Supplementary Environmental Report

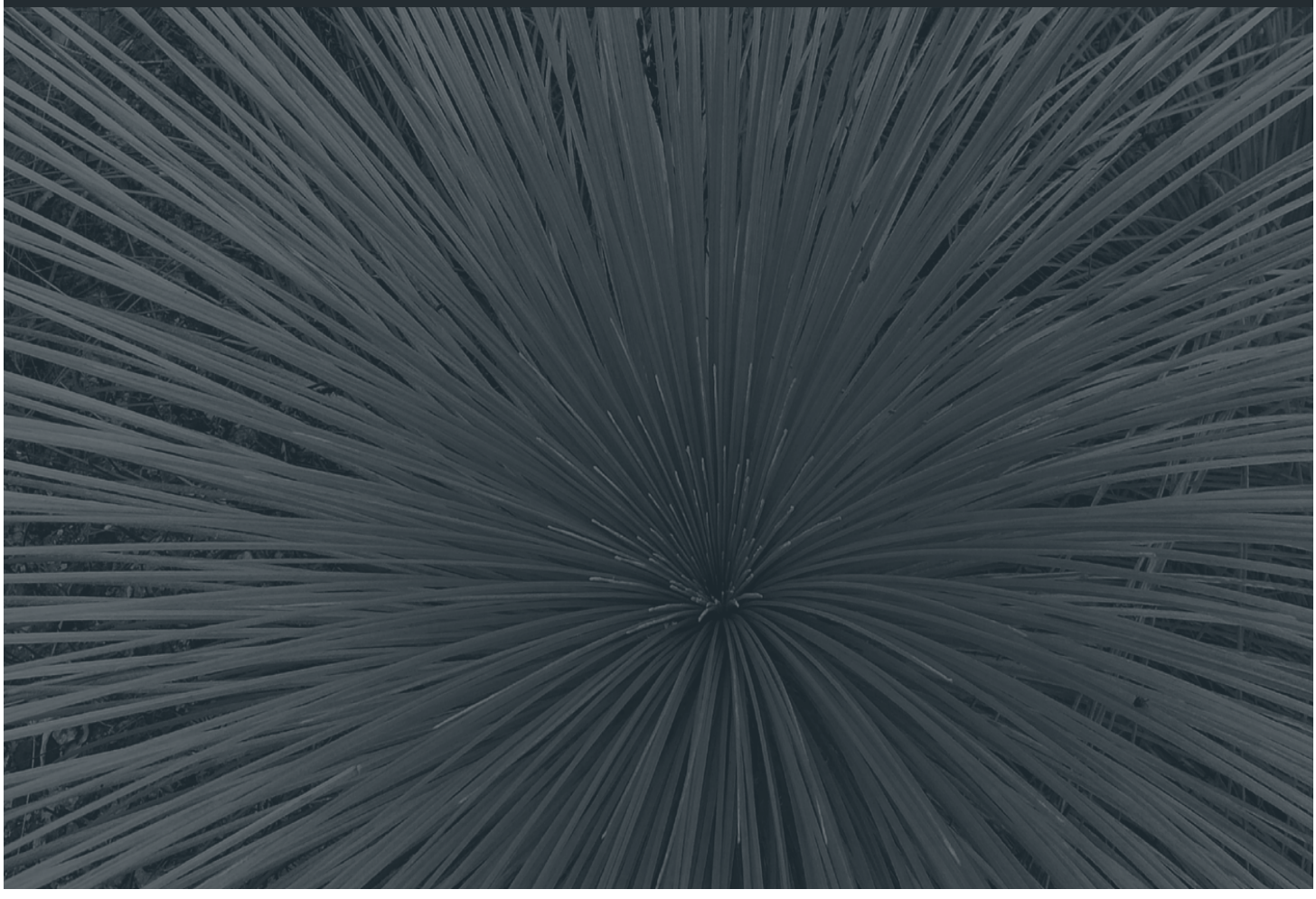
Lot 102 Farrall Road, Midvale

Project No: EP16-009(21)

EPA Reference: 2163

EPBC Reference: 2017/8066

Prepared for Peet Stratton Pty Ltd
March 2020



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1	July 2019	Chrystal King	CKK	Jason Hick	JDH
	Submitted to client for review.				
A	August 2019	Chrystal King	CKK	Ashley Bird	ALB
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B	November 2019	Chrystal King	CKK	Jason Hick	JDH
	Submitted to EPA following initial comments.				
C	February 2020	Chrystal King	CKK	Jason Hick	JDH
	Submitted to EPA following comments.				
S	March 2020	Chrystal King	CKK	Jason Hick	JDH
	Updated to include advertising dates.				

I hereby authorise this document to be submitted to the Department of Water and Environmental Regulation (EPA Services) on behalf of Peet Stratton Pty Ltd.

Signature: _____

Name: CRAIG RAYNOR

Position: SENIOR DEVELOPMENT MANAGER

Date: 17/3/2020

Invitation to make a submission

The Environmental Protection Authority (EPA) invites people to make a submission on the Supplementary Environmental Report (SER) for this proposal.

Peet Stratton Pty Ltd (Peet) proposes to develop Lot 102 Farrall Road, Midvale for residential uses in accordance with the Farrall Road Local Structure Plan No. 42. The SER has been prepared in accordance with the EPA's *Procedures Manual (Part IV Divisions 1 and 2)*. The SER is the report by the proponent on their environmental review which describes this proposal and its likely effects on the environment.

The SER is available for a public review period of 2 weeks from Monday 23 March 2020 closing on Monday 6 April 2020.

Information on the proposal from the public may assist the EPA to prepare an assessment report in which it will make recommendations on the proposal to the Minister for Environment.

Why write a submission?

The EPA seeks information that will inform the EPA's consideration of the likely effect of the proposal, if implemented, on the environment. This may include relevant new information that is not in the SER, such as alternative courses of action or approaches.

In preparing its assessment report for the Minister for Environment, the EPA will consider the information in submissions, the proponent's responses and other relevant information.

Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the *Freedom of Information Act 1992*.

Why not join a group?

It may be worthwhile joining a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on information in the SER. When making comments on specific elements in the SER:

- Clearly state your point of view and give reasons for your conclusions.
- Reference the source of your information, where applicable.
- Suggest alternatives to improve the outcomes on the environment.

What to include in your submission

Include the following in your submission to make it easier for the EPA to consider your submission:

- Your contact details – name and address.

- Date of your submission
- Whether you want your contact details to be confidential.
- Summary of your submission, if your submission is long.
- List points so that issues raised are clear, preferably by environmental factor.
- Refer each point to the page, section and if possible, paragraph of the SER.
- Attach any reference material, if applicable. Make sure your information is accurate.

The closing date for public submissions is: Monday 6 April 2020.

The EPA prefers submissions to be made electronically via the EPA's Consultation Hub at https://consultation.epa.wa.gov.au

Alternatively, submissions can be:

- posted to: Chairman, Environmental Protection Authority, Locked Bag 10, Joondalup DC WA 6919, or
- delivered to: The Environmental Protection Authority, Prime House 8 Davidson Terrace, Joondalup Western Australia 6027.

If you have any questions on how to make a submission, please contact the EPA Services at the Department of Water and Environmental Regulation on 6364 7000.

Supplementary Environmental Report Requirements

The EPA published its decision to assess the proposal on 5 June 2018 with the level of assessment set as 'Referral Information with Additional Information (2-week public review)'. Additional information was requested by the EPA on 12 October 2018 and the below table provides a response to the EPA's additional information request, outlining the Section of the document which have responded to the EPA request.

Required work	Reference
1. Providing context and clarifying potential environmental impacts	
Flora and vegetation	
Identify and assess the values and significance of flora and vegetation within Lot 102 and the immediate adjacent area including the communities and condition of the vegetation, in accordance with EPA guidance. Please describe these values in a local, and regional context.	Section 4.2.3.3
The Threatened and Ecological Community (TEC) *Shrublands and woodlands of the eastern Swan Coastal Plain* (FCT 20c) is mapped within the proposal area. The EPA requires an independent study to be undertaken regarding the occurrences of the TEC within Lot 102. The EPA must endorse the consultant undertaking the study, as well as the scope for the review. The study must be provided directly to the EPA by the endorsed consultant. Consultants should seek further data and background information to complete this task from the Department of Biodiversity, Conservation and Attractions (DBCA). DBCA maintains the TEC/PEC database and also has knowledge of the future plans for other sites of FCT20c. The TEC study should specifically detail: • the significance of the occurrences of the TEC within the proposal area, relative to known extent; • the potential impact of the proposal on the TEC occurrences, including consideration of the impacts of the development on hydrological processes and other potential impacts such as increased fragmentation and edge effects, weed invasion, recreational use, fire management and rubbish dumping; • the long-term likely survival and sustainability of the occurrences under pre-development and proposed development scenarios. • consideration of the buffer and management actions required to protect the occurrences from impacts including increased fragmentation, hydrological change, increased weed invasion, dust, inappropriate fire regimes, rubbish dumping and recreational impacts; • the management actions required for the occurrences to be rehabilitated; and location and size of an area/areas recommended for retention of the TEC.	Appendix D Section 4.2.3.2
The information provided in the existing referral documentation for the TEC does not concur with DBCA mapping. Please confirm the accuracy of the mapping used.	Section 4.2.3.2
The EPA expects that Peet Stratton Pty Ltd will consult with DBCA when dealing with matters related to management actions to mitigate impacts to the TEC.	Section 4.2.6.2
Provide a summary of residual impacts of the proposal.	Section 4.2.7
Identify management and mitigation measures for the proposal which demonstrate that the EPA's objective can be met.	Sections 4.2.6 to 4.2.7
Terrestrial fauna	
Identify and assess the values and significance of fauna, fauna habitat and habitat connectivity within Lot 102 and the immediate adjacent area and describe these values in a local and regional context, in accordance with EPA guidance.	Section 4.3.3

Required work	Reference
1. Providing context and clarifying potential environmental impacts (continued)	
Terrestrial fauna (continued)	
Describe and assess the potential impacts as a result of the proposal (including fragmentation) on fauna and significant fauna, including short-range endemic (SRE) invertebrate fauna. Estimate the number of significant species that are likely to be impacted, in the context of the existing population, as a result of direct and indirect impacts to fauna habitat.	Section 4.3.4
Consult with DBCA when dealing with matters related to management actions to ameliorate impacts to fauna.	Section 4.3.6.2
Provide a summary of residual impacts of the proposal.	Section 4.3.7
Identify management and mitigation measures for the proposal which demonstrate that the EPA's objective can be met.	Section 4.3.6
Inland waters (surface and groundwater)	
Identify and assess the values and significance of inland waters (quality and quantity, including hydrological processes) within the development envelope and immediate adjacent area and describe these values in a local, and regional context.	Section 4.4.3
Describe and assess the potential impacts (direct and indirect) as a result of both construction and operational elements of the proposal on water quantity and quality in relation to inland waters.	Section 4.4.4
Please describe the hydrology and surface/groundwater interdependence of the wetland proposed to be retained (UFI15136).	Section 4.4.5.2
Predict the extent, severity and duration of potential impacts, including changes to local and regional groundwater flows and levels, drawdown, local water quality and impacts to other groundwater users as a result of the proposal. Particularly consider potential impacts from the removal of sand to finished floor levels.	Section 4.4.5
Analyse and assess potential inland water impacts and discuss proposed management, monitoring and mitigation measures. Specifically, provide water balance information on pre and post development inland water quality and quantity, including management, monitoring and mitigation measures to address potential impacts.	Sections 4.4.5 to 4.4.6
Identify management and mitigation measures for the proposal which demonstrate that the EPA's objective can be met.	Sections 4.4.6 to 4.4.7
2. Environmental Offsets	
Completion of the Residual Impact Significance Model (page 11 of the WA Environmental Offsets Guideline) for all direct and indirect impacts, including an explanation of how the information and values within the model have been determined.	Table 31 Section 6.4
Completion of the WA Offsets Template (Appendix 1) in the WA Environmental Offsets Guidelines (2014), including the provision of supporting information, such as evidence of rehabilitation success.	Table 32
An offsets package with supporting information to demonstrate consistency with the WA Environmental Offsets Policy and Guidelines.	Section 6.6

Required work	Reference
3. Matters of National Environmental Significance (MNES)	
Noting that the Approved Conservation Advice for Shrublands and Woodlands of the eastern Swan Coastal Plain (Department of the Environment and Energy 2017) (hereafter approved conservation advice) defines critical habitat as: "*The habitat that is critical for survival of the ecological community is the area of occupancy of known occurrences; and the sandy to gravelly soils on the eastern Swan Coastal Plain and foothills of the Darling Scarp on which the community occurs, areas of similar habitat within 200 metres of known occurrences, (i.e. sandy to gravelly soils on the eastern Swan Coastal Plain and foothills of the Darling Scarp); and remnant vegetation that surrounds or links several occurrences (this is to provide habitat for pollinators or to allow them to move between occurrences).* " Please confirm the total number of hectares of 'critical habitat' for the Shrublands and Woodlands of the eastern Swan Coastal Plain that is proposed to be cleared.	Section 7.1
The proponent should provide information detailing any potential indirect impacts to larger areas of the ecological community immediately surrounding or adjacent to the proposed action. When discussing potential direct and indirect impacts please give consideration to the local, regional, state and national scale and the precautionary principle. This discussion should include, but not be limited to, consideration of fragmentation and edge effect risks, changes in surface water runoff, changes in nutrient cycling, mobilisation of Acid Sulphate Soils and the potential introduction of pathogens or weeds. If required, the proponent should develop management plans to mitigate/avoid any potential impacts to the ecological community.	Section 7.3
For the relevant matters of national environmental significance provide an overall conclusion as to the environmental acceptability of the proposal, including: • a discussion on the consideration with the requirements of the EPBC Act, including the objects of the EPBC Act, the principles of ecologically sustainable development and the precautionary principle; • reasons justifying undertaking the proposal in the manner proposed, including the acceptability of the avoidance and mitigation measures; and • if relevant, a discussion of residual impacts and any offsets and compensatory measures proposed or required for significant residual impacts on MNES, and the relative degree of compensation and acceptability.	Section 7.5
Demonstrate that the action is consistent with any relevant recovery plan or threat abatement plan, including (but not limited to): • English, V. & J. Blyth (2000). Eastern Shrublands and Woodlands (Swan Coastal Plain Community 20c) Interim Recovery Plan 2000-2003. Interim Recovery Plan No. 58. Department of Conservation and Land Management, Wanneroo, Western Australia. Available from: http://www.environment.gov.au/system/files/resources/87dce43f-f6e6- 42fc-9580-cc1aead25ac3/files/eastern-shrublands.pdf • Department of the Environment (2014). Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/system/files/resources/bad95d05-3741-4db3-8946-975155559efb/files/threat-abatement-plan-disease-naturalecosystems-caused-phytophthora-cinnamomi.pdf • Department of the Environment and Energy (2016). Threat abatement plan for competition and land degradation by rabbits. Canberra, ACT: Commonwealth of Australia. Available from: http://www.environment.gov.au/system/files/resources/bf9352c2-35ae-4a80-8828-96de630731a9/files/tap-rabbit-2016.pdf	Sections 7.2.1 to 7.2.2
Demonstrate that the action has had regard to any relevant conservation advice: Department of the Environment and Energy (2017). *Approved Conservation Advice for Shrublands and Woodlands of the eastern Swan Coastal Plain. Canberra*: Department of the Environment and Energy. Available from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/20-conservation-advice.pdf	Section 7.2.1

Required work	Reference
3. Matters of National Environmental Significance (MNES) (continued)	
To the extent that impacts to EPBC Act listed species and communities cannot be avoided or mitigated, provide details of an offset(s) intended to compensate for residual significant impacts on EPBC Act listed species and ecological communities (if any), including: • the type of offset/s proposed; • the extent to which the proposed offset correlates to, and adequately compensates for, the residual significant impacts on EPBC Act listed species and communities; • suitability of the location of any proposed offset site for EPBC Act listed species and communities; • conservation gain to be achieved by the offset i.e. positive management strategies that improve the site or averting the future loss, degradation or damage of the protected matter; • time it will take to achieve the proposed conservation gain; • level of certainty that the proposed offset will be successful; and B current land tenure of any proposed land-based offset and the method of securing and managing that offset for 20 years or the period of the impact (whichever is less).	Section 7.4
Demonstrate how any proposed offset is consistent with the EPBC Act *Environmental Offsets Policy* (October 2012), and provide a completed offsets assessment guide and justification for the values used to complete the offsets assessment guide.	Section 7.4.3
Please provide further detail on the social and economic costs and/or benefits of undertaking the proposed action, including: • basis for any estimations of costs and/or benefits; • potential employment opportunities expected to be generated at each phase of the proposed action; and • details of any public and stakeholder consultation activities, including the outcomes.	Section 7.6

Executive Summary

Peet Stratton Pty Ltd (the proponent or Peet) propose to subdivide and develop Lot 102 Farrall Road, Midvale (herein referred to as 'the site') for residential uses as part of the broader Movida urban development (**Table ES1**). This proposed development is in accordance with the Farrall Road Local Structure Plan No. 42 (LSP) which incorporates the site (and wider area of the Movida urban development) and was approved by the Western Australian Planning Commission (WAPC) in September 2016.

Table ES1: Summary of the proposal

Item	Details
Proposal Title	Urban development of Lot 102 Farrall Road, Midvale
Proponent name	Peet Stratton Pty Ltd
Short description	Peet Stratton propose to develop Lot 102 Farrall Road, Midvale (8.298 ha) for residential uses in accordance with the Farrall Road Local Structure Plan No. 42. The development includes roads, residential lots, public open space areas and associated infrastructure.

The proposed subdivision and associated development of the site will involve the creation of residential land allotments, road reserves, the provision of services, utilities and associated infrastructure and public open space. The development envelope ('site') is 8.298 ha, containing a disturbance footprint of 5.079 ha and a southern public open space (POS) area of 3.219 ha as detailed in **Table ES2** and shown in **Plate ES1**.

The southern POS area will provide for the retention of native vegetation including a wetland, Bush Forever Site No. 309 and areas of Floristic Community Type (FCT) 20c 'shrublands and woodlands of eastern Swan Coastal Plain'[1]. Floristic Community Type 20c is a Threatened Ecological Community (TEC) recognised and listed as 'Critically Endangered' by the WA Minister for the Environment and 'endangered' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is expected that FCT 20c will also be listed as a TEC pursuant to the *Biodiversity Conservation Act 2016* (BC Act) in the future.

Table ES2: Location and proposed extent of physical and operational elements.

Element	Proposed Extent	Location
Development envelope incorporating:	8.298 ha	**Plate ES1** **Figure 2**
Disturbance footprint (including roads, lots infrastructure and northern public open space areas)	5.079 ha	
Southern POS area	3.219 ha	

[1] This FCT is also referred to as 'eastern shrublands and woodlands' and 'shrublands and woodlands of the eastern side of the Swan Coastal Plain'.

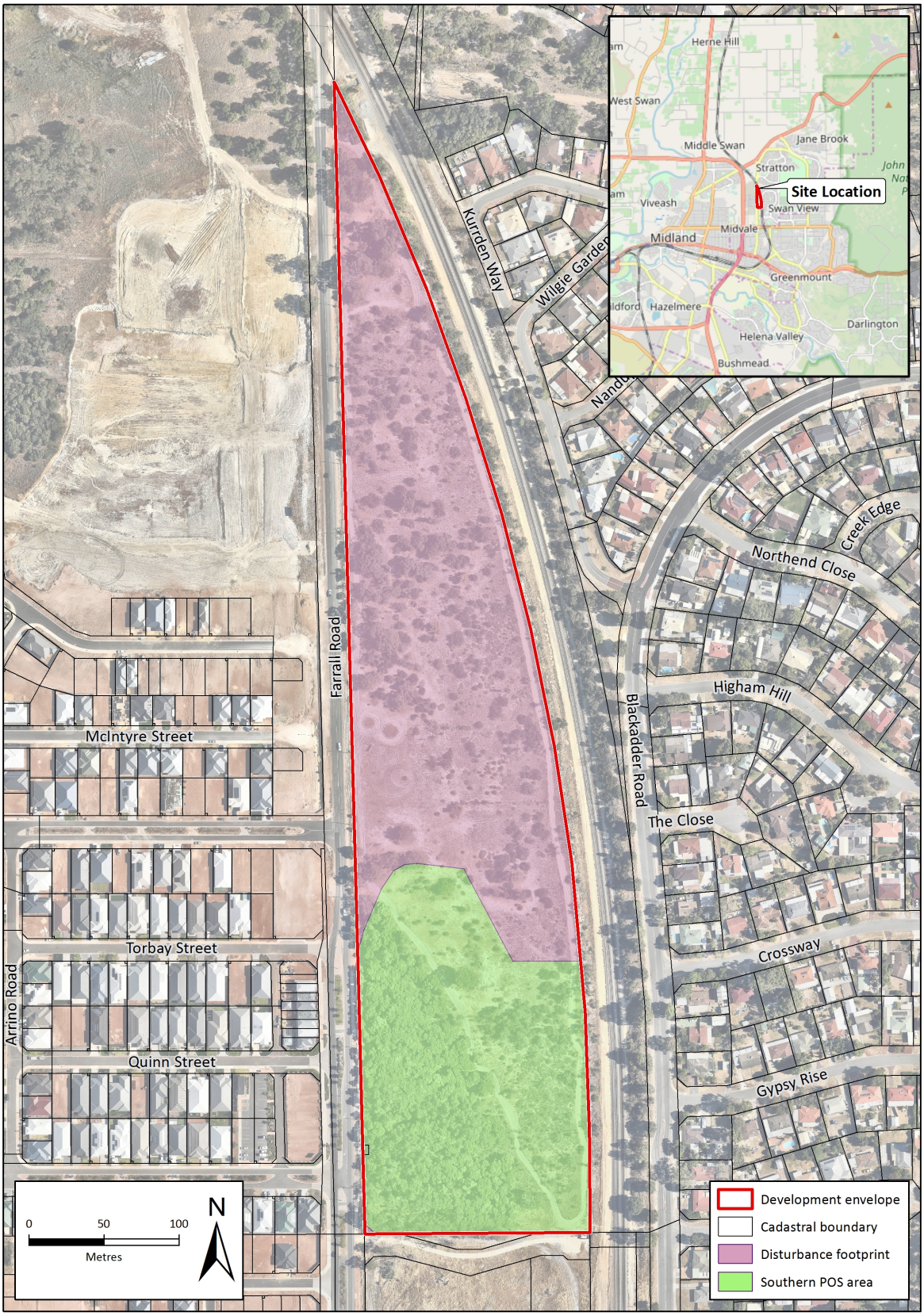

Plate ES1: The Proposal

The proposal was referred to the Environmental Protection Authority (EPA) pursuant to Section 38 of the *Environmental Protection Act 1986* (EP Act) in September 2017. The EPA determined that the proposal would be assessed by the EPA and set the level of assessment as 'Assessed on referral information with Additional Information (2-week public review)' in May 2018. The EPA identified the following factors relevant to the environmental assessment of the proposal:

- Flora and vegetation
- Fauna
- Inland waters.

The proposed action was referred pursuant to the EPBC Act in November 2017. It was determined that the proposed action was a 'Controlled Action' (EPBC 2017/8066) in July 2018 due to the expected impacts to Matters of National Environmental Significance (MNES) listed under Section 18 and 18A. As outlined in a letter to the proponent dated 2 July 2018, the relevant MNES for this proposed action is:

- Shrublands and woodlands of the eastern swan Coastal plain (FCT 20c TEC).

The proposed action was also authorised to be assessed under the WA assessment process and is being assessed through an accredited assessment under section 87 of the EPBC Act.

Table ES3 summarises the potential impacts arising from implementation of the proposal, together with the proposed mitigation and potential residual impacts and offset requirements.

Table ES3: Summary of potential impacts, proposed mitigation and outcomes

Flora and Vegetation	
EPA Objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Policy and Guidance	*Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b). *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016c)
Potential impacts	• Removal of vegetation over the site, of which: o 2.42 ha is in 'completely degraded' condition and was not recorded as part of a plant community. This area contains sparse native and planted exotic trees over a closed grassland of pasture weeds. o 2.55 ha is in 'degraded' condition with 0.85 ha of this recorded as FCT 21c Priority 3 Priority Ecological Community (PEC) 'low lying *Banksia attenuata* woodlands or shrublands' o 0.2 ha is in 'good' condition and representative of FCT 20c TEC 'shrublands and woodlands of eastern Swan Coastal Plain'. • Removal of 0.046 ha of wetland dependent vegetation associated in the southern portion of the site. • Removal of 8 out of 14 individuals of *Isopogon drummondii,* a Priority 3 flora species. • Indirect impacts: o Fragmentation or isolation of populations and occurrences o Impacts on habitat that supports the flora and vegetation o Introduction and spread of weed/disease and fire impacts o Increased recreational use and rubbish dumping facilitated by residential development through improved access and increased population.

Table ES3: Summary of potential impacts, proposed mitigation and outcomes (continued)

Flora and Vegetation	
Mitigation	**Avoid** • The proposal has avoided impacts to the largest, most intact patch of FCT 20c TEC (0.54 ha), the wetland area with 'excellent' condition vegetation and vegetation within Bush Forever Site No. 209. These areas will be retained as undisturbed native vegetation within the southern POS area and handed over to the City of Swan and managed for conservation in the long term. • The proposal has also avoided impact to 6 of the 14 individuals of *Isopogon drummondii,* a Priority 3 flora species.
	Minimise • The proposal intends to minimise impacts to the TEC and wetland through the provision of a buffer to development, which will be revegetated and appropriately landscaped. • Clearing and construction within the site will be appropriately managed to minimise impacts from dust, weeds, disease, fire and rubbish dumping during construction. Construction environmental management will be directed through the preparation and implementation of a Construction Environmental Management Plan (CEMP) prepared as either a condition of subdivision or development application.

	Rehabilitate
	• A Rehabilitation and Vegetation Management Plan (RVMP) will be implemented as a condition of subdivision (as required by the LSP). A copy of the RVMP is provided in **Appendix J**.
	• The RVMP establishes the following goals:
	  ○ Restore approximately 5,278 m^2 of FCT 20c vegetation in 'degraded' or 'completely degraded' condition[2], such that a vegetation condition rating of 'good' or better is achieved.
	  ○ Manage approximately 4,565 m^2 of FCT 20c vegetation in 'very good' or better condition to maintain its existing condition and restore any 'degraded' portions to 'good' or better condition.
	  ○ Manage approximately 17,036 m^2 FCT 11 vegetation associated with Bush Forever Site 309 to maintain its existing condition and restore any 'degraded' portions to 'good' or better condition.
	• The implementation of the RVMP will result in the re-establishment of 0.98 ha of native vegetation in 'good' or better condition, generally representative of FCT 20c TEC.
	• The implementation of the RVMP will improve the resilience of the native vegetation, reducing fragmentation and isolation of populations and reducing indirect impacts from weeds, disease and fire within the southern POS area.
	• The implementation of the RVMP will also improve fauna habitat within the southern POS area.

Residual impact and significance	The implementation of proposal will result in the loss of 0.2 ha of FCT 20c TEC in 'good' condition (occurring as two separate patches). According to the *WA Environmental Offsets Guidelines* (Government of WA 2014), the clearing of any TEC may be considered a significant residual impact that may require an offset. However, the FCT 20c TEC patches proposed to be cleared as part of this proposal are very small (0.15 ha and 0.05 ha), already fragmented and surrounded by vegetation in 'degraded' condition (meaning it is largely exotic weeds). Without active, intensive and ongoing management these patches are unlikely to persist in the future as confirmed by an independent assessment of the TEC over the site (van Etten 2019). It is therefore considered that in view of the viability of these patches and the proposed rehabilitation that the proposal avoids a significant residual impact, consistent with the *WA Environmental Offsets Guidelines* (Government of WA 2014), whereby revegetation and rehabilitation are considered as part of mitigation and therefore additional offsite offsets are not required.

[2] As defined by Keighery (1994) and banksia woodland TEC condition scale (TSSC 2016).

Table ES3: Summary of potential impacts, proposed mitigation and outcomes (continued)

Flora and Vegetation	
Residual impact and significance (continued)	The implementation of the proposal will also avoid indirect impacts through the management of construction and development. Specific measures to minimise impacts to flora and vegetation will be incorporated into the Urban Water Management Plan (UWMP), CEMP and RVMP.
Fauna	
EPA Objective	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Policy and Guidance	*Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016a). *Technical Guidance – Sampling methods for terrestrial vertebrate fauna* (EPA 2016e). *Technical Guidance – Terrestrial fauna surveys* (EPA 2016d). *Technical Guidance – Sampling of short range endemic fauna* (EPA 2009). *EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo.* (DSEWPaC 2012b).

Potential impacts	• Removal, fragmentation and modification of fauna habitat through the clearing of land including:
	  ○ Removal of 2.74 ha of vegetation providing habitat for black cockatoos and other fauna, including 0.2 ha of marri woodland comprising quality foraging habitat for Baudin's black cockatoo and Forest red-tailed black cockatoo.
	  ○ Removal of 11 trees with a diameter at breast height ≥ 50 cm providing potential breeding and roosting habitat for black cockatoo species (Baudin's black cockatoo, Carnaby's black cockatoo and Forest red-tailed black cockatoo).
	• Mortality or displacement of individuals or populations through the clearing and disturbance of land.
	• Indirect impacts
	  ○ Introduction or promotion of weeds, introduced fauna or pests and disease as part of residential development construction
	  ○ Disruption of the dispersal of individuals required to colonise new areas inhibiting maintenance of genetic diversity between populations.

Mitigation	**Avoid** The proposal has avoided impacts to the highest value fauna habitat within the site, providing for the long-term retention of the wetland and the adjacent banksia woodland within the southern POS. The implementation of the proposal will also provide for the retention of four potential black cockatoo roosting and breeding trees.
	Minimise • Impacts to fauna during construction and development will be minimised through fencing, pre-clearing fauna trapping and clearing management protocols. Construction environmental management will be directed through the preparation and implementation of a CEMP. • The implementation of the CEMP will also minimise impacts from weeds, introduced fauna or pests and disease during construction.
	Rehabilitate The RVMP will aim to minimise impacts to fauna through the improvement of fauna habitat and pest control if required.

Table ES3: Summary of potential impacts, proposed mitigation and outcomes (continued)

Fauna	
Residual impact and significance	The implementation of the proposal will result in the clearing of 2.74 ha of black cockatoo habitat and 11 potential roosting and breeding trees for black cockatoos. According to the *WA Environmental Offsets Guidelines* (Government of WA 2014) this residual impact could be considered to be significant because habitat for a species listed under the *Biodiversity Conservation Act 2016* and *Environment Protection Biodiversity Conservation Act 1999* with a classification of endangered (IUCN criteria) will be impacted. However, it is considered that the proposal would not result in a significant residual impact to fauna and offsite offsets are not required. This is because of the 2.74 ha of black cockatoo habitat to be cleared only 0.2 ha of vegetation would be considered to be quality habitat (for Baudin's black cockatoo and Forest red-tailed black cockatoo). Furthermore, no evidence of roosting was recorded within the site and the potential habitat trees do not contain suitable hollows to allow breeding. There are large areas of quality foraging, roosting and potential breeding habitat within the local area including Talbot Nature Reserve and John Forrest National Park. In addition, the implementation of the proposal will minimise indirect impacts to fauna during the construction and development process through various management measures adopted within site operations. These will be captured through the CEMP, UWMP and RVMP to be prepared prior to subdivision or development.
Inland Waters	
EPA Objective	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Policy and Guidance	*Statement of Environmental Principles, Factors and Objectives* (EPA 2019b) *Environmental Factor Guideline Inland Waters* (EPA 2018a). *State Planning Policy 2.9: Water Resources* (WAPC 2006) *Better Urban Water Management* (WAPC 2008) *Decision Process for Stormwater Management in Western Australia* (DWER 2017) *Stormwater Management Manual for Western Australia* (DoW 2007).

Potential impacts	• Modification of a wetland ecosystem through removal of vegetation or landform modification.
	• Alteration of the hydrogeological regime that sustains the wetland ecosystem.
	• Indirect impacts
	  ○ Abstraction of groundwater that impacts other groundwater users.
	  ○ Impacts to water quality.

Mitigation	**Avoid** The proposal has avoided impacts to a wetland within 'excellent' condition vegetation through the retention of the wetland within the southern POS area. The proposal also avoids hydrological impacts by locating the future road reserve and residential development outside of the upstream surface water and groundwater recharge catchment of the wetland.
	Minimise • Impacts to the wetland will be minimised by maintaining existing contours and vegetation cover within the upstream surface water and groundwater recharge catchment of the wetland. This will include provision of a revegetated and landscaped buffer. • The current hydrological regime for the wetland will be maintained through the treatment of the small rainfall event within lots and road reserves with conveyance of minor and major events towards the west avoiding run off being directed into the wetland. These measures will be outlined in an UWMP (prepared as a condition of subdivision, on advice of the Department of Biodiversity Conservation and Attractions (DBCA) and approved by the City of Swan). • Impacts to the wetland from the construction and development of the site will be minimised through appropriate controls for dust, erosion, sediment and stormwater runoff. Management measures for these impacts will be outlined in a CEMP which will be prepared and implemented prior to construction.

Table ES3: Summary of potential impacts, proposed mitigation and outcomes (continued)

Inland Waters	
Mitigation (continued)	• Groundwater licences will be acquired in accordance with the *Rights in Water and Irrigation Act 1914* and all licence conditions will be satisfied in order to minimise impacts to other groundwater users.
	Rehabilitate The RVMP will include revegetation and maintenance works for the wetland and its associated buffer to ensure that vegetation cover is maintained and infiltration continues to occur, which sustains the hydrogeological regime associated with the wetland
Residual impact and significance	There are not considered to any direct impacts to the wetland as a result of the proposal however indirect impacts will be mitigated and managed through the construction and development process. Specific design measures and management will be incorporated into the UWMP, CEMP and RVMP to minimise impacts to the inland waters environmental factor. As such, there is not considered to be any significant residual impact.

While completion of the Residual Impact Significance Model (Government of WA 2014) for the proposal suggests potential offsets may be required to offset impacts associated with the implementation of the proposal, a detailed assessment of the impacts and the mitigation measures proposed as part of the proposal demonstrates that additional offsite offsets are not required as outlined below.

The *WA Environmental Offsets Guidelines* (Government of WA 2014) state that 'mitigation includes the effect of onsite rehabilitation in rectifying the impact of a project once complete'. The implementation of the RVMP (**Appendix J**) will create a consolidated area of 0.98 ha of vegetation generally representative of FCT 20c TEC (in 'good' or better condition), which is 32 % greater than what currently exists at the site. Furthermore, it is unlikely that the two patches of FCT 20c TEC (0.15 ha and 0.5 ha) would persist in the longer term under the current management arrangement, due to ongoing and persistent threats, particularly from weed invasion as confirmed by the independent TEC assessment of the proposal (van Etten 2019).

Considering the current state of the existing patches of FCT 20c TEC and the proposed rehabilitation as part of implementing the proposal, it is considered that the proposal avoids a significant residual impact to this TEC and as such additional offsite offsets are not required.

The removal of 2.74 ha of potential black cockatoo habitat and 11 potential habitat trees over the site is not considered significant and therefore does not warrant an offset, on the basis that the majority of the black cockatoo habitat within the site is in 'degraded' condition with only 0.2 ha considered to represent quality foraging habitat (Harewood 2018). Furthermore, the potential habitat trees do not contain suitable hollows to allow black cockatoo breeding, are scattered across the site, and are not located in proximity to large areas of quality black cockatoo foraging habitat. When considered in the wider local context, the local area also contains large amounts of quality foraging habitat, including 3,037 ha within 6 km of the site (DEC 2011). On this basis, it considered that the implementation of the proposal will not result in a significant residual impact that requires an offset.

While a small amount of wetland dependent vegetation will be removed, this vegetation is in 'degraded' condition and is outside of the Bush Forever site and is not considered representative of the CCW. The proposal is not expected to significantly impact hydrological regime that sustains the wetland.

The federal offsets policy (Commonwealth of Australia 2012) allows for the consideration of on-site revegetation as an offset, while the *WA Environmental Offsets Guidelines* (Government of WA 2014) includes the impact of onsite revegetation as 'mitigation' within the 'avoid, mitigate and rehabilitate' mitigation hierarchy. Application of the federal offsets assessment guide and policy *(DSEWPaC 2012a).* for the proposal demonstrates that the proposed protection of retained vegetation and revegetation will offset 187.9 % of the residual impact of the proposal on FCT 20c TEC.

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Abbreviation Tables

Table A1: Abbreviations – Organisations

Organisations	
DAWE	Department of Agriculture, Water and Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DPaW	Department of Parks and Wildlife (now DBCA)
DER	Department of Environmental Regulation (now DWER)
DoEE	Department of the Environment and Energy (now DAWE)
DoW	Department of Water (now DWER)
DOP	Department of Planning (now DPLH)
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
OEPA	Office of the Environmental Protection Authority
WAPC	Western Australian Planning Commission

Table A2: Abbreviations – General terms

General terms	
AOO	Area of Occupancy
ASS	Acid Sulphate Soils
ANZECC	Australian and New Zealand Environment and Conservation Council
CCW	Conservation category wetland
CEMP	Construction Environmental Management Plan
CoS	City of Swan
ESA	Environmentally sensitive area
FCT	Floristic community type
HRAP	Healthy Rivers Action Plan
IBRA	Interim Biogeographic Regionalisation of Australia
LPS	Local Planning Scheme
LSP	Local Structure Plan
MUW	Multiple use wetland
MNES	Matters of National Environmental Significance

Table A2: Abbreviations – General terms (continued

General terms	
MRS	Metropolitan Region Scheme
PEC	Priority Ecological Community
REW	Resource enhancement wetland
RVMP	Rehabilitation and Vegetation Management Plan
SRE	Short Range Endemic
TEC	Threatened ecological community
UFI	Unique feature identifier
UWMP	Urban Water Management Plan

Table A3: Abbreviations –Legislation

Legislation	
BC Act	Biodiversity Conservation Act 2016
EP Act	Environmental Protection Act 1986
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
PD Act	Planning and Development Act 2005

Table A4: Abbreviations – units of measurement

Units of measurement	
cm	Centimetre
ha	Hectare
m	Metre
m^2	Square metre
m/day	Metres per day
km	Kilometers
km^2	Square kilometers
m AHD	m in relation to the Australian height datum
AEP	Annual exceedance probability

1 Introduction

1.1 Purpose and scope

Peet Stratton Pty Ltd (Peet, the proponent) propose to subdivide and develop Lot 102 Farrall Road, Midvale Western Australia for residential uses (herein referred to as the site and as shown in **Figure 1**). The Local Structure Plan (LSP) known as the Farrall Road Local Structure Plan No. 42 incorporating the site (and wider area) was approved by the Western Australian Planning Commission (WAPC) in September 2016. The LSP area incorporates Movida Estate which is being developed by Peet, as well as other areas for residential development which are owned by other landowners.

The purpose of this Supplementary Environmental Report (SER) is to describe and assess the significance of any environmental impacts that have the potential to occur as a result of implementing the proposal. Impacts are considered in the context of the significant environmental factors identified by the EPA in the additional information request (dated 12 October 2018), specifically flora and vegetation, fauna and inland waters.

1.2 Proponent

Table 1 provides the details of the proponent, Peet Stratton Pty Ltd.

Table 1: Proponent details

	Proponent Details
Name	Peet Stratton Pty Ltd
ACN/ABN	31 169 385 139 (ABN)
Postal Address	PO Box 7224, Cloisters Square WA 6850
Proponent contact	Paul Morgan Development Director, Operations Peet Limited Paul.morgan@peet.com.au
Project Manager (Peet)	Gemma Davis Development Manager Peet Limited gemma.davis@peet.com.au
Consultant contact (Emerge Associates)	Chrystal King Suite 4, 26 Railway Road, Subiaco WA (08) 9380 4988 Chrystal.king@emergeassociates.com.au

Peet Stratton Pty Ltd is managed by Peet, which is one of Australia's leading residential developers creating master-planned communities, medium density housing and apartments for homebuyers across the country (Peet 2019). Peet has over 125 years' experience in creating communities and was established by James Thomas Peet in Perth in 1895. Peet is responsible for creating some of Perth's best known suburbs, including Scarborough, North Perth, Cottesloe, Bayswater and Dalkeith. Peet listed on the Australian Stock Exchange in 2004 and has expanded into all Australian states and territories.

1.3 Historical environmental assessment context

1.3.1 Environmental Protection Act 1986 (EP Act)

The EP Act is Western Australia's primary environmental impact assessment legislation. More, broadly the EP Act provides for 'the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing'.

Part IV of the EP Act provides for the consideration of proposals that may have, or will have, a significant effect on the environment. The Environmental Protection Authority (EPA) considers referrals and decides whether or not they require formal environmental impact assessment (EIA) and if so, at what level. The environmental impact assessment process is administered by EPA Services within the Department of Water and Environmental Regulation (DWER).

A Section 38 referral (and accompanying supporting documentation) pursuant to the EP Act for the proposal was submitted to the Office of the EPA (now EPA Services, DWER) in September 2017. The referral described a subdivision proposal for the site along with the existing environment, potential impacts and impact mitigation strategies. This proposal was advertised for a 7-day public comment period in October 2017.

In May 2018 the EPA subsequently determined that the project would be 'assessed on referral information with additional information (2-week public review).' A request for additional information for assessment was then provided by the EPA to the proponent in October 2018 which identified the following factors as relevant to the environmental assessment of this proposal:

- Flora and vegetation
- Fauna
- Inland waters.

The purpose of this document (i.e. Supplementary Environmental Report) is therefore to address the EPA's request through the provision of a comprehensive outline of the existing environmental values and their significance, potential impacts associated with the proposal and the proposed management and impact mitigation measures and evaluation of any residual impacts.

An assessment of these key environmental factors and a response to the information requested by the EPA is provided in **Section 4.2** (flora and vegetation), **Section 4.3** (terrestrial fauna) and **Section 4.4** (inland waters) of this document. The specific responses to the EPA's request are summarized at the beginning of this report within the section titled **Supplementary Environmental Report Requirements**.

1.3.2 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

In addition to the requirements of the EP Act, the proponent concurrently referred the proposed action to the Commonwealth Department of Environment and Energy (DoEE) (now Department of Agriculture, Water and Environment (DAWE)) pursuant to the EPBC Act in December 2017. The DoEE determined in July 2018 that the proposed action was a 'Controlled Action' requiring assessment and approval under the EPBC Act and identified that the proposed action could be assessed via an

accredited assessment under Section 87 of the EPBC Act, in this case Section 38 of the WA EP Act. As part of this determination, the DoEE also requested additional information on Matters of National Environmental Significance (MNES) through the EPA. A response to this request for additional information on MNES has been provided by Strategen Environmental and is provided in **Section 7** of this document.

1.3.3 Environmental impact assessment process

This Supplementary Environmental Report will be published for a period of 2 weeks, during which time any member of the public is invited to make a submission on the contents of the SER. The **Invitation to make a submission** section at the beginning of this document contains details on how to make a submission and the closing date.

Following completion of the public review period, the EPA will conduct its own assessment of the proposal, taking into account public submissions and the proponent's responses to any submissions received. EPA Services will provide a draft assessment report to be considered by the EPA, which will then be finalised and provided to the Minister for the Environment.

It is relevant to note that since the preparation of the original referral, new or updated guidelines and policies have been released by the State and Commonwealth government which have subsequently been incorporated into this document. These documents include:

- *Approved Conservation Advice for Shrublands and Woodlands of the eastern Swan Coastal Plain* (DoEE 2017).
- *Environmental Factor Guideline: Inland Waters* (EPA 2018a).
- *Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region* (EPA 2019a).

The EPA also requested an independent study be undertken of the Floristic Community Type (FCT) 20c Threatened Ecological Community (TEC) occurrence within the site and potential impacts and mitigation and management measures. In response to this independent study, there was a minor change to the proposal to increase the area of the southern POS proposed by the proponent. The change to the proposal resulted in a Section 43A 'change to proposal during assessment' (pursuant to Section 43A of the EP Act), which was submitted to the EPA in April 2019 and accepted by the EPA in May 2019. The change to the proposal is discussed further in **Section 2.3**.

1.4 Other approvals and regulation

Lot 102 is zoned 'urban' and 'residential development' under the Metropolitan Region Scheme (MRS) and the City of Swan Local Planning Scheme (LPS) No. 17 respectively. The LSP for the wider Movida residential development (inclusive of the site) was approved by the Western Australian Planning Commission (WAPC) on 15 September 2016 and is provided as **Appendix A**.

As part of the LSP approval process for the wider Movida residential development, a range of environmental investigations were completed including specific fauna, flora and vegetation surveys. The site-specific investigations for the site included:

- *Geotechnical Investigation Report* (MPA Williams & Associates 2005)

- *Geotechnical Investigation* (GHD 2008)
- *Transport Assessment* (Shawmac 2010)
- *Road and Rail Acoustics Assessment* (Herring Storer Acoustics 2010)
- *Environmental Assessment Report* (Coffey Environments 2010)
- *Local Water Management Strategy* (GHD 2010)
- *Servicing Strategy Report* (GHD 2010)
- *Road and Rail Acoustic Assessment* (Herring Storer Acoustics 2015)
- *Geotechnical and Preliminary Acid Sulphate Soil Investigation* (Douglas Partners 2014)
- *Fire Management Plan* (Natural Area Consulting Management Services 2015)
- *Open Space Master Plan* (Place Laboratory 2015)
- *Local Water Management Strategy* (Emerge Associates 2015d)
- *Flora, Vegetation and Wetland Assessment* (Emerge Associates 2015c)
- *Fauna and Fauna Habitat Assessment* (Greg Harewood 2014)
- *Biophysical Assessment of Blackadder Creek and Woodbridge Creek* (Emerge Associates 2015a).

The results of these surveys were summarised in the *Environmental Assessment and Management Strategy* (EAMS) (Emerge Associates 2015b) that was submitted as part of the LSP documentation and advertised for public comment as part of the LSP approval process. During the LSP process consideration was given to the retention and management of significant environmental features on the site.

Table 2 provides a summary of the key environmental approval and regulations relevant to the site.

Table 2: Other approval and regulations

Potential proposal activities	Type of approval	Legislation	Regulatory body	Date of approval (if relevant)
Approved framework for future subdivision and development	LSP approval	*Planning and Development Act 2005*	WAPC	15 September 2016
Disturbance to registered Aboriginal sites	Section 18 consent	*Aboriginal Heritage Act 1972*	Department of Planning, Lands and Heritage	18 September 2015
Bulk earthworks	Development application	*Planning and Development Act 2005*	City of Swan	To be secured if earthworks are required prior to subdivision approval.
Disturbance to Blackadder Creek	Bed and Banks Permit	*Rights in Water and Irrigation Act 1914*	DWER	PMB200793(3) granted April 2019
Subdivision	Subdivision approval	*Planning and Development Act 2005*	WAPC	Application to be lodged once Part IV EP Act approval is resolved.

2 Proposal

2.1 Background

Peet propose to subdivide and develop the site for residential uses as part of the wider Movida urban development (**Figure 2**). The LSP for the wider Movida urban development (inclusive of the site as shown in **Figure 1**) was approved by the WAPC on 15 September 2016. A modified concept subdivision design for the site is attached as **Appendix B,** which is consistent with the Section 43A proposal considered by the EPA Services in April 2019, as detailed in **Section 2.3**.

The site was rezoned under the MRS and LPS prior to 1996, before the statutory requirement for the referral of scheme amendments to the EPA under Section 48 of the EP Act was established. As such the proposed land use within the site has not previously been subject to an environmental assessment by the EPA.

As part of the LSP approval process for the wider Movida urban development, a range of environmental investigations were completed, including site specific fauna, flora and vegetation surveys. The historic investigations for the site were detailed in **Section 1.4**. During the LSP process, consideration was given to the retention and management of various environmental features on the site, including native vegetation and existing trees.

Subsequent to the flora and vegetation investigations undertaken as part of the LSP process (Coffey Environments 2010; Emerge Associates 2015c), additional flora and vegetation surveys were undertaken to understand the flora and vegetation values of the site including a winter flora and vegetation assessment by Tauss & Associates (2016) and additional vegetation survey and mapping by Emerge Associates (2016). Whilst plant community and vegetation condition mapping are generally consistent across these investigations, there were some minor differences. To support the Section 38 referral, a technical memorandum was prepared to update the flora and vegetation information from Emerge Associates (2015c) with information obtained by Emerge Associates in February and June 2016 and by Tauss & Associates in June 2016. This technical memorandum (Emerge Associates 2017) has been provided in **Appendix C**.

Additional technical surveys and assessments were also prepared to respond to the EPA's request for further information (12 October 2018) including:

- An independent study of the TEC occurrences within Lot 102, including the impact of the proposal and the location and size of areas recommended for retention (*Independent Study of Threatened Ecological Community, Lot 102 Farrall Road, Midvale*, (van Etten 2019)) (**Appendix D**).
- A technical assessment considering the any potential impacts of the proposal to inland waters (surface and groundwater) (**Appendix E**).
- An updated fauna survey specific to Lot 102, *Fauna Assessment Lot 102 Farrall Road, Midvale* (Harewood 2018) (**Appendix F**).
- A survey for short range endemic invertebrates, *Short Range Endemic invertebrate desktop assessment for Lot 102 Farrall Road, Midvale, Western Australia* (Invertebrate Solutions 2019) (**Appendix G**).

These studies are discussed further in **Section 4** below.

2.2 Justification of development

The WAPC (supported by the Western Australian Department of Planning, Lands and Heritage (DPLH)) is responsible for urban, rural and regional land use planning and the coordination of urban development within Western Australia. Statutory planning documents such as the MRS as well as regional and strategic guidance documents, are prepared and updated to outline the location and nature of necessary urban growth, commercial/activity centres, transport systems and infrastructure throughout Western Australia. This planning framework considers environment, health, transport, infrastructure, economy and community within an integrated and holistic framework. State government agencies, local government and utilities use the MRS and the planning framework to make decisions regarding infrastructure needs, commercial centres and community facilities within specific areas.

In accordance with the above, the proposal sits consistently within an established broader land use planning context, in which the Government of Western Australia has considered the extent of urban growth required throughout Western Australia in order to accommodate the projected population growth.

The site has been identified at a state level for urban development and is identified within the *North-East Sub-regional Planning Framework* (WAPC 2018) as an 'urban undeveloped' area. The sub-regional planning framework builds upon *Directions 2031 and Beyond* (WAPC 2010a) facilitating higher densities in undeveloped areas already zoned for urban use, such at the site. The site is considered a key short-term urban development area.

The site is an important infill site in the eastern corridor which benefits from existing services, infrastructure and amenity. The proposal provides the ability to support an increasing population and provide additional housing without requiring a significant investment or additional environmental impacts from new infrastructure, amenities and services.

2.3 Proposal description

The site is bound by Farrall Road to the west, Midland freight rail to the east and north and future residential development to the south (**Figure 1**). The proposal (**Figure 2**) includes the proposed subdivision of the site and associated infrastructure works and development for residential purposes specifically:

- Clearing of vegetation and earthworks to create road reserves and to provide suitable ground levels to drain the land (i.e. wastewater and stormwater) and to ensure that sufficient separation to the groundwater level is met.
- Construction of roads and stormwater drainage systems to service the lots, including the realignment of the existing Farrall Road. The new Farrall Road is to be aligned to reduce it's current severance of the Estate and provide for a future grade-separated crossing of the railway line in the long term. The new road will be built as a mini-dual carriageway to reduce traffic speeds and will include a roundabout at the intersection of Burrows Loop and Farrall Road.

- Earthworks on the proposed residential part of Lot 102 will be undertaken to reduce the grade of this land so that it falls from the rail level (i.e. about 21.7 mAHD adjacent to the southern POS) to the existing levels of Farrall Road in the west (i.e. about 19.6 mAHD adjacent to the southern POS). Locally and then hidden along the rear boundaries of lots, some retaining walls (parallel to the railway) will be installed to ensure that the lots fit into the land without being at odds with the fall of the land and so are more in keeping with the desire for flat grades. Some excess sand fill will be removed from the site to meet these changes to the ground levels whilst managing the final appearance of the lots. As noted below the shape and fall of the residential part of Lot 102 will be transitioned to avoid any impact on the POS buffer and the Bush Forever portion of the Land.
- The earthworks and new road pavements will be shaped in such a way to minimise encroachment into the southern POS area. The realignment of Farrall Road will similarly have little or no impact on the ground levels in the POS area.
- A noise wall to State Planning Policy 5.4 (SPP 5.4) *Road and Rail Noise* (DPLH 2019) requirements will be constructed along the eastern edge of Lot 102 (i.e. the western edge of the freight rail reserve).
- Services including sewer and water reticulation, underground power, communication fibre-to-the home networks, and street lights will also form a part of the development works.
- Open space areas within Lot 102 and nearby will be developed to provide a high level of amenity in each case.

The concept subdivision plan (**Appendix B**), shows the location of the southern POS area, the entry road to the site and a 'Future Development Area'. This 'Future Development Area' incorporates lots, roads, and the northern POS areas which are still subject to a final detailed design.

The subdivision design for the proposal (**Appendix B**, **Figure 2**) has responded to the environmental attributes present within the site. The original subdivision designs included the Bush Forever site and wetland in the southern POS to retain the associated conservation values in the long term. The subsequent identification of the TEC within the site refined the management intent for this area allowing the southern POS to also incorporate the largest, most intact portion of the TEC into the southern POS area and a revegetated buffer area.

The concept subdivision plan was recently updated to accommodate recommendations provided by the independent TEC assessment (van Etten 2019). Specifically, the southern POS area was increased to allow for the provision of a 25 m buffer from the mapped boundary of the Farrell06 occurrence of FCT 20c TEC. This buffer increased the southern POS area along the eastern boundary of the site and increases the area proposed for revegetation, given the area will need to be revegetated and provide the necessary buffering function.

There is currently no explicit policy or guideline that requires or even recommends buffers for TECs. A 25 m buffer was recommended as the minimum buffer size by van Etten (2019) and was based upon 'observations of weed invasion into Banksia woodland' (van Etten 2019). The buffer area is currently in 'degraded' to 'completely degraded' condition and includes the weed species that are present throughout the site.

It is considered that given the mitigation measures included as part of the proposal (discussed further in **Section 4**) the minimum buffer is adequate. In particular, the extensive revegetation and

weed control proposed within the 'buffer' (as discussed further in **Section 4.2.6**) and the proposed management by the proponent over 5 to 7 years, a 25 m vegetated buffer is adequate to separate and buffer the TEC from future urban development. Access will also be restricted within the buffer and this, in combination with the mitigation measures proposed will maximise the buffer capacity of the area.

A Section 43A 'change to proposal during assessment' (pursuant to Section 43A of the EP Act) was submitted to the EPA in April 2019 outlining a minor increase to the southern POS area. The EPA accepted the change to the proposal in May 2019.

A summary of the proposal is provided in **Table 3** and the location and proposed extent of the proposal is provided in **Table 4**.

Table 3: Summary of the proposal.

Item	Details
Proposal Title	Urban development of Lot 102 Farrall Road, Midvale
Proponent name	Peet Stratton Pty Ltd
Short description	Peet Stratton propose to develop Lot 102 Farrall Road, Midvale (8.298 ha) for residential uses in accordance with the Farrall Road Local Structure Plan No. 42. The development includes roads, residential lots, public open space areas and associated infrastructure.

Table 4: Location and proposed extent of physical and operational elements.

Element	Proposed Extent	Location
Development envelope incorporating:	8.298 ha	**Figure 1 Site Location** **Figure 2 The Proposal**
Disturbance footprint (including roads, lots infrastructure and northern public open space areas)	5.079 ha	
Southern POS area	3.219 ha	

2.4 Local and regional context

The majority of the site was historically used for agricultural (grazing) purposes prior to 1953 and now contains variably disturbed remnant vegetation, ranging in condition from 'completely degraded' to a small area in 'excellent' condition. The south western portion of the site is identified as Bush Forever Site No. 309 - *Farrall Road Bushland, Stratton* and comprises intact native vegetation in 'excellent' condition. The north point of the site contains Blackadder Creek which flows from east to west.

The site experiences a dry Mediterranean climate of hot dry summers and cool wet winters (BoM 2019a). Long term climatic averages indicate that the site is located in an area of moderate rainfall, receiving 766 mm on average annually. The majority of rainfall is received between June and August (**Table 5**).

Table 5: Temperature and rainfall averages for the Perth Airport weather station (1944 – September 2019).

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean maximum temperature (°C)	31.8	31.9	29.7	25.6	21.8	19.0	18.0	18.6	20.2	22.8	26.0	29.0
Mean minimum temperature (°C)	17.0	17.5	16.0	13.0	10.4	9.0	8.0	8.1	8.9	10.3	12.8	14.9
Mean rainfall (mm)	11.1	14.9	16.0	40.0	97.4	155.7	155.3	118.9	72.7	43.2	25.6	11.3

The site is gently sloping to the west, with topographic contours ranging from approximately 25 m AHD along the eastern boundary to 19 m AHD along the western boundary. Land resource mapping (King and Wells 1990) shows the site comprising of three land resource units being:

- Forrestfield: A series of lateritized low relief spurs forming the foothills of the Darling Scarp. They are composed of fossil shoreline bench sediments, holocene colluvium and narrow bands of alluvial deposits.
    - F1: Very gently to gently inclined footslopes with deep rapidly drained siliceous yellow brown sands, and pale or bleached sands with yellow-brown subsoil.
- Guildford: Broad level to very gently included plain located west of the foothills. The dominant soils are imperfectly to poorly drained and are formed from unconsolidated riverine material of Pleistocene age.
    - Gf2: Plain with imperfectly7 drained yellow duplex soils with sand to sandy loam topsoil
    - Gf3: Plain with poorly drained modelled yellow earths with loamy topsoil.

The majority of the site is occupied by the Forrestfield land unit, whereas portions of Guildford are located in the southern and northern portions of the site.

The geology of the site is largely comprised of pebbly silty sand overlying clay consistent with the Guildford Formation (Gozzard 1982), and the eastern portion of the site comprises medium-grained yellow sands of the Yoganup Formation.

The site is situated approximately 700 m west of Bush Forever Site 306 - *Talbot Road Bushland* which contains high quality vegetation, including two critically endangered TECs (as endorsed by the Western Australian Minister for the Environment) being, FCT 20c and FCT 3c (*Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain). FCT 20c is also listed as critically endangered pursuant to the EPBC Act, whereas FCT 3c is endangered pursuant to the EPBC Act. Talbot Road Bushland contains a number of crown reserves as well as land owned by the City of Swan and the Metropolitan Cemeteries Board. It is largely managed as a Nature Reserve for the conservation of flora and fauna by Department of Biodiversity, Conservation and Attractions (DBCA).

3 Stakeholder Engagement

3.1 Key stakeholders

The following have been identified as key stakeholders in regards to the proposal for the site.

- Department of Biodiversity, Conservation and Attractions (DBCA) formerly Department of Parks and Wildlife (DPaW)
- DPLH, formerly Department of Planning (DoP)
- EPA Services, DWER, formerly Office of the Environmental Protection Authority (OEPA)
- City of Swan (CoS)
- Federal Department of Agriculture, Water and Environment (DAWE) formerly, Department of Environment and Energy (DoEE)
- Blackadder Woodbridge Catchment Group (BWCG)
- Stratton Community Association
- Urban Bushland Council WA Inc
- South West Aboriginal Land and Sea Council (SWALSC) and traditional owners who were consulted as part of the Section 18 approval associated with the LSP.

3.2 Stakeholder engagement process

The proponent has prepared and is already implementing a community engagement and development strategy (Creating Communities 2018) for the site and the wider Movida Estate. This strategy is being implemented with assistance from Creating Communities, who are a specialist community and stakeholder engagement consultant. Since 2016, the proponent has consulted with extensive range of stakeholders and community members as outlined in **Table 6** Stakeholder consultation for the wider Movida Estate

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
City of Swan	Quarterly meetings with Place Manager Quarterly attendance at Stratton Stakeholder Group Meeting beginning 28 July 2017	Creating Communities, on behalf of Peet, attend the Stratton Stakeholder Group meetings Creating Communities are in regular communication with the City of Swan Place Manager	Explore collaboration and partnership opportunities – e.g. partnership events and initiatives, cross promotion of community activities, discussing current community challenges and priorities, etc.
Stratton Community Association (SCA)	Ongoing liaison and collaboration beginning 28 July 2017	Creating Communities are in regular communication with the SCA. Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years	Explore collaboration and partnership opportunities – e.g. partnership events and initiatives, cross promotion of community activities, discussing current community challenges and priorities, etc. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021

Table 6 Stakeholder consultation for the wider Movida Estate (continued)

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
Middle Swan Primary School	August 2018 28 July 2017	Met to discuss community development approach, CEDP and potential partnership opportunities. Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Middle Swan Primary School is a community partner with Peet and the Movida community. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Swan View Senior High School	28 July 2017	Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Midland Police	Ongoing liaison and collaboration beginning 28 July 2017	Regular communication regarding community safety Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Good relationship with Midland Police – discuss crime and antisocial behaviour and opportunities for collaboration regarding community safety and encouraging residents to meet their neighbours. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Eastern Metropolitan Regional Council	May 2018	Discussed opportunities to collaborate on environmental initiatives.	Will continue to liaise with EMRC as required.
Rise Community Network Community	Regular communication through the Stratton Stakeholder Group beginning 28 July 2017	Understand youth challenges and opportunities in the Stratton/Midvale community. Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Continue to seek opportunities for collaboration on youth initiatives. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Trillion Trees	Consultation commenced May 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities.	Engaged with community development program at Movida with opportunities for partnership opportunities with the new Blackadder public open space.
Swan Alliance (Ngala, Mission Australia and Anglicare WA)	Consultation commenced 28 July 2017	Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Swan Chamber of Commerce	Consultation commenced May 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities.	Engaged with community development program at Movida

Table 6 Stakeholder consultation for the wider Movida Estate (continued)

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
Blackadder Woodbridge Catchment Group	July 2019	Discussed initial plans for Blackadder Creek POS and shared feedback from community and stakeholder workshop in June. Also discussed potential future collaboration opportunities.	Will continue to engage with BWCG as required
Midvale Early Childhood & Parenting Centre	Quarterly attendance at Stratton Stakeholder Group Meeting beginning August 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities	Regularly promote services and events at Child and Parent Centre to Movida community
Midland Women's Health Care Place	Consultation commenced May 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities	Engaged with community development program at Movida Regularly promote services and events at Midland Women's Health Care Place to the Movida community

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Table 6 Stakeholder consultation for the wider Movida Estate

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
City of Swan	Quarterly meetings with Place Manager Quarterly attendance at Stratton Stakeholder Group Meeting beginning 28 July 2017	Creating Communities, on behalf of Peet, attend the Stratton Stakeholder Group meetings Creating Communities are in regular communication with the City of Swan Place Manager	Explore collaboration and partnership opportunities – e.g. partnership events and initiatives, cross promotion of community activities, discussing current community challenges and priorities, etc.
Stratton Community Association (SCA)	Ongoing liaison and collaboration beginning 28 July 2017	Creating Communities are in regular communication with the SCA. Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years	Explore collaboration and partnership opportunities – e.g. partnership events and initiatives, cross promotion of community activities, discussing current community challenges and priorities, etc. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021

Table 6 Stakeholder consultation for the wider Movida Estate (continued)

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
Middle Swan Primary School	August 2018 28 July 2017	Met to discuss community development approach, CEDP and potential partnership opportunities. Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Middle Swan Primary School is a community partner with Peet and the Movida community. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Swan View Senior High School	28 July 2017	Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Midland Police	Ongoing liaison and collaboration beginning 28 July 2017	Regular communication regarding community safety Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Good relationship with Midland Police – discuss crime and antisocial behaviour and opportunities for collaboration regarding community safety and encouraging residents to meet their neighbours. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Eastern Metropolitan Regional Council	May 2018	Discussed opportunities to collaborate on environmental initiatives.	Will continue to liaise with EMRC as required.
Rise Community Network Community	Regular communication through the Stratton Stakeholder Group beginning 28 July 2017	Understand youth challenges and opportunities in the Stratton/Midvale community. Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Continue to seek opportunities for collaboration on youth initiatives. Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Trillion Trees	Consultation commenced May 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities.	Engaged with community development program at Movida with opportunities for partnership opportunities with the new Blackadder public open space.
Swan Alliance (Ngala, Mission Australia and Anglicare WA)	Consultation commenced 28 July 2017	Attended Movida Stakeholder Community Planning Workshop and invited to engage in community social planning for the next three years.	Feedback received helped inform the Movida Community and Economic Development Plan (CEDP) 2018-2021.
Swan Chamber of Commerce	Consultation commenced May 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities.	Engaged with community development program at Movida

Table 6 Stakeholder consultation for the wider Movida Estate (continued)

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
Blackadder Woodbridge Catchment Group	July 2019	Discussed initial plans for Blackadder Creek POS and shared feedback from community and stakeholder workshop in June. Also discussed potential future collaboration opportunities.	Will continue to engage with BWCG as required
Midvale Early Childhood & Parenting Centre	Quarterly attendance at Stratton Stakeholder Group Meeting beginning August 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities	Regularly promote services and events at Child and Parent Centre to Movida community
Midland Women's Health Care Place	Consultation commenced May 2018	Ongoing discussions regarding community development approach, CEDP and potential partnership opportunities	Engaged with community development program at Movida Regularly promote services and events at Midland Women's Health Care Place to the Movida community

Stakeholder consultation was also undertaken during the LSP public advertising process which requires the proponent to respond to any concerns raised by government agencies or the local community through public submissions.

Following the advertising of the LSP, submissions were received from 24 members of the public including adjacent landowners, traditional owners and the BWCG. Public submissions raised concerns with the potential increase in traffic, impact of the freight rail line on residential properties and the loss of flora and fauna arising from implementation of the LSP.

The LSP was also referred to the following state government agencies and service providers in 2015:

- Department of Transport (DoT)
- Main Roads Western Australia (MRWA)
- Public Transport Authority (PTA)
- Department of Housing
- Department of Water (DoW)
- Department of Parks and Wildlife (DPaW)
- Western Power
- Water Corporation
- Department of Education
- Department of Aboriginal Affairs
- Department of Planning (DoP)
- Shire of Mundaring
- Telstra.

Objections to aspects of the LSP were received from MRWA, Western Power and the DoP. None of these objections were relevant to the site and were concerned with the Western Power easement adjacent to Roe Highway, Farrall Road and freight rail intersection and Orchard Road.

Comments from members of the public, government agencies and City of Swan Council were addressed by the City of Swan and WAPC prior to finalisation of the LSP. This resulted in a number of changes from the original LSP including two changes relevant to the site:

- Inclusion of an area within Lot 102 being set aside for further investigation and a review of environmental values, specifically related to the occurrences of FCT 20c TEC.
- A condition of subdivision approval to include a 'Rehabilitation and Vegetation Management Plan'.

A copy of the comments received on the LSP from members of the public and government agencies is included within the City of Swan Council minutes (20 January 2016) attached as **Appendix I.**

3.3 Stakeholder consultation

In addition to the state planning process, stakeholder consultation conducted as part of the EP Act (Section 38) referral and the EPBC Act referral is outlined in **Table 7**: Stakeholder consultation for the site.

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
Department of Parks and Wildlife (now DBCA)	February 2016 November 2016	Discussion on the TEC patches and proposed Rehabilitation and Vegetation Management Plan (RVMP) and LSP amendment.	Stakeholders generally supportive of the RVMP approach. Original RVMP prepared for the site was approved by DBCA in August 2017. DBCA will be provided the updated RVMP as part of the consultation process.
Department of Planning (now DPLH)			
Office of the EPA (now EPA Services)			
Department of Biodiversity, Conservation and Attractions	June 2019 October 2019	Email discussion on flora, vegetation and fauna management	General acceptance of management principles with formal review of documentation by DBCA proposed through the assessment process.
City of Swan	December 2018 March 2019 June 2019	Discussion on the proposed POS area, rehabilitation proposed and ongoing management.	Confirmation they will accept future management of the southern POS area (**Appendix I**).
Department of the Environment and Energy (now DAWE)	May 2017 ongoing	Ongoing liaison with the Department regarding referral of proposed development under EPBC Act and subsequent determination of Controlled Action and accredited assessment process.	The proposed development is being assessed under an accredited assessment pursuant to Section 87 of the EPBC Act between the Commonwealth and the State of Western Australia.

Table 7: Stakeholder consultation for the site. (continued)

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
EPA Services, DWER	December 2017 October 2018 December 2018 February 2019 September 2019	Discussions on the additional information requirements and expectations.	Confirmation on the appointment of independent consultant and scope of this report. Address comments from EPA and other stakeholders and update report.

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It is noted that the public advertising of this SER also provides further opportunity for stakeholders/members of the public to provide comment on the proposal and ensure that information is publicly available for all interested parties.

Table 7: Stakeholder consultation for the site.

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
Department of Parks and Wildlife (now DBCA) Department of Planning (now DPLH) Office of the EPA (now EPA Services)	February 2016 November 2016	Discussion on the TEC patches and proposed Rehabilitation and Vegetation Management Plan (RVMP) and LSP amendment.	Stakeholders generally supportive of the RVMP approach. Original RVMP prepared for the site was approved by DBCA in August 2017. DBCA will be provided the updated RVMP as part of the consultation process.
Department of Biodiversity, Conservation and Attractions	June 2019 October 2019	Email discussion on flora, vegetation and fauna management	General acceptance of management principles with formal review of documentation by DBCA proposed through the assessment process.
City of Swan	December 2018 March 2019 June 2019	Discussion on the proposed POS area, rehabilitation proposed and ongoing management.	Confirmation they will accept future management of the southern POS area (**Appendix I**).
Department of the Environment and Energy (now DAWE)	May 2017 ongoing	Ongoing liaison with the Department regarding referral of proposed development under EPBC Act and subsequent determination of Controlled Action and accredited assessment process.	The proposed development is being assessed under an accredited assessment pursuant to Section 87 of the EPBC Act between the Commonwealth and the State of Western Australia.

Table 7: Stakeholder consultation for the site. (continued)

Stakeholder	Date	Issues/topics raised	Proponent response/outcome
EPA Services, DWER	December 2017 October 2018 December 2018 February 2019 September 2019	Discussions on the additional information requirements and expectations.	Confirmation on the appointment of independent consultant and scope of this report. Address comments from EPA and other stakeholders and update report.

4 Environmental principles and factors

4.1 Principles

The five principles of environmental protection as set out in Section 4A of the EP Act have been considered during development of the proposal (**Table 8**).

Table 8: EP Act Principles.

Principle	Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by:* *a. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and* b. *an assessment of the risk-weighted consequences of various options.*	The proponent has addressed the precautionary principle by undertaking a thorough investigation into the site to avoid any scientific uncertainty. In particular, this has included significant survey and assessment of the area of FCT 20c TEC, with numerous surveys and mapping over several years. A thorough understanding of the values and attributes of the site has provided the information to assess the potential impacts associated with the proposal and measures to minimise and mitigate these impacts. At this point in time there is no scientific uncertainty that would affect decision making processes for the proposal.
2. The principle of intergenerational equity *The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.*	Peet recognises the importance of sustainable development and is working to create sustainable communities for people to work, learn and play. The proposal provides for the development of an infill site, five minutes from Midland which contains a diversity of home sites to suit a variety of families. This includes affordable housing for first homebuyers and downsizers. The implementation of the proposal provides the opportunity for significant environmental values within the site, such as the Bush Forever Site, a wetland and FCT 20c TEC to be improved through revegetation, transferred to the Crown and managed in the long term for conservation with input from the community. These environmental values are currently in private ownership, with no ongoing maintenance and no formal public access. In line with the principle of intergenerational equity, the implementation of the proposal will enhance, provide ongoing maintenance and provide future generations with the ability to access and contribute to the management and appreciation of these areas.
3. The principle of the conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	A number of studies have been undertaken to understand the presence of flora, vegetation and fauna values within the development envelope and surrounding area. These studies have been used to refine the proposal and it has been determined that with appropriate design and the preparation of management plans, including revegetation of the southern POS area that no significant residual environmental impacts will occur from implementation of the proposal. The proposal will provide for biological diversity and ecological integrity through the long term management of a conservation POS area with secure tenure.

Table 8: EP Act Principles (continued).

Principle	Consideration
4. Principles relating to improved valuation, pricing and incentive mechanisms *a. Environmental factors should be included in the valuation of assets and services.* *b. The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *c. The users of goods and services should pay prices based on the full life-cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste.* *d. Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solution and responses to environmental problems.*	The proponent has considered the costs of implementing the project, including the proposed revegetation and management of the southern POS area. The proponent has committed to implementation and management of the southern POS area for a period of at least 5 years prior to handover. The proponent has pro-actively engaged with the City of Swan to confirm that the long-term management of the site will be undertaken by the local government for conservation purposes. The City of Swan have also considered the long term management costs of maintaining the southern POS area (**Appendix I**).
5. The principle of waste minimisation *All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.*	It is expected that wastes will be minimised through adoption of the hierarchy of waste controls; avoid, minimise, recycle and safe disposal. The construction contractor will be required to take all reasonable and practicable measure to reduce waste generation and disposal of construction wastes appropriately. This will be outlined in the CEMP prepared prior to construction and development of the site. The current construction contractor has ISO 14001 Environmental Management System accreditation and is currently achieving a target of re-using or recycling 80 % of construction waste (by weight). The future construction contractor for the site will also be required to meet this target.

4.2 Flora and Vegetation

4.2.1 Environmental Protection Authority objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

4.2.2 Policy and guidance

The flora and vegetation investigations that have informed the planning of the site have been conducted in accordance with the *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016c) and the *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b).

Furthermore, the proposal has been informed by the following recovery plans and conservation advice:

- *Eastern Shrublands and Woodlands (Swan Coastal Plain Community 20c) Interim Recovery Plan 2000-2003* (English and Blyth 2000).
- *Shrublands and Woodlands of the Eastern side of the Swan Coastal Plain (Community Type 20c), Interim Recovery Plan 2006-2011* (DEC 2006).
- *Approved conservation advice for the shrublands and woodlands of the eastern Swan Coastal Plain* (DoEE 2017).

4.2.3 Receiving environment

The site lies within the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia (IBRA) region (Thackway and Cresswell 1995). This region is characterised by *Banksia* or Tuart on sandy soils, *Allocasuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland (Mitchell *et al.* 2002).

Vegetation complex mapping undertaken by Heddle *et al.* (1980), which uses a combination of landform, soil and rainfall parameters, indicates the site is within the Guildford Complex which is transitional between the Bassendean Dune System and the Pinjarra Plain (**Figure 3**). This complex is described as "A mixture of open forest to tall open forest of *Corymbia calophylla* - *Eucalyptus wandoo* - *Eucalyptus marginata* and woodland of *Eucalyptus wandoo* (with rare occurrences of *Eucalyptus lane-poolei*). Minor components include *Eucalyptus rudis* - *Melaleuca rhaphiophylla*."

Vegetation complex mapping shows that the Forrestfield complex is located approximately 150 m east of the site. The Forrestfield complex is described as 'Vegetation ranges from open forest of *Corymbia calophylla* (Marri) - *Eucalyptus wandoo* (Wandoo) - *Eucalyptus marginata* (Jarrah) to open forest of *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri) - *Allocasuarina fraseriana* (Sheoak) - *Banksia* species. Fringing woodland of *Eucalyptus rudis* (Flooded Gum) in the gullies that dissect this landform' (Heddle *et al.* 1980).

Prior to European settlement and the extensive land clearing that followed, the Guildford Complex covered 90,512 ha of the Swan Coastal Plain. Today 4,608 ha or 5.09 % of this complex remains (Government of Western Australia 2019). Less than 1 % of this complex's original extent is currently under some form of formal or informal protection (Government of Western Australia 2019) within 0.32% within DBCA managed land (Government of Western Australia 2019). The Forrestfield

Complex once covered 22,812ha on the Swan Coastal Plain (Government of Western Australia 2019). Today 2,803 ha (12 %) remains, with 3.4 % under some form of formal or informal protection (PBP 2013) and 1.7 % within DBCA managed land (Government of Western Australia 2019).

Variations in native vegetation within the site can also be further classified based on regional vegetation associations. Beard *et al*. (2013) mapping shows the site as comprising vegetation association 'Pinjarra_1009'. This association is described as comprising '*Eucalyptus marginata, Corymbia calophylla, E. wandoo*.' (Beard *et al.* 2013). The 'Pinjarra_1009' association has 16.37 % of its pre-European extent remaining on the Swan Coastal Plain with 0.02 % protected for conservation purposes (Government of Western Australia 2018).

A search was previously conducted for threatened and priority flora within a 5 km radius of the site using the Department of Parks and Wildlife's (DPaW) database (reference no. 03-1014FL) and the *Protected Matters Search Tool* (DoEE 2015) (Emerge Associates 2015c). A total of 44 species comprising 21 threatened and 23 priority flora species were identified as potentially occurring in the wider local area.

A search was previously conducted of DPaW's database (reference no. 08-01014EC) and the *Protected Matters Search Tool* (DoEE 2015) to identify known locations of TECs and PECs within 10 km of the site (Emerge Associates 2015c). Since these searches were conducted the 'banksia woodlands of the Swan Coastal Plain' TEC (banksia woodland TEC) was listed under the EPBC Act on the 16th September 2016. The banksia woodland TEC is comprised of a wide variety of banksia dominated FCTs. Some of these FCTs had previously been listed as a TEC or PEC at a State level.

Including the banksia woodland TEC, six TECs and two PECs (of which one community is both a TEC and a PEC) have been identified as occurring within the wider local area (**Table 9**).

Table 9: TECs and PECs known or likely to occur within 10 km of the site.

Code	Community name	TEC/ PEC	Level of significance	
			State	EPBC Act
3a	*Corymbia calophylla - Kingia australis* woodlands on heavy soils, Swan Coastal Plain	TEC	Critically Endangered	Endangered
3c	*Corymbia calophylla – Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain	TEC	Critically Endangered	Endangered
20c	Shrublands and woodlands of the eastern side of the Swan Coastal Plain	TEC	Critically endangered	Endangered
20a	*Banksia attenuata* woodland over species rich dense shrublands	TEC	Endangered	Endangered (Banksia woodlands of the Swan Coastal Plain)
20b	*Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain	TEC	Endangered	
21c	Low lying *Banksia attenuata* woodlands or shrublands	TEC/ PEC	Priority 3	
Com 5 Markey	Central Northern Darling Scarp Granite Shrubland Community	PEC	Priority 4	-

4.2.3.1 Historic surveys

Several flora and vegetation surveys have been undertaken over Lot 102, as detailed in **Table 10**, with results summarised in **Section 4.2.3.2** and **Appendix C.**

Table 10: Historic flora and vegetation surveys undertaken across Lot 102.

Survey timing	Survey scale	Surveyor	Likely *Banksia* spp. woodland FCT/s
October and November 2010	Wider region of Movida Estate including the site	Coffey Environments	Unknown
October 2014	Wider region of Movida Estate including the site	Emerge Associates	Inconclusive. Most likely FCT 21c.
February 2016	Site only (vegetation condition re-mapped and one additional quadrat installed and surveyed)	Emerge Associates	Inconclusive
May and June 2016	Site only (wetland vegetation not sampled)	Tauss & Associates	FCT 20c and FCT 21c
June 2016	Site only and amalgamation of new information with the results of previous surveys listed above	Emerge Associates	FCT 20c

As illustrated in **Table 10**, a number of the historic surveys recorded the potential presence of the TEC FCT 20c 'shrublands and woodlands of eastern Swan Coastal Plain'3. Floristic Community Type 20c is a TEC recognised and listed as 'Critically Endangered' by the WA Minister for the Environment and 'endangered' under the EPBC Act.

While the historic presence within parts of the site was assumed beforehand, the presence of FCT 20c TEC was confirmed via surveys by Tauss and Associates and Emerge Associates in May and June 2016 and mapped by DPaW (now DBCA) in 2016, as shown in **Figure 3**.

To address the additional information requested by the EPA, an additional independent assessment was completed to review the occurrences of the FCT 20c TEC and provide an assessment of the impacts associated with the proposal (**Appendix D**). This assessment was completed by Dr Eddie van Etten in December 2018, with a technical report provided in February 2019. Dr van Etten is a member of the Western Australian Threatened Species Scientific Committee and was appointed to undertake the independent TEC assessment following confirmation of his appointment by the EPA. Dr van Etten was selected due to his extensive experience in FCT assessment on the Swan Coastal Plain. Specifically, he is currently working on a number of projects focused on FCT 20c, has a broad knowledge of principles and practice of restoration ecology and has previous experience providing advice on Environmental Impact Assessment (EIA) including past EPA assessments.

The technical report associated with the FCT 20c TEC assessment is provided in **Appendix D** with a summary of results outlined below (**Section 4.2.3.2**).

[3] This FCT is also referred to as 'eastern shrublands and woodlands' and 'shrublands and woodlands of the eastern side of the Swan Coastal Plain'.

4.2.3.2 Summary of survey results

While vegetation complex mapping by Heddle *et al*. (1980) for the Swan Coastal Plain indicates that the site is situated within the expected extent of the Guildford Complex (**Figure 3**), the flora and vegetation surveys concluded that the site is more representative of the Forrestfield complex (which based on the Heddle *et al*. (1980) mapping occurs approximately 150 m to the east of the site). This is due to the sandy soils present within the site that are associated with the Yoganup Formation (also referred to as the Ridge Hill Shelf landform), rather than the clay and silt soils associated with the Guildford association. An inferred map of the complex boundary over the site (as determined by the flora and vegetation survey and site observations) is provided in **Figure 3**.

Overall, native vegetation within the site has been historically degraded due to historic land uses over the site. A flora and vegetation survey by Emerge (2017) recorded five plant communities of varying condition in the site (**Appendix C**) and as outlined in **Table 11** and shown on **Figure 4**, **Figure 5** and **Plates 1 to 5.**

Table 11: Plant communities identified within the site (Emerge Associates 2017)

Plant community	Description	Area (ha)
Mp	Woodland to low open forest of *Melaleuca preissiana*, with emergent *Corymbia calophylla* over sparse shrubland of *Astartea scoparia, Marianthus* sp., *Xanthorrhoea preissii* and *Acacia pulchella* over sedgeland to closed sedgeland of *Dielsia stenostachya* and Cyperaceae sp. and open forbland of *Corynotheca micrantha* subsp. *micrantha*, *Drosera* spp. and *Burchardia congesta*.	1.63
Cc	Woodland of *Corymbia calophylla* over shrubland Jacksonia spp., Adenanthos cygnorum and **Leptospermum laevigatum* (or shrub layer absent) over closed forb/grassland of pasture weeds.	0.22
BaBm	Sparse to open woodland of *Banksia attenuata* and *Banksia menziesii* over open shrubland to shrubland of *Adenanthos cygnorum* and *Allocasuarina humilis* over low sparse shrubland to shrubland of *Conostephium pendulum*, *Stirlingia latifolia* and Hibbertia spp. over forb and sedgeland of *Lyginia* spp., *Dasypogon bromeliifolius*, *Conostylis aculeata*, *Podotheca gnaphalioides* and forb/grassland of pasture weeds.	2.52
Bima	Open woodland to woodland of *Banksia ilicifolia, B. menziesii* and *B. attenuata* over scrubland to tall open shrubland of *Adenanthos cygnorum* and *Stirlingia latifolia* over low open shrubland *Acacia huegelii* and *Hemiandra pungens* over open native herbland and grassland of pasture weeds such as **Ehrharta calycina*.	0.85
PC	Sparse native and planted exotic trees over closed forb/grassland of pasture weeds	3.08
Total		**8.30**

Plate 1: Plant community Mp in 'excellent' condition.

Plate 2: Plant community Cc in 'degraded' condition.

Plate 3: Plant community BaBm in 'very good' condition.

Plate 4: Plant community Bima in 'degraded' condition.

Plate 5: Plant community PC in 'completely degraded' condition.

While the majority of the native vegetation within Lot 102 is in a 'degraded' or 'completely degraded' condition, the most intact native vegetation is located in the south-western corner of the site and comprises the Mp plant community (*Melaleuca preissiana* woodland). The majority of this community is in 'excellent' condition (**Figure 5**).

As outlined above (**Section 4.2.3.1**), FCT 20c TEC was confirmed within the site in 2016. The FCT 20c TEC generally corresponds with the BaBm community, however understanding of the presence, condition and location of the specific patches of the TEC has evolved over time. Initial flora and vegetation surveys were conducted by Emerge to support the LSP in 2014 (Emerge Associates 2015c) and were conducted at a scale appropriate for the extent of the LSP. This survey recorded vegetation condition over the site as 'degraded' and 'completely degraded' (with the exception of the southern wetland area which was recorded as being in 'excellent' condition).

Following public submission on the LSP, further detailed vegetation condition mapping (at a much finer scale) was conducted by Emerge in 2016, including 13 additional field survey plots and 15 observation points. This information was then provided to DPaW (now DBCA) for review. Tauss & Associates (2016) also conducted a flora and vegetation survey across the site. Consequently, DPaW updated their TEC FCT mapping in August 2016 as outlined in **Table 12** below.

The location and extent of FCT 20c TEC formed part of the independent TEC assessment (van Etten 2019) and the vegetation condition recorded by the various parties for the each FCT 20c TEC patch is outlined in **Table 12**.

Table 12: Vegetation condition and size of FCT 20c TEC.

Vegetation patch identifier (DBCA database)	Size (ha)	Vegetation Condition		
		Emerge 2016	DBCA 2016	Independent consultant (van Etten 2019)
Farrell03	0.05	Good	Good	Good
Farrell04	0.15	Good	Good	Degraded
Farrell05	0.03	Completely degraded-degraded. Not included as a 'patch'.	Good	Degraded. Not included as a 'patch'.
Farrell06	0.48 (detailed mapping by Emerge = 0.54)	Degraded to excellent	Good	Not rated/assessed.

There were some differences between the DBCA vegetation condition (obtained from the TEC database) and that of Emerge mapped using Keighery (1994). Vegetation condition is commonly mapped in WA using a qualitative scale developed by Keighery (1994) and sometimes referred to as the Bush Forever vegetation condition scale. This qualitative scale can lead to differing values dependent on the survey timing (season), the survey resolution and the person completing the survey.

The EP Act (Section 38) referral for the proposal considered those areas of the FCT 20c TEC that were represented by intact vegetation in 'good' or better condition as mapped by Emerge in 2016. This is consistent with commonly accepted assessment practices which specify that vegetation communities are only considered representative (or significant) if they persist in 'good' or better condition. However, this is no longer consistent with the approved Commonwealth conservation advice for FCT 20c TEC (DoEE 2017), which states that 'no condition thresholds have been applied to the nationally-listed ecological community and hence it is considered that all areas meeting the description of the ecological community are critical to its survival'.

Although there are no stated condition thresholds for the community in the conservation advice, patches of vegetation must still meet the description of the ecological community (as defined in the conservation advice), which is:

The Shrublands and Woodlands of the eastern Swan Coastal Plain ecological community is a woodland mainly on the transitional soils of the Ridge Hill Shelf, on the Swan Coastal Plain adjacent to the Darling Scarp, and extends onto the alluvial clays deposited on the eastern fringe of the Swan Coastal Plain, and also into adjacent aeolian deposits. The community mainly occurs as a shrubland, or a woodland of Banksia attenuata and Banksia menziesii, or Corymbia calophylla, sometimes with Allocasuarina fraseriana, over a shrub layer that can include the species Adenanthos cygnorum, Hibbertia huegelii, Scaevola repens var. repens, Allocasuarina humilis, Bossiaea eriocarpa, Hibbertia hypericoides and Stirlingia latifolia. A suite of herbs including Conostylis aurea, Trachymene pilosa, Lomandra hermaphrodita, Burchardia umbellata and Patersonia occidentalis, and the sedges Mesomelaena pseudostygia, Mesomelaena tetragona, and Lyginia barbata often occur in the community. The weeds Gladiolus caryophyllaceus and Ursinia anthemoides are also common (Gibson et al. 1994; DEC 2006).

As outlined in the independent TEC assessment with the ongoing degradation of the patches of FCT 20c TEC, these patches will reach a point where the description of the community does not reflect the vegetation contained within the patch and the patch can not recover from this degradation without significant intervention. The independent TEC assessment states 'Although the conservation advice for FCT 20c released by the Commonwealth states that all patches are important irrespective of condition, there is likely to be point in the degradation cycle where the community is: 1) is not recoverable even with serious intervention; and 2) no longer identifiable as that particular community as its characteristics have changed so much' (van Etten 2019).

As such, for the purposes of the proposal, Emerge have subsequently adopted the DPaW patch boundary mapping of FCT 20c TEC (which is generally consistent with the boundaries mapped by Emerge). The exception to this is the Farrell05 patch (**Figure 3** and **Table 12**) as the independent TEC assessment confirmed that Farrell05 is degraded and supported 'it not being included in the mapped extent of FCT 20c…due to its poor condition' (van Etten 2019). This patch is small (0.03 ha, the smallest of the FCT 20c TEC patches within the site) and is located along a historic fenceline. The independent assessment notes that the patch is highly degraded and dominated by grassy weeds with low native species richness (van Etten 2019). Images of the FCT 20c TEC patches are provided below in **Plates 6 to 9**.

Given Farrell06 is proposed to be retained within the development envelope, additional detailed mapping was completed by Emerge to refine the size of this FCT 20c TEC patch as shown in **Figure 3**. Again, the extent of this patch is generally similar to the mapping of DBCA, with the Emerge patch mapping slightly larger (0.54 ha compared to 0.48 ha). The updated Emerge mapping was also used to inform future management and revegetation requirements as outlined further in **Section 4.2.5.9** and **Appendix I.**

Throughout the document, the larger area of Farrell06 (0.54 ha) has been used when calculating impacts and extent with the total FCT 20c TEC area within the site being 0.74 ha (the sum of Farrell04 (0.15 ha), Farrell03 (0.05 ha) and Farrell06 (0.54 ha)).

Plate 6: Farrell03 patch.

Plate 7: Farrell04 patch.

Plate 8: Farrell05 patch.

Plate 9: Farrell06 patch.

In addition to the TEC, the outcomes of the flora and vegetation survey (Emerge Associates 2017) were:

- Fourteen individuals of *Isopogon drummondii*, a Priority 3 flora species were recorded, which were spread throughout the site (**Figure 3**).

- The Bima vegetation community (0.85 ha in 'degraded' condition) was found to be representative of FCT 21c 'low lying *Banksia attenuata* woodlands or shrublands'. This is a state listed Priority 3 Ecological Community (PEC), classified as a poorly known community.
- No Rare Flora were recorded.
- Vegetation within plant community Mp was identified as being in 'Excellent' condition, which corresponds with a portion of wetland UFI 15136 and Bush Forever Site 309. This wetland is currently mapped as a 'multiple use' wetland, however it considered by Emerge to be representative of a 'conservation' category wetland.

4.2.3.3 Significant flora and vegetation values

In accordance with the *Environmental Factor Guideline: Flora and Vegetation* (EPA 2016b), the flora and vegetation values over the site include:

- 0.74 ha of FCT 20c TEC.
- Fourteen individuals of a priority '3' species *Isopogon drummondii*.
- 0.85 ha of FCT 21c PEC.
- Vegetation within the Forrestfield/Guildford complex
- 1.71 ha of 'excellent' condition wetland dependent vegetation.

These values are summarised in **Figure 3** and **Figure 4** and are discussed further below.

The FCT 20c TEC is recognised as being restricted in distribution and the presence within the site represents the sixth known discrete location of this TEC. Although the occurrence of the community is small (<1 ha), it is significant given the status of the community and the limited number of sites from which it is currently known (**Appendix D**). The known area of occupancy (AOO) of this TEC is 129 ha, 90 % which is found at two localities (Talbot Road Reserve and adjacent bushland in Midvale and the former Bushmead Rifle Range site in Helena Valley). On this basis, the TEC present within the site represents less than 0.6 % of the entire known AOO. Nevertheless, the FCT 20c TEC is an additional occurrence of this TEC and therefore is significant and requires consideration under both the EP Act and the EPBC Act.

Priority 3 flora species are poorly known species, which may not be under imminent threat. The species *Isopogon drummondii* has been recorded within a number of local government areas including Dandaragan to the north, Serpentine- Jarrahdale to the south and Mundaring to the east. It is recognised by the DBCA that the flora species requires further survey however it may not be under imminent threat. Priority 3 flora species are not listed under the *Biodiversity Conservation Act 2016* (BC Act).

Priority Ecological Communities (PECs) are poorly known ecological communities which are not listed under the BC Act. Priority 3 ecological communities are the lowest priority (out of Priority 1,2 and 3) for further survey and/or definition of the community. The plant community Bima which was classified as FCT 21c is in 'degraded' condition and includes a number of pasture weeds including **Ehrharta calycina, *Eragrostis curvula* and **Briza maxima*.

The vegetation within the site is considered to be within the Forrestfield and Guildford complexes (**Figure 3**), both complexes which have less than 30% of pre-European extent remaining, with Guildford less than 10% remaining. Vegetation within the 'inferred' Forrestfield complex ranges from

'degraded' to 'good' while vegetation within the Guildford complex (represented by the wetland in the south western portion of the site) is generally in 'excellent condition.

Bush Forever Site 309 contains a wetland dependent vegetation community that was mapped as 'woodland to low open forest of *Melaleuca preissiana,* with emergent *Corymbia calophylla* over sparse shrubland of *Astartea scoparia, Marianthus* sp*., Xanthorrhoea preissii* and *Acacia pulchella* over sedgeland to closed sedgeland of *Dielsia stenostachya* and *Cyperaceae* sp*.* and open forbland of *Corynotheca micrantha* subsp. *micrantha*, *Drosera* spp. and *Burchardia congesta'* (Emerge Associates 2015c). No floristics quadrats were sampled within this vegetation but based on its structure and composition it is inferred to represent FCT 11 'Wet forests and woodlands' (Gibson *et al.* 1994). FCT 11 is a relatively well reserved wetland plant community across the Swan Coastal Plain (Gibson *et al.* 1994).

The remnant native vegetation in the Bush Forever site is mostly intact and was mapped as being in 'excellent' condition in accordance with the Keighery (1994) vegetation condition scale (Emerge Associates 2015c). However, some degraded areas occur around the margins where understorey layers are replaced by a closed grassland of **Ehrharta calycina* (perennial; veldt grass), *Ehrharta longifolia* (annual veldt grass)*, Eragrostis curvula* (African love grass) with localised occurrence of the bulb **Watsonia meriana* var. *bulbillifera* (bugle lily).

Bush Forever Site 309 also contains a 'multiple use' wetland but due to the 'excellent' condition of vegetation present it is more representative of a conservation category wetland (CCW) (Emerge Associates 2015c). This boundary of the CCW is generally consistent with the boundary of the Mp vegetation community shown in **Figure 4**.

4.2.4 Potential impacts of the proposed development

There are a number of impacts potentially associated with the proposal including:

- Direct impacts
  - Clearing of native vegetation (2.74 ha in 'good' to 'degraded' condition), including
    - vegetation within the Forrestfield complex
    - vegetation representing FCT 20c TEC (0.2 ha)
    - eight Priority 3 *Isopogon drummondii*.
  - Clearing of vegetation communities including:
    - 0.22 ha CC vegetation community in 'degraded' condition as shown in **Plate 2**.
    - 0.85 ha Bima vegetation community in 'degraded' condition (FCT 21c Priority 3 PEC) as shown in **Plate 4**.
    - 1.67 ha BaBm vegetation community in 'good' to 'degraded' condition.
  - Impacts to a Bush Forever site through vegetation clearing.
- Indirect impacts
  - Fragmentation or isolation of populations and occurrences of flora and vegetation.
  - Impacts on habitat that supports retained flora and vegetation.
  - Introduction and/or spread of weeds and or/disease and increasing impacts such as fire.
  - Increased recreational use and rubbish dumping facilitated by residential development through improved access and increased population.
  - Impact on other areas of native vegetation outside of the site.

- Cumulative impacts associated with other proposals.

Further information on these impacts is discussed below incorporating results of the independent FCT 20c TEC Review (van Etten 2019) (**Appendix D**).

4.2.5 Assessment of impacts

The *Environmental Protection Bulletin No. 20 Protection of naturally vegetated areas through planning and development* (EPA 2013) provides design guidelines for planning and development that assist in meeting the EPA's objective for flora and vegetation and terrestrial fauna. In accordance with this Bulletin, part of the site contains regionally significant natural areas including FCT 20c TEC and the wetland (representative of a CCW) which also represents the highest quality fauna habitat. The proponent has considered these guidelines when formulating this proposal as outlined in **Table 13** below.

Table 13: Consideration of EPA Bulletin No. 20 design guidelines.

EPA Design Guidelines	Proposal response
Locate development on cleared land	The site contains both native and non-native vegetation and in accordance with EPA Bulletin No. 20, the proposal has been located on areas of mostly degraded vegetation and/or cleared land (i.e. non-native vegetation).
Consider the impacts of fire protection requirements on biodiversity	The design of the proposal has ensured that no vegetation clearing within the southern POS for fire hazard reduction is required. This is achieved primarily through the incorporation of a road reserve boundary to the southern POS area (**Appendix A**).Where development is located adjacent to the southern POS area increased construction standards for dwellings and other measures (as outlined in the *Planning for Bushfire Protection Guidelines (WAPC and DFES 2017)* will be utilised to avoid the need for any fire hazard reduction within the southern POS area.
Protect large consolidated naturally vegetated areas	The proposal has retained the largest naturally vegetated area within the site, including the highest quality vegetated patch. The southern POS has been designed to achieve a low edge to area ratio to minimise edge impacts.
Ecological linkages should be planned in the regional context and connect large naturally vegetated areas	This design guideline is intended for use in regional planning processes. The site is not subject to a regional planning process, as it is currently zoned with an approved LSP. However, Blackadder Creek located in the north of the site, would provide an ecological linkage to the east and west. Blackadder Creek is proposed to be retained and included within POS as part of the proposal.
Ensure clear and ongoing management responsibilities in retained naturally vegetated areas	The southern POS area will be managed in the future by the City of Swan, an experienced conservation land manager, who are responsible for the management of a number of conservation POS areas through the local government area.
Infrastructure should not be located within consolidated retained naturally vegetated areas	No infrastructure is proposed within the southern POS area as part of this proposal.

4.2.5.1 Clearing of native vegetation

Implementation of the proposal would result in the clearing of 5.08 ha of land with the majority of this vegetation (4.88 ha) being in 'degraded' and 'completely degraded' condition. These areas are dominated by non-native species, such as invasive weeds with only sparse, scattered native vegetation.

Table 14 provides an assessment of vegetation condition within the site outlining the area (ha) and percentage of the site cleared as part of implementation of the proposal. No native vegetation in 'excellent' or 'very good' condition is proposed to be cleared as part of implementing the proposal and only 0.2 ha of the site contains vegetation in 'good' condition that would be cleared as part of the implementing the proposal.

Table 14: Areas cleared based upon vegetation condition.

Vegetation condition (Emerge Associates 2017)	Extent within site (ha)	Extent cleared within disturbance footprint	% of site cleared within disturbance footprint as part of implementation of proposal
Excellent	1.4	0	0
Very good	0.07	0	0
Good	0.53	0.2	2.4
Degraded	3.22	2.45	29.5
Completely degraded	3.08	2.42	29.2

On the basis that native vegetation is represented by vegetation classified as being in 'excellent', 'very good', 'good' and 'degraded' condition, then 5.22 ha of the site contains native vegetation and 2.65 ha of this native vegetation will be removed within the disturbance footprint. However, only 0.2 ha of native vegetation in 'good' condition will be cleared, while the remainder (2.45 ha) is in 'degraded' condition .

The flora and vegetation survey concluded that the site was generally representative of the Forrestfield vegetation complex (Heddle *et al.* 1980) and vegetation statistics for this complex have been provided in **Table 15** based upon *2018 South West Vegetation Complex Statistics* (Government of Western Australia 2019). The Forrestfield complex is present over less than 30 % of its pre-European extent at both a local and regional scale and is recommended as a priority for retention within the City of Swan *Local Biodiversity Strategy* (City of Swan 2015).

In order to understand the regional and local impact of the proposal, the impact on the clearing of vegetation within the Forrestfield complex was calculated as a percentage of the extent remaining on the Swan Coastal Plain and within the City of Swan of the site as shown in **Table 15**. This table demonstrates that the implementation of the proposal will affect less than 1 % of the remaining extent of the Forrestfield vegetation complex at both at a regional (within the Swan Coastal Plain) and local (within the City of Swan) scale. This impact is not considered to be significant.

Table 15: The extent of Forrestfield complex locally and regionally and the impact of the proposal based upon 2018 South West Vegetation Complex Statistics (Government of Western Australia 2019).

Vegetation Complex	Forrestfield Complex (from Heddle *et al.* 1980)
Swan Coastal Plain extent	
Pre-European extent (ha)	22,812.92
2018 extent remaining on Swan Coastal Plain (ha)	2,803.36
Percentage of pre-European extent remaining on Swan Coastal Plain	12.29 %
City of Swan Local Government Area extent	
Pre-European extent within the City of Swan	2,402.39
2013 remnant vegetation extent (ha) within the City of Swan	444.03
Percentage of pre-European extent remaining within the City of Swan	18.48 %
Impact of the proposal	
Extent within the site (ha)	3.4[4]
Extent impacted by the proposal	2.74
% of extent remaining on Swan Coastal Plain impacted by proposal	0.10 %
% of extent remaining within the City of Swan impacted by the proposal	0.68 %

The implementation of the proposal will also involve the clearing of 0.047 ha of wetland dependent vegetation as mapped by Emerge (but outside of Bush Forever Site 309). The removal of this small area of wetland dependent vegetation is not considered significant, given this vegetation in in 'degraded' condition and is not within the potential CCW within the site.

The wetland within the southern portion of the site is located within the Swan River consanguineous suite. The concept of consanguineous suites (natural wetland groups) was developed by Semeniuk (1988) and refers to the grouping of wetlands into assemblages based on their similarities, such as geomorphic setting, origin and hydrology.

Statistics for the distribution of consanguineous suites across the Swan Coastal Plain indicate that Swan River consanguineous wetlands comprised 10,224 ha as of 2016, of which 15.7 % (1,608 ha) were classified as CCWs (DBCA 2017). The wetland within the southern portion of the site is not currently mapped as CCW, although the values and attributes of the wetland suggest that this management category would be appropriate. The removal of 0.047 ha of Swan River consanguineous suite wetland would not influence the amount of Swan River consanguineous suite with conservation management category and is not considered to have a direct significant residual impact at the local or regional scale.

The implementation of the proposal will provide for the retention of vegetation within the southern POS and all of the area considered representative of the CCW.

[4] Estimated based upon the 'inferred' boundary for Forrestfield (**Figure 3**)

4.2.5.2 Clearing of state listed TECs and PECs

The implementation of the proposal will result in the clearing of 0.2 ha of FCT 20c TEC within the site including patches Farrell03 (0.05ha) and Farrell04 (0.15ha) (as outlined in **Figure 3**) both having been identified as being in 'good' condition (Emerge Associates 2017). Within the site is this represents 27 % of the TEC extent, however within the AOO this is 0.15 % (DoEE 2017). Vegetation statistics for this TEC are provided below in **Table 16** and are based upon information contained within:

- *Approved Conservation Advice for Shrublands and Woodlands of the eastern Swan Coastal Plain*, (DoEE 2017)
- Interim Recovery Plan 2006-2011 for the shrublands and woodlands on the eastern side of the Swan Coastal Plain (community type 20c) (DEC 2006)
- *Eastern Shrublands and Woodlands (Swan Coastal Plain Community 20c): Interim Recovery Plan 2000-2003* (English and Blyth 2000)

The area of FCT 20c TEC is generally well known and it is a highly restricted TEC (DoEE 2017). An assessment of local impacts has been confirmed to 20 km, while regional impacts have been assessed using the entire extent of the TEC, given it is confined to the eastern Swan Coastal Plain (English and Blyth 2000).

Table 16 demonstrates that removal of 0.2 ha within the disturbance footprint is 0.28 % of the TEC within 20 km of the site and 0.15 % of the entire known TEC extent. The impact of the proposal is less than 0.5 % of the remaining extent at both the local scale and regional scale and therefore it is considered that this impact is not a significant residual impact.

Table 16: The extent of FCT 20c TEC regionally and locally and the impact of the proposal.

Threatened Ecological Community extent	Extent remaining (ha)	Extent remaining (ha) within 20 km of the site (ha)	Extent within the site (ha)	Area impacted by the proposal (ha)	Impacted area as a % of total	Impacted area as a % of 20 km extent
FCT 20c TEC	129.13	71.86	0.75	0.2	0.15 %	0.28 %

The implementation of the proposal will also result in the clearing of 0.85 ha of FCT 21c Priority 3 PEC in 'degraded' condition. The PEC is not an ecological community that is formally recognised as being threatened (through legislation) and is generally considered a 'poorly-known community'. Given the PEC present within the site is degraded, it is considered not to be representative of the PEC. Furthermore, implementation of the proposal is unlikely to lead to this PEC becoming endangered and therefore it is considered that the potential direct impacts from the proposal on this potential PEC would not be significant.

4.2.5.3 Clearing of Priority Flora

The implementation of the proposal will result in the clearing of eight individuals of *Isopogon drummondii,* a Priority 3 flora species. Within the site, this is 57 % of the 14 individuals in total within the site.

Specific local or regional information has not been calculated for this Priority Flora species, however Threatened and Priority Flora data provided by the former DPaW in 2014 (Ref. No. 03-1014FL)

confirmed that over 1,000 individuals were present within the Talbot Road Nature Reserve and around the Midland Cemetery, 700 m east of the site. On this basis, the removal of 8 individuals is likely to reduce the local population by less than 1 %, which is not considered to be a significant impact.

The species has also been recorded within several local government areas within the Perth Metropolitan Region including Bayswater, Gosnells, Kalamunda, Mundaring and Serpentine-Jarrahdale.

Furthermore, this species is a Priority 3 flora species which is defined as 'Species that are known from several locations, and the species do not appear to be under imminent threat, or for few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat…' As such, it is considered that the removal of eight individuals would not cause this species to become rare or further threatened and therefore the potential direct impact on this species is not considered to be significant.

4.2.5.4 Impact on Bush Forever site

The implementation of the proposal will not involve any clearing of vegetation within Bush Forever Site 309 and this site is proposed to be retained and managed within the southern POS area. In accordance with SPP 2.8 *Bushland Policy for the Perth Metropolitan Region* (WAPC 2010b) the proposal is not considered to have a significant impact on Bush Forever Site 309 as this site would be protected and retained in it's entirety. This area will be vested with the City of Swan, an experienced conservation land manager and provide for the long term conservation management of the wetland and dryland vegetation.

4.2.5.5 Fragmentation or isolation of populations and occurrences

The native vegetation currently within the site is largely fragmented, separated by large areas of non-native vegetation. This includes the patches of FCT 20c TEC which are separated by areas 'degraded' and 'completely degraded' vegetation. At a regional scale, native vegetation within the site is also somewhat isolated, given the site is surrounded by areas of urban development including Swan View to the east, Stratton to the north east and the remainder of Movida Estate to the west. Urban development, roads and railways separate the site from the larger areas of TEC, including the Talbot Road Reserve patch, located approximately 700 m to the east, and the Bushmead Rifle Range patch, approximately 4 km to the south.

As outlined in the independent TEC assessment, the impact of any increased isolation is difficult to assess and will be very much dependent of the current degree of gene exchange within the individual species, which is mainly related to the distribution and reproductive characteristics of the individual species, including their pollination type, breeding system and seed dispersal strategies (van Etten 2019). Therefore, the impact will be somewhat independent of the current mapped patches of FCT 20c TEC and would be dependent on the particular flora species.

In absence of the proposal, it highly likely that the patches of FCT 20c TEC would degrade over time because they are already fragmented, isolated and subject to ongoing threatening processes (such as weed invasion, rubbish dumping, uncontrolled access and fire). This is supported by the independent TEC assessment (van Etten 2019) which states 'patches of FCT 20c at the site are currently small and

quite fragmented…so they would be unlikely to be viable over the long term given persistent threats and edge effects.' On this basis, it is considered that the clearing of these isolated, fragmented patches is not significant.

The clearing of individuals of *Isopogon drummondii* will reduce the population of this species over the site. But as this population is already isolated, no substantive change to the isolation or fragmentation of the population will occur. The species is known from a wide area in the south-west of WA and over 1,000 individuals are present Talbot Nature Reserve 700 m to the east. Given a population of *Isopogon drummondii* is retained on site, the removal of 8 individuals will not result in significant impact to the AOO or extent of occurrence (EOO) of this species.

4.2.5.6 Impacts on habitat that supports flora and vegetation

Within the disturbance footprint, impacts on habitat that support flora and vegetation will occur through the clearing of native vegetation. Within the Southern POS area, impacts on habitat that supports flora and vegetation may occur through the construction and development process, including impacts to soils, landforms and microclimate. These impacts will be managed through the construction process through specific management measures and outlined in a Construction Environmental Management Plan (CEMP) to be prepared as a condition of subdivision or development application.

Impacts from weeds, disease, fire, recreational use, dumping and hydrological impacts are discussed further in **Sections 4.2.5.7** and **Section 4.2.5.8** below.

4.2.5.7 Introduction and spread of weeds/disease and fire impacts

The site currently contains a large number of weeds and weedy species (**Plate 10**). The independent TEC review (van Etten 2019) states that weed invasion from degraded/cleared areas of the site would over time degrade the condition and extent of TEC FCT 20c patches.

Implementation of the proposal provides an opportunity to remove the majority of weeds (and associated weed seedbank) from the site, through the clearing of weed dominated vegetation and development for residential uses. The proposed impact from weeds on the retained native vegetation will be addressed through active weed management of these areas and revegetation to minimise weed recolonisation. The revegetation approach for the site, including weed control is discussed further in **Section 4.2.6.3**, **Section 6.3** and **Appendix J**.

The site currently dominated by grassy weed species (**Plate 10**) which provide a significant grass fire risk. Currently the site has limited passive surveillance and can be accessed from Farrall Road increasing the opportunity for arson. Implementation of the proposal will allow for the provision of improved access to the site (through the construction of roads) and hydrants which will also improve bushfire response at the site. Furthermore, the presence of a community following implementation of the proposal is likely to lead to earlier detection and suppression of fires.

Plate 10: Typical weedy area of the site showing Ehrharta calycina (perennial veldtgrass).

4.2.5.8 Increased recreational use and dumping

The site is already subject to unauthorized, illegal access and rubbish dumping (**Plate 11** and **Plate 12**). During the construction phase of the proposal, access will be controlled via fencing and signage will be erected to limit public access. These measures will be outlined in a CEMP to be prepared prior to construction. The construction contractor will manage access during the construction period and during this time, an increase in recreational use and dumping is not expected, given the site controls that will be implemented through the construction contractor.

Following implementation of the proposal, recreational use will be managed with areas of landscaped open space (as shown in **Figure 6**) within the southern POS area used for passive recreation. The conservation areas within the southern POS will be fenced and signage used to restrict access. Once revegetation and landscaping works commence, any incidence of dumping is expected to reduce given access control, the increased public presence, passive surveillance and the sense of community that will be created within the area. As such, it is not anticipated that increased recreational use and dumping will significantly impact on flora and vegetation.

Plate 11: Rubbish dumping within the site (1).

Plate 12: Rubbish dumping within the site (2).

4.2.5.9 Consideration of cumulative impacts

Cumulative impact assessment aims to consider the effects of multiple actions or impacts on the environment beyond the environmental impact assessment of a single proposal. Cumulative impacts include the actual and potential impacts of a number of activities or projects that may combine over time and/or space to change the significance of the proposal.

When considering cumulative impacts in relation to the FCT 20c TEC, a large amount of data is available on the locations of the community, the areas of community as well as land tenure information. Information provided by DBCA on FCT 20c TEC occurrences confirms that there is 129.13 ha of FCT 20c TEC remaining. Specific information on the occurrences of the TEC is provided in **Table 17.**

Table 17: Known occurrences of FCT 20c TEC outside of the site (English and Blyth 2000; DEC 2006; DoEE 2017; van Etten 2019).

Site	Location	Size of FCT 20c TEC	Land information and tenure
Talbot Road South	Talbot Road Reserve 23953 (Talbot Road Nature Reserve)	40 ha	Part of Bush Forever Site 306 Reserved for Parks and Recreation Managed by DBCA
	Unallocated Crown Land (Swan Location 11314)	11 ha	Part of Bush Forever Site 306 Reserved for Parks and Recreation
	Cemetery Reserve 6955	17 ha	Part of Bush Forever Site 306 Managed by Metropolitan Cemeteries Board
Talbot Road North	Lot 6 Talbot Road, Stratton	4.27 ha	Managed by DBCA
Bushmead	Part Lot 9 on Diagram 4347, Helena Location 20a, Bushmead Rifle Range, Helena Valley	49.91 ha	Bush Forever Site 213 Private land, under covenant with DBCA
Stirling Crescent	Corner of great Eastern Highway bypass and Roe Highway	6.63 ha	Bush Forever site 481 Hazelmere 4.5 ha Main Roads ownership Balance private land
Clifford Road	At the junction of Clifford St and Tonkin Hwy Maddington	0.84 ha	Main Roads WA

Three of these sites are under the tenure or management of the Crown, State or local government and therefore there is some certainty to their tenure and ongoing management arrangements. Reserve 23953, Unallocated Crown Land (Swan Location 11314) and the Bushmead site are reserved for 'Parks and Recreation' under the MRS which requires that any use or development is 'restricted to that which is consistent with furthering the enhancement of the reserve and facilitating its use for…conservation purposes' (WAPC 2017).

A number of these areas are also Bush Forever sites (no: 306 and 213) and in accordance with *State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region,* proposals or decision making should recognise regionally significant bushland protection and it's management as a primary purpose and a fundamental planning consideration in its own right.

As such, it is considered unlikely that there would be a future proposal that would result in the clearing of FCT 20c TEC at these sites and as such, they have been excluded from the cumulative impact consideration.

However, there may be some uncertainty around the long-term retention of the 'Stirling Crescent' and 'Clifford Road' sites which are both in ownership of Main Roads and located adjacent to major road infrastructure. While the proponent is not aware of any active proposals associated with these sites, these two FCT 20c TEC sites could be subject to future impacts.

Removal of FCT 20c TEC within the 'Clifford Road' and 'Stirling Crescent' sites plus implementation of the proposal would lead to a reduction in the extent of FCT 20c TEC by 7.67 ha. This is a 5.9 % reduction in the extent of the FCT 20c TEC community. The *Approved Conservation Advice for Shrublands and Woodlands of the eastern Swan Coastal Plain (DoEE 2017)* 'states that all areas of the ecological community are critical to its survival' and as such, it is considered that this 5.9 % reduction would be a significant impact. The proposal would only contributes 0.15 % of this 5.9 % reduction and therefore a minimal contribution.

Clearing of FCT 20c TEC within these two areas would require a separate environmental approvals processes demonstrating implementation of the mitigation hierarchy. This is likely to result in a) some retention of these FCT 20c TEC areas; b) additional secure tenure for these FCT 20c TEC sites; and c) potential rehabilitation and revegetation to improve the condition and viability of these patches. Therefore, it would be reasonable to assume that any cumulative impacts are likely to be less than 5.9 % of the 129.13 ha extent of FCT 20c TEC.

Given the uncertainty surrounding any future proposals for FCT 20c TEC and the requirements of any mitigation measures, it is not possible to undertake an accurate assessment of cumulative impacts. It is the intention that the proposal creates an area of 0.98 ha of FCT 20c TEC in the long term through revegetation and as such will increase the extent of FCT 20c TEC within the site. On this basis, the contribution of the proposal to any cumulative impacts (which may occur over a similar time scale) is not considered to be significant.

Table 18 provides an assessment of the protection status of the Forrestfield complex using data from the *2018 South West Vegetation Complex Statistics* (Government of Western Australia 2019) and the City of Swan's *Local Biodiversity Strategy* (City of Swan 2015).

The *2018 South West Vegetation Complex Statistics* data provides additional information on areas of vegetation secure for conservation including:

- Lands protected for conservation being those listed in the DBCA legislated lands and water dataset as either Crown reserves or lands managed under Section 8A of the *Conservation and Land Management Act 1984* that have an *International Union for the Conservation of Nature* category of I- IV in accordance with the IUCN Protected Area Categories System (IUCN 2020).
- Lands secure for conservation based upon the 'EPA definition' being: 'National Parks, Nature Reserves, Conservation Parks and any other crown reserve that have "Conservation" as part of the reserve purpose'.

The City of Swan's *Local Biodiversity Strategy* (City of Swan 2015) also identifies areas with some level of protection including protection through reservation as National Parks, Conservation Reserves or Local Reserves.

Table 18: The extent of Forrestfield complexes in protection.

Complex extent information	Forrestfield Complex (from Heddle *et al.* 1980))
2018 South West Vegetation Complex Statistics	
Pre-European extent (ha)	22,812.92
2018 extent remaining (ha)	2,803.36 (12.29 % of pre-European extent)
Current extent secure for conservation – EPA definition (ha)	359.71 (1.58 % of pre-European extent)
Current extent protected (IUCN I -IV) for conservation (ha)	313.01 (1.37 % of per-European extent)
City of Swan Local Biodiversity Strategy data for the City of Swan LGA	
Pre-European extent (ha)	2,180.76
2013 extent remaining (ha)	399.06 (18.3 % of pre-European extent)
Pre-European extent with some level of protection locally (ha)	324.28 (14.87 % of pre-European extent)

Table 18 demonstrates that across the Swan Coastal Plain a small amount (1.58 % to 1.37%) of the pre-European extent of the Forrestfield vegetation complex is protected and therefore the complex could be at risk to cumulative impacts. However, at the local scale, a greater proportion of the remaining extent is protected with 324.28 ha (or 81 %) of the remaining pre-European extent of 399.06 ha protected within the City of Swan. At the local scale, the complex is less susceptible to cumulative impacts.

Assuming that all areas outside of the protected areas were proposed for development (which is unlikely) then the impact of the proposal (2.74 ha) would contribute to a significant cumulative impact. However, the majority of this vegetation 2.54 ha is in 'degraded' condition so it is arguable whether this portion is representative of the complex, given the change to vegetation composition and structure.

The City of Swan's *Local Biodiversity Strategy* (City of Swan 2015) characterizes the Forrestfield complex by MRS land use categories and the following is noted for the Forrestfield Complex:

- 147.59 ha is located in Parks and Recreation
- 166.72 ha is reserved for Public Purposes (Commonwealth Government Land)
- 55.54 ha is zoned Rural
- 20.39 ha is zoned Urban.

This detailed break-down of land uses provides an opportunity to consider potential cumulative impacts at a local scale. If we consider that future proposals are likely to impact upon land zoned for rural and urban land use, then 75.93 ha of the remaining 399.06 ha could be affected. This is approximately 19 % of the remaining extent within the City of Swan and could be considered a significant impact on the remaining extent of the Forrestfield complex.

As outlined above, the impact of any future proposals is likely to be less than 75.93 ha as any future proposals would need to consider the mitigation hierarchy which would likely lead to additional

retention, secure tenure and potentially revegetation to improve the condition of the Forrestfield complex associated with any future proposals. This is the case for the proposal, which will result in the retention of 2.46 ha of vegetation representative of the Forrestfield complex being retained in secure tenure with revegetation to improve the condition and viability. Furthermore, the breakdown of the complex into MRS land use categories confirms that over 78 % of the remaining extent of the complex is in either Commonwealth, State or local government ownership and therefore likely to be protected.

4.2.6 Mitigation

4.2.6.1 Avoid

The site has been identified at a state level for urban development and is identified within *the North-East Sub-regional Planning Framework* (WAPC 2018) as an 'urban undeveloped' area. The sub-regional planning framework builds upon *Directions 2031 and Beyond* (WAPC 2010a) facilitating higher densities in undeveloped areas already zoned for urban use, such at the site. The site is considered a key short-term urban development area.

The design of the LSP considered flora and vegetation values and provided for a southern POS area to retain native vegetation. Consistent with the LSP, the proposal (**Appendix A**) would avoid impacts to the most intact patch of FCT 20c TEC and the Bush Forever site and wetland. The independent TEC assessment notes that the highest priority for retention should be the largest patch of FCT 20c TEC, with an appropriate buffer (van Etten 2019). This has been accommodated in the proposal with the southern POS area incorporating 0.54 ha of FCT 20c TEC.

As part of implementing the proposal, the proponent will rehabilitate and manage the southern POS area, controlling access and undertaking revegetation and weed control over a minimum of five years as outlined in the RVMP provided as **Appendix J.**

The design of the southern POS will include the following elements to avoid impacts to the flora and vegetation:

- No turf is proposed.
- No irrigation will be provided.
- Conservation fencing (to the City of Swan specifications) will be included around the boundary of the conservation area to separate the landscaped portion of the southern POS and restrict access to the conservation areas.
- Crushed limestone paths on existing tracks will be provided through the POS (outside of the fenced conservation areas) to provide pedestrian access and enable fire appliance access.
- Bin/s will be provided to reduce rubbish impacts from public usage.
- Ongoing management of the POS will be undertaken by the proponent prior to handover (over 5 to 7 years) and will include rubbish removal, weed control, maintenance of signage and fencing as well as ongoing revegetation maintenance.

The southern POS area will then be handed over to the City of Swan and managed for conservation in the long term. At a City of Swan Council meeting on 5th June 2019, the Council agreed to accept

management of the southern POS area including ongoing maintenance, acknowledging the significant environmental values within the proposed southern POS (**Appendix I**).

The proposal has also aimed to avoid areas of *Isopogon drummondii* with six of the 14 individuals retained through the proposal within the southern POS.

4.2.6.2 Minimise

Impacts of the proposal on retained areas of vegetation (including FCT 20c TEC and the wetland) will be minimised through the provision of a vegetated buffer to the proposed development which will also be rehabilitated (as discussed in **Section 4.2.6.3**). Accordingly the proposal was modified through a Section 43a request to increase the buffer for the FCT 20c TEC patch following the recommendations of the independent TEC assessment (van Etten 2019). The proposal provides for a 25m buffer between any proposed residential development to the north of the Farrell06 patch of FCT 20c TEC. Similarly, a 50 m buffer has been provided from the eastern boundary of the proposed CCW.

Impacts potentially arising during clearing of the site will be managed during construction and specific management-based provisions to address flora and vegetation that will be included within the CEMP are outlined in **Table 19** and have been reviewed by DBCA.

The CEMP will be required for any earthworks on the site, either through subdivision or an earthworks development application and will need to be approved by the City of Swan.

Furthermore, the proposed RVMP (discussed further below and attached as **Appendix J**) has also aimed to minimise impacts to the retained vegetation within POS and will ensure:

- Pathways within the POS area are located on existing tracks.
- Degraded areas separating the wetland and FCT 20c TEC from the development will be rehabilitated to minimise impacts from development on retained native vegetation.

Table 19: Management provisions to be included within the CEMP for Flora and vegetation.

Management Targets	Management Actions	Monitoring	Reporting
• No clearing of vegetation outside of the disturbance footprint during civil construction. • Clearing of native vegetation within the development envelope will not exceed 2.74 ha and not include more than 0.2 ha of FCT 20c TEC attributable to civil construction.	• Demarcate the southern POS area through temporary fencing to prevent clearing beyond the disturbance footprint	• Daily inspection during clearing of clearing areas and temporary fencing to confirm no clearing beyond the disturbance footprint.	• Report unauthorised clearing to DWER.

Table 19: Management provisions to be included within the CEMP for Flora and vegetation (continued).

Management Targets	Management Actions	Monitoring	Reporting
• No introduction of new weed species into the development envelope during and attributable to construction. • No disturbance to retained vegetation within southern POS during and attributable to construction.	• Provide site inductions to personnel that include information on the importance of retained vegetation and weed management and hygiene practices	• Daily inspection for evidence of unauthorised access into the southern POS (beyond the disturbance footprint). e.g. observations of vehicles or machinery, damage to fencing • Monthly visual inspections for weeds along the clearing edge, adjacent to native vegetation, commencing at the commencement of clearing activities, and to continue for the duration of construction	• Report increase in weed species, density and/or numbers from pre-construction monitoring observations within the development envelope. • Reporting to be provided to EPA.
• *Phytophthora* dieback is not introduced to vegetation surrounding the development envelope attributable to construction activities as observed within three years from the commencement of construction	• All vehicles and machinery to be inspected and free of weeds and soil prior to entering the development envelope.	• Yearly visual monitoring within southern POS area for potential dieback for three years. • If visual monitoring suggests dieback, confirm presence of the disease with laboratory analysis.	• Report occurrence of dieback. • Maintain records of vehicle and machinery inspections during construction.
• No fires onsite attributable to construction.	• All machinery and vehicles undertaking native vegetation clearing are fitted with a fire extinguisher or that one is present within 15 m of equipment. • Prohibit clearing when fire danger is Extreme or Catastrophic.	• Daily inspection of cleared areas for smoking/smouldering vegetation.	• Report uncontrollable fires to DFES • Maintain records of minor fires to enable review of procedures if required.
• Minimise impact from construction dust on retained vegetation.	• Water application during construction (through a water cart or similar) to minimise potential impacts to vegetation from dust.	• Daily inspection of retained vegetation for visible dust during construction.	• Maintain records of water application and visible dust and provide data to EPA following construction.

Table 19: Management provisions to be included within the CEMP for Flora and vegetation (continued).

Management Targets	Management Actions	Monitoring	Reporting
• Maximise retention of intact plant material from the site within rehabilitation areas.	• Transferrable material (such as grass trees, zamia palms and large wood) will be translocated into the southern POS or temporary storage areas. • Direct vegetation transfer from cleared areas of FCT 20c TEC will be directly transferred to an identified receiving site within the southern POS. If direct transfer is not possible, topsoil will be stockpiled in a temporary storage area.	• Direct vegetation transfer of FCT 20c TEC to be visually monitored by an ecologist to confirm transfer protocol.	• Document direct vegetation transfer including date, volume, location of transfer and recipient sites. Report on direct vegetation transfer to be provided to EPA.

4.2.6.3 Rehabilitate

An RVMP has been prepared and will be implemented as a condition of subdivision (as detailed in the LSP). An initial version of the RVMP (August 2017) was reviewed and supported by DBCA in 2017 and included management of the FCT 20c TEC vegetation and additional revegetation. The RVMP has subsequently been updated (**Appendix J**) based upon the independent TEC assessment (van Etten 2019) to provide for a revegetated area of 25 m to the north of the mapped FCT 20c TEC within the southern POS area. This revegetated area will provide a vegetated buffer for FCT 20c TEC from the surrounding proposed residential land development and uses.

The RVMP has been developed using the adaptive restoration framework for banksia woodlands (Stevens *et al.* 2016) which follows the six principles outlined in *The National Standards for the Practice of Ecological Restoration in Australia* (Standards Reference Group SERA 2017):

1. Ecological restoration practice is based on an appropriate local indigenous reference ecosystem.
2. Restoration inputs will be dictated by level of resilience and degradation.
3. Recovery of ecosystem attributes is facilitated by identifying clear targets, goals and objectives.
4. The goal of ecological restoration is full recovery, insofar as possible, even if outcomes take long timeframes or involve high inputs.
5. Restoration science and practice are synergistic.
6. Social aspects are critical to successful ecological restoration.

Rehabilitation areas have been categorised based upon the intensity of effort (**Figure 6**) and the rehabilitation approach is outlined in **Table 20**.

The rehabilitation requirements have been defined based upon detailed on-ground site assessment of the management areas (**Figure 6**). Areas of 'low' and 'targeted' management will aim to increase the resilience of FCT 20c TEC primarily through weed control with some infill planting over a number of years. This will reduce disturbance to the community and allow the patch to persist in the longer term.

In areas adjacent to FCT 20c TEC (and historically part of this community now in 'degraded' condition), there is an opportunity to recreate the functionality of the ecological community and restore areas of banksia woodland. These areas require an 'intensive' management response and will involve revegetation, plus areas of direct vegetation transfer from cleared areas of FCT 20c TEC within the development footprint. Direct vegetation transfer will aim to retain some of the biological components (such as flora species, invertebrate and microbiological communities) from the areas of FCT 20c TEC that will be removed through implementation of the proposal. Direct vegetation transfer will also reduce the overall impact of the proposal as although vegetation will be removed, key biological components of these vegetation patches will be retained and consolidated. The direct vegetation transfer will also reduce the time lag associated with achieving the revegetation outcomes, as live biological material will be transferred which is likely to be more successful and viable than standard revegetation (given species are already adapted to the local climate and conditions). A dieback assessment will be conducted over the site prior to any direct vegetation transfer to reduce the transfer of dieback into the southern POS.

Table 20: Rehabilitation areas and approach.

Management Area	Management intensity	Management methods					Approximate Area (ha)
		Landform preparation	Plant establishment	Weed control	Access control	Dieback risk reduction	
Shrubland/ woodland - 1	Low			✓	✓	✓	0.46
Shrubland/ woodland - 2	Targeted (infill)		✓ (infill)	✓	✓	✓	0.18
Shrubland/ woodland - 3	Intensive	✓	✓	✓	✓	✓	0.17
Shrubland/ woodland - 4	Intensive	✓	✓	✓	✓	✓	0.05
Shrubland/ woodland - 5	Intensive	✓	✓	✓	✓	✓	0.04
Shrubland/ woodland - 6	Intensive	✓	✓	✓	✓	✓	0.08
Wetland-1	Low			✓	✓	✓	1.7
Landscaped area	Not subject to the RVMP						0.58

The RVMP follows restoration protocols from successful banksia woodland restoration projects including the retention of topsoil, weed management and plant establishment. Best practice rehabilitation protocols have been adopted from *Banksia woodlands: A restoration guide for the*

Swan Coastal Plain (Stevens *et al.* 2016) and the Banksia Woodland Restoration Project, managed by the Department of Parks and Wildlife (now DBCA).

Specifically, the goals of the RVMP include the following:

- Restore approximately 5,278 m^2 of FCT 20c vegetation in 'degraded' or 'completely degraded' condition[5], such that a vegetation condition rating of 'good' or better is achieved.
- Manage approximately 4,565 m^2 of FCT 20c vegetation in 'very good' or better condition to maintain its existing condition and restore any 'degraded' portions to 'good' or better condition.
- Manage approximately 17,036 m^2 FCT 11 vegetation associated with Bush Forever Site 309 to maintain its existing condition and restore any 'degraded' portions to 'good' or better condition.

The independent TEC assessment states that the retention and rehabilitation of the 'FCT 20c patch, buffer, wetland and wetland-upland transition represents the best opportunity to effectively and sustainably protect a relatively large expanse of native vegetation with particularly important conservation values' (van Etten 2019). Furthermore, it supported the approach and techniques to rehabilitation outlined in the RVMP including weed control and the direct vegetation transfer.

In the longer term, the restoration of the southern FCT 20c TEC patch proposes to create an area of 0.98 ha of FCT 20c TEC in 'good' or better condition within the southern POS area. The proponent will implement revegetation and manage the site until subdivision and development over the site is complete (a period of no less than five years). Five years of revegetation and management would be adequate to restore the major components of the FCT 20c TEC within these areas. Following the implementation of rehabilitation by the proponent, the site will be ceded to the Crown free of cost with ongoing management by the City of Swan for conservation in the long term. The City of Swan has agreed it will manage the southern POS area and the conservation values of the POS area in the long term (**Appendix I**).

4.2.7 Predicted outcome

The key flora and vegetation values identified within the site include:

- Native vegetation that is in 'excellent' to 'degraded' condition.
- One threatened ecological community and one priority ecological community.
- Vegetation representative of the Forrestfield complex.
- Sixteen individuals of *Isopogon drummondii.*

The predicted outcome of the proposal in relation to flora and vegetation includes:

- Removal of 0.2 ha of FCT 20c spread over two discrete patches (0.05 ha and 0.15 ha) in 'good' condition.
- Removal of eight individuals of *Isopogon drummondii,* a Priority 3 flora species.
- Removal of 2.74 ha of native vegetation in 'good' (0.2 ha) and 'degraded' (2.54 ha) condition within the Forrestfield vegetation complex.
- Retention of 0.54 ha of FCT 20c TEC in 'good' to 'very good' condition with a goal of creating a singular patch of 0.98 ha of FCT 20c TEC in 'good' or better condition through revegetation and weed control.

[5] As defined by Keighery (1994) and banksia woodland TEC condition scale (TSSC 2016).

- Impacts from dust, weeds, disease, fire, recreation use, dumping and hydrological impacts will be minimised through construction procedures as outlined through the preparation and implementation of a CEMP.

Through the implementation of the mitigation hierarchy, the residual impacts of the proposal to flora and vegetation will be minimised and are not likely to be significant.

The removal of 2.74 ha of vegetation within the Forrestfield complex is less than 1% of the remaining extent within the Swan Coastal Plain and is not considered to be a significant impact.

The removal of FCT 20c TEC will reduce the extent of the TEC at the site by 27 % but this is not considered significant overall (representing <0.2 % of the known area) and 0.28 % of the known population within 20 km.

All TEC patches within the site are small and fragmented and would be unlikely to be viable in the long term given persistent threats (weeds, fire etc…) and edge effects. Given the degraded and declining condition of these patches, these patches are unlikely to be viable. This is particularly relevant for the smaller patches of the TEC (Farrell03, Farrell04 and Farrell05), given their size. As such, when considering the impacts from the proposal at the site scale the size, location and persistence of the TEC patches dictate that residual impacts are not significant.

The proposal allows for the retention of the highest quality and largest patch of FCT 20c TEC. The proposal involves the creation of a 25 m vegetated buffer around the Farrell06 patch, with the intention that in the longer term this will create an area of approximately 0.98 ha representative of FCT 20c in 'good' or better condition increasing the area of FCT 20c TEC at the site. It is considered that this presents the best option to retain a viable TEC occurrence within the site, with an ongoing management framework to ensure the long-term retention of the community.

Given the above, it is considered that the consolidation and increase in area of the FCT 20c TEC patch with long term conservation management avoids a significant residual impact and as such no offsite offsets are required. The implementation of the proposal will meet the EPA's objective to protect flora and vegetation so that biological diversity and ecological integrity are maintained.

4.3 Terrestrial Fauna

4.3.1 Environmental Protection Authority objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

4.3.2 Policy and guidance

The fauna investigations that have informed the assessment of the site have been conducted in accordance with:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016a).
- *Technical Guidance – Sampling methods for terrestrial vertebrate fauna (EPA 2016e).*
- *Technical Guidance – Terrestrial fauna surveys (EPA 2016d).*
- *Technical Guidance – Sampling of short range endemic fauna (EPA 2009).*

- *EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo.* (DSEWPaC 2012b).

4.3.3 Receiving environment

A review of historic aerial photography indicates that the northern portion of the site was largely cleared prior to 1965 (Landgate 2014) and was most likely used for grazing and cropping. In contrast, the southern portion of the site has generally remained intact and subsequently contains high quality fauna habitat. This affects the extent and quality of fauna habitats across the site.

To support the fauna assessment of the site, the following surveys have been completed:

- A level 1 fauna assessment to support the LSP *Fauna Assessment Miscellaneous Lots Farrall Road Orchard Avenue Midvale,* (Harewood 2014)
- An update to this fauna assessment which was focused on the site, *Fauna Assessment – Lot 102 Farrall Road Midvale* (Harewood 2018)
- *Short Range Endemic Invertebrate Desktop Assessment for Lot 102 Farrall Road, Midvale* (Invertebrate Solutions 2019)

4.3.3.1 Vertebrate fauna

A Level 1 fauna survey in accordance with EPA (2016d) guidelines was conducted over Lot 102 (and the wider Movida Estate) in 2014 and 2016 (Harewood 2018). This fauna assessment also included a Black Cockatoo Habitat Assessment (based upon the guidelines prepared by the Commonwealth of Australia (2012b)) and a Level 2 assessment based upon EPA guidelines (EPA 2016d) over the site. The fauna assessment report was updated in 2018 to focus on Lot 102 and is attached as **Appendix F**.

The Level 1 fauna survey identified a total of 33 native fauna species within or near the site including five species of conservation significance. Five introduced species were also confirmed as being present. Overall, fauna habitat values at the site have been severely compromised by the total or partial clearing of native vegetation. Most areas lack any natural fauna habitat and are now only utilised by generally common and widespread fauna species with non-specific requirements which allow them to persist in highly disturbed habitats (Harewood 2014).

Vegetation communities as defined by Emerge Associates (**Table 11**) were used in the Level 1 fauna survey to classify areas into broad habitat types as shown in **Figure 4**.

The Black Cockatoo assessment (**Appendix F**) identified 15 trees with a Diameter at Breast Height (DBH) $\geq$ 50 cm within the site. These included the following species:

- *Corymbia callophylla* (Marri)
- *Eucalyptus marginata* (Jarrah)
- *Eucalyptus rudis* (Flooded Gum)
- *Eucalyptus todtiana* (Coastal Blackbutt).

These trees are scattered across the site as shown in **Figure 7.** Three of the 15 trees contained one or more hollows, however these were not considered to be suitable nesting hollows (Harewood 2018). No evidence of roosting was recorded within the site.

Evidence of foraging by Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Forest red-tailed Black Cockatoo (*Calyptorhynchus banksia naso*) was observed on Marri, Banksia, Sheoak and Blackbutt fruits

A total of 3.59 ha of potential foraging habitat was identified within the BaBm, Cc, and Bima plant communities as described in **Table 11.** The fauna assessment (**Appendix F**) identified that approximately 0.2 ha of this would be considered 'quality' foraging habitat (Harewood 2018) for the Forest red-tailed black cockatoo and Baudin's black cockatoo.

The vertebrate fauna species, the likelihood of their occurrence and possible impacts are outlined below in **Table 21**.

Table 21: Fauna species of conservation significance and likely occurrence and impacts (Harewood 2018).

Species	Common name	Probability of occurrence	Likely impacts from proposal
Australotomurus morbidusi	Guildford Springtail	Would not occur	No impact
Synemon gratiosa	Graceful Sunmoth	Would not occur	No impact
Euoplos inornatus	Inornate Trapdoor Spider	Would not occur	No impact
Westralunio carteri	Carter's Freshwater Mussel	Would not occur	No impact
Geotria australis	Pouched Lamprey	Would not occur	No impact
Pseudemydura umbrina	Western Swamp Tortoise	Would not occur	No impact
Ctenotus delli	Darling Range Heath Ctenotus	Would not occur	No impact
Neelaps calonotos	Black-striped Snake	Would not occur	No impact
Leipoa ocellata	Malleefowl	Would not occur	No impact
Botaurus poiciloptilus	Australasian Bittern	Unlikely to occur	No impact anticipated
Ixobrychus flavicollis	Black Bittern	Unlikely to occur	No impact anticipated
Ixobrychus minutus	Little Bittern	Unlikely to occur	No impact anticipated
Rostratula benghalensis	Painted Snipe	Would not occur	No impact
Oxyura australis	Blue-billed Duck	Would not occur	No impact
Plegadis falcinellus	Glossy Ibis	Unlikely to occur	No impact anticipated
Pandion haliaetus	Osprey	Would not occur	No impact
Falco peregrinus	Peregrine Falcon	Possible but only rarely	Loss/modification of very small areas of natural habitat. No significant impact likely.
Cacatua pastinator pastinator	Muir's Corella	Would not occur	No impact
Calyptorhynchus latirostris	Carnaby`s Black Cockatoo	Known to occur	Loss/modification of small areas of natural habitat
Calyptorhynchus baudinii	Baudin`s Black Cockatoo	Possible	Loss/modification of small areas of natural habitat

Table 21: Fauna species of conservation significance and likely occurrence and impacts (Harewood 2018) (continued).

Species	Common name	Probability of occurrence	Likely impacts from proposal
Calyptorhynchus banksia naso	Forest Red-tailed Black Cockatoo	Known to occur	Loss/modification of small areas of natural habitat
Apus pacificus	Fork-tailed Swift	Unlikely to occur, flyover only on very rare occasions	No impact
Motacilla cinerea	Grey Wagtail	Would not occur	No impact
Dasyurus geoffroii	Chuditch	Would not occur	No impact
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale	Would not occur	No impact
Pseudocheirus occidentalis	Western Ringtail Possum	Would not occur	No impact
Isoodon fusciventer	Quenda	Possible	No Impact – area of habitat to be retained.
Macrotis lagotis	Bilby	Would not occur	No impact
Bettongia penicillata ogibyi	Woylie	Would not occur	No impact
Notamacropus irma	Western Brush Wallaby	Would not occur	No impact
Falsistrellus mackenziei	Western False Pipistrelle	Unlikely to occur	No impact anticipated
Hydromys chrysogaster	Water Rat	Would not occur	No impact

Four conservation significant species are considered to potentially utilise the site, including three black cockatoo species (*Calyptorhynchus latirostris, C. baudinii* and *C. banksia naso*) and the Peregrine Falcon (*Falco peregrinis*).

The Peregrine Falcon would not be significantly impacted by the proposal, given it occurs in a large number of habitats beyond the site and still be able to occur within the site and surrounds following implementation of the proposal.

At the regional scale, the impacts associated with the proposal are considered to be minor, given the small size of the site (8.298 ha) , the degraded condition of the majority of the site's vegetation and it's limited fauna habitat values. Furthermore, the implementation of the proposal will allow for the retention of native vegetation within the southern POS area that provides the greatest fauna habitat value.

In the local context, the site forms part of a small undeveloped area of land surrounded by urban development which provides refuge fauna habitat value for some species. However, given the degraded nature of the majority of the site, the fauna habitat value is not considered to be significant. The exception to this is the area of intact native vegetation that incorporates a wetland and Bush Forever Site 309 which is likely to provide a local refuge site for several fauna species such as small mammals, frogs and waterbirds.

4.3.3.2 Invertebrate fauna

In addition to the vertebrate fauna survey, a desktop assessment of short range endemic (SRE) invertebrate fauna was conducted by Invertebrate Solutions in 2018 (**Appendix G**). This assessment also included an impact risk assessment for the proposal.

Short range endemic invertebrates are species with restricted distributions and the isolation of invertebrates in specific habitats leads to endemism at various spatial scales (Invertebrate Solutions 2019). Some invertebrate groups are particularly susceptible to short-range endemism which is generally defined in Western Australia as having a range of less than 10,000 km^2 (100 km x 100 km) Harvey *et al*. (2002). Taxa that exhibit short range endemism are particularly vulnerable to disturbance, either natural or anthropogenic, as they are reliant upon specialised and often restricted habitats (often moist) (Framenau *et al.* 2008). Short range endemic taxa are unable to disperse to *refugia* when their habitats are threatened or destroyed, thus making them a priority for conservation efforts (Invertebrate Solutions 2019).

Short range endemic status has been assigned using the categories described in **Table 22**, based upon the available information from the Western Australian Museum database and discussion with appropriate taxonomic authorities for various invertebrate groups (Invertebrate Solutions 2019).

Table 22: Short range endemic status of species (from Invertebrate Solutions 2019).

SRE Status	Definition
Confirmed	A confirmed SRE species. A known distribution of < 10,000 km2 (after Harvey 2002). Taxonomy of the group is well known. The group is well represented in collections, or via comprehensive sampling.
Likely	Likely to be a SRE species based upon knowledge of the family/genus, where other closely related species show evidence of short range endemism. Where habitats containing the specimens show discontinuity within the landscape.
Possible	Based upon existing knowledge of the genus / family there is a possibility that the species may have a restricted range. Where habitats containing the specimens may show discontinuity within the landscape. Potential SRE species may be assigned one of the sub categories below: A. Data deficient i.e. new species, lack of distribution, taxonomic or collecting knowledge, juvenile specimens, wrong sex for identification B. Habitat indicators C. Morphology indicators D. Molecular evidence E. Research and expertise of WAM staff/taxonomic specialists
Widespread	Not a SRE species, a wide ranging distribution of > 10,000 km2

The broader desktop study area (a 20 km^2 area) contains 11 confirmed SRE species (four land snails, four mygalomorph trapdoor spiders, three groundwater amphipods, and one tree cricket), four likely SRE species (two tree crickets, one mygalomorph trapdoor spider, and one millipede), and two possible SRE species (one springtail and one midge) (**Appendix G**). The SRE species, their probability of occurrence within the site and their likely impacts are detailed below in **Table 23.**

Table 23: SRE invertebrate species and likely occurrence and impacts (Invertebrate Solutions 2018).

Species	Invertebrate group	Probability of occurrence	Likely impacts from proposal
Confirmed SRE species with potential habitat			
Bothriembryon sp. 'Darling Ranges n. sp.'	Land snail	Low	None, no records in the vicinity of the site
Bothriembryon serpentinus	Land snail	Low	None, no records in the vicinity of the site
Luinodiscus cf. sublesta	Land snail	Low	None, no records in the vicinity of the site
Succinea contenta	Land snail	Low	None, species is unlikely to persist on the Swan Coastal Plain
Paramelitidae (Stygofauna spp.)	Amphipod	Very low	None, species not recorded on Swan Coastal Plain.
Bungulla harrisonae	Trapdoor spider	Low	None
Euoplos inornatus	Trapdoor spider	Low	None
Idiosoma jarrah	Trapdoor spider	Very Low	None, restricted to the Jarrah Forest Bioregion
Idiosoma sigillatum	Trapdoor spider	Moderate	Minor, if present, likely to persist in areas that will be retained
Throscodectes xiphos	Tree cricket	Very Low	None, no records in the vicinity of the site
Likely SRE species with potential habitat			
Dinocambala ingens	Millipede	Low	None, species occurs on the Darling Scarp
Synothele michaelseni	Trapdoor spider	High	Minor, if present, likely to persist in areas that will be retained
Pachysaga strobila	Katydid	Very Low	None, no records in the vicinity of the site
Non SRE conservation significant insects with potential habitat			
Austrosaga spinifer	Tree cricket	High	Not significant, likely to be retained within POS area of the site
Hesperocolletes douglasi	Native bee	Low	Minor, if present, likely to persist in areas that will be retained
Hylaeus globuliferus	Native bee	Moderate	None, no records in the vicinity of the site
Leioproctus contrarius	Native bee	Moderate	None, generally occurs with *Lechenaultia* spp

Of these species listed in **Table 23**, two species have a 'high' probably of occurrence and three have a 'moderate' probability of occurrence. These species are either considered 'likely to persist in areas that will be retained' or unlikely to be present given the absence of local records in the area or suitable flora species.

The SRE assessment concluded that there are no confirmed SRE species that have a high likelihood of occurrence and likely to be impacted by the proposal. The SRE assessment concluded that given the size of the site and the degraded nature of the site, it is unlikely that the proposal would result in a significant impact on any SRE or conservation significant invertebrate species (Invertebrate Solutions 2019).

4.3.4 Potential impacts of the proposed development

There are a number of potential impacts on fauna associated with the proposal including:

- Direct impacts
  - Removal, fragmentation and modification of habitat through the clearing of land resulting in direct impacts to fauna species that rely on the site.
  - Mortality or displacement of individuals or populations through the clearing and disturbance of land.
- Indirect impacts
  - Removal, fragmentation and modification of potential black cockatoo habitat through the clearing of land including:
    - Clearing of 2.74 ha of vegetation providing habitat for black cockatoos, including 0.2 ha of marri woodland comprising quality black cockatoo foraging habitat (for Forest red-tailed black cockatoos and Baudin's black cockatoos).
    - Clearing of 11 potential habitat trees providing potential roosting and breeding habitat for all three black cockatoo species.
  - Introduction or promotion of weeds, introduced fauna or pests and disease.
  - Disruption of the dispersal of individuals required to colonise new areas inhibiting maintenance of genetic diversity between populations.
  - Cumulative impacts associated with other proposals.

Further information on these impacts is discussed below.

4.3.5 Assessment of impacts

As outlined in **Section 4.2.5** and **Table 13**, EPA Bulletin No 20. *Protection of natural areas through planning and development* (EPA 2013) has been considered to minimise impacts to fauna habitat including:

- Retaining the highest quality areas of fauna habitat.
- Protecting the largest naturally vegetated area within the site which provides the highest quality fauna habitat.
- Providing clear and ongoing management for the southern POS area, with the City of Swan as the future land manager.
- Excluding infrastructure from the southern POS area.

4.3.5.1 Removal, fragmentation and modification of habitat

The key conservation significant vertebrate species likely to be impacted by the proposal include the three black cockatoo species, plus the Peregrine Falcon. The impact of removal, fragmentation and modification of habitat on the three black cockatoo species is considered in **Section 4.3.5.3** while the Peregrine Falcon is not considered to be significantly impacted as it it occurs in a large number of habitats beyond the site (found all across Australia and the world in woodlands to open grasslands and coastal cliffs) and would potentially be able to still use the site following implementation of the proposal.

The implementation of the proposal will also result in the removal of native and non-native vegetation over 5.66 ha of the site (being 5.08 ha within the development footprint and 0.58 ha within the southern POS cleared to provide recreation uses) that would provide habitat for a variety of fauna species. Of this, 2.74 ha is considered to be native vegetation (in 'degraded-excellent' condition) within the development footprint and would provide native fauna habitat.

Using the 'Extent of native vegetation' (Department of Primary Industries and Regional Development, (DPIRD)) Geographic information Systems (GIS) dataset from 2018 as a surrogate for vertebrate fauna habitat, consideration can be given to the impact of the proposal at a local (within 20 km) and regional (across the Swan Coastal Plain) scale. This assumes that only native vegetation within the DPIRD dataset provides fauna habitat value and does not account for other fauna habitats that may exist in non-native vegetation, such as gardens or parks.

Table 24 demonstrates that ~67,000 ha of fauna habitat (native vegetation) remains on the Swan Coastal Plain when compared with pre-European extent. As outlined in **Table 25**, implementation of the proposal is likely to result in 0.24 % reduction in available fauna habitat locally (within 20 km of the site) and 0.0041 % at a regional scale (across the Swan Coastal Plain). This reduction in available fauna habitat is not considered to constitute a significant impact at the local or regional scale.

Table 24: The extent of fauna habitat locally and regionally.

Fauna habitat	Pre-European extent (ha) on the Swan Coastal Plain	Extent remaining on Swan Coastal Plain (ha)	% remaining on Swan Coastal Plain	Extent remaining (ha) within 20 km of the site (ha)	Extent within the site (ha)
Native vegetation extent	1,142,333.55	67,332.45	5.98 %	1109.38	5.2

Table 25: The impact of the proposal on the extent of fauna habitat locally and regionally.

Fauna habitat	Extent within the site (ha)	Extent impacted by the proposal (ha)	Area impacted as % of extent remaining on Swan Coastal Plain	Area impacted as % of extent within 20 km of the site
Native vegetation extent	5.2	2.74	0.0041 %	0.24 %

Direct impacts to fauna are likely to occur when fauna have restricted habitats or limited dispersal abilities, such as SRE species.

Of the area of clearing, 2.52 ha of banksia woodland habitat within the site will be removed which may provide habitat for the SRE species *Idiosoma sigillatum* (trapdoor spider). Within the SRE assessment this species was the only confirmed SRE species which has a moderate probability of being present within the site (Invertebrate Solutions 2019). However given the degraded nature of the vegetation at the site, it is considered that this species is only likely to persist in the areas being retained (Invertebrate Solutions 2019).

An International Union for Conservation of Nature (IUCN) red list assessment for *Idiosoma sigillatum was* conducted as part of a study of the decline of trapdoor spiders by Rix *et al.* (2017). This identified that the AOO of this species is likely to be close to or less than 2,000 km^2 (200,000 ha). Given this, it is considered that the native vegetation extent presented in **Table 24** and **Table 25**

provides a reasonable (conservative) proxy for the regional assessment of this SRE species and the implementation of the proposal would not constitute a significant impact.

An area of 0.85 ha of banksia woodland will be retained and protected within the southern POS area which will provide habitat for a number of invertebrate and vertebrate fauna species, including SRE species.

The implementation of the proposal will result the remaining native vegetation and fauna being confined to the southern POS area. Given that the habitat for SRE species is already fragmented across the site and the highest value SRE habitat within the site (Invertebrate Solutions 2019) is retained within the proposal, SRE species are not expected to be significantly impacted by the removal, modification or fragmentation of habitat.

4.3.5.2 Mortality or displacement of individuals or populations

The clearing and construction of the site will be managed to minimise mortality or displacement impacts to fauna. Vehicle movements and speed limits will be outlined in the CEMP prepared prior to subdivision or development. The CEMP will also outline the requirement for vertebrate fauna trapping and a fauna spotter during the initial clearing.

Areas of vegetation to be retained within the site, within the southern POS area will provide some local refuge areas for displaced fauna, including areas of wetland and upland vegetation.

Actions to limit the mortality or displacement of individuals or populations of fauna are outlined in **Section 4.3.6.2** and will avoid a significant residual impact on fauna within the site.

4.3.5.3 Removal, fragmentation and modification of black cockatoo habitat

The implementation of the proposal will result in the clearing 2.74 ha of potential black cockatoo foraging habitat.

The majority of this habitat (2.54 ha) is 'good to degraded' banksia woodland which would provide low quality foraging habitat for Carnaby's black cockatoo. 0.2 ha of marri woodland in 'degraded' vegetation condition is considered quality black cockatoo foraging habitat for Baudin's black cockatoo and Forest red-tailed black cockatoo (**Figure 7** and **Appendix F**).

The implementation of the proposal will result in the clearing of 11 black cockatoo habitat trees, including coastal blackbutt, marri and jarrah species. These trees would provide scattered low-quality potential roosting habitat for Baudin's black cockatoo (5 marri and 1 jarrah), Forest red-tailed black cockatoo (5 marri and 1 jarrah) and Carnaby's black cockatoo (5 marri)(DSEWPaC 2012b).

No roosting was recorded within these trees and the trees do not include suitable hollows for black cockatoo species for breeding (**Appendix F**). The habitat trees are scattered within the site and are not surrounded by quality habitat.

In accordance with EPA's *Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region* Section 16(j) advice (EPA 2019a):

- Foraging habitat within 7 km of a breeding site is important to adequately support breeding cockatoos (Saunders 1990).

- Night roosts need food and water within 6km, with overlapping foraging ranges within 12 km, to support roosting sites and maintain habitat connectivity and movement across the landscape (Shah 2006; Le Roux 2017).

There are no confirmed night roosts within the site, however breeding of Carnaby's black cockatoo and Forest red-tailed black cockatoo has been recorded within 6 km of the site at John Forrest National Park, with Carnaby's black cockatoo also known to breed in the Mundaring region (DEC 2011; Johnstone *et al.* 2011; Cherriman and Bamford 2013).

Table 26 provides a summary using potential foraging habitat for Carnaby's black cockatoo using *Carnaby's cockatoo (Calyptorhynchus latirostris) spatial data for Swan Coastal Plain and Jarrah Forest IBRA regions* (DEC 2011) and demonstrates that less than 0.1 % of local habitat will be affected through implementation of the proposal. While breeding, black cockatoos will generally forage within a 6–12 km radius of their nesting site (DSEWPaC 2012c), so a radius of 6 km has been used to calculate potential local impacts.

The use of native vegetation extent (as outlined in **Table 24** and **Table 25**) can also provide a proxy for black cockatoo habitat, given that Forest red-tailed have wider foraging preferences than Carnaby's. It is also useful to note, that both these datasets do not include non-native foraging species which can make up an extensive proportion of food sources for black cockatoos species (such as pine plantations for Carnaby's black cockatoo and Cape Lilac (*Melia azedarach*) for Forest red-tailed black cockatoo). Based upon the information in **Table 24** to **Table 26**, the residual impact to these species is not considered significant.

Table 26: The impact of the proposal on the extent of Carnaby's black cockatoo habitat locally.

Fauna habitat	Extent within the site (ha)	Extent impacted by the proposal (ha)	Area of potential black cockatoo habitat within 6 km of the site (ha) (DEC 2011)	Area impacted as % of extent within 6 km of the site
Carnaby's black cockatoo habitat	5.2	2.74	3,307	0.09 %

Any impacts to black cockatoos would be considered indirect given black cockatoo species are highly mobile and will be able to utilise areas of high-quality habitat within the local area, including large areas of habitat within Talbot Road Reserve and John Forrest National Park to the east, as well as the retained habitat within the site and other local areas of remnant vegetation.

An area of 0.85 ha of Carnaby's foraging habitat will be retained and protected within the southern POS area, which will provide habitat for black cockatoo species as well as other vertebrate and invertebrate fauna species, including SRE species. In addition, one habitat tree (jarrah) will be retained within the southern POS.

In accordance with the *EPA Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region* Section 16(j) advice (EPA 2019a), the proposal has focused on providing rehabilitation and restoration of degraded areas within close proximity to the impacted area. Given the extent of the impact and the retention and rehabilitation proposed within the southern POS area, the residual impact to black cockatoos is not considered significant.

4.3.5.4 Introduction or promotion of weeds, introduced fauna or pests and disease

For SRE fauna, the most important potential indirect impact associated with the proposal is the potential weed incursion into the retained areas of native vegetation (Invertebrate Solutions 2019). This threat already exists at the site which contains large areas of 'degraded' and 'completely degraded' native vegetation dominated by grassy weed species (**Figure 5**). Weed incursion can have a significant impact on SRE species that may rely on small microhabitats and are vulnerable to changes in habitat, given their limited dispersal capabilities. Weed impacts to areas of retained native vegetation within the southern POS area will be managed through clearing and construction procedures (CEMP) and ongoing weed control implemented by the proponent as part of the proposal (as described within the RVMP (**Appendix J**)).

Further to this, hygiene protocols to reduce the introduction and spread of disease will be incorporated into the construction and revegetation procedures. These will be documented into a CEMP for construction and an RVMP for the revegetation and rehabilitation of the southern POS.

It is unlikely that the implementation of the proposal would increase the incidence of introduced fauna or pests compared to the existing site conditions, however, the implementation of the proposal will provide for the treatment of introduced fauna or pests as required. This may involve rabbit baiting or other pest control as required and is outlined within the RVMP (**Appendix J**) prepared for the proposal.

It is considered with the preparation and implementation of the CEMP and RVMP to manage weeds, introduced fauna, pests or disease that the residual impact on fauna (including SRE fauna) is not significant.

4.3.5.5 Disruption of the dispersal of individuals to colonise new areas

Locally the site (and adjacent Movida Estate) forms part of a small undeveloped area of land within an urban context. However, given the degraded vegetation, the habitat values are limited and the site would not be considered to be a key habitat linkage.

The conservation significant fauna likely to be impacted by the proposal are all bird species, which are aerial and can move through the landscape and therefore the proposal is unlikely to disrupt the dispersal ability of these species. The site will continue to provide habitat for these species following implementation of the proposal

4.3.5.6 Consideration of cumulative impacts

As outlined in **Section 4.2.5.9**, cumulative impacts consider the environmental impact associated with other proposals that are known to, or highly likely to occur in the future and may contribute to cumulative impacts at a local or regional scale. With respect to fauna, future proposals have been considered broadly using the Perth and Peel urban land development outlook (UDLO) dataset (DPLH 2017) to represent future development using short, medium and long term outlook combined. The DPIRD 2018 'extent of native vegetation' dataset is used as a surrogate for fauna habitat.

Table 27 demonstrates that the long-term cumulative impact on the fauna habitat (based upon native vegetation extent) is less than 2 % over the Swan Coastal Plain. As such, it is considered that

the proposal would not have a significant impact on fauna or fauna habitat even when considering cumulative impacts at the regional scale.

Table 27: Cumulative impacts of vegetation clearing on native vegetation extent.

Fauna habitat	Extent within the site (ha)	Extent within UDLO (incorporating Short, Medium and Long term) (ha)	Cumulative impact (ha)	Extent remaining on Swan Coastal Plain (ha)	Cumulative impact as a % of Swan Coastal Plain extent
Native vegetation extent	5.2	827.19	832.39	67332.49	1.23 %

4.3.6 Mitigation

4.3.6.1 Avoid

As outlined in **Section 4.2.6.1, t**he site has been identified at a state level for urban development in key planning documents including the *North-East Sub-regional Planning Framework* (WAPC 2018).

The proposal would avoid impacts to the most important area of fauna habitat within the site, being the wetland and adjacent banksia woodland. This area supports the highest value fauna habitat within the site (Harewood 2018; Invertebrate Solutions 2019).

This area would provide some habitat for black cockatoo species through the retention of banksia species, such as *Banksia attenuata* and *Banksia menziesii,* which provide foraging habitat for Carnaby's and Forest red-tailed black cockatoos. In addition, *Eucalyptus marginata* was also recorded in the southern POS area and provides foraging, potential breeding and night roosting habitat for Forest red-tailed black cockatoo and potential breeding for Carnaby's black cockatoos and night roosting for Baudin's black cockatoo species, noting that no breeding or night roosting was observed.

The implementation of the proposal will also provide for the retention of four potential habitat trees. Furthermore, the proposal accommodates a buffer to these areas of habitat, which will also be rehabilitated to further minimise impacts to these key fauna habitat areas. The rehabilitation of the southern POS area incorporating the buffer is detailed further in **Appendix J**.

4.3.6.2 Minimise

Impacts to fauna will be minimised during the construction phase through a number of management-based provisions as outlined in **Table 28**. These will be documented in a CEMP and have been reviewed and supported by DBCA.

The proposed revegetation and rehabilitation of the southern POS area will also seek to minimise impacts to fauna through incorporating:

- Hygiene procedures to minimize impacts of disease (e.g. dieback) on fauna habitat.
- Pest control as required to reduce impacts from vertebrate pests on retained fauna habitat.
- Weed management and revegetation to improve quality and ecosystem resilience within retained fauna habitat.

No stormwater or and run-off will be directed into areas of retained vegetation as part of implementation of the proposal. Stormwater and drainage management measures will be outlined in an Urban Water Management Plan (UWMP) that will be prepared a condition of subdivision on advice of DBCA to the satisfaction of the City of Swan. As such fauna are not expected to be impacted by changes to hydrological conditions.

Table 28: Fauna management provisions to be included within the CEMP.

Management Targets	Management Actions	Monitoring	Reporting
No avoidable deaths of conservation fauna during vegetation clearing for construction.	• Undertake clearing in one direction to allow fauna to escape machinery. • Require that within seven days prior to clearing of native vegetation, a qualified fauna expert undertakes a vertebrate trapping and relocation program for conservation significant vertebrate fauna in accordance with a licence to take fauna for education or public purpose issued under Section 15 of the WC Act by DBCA. • Conduct vertebrate fauna trapping and relocation in accordance with DBCA's Standard Operating Procedures (SOPs) or permit conditions. • Require that fauna spotters are present during clearing of native vegetation to supervise dispersal/ relocation of any remnant fauna, and identification of any potential injured fauna. • Select fauna individuals injured during fauna habitat clearing will be rehabilitated by a wildlife carer. • Require that all personnel complete a site induction that will cover fauna values within and adjacent to the development envelope.	• Daily inspection for conservation significant fauna during vegetation clearing. • Record known injuries or deaths of conservation significant fauna species.	• Prepare a report on the trapping program outlining methods and results, including number and species of any fauna caught and where they were released. • Report should also include records of other fauna interactions (captures, strikes, injuries, fatalities etc…). • Report provided to DBCA as per fauna licence conditions.
No disturbance of active Black Cockatoo nests (if found) during and attributable to construction.	• An appropriately qualified person to inspect potential black cockatoo habitat trees no more than 7 days prior to vegetation clearing during July to December. • If black cockatoo breeding activity is identified, demarcate trees with active nest and apply a 10 m buffer around the tree with temporary fencing. • Postpone clearing of active nests until DBCA advises it is suitable to continue.	• Monthly visual observations of marked breeding tree hollows (if found) for signs of disturbance and breeding activity • Conduct walkover inspection of applied 10 m buffers around marked breeding trees for signs of disturbance, such as temporary fence moved, prematurely vacated nests, broken eggs, and dead fledglings • If breeding activity is observed, regularly inspect the tree until fledglings leave the nest	• Prepare a report which outlines: ○ Results of the potential breeding tree assessment, including the qualifications of the inspector ○ Number of trees with active nests (if any) ○ Outcome e.g. clearing postponed if found and area avoided until fledglings left the nest. ○ Any signs of disturbance to active nests ○ Report provided to DBCA as per fauna licence conditions.

4.3.6.3 Rehabilitate

Rehabilitation will improve habitat values and resilience of fauna habitat areas. The proposed rehabilitation for the southern POS area is detailed within **Section 4.2.6.3**, **Section 6.3**, **Figure 6** and the RVMP (**Appendix J**). The RVMP aims to improve the quality of the vegetation within the POS area and subsequently improve the fauna habitat, including banksia woodland habitat (including *Eucalyptus marginata*) for black cockatoo species. Rehabilitation will also incorporate fauna habitat structures (logs, woody debris) to encourage the return of native fauna.

Retained vegetation and rehabilitated areas will be permanently fenced to protect fauna habitat from domestic dogs and the public.

4.3.7 Predicted outcome

The key fauna values identified within the site include:

- Native vegetation providing potential fauna habitat for native species including: Carnaby's black cockatoo, Forest red-tailed black cockatoos, SRE species and the Peregrine Falcon.

The predicted outcomes in relation to fauna habitat includes:

- Removal of 2.74 ha of native vegetation (in 'degraded' to 'excellent' condition) and would provide native fauna habitat including:
    - 2.52 ha of banksia woodland which may provide habitat for the SRE species *Idiosoma sigillatum* (trapdoor spider)
    - 2.74 ha of potential black cockatoo habitat (banksia woodland and marri woodland)
    - 11 scattered potential habitat trees which may provide potential roosting and breeding habitat for all three black cockatoo species.
- Retention of the highest quality areas of fauna habitat within the site, including 0.85 ha of banksia woodland and 1.7 ha of wetland vegetation representative of CCW.
- Revegetation of degraded fauna habitat within the southern POS area.

The majority of the habitat that will be cleared through implementation of the proposal is 'degraded' or 'completely degraded' native vegetation and provides limited habitat values for significant species. The species that will be impacted through removal of degraded habitat are generally common and widespread species with non-specific requirements which will allow them to persist in other highly disturbed habitats through the local area (Harewood 2018). Similarly, any likelihood of impacts to SRE fauna is considered low given the small size of the sites and the retention of the majority of vegetation that is not degraded. The SRE assessment concluded that the proposal is unlikely to significantly impact on any SRE or conservation species (Invertebrate Solutions 2019).

The impacts to black cockatoo species through the loss of areas of foraging and potential breeding and roosting habitat are not considered significant, given the scale of the impact and the extensive amount of high quality foraging (and roosting) habitat within 6 km of the site (~3,037 ha based upon Department of Environment and Conservation (DEC) *Carnaby's cockatoo (Calyptorhynchus latirostris) spatial data for Swan Coastal Plain and Jarrah Forest IBRA regions* (DEC 2011)).