Figure 10-1: Fauna Habitat

Legend

- Development Area Footprint
- Black Cockatoo Breeding Trees
- Minor Road
- Track
- Fauna Habitat
- Bankia Woodlands
- Eucalypt Woodlands
- Pine Plantation Regrowth
- Scattered Trees
- Heath and Shrubland
- Parkland, Planted Vegetation and Maintained Gardens

Coordinate System: GDA 1994 MGA Zone 50
Date: 18/03/2019
Scale ± 1:19,000

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Figure 10-1: Fauna Habitat

Legend
- Development Area Footprint
- Black Cockatoo Breeding Trees
- Track
- Fauna Habitat
- Health and Shrubland
- Parkland, Planted Vegetation and Maintained Gardens
- Scattered Trees
- Wetlands and Riparian Vegetation
- Bankia Woodlands
- Cleared
- Eucalypt Woodlands

Coordinate System: GDA 1994 MGA Zone 50
Date: 18/03/2019
Scale ± 1:16,500


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Figure 10-1: Fauna Habitat

Legend
- Development Area Footprint
- Black Cockatoo Breeding Trees
- Fauna Habitat
  - Cleared
  - Eucalypt Woodlands
  - Heath and Shrubland
- Parkland, Planted Vegetation and Maintained Gardens
- Scattered Trees
- Wetlands and Riparian Vegetation

Coordinate System: GDA 1994 MGA Zone 50
Date: 18/03/2018

Scale

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Figure 10-1: Fauna Habitat

Legend
- Development Area Footprint
- Black Cockatoo Breeding Trees
- Track
- Fauna Habitat
- Eucalypt Woodlands
- Parkland, Planted Vegetation and Maintained Gardens
- Banksia Woodlands
- Scattered Trees
- Cleared

Coordinate System: GDA 1994 MGA Zone 50
Date: 18/03/2019
Scale: 1:12,000

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10.5 Potential impacts

The potential for impacts to terrestrial fauna resulting from the Proposal are summarised in Table 9-11.

Table 10-5: Potential impacts

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASDP site</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Clearing and fragmentation of habitat for conservation significant species | The ASDP site contains 26 ha of habitat which may be impacted by the construction of the facility, including:  
  • potential habitat for Carnaby's Black Cockatoo (26 ha)  
  • potential habitat for Quenda (1.7 ha)  
  • potential habitat for Brush Wallaby (17 ha). |
| Indirect impacts  | Construction activities have potential to impact on adjacent fauna and fauna habitat through fragmentation or degradation of habitat. Construction and operational activities may result in interactions with terrestrial fauna. |
| **Pipeline**      |         |
| Clearing and fragmentation of habitat for conservation significant species | The pipeline DAF contains 50.9 ha of habitat which may be impacted by the construction of the pipeline, including:  
  • potential habitat for Carnaby's Black Cockatoo (50.9 ha)  
  • potential habitat for Forest Red-tailed Black Cockatoo (42.6 ha)  
  • potential habitat for Quenda (44.8 ha)  
  • potential habitat for Great Egret (1.7 ha). |
| Indirect impacts  | Construction activities have potential to impact on adjacent fauna and fauna habitat through fragmentation or degradation of habitat. Construction and operational activities may result in interactions with terrestrial fauna. |

10.6 Assessment of impacts

As assessment has been undertaken of the direct and indirect impacts of the Proposal using the results of fauna studies and fauna habitat mapping as outlined in Section 10.4. Impacts have been described separately for the ASDP site and the pipeline DAF. The assessment of impacts within the pipeline DAF has been considered in corridor sections, identifying the key environmentally sensitive features in each.
10.6.1 ASDP site

Direct loss of habitat

The Proposal will result in the direct loss of fauna habitat through clearing in the ASDP site including:

- 26 ha of fauna habitat potentially used as a foraging resource for the Carnaby’s Black Cockatoo
- 1.7 ha of habitat potentially used by Quenda
- 17 ha of habitat potentially used by Brush Wallaby.

Fauna surveys conducted at the ASDP site did not record the presence of conservation significant fauna species. Further, the survey did not find any evidence of Black Cockatoos roosting or nesting. The potential impacts to fauna from the loss of fauna habitat within the ASDP site are therefore considered to be ‘minor’ in proportion to the current distribution and populations and the availability of extensive areas of suitable habitat locally and regionally.

The Carnaby’s Black Cockatoo foraging habitat recorded in the ASDP site is not considered a significant food resource and was rated as having low and medium foraging value (Bamford Consulting Ecologists 2018). Furthermore, no potential breeding trees or suitable hollows were identified in the ASDP site.

The ASDP site is surrounded by conservation areas and large areas of habitat, including 39.7 ha of retained Banksia woodland habitat which is likely to provide a significant foraging resource for the Carnaby’s Black Cockatoo and other bird species (Bamford Consulting Ecologists 2018). The impact from loss of potential habitat for black cockatoos within the ASDP site is therefore not considered significant.

Indirect impacts

Fragmentation

Clearing of native vegetation results in fragmentation, where initially contiguous areas of habitat are separated into a number of smaller areas. Fragmentation impacts include the creation of small isolated populations with limited gene flow between populations, leading to inbreeding depression and reduced potential to adapt to environmental change. Fragmentation also leads to the loss or severe modification of the interactions between species, including those interactions that are important for the survival of species. Important variables that must be considered in assessing the impacts of fragmentation include the distance apart of the fragments, the area of the fragments and their shape.

The ASDP site is located in an already fragmented landscape due to previous developments and recreational use of the area and the Proposal is not expected to significantly increase fragmentation effects.
Vehicle movements

Construction of the Proposal is predicted to result in increased traffic, mainly on the access road from Marmion Avenue. Vehicle movements have the potential to directly injure or kill fauna through collisions or disturb fauna through noise and pollution generation. Some loss of fauna may occur; however, this will be mitigated through use of appropriate management actions.

Construction impacts will be managed through the TCEMF to avoid or minimise indirect impacts from construction on fauna and fauna habitat.

10.6.2 Pipeline

Direct loss of habitat

The pipeline DAF contains 51 ha of fauna habitat. Of this habitat, 26.7 ha is potential foraging habitat for Carnaby's Black Cockatoo rated as ‘High’ and ‘Very High’ quality. An area of 9.7 ha was identified as potential foraging habitat for Forest Red-tailed Black Cockatoo, also rated as ‘High’ and ‘Very High’ quality.

A large proportion (49%) of the fauna habitat within the pipeline DAF is in a ‘Degraded’ or ‘Completely Degraded’ condition (25 ha). The pipeline DAF is 30 m wide; however, as previously discussed the actual construction corridor impacted will range from 12 m to 16 m depending on the constraints present at each location (refer to Section 3.4.4).

The pipeline route has been designed with specific consideration to the avoidance of private land and property, sensitive ecological areas and native vegetation (which provides habitat for fauna). The majority of the pipeline will be constructed in road reserves (approximately 22 km or 68% of the length), with the remainder in land owned by Water Corporation (4 km or 12%), DPLH (5 km or 16%) and LandCorp/Main Roads Western Australia (1.5 km or 5%).

Construction will be managed through the TCEMF to avoid and minimise impacts on fauna habitat to the extent possible. Impacts associated with clearing of native vegetation are assessed in Section 9 of this ERD. The impacts of clearing of fauna habitat are assessed below for relevant sections of the pipeline corridor. Page numbers presented against each section refer to the pages of Figure 10-1.

Romeo Road from Marmion Avenue to Wanneroo Road (p 1)

Clearing may be required in this section, if works are completed in advance of the Romeo Road upgrade works. The section contains 0.56 ha of Banksia woodland habitat and 4.54 ha of Heath and shrubland habitat, both of which may provide habitat for Black Cockatoos. The condition of the vegetation varies from ‘Very Good’ to ‘Degraded’ interspersed with large sections of cleared and ‘Completely Degraded’ land.

By using a restricted pipeline construction corridor, it is expected that the area of habitat that may require clearing can be reduced to less than 2 ha.
Whilst the preferred route from the ASDP site towards Carabooda Tank follows Marmion Avenue and Romeo Road, it is recognised this route remains at risk due to various developments in the area. An alternative route has also been identified, in consultation with LandCorp, where the pipeline deviates to the north from approximately the midpoint of Romeo Road (see Figure 3-4).

This route locates the pipeline within a future road reserve, referred to as ‘NS2’, prior to heading west along the southern side of the Alkimos City Centre commercial zone cadastral boundary. Due to the presence of various development proposals within the Alkimos City Centre zone, by several proponents including LandCorp, Metronet and MRWA, it is recognised that these developments remain subject to environmental approval assessments.

McLennan Drive from Wanneroo Road to Carabooda Tank site (p 3)

Some clearing may be required in this section, most likely between Gibbs Road and Godel Road. The section contains 0.4 ha of Banksia woodland, 3.1 ha of Eucalypt woodland, 1.0 ha of Heath and shrubland and 0.1 ha of Scattered trees habitat, all of which may provide habitat to Black Cockatoos. Most of vegetation is in a ‘Degraded’ condition with some patches in ‘Good Condition’.

By using a restricted pipeline construction corridor, it is expected that the area of habitat that may require clearing can be reduced to 1.8 ha.

McLennan Drive to Wesco Road (p 3)

At the end of McLennan Drive the Pipeline corridor runs south along the western boundary of State Forest and Bush Forever site 290. The route generally follows cleared track although some clearing of native vegetation will be required. Vegetation in this section covers 4.8 ha of Banksia woodland, 0.8 ha of Eucalypt woodland, 0.01 ha of Heath and shrubland and 0.8 ha of Scattered trees habitat, all of which may provide habitat to Black Cockatoos. Most of the vegetation at this location is in a ‘Very Good’ to ‘Excellent’ condition.

By using a restricted pipeline construction corridor, it is expected that the area of habitat that may require clearing can be reduced to 2.5 ha.

Wesco Road to Old Yanchep Road (p 4)

The pipeline in this section will be installed in the northern then southern verge of the road reserve through a small section of Bush Forever site 290 and through sites 136 and 293. Both verges are relatively clear of vegetation. Vegetation in this section covers 2.5 ha of Banksia woodland, 0.3 ha of Eucalypt woodland, 0.7 ha of Heath and shrubland, 2.7 ha of Pine plantation regrowth and 0.1 ha of Scattered trees habitat, all of which may provide habitat to black cockatoos. Vegetation in this section is in ‘Degraded’ condition with impacts expected to be avoided.

By using a restricted pipeline construction corridor, it is expected that the area of habitat that may require clearing can be reduced to 2.5 ha.
Old Yanchep Road between Wesco Road and Wattle Avenue East (p 5)

The pipeline corridor will follow Old Yanchep Road south, most likely in the western verge. Vegetation in this section covers 0.01 ha of Banksia woodland and 4.5 ha of Heath and shrubland habitat, all of which may provide habitat to Black Cockatoos. Most of the vegetation at this location is in 'Degraded' condition. By using a restricted pipeline construction corridor, it is expected that the area of habitat that may require clearing can be reduced to 1.8 ha.

Wattle Avenue East between Old Yanchep Road and Nowergup Tank site (p 5)

Between Old Yanchep Road and Orchid Road the Pipeline corridor will follow the northern verge of the access road to Barbagallo Raceway adjacent to several Bush Forever sites. Some clearing may be required. From Orchard Road, the Pipeline follows the southern verge of the raceway access road. This section is relatively clear of vegetation although some clearing may be required of vegetation in 'Degraded' condition. From the raceway, the pipeline follows unmade track through a vegetated area, part of which comprises Bush Forever site 293. Vegetation in this area is mostly in 'Good' condition. Whilst the pipeline can follow existing cleared tracks and restricted corridor construction methods, some clearing is expected.

This section contains 6.4 ha of Banksia woodland, 0.7 ha of Eucalypt woodland, 0.2 ha of Scattered trees habitat, the majority of which is in in Good and Degraded condition, which may provide habitat to Black Cockatoos.

By using a restricted pipeline construction corridor, it is expected that the area of habitat that may require clearing can be reduced to 2.9 ha.

Old Yanchep Road between Pederick Road and Flynn Drive (p 6)

This section of pipeline will run in the wide western road verge adjacent to a golf course, mainly due to constraints posed by overhead power cables. This wide verge is well vegetated (2.4 ha of fauna habitat) and some clearing will be required. The vegetation here represents 2.0 ha of Banksia woodland, 0.03 ha of Parkland, planted vegetation and maintained gardens, and 0.4 ha of Scattered trees habitat ranging from 'Completely Degraded' to 'Very Good' condition. These fauna habitat types may provide habitat to Black Cockatoos.

By using a restricted pipeline construction corridor, it is expected that the area of habitat that may require clearing can be reduced to less than 1.0 ha.

Indirect impacts

Fragmentation

The impacts of fragmentation resulting from clearing of vegetation are described above. Fragmentation of habitat has largely been avoided by closely following existing linear infrastructure and roads and utilising previously cleared areas such as tracks and road reserve.

Given the pipeline will be buried underground and revegetation will be undertaken over cleared areas (other than an area of 5m wide above the pipeline to provide ongoing access), the impacts of fragmentation are anticipated to be minor.
Construction activities for the Proposal will require the excavation of trenches. Trenches may act as a linear barrier to the movement of terrestrial fauna and may entrap individual animals, potentially resulting in injury or death. Construction impacts will be managed through installation of the pipeline in sections, minimising the extent of any trenches.

The TCEMF will outline measures to avoid or minimise indirect impacts from construction on fauna and fauna habitat.

**Vehicle movements**

Operational and construction phases of the Proposal are predicted to result in increased traffic. Vehicle movements have the potential to directly injure or kill fauna through collisions or disturb fauna through noise and pollution generation. Some loss of fauna may occur; however, this will be mitigated through use of appropriate management actions. Construction impacts will be managed through the TCEMF to avoid or minimise indirect impacts from construction on fauna and fauna habitat.

**10.6.3 Summary of impacts**

The Proposal could result in the direct loss of habitat in the DAF through clearing including:

- up to 41 ha of potential Carnaby’s Black Cockatoo foraging habitat (26 ha in ASDP site; up to 14 ha in pipeline DAF)
- the Carnaby’s Black Cockatoo foraging habitat recorded in the ASDP site is not considered a significant food resource and was rated as having low and medium foraging value (Bamford Consulting Ecologists 2018). Furthermore, no potential breeding trees or suitable hollows were identified in the ASDP site
- up to 65 Black Cockatoo potential breeding trees containing 24 potentially suitable breeding hollows in the pipeline DAF
- 1.7 ha of habitat suitable for Quenda (ASDP site)
- 17 ha suitable for Brush Wallaby (ASDP site).

The DAF is surrounded by over 8000 ha of native vegetation in State Forest which would provide habitat for Black Cockatoo, Quenda and Brush Wallaby. Given this large extent, the Proposal is unlikely to reduce the area of occupancy for these species at a local level.

Indirect impacts arising during construction and operation will be managed through the TCEMF and will include measures such as:

- clearing within authorised areas only
- relocating fauna prior to clearing, where practicable
- conducting clearing in stages to allow for the movement of any remaining fauna
- limiting the time and length excavated trenches are opened/exposed
- preventing vehicle access outside authorised areas during construction, and limiting vehicle speeds inside the construction area
- rehabilitating habitat areas.
10.6.4 **Black cockatoo**

Given the presence of potential Black Cockatoo habitat within the DAF, an assessment of impacts on Black Cockatoo’s (Carnaby’s Black Cockatoo and Forest Red-tailed Black Cockatoo) was undertaken against the significant impact criteria for endangered and vulnerable species as presented in Table 10-6 below.

**Table 10-6: Assessment against significant impact criteria**

<table>
<thead>
<tr>
<th>Significant impact criteria</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead to a long-term decrease in the size of an important population of a species</td>
<td>A total of 26.7 ha of Carnaby’s Black Cockatoo foraging habitat and 9.7 ha of Forest Red-tailed Black Cockatoo foraging habitat in High and Very High quality was identified in the DAF. No potential breeding trees or suitable hollows were identified in the ASDP site. Within the pipeline DAF, 191 potential breeding trees, containing 32 potentially suitable breeding hollows, were identified. Construction of the pipeline may require the clearing of up to 65 potential breeding trees, containing 24 potential breeding hollows. Due to the linear nature and scale of the clearing of habitat in the DAF, the proposal will not lead to a long-term decrease in the population of Black Cockatoos. When the pipeline DAF was inspected by AECOM (2017) and Ecoscape (2018) there was no visual evidence of trees being used for breeding by Black Cockatoos.</td>
</tr>
<tr>
<td>Reduce the area of occupancy of an important population</td>
<td>The DAF is surrounded by existing reserves containing over 8000 ha of potential Black Cockatoo habitat. The Proposal is not expected to impact the occupancy of Black Cockatoos due to the highly mobile nature of the species and the large extent of Black Cockatoo habitat surrounding the DAF. As such, the proposed action will not reduce the area of occupancy of the species.</td>
</tr>
<tr>
<td>Fragment an existing important population into two or more populations</td>
<td>Black Cockatoo habitat within the DAF is mostly highly fragmented, and largely intersects and aligns with areas already cleared of vegetation. Where the Proposal potentially intersects intact vegetation, it is mostly on the edges of vegetated areas and therefore is unlikely to fragment the population of the species.</td>
</tr>
<tr>
<td>Adversely affect habitat critical to the survival of a species</td>
<td>The DAF contains potential breeding habitat for Black Cockatoos. However, there are no known breeding sites in the DAF. As such, the proposed action will not adversely affect the habitat critical to survival of the species.</td>
</tr>
<tr>
<td>Significant impact criteria</td>
<td>Assessment</td>
</tr>
<tr>
<td>----------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Disrupt the breeding cycle of an important population</td>
<td>No potential breeding trees or suitable hollows were identified in the ASDP site. Within the pipeline DAF, 191 potential breeding trees, containing 32 potentially suitable breeding hollows, were identified. Construction of the pipeline is likely to only require the clearing of up to 65 potential breeding trees, containing 24 potentially suitable breeding hollows. No activity or evidence of previous activity was noted in the hollows during survey undertaken (Ecoscape 2018; AECOM 2017). Due to the narrow, linear strip of the pipeline component of the project, the availability of good quality habitat for Black Cockatoos in nearby reserves and the avoidance of high quality Black Cockatoo habitat where possible, the project is unlikely to disrupt the breeding cycle of a population.</td>
</tr>
<tr>
<td>Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</td>
<td>The potential loss of habitat because of the Proposal represents only a small portion of the potential breeding and foraging habitat available near the DAF. Black Cockatoos are a highly mobile species; therefore, the proposed action will not present a barrier to movement across the region.</td>
</tr>
<tr>
<td>Result in invasive species that are harmful to a vulnerable or endangered species becoming established in the vulnerable or endangered species' habitat</td>
<td>The proposed action is not expected to involve any actions that may cause the introduction of new diseases or invasive species that could impact Black Cockatoos.</td>
</tr>
<tr>
<td>Interfere with the recovery of the species</td>
<td>The Proposal is unlikely to interfere with the recovery of Black Cockatoo species as over 8000 ha of vegetation containing good quality Black Cockatoo habitat is retained in nearby reserves within a 4 km radius of the DAF. Additionally, the surveys undertaken for the Proposal identified a significant number of foraging and breeding habitat for the species located nearby the DAF with 634 potential breeding trees with 67 potentially supporting breeding hollows identified outside the DAF.</td>
</tr>
</tbody>
</table>

Based on the small scale of clearing of mostly ‘Medium’ and ‘Low’ quality Black Cockatoo habitat, the avoidance of potential breeding trees and night roost trees, the extensive areas of quality habitat in the area, and the avoidance and mitigation of indirect impacts, the Proposal is not expected to cause significant impacts to Black Cockatoos.

### 10.7 Mitigation

Water Corporation has applied the mitigation hierarchy to the Proposal to protect terrestrial fauna so that biological diversity and ecological integrity are maintained. Mitigation measures are summarised in Table 10-7.
### Table 10-7: Mitigation hierarchy to potential impacts on Terrestrial Fauna

<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Avoid</th>
<th>Minimise</th>
<th>Monitoring and management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASDP site</strong></td>
<td>The requirement for clearing has been avoided where possible. The extent of the DAF has considered the results of the fauna survey and has resulted in the placement of the ASDP site to avoid Banksia woodland habitat, which was identified from the Bamford Consulting Ecologists (2018) survey as being High quality foraging habitat for Black Cockatoos. Areas to be cleared will be clearly delineated to avoid any unnecessary habitat loss.</td>
<td>Loss or reduction of habitat through the introduction of weeds and pathogens will be mitigated with appropriate construction hygiene controls implemented through the terrestrial construction EMF. The Water Corporation will revegetate all temporary cleared areas following the implementation of the Proposal.</td>
<td>Implementation of a terrestrial construction EMF to guide construction activities and provide environmental performance standards, including management measures.</td>
</tr>
<tr>
<td>Loss and fragmentation of habitat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fauna mortality</td>
<td>The DAF will be clearly demarcated to avoid any accidental clearing or degradation to areas of intact vegetation adjacent to the Proposal area. A qualified fauna handler as recognized by the DBCA will undertake fauna handling (including relocation or removal) prior to and during clearing.</td>
<td>The terrestrial construction EMF will outline protocols for pre-clearing surveys and contingency actions to ensure the safety of fauna including Black Cockatoos and strategies to minimise vehicle collisions with native fauna. Additionally, during construction site personnel will be educated on the vulnerability of some species to road kill (e.g. Black Cockatoos and Quenda). Clearing will be conducted in a staged approach to allow fauna an avenue of escape.</td>
<td></td>
</tr>
<tr>
<td>Changes to feral animal populations</td>
<td>During construction waste disposal will be managed appropriately to avoid attracting feral animals to the area and staff will be educated to not to feed feral species.</td>
<td>The ASDP site is adjacent to already cleared and fragmented areas of vegetation, which will minimise these effects.</td>
<td></td>
</tr>
<tr>
<td>Disturbances to fauna including dust, erosion, light and noise</td>
<td>Dust and erosion controls implemented by the proposal during and post construction will ensure wind driven erosion processes will not impact the surrounding habitat.</td>
<td>Dust and erosion mitigation techniques will be employed during construction to reduce the effects of erosion on adjacent habitat. Management procedures during construction will</td>
<td></td>
</tr>
</tbody>
</table>
Potential impacts | Avoid | Minimise | Monitoring and management
--- | --- | --- | ---
The terrestrial construction EMF will outline access control measures to avoid uncontrolled access to adjacent habitat. | reduce noise and light impacts where possible. | |

**Pipeline**

| Loss and fragmentation of habitat | Intrusion into or bisection of adjacent areas of intact habitat has been avoided where possible. Areas where clearing of habitat must take place, have been designed to occur on the edge of vegetation along road verges, previously cleared tracks and degraded areas where possible to avoid loss of habitat. This approach also avoids further fragmentation of habitat within and surrounding the pipeline. Areas to be cleared will be clearly delineated to avoid any unnecessary habitat loss. Identified breeding trees to be retained within the DAF will be clearly marked for retention to avoid accidental clearing. | The clearing of habitat has been minimised by reducing the construction corridor width to as low as possible by using restricted and slightly-restricted corridor pipeline construction methods (12 m to 16 m width). The pipeline construction corridor will be rehabilitated to the pre-construction land use, including revegetation with native species where appropriate. A 5 m wide cleared strip will be maintained for Water Corporation access. The Proposal alignment has been developed to utilise existing linear infrastructure (i.e. road reserve) where possible. This will significantly reduce the fragmentation of habitat. Loss or reduction of habitat through the introduction of weeds and pathogens will be mitigated with appropriate construction hygiene controls implemented by the terrestrial construction EMF. | Implementation of a terrestrial construction EMF to guide construction activities and provide environmental performance standards, including management measures. |

<p>| Fauna mortality | The DAF will be clearly demarcated to avoid any accidental clearing or degradation to areas of intact vegetation adjacent to the Proposal area. A qualified fauna handler as recognised by the DBCA will undertake fauna handling (including relocation or removal) prior to and during clearing. | The terrestrial construction EMF will outline protocol for pre-clearing surveys and contingency actions to ensure the safety of fauna including Black Cockatoos and strategies to minimise vehicle collisions with native fauna. Additionally, during construction site personnel will be educated on the | |</p>
<table>
<thead>
<tr>
<th>Potential impacts</th>
<th>Avoid</th>
<th>Minimise</th>
<th>Monitoring and management</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>vulnerability of some species to road kill (e.g. Black Cockatoos and Quenda). Pre-start trench inspections will occur for fauna each morning and any fauna observed will be removed by a qualified fauna handler. Clearing will be conducted in a staged and linear approach to allow fauna an avenue of escape deeper into bushland.</td>
<td>Dust and erosion controls will be implemented during and post construction to ensure wind driven erosion processes will not impact the surrounding habitat. The EMF will outline access control measures to avoid uncontrolled access to adjacent habitat.</td>
</tr>
</tbody>
</table>

### 10.8 Predicted outcome

Based on the small scale of clearing adjacent to existing cleared areas, the avoidance of high quality and critical habitat areas, the extensive areas of intact habitat in the vicinity, and the mitigation to be implemented, the Proposal is not expected to result in a significant impact on biological diversity and ecological integrity.

Accordingly, it is expected that the EPA’s objective for terrestrial fauna will be met.
11. Landforms

11.1 EPA objectives

The EPA’s environmental objective for landforms is:

“To maintain the variety and integrity of significant physical landforms so that environmental values are protected” (EPA 2018c).

11.2 Relevant policy and guidance

The relevant EPA policy and guidelines, and the scope of each of these as relevant to the Proposal, are presented in Table 11-1.

Table 11-1: Policies and guidelines

<table>
<thead>
<tr>
<th>Policy and guidance</th>
<th>Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA Factor Guideline – Landforms (EPA 2018c)</td>
<td>The design of the Proposal has considered the local topography and the ASDP is set into the local dune system to visually shield the infrastructure from view.</td>
</tr>
</tbody>
</table>

11.3 Overview of studies

Three landform studies have been commissioned to investigate the values of the area surrounding the DAF. In addition to the studies commissioned as part of the Proposal, three historical studies undertaken in the local and regional area have also been reviewed. Table 11-2 below identifies the relevant studies and their scopes.

Table 11-2: Landform studies

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkimos Eglinton environmental review: MRS amendment 1029/33 (ATA Environmental 2003)</td>
<td>LandCorp and Eglinton Estates commissioned this study to investigate the Alkimos-Eglinton area. The study identifies the environmental constraints of the regional area for an amendment to the Metropolitan Regional Scheme (MRS). The report informed the rezoning of land to provide greater access to the coast for residential and commercial opportunities. Additionally, the relocation of the WWTP, the Groundwater Treatment Plant, and modifications to land reserved to parks and recreation were assessed.</td>
</tr>
<tr>
<td>A description of the coastal and marine zones of the Alkimos area (Semeniuk et al 2004)</td>
<td>This study investigated the coastal and marine landforms for Site A and Site B of the proposed Alkimos WWTP. The purpose of the study was to identify significant landforms occurring within the proposed locations for the WWTP.</td>
</tr>
<tr>
<td>Local environmental impact assessment and management strategy: Alkimos coastal node local structure plan 2016 (RPS 2016)</td>
<td>This work was commissioned by the City of Wanneroo (CoW) to investigate the environmental conditions and constraints across the Alkimos-Eglinton area. The report provides a management framework for the development of the Alkimos-Eglinton area as a residential and commercial node.</td>
</tr>
<tr>
<td>Groundwater Treatment Plant to Carabooda (Ecoscape 2018)</td>
<td>Ecoscape was commissioned to conduct a detailed flora and vegetation survey of a number of pipeline options for the Proposal and sites for a Groundwater Treatment Plant and pump station.</td>
</tr>
<tr>
<td>Investigation</td>
<td>Scope</td>
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<tr>
<td>Alkimos Flora and Vegetation Survey – Spring 2016</td>
<td>Strategen undertook a flora and vegetation assessment of land surrounding the current Alkimos WWTP to identify the flora and vegetation values present.</td>
</tr>
<tr>
<td>Flora, Vegetation and Fauna Assessment – Spring (AECOM 2017)</td>
<td>AECOM was commissioned to conduct a detailed assessment of dieback, flora and vegetation, Level 1 fauna, and black cockatoo to identify environmental values within a 26 km linear corridor with a 50 m buffer located in the Shire of Wanneroo, commencing off Old Yanchep Road (Yanchep) and heading south, terminating at Wanneroo Reservoir at Belgrade Road (Wanneroo).</td>
</tr>
</tbody>
</table>