



**Environmental
Protection
Authority**

Byford Rail Extension

Public Transport Authority

Report 1710

September 2021

This assessment report has been prepared by the Environmental Protection Authority (EPA) under s. 44 of the *Environmental Protection Act 1986* (WA). It describes the outcomes of the EPA's assessment of the Byford Rail Extension proposal by the Public Transport Authority of Western Australia.

The Byford Rail Extension was determined under the Commonwealth *Environment Protection and Biodiversity Act 1999* to be a controlled action and to be assessed by the EPA under an accredited process. This document is also the result of the EPA's accredited assessment process.

This assessment report is for the Western Australian and Commonwealth Ministers for Environment and sets out:

- what the EPA considers to be the key environmental factors identified in the course of the assessment
- 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, if any, to which implementation should be subject
- other information, advice and recommendations as the Authority thinks fit.



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Chair
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28 September 2021

Summary

Proposal

The Byford Rail Extension is a proposal to construct and operate an 8 kilometre new railway (including dual tracks and associated rail infrastructure), between Armadale and Byford. The proposal includes modifications to the existing Armadale Station and construction of a new Byford Station. The proposal also includes the replacement of a number of existing at-grade line crossings (level crossings) with grade separated crossings, either road over rail or rail over road. The proposal is located approximately 27 kilometres from Perth, in the Swan Coastal Plain region of Western Australia.

The proponent for the proposal is the Public Transport Authority of Western Australia.

The proposal is located primarily within the existing rail reserve currently used for the Australind passenger rail service that operates between Perth and Bunbury. The Australind track will be temporarily relocated within the rail corridor to allow for the construction of the new dual railway tracks. The existing rail formation will be reconstructed to accommodate new rail alignments and provide adequate track foundations. The proposal includes replacement of the bridge at Wungong Brook, and construction of a principal shared path.

Consultation

The EPA published the proponent's referral information for the proposal on its website for 7 days public comment. The EPA also published the proponent's environmental review document on its website for public review for 2 weeks (from 3 May 2021 to 17 May 2021). The EPA considered the comments received during these public consultation periods in its assessment.

Mitigation hierarchy

The mitigation hierarchy is a sequence of proposed actions to reduce adverse environmental impacts. The sequence commences with avoidance, then moves to minimisation/reduction/rehabilitation, and offsets are considered as the last step in the sequence.

The proponent considered the mitigation hierarchy in the development and assessment of its proposal, and as a result has:

- Avoided impacts to significant flora species and vegetation communities, valuable fauna habitat and Conservation Category Wetlands (CCWs) by:
 - designing the disturbance footprint to avoid clearing within the boundary of a known population of threatened flora (*Diuris purdiei*)
 - narrowing the development envelope and disturbance footprint adjacent to Lambert Lane Nature Reserve to avoid direct impacts.

- Minimised impacts to significant flora species and vegetation communities, valuable fauna habitat, CCW's and registered Aboriginal heritage site(s) by:
 - removing the impact to registered Aboriginal mythological site Wungong Brook (site ID 3512) from the existing mid-stream support pylon
 - amending the development envelope and disturbance footprint to utilise highly modified areas to minimise impacts to important fauna habitat and ecological communities
 - identifying hygiene measures, monitoring and weed control to limit the spread of weeds and disease and minimise indirect impacts
 - incorporating water sensitive urban design principles
 - implementing measures to minimise erosion and sedimentation in Wungong Brook
 - restoring and revegetating Wungong Brook bed and banks following bridge works
 - having Noongar monitors on-site for all new ground disturbance associated with the proposal at the three agreed locations identified from the consultative survey, to identify any potential unknown Aboriginal heritage sites or artefacts.

Residual impacts are those that remain after the mitigation hierarchy has been applied. The residual impacts of the proposal for each of the key environmental factors are outlined below.

Assessment of key environmental factors

The EPA has identified the key environmental factors (listed below) in the course of the assessment and has assessed the proposal will likely result in the following:

Flora and vegetation

Residual impact		Assessment finding
1.	2.26 hectares (ha) of SCP 3a <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain Threatened Ecological Community will be cleared.	This is a significant residual impact that is likely to be able to be regulated through reasonable conditions (recommended conditions 1 and 4), including a requirement for offsets (recommended condition 6) so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.
2.	0.48 ha of SCP 3c <i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain Threatened Ecological Community will be cleared.	This is a significant residual impact that is likely to be able to be regulated through reasonable conditions (recommended condition 1), including a requirement for offsets (recommended condition 6) so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

Residual impact		Assessment finding
3.	4.4 ha of Guildford Complex will be cleared. Approximately 5% of the pre-European extent of this vegetation complex remains on the Swan Coastal Plain.	This is a significant residual impact that is likely to be able to be regulated through reasonable conditions (recommended condition 1), including a requirement for offsets (recommended condition 6) so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.
4.	1.54 ha of regionally significant vegetation will be cleared across three Bush Forever sites.	This is a significant residual impact that can be regulated through reasonable conditions (recommended conditions 1, 3 and 4), including a requirement for offsets (recommended condition 6) so that the environmental outcome is consistent with the EPA objective for flora and vegetation.
5.	Indirect impacts to flora and vegetation within 20 metres of the development envelope in Lamber Lane, Bush Forever site 264 and Crown Reserve R14217.	The residual impact from indirect impacts can be regulated through reasonable conditions (recommended condition 4) to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.

Terrestrial fauna

Residual impact		Assessment finding
1.	Direct impacts to 8.65 ha of moderate value foraging habitat for Baudin's cockatoo.	The residual impact is significant and can be regulated through reasonable conditions (recommended conditions 1 and 4), including a requirement for offsets (recommended condition 6), to ensure the environmental outcome of the proposal is likely to be consistent with the EPA objective for terrestrial fauna.
2.	Direct impacts to 8.65 ha of moderate value foraging habitat for Carnaby's cockatoo.	The residual impact is significant and can be regulated through reasonable conditions (recommended conditions 1 and 4), including a requirement for offsets (recommended condition 6), to ensure the environmental outcome of the proposal is likely to be consistent with the EPA objective for terrestrial fauna.
3.	Direct impacts to 8.65 ha of moderate to high value foraging habitat for forest red-tailed black cockatoo.	The residual impact is significant and can be regulated through reasonable conditions (recommended conditions 1 and 4), including a requirement for offsets (recommended condition 6), to ensure the environmental outcome of the proposal is likely to be consistent with the EPA objective for terrestrial fauna.
4.	Loss of up to 139 potential black cockatoo breeding trees (131 with no hollows, and eight with unsuitable hollows).	The residual impact is significant and can be regulated through reasonable conditions (recommended conditions 1 and 4), including a requirement for offsets (recommended condition 6), to ensure the environmental outcome of the proposal is likely to be consistent with the EPA objective for terrestrial fauna.

Residual impact		Assessment finding
5.	Direct impacts to black cockatoos using hollows during clearing activities.	The residual impact should be subject to implementation conditions (recommended condition 2) to ensure the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.
6.	Unlikely to be material impacts to Carter's freshwater mussel provided minimisation measures are complied with.	The residual impact should be subject to implementation conditions (recommended condition 3) to ensure the environmental outcome of the proposal is consistent with the EPA objective for terrestrial fauna
7.	Indirect impacts to fauna habitat outside the development envelope in Lambert Lane Nature Reserve, Bush Forever site 264 and Crown Reserve R14217.	The residual impact from indirect impacts should be subject to implementation conditions (recommended condition 4) to ensure the environmental outcome is consistent with the EPA objective for terrestrial fauna.

Inland waters

Residual impact		Assessment finding
1.	3.5 ha of CCWs of which 2.6 ha retains wetland or conservation values.	The residual impact is significant and can be regulated through reasonable conditions (recommended conditions 1, 3 and 4), including a requirement for offsets (recommended condition 6), to ensure the environmental outcome is likely to be consistent with the EPA objective for inland waters.
2.	Unlikely to be material impacts to Wungong Brook provided minimisation measures are complied with.	The residual impact should be subject to implementation conditions (recommended condition 3) to ensure the environmental outcome of the proposal is consistent with the EPA objective for inland waters.
3.	Unlikely to be material impacts to groundwater provided minimisation measures are complied with.	The residual impact should be subject to implementation conditions (recommended condition 3) to ensure the environmental outcome of the proposal is consistent with the EPA objective for inland waters.

Social surroundings

Residual impact		Assessment finding
1.	Direct impacts to Registered Aboriginal Heritage site Wungong Brook	<p>The residual impact should be subject to implementation conditions (recommended 3) to ensure the environmental outcome is consistent with the EPA objective for social surroundings.</p> <p>Consultation with traditional owners resulted in representatives giving approval for the proposal,</p>

Residual impact		Assessment finding
		provided Aboriginal monitors are present on-site during ground disturbing activities.
2.	Unlikely to be material impacts to noise-sensitive receptors provided minimisation measures are complied with.	The residual impact should be subject to implementation conditions (recommended condition 5) to ensure the environmental outcome of the proposal is consistent with the EPA objective for social surroundings.

Holistic assessment

The EPA considered connections and interactions between relevant environmental factors to inform a holistic view of impacts to the whole environment. The EPA formed the view that the holistic impacts would not alter the EPA's conclusions about consistency with the EPA's factor objectives.

Conclusion and recommendations

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

- environmental values which may be significantly affected by the proposal
- residual impacts and effects in relation to the key environmental factors, separately and holistically (this has included considering cumulative impacts of vegetation clearing required for other nearby developments)
- likely environmental outcomes (and taking into account the EPA's recommended conditions), consistency of these outcomes with the EPA's objectives for the key environmental factors
- the EPA's confidence in the proponent's proposed mitigation measures
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment
- principles of the *Environmental Protection Act 1986*.

The EPA has recommended that the proposal may be implemented subject to conditions recommended in Appendix A.

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1 Proposal

The Byford Rail Extension is a proposal to construct and operate an 8 kilometre (km) new railway (including dual tracks and associated rail infrastructure), between Armadale and Byford. The proposal includes modifications to the existing Armadale Station and construction of a new Byford Station. The proposal also includes the replacement of a number of existing at-grade line crossings (level crossings) with grade separated crossings, either road over rail or rail over road. The proposal is located 27 km from Perth, in the Swan Coastal Plain region of Western Australia (see Figure 1).

The proposal is located primarily within the existing rail reserve currently used for the Australind passenger rail service that operates between Perth and Bunbury. The Australind track will be temporarily relocated within the rail corridor to allow for the construction of the new dual railway tracks. The existing rail formation will be reconstructed to accommodate new rail alignments and provide adequate track foundations. The proposal includes replacement of the bridge at Wungong Brook, and construction of a principal shared path (see Figure 2).

The proponent for the proposal is the Public Transport Authority of Western Australia. The proponent referred the proposal to EPA on 7 September 2020. The referral information was published on the EPA website for 7 days public comment. On 7 October 2020, the EPA decided to assess the proposal at the level Public Environmental Review. The EPA also published the Public Transport Authority Byford Rail Extension environmental review document (ERD) (PTA 2021a) on its website for public review for 2 weeks (from 3 May 2021 to 17 May 2021).

The proposal was determined under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) to be a controlled action and to be assessed by the EPA under an accredited process.

The elements of the proposal which have been subject to the EPA's assessment are included in Table 1.

Table 1: Location and proposed extent of proposal elements

Proposal element	Location	Maximum extent or range
Physical elements		
Railway tracks and associated infrastructure	The new 8 km dual railway track extends the existing electrified rail network at Armadale in a southerly direction using the existing Australind rail corridor to the new Byford Station, north of Abernethy Road, Byford. Rail modifications will also be required as far as Sherwood Station 1.5 km north of Armadale Station.	Disturbance of up to 80.7 ha in the area shown as disturbance footprint contained entirely within a 164.6 ha development envelope. This includes the clearing of up to 15.99 ha of native vegetation.

Proposal element	Location	Maximum extent or range
Armadale Station (modifications)	Located approximately 500 m south of Armadale Road, Armadale.	Modifications to the existing railway station and associated facilities including intermodal rail, bus, 'park and ride', 'kiss and ride' and active mode (walking/cycling) facilities.
Byford Station	Located approximately 8 km south of the existing Armadale Station, 400 m north of Abernethy Road, Byford.	New railway station and associated facilities including intermodal rail, bus, 'park and ride', 'kiss and ride' and active mode (walking/cycling) facilities.
Level crossings	Located along the Australind rail corridor.	Existing level crossings will be retained, closed or replaced with grade separated crossings, depending on the most appropriate design option. Each crossing is entirely within the disturbance footprint.
Wungong Brook Rail Bridge	Rail crossing over Wungong Brook.	Duplication of a rail bridge over Wungong Brook.
Construction and access areas	Where practicable the proponent will locate temporary construction areas in areas of existing disturbance.	Construction and access areas in and adjacent to the Australind rail corridor is entirely within the disturbance footprint.
Principal shared path	The principal shared path will follow the rail alignment south, connecting into the existing shared path network.	The principal shared path is entirely within the disturbance footprint.
Operational elements		
Rail and bus services	The passenger railway will operate as an extension to the existing Perth to Armadale line, extending 8 km to Byford. New rail and bus services are proposed for Byford Station.	The passenger rail will operate within the disturbance footprint.

Units and abbreviations

ha – hectare
km – kilometre
m – metre

Proposal amendments

The original proposal is set out in section 2.2 of the proponent's referral supporting report (PTA 2020), which is available on the EPA website.

During the assessment process the EPA encouraged the proponent to identify avoidance and mitigation measures for the proposal in addition to those included in the original proposal.

The proponent requested changes to the proposal during the assessment. The changes were unlikely to significantly increase any impacts of the proposal and some reduced potential impacts on the environment. The EPA Chair's notice of 6 April 2021, consenting to the change, is available on the EPA website.

The consolidated and updated elements of the proposal which have been subject to the EPA's assessment are included in Table 1.

Proposal alternatives

The proponent undertook a preliminary assessment on the potential to realign the rail corridor to avoid key environmental values. It was considered that there were no viable alternatives that could realign the rail between Armadale and Byford that would lead to better environmental outcomes or the avoidance of key environmental values (PTA 2021).

The proponent did not undertake a comparison of the environmental impacts of the alternative alignments.

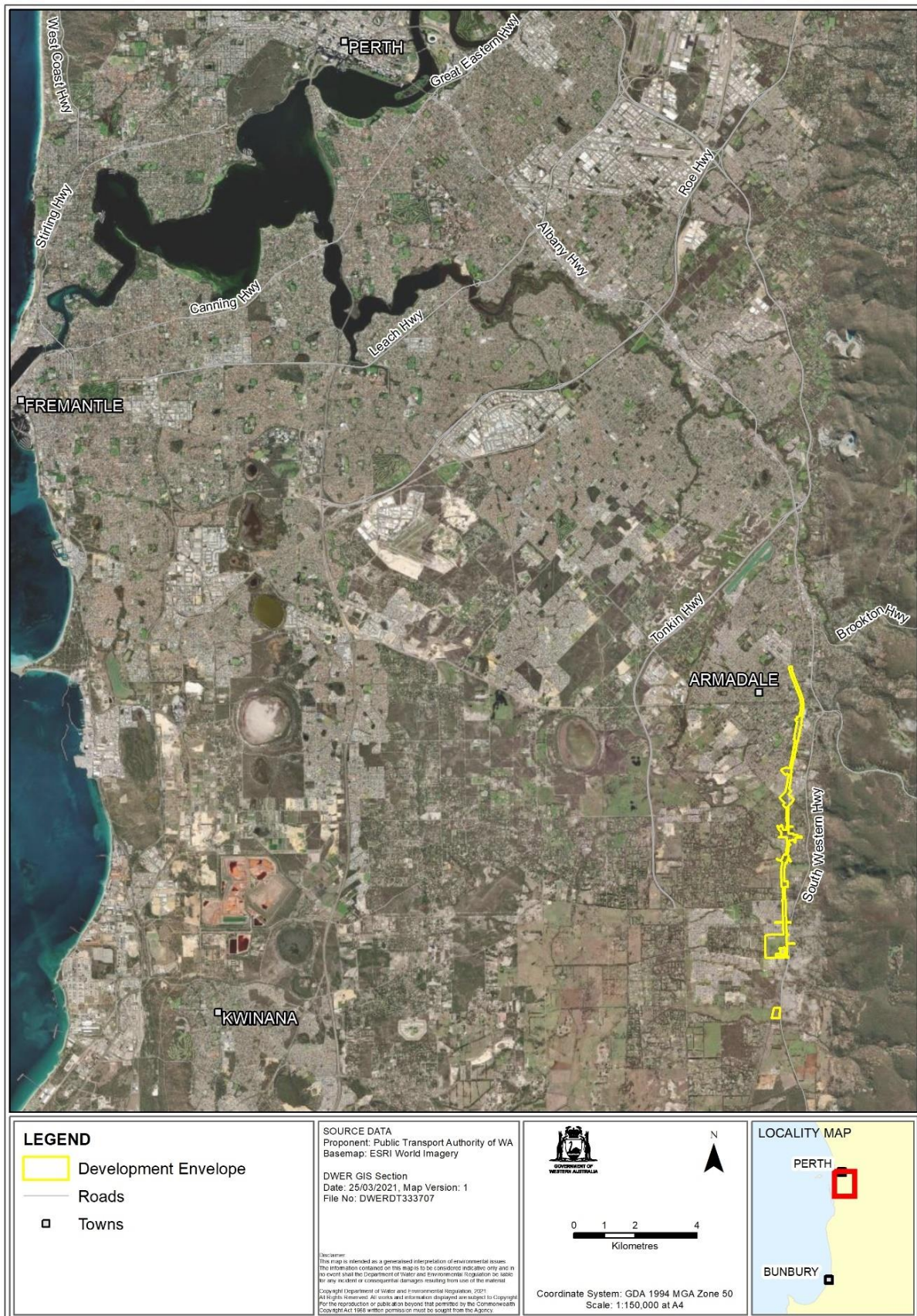


Figure 1: Project location



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Figure 2: Development envelope and disturbance footprint

2 Assessment of key environmental factors

This section includes the EPA's assessment of the key environmental factors. The EPA also evaluated the impacts of the proposal on other environmental factors (air quality, and greenhouse gas emissions) and concluded these were not key factors for the assessment. This evaluation is included in Appendix D.

2.1 Flora and vegetation

2.1.1 Environmental objective

The EPA's environmental objective for flora and vegetation is *to protect flora and vegetation so that biological diversity and ecological integrity are maintained* (EPA 2016a).

2.1.2 Investigations and surveys

The EPA advises the following investigations and surveys were used to inform the assessment of the potential impacts to flora and vegetation:

- Report for rail reserves in the Shire of Serpentine Jarrahdale, spring flora and vegetation survey and fauna and habitat assessment (available from Index of Biodiversity Surveys for Assessment (IBSA)) (GHD 2012)
- METRONET – Byford Extension part one flora and fauna assessment (appendix A of the referral and appendix C of the ERD) (AECOM 2020)
- Environmental advice Armadale train line platform and signalling upgrade program (Aurora 2020, provided as part of the response to submissions)
- Byford Rail Extension, flora and vegetation assessment (appendix B of the ERD) (GHD 2021b)
- Byford Rail Extension, Phytophthora Dieback occurrence assessment (appendix D of the ERD) (Glevan Consulting 2021).

The surveys were consistent with the *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b).

2.1.3 Assessment context: existing environment

As defined in the Interim Biogeographical Regionalisation for Australia, the proposal is situated within the Perth (SWA02) subregion of the Swan Coastal Plain region (Department of Sustainability, Environment, Water, Population and Communities 2013). The proposal is located in a highly urbanised setting with the exception of an area of rural residential properties in the suburbs of Wungong and Darling Downs.

The development envelope is 164.6 hectares (ha) of which 39.5 ha is vegetated. The 80.7 ha disturbance footprint contains 16 ha considered representative of native vegetation. Vegetation ranged in condition from completely degraded to very good, with a small (0.02 ha) area of excellent condition vegetation. Two Declared Pests under the *Biosecurity and Agriculture Management Act 2007* were recorded within the development envelope.

2.1.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in the response to submissions (RtS) (PTA 2021c).

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.1.5, 2.1.6, 2.1.7, and 2.1.9.

2.1.5 Potential impacts from the proposal

The proposal has the potential to have significant direct and indirect impacts on vegetation during construction and operation from:

- clearing of Guildford Complex, Threatened Ecological Communities (TECs), and Bush Forever
- spread of weeds and disease
- abstraction or dewatering activities
- changes to surface water regimes.

Issues were raised during the public consultation in relation to potential impacts to the Priority 2 species *Johnsonia pubescens* subsp. *cygnorum*. The species occurs across a range of approximately 1,400 square km between the suburb of Como and the town of Pinjarra. The Department of Biodiversity, Conservation and Attractions (DBCA) estimate the total population of the species at 2,201 individuals across 14 subpopulations. In their submission, the DBCA noted the potential for cumulative impacts to the species as a result of planned infrastructure developments.

The issue raised in relation to the Priority 2 species was addressed by the proponent. They noted that additional populations have been recorded during surveys for other projects and the recorded total population was closer to 2,500 individuals, with a potential cumulative impact to the species of 1,123 individuals.

Clearing for the proposal will directly impact three individuals and potentially indirectly impact a further two, all of which are newly recorded occurrences of the species. The EPA considered the impact to the Priority 2 flora species and concluded it is unlikely to be material provided clearing and disturbance extent is confined.

2.1.6 Avoidance measures

The proponent has designed the proposal to avoid impacts to flora and vegetation by:

1. designing the disturbance footprint to avoid clearing within the boundary of a known population of the threatened species *Diuris purdiei* (Threatened) (Purdie's donkey orchid)
2. narrowing the development envelope and disturbance footprint through the area adjacent to Lambert Lane Nature Reserve to avoid impacting the reserve

3. utilising previously disturbed areas for permanent infrastructure to avoid clearing of native vegetation as much as possible.

The issues raised during the public consultation in relation to potential impacts to the population of *Diuris purdiei* has been addressed through avoidance measure 1 which limits construction activities to within the footprint, avoiding impacts within the known population boundary.

In response to the issue raised by the DBCA during the public consultation regarding the potential for suitable habitat for *Diuris purdiei* to be impacted by the proposal, the proponent will be required to request an authorisation under section 40 of the *Biodiversity Conservation Act 2016* (BC Act) for inadvertent take for soil stored seed and underground tubers of the species if suitable habitat is determined to occur.

The issue raised during public consultation regarding avoiding impacts to Lambert Lane Nature Reserve has been addressed through avoidance measure 2 which defines the development envelope and disturbance footprint as outside the boundary of the Lambert Lane Nature Reserve.

2.1.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed the following measures to minimise impacts to flora and vegetation:

1. amending the development envelope and disturbance footprint resulting in a reduction of impact to vegetation by 34 ha (from 50 ha to 16 ha)
2. minimising the clearing required of the TECs from 5.24 ha to 2.74 ha
3. amending the development envelope and disturbance footprint resulting in a reduced clearing extent within Fletcher Park, Bush Forever site 264 and Bush Forever site 266
4. minimising clearing within Bush Forever site 350 through locating the disturbance footprint in a highly modified location
5. implementing a minimum separation distance of 50 m and 100 m from groundwater dependent vegetation where possible to minimise potential impacts of groundwater abstraction (see section 2.3)
6. mapping and demarcating areas of conservation significant flora to minimise clearing impacts as far as practicable
7. implementing hygiene measures, monitoring and weed control to limit the spread of weeds and disease and minimise indirect impacts to adjacent native vegetation.

The issues raised during the public consultation regarding the direct and indirect impacts on the TECs have been considered through minimisation measures 1, 2, and 3.

The issues raised during the public consultation regarding the potential impacts to TECs as a result of groundwater abstraction has been considered through minimisation measure 5.

2.1.8 Rehabilitation measures

The proponent has proposed to revegetate areas cleared during construction that are not required for permanent infrastructure or management access, and with consideration for operational safety requirements (PTA 2021). No rehabilitation has been proposed.

2.1.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values for flora and vegetation likely to be impacted by the proposal were vegetation communities and regionally significant vegetation.

TEC SCP 3a

SCP 3a *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain (SCP3a) is listed as a TEC with a status of Critically Endangered under the BC Act. The community is also listed under the EPBC Act as Endangered.

The community occurs on heavy soils on the eastern side of the Swan Coastal Plain in areas where groundwater is generally within 3 metres (m) of natural ground surface (DotEE 2017a). The community is likely to have a high dependence on groundwater. Clearing for agriculture across the range of the community has resulted in approximately 97% of all vegetation on the eastern side of the Swan Coastal Plain being cleared (DotEE 2017a).

DBCA has advised that approximately 192.6 ha of SCP3a is currently mapped across the Swan Coastal Plain, of which 100 ha has some form of protection, with 27 ha within the DBCA estate. Due to its very restricted distribution, no condition thresholds have been applied to the community and all areas meeting the description of SCP3a are considered habitat areas critical to its survival (DotEE 2017a).

Up to 2.26 ha of SCP3a will be directly impacted by the proposal. The majority of the community within the disturbance footprint is in good condition (1.68 ha). A further 0.02 ha is in excellent condition, 0.06 ha in very good condition, and 0.5 ha in degraded condition. An additional 2.79 ha of SCP3a may be indirectly impacted by the proposal. A number of infrastructure projects that are currently in the planning phase have the potential to further impact known occurrences of SCP3a across its range.

Likely residual impacts

The EPA considers the likely residual impacts of the proposal on flora and vegetation to be:

1. clearing of 2.26 ha of SCP 3a *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain TEC.

The EPA considered that the issues raised during the public consultation about potential direct and indirect impacts to the SCP3a TEC is likely to be a residual impact for the proposal.

The occurrences of SCP3a that will be directly impacted by the proposal in the vicinity of Lambert Lane Nature Reserve and Fletcher Park are narrow and linear, and within the existing rail corridor adjacent to larger, intact areas. The occurrence of SCP3a north of Larsen Road is an isolated fragment, and wholly within the railway reserve. The loss of 2.26 ha of the community is an unavoidable, incremental impact.

The EPA notes that the proponent amended the proposal during the assessment and has avoided impacting the large, intact remnant of the community within Larsen Lane Nature Reserve as well as minimising impact to the portion of the community that occurs within the railway reserve.

The EPA has assessed the residual impact to this TEC to be significant due to the cumulative impact on the community, its restricted distribution, and given all habitat areas are considered critical to its survival. The residual impact on this community aligns with the definition of significant residual impact which includes areas that are already defined as being critically impacted in a cumulative context (Government of Western Australia 2014).

The residual impact on this community needs to be able to be offset to ensure the environmental outcome is likely to be consistent with the EPA objective to *protect flora and vegetation so that biological diversity and ecological integrity are maintained*.

To offset the significant residual impact, the proponent is proposing to undertake on-ground management and revegetation of areas of SCP3a in adjacent or other nearby areas. The proposed offsets are likely to result in an improvement in the health and condition of those nearby remnants such that their resilience and condition should improve over time.

The proponent has further proposed to develop and implement a revegetation research plan at Fletcher Park, with the aim of advancing the practical knowledge of the restoration and enhancement of degraded areas of remnant occurrences of SCP3a. The EPA considers that a revegetation research plan could inform the development of cost-effective methods for rehabilitating and improving the buffers and resilience of remnant occurrences of the community. Offsets are further discussed in section 4.

The EPA has assessed that this is a significant residual impact that is likely to be able to be regulated through reasonable conditions (recommended condition 1, recommended condition 4) and counter-balanced by offsets, including a research component, so that the environmental outcome is likely to be consistent with the EPA's objective for flora and vegetation.

TEC SCP 3c

SCP 3c *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain (SCP3c) is listed as a TEC with a status of Critically Endangered under the BC Act. The community is also listed as Endangered under the EPBC Act.

Similarly to SCP3a, the community is known to occur on heavy soils on the eastern side of the Swan Coastal Plain. There is variation in the floristic composition of SCP3a and SCP3c, likely related to differences in water regime (DotEE 2017b). SCP3c is known to occur on drier sites compared to its counterpart (DotEE 2017b). The SCP3c community is under similar threats and pressures to SCP3a.

DBCA has advised that approximately 125.4 ha of SCP3c is currently mapped across the Swan Coastal Plain, of which 52.2 ha is in the DBCA estate or held freehold and is protected. Due to its very restricted distribution, no condition thresholds have been applied to the community and all areas meeting the description of SCP3c are considered habitat areas critical to its survival (DotEE 2017b).

Up to 0.48 ha of SCP3c will be directly impacted by the proposal; 0.22 ha in good condition and 0.26 ha in degraded condition. The proposal has the potential to indirectly impact a further 0.16 ha in good condition. A number of infrastructure projects that are currently in the planning phase have the potential to further impact known occurrences of SCP3c across its range.

Likely residual impacts

The EPA considers the likely residual impacts of the proposal on flora and vegetation to be:

2. clearing of 0.48 ha of SCP 3c *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain TEC.

The occurrence of SCP3c that will be directly impacted by the proposal is an isolated fragment, wholly within the railway reserve. The loss of 0.48 ha of this remnant of the community is an unavoidable, incremental impact. The EPA notes that the proponent has minimised the disturbance footprint in the vicinity of this occurrence to the extent practicable.

The EPA has assessed the residual impact to this TEC to be significant due to the cumulative impact on the community, its restricted distribution, and given all habitat areas are considered critical to its survival. The residual impact on this community aligns with the definition of significant residual impact which includes areas that are already defined as being critically impacted in a cumulative context (Government of Western Australia 2014).

The residual impact on this community needs to be able to be offset to ensure the environmental outcome is likely to be consistent with the EPA objective to *protect flora and vegetation so that biological diversity and ecological integrity are maintained*.

To offset the significant residual impact, the proponent is proposing on-ground management and revegetation of areas of SCP3c in other nearby areas of the community. The proposed offsets are likely to result in an improvement in the health and condition of those nearby remnants such that their resilience and condition should improve over time. Offsets are further discussed in section 4.

This is a significant residual impact that is likely to be able to be regulated through reasonable conditions (recommended condition 1) and counterbalanced by offsets so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

Guildford Complex

Approximately 7.5 ha of Guildford Complex occurs within the development envelope, of which up to 4.4 ha will be directly impacted by the proposal. Approximately 5.1% of the pre-European extent of Guildford Complex remains across the Swan Coastal Plain (Government of Western Australia (GoWA) 2019). Within the two local government areas that the proposal is located, 1.8% of the pre-European extent of the complex remains within the City of Armadale and 4.25% remains in the Shire of Serpentine-Jarrahdale (Government of Western Australia 2019).

All vegetation associated with the Guildford Complex is important given the restricted distribution and extent of the complex remaining across the Swan Coastal Plain. The EPA has assessed the residual impact to the Guildford Complex to be significant due to the severely restricted extent of the complex, the proportion remaining across the Swan Coastal Plain and the ongoing threat from several threatening processes, including land clearing.

Likely residual impacts

The EPA considers the likely residual impacts of the proposal on flora and vegetation to be:

3. clearing of 4.4 ha of vegetation associated with the Guildford Complex.

The EPA considered that the issue raised during the public consultation about impacts to Guildford Complex is likely to be a residual impact for the proposal.

The EPA has assessed the residual impact to Guildford Complex to be significant due to the cumulative impact on the community. The residual impact on this community aligns with the definition of significant residual impact which includes areas that are already defined as being critically impacted in a cumulative context (Government of Western Australia 2014). The residual impacts on this vegetation complex needs to be able to be counterbalanced to ensure the EPA meets its objective to maintain biodiversity.

To offset the significant residual impact, the proponent is proposing to undertake on-ground management in nearby areas of Guildford Complex. The on-ground management relates to maintaining the health and condition of vegetation associated with the Guildford Complex to prevent against further loss of vegetation associated with the complex. Without the offset there is the potential that the condition and health of this complex would decline over time from existing pressures and threats.

The EPA determined that the vegetation that will be directly impacted has a very high conservation significance regardless of condition rating given that the extent of the complex remaining across the Swan Coastal Plain is in the order of 5% of its pre-European extent. For this reason, the EPA considers that a 1:1 offset is appropriate

to counterbalance the direct impact to 4.4 ha of vegetation associated with the Guildford Complex.

The EPA considers that this is a significant residual impact that is likely to be able to be regulated through reasonable conditions (recommended condition 1) and counter-balanced by offsets so that the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.

Bush Forever

Three Bush Forever (BF) sites will be directly impacted by the proposal (see Table 2). The extent of BF 264 and BF 350 intersected by the proposal occur within gazetted railway reserves. The extent of the disturbance footprint within BF 266 is held freehold by the Commissioner for Railways. Each of the Bush Forever sites presently contain railway infrastructure. The total extent of impact to regionally significant vegetation within Bush Forever sites is 1.54 ha, primarily associated with TECs and/or Conservation Category Wetlands (CCWs).

The EPA notes the existing presence of the railway within the three Bush Forever sites and that the proposal is unlikely to increase impacts associated with fragmentation of regionally significant vegetation or disruption to regional ecological linkages. Further, the proposal will not fragment any extensive areas of remnant vegetation.

Table 2: Extent of each Bush Forever site directly impacted by the proposal

Bush Forever site	Site size (ha)	Extent of remnant vegetation within BF site (ha)	Extent of BF site in development envelope (ha)	Extent of BF site in disturbance footprint (ha)	Vegetated extent of BF site in disturbance footprint (ha)
264 Lambert Lane Bushland, Wungong	11.01	8.53	3.06	2.73	1.29
266 Wungong Brook, Byford	21.21	7.42	1.13	0.36	0.21
350 Byford to Serpentine Rail/Road Reserves and Adjacent Bushland	92.64	21.14	1.71	1.04	0.04

Likely residual impacts

The EPA considers the likely residual impacts of the proposal on flora and vegetation to be:

- clearing of 1.54 ha of regionally significant vegetation across three Bush Forever sites.

The EPA considered that the issue raised during the public consultation about potential impacts to Bush Forever is likely to be a residual impact for the proposal.

In considering the impacts to regionally significant bushland within Bush Forever, the EPA notes that there is a general assumption against clearing and that all reasonable steps should be taken to avoid and minimise impacts to bushland (WAPC 2010). There is also acknowledgement that some proposals may result in unavoidable adverse impacts on bushland (WAPC 2010).

The EPA has assessed the residual impact to Bush Forever to be significant. Consistent with the *WA Environmental Offset Guidelines 2014* (Government of Western Australia 2014), impact to areas reserved under statute or managed for the purpose of conservation would require an offset.

To offset the significant residual impact, the proponent is proposing to undertake on-ground management and revegetation in adjacent or other nearby areas of regionally significant vegetation. The proposed offsets are likely to result in an improvement in the health and condition of those nearby areas such that their resilience and condition should improve over time. Without the offset there is the potential that the condition and health of these areas would decline over time from existing pressures and threats.

The EPA determined that the vegetation that will be directly impacted has a very high conservation significance and thus consistent with previous assessments, any offset requirements should provide a net gain of at least 2:1 of like-for-like vegetation.

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 remaining areas of regionally significant bushland adjacent to the development envelope.

The residual impact on this community needs to be able to be offset to ensure the environmental outcome is consistent with the EPA objective *to protect flora and vegetation so that biological diversity and ecological integrity are maintained*.

This is a significant residual impact that can be regulated through reasonable conditions (recommended conditions 1, 3 and 4) and counterbalanced by offsets so that the environmental outcome is consistent with the EPA's objective for flora and vegetation.

Indirect impacts

Two Declared Pests under the *Biosecurity and Agriculture Management Act 2007* were recorded within the development envelope, *Rubus ulmifolius* (black berry) and *Moraea flaccida* (one-leaf cape tulip). The 43 black berry plants were recorded within the development envelope along Wungong Brook and were part of a larger population that extends west beyond the project boundary. The 10 one-leaf cape tulips were recorded within the disturbance footprint.

The aggressive weed species *Watsonia meriana* was also recorded within the development envelope. This species has the potential to invade adjacent native vegetation and impact biological diversity and ecological integrity.

One area of dieback infested vegetation was identified adjacent to the development envelope in the vicinity of Fletcher Park. The inadvertent spread of dieback has the potential to indirectly impact vegetation adjacent to the proposal.

Occurrences of SCP3a are associated with CCWs and are likely to be highly dependent on the availability of perched groundwater or surface water flow regimes (see section 2.3). Disruption to hydrological regimes has the potential to indirectly impact vegetation adjacent to the development envelope.

Likely residual impacts

The EPA considers the likely residual impacts of the proposal on flora and vegetation to be:

5. indirect impacts to flora and vegetation within 20 m of the development envelope in Lamber Lane, Bush Forever site 264 and Crown Reserve R14217.

The EPA considered that the issue raised during the public consultation about potential indirect impacts to adjacent vegetation is likely to be a residual impact for the proposal.

The potential indirect impacts need to be actively managed, especially in areas of good to excellent condition vegetation, to ensure the biological diversity and ecological integrity of the vegetation in the local area is not adversely impacted by implementation of the proposal.

The proponent will need to comply with regulations to manage declared weeds in accordance with the *Biosecurity and Agricultural Management Act 2007* and comply with any additional approvals, permits and licenses that may be required under the BC Act in relation to works at Wungong Brook.

Due to the high environmental values in areas adjacent to the development envelope, the EPA has recommended condition 4 to ensure indirect impacts are managed.

The EPA advises that the residual impact from indirect impacts should be subject to implementation conditions (recommended condition 4) to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.

2.1.10 Summary of flora and vegetation assessment and recommended conditions

The EPA has considered the likely residual impacts of the proposal on flora and vegetation. In doing so, the EPA has considered whether reasonable conditions could be imposed, or other decision-making processes can ensure consistency with the EPA factor objective. The EPA assessment findings are presented in Table 3.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed.

The EPA has also had regard to its conclusions in other recent METRONET assessments, including Malaga to Ellenbrook Rail Works (Report 1690) and Thornlie-Cockburn Link (Report 1646).

Table 3: Summary of assessment for flora and vegetation

Residual impact		Assessment finding	Recommended conditions and DMA regulation
1.	2.26 ha of SCP 3a <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain Threatened Ecological Community will be cleared.	Significant residual impact is likely to be able to be regulated through reasonable conditions and counterbalanced by offsets so the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 4 (indirect impacts) • 6 (offsets)
2.	0.48 ha of SCP 3c <i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain Threatened Ecological Community will be cleared.	Significant residual impact is likely to be able to be regulated through reasonable conditions and counterbalanced by offsets so the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 6 (offsets).
3.	4.4 ha of Guildford Complex will be cleared. Approximately 5% of the pre-European extent of this vegetation Complex remains on the Swan Coastal Plain.	Significant residual impact is likely to be able to be regulated through reasonable conditions and counterbalanced by offsets so the environmental outcome is likely to be consistent with the EPA objective for flora and vegetation.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 6 (offsets).
4.	1.54 ha of regionally significant vegetation will be cleared across three Bush Forever sites	Significant residual impact is likely to be able to be regulated through reasonable conditions and counterbalanced by offsets so the environmental outcome is consistent with the EPA objective for flora and vegetation.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 3 (Wungong Brook) • 4 (indirect impacts) • 6 (offsets).

Residual impact		Assessment finding	Recommended conditions and DMA regulation
5.	Indirect impacts to flora and vegetation within 20 m of the development envelope in Lamber Lane, Bush Forever site 264 and Crown Reserve R14217	Residual impact from indirect impacts should be subject to implementation conditions to ensure the environmental outcome is consistent with the EPA objective for flora and vegetation.	Regulated through recommended condition 4 (indirect impacts).

2.2 Terrestrial fauna

2.2.1 Environmental objective

The EPA's environmental objective for terrestrial fauna is *to protect terrestrial fauna so that biological diversity and ecological integrity are maintained* (EPA 2016c).

2.2.2 Investigations and surveys

The EPA advises the following investigations and surveys met the EPA's requirements and were used to inform the assessment of the potential impacts to terrestrial fauna:

- Byford Rail Extension Part One AECOM Flora and Fauna Assessment Final Rev0 (Appendix C of the environmental review document) (AECOM 2020)
- Bamford - Byford Rail Extension Fauna Assessment Spring 2020 Rev4 (Appendix E of the environmental review document) (Bamford 2021)
- Byford Rail Extension Black Cockatoo Hollow Assessment Rev0 (Appendix F of the environmental review document) (Kirkby 2021)
- GHD BRE Consolidated Terrestrial Fauna Report April 2021 (Appendix G of the environmental review document) (GHD 2021)
- Carters Mussel Stream Environment and Water BRE Targeted Fauna Survey Rev0 Final - 18 January 2021 (Appendix H of the environmental review document) (PTA 2021d)
- Short Range Endemic SRE and Conservation Significant Invertebrate Fauna (Appendix I of the environmental review document) (PTA 2021e).

2.2.3 Assessment context: existing environment

The development envelope is surrounded by extensively cleared and developed areas but there are remnants of native vegetation (Lambert Lane Nature Reserve, Fletcher Park and Bush Forever sites 264, 266 and 350) that provide ecological linkages and include areas of varying condition wetlands. These areas support a variety of terrestrial fauna, several of which are protected under state and national legislation. The established rail reserve is predominantly a mosaic of highly modified or degraded habitats.

The development envelope intersects several aquatic habitats, including Wungong Brook, Neerigen Brook, Beenyup Brook and multiple drains. The majority have historically been modified as part of clearing and agricultural land use and drainage control. Wungong Brook is the largest of the watercourses.

Conservation significant terrestrial fauna recorded during field surveys within the development envelope include Baudin's cockatoo, Carnaby's cockatoo, forest red-tailed black cockatoo, Carter's freshwater mussel (mussel) and quenda. There are 18 other conservation significant species that are identified as having varying potential to occur within the development envelope. The likelihood of these species occurring in the development envelope ranges through vagrant, irregular visitor,

regular visitor and potential resident. Table 30 of the proponent's ERD (PTA 2021a) provides a detailed list of the species and likelihood of occurrence.

2.2.4 Consultation

Matters raised during stakeholder consultation and the proponent's responses are provided in section 4 of the proponent's ERD (PTA 2021a) or in the RtS (PTA 2021c).

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.2.5, 2.2.7 and 2.2.9.

2.2.5 Potential impacts from the proposal

The proposal has the potential to have significant direct and indirect impacts on terrestrial fauna during construction and operation from:

- clearing of 80.7 ha of fauna habitat in varying condition
- degradation of habitat from introduction and increased spread of weeds and/or disease and altered hydrological regimes
- changes in feral animal abundance and/or movement.

The proposal will also contribute to cumulative impacts on terrestrial fauna values across the Perth metropolitan area. There are three other major development projects in the immediate surrounds of the proposal and nine native vegetation clearing permits either currently under assessment or have been granted in areas adjacent to the proposal, totalling 30.7 ha of clearing in addition to the proposal.

2.2.6 Avoidance measures

The proponent states the proposal has been designed to avoid fauna habitat as much as possible. For example, by utilising the existing Armadale and Australind rail corridor the proponent has avoided creating a new corridor barring fauna movement. The location of temporary construction areas will be located within existing cleared or completely degraded areas adjacent or near the rail corridor wherever practicable, avoiding areas of habitat.

2.2.7 Minimisation measures (including regulation by other DMAs)

In April 2021 the proponent changed the proposal during the EPA's assessment to reduce clearing of native vegetation by 34 ha (50 ha down to 16 ha), a 46% decrease in clearing, by reducing and better defining the disturbance footprint. The proponent has also stated they will investigate further minimising direct impacts during the detailed design phase by avoiding additional fauna habitat areas.

The existing Wungong Brook Bridge, which currently has a mid-stream support pillar, will be replaced with two single span bridges, minimising impact to the water course and mussel habitat. Mussel individuals that would have been directly and indirectly impacted during bridge construction will be translocated upstream.

The proponent has proposed the following measures to minimise impacts to terrestrial fauna:

- during black cockatoo breeding season (1 July to 31 December), appropriately qualified, licenced and black cockatoo experienced terrestrial fauna spotter(s) will inspect all potential nesting trees with hollows within seven days prior to clearing of potential nesting trees
- if black cockatoos are found to be using a hollow, a 10 m buffer radius will not be cleared around the tree until the hollows are no longer being used by the black cockatoos
- a fauna specialist will conduct pre-clearing trapping and relocating of ground dwelling conservation significant fauna to neighbouring suitable habitat or locations confirmed with DBCA no more than seven days prior to clearing activities
- open trenches will be inspected twice daily and any trapped fauna removed by an appropriately qualified person, egress points and fauna refuges will be provided at intervals not exceeding 50 m
- directional clearing will be undertaken to allow fauna species present to move into adjacent areas
- water sensitive urban design will be applied to manage the quality of surface water runoff originating from hard stand areas such as carparks and train stations
- silt curtains and erosion matting will be implemented to minimise risk of erosion and sedimentation on mussels and habitat
- installation of drainage structures to manage, maintain or improve existing surface water drainage from the proposal and incorporate erosion protection measures will minimise impacts to aquatic habitats
- erected fencing either side of the rail line will prevent fauna accessing the track minimising vehicle or train strike
- installation of a 300 mm to 1500 mm culvert crossing at natural ground level to facilitate fauna movement between east and west habitat areas.

Any trapping and relocation, or inadvertent take, of listed fauna will need to be undertaken in accordance with a licence issued by DBCA required under the BC Act. This includes the translocation of mussel individuals.

A development approval application will be required for any works that impact the development control area defined in the *Swan and Canning Rivers Management Act 2006*. The development approval application will need to be lodged with the Western Australian Planning Commission which may be referred to DBCA for review and comment, with provision to recommend conditions to the Commission.

Although unlikely, there is potential indirect impacts to localised mussels from small scale and short duration dewatering of the superficial aquifer for bridge pile caps. Dewatering will be subject to approval under the *Rights in Water and Irrigation Act 1914* (RIWI Act) to manage water quality which will indirectly support mussel habitat.

The EPA notes the proponent has not provided a terrestrial fauna management plan for the proposal during the EPA's assessment. The proponent's ERD (PTA 2021a) and RtS (PTA 2021c) state a Construction Environmental Management Plan (CEMP) will be prepared prior to commencement of construction to address all significant construction related risks, including those to fauna. The EPA expects the PTA to prepare the CEMP in close consultation with DBCA and local government authorities to ensure adequate construction and operation management measures are in place to minimise impacts to terrestrial fauna.

2.2.8 Rehabilitation measures

The EPA notes the proponent has not committed to rehabilitating but will revegetate cleared areas, including riparian vegetation, that are not required for future infrastructure or management access. To minimise the spread of weeds during revegetation activities, topsoil will be managed to reduce weeds in the seed bank prior to reuse for landscaping.

2.2.9 Assessment of impacts to environmental values

The EPA considered that the key terrestrial fauna values likely to be impacted by the proposal are the three black cockatoo species (Baudin's cockatoo, Carnaby's cockatoo and forest red-tailed cockatoo) and Carter's freshwater mussels (mussels).

The residual impacts are to:

- black cockatoos from permanent clearing of habitat
- mussels from habitat disturbance, changed hydrological regimes and increased sedimentation.

Indirect impacts such as habitat degradation from increased spread of weeds and disease and increased feral animal abundance and/or movement could also cause residual impacts.

Black cockatoo species

All three conservation significant black cockatoo species were recorded in the development envelope. The three species are subject to recovery plans (DPaW 2013 and DEC 2008) that outline the key threatening processes to the species.

The linear corridor clearing wide point is 500 m, but generally no wider than 100 m. The EPA considers the corridor is unlikely to fragment black cockatoo populations and will not fragment existing native vegetation to an extent that creates a barrier to movement of black cockatoos as they are highly mobile.

Foraging habitat

Across the development envelope and footprint there are large amounts of negligible value foraging habitat for all three black cockatoo species that provide very little to no foraging value. This is particularly evident in previously cleared areas for light industrial areas and hard surfaces such as existing roads, hardstands and buildings.

Negligible value foraging habitat was not considered during the EPA's assessment of impacts to black cockatoo foraging habitat.

The proposal will result in the clearing of approximately:

- 8.65 ha of foraging habitat for Baudin's cockatoo (comprised entirely of moderate foraging habitat)
- 19.3 ha of foraging habitat for Carnaby's cockatoo (comprised of 8.65 ha of moderate value and 10.67 ha of low value foraging habitat)
- 61.1 ha of foraging habitat for forest red-tailed black cockatoo (comprised of 8.65 ha of moderate to high value and 52.49 ha of low value foraging habitat).

The EPA notes the loss of 61.1 ha of forest red-tailed black cockatoo foraging habitat overlaps with the 19.3 ha of Carnaby's black cockatoo foraging habitat and 8.65 ha of Baudin's cockatoo habitat. The EPA notes the habitat lost is predominately of low to moderate value; are thin linear strips within the rail corridor adjacent to larger, intact areas; and attract low flying black cockatoos close to operational trains.

There is extensive quality foraging habitat for the three species of black cockatoo to the east of the proposal, reserved in State Forest and regional parks, with an estimated 31,754 ha of regional foraging habitat within 12 km of the development envelope. Of this, 26,914 ha is forest on the nearby Darling Escarpment (Bamford 2021). The proposed clearing equates to a 0.2% reduction in regional foraging habitat for black cockatoo species.

Carnaby's cockatoo foraging habitat within 6 km of roost and nest sites is considered critical to supporting the species, which will follow vegetation corridors and actively avoid cleared and open areas when moving between roosting, water and food resources (EPA 2019). A gap of no more than 4 km between patches of black cockatoo foraging habitat is expected as the development envelope is in close proximity to a number of areas that contain similar habitat, if not better quality, to the footprint (AECOM 2020; Bamford 2021).

Potential breeding trees

The proposal is outside the Baudin's cockatoo modelled breeding range (the Warren bioregion and southern Jarrah forests). The proposal sits slightly west of forest red-tailed black cockatoo breeding range, the closest known location is west of Armadale. The proposal occurs within the Carnaby's cockatoo known breeding range, with one potential active breeding tree approximately 30 m west of the footprint near Lambert Lane was recorded.

336 potential black cockatoo breeding trees were recorded within the development envelope, with 139 (41.4%) within the footprint comprised of 131 potential breeding trees with no hollows (94.2%), and eight trees with hollows (5.8%) but are not currently suitable for black cockatoos (Kirkby 2021).

There are extensive potential breeding trees for Carnaby's cockatoo and forest red-tailed black cockatoo to the east of the proposal reserved in State Forest and regional parks.

During clearing activities, there is potential for direct impacts to black cockatoos utilising suitable breeding trees. The proponent has committed to having qualified fauna spotters survey and inspect potential breeding trees seven days prior to clearing, with any trees with hollows in use to be avoided and given a 10 m buffer until the hollow is no longer being used.

Roosting habitat

There are no known roost sites located within the footprint for any of the three species. Birdlife Australia has recorded three confirmed roosting locations within approximately 500 m of the development envelope, two of which are confirmed as forest red-tailed cockatoo roost sites. These roosting sites are located towards the southeast of the development envelope and appear to be located in remnant trees within suburbia.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on terrestrial fauna to be:

1. direct impacts to 8.65 ha of moderate value foraging habitat for Baudin's cockatoo
2. direct impacts to 8.65 ha of moderate value foraging habitat for Carnaby's cockatoo
3. direct impacts to 8.65 ha of moderate to high value foraging habitat for forest red-tailed black cockatoo
4. loss of up to 139 potential black cockatoo breeding trees (131 with no hollows, and eight with unsuitable hollows)
5. direct impacts to black cockatoo's using hollows during clearing activities.

The EPA does not consider there to be a residual impact to foraging habitat below moderate quality as this foraging habitat mapping in the proponent's surveys was mainly cleared paddocks and grass. This low quality habitat is not significant in the context of this proposal and does not require offsetting.

The EPA notes the habitat proposed to be lost is predominately of low to moderate value; are thin linear strips within the rail reserve adjacent to larger intact areas; and attract the low flying black cockatoo close to operational trains, with bird strike a key threatening process to the species. As such, the EPA has assessed there to be a residual impact only to the smaller extent of moderate or higher value foraging habitat and potential breeding trees proposed to be cleared. There is no residual impact to habitat value below moderate.

The EPA has assessed these residual impacts to represent a significant residual impact due to the permanent loss and the cumulative impact occurring to conservation significant black cockatoo species, consistent with the definition of significant residual impacts regarding rare and endangered animals (Government of Western Australia 2014). The EPA also notes DBCA and the Department of

Agriculture, Water and Environment (DAWE) advice that the residual impacts to listed black cockatoo species are likely to be significant.

The significant residual impacts on this species need to be able to be offset to ensure the likely environmental outcome is unlikely to be inconsistent with the EPA objective to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

The EPA notes the likely environmental outcomes to be expected from proposed black cockatoo offsets relate to maintaining and improving the health and condition of similar habitats on other lands, to a level that is better than the impacted areas. Without the proposed offsets it is likely that the condition and health of these fauna habitats would decline over time from existing threats and pressures.

It is also noted that the areas to receive the offset actions are larger than the extent of the significant residual impacts and are appropriately proportionate.

These are significant residual impacts that are likely to be able to be regulated through reasonable conditions (recommended condition 1) and counter-balanced by offsets (recommended condition 6) so that the environmental outcome is likely to be consistent with the EPA's objective for terrestrial fauna.

Carter's freshwater mussel

Mussels were recorded during surveys within and adjacent to the development envelope in Wungong Brook. Salinity, water pollutants and sedimentation are threatening processes to mussels (Klunzinger et al. 2015).

The density of mussels recorded within the development envelope was variable (1 to 12 mussels per square meter), but the mean density was low (2.6 mussels per square meter). Either side of the development envelope in Wungong Brook had similar mean densities (upstream 2.6 and downstream 2.5 per square meter). This is consistent with other south west watercourse densities (1 to 15 mussels per square meter) (Klunzinger 2012).

When focusing within the narrower rail corridor limits at Wungong Brook mussels were a lower density (0.6 per square meter) than adjacent sections of the brook. The rail corridor has lower habitat suitability due to no riparian vegetation (compared to upstream and downstream areas) and is degraded from historical disturbance (i.e. presence of gravel and concrete from existing bridge footings).

The new single span bridges do not require footings within the Wungong Brook bed during construction or operation. There is potential for reduced water and habitat quality from construction, temporary dewatering, groundwater abstraction for construction water, removal of an existing bridge pylon, removal of riparian vegetation and vehicle movements.

The dewatering is small scale and short term and is within clay soils reducing drawdown affects away from the dewatering location. Construction abstraction bores are proposed to be distant from Wungong Brook at Eleventh Road and Byford

Station and avoid reducing superficial aquifer levels by sourcing water from deeper semi-confined and confined aquifers (i.e. the Leederville or Yarragadee).

A CEMP will be prepared requiring mitigation measures such as silt curtains, erosion matting and gross pollutant traps minimising reduced water quality impacts. Dewatering, abstraction of groundwater and any bed and bank disturbance will be subject to approval under the RIWI Act, whilst not able to directly condition management of mussels, these approvals will require management of water quality which will indirectly support mussels and their habitat. Construction in Wungong Brook will also be subject to development approval processes, with potential DBCA input, under the *Swan and Canning Rivers Management Act 2006*.

To avoid potential impacts the proponent has committed to translocating mussels away from areas of direct disturbance and from downstream (indirect impacts) to suitable habitat upstream. The proponent provided a draft translocation strategy as attachment 3 to the RtS (PTA 2021c). Translocating the mussels will require a licence to take under the BC Act. The draft translocation strategy will be refined and submitted to DBCA with the application for a licence prior to construction activities occurring at Wungong Brook.

The EPA is of the view that the section of Wungong Brook to be disturbed includes a minor amount of surrounding riparian vegetation (0.4 ha), with predominately low quality and degraded habitat from historical development. There is potential for higher quality habitat to occur over time around the new bridges with the proponent's riparian revegetation commitments. Noting the adjacent higher quality riparian habitat supporting denser mussel populations and the translocation of potentially impacted mussels upstream, the EPA considers the proposal is consistent with the EPA objective for terrestrial fauna.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on terrestrial fauna to be:

6. unlikely to be material impacts to mussels provided minimisation measures are complied with.

The EPA advises that the residual impact to mussels should be subject to implementation conditions (recommended condition 3) and can be subject to statutory decision-making processes, without regulatory duplication, to ensure the environmental outcome is consistent with the EPA objective for terrestrial fauna.

Indirect impacts

Habitat within the development envelope is heavily infested with weeds (Bamford 2021), including areas where the canopy is intact (eg. Wungong Brook and some rail reserve sections). Feral animals such as fox, cats, rabbits and dogs were recorded during fauna surveys.

The risks associated with increase spread of weeds, disease and/or soil pathogens are low and can be effectively managed by industry standard procedures committed

to by the proponent, listed under minimisation measures in section 2.2.7 above. However, due to the high environmental values in areas adjacent to the development envelope the EPA has recommended condition 4 to ensure indirect impacts are managed.

The proposal is not expected to cause an increase in the abundance of feral animals because there will be no changes to available food sources. Changes to fauna movement is possible with existing at-grade line crossings (level crossings) replaced with grade separated crossings (raised crossings) and additional rail corridor fencing installed. The EPA considers these potential movement pattern changes are unlikely to have a material effect on fauna or habitats.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on terrestrial fauna to be:

7. indirect impacts to fauna habitat outside the development envelope in Lambert Lane Nature Reserve, Bush Forever site 264 and Crown Reserve R14217.

The EPA advises that the residual impact from indirect impacts should be subject to implementation conditions (recommended condition 4) to ensure the environmental outcome is consistent with the EPA objective for terrestrial fauna.

2.2.10 Summary of terrestrial fauna assessment and recommended conditions

The EPA has considered the likely residual impacts of the proposal. In doing so, the EPA has considered whether reasonable conditions could be imposed or other decision-making processes can mitigate potential inconsistency with the EPA factor objective. The EPA assessment findings are presented in Table 4.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed.

The EPA has also had regard to its conclusions in other recent METRONET assessments, including Malaga to Ellenbrook Rail Works (Report 1690) and Thornlie-Cockburn Link (Report 1646).

Table 4: Summary of assessment for terrestrial fauna

Residual impact		Assessment finding	Recommended conditions and DMA regulation
1.	Direct impacts to 8.65 ha of high value foraging habitat for Baudin's cockatoo.	Significant residual impact is likely to be able to be regulated through reasonable conditions and counter-balanced by offsets so the environmental outcome is	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 4 (indirect impacts) • 6 (offsets).

Residual impact		Assessment finding	Recommended conditions and DMA regulation
		likely to be consistent with the EPA objective for terrestrial fauna.	
2.	Direct impacts to 8.65 ha of moderate value foraging habitat for Carnaby's cockatoo.	Significant residual impact is likely to be able to be regulated through reasonable conditions and counter-balanced by offsets so the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 4 (indirect impacts) • 6 (offsets).
3.	Direct impacts to 8.65 ha of moderate to high value foraging habitat for forest red-tailed black cockatoo.	Significant residual impact is likely to be able to be regulated through reasonable conditions and counter-balanced by offsets so the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 4 (indirect impacts) • 6 (offsets).
4.	Loss of up to 139 potential black cockatoo breeding trees (131 with no hollows, and eight with unsuitable hollows).	Significant residual impact is likely to be able to be regulated through reasonable conditions and counter-balanced by offsets so the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 4 (indirect impacts) • 6 (offsets).
5.	Direct impacts to black cockatoo's using hollows during clearing activities.	Residual impact should be subject to implementation conditions to ensure the environmental outcome is likely to be consistent with the EPA objective for terrestrial fauna.	Regulated through recommended condition 2 (terrestrial fauna).

Residual impact		Assessment finding	Recommended conditions and DMA regulation
6.	Unlikely to be material impacts to mussels provided minimisation measures are complied with.	Residual impact to mussels should be subject to implementation conditions and can be subject to statutory decision-making processes to ensure the environmental outcome is consistent with the EPA objective for terrestrial fauna	<p>Regulated through recommended condition 3 (Wungong Brook).</p> <p>Development approval for impact within the Development Control Area under the <i>Swan and Canning River Management Act 2006</i>.</p> <p>RIWI Act for any dewatering, abstraction or bed and bank disturbance to manage water quality which will indirectly support mussel habitat.</p> <p>BC Act licence to take issued by DBCA.</p>
7.	Indirect impacts to fauna habitat outside the development envelope in Lambert Lane Nature Reserve, Bush Forever site 264 and Crown Reserve R14217.	Residual impact from indirect impacts should be subject to implementation conditions to ensure the environmental outcome is consistent with the EPA objective for terrestrial fauna.	Regulated through recommended condition 4 (indirect impacts).

2.3 Inland waters

2.3.1 Environmental objective

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* (EPA 2018).

2.3.2 Investigations and surveys

The EPA advises the following investigations and surveys met the EPA's requirements and were used to inform the assessment of the potential impacts to inland waters:

- Byford Rail Extension: Wetland Assessment (Appendix J of the environmental review document) (Stream Environment and Water Pty Ltd 2021)
- METRONET Byford Rail Extension Strategic Hydrogeological Assessment (Appendix K of the environmental review document) (Golder 2021a)
- Byford Rail Extension Groundwater and Surface Water Level Monitoring Event Technical Memo (Appendix L of the environmental review document) (Golder 2021b).

2.3.3 Assessment context: existing environment

Surface water

Runoff from the Darling Scarp flows to the west across the development envelope along three natural drainage lines; Neerigen, Wungong and Beenyup brooks, and four local artificial drains, from north to south.

Surface water is mainly present during the wet season due to runoff from the Darling Scarp. After the wet season surface water is present in the brooks and drains due to groundwater inflow from the superficial aquifers in areas where the watertable is higher than the base of the brooks or drains.

Wungong Brook

The proposal traverses Wungong Brook, a regionally significant watercourse. It is classed as a CCW and generally flows all year round, as artificial releases from Wungong Dam in summer and autumn partially sustain the brook. Wungong Brook supports populations of Carter's freshwater mussel within, up and down stream of the development envelope. Vegetation that grows in association with Wungong Brook represents an aquatic groundwater dependant ecosystem. Wungong Brook is also a registered Aboriginal Site (Site ID 3512) and is part of Bush Forever site no. 266.

Surface water is abstracted from Wungong Brook by three licensed users, one upstream and two downstream.

Groundwater

Groundwater occurs within the development envelope in a superficial aquifer including the Guildford Formation and superficial alluvial and colluvial deposits associated with streams such as Wungong Brook. Groundwater also occurs in deep sedimentary deposits including the Leederville Formation and Cattamarra Coal Measures.

Groundwater is recharged from rainfall infiltration across the development envelope and stream flows where the watertable is below the bottom of the flow channel.

The watertable within the development envelope is between 1.5 m and 17.7 m below ground level. Estimated maximum groundwater levels are within 3 m of ground level, which is the maximum depth of the proposal's excavations, at the road over rail bridge at Eleventh Road, the Wungong Brook rail bridge and Byford Station.

There are five groundwater licensees within the development envelope and 11 within 100 m of it. These licensees draw groundwater from the superficial, Leederville and Yarragadee aquifers.

Wetlands

There are 13 wetlands mapped within the development envelope:

- eight are classified as CCWs (5.49 ha)
- two are classified as Multiple Use Wetland (MUW) (108.8 ha)
- three are classified as Resource Enhancement Wetlands (REW) (0.73 ha).

Seven wetlands are intersected by the disturbance footprint (see Table 5).

Table 5: Extent of wetlands within the disturbance footprint

Management category unique feature identifier (UFI) (Name)	Area within the footprint (ha)
CCW UFI 12149	0.19
CCW UFI 12150	0.08
CCW UFI 12184	0.46
CCW UFI 14179	0.34
CCW UFI 15120	2.38
CCW UFI 15464 (Lambert Lane Bushland)	0.03
MUW UFI 15382	1.83
MUW UFI 15797	50.07

The wetlands are all part of the Keysbrook consanguineous suite of wetlands and are a combination of palusplain and channel wetlands.

Five wetlands, including those associated with Fletcher Park and Wungong Brook, occur close to the development envelope and may be indirectly impacted by the proposal from changes to water quality or hydrology.

Wetlands within and near the development envelope have been altered through historical clearing and modification of hydrology. They are dependent on the presence of surface water and groundwater, with seasonal variations in levels, flow rates and quality.

Wetland values are retained where native vegetation and ecosystems are intact and are now considered to be of elevated conservation significance and coincide with CCWs. Wetlands and wetland vegetation are likely to be utilising groundwater to meet some of their water requirements where groundwater is shallow. Where groundwater is deeper, direct rainfall and surface water are likely to be sustaining wetlands.

Wetlands within Fletcher Park, Lambert Lane Nature Reserve and associated with Wungong Brook were identified as retaining high environmental and wetland values.

2.3.4 Consultation

The key matters raised during the EPA's public review period in relation to inland waters are listed below. The proponent has responded to these matters in the RtS document (PTA 2021c):

- the potential impacts to Wungong Brook from dewatering
- degradation of Wungong Brook from the clearing of riparian vegetation associated with the brook
- the requirement for adequate management plans to ensure impacts to Wungong Brook and high value wetlands are identified and mitigated during both construction and operation of the proposed rail line
- potential impacts of groundwater drawdown on groundwater dependent ecosystems (GDEs)
- management of potential acid sulfate soils (ASS) that may affect GDEs and aquatic ecosystems in the area
- water contamination or chemical alteration from abstraction or dewatering activities.

The key issues raised during the public consultation on the proposal and how they have been considered in the assessment are described in sections 2.3.5, 2.3.7, 2.3.8 and 2.3.9.

2.3.5 Potential impacts from the proposal

The construction of the proposal has the potential to impact on inland waters from:

- temporary abstraction and dewatering, decreasing groundwater availability and quality of surface water and interrupting surface water flow

- groundwater re-injection at Wungong Brook adversely affecting groundwater and surface water
- alteration of the shape of the bank at Wungong Brook to enable safe access to the brook by construction crews and machinery
- alteration of surface water flow paths during construction from the removal of existing central pylon at Wungong Brook and ground disturbing activities
- 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 existing groundwater users.

The ongoing operation of the proposal has the potential to impact on inland waters from:

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

2.3.6 Avoidance measures

The proponent has designed the proposal to avoid impacts to inland waters by avoiding disturbance to a CCW (UFI 15470) that occurs within Fletcher Park. This wetland retains intact native vegetation and is part of a Bush Forever site supporting the occurrence of the threatened ecological community SCP3a *Corymbia calophylla* – *Kingia australis* woodlands on heavy soils.

2.3.7 Minimisation measures (including regulation by other DMAs)

The proponent has proposed the following measures to minimise impacts to inland waters:

- adopting water sensitive urban design principles
- preparing and implementing a Construction Environmental Management Plan and Water Operating Strategy
- implementing sediment control measures, including silt curtains and erosion matting, as required
- temporarily containing surface water flows in sediment basins and releasing along existing drainage lines
- placing water supply abstraction bores at least 50 m, or where practicable, up to 100 m away from mapped wetlands and existing bores
- replacing the existing Wungong Brook bridge with two single span bridges to minimise impact to the watercourse

- implementing a 20 m buffer around CCWs and REWs within the development envelope
- minimising impact to CCW UFI 15120
- restoring Wungong Brook bed and banks outside of built infrastructure following removal of existing pylon and bridge works
- re-injecting dewatered effluent.

The EPA has determined, on advice of the Department of Water and Environmental Regulation (DWER), that impacts to groundwater and surface water quality from the proposal activities can be adequately managed under the RIWI Act through licenses to construct bores and abstract groundwater.

2.3.8 Rehabilitation measures

The proponent has committed to restoring the bed and banks of Wungong Brook by revegetating cleared riparian vegetation, outside of built infrastructure, following the removal of existing pylon and bridge works (PTA 2021).

2.3.9 Assessment of impacts to environmental values

The EPA considered that the key environmental values for inland waters likely to be impacted by the proposal are Wungong Brook and CCWs.

The residual impacts are to:

- Wungong Brook from construction activities
- CCWs from permanent clearing.

Indirect impacts such as increased sediment loads and change in water quality could also cause residual impacts.

Surface water

The ecological and hydrological functions of Wungong Brook may be impacted by the proposal construction activities which will occur over a period of several months, due to the removal of the existing central pylon and temporary alterations of flow paths to protect construction sites. To minimise impacts to Wungong Brook, the proponent will minimise access to the brook through the establishment of 20 m buffer zones along the brook.

Ground disturbing activities at other sites will temporarily impact surface water flows. As a result of construction activities there will be potential short-term diversion of drainage lines, reducing water flows downstream. The diverted flows will be temporarily contained in sediment basins and allowed to leave the site along existing drainage lines to assist in maintaining downstream environments (PTA 2021).

There is potential for re-injected water to discharge to Wungong Brook several hundred metres downstream of the bridge site. If this occurs, it will take place for several months during and after the period that the reinjection area is active. As the

quality of groundwater and surface water are similar, the EPA considers the impacts associated with the re-injection of excess dewater to be insignificant.

A CEMP will be prepared requiring mitigation measures such as silt curtains, erosion matting and gross pollutant traps to minimise water quality impacts. Any bed and bank disturbance will be subject to approval under the RIWI Act and construction in Wungong Brook will be subject to development approval, under the *Swan and Canning Rivers Development Act 2006*.

The EPA has assessed that the minimisation measures are likely to be adequate to ensure there are no significant impacts to these functions as a result of the proposal.

The Wungong Brook is not likely to be materially impacted by the proposal because of the proponent's minimisation measures.

The EPA has assessed the residual impacts to surface water, if managed as proposed, are likely to be consistent with its objective to maintain the surface water hydrological regimes and quality so that environmental values are protected.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on inland waters to be:

1. unlikely to be significant impacts to Wungong Brook, provided minimisation measures are complied with.

The EPA advises that the residual impact to Wungong Brook should be subject to implementation conditions (recommended condition 3) to ensure the environmental outcome is consistent with the EPA objective for inland waters.

Groundwater

Temporary dewatering is proposed at Wungong Brook for the construction of the proposed rail and principal shared path bridges as the excavation extends below the watertable.

The predicted cone of depression from groundwater abstraction is expected to be less than 50 m radius around the water supply bores and Wungong Bridge site. The proponent's minimisation measure of placing abstraction bores at least 50 m from existing users and sensitive receptors, or 100 m where practicable, is considered to be sufficient to manage potential impacts.

The dewatering is small scale and short term and is within clay soils, thereby reducing drawdown affects away from the dewatering location. Construction abstraction bores are proposed to be distant from Wungong Brook at Eleventh Road and Byford Station and avoid reducing superficial aquifer levels by sourcing water from deeper semi-confined and confined aquifers.

Dewatering and abstraction of groundwater will be subject to approval under the RIWI Act. A water operating strategy will be developed by the proponent and DWER

will need to endorse the strategy prior to approving any groundwater licence application(s). The water operating strategy will be incorporated into the CEMP and applied during construction. It will include operating protocols to minimise water use and drawdown on the watertable, and include a monitoring program to detect whether excessive drawdown is occurring from abstraction sites.

The EPA has assessed that the residual impacts, if managed as proposed, is consistent with its factor objective *to maintain the hydrological regimes and quality of groundwater so that environmental values are protected*.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on inland waters to be:

2. unlikely to be significant impacts to groundwater; subject to regulation by DWER under the RIWI Act.

The EPA advises that the residual impact to groundwater can be subject to statutory decision-making processes to ensure the environmental outcome is consistent with the EPA objective for inland waters.

Wetlands

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

The proposal will directly impact 3.5 ha of CCWs of which 2.6 ha retain wetland or conservation values, and 51.9 ha across two palusplain MUWs.

Conservation Category Wetlands

The proposal would clear up to 3.5 ha associated with CCWs, of which 0.34 ha is associated with Wungong Brook, and 3.16 ha which supports threatened ecological communities, vegetation and fauna values. The EPA notes the vegetation condition of the CCWs proposed to be cleared is predominately in good condition (1.11 ha), with 0.02 ha in excellent condition and 0.05 ha in very good, and the remaining in degraded and completely degraded condition.

The EPA has assessed there to be a significant residual impact to CCWs. Due to the permanent loss and the cumulative impact occurring to CCWs, the EPA has assessed the disturbance of CCWs represents a significant residual impact. This is consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014) definition of significant residual impact regarding areas within the formal conservation reserve system.

The EPA notes that the proponent has proposed to offset the loss of 2.6 ha of wetlands containing conservation values through the implementation of on-ground management including revegetation at Lambert Lane Nature Reserve and Brickwood Reserve.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on inland waters to be:

3. direct impacts to 3.5 ha of CCWs, of which 2.6 ha retains wetland or conservation values

The EPA has assessed the residual impact to CCWs to be significant. Consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), impact to areas reserved under statute or managed for the purpose of conservation would require an offset. The significant residual impacts on CCWs need to be able to be offset to ensure the likely environmental outcome is likely to be consistent with the EPA objective to protect inland waters so that hydrological regimes and quality of groundwater and surface water are maintained.

The EPA notes the likely environmental outcomes to be expected from proposed CCW offsets relate to maintaining and improving the health and condition of wetlands with conservation values on other lands, to a level that is better than the impacted areas. Without the proposed offsets it is likely that the condition and health of these wetlands would decline over time from existing threats and pressures. It is also noted that the areas to receive the offset actions are larger than the extent of the significant residual impacts and are appropriately proportionate.

These are significant residual impacts that are likely to be able to be regulated through reasonable conditions (recommended condition 1) and counter-balanced by offsets (recommended condition 6) so that the environmental outcome is likely to be consistent with the EPA's objective for inland waters.

2.3.10 Summary of inland waters assessment and recommended conditions

The EPA has considered the likely residual impacts of the proposal. In doing so, the EPA has considered whether reasonable conditions could be imposed or other decision-making processes can mitigate potential inconsistency with the EPA factor objective. The EPA assessment findings are presented in Table 6.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed.

The EPA has also had regard to its conclusions in other recent METRONET assessments, including Malaga to Ellenbrook Rail Works (Report 1690) and Thornlie-Cockburn Link (Report 1646).

Table 6: Summary of assessment for inland waters

Residual impact		Assessment finding	Recommended conditions and DMA regulation
1.	3.5 ha of CCWs, of which 2.6 ha retains wetland or conservation values	Significant residual impact is likely to be able to be regulated through reasonable conditions and counter-balanced by offsets so the environmental outcome is likely to be consistent with the EPA objective for inland waters.	Regulated through recommended conditions: <ul style="list-style-type: none"> • 1 (limit on the extent of the proposal) • 3 (Wungong Brook) • 4 (indirect impacts) • 6 (offsets)
2.	Unlikely to be material impacts to Wungong Brook provided minimisation measures are complied with	Residual impact to Wungong Brook should be subject to implementation conditions and can be subject to statutory decision-making processes to ensure the environmental outcome is consistent with the EPA objective for inland waters.	Regulated through recommended condition 3 (Wungong Brook). Development approval for impact within the Development Control Area under the <i>Swan and Canning Rivers Management Act 2006</i> . RIWI Act for any dewatering, abstraction or bed and bank disturbance to manage water quality.
3.	Unlikely to be significant impacts to groundwater provided minimisation measures are complied with	Residual impact to groundwater should be subject to implementation conditions and can be subject to statutory decision-making processes to ensure the environmental outcome is consistent with the EPA objective for inland waters.	Regulated through recommended condition 3 (Wungong Brook). Development approval for impact within the Development Control Area under the <i>Swan and Canning Rivers Management Act 2006</i> . RIWI Act for any dewatering, abstraction or bed and bank disturbance to manage water quality.

2.4 Social surroundings

2.4.1 Environmental objective

The EPA's environmental objective for social surroundings is *to protect social surroundings from significant harm* (EPA 2016d).

2.4.2 Investigations and surveys

The EPA advises the following investigations and surveys met the EPA's requirements and were used to inform the assessment of the potential impacts to social surroundings:

- Byford Rail Extension: Preliminary Assessment Operational Noise & Vibration Assessment (appendix M of the ERD) (SLR 2020)
- Inner Armadale Line Level Crossing Removal Project: Operational Noise & Vibration Assessment (SLR 2021)
- Report on Aboriginal Heritage Survey of Byford Rail Extension (appendix O of the ERD) (R & E O'Connor 2020)
- Byford Rail Extension Visual Impact Assessment (appendix Q of the ERD) (Ecoscape 2021).

2.4.3 Assessment context: existing environment

Aboriginal heritage

The proposal is within the area covered by the Whadjuk and Gnaala Karla Booja (GKB) Indigenous Land Use Agreements (ILUAs). It is located in Noongar Boodjar – Beeliar country, which is divided into general areas of Gandoo (sandy Jarrah country on the Pinjarra Plain) and Warget (clay country at the foot of Moorda, Darling Ranges).

The development envelope intersects with the boundary of one registered Aboriginal site, Site Number 3512 'Wungong Brook', a mythological site held under open access.

The significance of Wungong Brook (site number 3512) was verified during the survey. The traditional owner representatives discussed the importance of local creeks as sources for their ancestors, and flow within Wungong Brook was raised as a key point of discussion during the survey.

The consultative survey identified a former Aboriginal burial place within the development envelope, located within the rail reserve north of the Harbor Drive and Wungong intersection (R & E O'Connor Pty Ltd 2020). Further investigation confirmed that the skeletal material had previously been removed.

Noise

All adjacent land-uses and/or developments within the development envelope along both sides of the existing rail have been identified as noise and vibration sensitive receptors. Sensitive receptors within the development envelope include existing

residential properties, residential lots with Local Government development application approval, schools, childcare premises, medical facilities, and places of worship.

The proposal will be constructed along the existing Australind rail alignment and is therefore considered as a 'railway upgrade proposal', in accordance with WAPC SPP 5.4 – *Road and Rail Noise* (SPP 5.4) (WAPC 2019). Residents in proximity to the existing rail corridor currently experience noise and vibration emissions from the operation of the Australind line.

Baseline noise and vibration monitoring within the development envelope was carried out at three representative locations at rail sections with similar environmental settings (SLR 2020).

The maximum noise level criteria of 80 decibels (dB) L_{Amax} was exceeded during the day at all three monitoring locations, and during the night at two locations. While portions of the rail corridor are adjacent to residential and semi-rural areas, monitoring indicates that background levels already exceed appropriate noise criteria. The monitoring results indicate that vibration levels within the development envelope are generally below the proposal's design objectives and criteria.

The proposal includes upgrading the existing Armadale station which involves elevating the station 10 m above ground level. The proponent has advised that while the design is not finalised, it will be similar to the proposed Inner Armadale Line Level Crossing Removal project (Inner Armadale LCRP). The operational noise and vibration assessment and modelling undertaken for the Inner Armadale LCRP indicated that with proposed mitigation in the form of noise walls and rail web dampers, all adjacent residences are predicted to achieve compliance with the relevant noise criteria (SLR 2021). The noise impact from an elevated rail in viaduct was found to be less than at grade.

2.4.4 Consultation

The key matters raised during the EPA's public review period are listed below, with the proponent's responses provided in the RtS document (PTA 2021c):

- the requirement for sustained engagement and consultation with residents in regard to noise and visual amenity
- consideration of background noise levels to reflect reasonable management of noise.

2.4.5 Potential impacts from the proposal

The proposal has the potential to have direct and indirect impacts on social surroundings during construction and operation from:

Aboriginal heritage

- the installation of a railway bridge across Wungong Brook
- vegetation clearing, potentially disturbing unregistered heritage sites or artefacts.

Noise

- temporary exposure of sensitive receptors in residential areas and users of recreational areas near the railway and associated infrastructure to construction noise and vibration
- increased and ongoing exposure to operational noise and vibration for sensitive receptors in residential and recreational areas.

2.4.6 Minimisation measures (including regulation by other DMAs)

The proponent outlined the following minimisation measures to reduce both direct and indirect impacts to social surroundings:

Aboriginal heritage

- The bed and banks of Wungong Brook to be revegetated following construction.
- Noongar monitors to be on-site for all new ground disturbance associated with the proposal at the three agreed locations to identify any potential unknown Aboriginal heritage sites or artefacts.

Noise

- Combination of noise walls and rail web dampers, or noise walls only and rail web dampers only.
- Under ballast matting (UBM) and/or under sleeper pads (USP) with suitable trackform for the control of ground-borne noise and ground-borne vibration at appropriate locations.
- Viaduct structure to assist in moderating noise from elevated rail.
- Compliance with the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations).
- Undertake consultation with community stakeholders prior to final design where there may be concerns over noise and/or vibration impact.

2.4.7 Assessment of impacts to environmental values

The EPA considered that the key social surroundings values likely to be impacted by the proposal are Aboriginal Heritage, noise and visual amenity.

Aboriginal heritage

The proposal has the potential to impact on the physical value of Wungong Brook from the construction of a new single span rail and principal shared path bridges. The proposed bridge construction will involve the removal of the pier currently situated approximately midway between the banks of the brook. This will allow for improved flow of the brook, however, will result in temporary interruptions to flows during the removal of the pier.

Clearing of riparian vegetation and direct disturbance of the bed and banks of Wungong Brook will be required for the bridge construction. Consent under section 18 of the *Aboriginal Heritage Act 1972* for the disturbance of Wungong Brook will be sought by the proponent. The proponent has committed to revegetating the bed and banks of the brook following construction.

The EPA notes that the traditional owner representatives involved in the consultative survey gave their approval for the proposal, provided Aboriginal monitors are present on-site during ground disturbing activities.

The EPA concludes that the ongoing operation of the proposal will not impact on the values of this heritage site as the single span bridge will improve the flow of Wungong Brook and not impede the watercourse. Noting this, the proponent's revegetation commitments and the requirement for Aboriginal monitors to be on-site during ground disturbing activities, the EPA considers there is no significant impact to Aboriginal heritage and that the proposal is consistent with EPA's objectives for social surroundings.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on social surroundings to be:

1. direct impacts to registered Aboriginal Heritage site Wungong Brook

The EPA advises that the residual impact to Wungong Brook should be subject to implementation conditions (recommended condition 3) to ensure the environmental outcome is consistent with the EPA objective for social surroundings.

Noise

The proposal has the potential to impact nearby noise-sensitive premises and land uses during both construction and operation through the movement and operation of passenger trains and construction generated noise and vibrations.

The proponent has adopted the noise level objectives for airborne noise as outlined in SPP 5.4 and the New South Wales EPA Rail Infrastructure Guideline 2013 (NSW RING):

- daytime noise level of 60 dB LAeq
- night-time noise level of 55 dB LAeq
- 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. Based on the number of train movements in the area during the night period, the noise and vibration assessment adopted a GBN trigger level of L_{ASmax} 35 dB as per the NSW RING. Consistent with previous major rail projects within the Perth metropolitan area, a vibration trigger level of L_{V,RMS,1s} 106 dB for residential premises has been adopted regardless of time period.

Construction

In accordance with regulation 13 of the Noise Regulations, 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 2436:2010 (R2016) *Guide to noise and vibration control on construction, demolition and maintenance sites*.

The proponent considers that noise and vibration impacts would be localised and temporary during the construction phase. In the event that construction activities are planned outside of the permissible hours, the proponent will develop and submit for approval to the CEO of the relevant local government authority, an out of hours noise and vibration management plan as required by regulation 13 of the Noise Regulations.

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 Australian Standard 2436:2010.

Rail noise and vibration

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

The proponent undertook noise and vibration modelling to assess the noise and vibration impacts from the operation of the proposed railway alignments. The findings are:

- five residences are predicted to exceed the relevant GBN target level by up to 2 dB but comply with the GBV level
- two educational premises are predicted to exceed relevant GBN target levels by up to 12 dB
- one education premise is predicted to exceed relevant GBV levels by up to 2 dB
- north of Armadale station, approximately ten properties were modelled to receive noise levels above set targets for airborne noise.

The EPA notes that the operational noise and vibration objectives for the proposal include compliance with the Noise Regulations, State Planning Policy 5.4 Road and Rail Noise (SPP 5.4) and industry standards.

With the implementation of noise and vibration mitigation, the assessed residences along the corridor are predicted to achieve compliance with the target levels detailed in SPP 5.4 and the majority of adjacent residences assessed are predicted to have received maximum levels within 1 dB or below the maximum noise target level. The proponent proposes to install noise walls and rail dampers to mitigate the impact of noise and vibration on surrounding sensitive premises.

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 proposal becomes available.

Considering the proponent's minimisation measures and the proposal's compliance with Noise Regulations, SPP 5.4 and industry standards, the EPA has assessed that the residual impacts to noise-sensitive receptors, if managed as proposed, is consistent with its objective to protect social surroundings from significant harm.

Likely residual impacts

The EPA has assessed the likely residual impacts of the proposal on social surroundings to be:

2. unlikely to be material impacts to noise-sensitive receptors provided minimisation measures are complied with.

The EPA advises that the residual impact from construction and operational noise and vibration should be subject to implementation conditions (recommended condition 5) and can be subject to statutory decision-making processes to ensure the environmental outcome is consistent with the EPA objective for social surroundings.

2.4.8 Summary of social surroundings assessment and recommended conditions

The EPA has considered the likely residual impacts of the proposal. In doing so, the EPA has considered whether reasonable conditions could be imposed or other decision-making processes can mitigate potential inconsistency with the EPA factor objective. The EPA assessment findings are presented in Table 7.

The EPA has also considered the principles of the EP Act (see Appendix C) in assessing whether the residual impacts will be consistent with its environmental factor objective and whether reasonable conditions can be imposed.

The EPA has also had regard to its conclusions in other recent METRONET assessments.

Table 7: Summary of assessment for social surroundings

Residual impact		Assessment finding	Recommended conditions and DMA regulation
1.	Direct impacts to registered Aboriginal Heritage site Wungong Brook	Residual impact to registered Aboriginal heritage site Wungong Brook should be subject to implementation conditions and can be subject to statutory decision-making processes to ensure the environmental outcome is	Regulated through recommended condition 3 (Wungong Brook)

Residual impact		Assessment finding	Recommended conditions and DMA regulation
		<p>consistent with the EPA objective for social surroundings.</p> <p>Consultation with traditional owners resulted in representatives giving approval for the proposal, provided Aboriginal monitors are present on-site during ground disturbing activities.</p>	
2.	Unlikely to be material impacts to noise and vibration sensitive receptors provided minimisation measures are complied with	Residual impact from noise and vibration should be subject to implementation conditions and can be subject to statutory decision-making processes to ensure the environmental outcome is consistent with the EPA objective for social surroundings.	<p>Regulated through recommended condition 5 (noise).</p> <p>Compliance with:</p> <ul style="list-style-type: none"> • Environmental Protection (Noise) Regulations 1997 • SPP 5.4 • Australian Standard 2436:2010

3 Holistic assessment

While the EPA assessed the impacts of the proposal against the key environmental factors individually, given the link between flora and vegetation, terrestrial fauna, inland waters and social surroundings, the EPA also considered connections and interactions between parts of the environment to inform a holistic view of impacts to the whole environment.

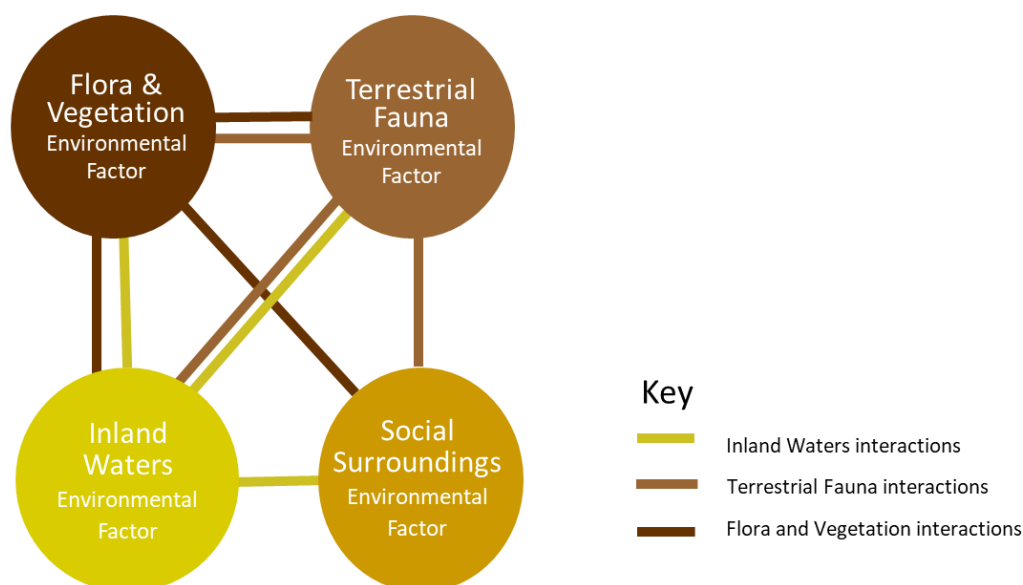


Figure 3: Intrinsic interactions between environmental factors

The conservation significant flora and vegetation provides habitat for the three listed black cockatoo species. Minimising the direct and indirect impacts to flora and vegetation will also minimise impacts to listed black cockatoo species habitat. The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts and offsetting of significant residual impacts to flora and vegetation will also mean the inter-related impacts to the health of other factors of the environment including the values associated with terrestrial fauna will be consistent with the EPA's environmental factor objectives.

The EPA also considered the high connectivity between maintaining good quality surface and groundwater, healthy habitat for aquatic fauna and ecologically important riparian and groundwater dependent flora and vegetation. This in turn also supports black cockatoo habitat and maintains the condition of the watercourses which are culturally important to the traditional owners. The EPA considers that the proposed mitigation and management measures and recommended conditions for impacts to inland waters will also mean the inter-related impacts to the health of other factors of the environment including the values associated with flora and vegetation, social surroundings and terrestrial and aquatic fauna will be consistent with the EPA's environmental factor objectives.

When the separate environmental factors of the proposal were considered together in a holistic assessment, the EPA formed the view that the impacts from the proposal would not alter the EPA's views about consistency with the EPA's factor objectives.

4 Offsets

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal.

Consistent with the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014), the EPA may consider the application of environmental offsets to a proposal where it determines that the residual impacts of a proposal are significant, after avoidance, minimisation and rehabilitation have been pursued.

In the case of this proposal, likely (and potential) significant impacts are:

- 2.26 ha of SCP 3a *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain
- 0.48 ha of SCP 3c *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain
- 4.4 ha of Guildford Complex
- 1.5 ha of Bush Forever
- 8.65 ha of moderate quality Carnaby's cockatoo foraging habitat
- 8.65 ha of moderate to high quality forest red-tailed black cockatoo foraging habitat
- 8.65 ha of moderate quality Baudin's cockatoo foraging habitat
- 139 black cockatoo potential breeding trees
- 2.6 ha of CCWs.

Proponent's offset strategy

The proponent has proposed to fund and undertake the following to offset the potential significant residual impacts of the proposal:

- on-ground management, including revegetation, at Lambert Lane Nature Reserve, Brickwood Reserve and Roman Road Nature Reserve (SCP3a, SCP3c, Bush Forever and CCWs)
- on-ground management at PTA's advanced offset site, Lowlands Nature Reserve (black cockatoo habitat and Guildford Complex)
- provide a financial contribution towards one or more research activities that advance practical knowledge about the restoration and enhancement of degraded areas within the SCP3a ecological community.

On-ground management includes undertaking weed surveys, weed control programs, dieback mapping to target ongoing management, existing track management, removal of illegally dumped rubbish and installation (or replaced with) new fencing, gates and signage limiting unauthorised access and increasing awareness. On-ground management of the proposed sites can prevent further degradation, maintain and/or improve the existing condition and will provide a good environmental outcome, ensuring larger patches persist in the long term.

Revegetation includes the rehabilitation of degraded areas of specific floristic community types within larger occurrences or on small sites to provide a buffer to the existing ecological communities.

The research-based component of the offsets is relevant, and when combined with on-ground management, would effectively counterbalance for impacts to SCP3a communities in the future. The research project will improve practical knowledge about the restoration and management of degraded areas within SCP3a ecological communities.

The EPA notes the Government of Western Australia purchased the Lowlands Nature Reserve in 2014 to offset residual environmental impacts from the Strategic Assessment of Perth and Peel Region, of which the METRONET program was included. In 2019, the State Government allocated the entirety of the Lowlands Nature Reserve to the PTA as an advanced offset site for METRONET offset requirements.

Assessment of proponent's offset

A summary of the proposed locations and quantum of offsets is set out below in table 8.

Table 8: Assessment of proposed offsets

Environmental values and Significant residual impact	Proposed offset and Quantum of offset extent	Ratio Adequacy	Environmental Outcome
SCP3a TEC (EPBC Act: Endangered; BC Act: Critically endangered) Impact: 2.26 ha	Lambert Lane Nature Reserve (3.3 ha) and Brickwood Reserve (6.5 ha) - on-ground management including revegetation. Quantum: 9.8 ha Research project to advance practical knowledge about the restoration and enhancement of degraded areas within the SCP3a ecological community.	This offset ratio is considered adequate as it equals 100.22% of the required SCP3a offset based on the Commonwealth's Offset Assessment Guide calculator. (Brickwood Reserve offsets 58.95% of the offset requirement for SCP3a. Lambert Lane Nature Reserve provides 41.27% of the offset requirement for SCP3a.)	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for flora and vegetation, recovery plans (Blyth & English 2000a and DEC 2011) and conservation advice (DotEE 2017a).
SCP3c TEC (EPBC Act: Endangered; BC Act: Critically endangered)	Roman Road Nature Reserve - on-ground management including revegetation. Quantum: 3 ha	The Roman Road Nature Reserve offset ratio is considered adequate as it equals 110.4% of the required SCP3c offset	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for flora and vegetation,

Impact: 0.48 ha		based on the Commonwealth's Offset Assessment Guide calculator.	recovery plan (Blyth & English 2000a) and conservation advice (DotEE 2017b).
Guildford Complex Impact: 4.4 ha	Lowlands Nature Reserve – on-ground Management. Quantum: 4.4 ha	The Lowlands Nature Reserve offset ratio is calculated by applying a 1:1 ratio. Given the varied condition of the vegetation to be cleared associated with this complex, and with consideration for State Planning Policy 2.8 Appendix 2 (ix)(b) (WAPC 2010) this is considered an adequate ratio.	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for flora and vegetation.
Bush Forever Impact: 1.5 ha	Lambert Lane Nature Reserve - on-ground management including revegetation. Quantum: 3 ha	The Lambert Lane Nature Reserve offset is calculated by applying a 2:1 ratio, as specified in State Planning Policy 2.8 (WAPC 2010) for very high conservation significant vegetation. This is considered an adequate ratio.	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for flora and vegetation and bush forever implementation guideline (WAPC 2000).
Carnaby's cockatoo foraging habitat (EPBC and BC Act: Endangered) Impact: 8.65 ha	Lowlands Nature Reserve – on-ground management. Quantum: 47.05 ha	The Lowlands Nature Reserve offset ratio is considered adequate as it equals 100.12% of the required Carnaby's cockatoo foraging habitat offset based on the Commonwealth's Offset Assessment Guide calculator.	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for terrestrial fauna, recovery plan (DPaW 2013), impact assessment advice (EPA 2019) and referral and draft revised referral guidelines (DSEWPAC 2012d and DotEE 2017c).
Baudin's cockatoo foraging habitat (EPBC and BC Act: Endangered) Impact: 8.65 ha	Lowlands Nature Reserve – on-ground management. Quantum: 70.6 ha	The Lowlands Nature Reserve offset ratio is considered adequate as it equals 100.05% of the required Baudin's cockatoo foraging habitat offset	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for terrestrial fauna, recovery plan (DEC

		based on the Commonwealth's Offset Assessment Guide calculator.	2008) and draft revised referral guidelines (DSEWPAC 2012d and DotEE 2017c).
Forest red-tailed black cockatoo foraging habitat (EPBC and BC Act: Vulnerable) Impact: 8.65 ha	Lowlands Nature Reserve – on-ground management. Quantum: 76.8 ha	The Lowlands Nature Reserve offset ratio is considered adequate as it equals 100% of the required forest red-tailed black cockatoo foraging habitat offset based on the Commonwealth's Offset Assessment Guide calculator.	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for terrestrial fauna, recovery plan (DEC 2008), conservation advice (DEWHA 2009) and referral and draft revised referral guidelines (DSEWPAC 2012d and DotEE 2017c).
Black cockatoo potential breeding trees Impact: 139 trees	Lowlands Nature Reserve – on-ground management. Quantum: 417 trees	The Lowlands Nature Reserve offset ratio is adequate with a 3:1 ratio of impacted black cockatoo potential breeding trees.	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for terrestrial fauna, recovery plans (DEC 2008 and DPaW 2013), conservation advice (DEWHA 2009), impact assessment advice (EPA 2019) and referral and draft revised referral guidelines (DSEWPAC 2012d and DotEE 2017c).
Conservation Category Wetlands (High conservation value) Impact: 2.6 ha	Lambert Lane Nature Reserve and Brickwood Reserve - on-ground management including revegetation. Quantum: 7.8 ha	A 3:1 ratio was applied to offset the impacts to CCWs within the footprint. This offset ratio is consistent with previous Metronet offset strategies (Yanchep Rail Extension, Thornlie-Cockburn Link and Malaga to Ellenbrook Rail Works), and is considered to be adequate.	Anticipated outcomes of the proposed offset are consistent with the EPA's objective for inland waters.

An explanation of the anticipated outcomes of the proposed offsets projects is set out in section 3.4 of the Offsets Strategy (PTA 2021b).

It is noted that the environmental outcomes to be expected from each project (on-ground management and revegetation) relate to maintaining and improving the health and condition of the same threatened communities and fauna habitats on other lands, to a level that is better than the impacted areas. Without the proposed offsets it is likely that the condition and health of the remnant communities and fauna habitats would decline over time from existing threats and pressures.

The EPA considers that the offsets to be provided by those sites are relevant and proportionate to the significance of the environmental value being impacted. The EPA considers the proposed offset quantum is consistent with the *Commonwealth's Offset Assessment Guide* (Commonwealth of Australia 2012a) and the *WA Environmental Offsets Guidelines* (Government of Western Australia 2014).

The EPA has also consulted on the preferred sites and the draft offsets strategy with DBCA and DAWE. The DAWE has provided advice on the offsets proposed by the proponent. DAWE's comments support the above approach to offsets, however the EPA notes that the required offset strategy will be subject to consultation with DAWE (and DBCA), and approved by the CEO, which will ensure that it meets the *EPBC Environmental Offsets Policy* (2012).

In appraising the proponent's offsets projects and considering whether they are in accordance with *WA Environmental Offsets Policy* (Government of Western Australia 2011), the EPA has considered the following principles:

1. Environmental offsets will only be considered after avoidance and mitigation options have been pursued. The proponent has detailed avoidance and minimisation in their ERD (PTA 2021a) and RtS (PTA 2021c), and these are discussed in this report under the heading of *Minimisation* under each relevant key environmental factor (Section 2). The proposal is also to extend existing public transport infrastructure from the existing Armadale train station (to Byford) within an established rail corridor to meet the needs of present and future generations, rather than creating another transport corridor at a greenfield site. Following the implementation of avoidance and minimisation measures the EPA considers that significant residual impacts remain by way of direct impacts to threatened ecological communities, regionally significant vegetation, threatened fauna habitats, and Conservation Category Wetlands.

The EPA considers that this principle has been met.

2. Environmental offsets are not appropriate for all projects. The EPA has determined that in this instance offsets are appropriate due to the nature and magnitude of the likely significant residual impacts on environmental biodiversity values facing increasing pressures such as threatened ecological communities and threatened fauna habitat. Therefore, this principle has been met.

3. Environmental offsets will be cost-effective, as well as relevant and proportionate to the significance of the environmental value being impacted.

From Table 8 above the EPA considers that the proposed offsets include actions to directly improve the condition of the value to be offset. It is also noted that the offset ratios are adequate, meaning the extent of the areas receiving the offset actions are appropriately larger than the extent of residual impacts and proportionate to the significance of the environmental value being impacted.

The EPA is also of the view that the research offset at Fletcher Park for impacts to the SCP3a community are appropriate as it is reasonably related to the impacts, is near the impact area and has the capacity to improve the effectiveness of the proposed direct offsets to be undertaken.

The EPA has determined that, given the need to improve the knowledge base regarding restoration measures and their management, especially for the SCP3a community, research based offsets would be relevant. When combined with on-ground management actions, research offsets have the potential to cost-effectively counterbalance for impacts to these communities in the future. This principle will be met.

4. Environmental offsets will be based on sound environmental information and knowledge. The offsets projects utilise sound environmental information and knowledge from recent biological surveys about location, quality and condition of the environmental values at offsets sites. The EPA has also had regard to the environmental information and knowledge in the following:

- Approved Conservation Advice for *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils of the Swan Coastal Plain (DotEE 2017a)
- *Corymbia calophylla* - *Kingia australis* woodlands on heavy soil (Swan Coastal Plain Community type 3a - Gibson et al. 1994), Interim Recovery Plan 2011-2016 (DEC 2011)
- *Corymbia calophylla* - *Kingia australis* woodlands on heavy soil (Swan Coastal Plain Community type 3a - Gibson et al. 1994), Interim Recovery Plan 2000-2003. Interim Recovery Plan No. 59 (Blyth & English 2000a)
- Approved Conservation Advice for *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain (DotEE 2017b)
- *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (Swan Coastal Plain Community type 3c - Gibson et al. 1994) Interim Recovery Plan 2000-2003 (Blyth & English 2000b).

In relation to the SCP 3a and 3c communities, the information and findings from the interim recovery plan and approved conservation advice suggest that on the basis of current knowledge these communities are under increasing threats and pressures from activities associated with the urban environment including weed infestations, dieback, vandalism, rubbish dumping and uncontrolled access for recreational and other users. These pressures are likely to increase further should urban development increase and intensify and therefore a need exists for targeted management actions.

In addition, the EPA is of the view that the research project at Fletcher Park has the potential to provide new knowledge to develop better revegetation and restoration

measures for management of remnant SCP 3a and 3c communities. Outcomes of research projects must be publicly available and provided to the relevant agencies.

Therefore, this principle will be met.

5. Environmental offsets will be applied within a framework of adaptive management. It is appropriate for the on-ground management actions identified in the proponent's offsets areas to also apply any learnings from the proponent's research project at Fletcher Park. This will allow for an adaptive framework based on recent research and is consistent with this principle.

The proponent will be required under condition 6 to provide adaptive management measures to ensure that risks and unintended consequences are managed.

Condition 6-5 also requires the proponent to review and revise the offsets management plan as and when directed by the CEO, in consultation with the DBCA. This further provides for adaptive management of the offset and will ensure that the objective in condition 6-1 will be achieved if initial management actions are found to be ineffective.

Therefore, this principle will be met.

6. Environmental offsets will be focused on longer term strategic outcomes.

The EPA considers that undertaking management actions on lands which are already managed for conservation purposes, in a manner which complements existing management plans and/or management arrangements will ensure that the offset provides a secure and long-term benefit.

In addition, the proposed research outcomes would, when met inform the long-term objective of contribute to the scientific understanding of the ecological community and methods for restoration and protection over the long term.

Therefore, this principle will be met.

Consideration of conditions

In considering how the proponent's offsets strategy has applied the six principles above, the EPA recommends conditions that requires an offsets management plan to be prepared and submitted prior to the construction of the proposal.

The EPA has recommended condition 6 that requires the proponent undertake offset measures to counterbalance the significant residual impact of direct and indirect impacts to relevant environmental values. Condition 6 sets out the offset location, the type of offset measures to be implemented and the extent of the offset location that should be subject to the offset measures.

To demonstrate that the objective to counterbalance the significant residual impacts will be met, condition 6-3 requires the proponent to prepare and submit an offset management plan which is to include the offset measures to be implemented. Further, where on-ground management or revegetation is proposed, the offset management plan is to include targets to be achieved, including for completion

criteria and vegetation condition, which will result in a tangible improvement to the environmental values being offset.

The offset management plan is to include the development and implementation of a revegetation research plan to apply to Fletcher Park with the aim of developing cost effective methods for rehabilitating and improving the buffers and resilience of remnant occurrences of the SCP 3a *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, community.

The offset management plan is to be prepared and submitted prior to ground-disturbing activities or clearing of vegetation.

5 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 matters 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 or not 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:

- Approved Conservation Advice for Clay Pans of the Swan Coastal Plain (DSEWPaC 2012)
- Advice on the presence of hybrids in listed ecological communities (Threatened Species Scientific Committee 2011)
- Approved Conservation Advice for *Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo) (Department of the Environment, Water, Heritage and the Arts 2009)
- Approved Conservation Advice for *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils of the Swan Coastal Plain. (Department of the Environment and Energy 2017)
- Approved Conservation Advice for *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain (Department of the Environment and Energy 2017)
- Approved Conservation Advice for *Diuris purdiei* (Purdie's Donkeyorchid) (Department of the Environment, Water, Heritage and the Arts 2008)
- Baudin's cockatoo *Calyptorhynchus baudinii* and Forest red-tailed black cockatoo *Calyptorhynchus banksii naso* Recovery Plan (DEC 2008).
- Carnaby's cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (DPAW 2013).
- Chuditch (*Dasyurus geoffroii*) Recovery Plan (DEC 2012)
- Commonwealth EPBC Act Environmental Offsets Policy (Commonwealth of Australia 2012)
- Conservation Advice *Calyptorhynchus baudinii* Baudin's cockatoo (Department of the Environment and Energy 2018)

- Conservation Advice *Synaphea* sp. Pinjarra Plain (A.S. George 17182) (Threatened Species Scientific Committee 2018)
- Conservation Advice *Synaphea* sp. Serpentine (G.R. Brand 103) (Threatened Species Scientific Committee 2018)
- Conservation Advice *Westralunio carteri* Carter's freshwater mussel (Department of the Environment and Energy 2018)
- *Corymbia calophylla* - *Kingia australis* woodlands on heavy soil (Swan Coastal Plain Community type 3a - Gibson et al. 1994), Interim Recovery Plan 2000-2003. Interim Recovery Plan No. 59 (English, V. & J. Blyth 2000)
- *Corymbia calophylla* - *Kingia australis* woodlands on heavy soil (Swan Coastal Plain Community type 3a - Gibson et al. 1994) interim recovery plan 2011-2016
- *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands (Swan Coastal Plain Community type 3c - Gibson et al. 1994), Interim Recovery Plan 2000-2003. Interim Recovery Plan No. 60 (English, V. & J. Blyth 2000)
- Draft Revised Referral Guideline for Three Threatened Black Cockatoo Species: Carnaby's cockatoo, Baudin's cockatoo, Forest red-tailed black cockatoo (DotEE 2017)
- EPBC Act Referral Guidelines for Three Black Cockatoo Species (DSEWPaC 2012)
- Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest red-tailed Black Cockatoo *Calyptorhynchus banksii* naso) Recovery Plan (DEC 2008).
- How to use the Offsets assessment guide. Department of Sustainability, Environment, Water, Population and Communities (DSEWPC 2012).
- Significant Impact Guidelines 1.1 - Matters of National Environmental Significance, Commonwealth of Australia (DEWHA 2013).
- Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA 2010)
- Survey guidelines for Australia's threatened orchids: Guidelines for detecting orchids listed as 'Threatened' under the Environment Protection and Biodiversity Conservation Act 1999 (DEWHA 2013).
- Threat abatement plan for competition and land degradation by rabbits (DotE 2016)
- Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (Department of the Environment and Energy 2018)
- Threat abatement plan for predation by the European red fox (DEWHA 2008)
- Threat abatement plan for predation by feral cats (DotE 2015).

EPA assessment

Impacts to the environment relating to MNES are covered under the key environmental factors of Flora and Vegetation and Terrestrial Fauna of this report.

The ERD (PTA 2021a) identified the MNES, predicted the environmental impacts and provided an assessment against significant impact criteria for listed threatened species and ecological communities.

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

TEC SCP 3a

The proposal will result in the clearing of approximately 2.26 ha of SCP 3a *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain TEC.

The majority of the community within the disturbance footprint is in good condition (1.68 ha). A further 0.02 ha is in excellent condition, 0.06 ha in very good condition, and 0.5 ha in degraded condition. An additional 2.79 ha of SCP3a may be indirectly impacted by the proposal. A number of infrastructure projects that are currently in the planning phase have the potential to further impact known occurrences of SCP3a across its range.

The EPA has assessed the residual impact to this TEC to be significant due to the cumulative impact on the community, the restricted distribution of the community, and given all habitat areas are considered critical to its survival. The residual impact on this community aligns with the definition of significant residual impact which includes areas that are already defined as being critically impacted in a cumulative context (Government of Western Australia 2014).

The EPA has assessed the direct and indirect impacts on this species (section 2.19) and has proposed offsets to counterbalance the significant residual impacts of the proposal (section 4). The EPA has recommended conditions to limit the extent of direct impacts to the proposal (condition 1), manage indirect impacts such as weeds and disease (condition 4) and offset the residual significant impact (condition 6).

TEC SCP 3c

The proposal will result in the clearing of approximately 0.48 ha of SCP 3c *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain TEC.

Up to 0.48 ha of SCP3c will be directly impacted by the proposal; 0.22 ha in good condition and 0.26 ha in degraded condition. The proposal has the potential to indirectly impact a further 0.16 ha in good condition. A number of infrastructure projects that are currently in the planning phase have the potential to further impact known occurrences of SCP3c across its range.

The EPA has assessed the direct and indirect impacts on this species (section 2.19) and has proposed offsets to counterbalance the significant residual impacts of the proposal (section 4). The EPA has recommended conditions to limit the extent of direct impacts to the proposal (condition 1), manage indirect impacts such as weeds and disease (condition 4) and offset the residual significant impact (condition 6).

Black Cockatoo's (Carnaby's cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo)

The proposal will result in the clearing of approximately:

- 8.65 ha of high value foraging habitat for Baudin's cockatoo
- 8.65 ha of moderate value foraging habitat for Carnaby's cockatoo
- 8.65 ha of moderate to high value foraging habitat for forest red-tailed black cockatoo
- loss of up to 139 potential black cockatoo breeding trees (131 with no hollows, and eight with unsuitable hollows).

The proposal may impact black cockatoos if they are present in the development envelope during clearing. The EPA notes there are no known roost sites located within the footprint for any of the three species. Birdlife Australia has recorded three confirmed roosting locations within approximately 500 m of the development envelope, two of which are confirmed as a forest red-tailed black cockatoo roost sites. These roosting sites are located towards the southeast of the development envelope and appear to be located in remnant trees within suburbia.

The EPA has assessed the direct and indirect impacts on these species (section 2.2) and has proposed offsets to counterbalance the significant residual impacts of the proposal (section 4). The EPA has recommended conditions to limit the extent of direct impacts to the proposal (condition 1), survey black cockatoo breeding trees prior to clearing (condition 2), manage indirect impacts such as weeds and disease (condition 4) and offset the residual significant impact (condition 6).

Carter's freshwater mussel

Mussels were recorded during surveys within and adjacent to the development envelope in Wungong Brook. Removal of the existing crossing and construction of the new crossings has potential to cause direct and indirect impacts to mussels.

To avoid potential impacts the proponent has committed to translocating mussels away from areas of direct disturbance and from downstream (indirect impacts) to suitable habitat upstream. The proponent provided a draft translocation strategy as attachment 3 to the RtS (PTA 2021c). Translocating the mussels will require a licence to take from DBCA under the BC Act prior to construction activities occurring at Wungong Brook.

The section of Wungong Brook to be disturbed includes a minor amount of surrounding riparian vegetation (0.4 ha), with predominately low quality and degraded habitat from historical development. There is potential for higher quality habitat to occur over time around the new bridges with the proponent's riparian revegetation commitments. Noting the adjacent higher quality riparian habitat that support denser mussel populations and the translocation of potentially impacted mussels upstream, the potential impacts will be minimised and are likely to be avoided.

The EPA has assessed the direct and indirect impacts on these species (section 2.2) but does not consider the significant residual impacts of the proposal requires offsetting. The EPA has recommended conditions to limit the extent of direct impacts to the proposal (condition 1), avoid and minimise impacts to mussels and suitable habitat (condition 3), manage indirect impacts such as weeds and disease (condition 4) and offset the residual significant impact (condition 6).

Summary

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

- condition 1 to limit the location and extent of the clearing of vegetation and moderate or higher value habitat
- condition 2 which requires the proponent to survey black cockatoo breeding trees prior to clearing
- condition 3 which requires the proponent to avoid and minimise impacts to mussels and suitable habitat
- condition 4 which requires the proponent to manage indirect impacts such as weeds and disease

The EPA considers that there will be a significant residual impact from the direct clearing of SCP3a, SCP3c, black cockatoo foraging habitat and potential breeding trees. The EPA has recommended an offset in condition 6 (see section 4) which takes into account the significant residual impacts.

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 conservation status of the listed species.

6 Recommendations

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

- environmental values likely to be significantly affected by the proposal
- assessment of key environmental factors, separately and holistically (this has included considering cumulative impacts of the proposal where relevant)
- EPA's confidence in the proponent's proposed mitigation measures
- likely environmental outcomes which can be achieved with the imposition of conditions
- consistency of environmental outcomes with the EPA's objectives for the key environmental factors
- whether other statutory decision-making processes can mitigate the potential impacts of the proposal on the environment and
- principles of the EP Act.

The EPA recommends that the proposal may be implemented subject to the conditions recommended in Appendix A.

Appendix A: Recommended conditions

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

BYFORD RAIL EXTENSION

Proposal: The proposal is to construct and operate an 8 kilometre new railway, including dual tracks and associated rail infrastructure, between Armadale and Byford. The proposal includes modification to the existing Armadale station, construction a new Byford station, replacement of a number of existing at-grade line crossings (level crossings) with grade separated crossings, either road over rail or rail over road.

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: 2261

Report of the Environmental Protection Authority: 1710

Pursuant to section 45 of the *Environmental Protection Act 1986*, it has been agreed that the proposal described in section 2.2 of the proponent's referral (September 2020), as amended by the change to proposal approved under section 43A on 6 April 2021, may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Limitations and Extent of Proposal

When implementing the proposal, the proponent shall ensure the proposal does not exceed the following extents:

Element	Location	Limitation or maximum extent
Physical elements		
Development envelope	Figure 1	164.6 ha
Disturbance footprint	Figure 1	80.7 ha
Direct disturbance of native vegetation	within the disturbance footprint in Figure 1	No more than 16 ha

Clearing of SCP3a <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain	within the disturbance footprint in Figure 1	No more than 2.26 ha
Clearing of SCP3c <i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain	within the disturbance footprint in Figure 1	No more than 0.48 ha
Clearing of native vegetation within the Guildford Complex	within the disturbance footprint in Figure 1	No more than 4.44 ha
Clearing of <i>Johnsonia pubescens</i> subsp. <i>cygnorum</i>	within the disturbance footprint in Figure 1	No more than three individuals
Clearing of native vegetation within Bush Forever sites	within the disturbance footprint in Figure 1	No more than 1.54 ha
Disturbance of Conservation Category Wetlands	within the disturbance footprint in Figure 1	No more than 3.5 ha of which 2.6 ha retains wetland or conservation values
Clearing of foraging habitat for Carnaby's cockatoo (<i>Calyptorhynchus latirostris</i>)	within the disturbance footprint in Figure 1	No more than 8.65 ha of moderate quality and 10.67 ha of low quality foraging habitat
Clearing of foraging habitat for forest red-tailed black cockatoo (<i>Calyptorhynchus banksii naso</i>)	within the disturbance footprint in Figure 1	No more than 8.65 ha of moderate to high quality and 52.49 ha of low quality foraging habitat
Clearing of foraging habitat for Baudin's cockatoo (<i>Calyptorhynchus baudinii</i>)	within the disturbance footprint in Figure 1	No more than 8.65 ha of moderate foraging habitat
Clearing of black cockatoo potential breeding trees	within the disturbance footprint in Figure 1	No more than 131 trees with no hollows present, no more than 8 with unsuitable hollows and no trees with suitable hollows.

2 Terrestrial Fauna

2-1 The proponent shall undertake the following actions to minimise impacts to terrestrial fauna:

- (1) during clearing activities, ensure the use of appropriately **qualified and licensed terrestrial fauna spotter(s)**;
- (2) within seven (7) days prior to clearing, using **qualified and licensed terrestrial fauna spotter(s)** with experience in surveying for **black cockatoos**, inspect all **potential nesting trees** with hollows at risk of being impacted by construction activities associated with the proposal to determine if any hollows are being used for nesting by **black cockatoos**; and
- (3) 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**.

3 Wungong Brook

3-1 The proponent shall:

- (1) construct the new Wungong Brook crossing to ensure the hydrological regime of Wungong Brook is maintained during operation of the proposal;
- (2) construct the proposal to meet the following environmental objectives:
 - (a) avoid where possible, otherwise minimise, direct and **indirect impacts** to the ecological and hydrological functions of Wungong Brook from construction activities including but not limited to erosion, sedimentation, pollutants, weed and disease introduction, vegetation clearing, and changes to ecological values; and
 - (b) avoid where possible, otherwise minimise, direct and **indirect impacts** to Carter's freshwater mussel and suitable habitat.

3-2 To achieve the objectives of condition 3-1(2), prior to **ground-disturbing activities** for the purposes of constructing the Wungong Brook crossing unless otherwise agreed in writing by the **CEO**, the proponent shall prepare and submit a Wungong Brook Management Plan. This Plan shall:

- (1) when implemented, substantiate and ensure that condition 3-1 is being met;
 - (2) describe measures to ensure the requirements of condition 3-1 will be met;
 - (3) detail how the banks of the Wungong Brook will be reinstated in the event they are altered or disturbed from activities associated with construction of the proposal, including for the removal of the existing Wungong Brook crossing;
 - (4) detail the management measures that will be implemented to minimise turbidity as a result of construction activities within the channel of Wungong Brook;
 - (5) detail the management measures that will be implemented to avoid direct discharge to Wungong Brook during dewatering activities; and
 - (6) be prepared in consultation with the South West Aboriginal Land and Sea Council and the Department of Biodiversity, Conservation and Attractions.
- 3-3 The proponent shall not commence **ground-disturbing activities** associated with the removal of the existing Wungong Brook crossing or construction of the new Wungong Brook crossings (whichever occurs earlier) until the **CEO** has approved by notice in writing the Wungong Brook Management Plan required by condition 3-2. The proponent shall implement the version of the Wungong Brook Management Plan approved by the **CEO**.
- 3-4 Within twelve (12) months following completion of construction of the proposal, the proponent shall undertake rehabilitation of the banks of the Wungong Brook using locally native species to reinstate foreshore vegetation and fauna habitat in areas temporarily disturbed during construction along Wungong Brook.
- 4 Indirect Impacts – Lambert Lane and Fletcher Park**
- 4-1 During construction of the proposal, the proponent shall undertake measures to avoid where possible, otherwise minimise, proposal attributable **indirect impacts** to **native vegetation** outside the **development envelope** in Lambert Lane Nature Reserve, Bush Forever site 264 and Crown Reserve R14217.
- 4-2 Following construction of the proposal, the proponent shall undertake weed control for five (5) years within Lambert Lane Nature Reserve, Bush Forever site 264 and Crown Reserve R14217 within ten (10) metres of the **development envelope** to ensure there is no change attributable to the proposal from the baseline composition and cover of weeds determined prior to construction.

- 4-3 The proponent shall prepare and submit a report to demonstrate that the requirements of conditions 4-1 and 4-2 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.

5 Social Surroundings (Noise)

- 5-1 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.

- 5-2 At least three (3) months prior to the operation of the proposal, in order to meet the requirements of condition 5-1(1), the proponent shall submit a revised Byford Rail Extension Operational Noise and Vibration Management Plan to include:

- (1) the details of any relevant mitigation measures to confirm that noise and vibration criteria will be met;
- (2) an update to Section 5 Management plan and Appendix C Noise and vibration mitigation extent options of the Byford Rail Extension Operational Noise and Vibration Management Plan (Reference: 675.11323.01500-R02 January 2021), to show the locations and minimum heights of noise walls, rail damper locations and ballast matting locations; and
- (3) demonstration that the design and construction of mitigation measures will meet the noise and vibration objectives set out in section 2 Assessment framework and design objectives of the Byford Rail Extension Operational Noise and Vibration Management Plan (Reference: 675.11323.01500-R02 January 2021).

- 5-3 The proponent shall implement the revised Byford Rail Extension Operational Noise and Vibration Management Plan, or the most recent version, which the **CEO** has confirmed by notice in writing satisfies the requirements of condition 5-2.

- 5-4 The proponent shall continue to implement the revised Byford Rail Extension Operational 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 5-1(1) is being and will continue to be met.

- 5-5 In the event of failure to implement management actions detailed in the approved Byford Rail Extension Operational Noise and Vibration Management

Plan, the proponent shall meet the requirements of condition 9-5 (Compliance Reporting) and shall implement the corrective actions outlined in the approved Byford Rail Extension Operational Noise and Vibration Management Plan, including, but not limited to, actions and investigations to be undertaken.

6 Offsets

6-1 The proponent shall implement offset measures to achieve the objective of counterbalancing the significant residual impact to the following environmental values:

- (1) 2.26 ha of SCP 3a *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils, Swan Coastal Plain;
- (2) 0.48 ha of SCP 3c *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain;
- (3) 4.44 ha of Guildford Complex;
- (4) 1.54 ha of Bush Forever;
- (5) 8.65 ha of moderate quality Carnaby's cockatoo foraging habitat;
- (6) 8.65 ha of moderate to high quality forest red-tailed black cockatoo foraging habitat;
- (7) 8.65 ha of moderate Baudin's cockatoo foraging habitat;
- (8) 139 black cockatoo potential breeding trees; and
- (9) 2.6 ha of Conservation Category Wetlands.

6-2 To meet the requirement of condition 6-1 the proponent shall tangibly improve the environmental values by implementing **on-ground management** to the extent and at the locations as set out and described in Table 1:

Table 1: Location and extent of offset measures required to meet the requirement of condition 6-1

Environmental value	Offset location	Extent of location to receive offset measures
SCP 3a <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils, Swan Coastal Plain	Lambert Lane Nature Reserve	At least 3.3 ha
	Brickwood Reserve	At least 6.5 ha
SCP 3c <i>Corymbia calophylla</i> - <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain	Roman Road Nature Reserve	At least 3.0 ha

Guildford Complex	Lowlands Nature Reserve	4.4 ha
Bush Forever	Lambert Lane Nature Reserve	3.1 ha
Moderate quality Carnaby's cockatoo foraging habitat	Lowlands Nature Reserve	At least 47.05 ha
Moderate to high quality forest red-tailed black cockatoo foraging habitat	Lowlands Nature Reserve	At least 76.8 ha
Moderate to high quality Baudin's cockatoo foraging habitat	Lowlands Nature Reserve	At least 70.6 ha
Black cockatoo potential breeding trees	Lowlands Nature Reserve	417 trees
Conservation Category Wetlands	Lambert Lane Nature Reserve	3.6 ha
	Brickwood Reserve	4.2 ha

Byford Rail Extension Offset Management Plan

- 6-3 Prior to **ground-disturbing activities**, or as agreed by the **CEO**, the proponent shall prepare and submit a Byford Rail Extension Offset Management Plan to the requirements of the **CEO**.
- 6-4 The Byford Rail Extension Offset Management Plan shall:
- (1) demonstrate that the objective in condition 6-1 will be met;
 - (2) describe how and when the offset measures will be implemented consistent with condition 6-2;
 - (3) be prepared on advice of the Department of Biodiversity, Conservation and Attractions, the Department of Planning, Lands and Heritage and the Shire of Serpentine-Jarrahdale;
 - (4) spatially identify the **Proposed Offset Conservation Area(s)** for **on-ground management** offset extent and measures consistent with condition 6-2, and that contains the environmental values identified in condition 6-1. Submit shapefiles for each of the **Proposed Offset Conservation Area(s)**;
 - (5) identify and spatially define the values used to calculate the extent of offset required at each offset location as set out in condition 6-2 and as described in sections 3, 4 and 5 and Appendix B of the *Byford Rail Extension Offset Strategy, August 2021*;
 - (6) demonstrate how the environmental values within the **Proposed Offset Conservation Area(s)** will be maintained and improved in order to counterbalance the significant residual impact to the environmental

values in condition 6-1 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*, and the *Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy Assessment Guide*, or any subsequent revisions of these documents;

- (7) for each offset location as set out in Table 1:
- (a) include baseline information for vegetation quality and condition in the **Proposed Offset Conservation Area(s)** that reflects the offset quantification for each environmental value as set out in sections 3, 4 and 5 and Appendix B of the *Byford Rail Extension Offset Strategy, August 2021*;
 - (b) state the targets to be achieved, including completion criteria and vegetation condition, which result in a **tangible improvement** to the environmental values being offset;
 - (c) demonstrate the consistency of the targets with the objectives of any relevant guidance, including but not limited to, recovery plans or area management plans;
 - (d) detail the **on-ground management** actions with associated timeframes for implementation and completion, to achieve the targets and objectives identified in condition 6-4(7)(a) and condition 6-4(7)(b);
 - (e) define the role of the proponent and/or any relevant management authority or other third party involved in delivering the offset, including contribution of funds to maintain the offset for twenty (20) years; and
 - (f) detail the monitoring, reporting and evaluation mechanisms for the targets, objectives, and actions identified under condition 6-4(7)(a), condition 6-4(7)(b) and condition 6-4(7)(c);

Revegetation Research Plan

- 6-5 The proponent shall prepare and submit a Revegetation Research Plan within twelve (12) months of the publication of this statement to apply to Fletcher Park, or other suitable location(s) as agreed by the **CEO**, with the aim to develop cost effective methods for rehabilitating and improving the buffers and resilience of remnant occurrences of the SCP 3a *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils community.

- 6-6 The Revegetation Research Plan is to include a procedure for incorporating the findings and learnings from the research into the Byford Rail Extension Offset Management Plan, or its future revisions, where relevant.
- 6-7 The proponent:
- (1) may review and revise the Byford Rail Extension Offset Management Plan and/or the Revegetation Research Plan; or
 - (2) shall review and revise the Byford Rail Extension Offset Management Plan and/or the Revegetation Research Plan as and when directed by the **CEO** by a notice in writing.
- 6-8 The proponent shall implement the latest revision of the Byford Rail Extension Offset Management Plan and the Revegetation Research Plan approved by the **CEO**.
- 6-9 The proponent shall continue to implement the Byford Rail Extension Offset Management Plan until the **CEO** has confirmed by notice in writing that the proponent has demonstrated that the objective in condition 6-1 is being met.
- 6-10 The proponent shall, within ninety (90) days of completing implementation of the plans, report to the **CEO** on the outcomes of the actions, objectives, and targets in the Byford Rail Extension Offset Management Plan, and where relevant, the findings from the Revegetation Research Plan.
- 6-11 When a notification to the **CEO** occurs in accordance with condition 9-5, the proponent shall provide a report to the **CEO** within sixty (60) days if the actions, objectives, or targets in the Byford Rail Extension Offset Management Plan are unable to be met, and provide details and timing of **contingency actions** to be undertaken, to the satisfaction of the **CEO**.
- 6-12 The proponent shall report to the **CEO** on the outcomes of the **contingency actions** as required by condition 6-11 within sixty (60) days of completion.
- 6-13 The proponent shall continue to implement **contingency actions** as required by condition 6-11 until the **CEO** has confirmed by notice in writing that the proponent has demonstrated that the objective in condition 6-1 is being met.

7 Contact Details

- 7-1 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.

8 Time Limit for Proposal Implementation

- 8-1 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.
- 8-2 By the date that is five (5) years from the date of this Statement, the proponent shall notify the **CEO** in writing of the date of substantial commencement of the proposal, together with reasons why that date has been selected.

9 Compliance Reporting

- 9-1 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 9-6, or prior to implementation of the proposal, whichever is sooner.
- 9-2 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.
- 9-3 After receiving notice in writing from the **CEO** that the Compliance Assessment Plan satisfies the requirements of condition 9-2 the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 9-1.
- 9-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 9-1 and shall make those reports available when requested by the **CEO**.
- 9-5 The proponent shall advise the **CEO** of any potential non-compliance within seven (7) days of that non-compliance being known.
- 9-6 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 9-1.

10 Public Availability of Data

10-1 Subject to condition 10-2, 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.

10-2 If any data referred to in condition 10-1 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.

Table 2: Abbreviations and definitions

Acronym or abbreviation	Definition or term
Black cockatoos	Includes Carnaby's cockatoo (<i>Calyptorhynchus latirostris</i>), forest red-tailed black cockatoo (<i>Calyptorhynchus banksia naso</i>) and Baudin's cockatoo (<i>Calyptorhynchus baudinii</i>).
Black cockatoo potential breeding trees	Any existing tree of a species known to support black cockatoo breeding which has a hollow or has a diameter at breast height of 500 millimetres or greater and therefore may develop a breeding hollow.
<i>Byford Rail Extension Offset Strategy, August 2021</i>	Public Transport Authority 2021 <i>Byford Rail Extension Offset Strategy</i> , Final/Rev 0, August 2021.
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or his delegate.
Conservation Category Wetland	As identified in the Geomorphic Wetlands of the Swan Coastal Plain (DBCA-019) dataset.
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 red line marked in Figure 1 of this Statement and defined by coordinates in Schedule 1.
Disturbance footprint	The blue shaded area within the blue line marked in Figure 1 of this Statement and defined by coordinates in Schedule 1.
Disturb	Is to be defined as per the definition of 'disturb' in section 5 [subsection disturb – (a)(i)(ii)(iii) and (iv)] of the <i>Biodiversity Conservation Act 2016</i> .
Ground-disturbing activities	Activities that are associated with the substantial implementation of a proposal including but not limited to, digging (with mechanised equipment), blasting, earthmoving, vegetation clearance, grading, gravel extraction, construction of new or widening of existing roads and tracks. Ground-disturbing activities does not include Geotechnical investigations (including potholing for services and the installation of piezometers) and other preconstruction activities where no clearing of vegetation is required.
Guildford complex	A mixture of open forest to tall open forest of <i>Corymbia calophylla</i> (Marri) - <i>Eucalyptus wandoo</i> (Wandoo) - <i>Eucalyptus marginata</i> (Jarrah) and woodland of <i>Eucalyptus wandoo</i> (Wandoo) (with rare occurrences of <i>Eucalyptus lane-poolei</i> (Salmon White Gum)). Minor components include <i>Eucalyptus rudis</i> (Flooded Gum) – <i>Melaleuca raphiophylla</i> (Swamp Paperbark).
ha	Hectare
Indirect impacts	Any potential impacts outside the development envelope as a result of authorised clearing and disturbance or other project activities. 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.
Native vegetation	Defined in sections 3(1) and 51A of the <i>Environmental Protection Act 1986</i>
On-ground management	This includes revegetation (re-establishment of native vegetation in degraded areas) and/or 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. Actions associated with on-ground management must be additional to those undertaken by the land manager as required by legislation.
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(s)	The areas of land identified in condition 6-4(4).
Qualified and licensed terrestrial fauna spotter(s)	Minimum of 3 years' experience for someone with appropriate qualifications, or a minimum of 5 years' experience for someone without appropriate qualifications, and licenced under section 10 of the <i>Biodiversity Conservation Act 2016</i> .
Revegetation	Deliberate re-establishment of native vegetation in degraded areas.
Tangible improvement	Demonstrated improvement of environmental values being offset as a direct result of on-ground management and/or revegetation.
WA Offsets Template	Template to be used to quantify the quantum of impact and offset extent required to counterbalance the proposal's significant residual impacts, as detailed in the <i>WA Environmental Offsets Guidelines</i> .

Figures (attached)

Figure 1 Byford rail extension development envelope and disturbance footprint
(This figure is a representation of the co-ordinates held by DWER (Doc Ref DWERDT505054))

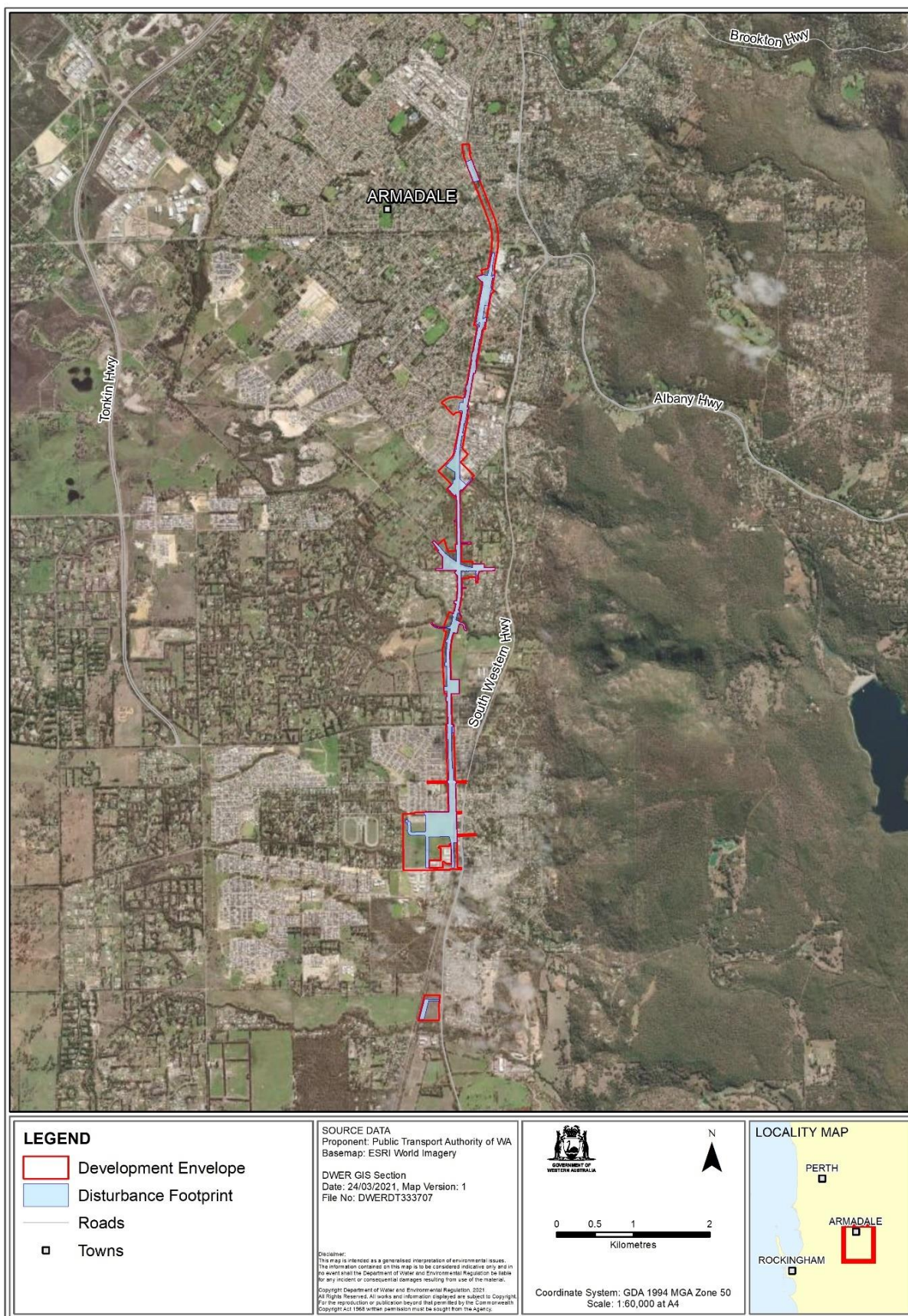


Figure 1: Byford rail extension development envelope and disturbance footprint

Schedule 1

All co-ordinates are in metres, listed in Map Grid of Australia Zone 50 (MGA Zone 50) datum of Geocentric Datum of Australia 1994 (GDA94)

Spatial data depicting Figure 1 are held by the Department of Water and Environmental Regulation as follows:

- Figure 1: Byford rail extension development envelope and disturbance footprint (DWERDT505054).

Appendix B: Decision-making authorities

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	<i>Aboriginal Heritage Act 1972</i> - section 18 consent to impact a registered Aboriginal heritage site
2. Minister for Environment	<i>Biodiversity Conservation Act 2016</i> - section 40 authority to take or disturb threatened species and - section 45 authority to modify occurrence of a threatened ecological community <i>Environmental Protection Act 1986</i> - Part IV Divisions 1 and 2
3. Minister for Planning	<i>Planning and Development Act 2005</i> - scheme amendments
4. Minister for Water	<i>Rights in Water and Irrigation Act 1914</i> - permit to interfere with beds and banks - permit to take water - groundwater abstraction licence - licence to construct bores - dewatering licence
5. Minister for Transport	<i>South-Western Railway Act 1891</i> - Construction of the Byford Railway Extension is authorised by this Act. It authorises the PTA to make railways and anything associated with the making of a railway along the land described in the Schedule and within 5 miles either side (known as the limits of deviation), in accordance with powers granted under section 99 of the <i>Public Works Act 1902</i>
6. Minister for Lands	<i>Land Administration Act 1997</i> - section 182 Entry for feasibility study
7. Chief Health Officer, Department of Health	<i>Health Act 1911</i> - section 107(2)(b) <i>Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulation 1974</i> - reg 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
8. Chief Dangerous Goods Officer Department of Mines, Industry Regulation and Safety	<i>Dangerous Goods Safety Act 2004</i> - storage and handling of hazardous materials and dangerous goods licence
9. Chairman, Western Australian Planning Commission	<i>Planning and Development Act 2005</i> - development applications with planning control areas <i>Swan and Canning Rivers Management Act 2006</i> - development applications within development control area
10. Chief Executive Officer, Department of Biodiversity, Conservation and Attractions	Biodiversity Conservation Regulations 2018 - authority to take fauna and flora (other than threatened flora and fauna)
11. Chief Executive Officer, Department of Water and Environmental Regulation	<i>Environmental Protection Act 1986</i> - part V clearing permit
12. Chief Executive Officer City of Armadale or Shire of Serpentine-Jarrahdale	<i>Planning and Development Act 2005</i> - development applications for station precincts <i>Building Act 2011</i> - Building application, permit and certificate <i>Health Act (Underground Water Supply) Regulation 1959</i> - regulation 11 approval required for a well or other underground source of water supply <i>Environmental Protection (Noise) Regulations 1997</i> - approval of noise management plan (under delegation from DWER)

Note: In this instance, agreement is only required with DMAs 1, 2, 3, 4, 5, and 6, these DMAs are Ministers.

Appendix C: Consideration of Environmental Protection Act principles

EP Act Principle	Consideration
<p>1. The precautionary principle</p> <p><i>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.</i></p> <p><i>In application of this precautionary principle, decisions should be guided by –</i></p> <ul style="list-style-type: none"> <i>(a) careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i> <i>(b) an assessment of the risk-weighted consequences of various options.</i> 	<p>The EPA has considered the precautionary principle in its assessment and has had particular regard to this principle in its assessment of impacts to Flora and Vegetation. The assessment of these impacts is provided in this report.</p> <p>The EPA notes that there is a known record of <i>Diuris purdiei</i> population in the southern portion of Fletcher Park within the development envelope, approximately 18 m beyond the boundary of the disturbance footprint. The EPA also notes that there is some uncertainty regarding the extent of the populations as the species is difficult to detect as it only flowers in the season following a hot summer or early autumn fire. Given there is insufficient evidence to rule out the presence of the species within the development envelope, it is considered that no clearing should occur within the area of the known population, noting that the disturbance footprint is considered to be outside of the known occurrence of the species. The EPA notes that the population record was from 2005 when nine individuals were recorded. It is not known whether there has been a fire in the area subsequent to the survey in which the species was recorded.</p> <p>The EPA has recommended conditions to ensure that measures are undertaken to minimise direct and indirect impacts to flora and vegetation, and to ensure that the significant residual impacts associated with the proposal are counterbalanced.</p> <p>From its assessment the EPA has concluded that the proponent has, to the extent practicable and reasonable, avoided the potential to impact the known population of <i>Diuris purdiei</i>. The EPA has recommended the proposal be subject to conditions to manage potential indirect impacts to native vegetation outside the development envelope in the vicinity of the known population.</p>
<p>2. The principle of intergenerational equity</p> <p><i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p>	<p>The EPA has considered the principle of intergenerational equity in its assessment and has had particular regard to this principle in its assessment of Terrestrial Fauna and Inland Waters. The assessment of these impacts is provided in the report.</p> <p>The EPA notes that the proponent took actions to avoid and minimise impacts of the proposal. This includes locating infrastructure to avoid clearing of fauna habitat where possible, with a particular emphasis on avoiding habitat of moderate or better value.</p>

EP Act Principle	Consideration
	<p>The EPA has recommended conditions to ensure impacts to Wungong Brook are minimised during construction and that the hydrology of Wungong Brook is maintained during operation of the proposal.</p> <p>The EPA has recommended that the significant residual impacts to black cockatoos requires offsets by way of on-ground management, which should be implemented at the proposed offsets sites in order to tangibly improve black cockatoo foraging habitat and potential breeding trees.</p>
<p>3. The principles of the conservation of biological diversity and ecological integrity</p> <p><i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p>	<p>The EPA has considered the principle of the conservation of biological diversity and ecological integrity in its assessment and has had particular regard to this principle in its assessment of flora and vegetation and terrestrial fauna. The assessment of these impacts is provided in this report.</p> <p>The EPA considered to what extent the potential impacts from the proposal to flora and vegetation and terrestrial fauna can be ameliorated to ensure consistency with the principle of the conservation of biological diversity and ecological, including by provision of offsets.</p> <p>The EPA has recommended offsets to counterbalance the significant residual impacts to Threatened Ecological Communities, regionally significant vegetation and black cockatoo foraging and potential breeding habitat.</p> <p>The EPA has recommended the implementation of on-ground management actions that will result in a tangible improvement to the environmental values being offset at each of the proposed offset sites. Additionally, the EPA has recommended the development and implementation of a revegetation research plan at Fletcher Park. The research is to be undertaken with the aim of developing cost effective methods for rehabilitating and improving the buffers and resilience of remnant occurrences of the SCP 3a <i>Corymbia calophylla</i> - <i>Kingia australis</i> woodlands on heavy soils community to assist in preserving the habitat and its value for future generations.</p> <p>From its assessment of this proposal the EPA has concluded that the environmental values will be protected, and the health, diversity and productivity of the environmental values will be maintained for the benefit of future generations.</p>
<p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p>	<p>This principle was considered by the EPA when assessing the impacts of the proposal on the environmental values of the Wungong Brook, Fletcher Park, Lambert Lane Nature Reserve and surrounds. In considering this principle, the</p>

EP Act Principle	Consideration
<p>(4) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(5) <i>The polluter pays principle — those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</i></p> <p>(6) <i>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 wastes.</i></p> <p>(7) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.</i></p>	<p>EPA notes that the proponent will bear the costs relating to implementing the proposal to achieve environmental outcomes, and management and monitoring of environmental impacts during construction, operation and decommissioning of the proposal.</p> <p>The EPA has had regard to this principle during the assessment of the proposal.</p>
<p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p>	<p>This principle was considered by the EPA when assessing the impacts of the proposal on the environmental and social values of Wungong Brook, Fletcher Park, Lambert Lane Nature Reserve and surrounds.</p> <p>The EPA notes that the proponent integrated the principle of waste minimisation into the proposal. Specifically, decision making during the proposal will incorporate the waste hierarchy to manage the potential waste streams. The proponent will implement the waste minimisation hierarchy of avoid, reuse, recycle and treat/dispose for the proposal. The Proposal will not cause soil or land waste disposal impacts. All waste streams will be reused, recycled or disposed to an appropriate off-site waste management facility.</p> <p>The EPA has had regard to this principle during the assessment of the proposal.</p>

Appendix D: 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
Air			
Air quality	Potential reduction in transport motor vehicle emissions.	<p><u>Public comments</u> None received for this factor.</p> <p><u>Agency comments</u> None received for this factor.</p>	<p>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 Byford Rail Extension.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> 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 Perth region, <p>the EPA considers that the proposal will likely reduce transport emissions if there is predicted change from private motor vehicle journeys. It is unlikely that the proposal would have a significant impact on air quality and that the impacts to this factor are manageable.</p> <p>Accordingly, the EPA did not consider the factor air quality to be a key environmental factor at the conclusion of its assessment.</p>
Greenhouse gas emissions	Potential greenhouse gas emissions	<p><u>Public comments</u> None received for this factor.</p> <p><u>Agency comments</u> None received for this factor.</p>	<p>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 Byford Rail Extension.</p> <p>Having regard to:</p> <ul style="list-style-type: none"> 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
			<ul style="list-style-type: none"> the incorporation of traffic, construction (including clearing), and operational contributing factors in the assessment the estimation that by 2050 about 3,020 tonnes of carbon dioxide equivalent emissions would be saved, <p>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.</p> <p>Accordingly, the EPA did not consider the factor greenhouse gas emissions to be a key environmental factor at the conclusion of its assessment.</p>
Social surroundings			
Visual Amenity	Change in visual amenity within identified landscape character units due to railway construction and associated vegetation clearing, road and/or rail bridges and noise walls or barriers	<p><u>Public comments</u></p> <p>None received for this factor.</p> <p><u>Agency comments</u></p> <p>None received for this factor.</p>	<p>Amenity assessment</p> <p>The EPA assesses that railway construction and associated vegetation clearing, road and/or rail bridges and noise walls will impact visual amenity. Observers along Wungong Road may experience higher visual impacts from the construction of noise walls. The walls may alter the existing natural view experience of the remnant vegetation that occurs within the rail corridor.</p> <p>The proponent proposes to upgrade the existing Armadale station by elevating it 10 m above ground level. The visual impact of viaduct will be similar to those of noise walls for at grade rail sections.</p> <p>The EPA notes the proponent proposes to consult with the residents and local community on the design of the new Byford Station and Armadale Station upgrade.</p> <p>Amenity minimisation measures include:</p> <ul style="list-style-type: none"> minimising the potential visual impact of noise controls where practicable in consultation with residents of rail-facing properties consulting with residents and the local community on the design of the new Byford station and Armadale station upgrade. <p>Accordingly, the EPA did not consider social surroundings (visual amenity) to be a key environmental factor at the conclusion of its assessment.</p>

Appendix E: Relevant policy, guidance and procedures

The EPA had particular regard to the policies, guidelines and procedures listed below in the assessment of the proposal.

- *Approved Conservation Advice for Calyptorhynchus banksii naso* (Forest Red-tailed Black Cockatoo) (DEWHA 2009)
- *Carnaby's cockatoo (Calyptorhynchus latirostris) Recovery Plan*. Department of Parks and Wildlife, Perth, Western Australia (DPaW 2013)
- *Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region*, Environmental Protection Authority, Western Australia (EPA 2019)
- *Conservation Advice Calyptorhynchus baudinii Baudin's cockatoo* (TSSC 2018)
- *Forest Black Cockatoo (Baudin's Cockatoo Calyptorhynchus baudinii and Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso) Recovery Plan*. Department of Environment and Conservation, Perth (DEC 2008)
- *EPBC Act referral guidelines for three threatened black cockatoo species* (DSEWPAC 2012d)
- *Environmental Factor Guideline – Air Quality* (EPA 2020)
- *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016a)
- *Environmental Factor Guideline – Inland Waters* (EPA 2018)
- *Environmental Factor Guideline – Social Surroundings* (EPA 2016d)
- *Environmental Factor Guideline – Terrestrial Environmental Quality* (EPA 2016e)
- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016c)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual*, (EPA 2020)
- *WA Environmental Offsets Policy* (Government of Western Australia 2011)
- *WA Environmental Offsets Guidelines*, Government of Western Australia (2014)
- *Statement of Environmental Principles, Factors and Objectives* (EPA 2020)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures* (State of Western Australia 2016)
- *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black Cockatoo* (DotEE 2017c)
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b)
- *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020).

Appendix F: List of submitters

7-day comment on referral

Public submission 1
Murdoch University – Black cockatoo ecology project
Peel Harvey Catchment Council

Public review of proponent information

Organisations and public

Public submission 1
Public submission 2
Public submission 3
Public submission 4
City of Armadale
Armadale Gosnells Landcare Inc.
Shire of Serpentine Jarrahdale
City of Armadale Bushcare and Environment Advisory Group
Wildflower Society of Western Australia

Government agencies

Commonwealth Department of Agriculture, Water and the Environment
Department of Planning, Lands and Heritage
Department of Biodiversity, Conservation and Attractions
Department of Water and Environmental Regulation

Appendix G: Assessment timeline

Date	Progress stages	Time (weeks)
7 October 2020	EPA decided to assess – level of assessment set	4
6 January 2021	EPA approved Environmental Scoping Document	13
28 April 2021	EPA accepted Environmental Review Document	16
3 May 2021	Environmental Review Document released for public review	1
17 May 2021	Public review period for Environmental Review Document closed	2
5 August 2021	EPA received final information for assessment	11
18 August 2021	EPA accepted proponent's Response to Submissions	2
19 August 2021	EPA completed its assessment	1 day
29 September 2021	EPA provided report to the Minister for Environment	6
4 October 2021	EPA report published	3 days
18 October 2021	Appeals period closed	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.

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EPA 2016c, *Environmental Factor Guideline – Terrestrial Fauna*, Environmental Protection Authority, Perth, WA.

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