including Bennett Brook, wetlands and terrestrial ecosystems associated with Banksia woodland communities.

Bennett Brook

The proposal traverses Bennett Brook, a regionally significant watercourse. Bennett Brook is a seasonal tributary to the Swan River. Its main water source is groundwater seepage from the Gnangara Mound, and to a lesser degree surface runoff from the floodplain and flood events. Bennett Brook and its floodplain are significant cultural and spiritual grounds for Aboriginal people. The soaks, springs and waterways of Bennett Brook are registered Aboriginal sites.

Wetlands

There are 17 wetlands mapped within the development envelope:

- nine are classified as Multiple Use Wetlands (114 ha)
- four are classified as Resource Enhancement Wetlands (REW) (139 ha)
- four are classified as Conservation Category Wetlands (CCW) (3 ha).

Fifteen wetlands are intersected by the disturbance footprint (125 ha). Some wetlands in the area are potentially perched due to the presence of coffee rock layers.

Vegetation condition of the wetlands is predominately Completely Degraded (Table 4). About 16.5 ha of wetland vegetation associated with CCW and REW wetlands is in Degraded or better condition within the disturbance footprint.

Seven wetlands – four CCWs (including Orchid Park and Horse Swamp) and three REWs – occur close to the development envelope and may be indirectly impacted by the proposal from changes to water quality or hydrology.

Table 4: Extent and condition of CCW and REW vegetation within the development envelope (DE) and disturbance footprint (Footprint)

Management category unique feature identifier (UFI) (Name)	Degraded or better		Completely Degraded or Cleared	
	DE	Footprint	DE	Footprint
CCW UFI 8417	0.64	0	0.02	0
CCW UFI 8429	0.03	0.03	0	0
CCW UFI 8728	1.01	1.01	0.20	0.20
CCW UFI 15259 (Bennett Brook)	0.84	0.61	0.04	0.03
REW UFI 8678	0.42	0.42	0.36	0.35
REW UFI 8806	0.48	0.48	1.09	1.09
REW UFI 15752 (Marshall Paddocks)	21.22	12.72	113.78	43.32
REW UFI 15757	1.23	1.23	0.83	0.83
Total	**25.87**	**16.50**	**116.32**	**45.82**

Drinking water source protection areas

The proposal is within the Gnangara groundwater area, recognised as a proclaimed Public Drinking Water Source Area (PDWSA) and Underground Water Pollution Control Area (UWPCA).

The proposal intersects with Priority 1, 2 and 3 (P1, P2 and P3) PDWSAs. The EPA notes that railways are an acceptable land use in P3 PDWSA and are compatible with conditions in P1 and P2 PDWSA. Ellenbrook station is located within a P3 PDWSA (compatible land use with conditions). The remaining stations do not intersect with the PDWSA.

Potential impacts

The construction of the proposal has the potential to impact on Inland Waters through the following:

- degradation of surface and groundwater quality
- lowering of groundwater levels and potential impacts from ASS (i.e. soils that have the potential to produce acid if exposed to oxygen)
- clearing and disturbance of native vegetation and wetlands
- impact on drinking water supplies in UWPCA and PDWSAs from a range of activities and pollutants

The ongoing operation of the proposal has the potential to impact on Inland Waters through the following:

- the degradation of surface and groundwater quality
- changes to groundwater and surface water flow paths and groundwater infiltration, including to Bennett Brook
- subsequent impacts to water quality of wetlands and consequential impacts to fauna habitat and GDEs

Mitigation and management

The EPA notes that the proponent has applied the mitigation hierarchy, in accordance with the *Environmental Factor Guideline – Inland Waters* (EPA 2018).

To minimise impacts to hydrological regimes and water quality during construction the proponent proposes to:

- adopt water sensitive urban design principles
- avoid or minimise dewatering through design and construction methods, including:
    - installation of diaphragm walls during construction of the Malaga dive structure
    - use of wet working techniques where possible
    - construction of the Bennett Brook rail bridge during the dry season (as far as practicable)
- re-inject dewatered effluent
- treat dewatered effluent prior to discharge
- not include bridge piers within the water channel of the Bennett Brook rail bridge

- not undertake refuelling, chemical storage, or stockpiles within 50 m of a CCW
- construct drainage structures to minimise alteration to surface water flows and incorporate erosion protection measures
- implement sediment control measures, including provision of silt fences, as required
- prepare and implement an ASS and dewatering management plan, CEMP, and TEC management plan.

The proponent has also changed the proposed road-over-rail bridge at Gnangara Road intersection to a rail-over-road bridge. This change to the proposal will result in a significant reduction in the extent of dewatering required and minimise potential indirect impacts to Banksia woodlands PEC/TEC at this location.

Assessment of impacts

The EPA considers the key issues associated with the proposal include the potential impacts associated with:

- constructing the Malaga dive structure
- impacts to Bennett Brook
- loss and potential degradation of wetlands
- impacts to PDWSAs.

These key issues are discussed below.

Malaga dive structure

The dive structure is where the railway extends below the ground surface and represents a significant component of the project in terms of disturbance of soil and groundwater. Excavations to about 9 m below ground level may be required, along with groundwater dewatering for 6 to 12 months. ASS disturbance is a key issue, with the disturbance likely to include areas mapped as having a high to moderate risk of ASS.

At this stage, the proponent has undertaken appropriate preliminary investigations to understand the type and degree of potential impacts and inform high level management strategies. The preliminary investigations and modelling show that without the implementation of mitigation measures the magnitude and lateral extent of groundwater drawdown from construction dewatering is likely to be significant. Given the early stage of the project design, there are some uncertainties about the magnitude and duration of predicted impacts to groundwater levels and quality because the final configuration of the dive structure has yet to be determined and the soil and groundwater characteristics still require further investigations.

Notwithstanding the uncertainties, the proponent has appropriately identified the types of management measures that may apply to address dewatering and associated ASS impacts, including:

- Direct re-injection of abstracted groundwater to minimise the oxygenation of the effluent and changes to its alkalinity and effects on ASS. This would involve the direct connection of abstraction bores to injection wells.
- Temporary storage of the dewatering effluent in a pond or tank to settle-out sediment to minimise aquifer blockage during infiltration or re-injection.
- Monitoring and, if required, chemical treatment of the dewatering effluent to ensure the re-injected water is of a quality that is compatible with local groundwater. This may include dosing the effluent to increase the alkalinity but only in a way that does not make the chemistry incompatible with local groundwater.

These measures are technically feasible and have been shown to be effective based on implementation for other projects. The proponent expects groundwater levels will recover shortly after abstraction or dewatering ceases or after one wet season.

Once the proposal progresses to the final design and engineering stage of the project, particularly for the dive structure, the proponent will need to undertake further detailed investigations of the hydrogeology of the area and confirm the final mitigation strategies to be adopted (e.g. details of direct re-injection). These further investigations will confirm the specific mitigation measures and inform the preparation of an ASS and dewatering management plan. The ASS and dewatering management plan is to include management actions and contingency measures to prevent significant environmental impacts attributable to the disturbance of ASS.

The EPA expects that the ASS and dewatering management plan will also address the residual uncertainties associated with the potential impacts that prolonged dewatering may have on areas of Banksia woodland, wetlands and GDEs by developing and including early warning triggers (linked to pre-determined actions) to prevent any adverse impacts to these communities.

This plan will also need to address the detailed management of spoil from the dive structure excavation. Consistent with the principle of waste minimisation, the proponent intends to reuse spoil within the development envelope where possible. In the case of ASS, the material will be treated (neutralised) and validated as per the ASS Management Strategy (Appendix W to the ERD) prior to reuse. Depending on the origin of the spoil, it may be necessary for sampling and testing to be undertaken to demonstrate the suitability of the material for reuse from an environmental and human health perspective. These details should be included in the ASS and dewatering management plan.

The proponent has also undertaken preliminary investigations in relation to the ongoing presence of the Malaga dive structure and the potential impacts of groundwater mounding upstream and the lowering of groundwater levels downstream of the dive structure. The preliminary investigations have identified that the proposal would result in some groundwater level mounding against the upgradient side of the structure and some groundwater level drawdown on the downgradient side. The preliminary groundwater modelling indicates that the groundwater level mounding and drawdown could be less than 0.1 m and localised in its lateral extent. The reason for the limited drawdown and mounding is because

the dive structure is not planned to extend through the full depth of the superficial aquifer, which allows groundwater to continue to flow underneath the structure. The proponent recognises that the extent and depth of the dive structure, and aquifer conditions will determine the full extent of the groundwater mounding and drawdown effects and hence will further investigate the issue during detailed design to confirm its initial predictions.

Bennett Brook

The proponent has indicated that construction of the Bennett Brook rail bridge will not include bridge piers or abutments within the bed or banks of the water course. The proponent has also committed to constructing the Bennett Brook rail bridge during the dry season, as far as is practicable. If constructed during the dry season, any potential impacts from dewatering during bridge construction will be short term and temporary and the proponent expects groundwater levels will recover shortly after dewatering ceases.

At this stage, the proponent proposes to construct a single span bridge, 26 m long between bridge footings. It is understood the configuration of the bridge will be designed to ensure flows and velocities do not adversely impact existing waterways, wetlands, and nearby properties up to a 1 in 100 year rainfall event.

The potential impacts from the proposal on the hydrological regime at Bennett Brook are considered to be manageable.

Loss of wetlands

The proponent has demonstrated application of the mitigation hierarchy through changes to the development envelope to minimise impacts to wetlands.

The EPA notes that the proposal would clear up to 1.9 ha associated with CCW, of which 0.6 ha is associated with Bennett Brook, and an additional 0.5 ha of an REW considered to support vegetation and fauna values. A further 61 ha associated with REW would be impacted by the proposal. The EPA notes that the condition of the vegetation of these REW is predominately Completely Degraded or the areas have previously been cleared. To place the residual impacts in context, the EPA notes that about 336 ha of CCW occurs within BF 304 and up to 680 ha of vegetation associated with wetlands occurs within the Whiteman Park boundary.

The EPA notes the proponent has proposed to offset the loss of 2.4 ha of wetlands containing vegetation and fauna values (1.9 ha of CCW and 0.5 ha of REW) through the implementation of an on-ground management offset within Whiteman Park. The EPA has recommended condition 12-2 requiring the proponent to prepare and submit an On-ground Management Offset Plan to counterbalance the significant residual impact to 1.9 ha of CCW and 0.5 ha of REW considered to support vegetation and fauna values. The proponent will be required to identify an area or areas within Whiteman Park, or other suitable location, where on-ground management actions will be implemented (condition 12-3). This if further discussed in section 5 (Offsets).

Drinking water source protection areas

Based on the proponent's commitments, the EPA considers that potential impacts to groundwater quality in drinking water source protection areas are manageable subject to restrictions on certain types of activities during construction.

Management measures

Overall, the EPA considers that the potential impacts to Inland Waters from the construction and ongoing operation of the proposal can be managed provided:

- the proposal is designed and implemented to maintain the hydrological regime and water quality in Bennett Brook (condition 6-1(1))
- bridge footings or pillars, drainage structures and abutments are constructed outside of the bed and banks of Bennett Brook (condition 6-2(1))
- soil and groundwater disturbing activities are managed according to the Department of Water and Environmental Regulation (DWER) guidelines (condition 8-1(3))
- dewatered effluent is not disposed of or discharged to the Bennett Brook (condition 6-2(3)) or other CCW or REW (condition 8-1(4))
- abstraction bores are not located within 50 m of Banksia woodlands or CCW (condition 8-1(5))
- no refuelling, chemical storage or stockpiling occurs within 50 m of a CCW (condition 8-1(6))
- the proponent ensures there are no direct or indirect impacts to native vegetation or wetlands in the NVRA or directly adjacent to the development envelope from dewatering (condition 8-1(8))
- construction of the Malaga dive structure does not pose a risk to environmental values from dewatering or disturbance, excavation, treatment, re-use, and disposal of ASS through the preparation and implementation of an ASS and Dewatering Management Plan (condition 9).

The EPA notes that the proponent would be required to obtain a licence from DWER to abstract groundwater under the *Rights in Water and Irrigation Act 1914* for construction purposes.

Taking into account the proponent's proposed measures to manage impacts to Inland Waters, the small incremental loss of CCW and REW containing vegetation and fauna values, and the proponent's commitment to offset the significant residual impact to 2.4 ha of wetlands, the EPA considers that the proposal can be implemented to meet the EPA's objective for Inland Waters.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Inland Waters* (EPA 2018)

- the sensitive receptors dependant on groundwater and surface water regimes within and directly adjacent to the development envelope including, wetlands, Banksia woodlands and Bennett Brook
- potential impacts from dewatering, abstraction, and disturbance of ASS
- the direct impacts to 1.9 ha of CCW and 0.5 ha of REW containing vegetation and fauna values, in the context of remaining wetlands mapped in BF 304 and Whiteman Park
- the implementation of the NVRA to avoid areas of wetland vegetation
- the proponent's proposed suite of mitigation measures, including the re-injection of dewatered effluent to minimise impacts to nearby GDEs, commitment to incorporate water sensitive urban design principles in to the design of the stations and car parks, and commitment to the preparation and implementation of an ASS and dewatering management plan.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Inland Waters that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through the authorised extent in Schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- implementation of condition 6 to design and manage the implementation of the proposal to maintain the hydrological regime and water quality in Bennett Brook
- implementation of condition 8 to:
    - manage soil and groundwater disturbing activities in accordance with the ASS Guideline Series
    - not dispose of dewatered effluent to CCW or REW
    - not locate abstraction bores within 50 m of identified Banksia woodlands or CCW
    - ensure no refuelling, chemical storage or stockpiling occurs within 50 m of a CCW
    - ensure no direct or indirect impacts to native vegetation or wetlands within the NVRA or directly adjacent to the development envelope from dewatering activities
- implementation of condition 9 to ensure the proponent manages dewatering, excavation activities, and the treatment, re-use and disposal of ASS at the Malaga dive structure to maintain the quality and hydrological regime of groundwater that supports CCW, REW and Banksia woodlands PEC/TEC, through the preparation and implementation of an ASS and Dewatering Management Plan
- implementation of offsets (see section 5, condition 12) to counterbalance the significant residual impact to 1.9 ha of CCW and 0.5 ha of REW containing vegetation and fauna values.

4.4 Social Surroundings

The EPA's environmental objective for Social Surroundings is *to protect social surroundings from significant harm.*

Relevant Policy and Guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Social Surroundings* (EPA 2016e)

The considerations for environmental impact assessment for this factor are outlined in *Environmental Factor Guideline – Social Surroundings* (EPA 2016e).

In addition to the relevant guidance above, the EPA also had regard to the WAPC SPP 5.4 – *Road and Rail Noise* (SPP 5.4) (WAPC 2019) and the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations).

EPA Assessment

The EPA's assessment of Social Surroundings is based on Aboriginal Heritage and amenity (noise).

Aboriginal Heritage

The proposal is within the Whadjuk People Indigenous Land Use Area. The proponent has entered into a Noongar Standard Heritage Agreement with the South West Aboriginal Land and Sea Council (SWALSC), as representatives of the Whadjuk People. An Activity Notice was issued to the SWALSC in respect of the project area on 25 January 2019. The SWALSC presented the Activity Notice to the Whadjuk Working Party on 20 February 2020, advising the proponent that a heritage survey was to be undertaken.

A desktop Aboriginal Heritage Analysis of the proposed Morley to Ellenbrook Railway line (Appendix R of the ERD) has been undertaken and two consultative surveys have been provided in confidence as part of the response to submissions.

The EPA has considered the above surveys in the assessment of Aboriginal Heritage in addition to the considerations for environmental impact assessment outlined in the *Environmental Factor Guideline – Social Surroundings* (EPA 2016e).

Existing environment

Three Aboriginal Heritage registered sites could potentially be impacted by the proposal:

- Bennett Brook: in toto site number 3692 – mythological site. Extends about 7 km from Bennett Brook/Swan River confluence to Mussel Pool in Whiteman Park. It includes the brook and banks on either side. Bennet Brook was formed by the Waugal whose spiritual essence still exists there.

- Drumpellier Drive North 1 site number 551 – ceremonial and spiritual site. This site is a stand of paperbark and tea trees (ti-trees) and is an old initiation, meeting, and camping ground.
- Drumpellier Drive North 2 site number 552 – ceremonial, water source and mythological site. A permanent pool surrounded by reeds, grass trees and paperbark trees. Sacred fresh water source associated with Dugatch (Waugal) dreaming and was an important site in maintaining kangaroo populations in the area.

The ERD (figure 50) shows the intersection of the development envelope with the registered Aboriginal Heritage sites. The EPA notes Bennett Brook Camp Area site number 3840 is mapped on the public register as intersecting with the development envelope. However, the survey confirms it is outside the development envelope and will not be impacted by the proposal.

It is understood the Whadjuk people and other Perth Noongar people are culturally opposed to tunnelling under the major waterways in their traditional lands. The EPA notes the proponent has proposed a rail bridge over Bennett Brook.

Potential impacts

The EPA notes the construction, operation, and maintenance of a rail bridge across Bennett Brook will have direct and indirect impacts on the cultural, spiritual, and environment/physical elements of the Bennett Brook Aboriginal Heritage site.

The construction and design of the bridge, including location of the bridge footings outside of the bed and banks of Bennett Brook, is integral to not impacting the waterway and hydrological flow regime of Bennett Brook and minimising impact to the spiritual and cultural associations of the Aboriginal Heritage site.

The proponent has advised that the construction of the bridge will result in the permanent removal of paperbark trees and temporary removal of riparian vegetation. The EPA notes the survey participants expressed views about removal of the paperbark trees and construction access in the Bennett Brook.

A portion of Aboriginal Heritage site 552 will be directly impacted through clearing of vegetation where the railway alignment passes to the east of this site. The EPA notes disturbance between the existing foot path and Drumpellier Drive has been recommended by the survey participants to be minimised.

The new Lord Street/Drumpellier Drive has already disturbed Aboriginal Heritage site 551 and the proponent has advised the proposed rail works will be in the area of existing disturbance with no new direct impacts.

There is the potential for indirect impacts to all three registered Aboriginal Heritage sites from unauthorised access or change of access for cultural use, dust, increased fire risk, noise, and hydrological change.

Mitigation and management

The EPA notes the proponent has engaged in consultation with the Whadjuk Working Party Nominees and relevant Registered Knowledge Holders.

The proponent has confirmed the design for the rail bridge over Bennett Brook will not include bridge footings/piers within Bennett Brook and will not impede the natural flow of water. The proponent also proposes to revegetate areas of Bennett Brook cleared for the construction of the bridge as soon as possible after construction.

The proponent has committed to having Noongar monitors on site for all new ground disturbing activities during construction as requested by the Whadjuk Working Party Nominees and the Registered Knowledge Holders. If new artefacts are found, activities will cease and will be reported to the appropriate authorities.

The proponent will minimise indirect impacts through implementation of the CEMP which addresses potential impacts on Aboriginal Heritage sites during construction such as unauthorised access to a heritage site, dust, increased fire risk, noise, and hydrological change/drainage.

The proponent has committed to maintaining the current levels of access to the registered Aboriginal Heritage sites. The EPA notes however that access, including cultural and spiritual use of the site, may be impacted by the proposal once operational. The proponent has advised access to the Bennett Brook site will not be restricted once the railway is operational. Site 551 and 552 will be fenced with an access track located around the sites to prevent impacts to the sites, and the potential for ongoing use of these sites by the Whadjuk people will be facilitated as far as is reasonably practicable.

Assessment of impacts

The proponent has demonstrated the use of the mitigation hierarchy through proposing to utilise the existing disturbed area to avoid further impacts to site 551 and designing the rail bridge over Bennett Brook to minimise impacts to the spiritual and cultural associations with the brook. The EPA notes however the physical/environmental impacts of the proposal will be permanent.

The EPA considers the potential impacts to the important Aboriginal cultural associations and heritage values of the Bennett Brook: in toto Aboriginal Heritage site can be minimised provided:

- the bridge footings or pillars, drainage structures and abutments are constructed outside of the bed and banks of Bennett Brook
- no excavation activities occur within the bed of Bennett Brook
- there is no access for the purposes of construction activities within the bed of Bennett Brook, with the exception of tree removal necessary for the bridge construction, as recommended in condition 6.

The EPA has also recommended condition 7-2 which requires the proponent to consult with the appropriate and relevant Whadjuk Noongar representatives and

Knowledge Holder families of Bennett Brook prior to, and during construction of the Bennett Brook rail bridge regarding the retention of paperbark trees.

The EPA considers that access and ongoing spiritual and cultural use of Aboriginal Heritage sites 551 and 552 may be impacted by the proposal. The EPA has recommended condition 7-1 requiring the proponent to consult with the Whadjuk Noongar representatives regarding the manner in which access will be maintained to sites 551 and 552.

The EPA notes that the proponent is aware of their obligations under the *Aboriginal Heritage Act* 1972 and section 18 clearances will be lodged for any disturbances to Aboriginal Heritage sites.

Amenity – Noise

Noise emissions have the potential to unreasonably interfere with the welfare, convenience, and comfort of people. The proposal has the potential to impact nearby noise-sensitive premises and land uses during both construction and operation through construction generated noise and vibrations and the movement and operation of passenger trains. Noise-sensitive premises are those occupied for residential or accommodation purposes and are defined in the Noise Regulations.

Construction noise

Noise impacts from construction activities for the rail line and stations and its impact on noise-sensitive premises are managed under Regulation 13 (Construction sites) of the Noise Regulations. This regulation specifies that any construction noise made between 7am and 7pm Monday to Saturday (excluding public holidays) is exempt from assigned noise limits in the Noise Regulations, provided the works are being carried out in accordance with the *Australian Standard (AS) 2436:2010 Guide to noise and vibration control on construction, demolition and maintenance sites*.

Operational noise

The proponent undertook noise and vibration modelling to assess impacts of the operation of the proposed railway and road realignments. Further information is provided in the Noise and Vibration Assessment Report – Malaga to Ellenbrook (Appendix S of the ERD) (PTA 2020a).

The assessment of noise and vibration from the proposal has been based on forecast ‘ultimate’ transport operations for the year 2041, which is indicative of 20 years after completion of the proposal. The assessment considers the noise and vibration from future passenger rail services, road upgrades, bus loops and car parking associated with the new stations proposed at Malaga, Whiteman Park and Ellenbrook.

In addition to the SPP 5.4 noise targets, as part of a review of best practice, the proponent has also considered rail noise targets from other railway noise guidelines in use within Australia, in particular the New South Wales EPA Rail Infrastructure Noise Guideline (NSW RING).

In terms of operational impacts, it is noted the Noise Regulations do not apply to operational train noise. The proponent has adopted the noise level objectives for airborne noise as outlined in SPP 5.4 and industry best practice as follows:

- daytime noise level of 55 decibels (dB) L_{Aeq}
- night-time noise level of 50 dB L_{Aeq}
- maximum pass-by noise level of 80 dB L_{Amax} (NSW RING).

For ground-borne noise (GBN) and ground-borne vibration (GBV) the EPA notes that the proponent has adopted industry best practice objectives.

The GBN and GBV objectives for the proposal are as follows:

- residential GBV – 'Curve 2' ($L_{v, RMS,1s}$ 106 dB)
- residential GBN – L_{Amax} 35 dB
- non- residential GBV – 'Curve 4' and 'Curve 8' ($L_{v, RMS,1s}$ 112 to 118 dB)
- non-residential GBN – L_{Amax} 45 to 50 dB.

The DWER has advised that it considers the above noise and vibration objectives to be appropriate for the assessment of the proposal.

Existing environment

Much of the proposal will be constructed at grade, with portions of elevation, cut and cover and underpasses in locations where the railway is required to cross existing roads, infrastructure, and water courses. Aside from the Malaga dive structure there are limited areas where excavation below existing ground level is required.

Much of the railway is in a recreational area (Whiteman Park) and aligned parallel to Drumpellier Drive (on the eastern side of the railway). Noise sensitive receptors were identified by the proponent at the following locations:

- Malaga station – residential dwellings west of Malaga station on the western side of Tonkin Highway. Residential, commercial, and light industrial south of Malaga station and residential south of Marshall Road in Bennett Springs.
- Bennett Springs East station – residential dwellings on larger landholdings surrounding the proposed future station. Residential dwellings on the eastern side of Drumpellier Drive in Dayton, east of the alignment.
- Whiteman Park station to Gnangara Road – recreational users in Whiteman Park to the west of the railway alignment. Current and future residential dwellings on the eastern side of Drumpellier Drive in and around Brabham.
- Gnangara Road to Ellenbrook station – residential dwellings east of Drumpellier Drive and on both sides of the railway through to Ellenbrook.

The EPA notes there is existing noise generated by the surrounding roads including Tonkin Highway, Marshall Road and Drumpellier Drive that has some impact on the surrounding environment including existing residential development.

Potential impacts

Construction noise

The proponent considers the construction noise and vibration impacts to be temporary in nature and can be managed appropriately through compliance with the Noise Regulations and the preparation and implementation of a CEMP and Noise and Vibration Management Plan (NVMP).

Operational noise

The noise and vibration assessment report indicates that the preliminary assessment undertaken for the airborne noise from stations, bus loops and car parking areas are within the day and night-time noise level objectives.

The modelling within the noise and vibration assessment report for the railway line indicates that without noise mitigation, the airborne noise level objective would be exceeded in the year 2041 in the suburbs of Bennett Springs, Brabham and Ellenbrook as follows:

- 61 residences are forecast to be above the daytime noise target by 11 dB
- 89 residences are forecast to be above the maximum pass-by noise level by 16 dB
- 70 residences are forecast to be above the night-time noise target by 12 dB.

The vibration modelling indicates that without mitigation the GBN and GBV objectives would be exceeded at several sensitive receptors in the suburbs of Brabham and Ellenbrook as follows:

- 48 residences are forecast to exceed the GBV target by up to 11 dB
- 114 residences are forecast to exceed the GBN target by up to 15 dB.

Recreational users and noise

The proponent considers that train pass-bys would be a potential source of rail noise alongside the proposal alignment within Whiteman Park. However, the predicted level of noise and transient nature of the pass-by events are not expected to adversely impact the acoustic amenity or recreational users of Whiteman Park. Furthermore, recreational use is not defined as a noise sensitive land-use under SPP 5.4 as it is not predominantly for occupation or residential use.

The DWER has advised that it considers the above noise and vibration methodology and predictions to be acceptable and reliable.

Mitigation and management

Construction

The proponent has committed to restricting construction of the proposal to the standard construction hours as prescribed in the Noise Regulations unless an Out of Hours Noise Management Plan has been prepared and approved by the relevant local government authority (City of Swan).

The proponent will implement noise and vibration controls in accordance with *AS 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites*.

The proponent will also implement a CEMP which includes management measures for construction noise such as monitoring of noise and vibration and a complaints register to compliment the requirements under the Noise Regulations and AS.

The EPA considers that, with appropriate management and mitigation measures, construction noise and vibration impacts are expected to be manageable.

Operation

The EPA notes final mitigation measures are to be confirmed when detailed design of the rail and road design and train operating plan are finalised.

With the implementation of noise mitigation, modelling predicts a significant reduction in airborne noise levels to sensitive receptors by 10 to 13 dB, with the noise level objective being exceeded by 1 to 3 dB at a reduced number of receptors.

Modelling predicts with the use of under ballast matting or sleeper pads the number of sensitive receptors that may be impacted by GBN and GBV is reduced significantly to 16 residences and the noise objective levels dropped by 10 dB. The EPA notes with the use of mitigation, non-residential areas are within the GBN and GBV objective levels.

The proponent commits to achieving the adopted transport noise and vibration objectives as far as is reasonable and practicable to do so via the use of various engineering controls. Location of the indicative mitigation proposed is shown in the ERD. The likely mitigation measures include:

- noise walls at the boundary of the rail lines
- optimisation of the design to minimise risk for aspects such as curving noise
- under ballast matting for the control of GBN and GBV
- rail track maintenance and regular inspection of condition.

A NVMP has been prepared for the rail operations servicing the new Malaga, Whiteman Park and Ellenbrook stations and the bus loops, road vehicles and car parking associated with the stations. The NVMP is to be reviewed and finalised by the proponent once detailed design and final mitigation measures are confirmed. The NVMP also includes monitoring methodologies which will be undertaken in accordance with SPP 5.4 and AS.

The EPA notes the proponent proposes to consult with the local residences and the City of Swan to identify the most appropriate noise mitigating measures taking into consideration effectiveness, local preferences, visual amenity, safety, maintainability, and cost.

The DWER has advised that the proposed extent and design of the preliminary noise and vibration mitigation measures seem appropriate, noting final design and extent of the noise and vibration mitigation measures depend on a detailed noise and vibration assessment, which will be conducted when the final design of the project and detailed information for the project area becomes available.

Assessment of impacts

The EPA notes that following detailed design of the proposal, the proponent will need to undertake further modelling of airborne noise, GBN and GBV. The most appropriate mitigation measures to meet the specified objectives can then be determined.

The EPA notes that the range and combination of measures available to the proponent (such as noise walls, sound absorptive panels, rail web dampers and under ballast matting) are technically feasible and have been shown to be effective on previous rail infrastructure projects.

The proponent has advised they will consult with local residences and the City of Swan when finalising the noise and vibration mitigation measures.

The EPA approved a change to the proposal during the assessment to allow for the rail to pass over Gnangara Road rather than a road over rail bridge. The EPA notes that any potential changes in train noise emissions from the higher elevation can be managed and mitigated using typical and feasible noise mitigation measures. These measures will need to be included in an updated NVMP.

Given the detailed design of the proposal, and hence the locations and heights of noise walls and other potential mitigation measures, are yet to be determined, the EPA has recommended condition 11, which will require the NVMP to be revised prior to operations commencing. The proponent is to update section 5 of the NVMP and include the details of relevant noise mitigation measures (i.e. noise walls and under ballast matting) to confirm that the noise and vibration objectives as set out in section 2 of the NVMP will be met.

The EPA considers that the impacts from noise on the amenity of the surrounding area and existing noise sensitive receptors are manageable and would not be significant, provided the proponent updates its NVMP with details of the mitigation measures once detailed design is available.

Summary

The EPA has paid particular attention to:

- *Environmental Factor Guideline – Social Surroundings* (EPA 2016e)
- results of heritage surveys and consultation to date with the Whadjuk people
- the proponent's commitment to construct a bridge over Bennett Brook to avoid and minimise impacts to Aboriginal Heritage and cultural values
- *SPP 5.4 – Road and rail noise* predicted noise impacts to sensitive noise receptors (WAPC 2019)

- the ability of noise mitigation measures to significantly reduce predicted noise levels to sensitive receptors
- the proponent's commitment to consult with local residences and the City of Swan to identify the most appropriate noise mitigating measures during final and detailed design.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Social Surroundings that the impacts to this factor are manageable and would no longer be significant, providing the proponent:

- implements conditions 6-1 and 6-2 which requires the hydrological regime and water quality in Bennett Brook to be maintained to support important Aboriginal cultural associations and heritage, through the implementation of a number of design and construction measures
- continues to consult with the Whadjuk Noongar representatives about the manner in which access for cultural use of Aboriginal Heritage sites 551 and 552 will be maintained as recommended in condition 7-1
- continues to consult with the Whadjuk Noongar representatives and Knowledge Holder families of Bennett Brook prior to and during construction of the Bennett Brook rail bridge regarding the retention of paperbark trees as recommended in condition 7-2
- updates its NVMP with details of the mitigation measures once final and detailed design is available and submit the plan for approval prior to the operation of the proposal, as set out in recommended condition 11.

5. Offsets

Relevant Policy and Guidance

The EPA considers that the following policy and guidance is relevant to its assessment of offsets for the proposal:

- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines* (Government of Western Australia 2014)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA 2020a).

EPA Assessment

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal. The EPA may apply environmental offsets where it determines that the residual impacts of a proposal are significant, after avoidance, minimisation and rehabilitation have been pursued.

Consistent with principle 1 of the *WA Environmental Offsets Policy* the proponent has applied the mitigation hierarchy by identifying measures to avoid and minimise environmental impacts. The proponent has also committed to rehabilitating areas of riparian vegetation disturbed during construction, and not required for operation, with suitable native species.

Mitigation measures are assessed under the relevant key environmental factor (see section 4). In applying the residual impact significance model (Government of Western Australia 2014), the EPA considers that the proposal would have a significant residual impact from the loss of:

- 10.05 ha Banksia woodlands of the Swan Coastal Plain PEC
- 81.4 ha Carnaby's cockatoo foraging habitat
- 68.1 ha forest red-tailed black cockatoo foraging habitat
- 423 black cockatoo potential breeding trees
- 1.9 ha of CCW
- 0.5 ha of REW considered to support vegetation and fauna values
- 17.2 ha of regionally significant vegetation within BF 304.

In noting the above significant residual impacts, the EPA has considered principle 2 (environmental offsets are not appropriate for all projects) of the *WA Environmental Offsets Policy* and has determined that offsets are appropriate and applicable for this proposal.

The proponent has prepared a draft Offset Strategy as part of the ERD (PTA 2020a) and an Offset Paper with consideration for on-ground management offsets (PTA 2020b). In considering the offsets proposed, the EPA notes the proponent has had

regard for principles 3 (relevant and proportionate) and 4 (based on sound environmental information). The proponent has used the *Commonwealth's Offset Assessment Guide* (Commonwealth of Australia 2012), the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014) and SPP 2.8 to calculate the offset quantum for the above environmental values. The proponent has identified direct land acquisition sites that contain the impacted environmental values and has included options for on-ground revegetation and management of wetland vegetation adjacent to the impact area at Whiteman Park.

Consistent with the approach used in other assessments, the EPA considers the use of the *Commonwealth's Offset Assessment Guide* (Commonwealth of Australia 2012) appropriate for offsetting the significant residual impacts to the Banksia woodlands PEC/TEC and the Carnaby's cockatoo and forest red-tailed black cockatoo foraging habitat. The proponent has proposed a three-to-one (3:1) ratio for offsetting the significant residual impact to the black cockatoo potential breeding trees which equates to 1,269 potential breeding trees. The EPA considers this appropriate for this proposal.

The proponent is proposing a ratio of three to one (3:1) to offset the significant residual impacts to the CCW and REW. The EPA considers this ratio is appropriate for the proposal. The EPA notes the proponent proposed a two-to-one (2:1) ratio for BF 304 offsets within the draft Offset Strategy. The EPA considers that the vegetation has a very high conservation significance and thus any offset requirement should provide a net gain of at least two-to-one (2:1) of like-for-like vegetation to counterbalance the significant residual impacts to regionally significant vegetation within BF 304.

The EPA notes the proponent has had regard for principle 5 (adaptive management) as contingency measures have been identified for each of the proposed direct and indirect offsets. The proponent proposes offsets to address the significant residual impacts, which comprise land acquisition, on-ground management actions and research. These are discussed further below.

On-ground management at Whiteman Park

The proponent has proposed an alternative to direct land acquisition for the significant residual impacts to the CCW, REW and BF 304 which was included with their Response to Submissions Report (PTA 2020b). The proponent has initiated discussion with the relevant stakeholders, the DBCA, Friends of Bennett Brook and the Department of Planning, Lands and Heritage (DPLH), to consider on-ground offsets within Whiteman Park, which is a Bush Forever site. This would likely include providing funding to a management body to undertake management actions such as weed control and plantings to improve the quality of vegetation, increase habitat, prevent erosion and enhance the ecological corridor from Whiteman Park to the Swan River. The management actions will be undertaken along Bennett Brook or at other wetlands such as Horse Swamp within 2 km of the impact site.

The Friends of Bennett Brook have undertaken works in the area and restored parts of Bennett Brook from Marshall Road to Clarry Small Park since 1998 and works closely with Whiteman Park's environmental team at DPLH. The EPA therefore

notes that restoration and rehabilitation work in the local area has been shown to be realistic, achievable, and feasible.

Direct offsets are actions designed to provide for on-ground improvement, rehabilitation and conservation of habitat and can include restoration, revegetation, and rehabilitation of natural areas outside the proposal area (Government of Western Australia 2011). The EPA considers on-ground management at Whiteman Park, or other suitable location, should be relevant and proportional to the level of impact and significance of the environmental values being impacted as it provides for a local benefit for the community and reduces the impact to the local loss of wetlands, BF 304 and habitat for the local populations of fauna (principle 3 of the *WA Environmental Offsets Policy*). Further, on-ground management is generally enduring and enforceable which is consistent with principle 6 (long-term strategic outcomes).

The EPA considers that on-ground management is an appropriate offset provided that any on-ground management includes improvement works, such as revegetation and weed control, to contribute to a net environmental benefit and an improvement in the environmental values of specific areas in BF 304, or other suitable area.

To ensure a relevant and net environmental benefit is achieved, the EPA has recommended condition 12-2 which requires the proponent to prepare and submit an On-ground Management Offset Plan with the environmental objective of counterbalancing the significant residual impacts to:

- 1.9 ha of CCW
- 0.5 ha of REW
- 17.2 ha of regionally significant vegetation within BF 304.

Condition 12-3(4) requires the plan to be prepared in consultation with stakeholders including the DBCA, the DPLH and Friends of Bennett Brook.

Land acquisition

Lowlands site

The proponent has proposed direct land acquisition and management of a portion of the Lowlands site to counterbalance the significant residual impacts to the Banksia woodlands PEC/TEC, the black cockatoo habitat and breeding trees.

The Lowlands site is 1,138 ha and was in private ownership until the WAPC acquired the site in 2014 as an advanced offset. The site has been allocated by the State government to the PTA to offset METRONET proposals. The EPA notes the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014) has provisions to provide for early offsets.

Lowlands is within BF 368 and was reserved for Parks and Recreation in the MRS in February 2020. The site is currently under the management of the DBCA as a Class A reserve for the management of flora and fauna.

The proponent has undertaken an environmental values assessment of the site, as part of the draft offset strategy, to identify the key environmental values of the site. However, neither a detailed flora and vegetation or fauna survey have been undertaken. The proponent advises the Lowlands site contains:

- Banksia woodlands PEC/TEC
- Carnaby's cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo foraging habitat
- 8,096 potential black cockatoo breeding trees (extrapolated)
- CCW and REW

The EPA notes the 8,096 potential breeding trees has been extrapolated from an average of 7.2 trees per hectare and may not accurately represent the number of potential breeding trees at the Lowlands site. The EPA also notes the Lowlands site has been proposed to offset other METRONET proposals, namely the Thornlie-Cockburn Link proposal.

The EPA notes the proponent's intent of the Lowlands land acquisition offset site is to provide funding to the DBCA to manage the site for conservation for seven years over and above the management the DBCA would provide as current land manager. A Memorandum of Understanding would be entered into between the proponent and the DBCA. The EPA notes the proponent's intended management actions as shown in the draft Offset Strategy are consistent with principles 3 (relevant and proportionate) and 4 (based on sound environmental information) and principle 6 (long-term strategic outcomes) as the site is proposed to be managed for conservation purposes.

To ensure all the significant residual impacts of the environmental values are offset, the EPA recommends condition 12-8 which requires the proponent to prepare and submit an Offset Strategy with the environmental objective of counterbalancing the significant residual impacts to:

- 10.05 ha of Banksia woodlands of the Swan Coastal Plan PEC
- 81.4 ha of Carnaby's cockatoo foraging habitat
- 68.1 ha of forest red-tailed black cockatoo foraging habitat
- 423 black cockatoo potential breeding trees.

Condition 12-9(4) requires that the Offset Strategy demonstrate that the proposed offset site contains at least 1,269 black cockatoo breeding trees or potential breeding trees.

Keysbrook site

The proponent proposed direct land acquisition and management of a portion of the Keysbrook site as an option to counterbalance the significant residual impacts to CCW, REW and BF 304 in the draft Offset Strategy.

The EPA notes much of the site is in Degraded to Completely Degraded condition due to the previous land use of cattle grazing. However, the site holds some environmental value being BF 77 and contains multiple CCW and REW.

The EPA's preference is on-ground management at Whiteman Park, or other suitable location, to offset the significant residual impact to CCW, REW and BF 304 which is discussed above and recommended in condition 12-3.

Black cockatoo research proposal funding

The proponent is proposing to provide funding to indirectly offset the significant residual impacts to the black cockatoo foraging habitat to Murdoch University for the Black Cockatoo Murdoch research proposal.

The funding for research is in addition to the land acquisition component. The EPA notes that the *Commonwealth's Offset Assessment Guide* (Commonwealth of Australia 2012) limits the proportion that compensatory mechanisms (which includes research) can be used to a maximum of 10 per cent of the total offset requirement. Under the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), a research project must demonstrate it is reasonably related to the impact and that research projects undertaken should provide information that would improve the environmental assessment of future projects and focus on achieving an outcome rather than providing a certain amount of money.

The proponent advises Murdoch's research proposal aims to utilise innovative tracking methodologies to undertake a movement ecology study of Western Australia's three threatened black cockatoo species, to determine habitat use and threatening processes in modified landscapes. This includes tracking the three species of black cockatoos on the Perth-Peel Coastal Plain and tracking Carnaby's cockatoos at key breeding sites to better understand movement dynamics of this species across its distribution range. The EPA notes the main outcome of the offset is for the State to obtain data and deliverables which contribute to the identification of critical habitat, areas under threat and areas for potential future offsets. Further information on Murdoch's research proposal is in the proponent's ERD.

The EPA's Technical Report for *Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region* (EPA 2019) acknowledges that a large amount of research has been conducted for this species but there remains significant knowledge gaps in relation to the ecology of the species and likely impacts of threatening processes. The technical guide also provides a list of the key knowledge gaps and research being undertaken or needed.

In considering the six principles of the *WA Environmental Offsets Policy*, the EPA has recommended condition 12-11 which requires the proponent to prepare and submit a black cockatoo research plan where research project(s) are proposed to offset the significant residual impacts to foraging habitat for Carnaby's cockatoo and forest red-tailed black cockatoos. This research plan is to aim to increase the scientific knowledge of black cockatoos relevant to improving the conservation and management of the species and its habitat in the Perth and Peel regions.

Summary

The EPA recommends that an offset (condition 12) is imposed to counterbalance the significant residual impacts of the proposal. The EPA recommends that an On-ground Management Offset Plan is prepared and submitted to counterbalance the significant residual impacts to the CCW and REW and BF 304. The On-ground Management Offset Plan is to identify an area within Whiteman Park, or other suitable location, where on-ground management actions will be implemented.

In addition, the EPA recommends an Offset Strategy, that may include a black cockatoo research plan, be prepared and submitted to counterbalance the significant residual impacts to the Banksia woodlands of the Swan Coastal Plain PEC and the Carnaby's cockatoo and forest red-tailed black cockatoo foraging habitat and potential breeding trees.

6. Matters of National Environmental Significance

The Commonwealth Minister for the Environment has determined that the proposal is a controlled action under the EPBC Act as it is likely to have a significant impact on one or more MNES. It was determined that the proposed action is likely to have a significant impact on the following matter protected by the EPBC Act:

- Listed threatened species and communities (s. 18 and s. 18A).

The EPA has assessed the controlled action on behalf of the Commonwealth as an accredited assessment under the EPBC Act.

This assessment report is provided to the Commonwealth Minister for Environment who will decide whether to approve the proposal under the EPBC Act. This is separate from any Western Australian approval that may be required.

Commonwealth Policy and Guidance

The EPA had regard to the following relevant Commonwealth guidelines, policies and plans during its assessment:

- *Commonwealth EPBC Act Environmental Offsets Policy* (Commonwealth of Australia 2012)
- *Approved conservation advice (incorporating listing advice) for the Banksia woodlands of the Swan Coastal Plain Ecological Community* (TSSC 2016)
- *Carnaby's cockatoo (Calyptorhynchus latirostris) recovery plan* (DPAW 2013)
- *Forest black cockatoo (Baudin's cockatoo Calyptorhynchus baudinii and forest red-tailed black cockatoo Calyptorhynchus banksii naso) recovery plan* (DEC 2008)
- *Approved conservation advice for Calyptorhynchus banksii naso (forest red-tailed black cockatoo)* (TSSC 2009)
- *Conservation advice Calyptorhynchus baudinii Baudin's cockatoo* (TSSC 2018c)
- *Conservation Advice Galaxiella nigrostriata black-stripe minnow* (TSSC 2018b)
- *Conservation advice Westralunio carteri Carter's freshwater mussel* (TSSC 2018a)
- *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi* (Commonwealth of Australia 2014).

EPA Assessment

The EPA notes that the proponent has given attention in the ERD to the intent of Commonwealth policy, guidelines and plans considered to be relevant for this matter. Impacts on the environment relevant to Banksia woodlands of the Swan Coastal Plain, black cockatoos, Carter's freshwater mussel and black-stripe minnow

are assessed under the key environmental factors of Flora and Vegetation and Terrestrial Fauna.

The EPA notes the following matters in relation to MNES not addressed under the key environmental factors.

Banksia Woodlands of the Swan Coastal Plain TEC

The Banksia woodlands TEC has been inferred to occur throughout the survey area, with five patches covering a total of 59.42 ha. Much of the extent of the Banksia woodlands TEC surveyed and mapped does not occur within the development envelope. The EPA notes that about 11,370 ha of the Banksia woodlands TEC was estimated to occur within the City of Swan local government area in 2015 (TSSC 2016). The EPA further notes that extensive areas have been developed for residential housing since 2015.

About 17 ha of the Banksia woodlands TEC occurs within the development envelope, of which 10.05 ha is within the disturbance footprint, the majority (8.54 ha) associated with the Malaga Patch. The relatively small (1.51 ha) extent of the Gnangara Patch that will be impacted by the proposal will not result in further fragmentation of the community or result in any occurrence becoming isolated. However, clearing would result in the loss of buffer areas that may lead to indirect impacts and degradation of the larger occurrence of Banksia woodlands TEC in this location. The EPA has therefore recommended that the loss of this area be offset (condition 12).

Clearing of the 8.54 ha of the Malaga Patch will result in further fragmentation of the community and will result in two isolated patches. The EPA has recommended that the loss of this extent of the Banksia woodland TEC also be offset.

The EPA notes the conservation advice in relation to buffers that help protect and manage occurrences of the Banksia woodland TEC (TSSC 2016). The presence of a buffer zone is intended to act as a barrier to further disturbance. Buffers are not considered part of the ecological community and are not formally protected. The EPA notes that areas of vegetation exist that are contiguous with the Malaga Patch that are not considered representative of the Banksia woodlands TEC and that these buffers will be directly impacted by the proposal through clearing. The EPA further notes that clearing of these buffers may result in indirect impacts and a loss of ecological integrity of the Malaga Patch NVRA and the area of Banksia woodland directly adjacent to the development envelope in the vicinity of the proposed Malaga station.

The EPA has not recommended an offset to counterbalance the loss of the buffers that are contiguous to the Banksia woodland TEC but do not contain the ecological community. The EPA does however acknowledge the importance of the buffer areas for the protection and management of occurrences. The EPA has therefore recommended conditions to ensure that there are no direct or indirect impacts to areas of Banksia woodland TEC within NVRA or adjacent the development envelope (section 4.1).

The Commonwealth has advised that an offset may be required to counterbalance the loss of buffer areas. The Commonwealth has further advised that the conservation advice states that the area critical to the survival of the ecological community includes all areas that meet the diagnostic characteristics and condition thresholds, plus the buffer zones (TSSC 2016).

Listed threatened black cockatoos

Three listed threatened black cockatoos were recorded or identified as being likely to occur within the development envelope:

- Carnaby's cockatoo (*Calyptorhynchus latirostris*) (Endangered)
- forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable)
- Baudin's cockatoo (*Calyptorhynchus baudinii*) (Endangered).

Impacts to Carnaby's cockatoo and forest red-tailed black cockatoo are addressed under the key environmental factor of Terrestrial Fauna (section 4.2).

The EPA notes that the proposal is at the northern extent of the range of Baudin's cockatoo. In its Response to Submissions Report (PTA 2020b), the proponent noted that there were no sightings or direct evidence of foraging by Baudin's cockatoo during recent surveys and there are no known records of the species foraging within the development envelope. Further, the proponent considered that whilst there are only a few known records of Baudin's cockatoo occurring in proximity to the development envelope, there is some evidence that the species has been observed more frequently in and around Whiteman Park since 2018.

The proponent considered it likely that the species may occur, forage and occasionally roost in the general area based on anecdotal evidence. The proponent considered that the foraging habitat quality within the development envelope for Baudin's cockatoo was moderate and below moderate and regional foraging habitat within 10 km of the proposal is likely to offer lower value habitat for the species than the Jarrah forest areas to the east.

The EPA has considered the potential direct and indirect impacts on the Baudin's cockatoo from the proposal. The EPA notes that despite the moderate value of the potential Baudin's cockatoo foraging habitat in the area and the proposal being at the northern extent of the modelled distribution of the species, the proponent has proposed to offset the loss of 81.4 ha. Based on the information provided, the EPA has not recommended a condition to offset the loss of Baudin's cockatoo potential foraging habitat.

Other listed matters

The EPA notes there may be impacts to Carter's freshwater mussel from the construction of the proposed Bennett Brook rail bridge. The species is known to live in freshwater with greatest densities found under overhanging riparian vegetation near stream banks. The EPA has assessed the potential indirect impacts to Carter's freshwater mussel (section 4.2) and has recommended condition 6-1 to ensure that the proposal is designed and implemented to maintain the hydrological regime and water quality in Bennett Brook to support Carter's freshwater mussel.

The EPA notes that targeted surveys in areas of suitable habitat did not locate any black-stripe minnow within or adjacent to the development envelope. The EPA considers that the proposal will not significantly impact on the black-stripe minnow, as the species is considered unlikely to occur in the development envelope. The EPA has therefore not recommended any conditions regarding the management of impacts to the black-stripe minnow.

Summary

The EPA recommends the following environmental conditions to minimise impacts on MNES:

- limit the location and authorised extent of the clearing of vegetation to 152.1 ha in Table 2 of Schedule 1
- condition 6 which requires the proponent to design and manage implementation of the proposal to maintain the hydrological regime and water quality in Bennett Brook that supports Carter's freshwater mussel
- condition 8 to ensure there are no direct or indirect impacts to native vegetation in NVRA or adjacent to the development envelope from dieback, ASS, weeds or dewatering during construction or that are attributable to the proposal within five years of construction
- condition 9 which requires the proponent to manage dewatering, excavation activities, and the treatment, re-use and disposal of ASS at the Malaga dive structure to maintain the quality and hydrological regime of groundwater that supports the biological diversity and ecological integrity of Banksia woodlands of the Swan Coastal Plain through further investigations and the preparation and implementation of an ASS and dewatering management plan
- condition 10 which ensures the proponent survey potential black cockatoo breeding trees prior to clearing and avoids clearing within 10 m of any tree being used for nesting.

The EPA considers that there will be a significant residual impact from the clearing of 10.05 ha of Banksia woodland TEC, 81.4 ha of Carnaby's cockatoo foraging habitat, 68.1 ha of forest red-tailed black cockatoo foraging habitat, and 423 potential black cockatoo breeding trees. The EPA has recommended an offset in condition 12 (see section 5) which takes into account the significant residual impacts described above.

The EPA's view is that the impacts from the proposal on the above-listed MNES are therefore not expected to result in an unacceptable or unsustainable impact on the listed Threatened species and communities.

7. Conclusion

The EPA has considered the proponent's proposal to construct and operate the Malaga to Ellenbrook Rail Works.

Application of the Mitigation Hierarchy

Consistent with relevant policies and guidance, the proponent has addressed the mitigation hierarchy by identifying measures to avoid, minimise and rehabilitate environmental impacts including:

- refining the development envelope and disturbance footprint via s. 43A of the EP Act to avoid where possible direct impacts to Aboriginal Heritage sites, significant ecological communities, significant fauna habitat and inland waters
- aligning the railway in predominately highly disturbed areas to minimise habitat fragmentation and indirect impacts
- implementing NVRA within the development envelope to retain areas of native vegetation, minimise the extent of native vegetation clearing and avoid clearing 201 black cockatoo potential breeding trees
- avoiding construction of bridge footings, drainage structures and abutments within the Bennett Brook
- re-injecting dewatered effluent to minimise impacts of dewatering on native vegetation and wetlands
- revegetating areas not required for ongoing operation of the proposal, including within the riparian zone of Bennett Brook
- implementing hygiene measures to minimise impacts to adjacent vegetation from weeds and dieback
- preparing and implementing an ASS and Dewatering Management Plan
- adopting water sensitive urban design principles
- revising the Noise and Vibration Management Plan following a detailed noise and vibration assessment based on the final design of the proposal.

Offsets

The EPA considers the proposal would have a significant residual impact from:

- clearing of 10.05 ha of Banksia woodlands of the Swan Coastal Plain PEC
- clearing of up to 81.4 ha of foraging habitat for Carnaby's cockatoo, 68.1 ha of foraging habitat for forest red-tailed black cockatoo and 423 black cockatoo potential breeding trees
- clearing of 1.9 ha of CCW and 0.5 ha of REW that supports vegetation and fauna values
- clearing of 17.2 ha of regionally significant vegetation within BF 304.

The EPA has recommended conditions for an On-ground Management Offset Plan and an Offset Strategy incorporating a research plan. The Plan and Strategy are to demonstrate that the offsets adequately counterbalance the significant residual impacts.

Conclusion

The EPA has taken the following into account in its assessment of the proposal as a whole:

- impacts to all the key environmental factors
- EPA's confidence in the proponent's proposed mitigation measures
- relevant EP Act principles and the EPA's objectives for the key environmental factors of Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings
- EPA's view that the impacts to the key environmental factors are manageable, provided the recommended conditions are imposed.

Given the above, the EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix 4.

8. Recommendations

The EPA recommends that the Minister for Environment notes:

1. The proposal assessed is for the construction and operation of the Malaga to Ellenbrook Rail Works.
2. The key environmental factors identified by the EPA in the course of its assessment are Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings, set out in section 4 of this report.
3. The EPA has recommended that the proposal may be implemented, provided that implementation is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addressed in the conditions include:
    a. maintaining the hydrological regime and water quality in Bennett Brook that supports Aboriginal cultural associations and heritage, Carter's freshwater mussel and the ecological integrity of Bennett Brook (condition 6)
    b. maintaining access to Registered Aboriginal Heritage sites and consulting with Whadjuk Noongar representatives and relevant Registered Knowledge Holder families prior to and during construction of the Bennett Brook rail bridge (condition 7)
    c. implementing measures to avoid direct and indirect impacts to native vegetation, significant fauna and wetlands retained within native vegetation retention areas or directly adjacent to the development envelope during and following construction (condition 8)
    d. preparing and implementing an acid sulfate soils and dewatering management plan to maintain the quality and hydrological regime of groundwater that supports Banksia woodlands of the Swan Coastal Plain and wetlands (condition 9)
    e. implementing measures to ensure no impacts to nesting black cockatoos during clearing and to minimise impacts to terrestrial fauna during construction (condition 10)
    f. minimising operational noise and vibration impacts on existing noise sensitive receptors (condition 11)
    g. implementing offsets to counterbalance impacts to Banksia woodlands of the Swan Coastal Plain ecological community, habitat for Carnaby's cockatoo and forest red-tailed black cockatoo, wetlands, and Bush Forever site 304 (condition 12).

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Appendix 1: List of Submitters

Organisations

Department of Planning, Lands and Heritage
Department of Biodiversity, Conservation and Attractions
Department of Water and Environmental Regulation
Friends of Bennett Brook

Individuals

Sue Cray

Appendix 2: Consideration of Environmental Protection Act principles

EP Act Principle	Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by –* *a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* *b) an assessment of the risk-weighted consequences of various options.*	In considering this principle, the EPA notes the proposal could significantly impact Flora and Vegetation, Terrestrial Fauna, Inland Waters, and Social Surroundings. The assessment of these impacts is provided in this report. Investigations into the biological and physical environment undertaken by the proponent have provided sufficient scientific certainty to assess the risk and identify measures to avoid and minimise the impacts. The EPA notes the proponent's modifications and reduction in the development envelope and footprint to minimise environmental impacts. The proponent has aligned the proposal adjacent to existing linear road infrastructure to minimise habitat fragmentation and edge effects and the alignment is mainly located in cleared areas in Marshall Paddocks outside the core conservation area of Whiteman Park utilising the urban deferred zoned land for Malaga station. The EPA notes the mostly at grade construction of the railway minimises the need for dewatering and clearing and the Malaga dive structure has been designed to minimise dewatering and impacts to the groundwater dependant ecosystems. and Banksia woodlands PEC/TEC. A bridge over Bennett Brook is proposed to avoid impacting the hydrological regime and ecological linkage of Bennet Brook and to minimise impacts to the Aboriginal Heritage site. The proposal incorporates native vegetation retention areas to minimise impacts to vegetation and fauna habitats within the development envelope. The EPA has recommended conditions to ensure risks are minimised or avoided where possible and that the proponent undertakes relevant measures to manage residual impacts. From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm.

EP Act Principle	Consideration
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on the environmental factors of Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings. The assessment of these impacts is provided in this report. The EPA notes that the proponent has identified measures to avoid or minimise impacts. The EPA has considered these measures during its assessment, and has recommended conditions to ensure that appropriate measures, including avoidance of impacts, are implemented. The proposal has the potential to contribute to a reduction in road transport emissions, greenhouse gas emissions and particulate matter emissions that would contribute positively on the health of the environment for the benefit of future generations. The proponent has minimised impact to Aboriginal Heritage sites through design controls and the EPA has recommended conditions to ensure cultural values and use of the sites are maintained for future generations. The EPA notes the proponent has committed to noise and vibration management and mitigation measures to minimise impacts to nearby existing and future residences during operation and construction. The EPA is confident that the health, diversity, and productivity of the environment should be maintained and enhanced through the proponent's application of the mitigation hierarchy and proposed management measures. The EPA has also considered to what extent the potential impacts from the proposal can be ameliorated by recommended conditions, including offsets. The EPA has concluded that the proposed offsets are likely to ameliorate impacts to the health, diversity, and productivity of the environment, and that the aim of the proposed offsets is to increase the extent of communities and habitat in secure tenure and managed for conservation, which will provide for future generations.

EP Act Principle	Consideration
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	This principle is a fundamental and relevant consideration for the EPA when assessing and considering the impacts of the proposal on the environmental factors of Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings. The EPA notes the proponent has identified measures to avoid and minimise impacts and proposes offsets where there is a significant residual impact. The EPA notes that during the assessment, the proponent has reduced the disturbance footprint by 116.9 ha (from 365.9 ha to 249.0 ha) and has designed the proposal to utilise existing cleared areas where practicable. The proponent has proposed to maintain the north-south ecological linkage through building a bridge over Bennett Brook and constructing two fauna underpasses for larger fauna to move north and south of the railway. The EPA notes the bridge design over Bennett Brook will not impede on the hydrological regime of the brook, thereby avoiding impacts to aquatic habitats and water quality, and maintaining the biodiversity. The EPA has considered the incorporation of the native vegetation retention areas within the development envelope which are located to protect the Banksia woodlands TEC/PEC, fauna habitat and 201 black cockatoo potential breeding trees. The EPA has also considered to what extent the potential impacts form the proposal can be ameliorated by recommended conditions, including offsets. The EPA has concluded that the proposed conditions and offsets are likely to ameliorate the impacts of the loss of biological diversity and ecological integrity. The EPA is of the view that the proposed conditions including offsetting meets the aim in improving the condition of existing environmental values within specific areas and increasing the extent of communities and habitat in secure tenure and managed for conservation.

EP Act Principle	Consideration
4. Principles relating to improved valuation, pricing and incentive mechanisms *(1) Environmental factors should be included in the valuation of assets and services.* *(2) The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *(4) Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimize costs to develop their own solution and responses to environmental problems.*	In considering this principle, the EPA notes that the proponent would bear the cost relating to mitigation and management of proposal related impacts to Flora and Vegetation, Terrestrial Fauna, Inland Waters and Social Surroundings. The EPA notes the proponent's mitigation and management measures for noise abatement such as noise walls and the construction of fauna underpasses, which will require ongoing maintenance by the proponent. The EPA notes the costs the proponent will bear to offset the significant residual impact to wetlands, Bush Forever and conservation significant species and communities. The EPA has had regard to this principle during the assessment of the proposal.
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	In considering this principle the EPA notes that the proponent proposes to minimise waste by adopting the hierarchy of waste controls (avoid, minimise, reuse, recycle and safe disposal) during construction and operation. The EPA has considered the significant quantities of soil material that will be excavated/removed from the development envelope at the site of the proposed Malaga dive structure in an area of high to moderate risk of acid sulfate soils (ASS) occurring at depth. The EPA notes the proponent proposes to apply the waste hierarchy to treat any excavated ASS prior to reuse as fill. In scoping for the proposal, the EPA requested that the proponent set out the proposed waste minimisation strategy to demonstrate consideration of the principle of waste minimisation. The EPA considered that the waste minimisation strategy should include details on the destination or use of

EP Act Principle	Consideration
	removed materials in accordance with the principle of waste minimisation as defined in the EP Act. The EPA notes that the railway alignment has been designed with an excess of fill to cut material to minimise the volume of potential ASS material excavated. The EPA considers that this approach is reasonable and should ensure that the generation of potential waste is minimised. The proponent has identified that where possible, excavated soil will be tested and treated for use on site. Similarly, dewatering effluent will be treated and used where possible for construction purposes. The proponent has proposed that any excess fill required for construction will be imported from other local projects where available, including from other proposals being constructed by the proponent. The proponent will ensure that any imported fill is fit for purpose and poses no risk of contamination. The waste minimisation strategy includes details on the destination or use of removed materials in accordance with the principle of waste minimisation as defined in the EP Act. The EPA considers that the proponent has demonstrated consideration of the principle of waste minimisation and has set out all reasonable and practicable measures to minimise the generation of waste and its discharge to the environment. The EPA has had regard to this principle during the assessment of the proposal.

Appendix 3: Evaluation of Other Environmental Factors

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
Land			
Terrestrial Environmental Quality	• Contamination of soils and groundwater from excavation and/or dewatering in areas of high to moderate risk of ASS occurring. • Contamination of soils and/or water from discharge of dewatering effluent. • Contamination of soils from stockpiling of potentially contaminated soils or ASS.	**Agency comments** • The proponent correctly identified the potential impacts and risk to Terrestrial Environmental Quality. • The proponent has undertaken appropriate investigations to understand the degree of potential impacts and risks to inform management, including a preliminary ASS investigation and a preliminary site investigation for contamination. • The proponent has summarised high level mitigation strategies in relation to site contamination with more detailed management measures set out in the appended Construction Environmental Management Plan. • A preliminary site investigation did not identify any significant risks with respect to known or suspected contaminated sites within or adjacent to the development envelope. • The proponent appropriately considered the potential for identified suspected or known groundwater contamination to be intercepted during dewatering works.	Terrestrial Environmental Quality was identified as a preliminary key environmental factor when the EPA decided to assess the proposal. Having regard to: • the low risk of potentially contaminated soils occurring within the development envelope • no known contaminated sites occurring within the development envelope • the potential impacts from the disturbance and/or dewatering of potential ASS can be assessed under the environmental factor of Inland Waters • dewatering near the Lexia potentially contaminated site are not expected to intersect the existing contamination plume • earthworks near the Swan Valley egg farm are likely to be at grade or on fill with further testing required

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
		Appropriate management measures were proposed to mitigate the risk of drawing in potentially contaminated groundwater with further details to be included in a dewatering management plan. • Potential risks associated with the potential disturbance of soil or groundwater contamination can be readily addressed through typical management measures incorporated into the construction environmental management plan and other management documents as required. • Based on the available information, site contamination is unlikely to pose a significant risk and can be readily managed through implementation of appropriate management plans. • The disturbance of ASS is relevant to Terrestrial Environmental Quality and Inland Waters. **Public comments** None received for this factor.	• the proponent's proposed mitigation measures • that review and comment of the detailed ASS and dewatering management plans will be provided by the DWER • guidelines for the identification, reporting, classification assessment and management of contaminated sites in Western Australia • National Environment Protection (Assessment of Site Contamination) Measure 1999 • the significance of considerations in the *Statement of Environmental Principles, Factors and Objectives* (EPA 2020b), the EPA considers it is unlikely that the proposal would have a significant impact on Terrestrial Environmental Quality and that the impacts to this factor are manageable. It should be noted that the disturbance of ASS and the potential impacts on Inland Waters is a key environmental factor and is discussed in Section 4.3 of this report. Accordingly, the **EPA did not consider Terrestrial Environmental Quality to**

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			be a key environmental factor at the conclusion of its assessment.
Air			
Air Quality	• Potential reduction in transport motor vehicle emissions.	**Agency comments** None received for this factor. **Public comments** None received for this factor.	In scoping for the proposal, the EPA requested that the proponent discuss the potential reduction in transport emissions (e.g. particulate matter, oxides of nitrogen, carbon monoxide) associated with reducing the number of motor vehicle journeys following construction of the Malaga to Ellenbrook Rail Works. Having regard to: • the proponent's qualitative air quality assessment and the assumptions applied • the appropriateness to extrapolate and apply the findings of the qualitative assessment for the purposes of this assessment • the proponent's consideration that replacing private vehicle journeys by car with rail will result in a decrease in concentrations of particulate matter and nitrous oxides • the existing relatively low levels of carbon monoxide in the Perth region,

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			the EPA considers that the proposal will likely reduce transport emissions if there is the predicted change from private motor vehicle journeys to passenger rail journeys. It is unlikely that the proposal would have a significant impact on Air Quality and that the impacts to this factor are manageable. Accordingly, the **EPA did not consider Air Quality to be a key environmental factor** at the conclusion of its assessment.
Greenhouse Gas Emissions	• Potential greenhouse gas emissions.	**Agency comments** None received for this factor **Public comments** None received for this factor	In scoping for the proposal, the EPA requested that the proponent discuss and compare net greenhouse gas emissions (tonnes of carbon dioxide equivalent per annum) between rail transport and conventional vehicle modes of transport following construction of the Malaga to Ellenbrook Rail Works. Having regard to: • the proponent's estimation of greenhouse gas emissions which includes assumptions about changes in transport modes from motor vehicles to passenger rail journey over time

Environmental factor	Description of the proposal's likely impacts on the environmental factor	Government agency and public comments	Evaluation of why the factor is not a key environmental factor
			• the incorporation of traffic, construction (including clearing), and operational contributing factors in the assessment • the estimation that over the life of the proposal (construction and 50 years of operation), about 1,000,000 tonnes of carbon dioxide equivalent emissions would be saved, the EPA considers that the proposal will not result in a significant increase to greenhouse gas emissions. It is unlikely that the proposal would have a significant impact on Greenhouse Gas Emissions and that the impacts to this factor are manageable. Accordingly, the **EPA did not consider Greenhouse Gas Emissions to be a key environmental factor** at the conclusion of its assessment.

Appendix 4: Identified Decision-Making Authorities and Recommended Environmental Conditions

Identified Decision-Making Authorities

Section 44(2) of *Environmental Protection Act 1986* specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) of the *Environmental Protection Act 1986* requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented, and if so, to what conditions and procedures, if any, that implementation should be subject.

The following DMAs have been identified:

Decision-Making Authority	Legislation (and approval)
1. Minister for Aboriginal Affairs	*Aboriginal Heritage Act 1972* (Consent under section 18)
2. Minister for Environment	*Biodiversity Conservation Act 2016* (Permit to take flora and fauna)
3. Minister for Planning	*Planning and Development Act 2005* (Scheme amendments)
4. Minister for Transport	*Land Administration Act 1997* (section 183 Authority to enter land and do anything that is authorised to be done under the rail enabling legislation (once enacted))
5. Minister for Water	*Rights in Water and Irrigation Act 1914* (Licence to take/licence for construction of a well/Permit to interfere with bed and banks)
6. Chief Executive Officer, Department of Water and Environmental Regulation	*Environmental Protection Act 1986* (Native vegetation clearing permit/Works approval/Granting of licence) Environmental Protection (Noise) Regulations 1997 (r.13 – out of hours noise management plan)
7. Chief Dangerous Goods Officer, Department of Mines, Industry Regulation and Safety	*Dangerous Goods Safety Act 2004* (Storage and handling of hazardous materials)

Decision-Making Authority	Legislation (and approval)
8. Chair, Western Australian Planning Commission	*Planning and Development Act 2005* (Development applications for station precincts which are in a Planning Control Area)
9. Chief Health Officer, Department of Health – Public Health Division	*Health Act 1911* (s.107(2)(b)) *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations)* r.4A – drains, sanitary conveniences, and any apparatus for the treatment of sewage intended to serve a building that is not a single dwelling or any other building that produces more than 540 litres of sewage per day
10. City of Swan	*Building Act 2011* (Building application, permit and certificate) *Health Act (Underground Water Supply) Regulation 1959* r.11 - Approval required for a well or other underground source of water supply *Environmental Protection (Noise) Regulations 1997* (Approval of Noise Management Plan)

Note: In this instance, agreement is only required with DMAs 1, 2, 3, 4 and 5 since these DMAs are Ministers.

Recommended Environmental Conditions

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
***(Environmental Protection Act 1986*)**

MALAGA TO ELLENBROOK RAIL WORKS

Proposal: The proposal is to construct and operate a new 13 kilometre railway line between Malaga and Ellenbrook in the City of Swan. The proposal includes the construction of new train stations and associated facilities at Malaga, Whiteman Park and Ellenbrook and a potential future station at Bennett Springs.

Proponent: Public Transport Authority of Western Australia
Australian Business Number 61 850 109 576

Proponent Address: Public Transport Centre, West Parade
PERTH WA 6000

Assessment Number: 2238

Report of the Environmental Protection Authority: 1690

Pursuant to section 45 of the *Environmental Protection Act 1986,* it has been agreed that the proposal described and documented in Table 1 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Proposal Implementation

1-1 When implementing the proposal, the proponent shall not exceed the authorised extent of the proposal as defined in Table 2 of Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the *Environmental Protection Act 1986*.

2 Contact Details

2-1 The proponent shall notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after five (5) years from the date of this Statement, and any commencement, prior to this date, must be substantial.

3-2 Any commencement of implementation of the proposal, on or before five (5) years from the date of this Statement, must be demonstrated as substantial by providing the CEO with written evidence, on or before the expiration of five (5) years from the date of this Statement.

4 Compliance Reporting

4-1 The proponent shall prepare, and maintain a Compliance Assessment Plan which is submitted to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation of the proposal, whichever is sooner.

4-2 The Compliance Assessment Plan shall indicate:

(1) the frequency of compliance reporting;

(2) the approach and timing of compliance assessments;

(3) the retention of compliance assessments;

(4) the method of reporting of potential non-compliances and corrective actions taken;

(5) the table of contents of Compliance Assessment Reports; and

(6) public availability of Compliance Assessment Reports.

4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2 the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.

4-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

4-6 The proponent shall submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement addressing the twelve (12) month period from the date of issue of this Statement and then

annually from the date of submission of the first Compliance Assessment Report, or as otherwise agreed in writing by the CEO.

The Compliance Assessment Report shall:

(1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;

(2) include a statement as to whether the proponent has complied with the conditions;

(3) identify all potential non-compliances and describe corrective and preventative actions taken;

(4) be made publicly available in accordance with the approved Compliance Assessment Plan; and

(5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

5 Public Availability of Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal, the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Bennett Brook – Social Surroundings (Aboriginal Heritage), Inland Waters, Terrestrial Fauna

6-1 The proponent shall design and manage the implementation of the proposal to meet the following environmental objective:

(1) maintain the hydrological regime and water quality in Bennett Brook that supports:

(a) important Aboriginal cultural associations and heritage;

(b) Carter's freshwater mussel (*Westralunio carteri*); and

(c) the **ecological integrity** of Bennett Brook, incorporating **Conservation Category Wetland** Unique Feature Identifier 15259.

6-2 To ensure that the objective of condition 6-1 is being met, the proponent shall:

(1) construct bridge footings or pillars, drainage structures and abutments outside of the bed and banks of Bennett Brook;

(2) ensure no excavation activities occur within the bed of Bennett Brook;

(3) not dispose or discharge dewatered effluent to the Bennett Brook or its tributaries;

(4) not allow access for the purposes of construction activities within the bed of Bennett Brook with the exception of tree removal necessary for bridge construction, unless agreed in writing by the CEO; and

(5) within twelve (12) months following construction of the proposal, undertake **rehabilitation** of areas temporarily disturbed during construction with locally native species to reinstate fauna habitat.

7 Social Surroundings (Aboriginal Heritage)

7-1 The proponent shall consult with appropriate and relevant Whadjuk Noongar representatives regarding how access to **Registered Sites** 551 and 552 can be maintained for the purpose of cultural practice.

7-2 The proponent shall undertake consultation with appropriate and relevant Whadjuk Noongar representatives and Registered Knowledge Holder families of Bennett Brook prior to and during construction of the Bennett Brook rail bridge regarding the retention of **paperbark trees** at and adjacent to the Bennett Brook crossing.

7-3 Prior to commencement of construction activities at Bennett Brook, the proponent shall provide evidence to the CEO of the consultation required by condition 7-2, including how input received was addressed.

8 Construction Impacts – Flora and Vegetation, Terrestrial Fauna, Inland Waters

8-1 During construction of the proposal the proponent shall:

(1) not clear more than:

(a) 10.05 ha of Banksia woodlands of the Swan Coastal Plain priority ecological community;

(b) 81.4 ha of Carnaby's cockatoo (*Calyptorhynchus latirostris*) **foraging habitat**;

(c) 68.1 ha of forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) **foraging habitat**; and

(d) 423 **black cockatoo** potential breeding trees.

(2) implement hygiene protocols, consistent with the ***Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia, Part 2 National Best Practice Guidelines*** as amended or replaced from time to time;

(3) manage soil and groundwater disturbing activities in accordance with the Acid Sulfate Soil Guideline Series *Identification and investigation of acid sulfate soils and acidic landscapes* (2015) and *Treatment and management of soils and water in acid sulfate soil landscapes* (2015), or any approved update of these guidelines;

(4) not dispose of dewatered effluent to **Conservation Category Wetlands** or **Resource Enhancement Wetlands**;

(5) not locate **abstraction bores** within fifty (50) metres of:

(a) identified Banksia woodlands; or

(b) **Conservation Category Wetlands**,

that are located adjacent to the **development envelope** or within native vegetation retention areas **(NVRA)**;

(6) ensure that no refuelling, chemical storage or stockpiling occurs within fifty (50) metres of a **Conservation Category Wetland**;

(7) undertake weed control and management measures to prevent the introduction or spread of weeds;

(8) implement measures to ensure there are no direct or **indirect impacts**, when compared to pre-construction **baseline conditions**, to native vegetation or wetlands in **NVRA**, or directly adjacent to the **development envelope** from dewatering activities; and

(9) implement measures to minimise indirect threatening processes, including grazing, on native vegetation within the **Patch 1 Malaga NVRA**.

8-2 Following construction of the proposal, the proponent shall:

(1) ensure there are no direct or **indirect impacts**, when compared to pre-construction **baseline conditions**, to native vegetation within the **NVRA** within five (5) years post construction that are attributable to the proposal;

(2) undertake weed control and management for five (5) years post construction within:

(a) the **NVRA**;

(b) Bush Forever site 304 in the **development envelope**; and

(c) Bush Forever site 304 within twenty (20) metres of the **development envelope.**

(3) implement measures for three (3) years post construction to manage indirect threatening processes, including grazing, within the **Patch 1 Malaga NVRA,** to ensure vegetation structure and condition is maintained when compared to pre-construction **baseline conditions**;

(4) within twelve (12) months, undertake **rehabilitation** of native vegetation with locally native species to achieve pre-construction vegetation densities in all areas disturbed during construction activities that are not required for the ongoing operation of the proposal; and

(5) undertake annual monitoring and any remedial measures to ensure **rehabilitation** required by condition 8-2(4) will successfully establish within five (5) years post construction.

8-3 The proponent shall prepare and submit a report to demonstrate that the requirements of condition 8-2 have been met. The first report shall be submitted within three (3) months of the completion of construction and then annually with the Compliance Assessment Report, until the CEO has confirmed by notice in writing that the requirements of condition 8-2 have been met.

9 Malaga Dive Structure – Inland Waters and Flora and Vegetation

9-1 The proponent shall manage dewatering, excavation activities, and the treatment, re-use and disposal of acid sulfate soils at the **Malaga dive structure** to meet the following environmental objective:

(1) maintain the quality and hydrological regime of groundwater that supports the biological diversity and **ecological integrity** of:

(a) Banksia woodlands of the Swan Coastal Plain priority ecological community;

(b) **Conservation Category Wetlands**; and

(c) **Resource Enhancement Wetlands**.

9-2 Prior to excavation or dewatering activities associated with construction of the **Malaga dive structure**, whichever occurs first, the proponent shall:

(1) undertake appropriate investigations for acid sulfate soils in accordance with the Department of Water and Environmental Regulation's acid sulfate soil guidelines for the identification and investigation of acid sulfate soils and acidic landscapes;

(2) prepare and submit an Acid Sulfate Soils and Dewatering Management Plan based on the findings of the investigations required by condition 9-2(1) and in accordance with the Department of Water and Environmental Regulation's acid sulfate soil guidelines for the treatment and management of soils and water in acid sulfate soil landscapes; and

(3) specify the measures to meet the objective in condition 9-1(1) in the Acid Sulfate Soils and Dewatering Management Plan.

9-3 The proponent shall implement the Acid Sulfate Soils and Dewatering Management Plan required by condition 9-2(2) which the CEO has advised in writing satisfies the requirements of condition 9-2(2).

9-4 Following the completion of construction of the **Malaga dive structure**, the proponent shall:

(1) within thirty (30) days, prepare, in accordance with the Department of Water and Environmental Regulation's acid sulfate soil guidelines for the treatment and management of soils and water in acid sulfate soil landscapes, and submit, a report to demonstrate compliance with the Acid Sulfate Soils and Dewatering Management Plan required by condition 9-2(2);

(2) undertake post-dewatering monitoring for a minimum of six (6) months to determine whether the environmental objective specified in condition 9-1(1) is being met; and

(3) within thirty (30) days of the last monitoring event required by condition 9-4(2), prepare and submit a post-dewatering monitoring report to demonstrate compliance with the environmental objective specified in condition 9-1(1).

9-5 The proponent:

(1) may review and revise the Acid Sulfate Soils and Dewatering Management Plan; or

(2) shall review and revise the Acid Sulfate Soils and Dewatering Management Plan as and when directed by the CEO by a notice in writing.

9-6 The proponent shall implement the latest revision of the Acid Sulfate Soils and Dewatering Management Plan, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 9-2(2).

10 Terrestrial Fauna

10-1 The proponent shall undertake the following actions to minimise impacts to terrestrial fauna:

(1) within seven (7) days prior to clearing, using a qualified and licensed terrestrial **fauna spotter**(s) with experience in surveying for **black cockatoos**, inspect all **potential nesting trees** with hollows within the **development envelope** to determine if any hollows are being used for nesting by **black cockatoos**; and

(2) if any hollows are in use by **black cockatoos** for nesting, the proponent shall not **disturb** or clear the nesting tree, or vegetation within a ten (10) metre radius of the nesting tree, until after the cockatoos have naturally completed nesting (young have fledged and dispersed) and an appropriately qualified and licensed terrestrial **fauna spotter** has verified that the hollow(s) are no longer being used by the **black cockatoos**.

10-2 During activities associated with the construction of the proposal, the proponent shall undertake as required the following actions to minimise impacts to terrestrial fauna:

(1) ensure the use of appropriately qualified and licensed terrestrial **fauna spotter**(s) during clearing activities;

(2) ensure that during **trenching activities** inspection for, and clearing of, fauna from open trenches by appropriately qualified and licensed terrestrial fauna rescue personnel occurs at least twice daily and not more than one (1) hour prior to backfilling of trenches, with the first daily inspection and clearing to be undertaken no later than three (3) hours after sunrise prior to any construction, and the second inspection and clearing to be undertaken daily between the hours of 3:00 pm and 6:00 pm;

(3) ensure that open trench lengths do not exceed a length capable of being inspected and cleared by appropriately qualified and licensed fauna rescue personnel within the required times set out in condition 10-2(2); and

(4) provide egress points, ramps and/or fauna refuges that provide suitable shelter from the sun and predators for trapped fauna in open trenches at intervals not exceeding fifty (50) metres.

11 Social Surroundings (Noise)

11-1 The proponent shall implement the proposal to meet the following environmental objective:

(1) minimise operational noise and vibration impacts on existing noise sensitive receptors **as far as practicable**.

11-2 At least three (3) months prior to the operation of the proposal, in order to meet the requirements of condition 11-1(1), the proponent shall submit a further revision of the Morley-Ellenbrook Rail Line Part 2 Malaga to Ellenbrook Noise and Vibration Management Plan (Reference: 675.11323-R05, June 2020) to include:

(1) the details of relevant noise mitigation measures to confirm that noise and vibration criteria will be met;

(2) an update to Section 5 Management Measures, to show the locations and minimum heights of noise walls; and

(3) demonstration that the design and construction of noise mitigation measures will meet the noise and vibration objectives set out in Section 2 Transport noise and vibration objectives.

11-3 The proponent shall implement the revised Morley-Ellenbrook Rail Line Part 2 Malaga to Ellenbrook Noise and Vibration Management Plan, or the most recent version, which the CEO has confirmed by notice in writing satisfies the requirements of condition 11-2.

11-4 The proponent shall continue to implement the revised Morley-Ellenbrook Rail Line Part 2 Malaga to Ellenbrook Noise and Vibration Management Plan, or any subsequently approved revisions until the CEO has confirmed by notice in writing that the proponent has demonstrated that the objective in condition 11-1(1) is being and will continue to be met.

11-5 In the event of failure to implement management actions detailed in the approved Morley-Ellenbrook Rail Line Part 2 Malaga to Ellenbrook Noise and Vibration Management Plan, the proponent shall meet the requirements of condition 4-5 (Compliance Reporting) and shall implement the measures outlined in the approved Morley-Ellenbrook Rail Line Part 2 Malaga to Ellenbrook Noise and Vibration Management Plan, including, but not limited to, actions and investigations to be undertaken.

12 Offsets

12-1 The proponent shall undertake offsets to achieve the objective of counterbalancing the significant residual impact on the following environmental values as a result of the implementation of the proposal:

(1) 10.05 ha of Banksia woodlands of the Swan Coastal Plain priority ecological community;

(2) 81.4 ha of Carnaby's cockatoo (*Calyptorhynchus latirostris*) **foraging habitat**;

(3) 68.1 ha of forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) **foraging habitat**;

(4) 423 **black cockatoo** potential breeding trees;

(5) 1.9 ha of **Conservation Category Wetlands**;

(6) 0.5 ha of **Resource Enhancement Wetlands**; and

(7) 17.2 ha of Bush Forever site 304,

On-ground Management Offset Plan

12-2 Within twelve (12) months of the publication of this Statement or as otherwise agreed by the CEO, the proponent shall prepare and submit an On-ground Management Offset Plan to the requirements of the CEO, with the environmental objective of counterbalancing the significant residual impact to:

(1) 1.9 ha of **Conservation Category Wetlands**;

(2) 0.5 ha of **Resource Enhancement Wetlands**; and

(3) 17.2 ha of Bush Forever site 304.

12-3 The On-ground Management Offset Plan required by condition 12-2 shall:

(1) spatially define and map the vegetation condition of an area or areas within Whiteman Park, or other suitable location as agreed by the CEO, where **on-ground management** actions are proposed to counterbalance the significant residual impacts to the environmental values specified in condition 12-2;

(2) detail the proposed **on-ground management** actions to be implemented, objectives and targets to be achieved, a timeframe for the actions to be undertaken, completion criteria, funding arrangements for these actions and any **contingency actions** to be undertaken within Whiteman Park, or other suitable location as agreed by the CEO;

(3) define the role of the proponent and/or any relevant management authority or other third party involved in delivering the offset;

(4) include evidence of consultation with stakeholders including:

(a) Department of Biodiversity, Conservation and Attractions;

(b) Department of Planning, Lands and Heritage; and

(c) Friends of Bennett Brook;

(5) demonstrate how the **on-ground management** actions to be undertaken within Whiteman Park, or other suitable location as agreed by the CEO, will result in a tangible improvement to the environmental values being offset;

(6) demonstrate how the **on-ground management** actions counterbalance the significant residual impact to the environmental values identified in condition 12-2 through application of the principles of the WA Environmental Offsets Policy 2011 and completion of the WA Offsets Template, as described in the WA Environmental Offsets Guidelines 2014 or any subsequent revisions of these documents; and

(7) detail the monitoring, reporting and evaluation mechanisms for actions identified under conditions 12-3(2).

12-4 The proponent:

(1) may review and revise the On-ground Management Offset Plan; or

(2) shall review and revise the On-ground Management Offset Plan as and when directed by the CEO by notice in writing.

12-5 The proponent shall implement the latest revision of the On-ground Management Offset Plan approved by the CEO by notice in writing.

12-6 The proponent shall continue to implement the On-ground Management Offset Plan until the CEO has confirmed by notice in writing that the proponent has demonstrated that the objective in condition 12-2 has been met.

12-7 The proponent shall notify the CEO within twenty-one (21) days if any of the actions or outcomes set out in the On-ground Management Offset Plan are unable to be achieved, and provide the detail and timing of **contingency actions** to be undertaken.

Offset Strategy

12-8 Within six (6) months of the publication of this Statement, or as otherwise agreed by the CEO, the proponent shall prepare and submit an Offset

Strategy to the requirements of the CEO, with the environmental objective of counterbalancing the significant residual impact to:

(1) 10.05 ha of Banksia woodlands of the Swan Coastal Plain priority ecological community;

(2) 81.4 ha of Carnaby's cockatoo (*Calyptorhynchus latirostris*) **foraging habitat**;

(3) 68.1 ha of forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) **foraging habitat**; and

(4) 423 **black cockatoo** potential breeding trees.

12-9 The Offset Strategy required by condition 12-8 shall:

(1) demonstrate that the objective in condition 12-8 will be met;

(2) identify an area, or areas, (the **Proposed Offset Conservation Area**) to be **acquired** with **on-ground management**, managed for conservation purposes, and contains the environmental values identified in condition 12-8;

(3) demonstrate how the environmental values within the **Proposed Offset Conservation Area** counterbalances the significant residual impact to the environmental values identified in condition 12-8(1), condition 12-8(2) and condition 12-8(3) through application of the principles of the WA Environmental Offsets Policy and completion of the WA Offsets Template, as described in the WA Environmental Offsets Guidelines 2014, and the *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy Assessment Guide (October 2012), or any subsequent revisions of these documents;

(4) demonstrate that the **Proposed Offset Conservation Area** contains at least 1,269 **black cockatoo** breeding trees or potential breeding trees;

(5) demonstrate how the **Proposed Offset Conservation Area** aligns with:

(a) Approved conservation advice (incorporating listing advice) for the Banksia woodlands of the Swan Coastal Plain Ecological Community 2016*;*

(b) Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan 2013; and

(c) Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksia naso*) Recovery Plan 2008,

or any subsequent revisions of these documents;

(6) identify how the **Proposed Offset Conservation Area** will be **acquired** and specify:

(a) a timeframe and quantum of works associated with establishing the **Proposed Offset Conservation Area**, including a contribution for maintaining the offset for at least seven (7) years after completion of purchase and details pertaining to monitoring, evaluating and reporting; and

(b) the **relevant management body** for the on-going management of the **Proposed Offset Conservation Area,** including its role, and the role of the proponent, and confirmation in writing that the **relevant management body** accepts responsibility for its role.

(7) where **on-ground management** is proposed:

(a) state the objective(s) and target(s) to be achieved, including completion criteria, which result in a tangible improvement to the environmental value(s) being offset;

(b) demonstrate the consistency of the objective(s) and target(s) with the objectives of any relevant conservation advice and recovery plans;

(c) detail the **on-ground management** actions with associated timeframes for implementation, including **contingency actions**, to achieve the objective(s) and target(s) identified above; and

(d) detail the monitoring, reporting and evaluation mechanisms for the objective(s), target(s) and actions identified above.

12-10 The proponent:

(1) may review and revise the Offset Strategy; or

(2) shall review and revise the Offset Strategy as and when directed by the CEO by a notice in writing.

12-11 Where research project(s) are proposed to offset the significant residual impacts to Carnaby's cockatoo and forest red-tailed black cockatoo, the proponent shall prepare and submit with the Offset Strategy required by condition 12-8, a Black Cockatoo Research Plan to the requirements of the CEO that will increase the scientific knowledge of black cockatoos relevant to improving conservation and management of the species and its habitat in the Perth and Peel regions. The Black Cockatoo Research Plan shall:

(1) demonstrate how the research project(s) will provide a positive and long-term conservation outcome for Carnaby's cockatoo and forest red-tailed black cockatoo and addresses agreed research priorities, considering key knowledge gaps identified in the EPA Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Regions (2019), the relevant black cockatoo recovery plans and/or other research priorities agreed with the Department of Biodiversity, Conservation and Attractions;

(2) identify the objectives and intended outcomes, and details of success criteria;

(3) provide an implementation schedule including an outline of key activities, deliverables, stages of implementation, and milestones towards completion;

(4) identify the agreed governance arrangements including stakeholder responsibilities for implementing the research, and agreements with any third parties involved and legal obligations;

(5) identify any potential risks involved and appropriate **contingency actions**;

(6) identify monitoring activities to assess progress with research implementation and for compliance purposes;

(7) provide details on the:

(a) financial and financial auditing arrangements including project budget and recipients of funds if project(s) are to be undertaken by any third parties;

(b) funding arrangements including the methodology to determine the amount of funding to be spent on research project(s); and

(c) timing of funding for the research project(s);

(8) identify procedures for reporting to the CEO and Department of Biodiversity, Conservation and Attractions, including the content, format, timing and frequency for reporting and provisions of data and information against the objectives and outcomes identified in condition 12-11(2); and

(9) identify how the results of the research offset will be communicated and/or published in an **open access** format for the benefit of future assessments and public understanding of the species.

12-12 The proponent:

(1) may review and revise the Black Cockatoo Research Plan; or

(2) shall review and revise the Black Cockatoo Research Plan as and when directed by the CEO by notice in writing.

12-13 Within six (6) months of receiving notice in writing from the CEO, on advice of the Department of Biodiversity, Conservation and Attractions, that the Offset Strategy satisfies the requirements of conditions 12-8, 12-9 and/or 12-11 the proponent shall implement the actions in accordance with the approved Offset Strategy.

12-14 The proponent shall implement the latest version of the Offset Strategy, which the CEO has confirmed by notice in writing, satisfies the requirements of conditions 12-8, 12- 9 and/or 12-11.

12-15 The proponent shall notify the CEO within twenty-one (21) days if any of the actions or outcomes set out in the Offset Strategy are unable to be achieved, and provide the detail and timing of **contingency actions** to be undertaken

Schedule 1

Table 1: Summary of the proposal

Proposal title	Malaga to Ellenbrook Rail Works
Short description	The proposal is to construct and operate a new 13 kilometre dual railway line from Malaga to Ellenbrook in the City of Swan. The proposal includes the construction and operation of new intermodal transit stations at Malaga, Whiteman Park and Ellenbrook, with provision for a future station at Bennett Springs East. The proposal includes construction of a principal shared path, bridge infrastructure (including over Gnangara Road), a dive structure, and construction laydown and access areas.

Table 2: Location and authorised extent of physical and operational elements

Column 1	Column 2	Column 3
Element	**Location**	**Authorised extent**
Clearing and disturbance for construction of the railway, stations, principal shared path, dive structure, drainage structures, fencing, bridges, noise walls, and construction laydown and access areas.	Located within the development envelope as shown in Figure 1.	Clearing and disturbance of no more than 249 ha of which 152.1 ha is native vegetation within a 463.8 ha development envelope.

Table 3: Abbreviations and Definitions

Acronym, Term or Abbreviation	Definition
Abstraction bores	Bores used for construction water supply.
Acquired	The protection of environmental values on an area of initially unprotected land for the purpose of conservation through improved security of tenure or restricting the use of land (e.g. ceding land to the Crown or perpetual conservation covenants). This includes upfront costs of establishing the offset site and the on-going management of costs of maintaining the offset for the long term.
As far as practicable	As far as reasonably achievable or feasible as determined by the CEO having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge.
Baseline conditions	The environmental conditions prior to being subject to pressures from a development or operation of concern. This may include natural environmental conditions that are largely un-impacted by human influences or state of the environment just prior to influences and effects of

	development.
Black cockatoos	Includes Carnaby's cockatoo (*Calyptorhynchus latirostris*), forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*) and Baudin's cockatoo (*Calyptorhynchus baudinii*).
Foraging habitat	Foraging habitat described in *EPBC Act referral guidelines for three threatened black cockatoo species* (Commonwealth of Australia 2012), or any subsequent revisions of this document.
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or his delegate.
Conservation Category Wetland	As identified in the Geomorphic Wetlands of the Swan Coastal Plain (DBCA-019) dataset as updated from time-to-time.
Contingency actions	Actions to be implemented when monitoring determines that a management target may not be met, and where the actions will bring the impact within the management target.
Development envelope	The area within the yellow line marked in Figure 1 of this Statement and defined by coordinates in Schedule 2.
Disturb	Is to be defined as per the definition of 'disturb' in section 5 [subsection disturb — (a)(i)(ii)(iii) and (iv)] of the *Biodiversity Conservation Act 2016.*
Ecological integrity	Ecological integrity is the composition, structure, function and processes of ecosystems, and the natural variation of these elements.
Fauna spotter	A person who is qualified and licenced under section 40 of the *Biodiversity Conservation Act 2016*.
ha	Hectare
Indirect impacts	Any potential impacts outside the development envelope or to NVRA as a result of the clearing and disturbance authorised in Table 2 of Schedule 1. This includes but is not limited to: hydrological change, weed invasion, altered fire regimes, introduction or spread of disease, changes in erosion/deposition/accretion and edge effects.
Malaga dive structure	Where the railway extends below ground surface west of the Malaga station and connects to the Bayswater to Malaga rail line.
Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia, Part 2,	E O'Gara, K Howard, B Wilson and GEStJ Hardy (2005) *Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia: Part 2 – National Best Practice Guidelines*. A report funded by the Commonwealth Government Department of the Environment and Heritage by the Centre for Phytophthora Science and Management,

National Best Practice Guidelines	Murdoch University, Western Australia, or any subsequent revisions of this document.
NVRA	Native vegetation retention areas, as shown in Figure 2 and defined by coordinates in Schedule 2
On-ground management	This includes revegetation (re-establishment of native vegetation in degraded areas) and rehabilitation (repair of ecosystem processes and management of weeds, disease or feral animals) with the objective to achieve a tangible improvement to the environmental values in the offset area.
Open access	The provision of free access to peer-reviewed, scholarly and research information to all, that removes restrictions on use and reuse.
Paperbark trees	*Melaleuca* tree species within the riparian zone or channel of Bennett Brook.
Patch 1 Malaga NVRA	Patch of Banksia woodlands of the Swan Coastal Plain priority ecological community located within the development envelope near the location of the proposed Malaga station, that will be retained within a NVRA, as shown in Figure 3 and defined by coordinates in Schedule 2.
Potential nesting trees	Any existing tree of a species known to support black cockatoo breeding which has a hollow and therefore may be being used for nesting.
Proposed Offset Conservation Area	The area of land identified in condition 12-9(2).
Registered Sites	Means a place to which the *Aboriginal Heritage Act 1972* applies by the operation of section 5 of that Act.
Rehabilitation	Repair of ecosystem processes and management of weeds, disease or feral animals.
Relevant management body	A party that is directly responsible for the on-going management of the Proposed Offset Conservation Area.
Resource Enhancement Wetlands	As identified in the Geomorphic Wetlands of the Swan Coastal Plain (DBCA-019) dataset as updated from time-to-time.
Trenching activities	Trenches used for utilities such as communications. Trenches do not include excavation for the sinking of the railway line.

Figures (attached)

Figure 1 Malaga to Ellenbrook Rail Works development envelope and disturbance footprint (This figure is a representation of the co-ordinates shown in Schedule 2)

Figure 2 Native vegetation retention areas relevant to condition 8 (This figure is a representation of the co-ordinates shown in Schedule 2)

Figure 3 Native vegetation retention area at Patch 1 Malaga relevant to condition 8-1(9) and condition 8-2(3) (This figure is a representation of the co-ordinates shown in Schedule 2)

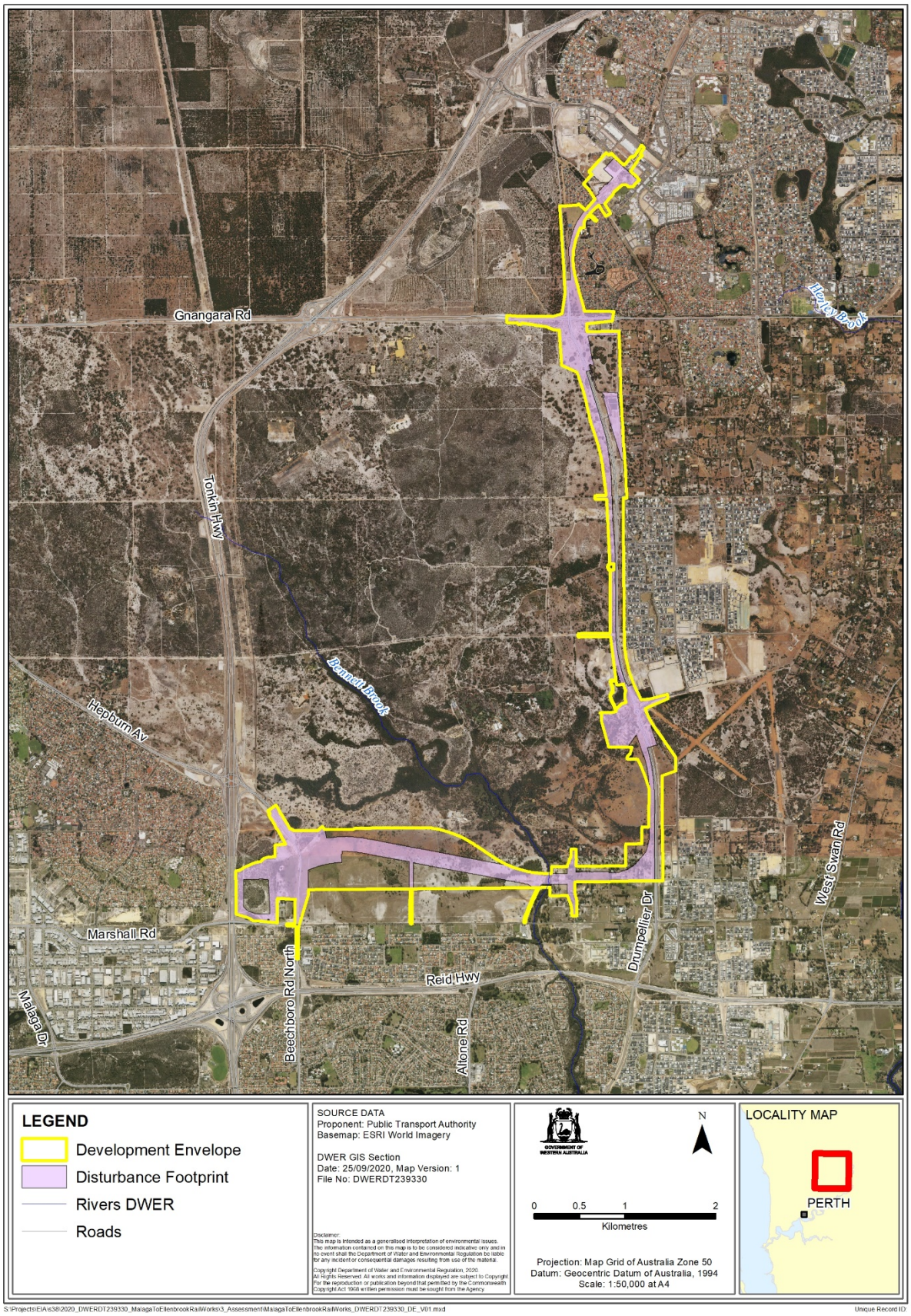

Figure 1: Malaga to Ellenbrook Rail Works development envelope and disturbance footprint

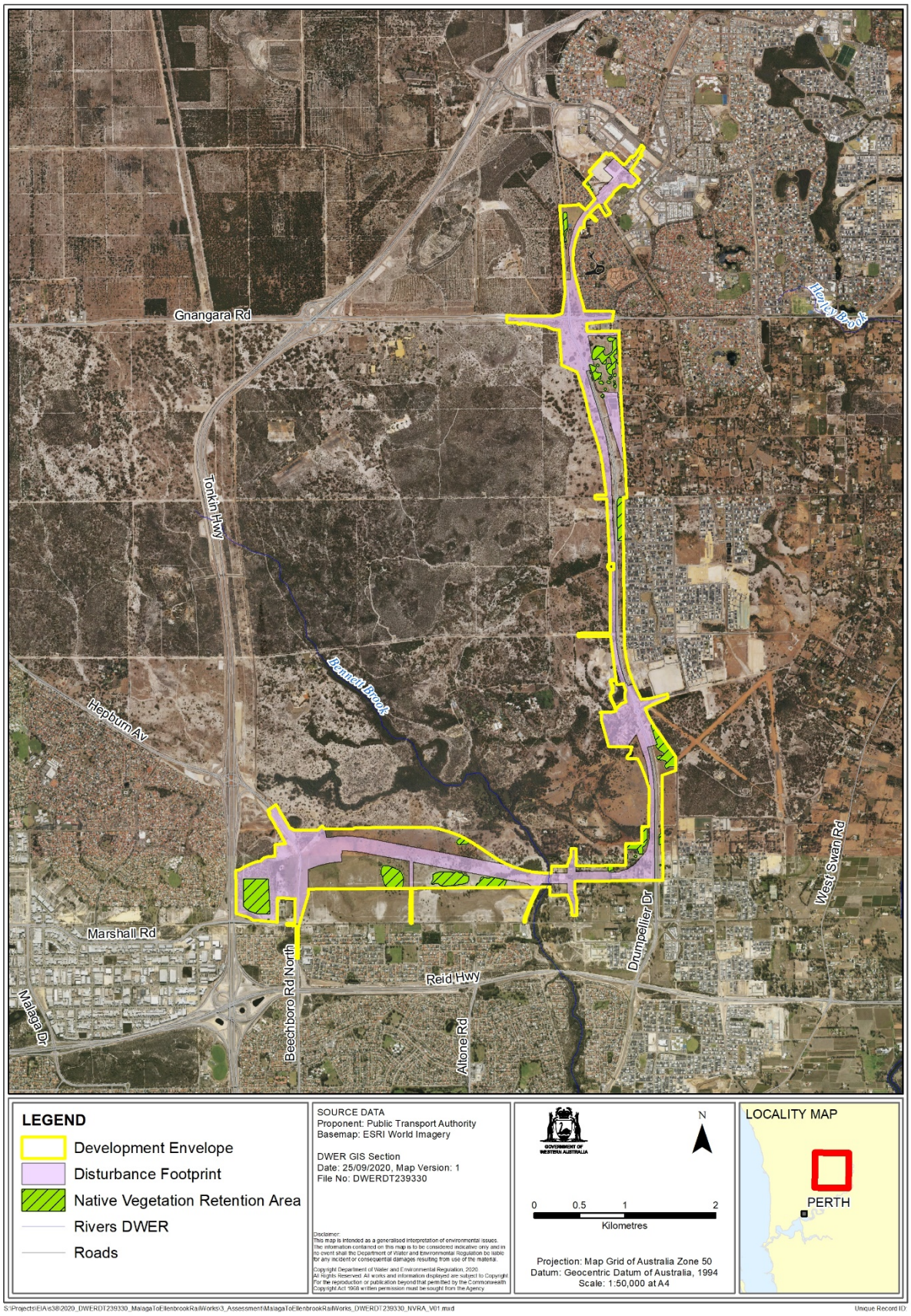

Figure 2: Native vegetation retention areas relevant to condition 8

Figure 3: Native vegetation retention area at Patch 1 Malaga relevant to condition 8-1(9) and condition 8-2(3)

Schedule 2

Coordinates defining the Malaga to Ellenbrook Rail Works development envelope and disturbance footprint in Figure 1 and coordinates defining the Native Vegetation Retention Areas in Figures 2 and 3 are held by the Department of Water and Environmental Regulation, Document Reference Number DWERDT349019.