



Government of **Western Australia**
Public Transport Authority

Forrestfield-Airport Link

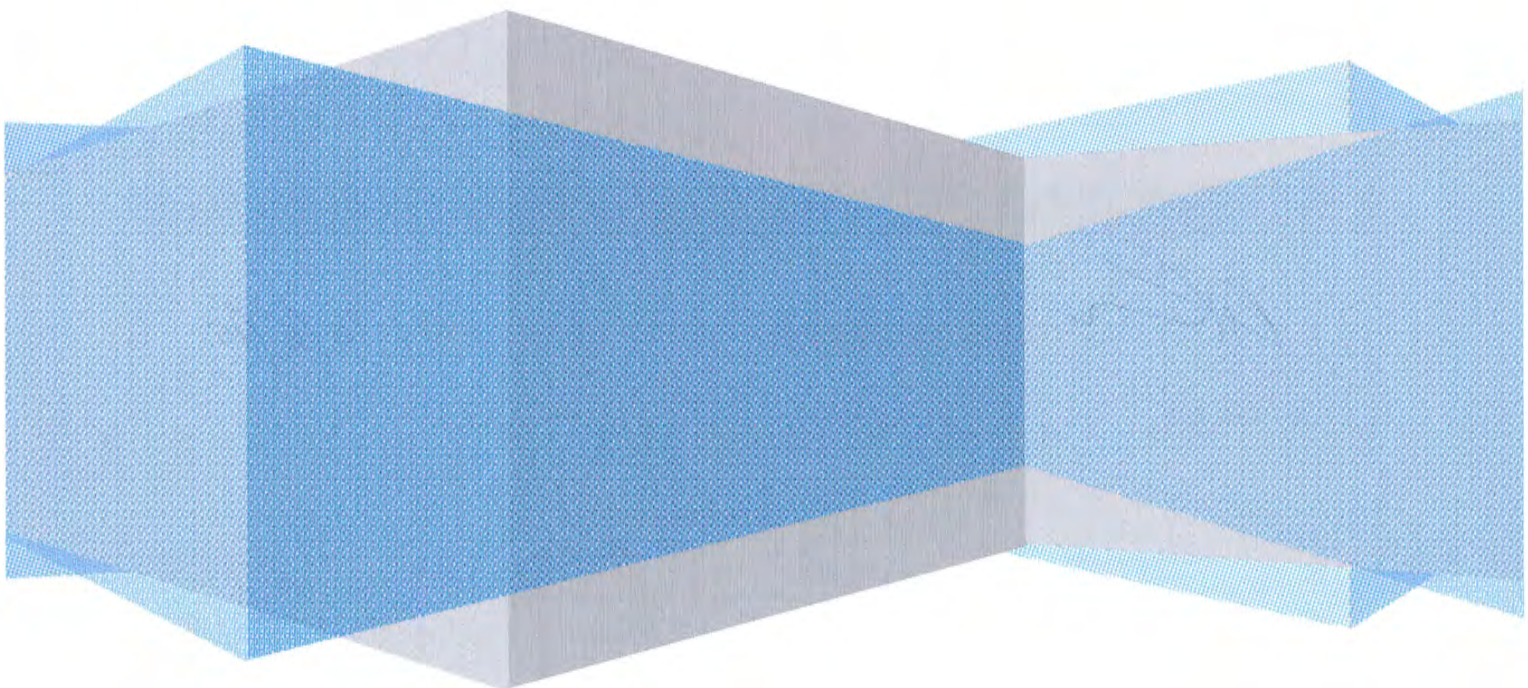
Assessment on Proponent Information

– Environmental Review

Prepared by

Strategen

FAL-PTAWA-EN-RPT-00017




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Approvals

The signatures below certify that this report has been reviewed, endorsed and approved, and that the signatories are aware of all the requirements contained herein and are committed to ensuring their provision.

Reviewed	
 Signature Paul Monaghan Environmental Manager	Date 5/6/15

Approved	
 Signature Ray Seman Project Director	Date 5/6/15.



Forrestfield-Airport Link

Assessment on Proponent Information - Environmental Review

Prepared for
Public Transport Authority
by Strategen

June 2015



STRATEGEN
environmental consultants

Forrestfield-Airport Link

Assessment on Proponent Information - Environmental Review

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June 2015

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Client: Public Transport Authority

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Appendix 6	Matters of National Environmental Significance Document

All appendices are contained on a data CD-ROM attached to the inside the hard cover of this report or on the disc containing the electronic version of this report.

1. Proponent and project description

1.1 The proponent

The Proponent for the Forrestfield-Airport Link (FAL) is the Public Transport Authority of Western Australia (PTA). The PTA is the Government agency that is responsible for the planning, delivery and management of public transport in WA.

Proponent details:

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Key contact:

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1.2 Project description

The FAL (the Project) forms an integral component of Perth's long term public transport network and is designed to meet the existing and future public transport demand. The proposed rail line will provide improved connectivity between the eastern suburbs, aviation hubs and the Perth Central Business District (CBD), as well as providing a viable alternative to traditional car travel between these destinations.

The Project comprises an approximately 9 km extension of the Perth rail network from east of Bayswater Station on the existing Perth to Midland train line to the eastern suburb of Forrestfield (Figure 1-1). The majority of the rail line will be constructed underground within two bored tunnels. The proposed alignment traverses State and Commonwealth Land and generally follows Tonkin Highway and Brearley Avenue before crossing under Perth Airport and surfacing to the east in Forrestfield.

The Project will provide three new stations which will service Perth's eastern suburbs and Perth Airport (Figure 1-2). Car parking, bus, pedestrian, taxi and cycle access facilities will be provided at Airport West and Forrestfield Stations. The Forrestfield Station also includes a Train Stabling Facility which is a minor maintenance depot where the trains are parked overnight and cleaned. A description of the stations is provided in Table 1-1.

Infrastructure to allow for safe egress from the tunnels will also be constructed along the alignment; specifically Emergency Egress Shafts, which link the tunnels to the surface and Cross Passages which provide an underground link between the two tunnels. Ancillary works will also be required to facilitate successful delivery of the Project including relocation of underground services and amendments to the road network in the vicinity of the Project area.

Table 1-1: Stations associated with the Project

Station	Location
Airport West	Located outside the western boundary of the airport within the Brearley Avenue Road reserve on State land. This station will have below ground platforms with the station access at the surface similar to the Esplanade Station in the Perth CBD.
Consolidated Airport	Located at the International Terminal on Commonwealth land. This station will be underground similar to the Perth Underground Station in the Perth CBD.
Forrestfield	Located adjacent to Dundas Road in High Wycombe on State land. This station will be at the existing ground level similar to Thornlie Station.

The component of the Project within Perth Airport is on Commonwealth Land and subject to environmental assessment and approval under the Commonwealth *Airports Act 1996* (Airports Act). The components of the Project, and the associated environmental impacts, on Commonwealth Land are not subject to assessment by the Western Australian Environmental Protection Authority (EPA) and are therefore not discussed in this report. The component of the Project on State land that is subject to assessment by the EPA is referred to as the Proposal. Details of the Proposal are provided in Section 2.

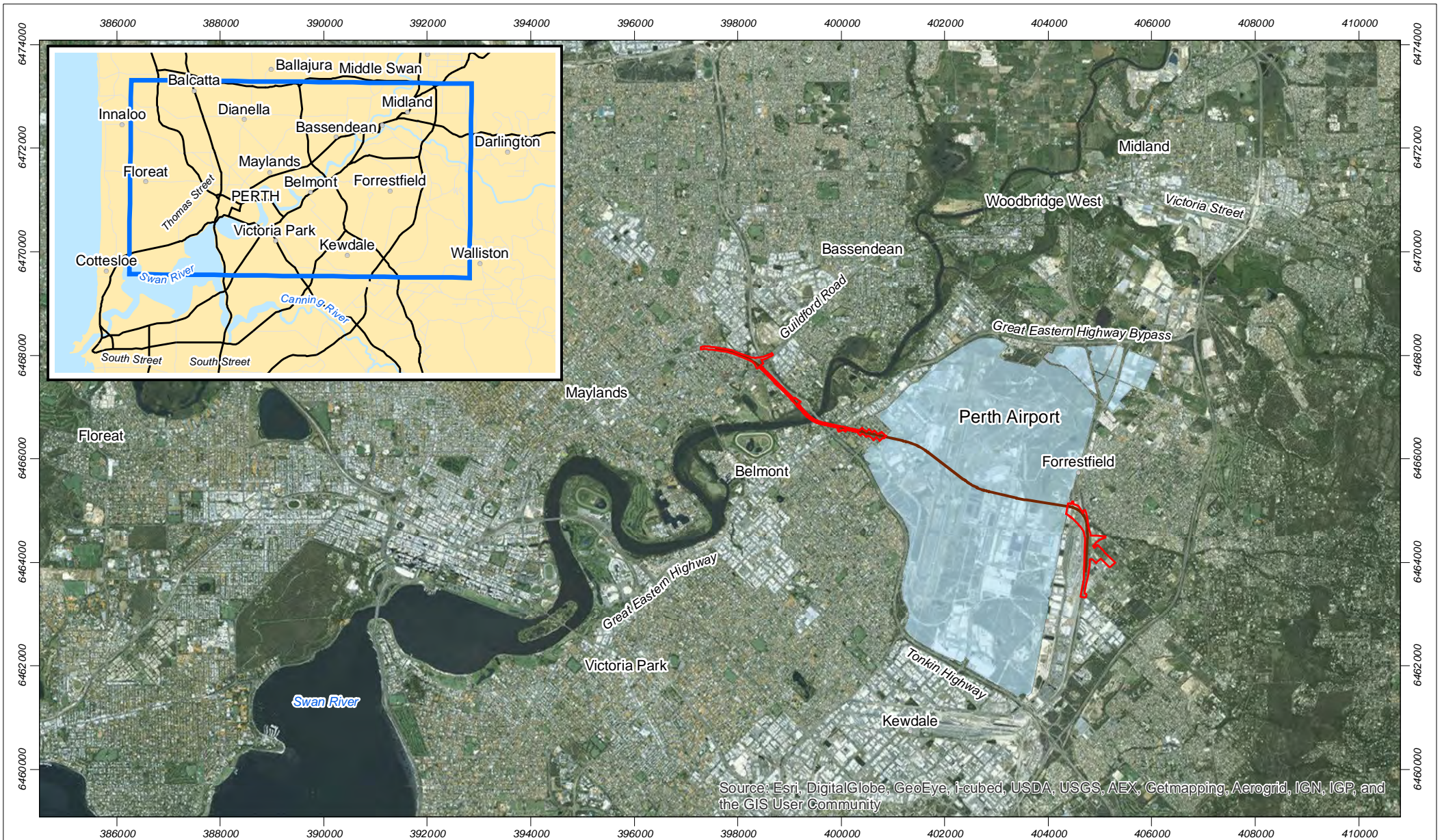


Figure 1-1: Project location

Scale 1:100,000 at A4
 0 0.5 1 1.5 2 km

Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.

Legend

-  Forresterfield-Airport Link
-  Development Envelope
-  Commonwealth zoning

Note: The area of the Project within Commonwealth zoning does not form part of the Proposal which is subject to assessment by the EPA.



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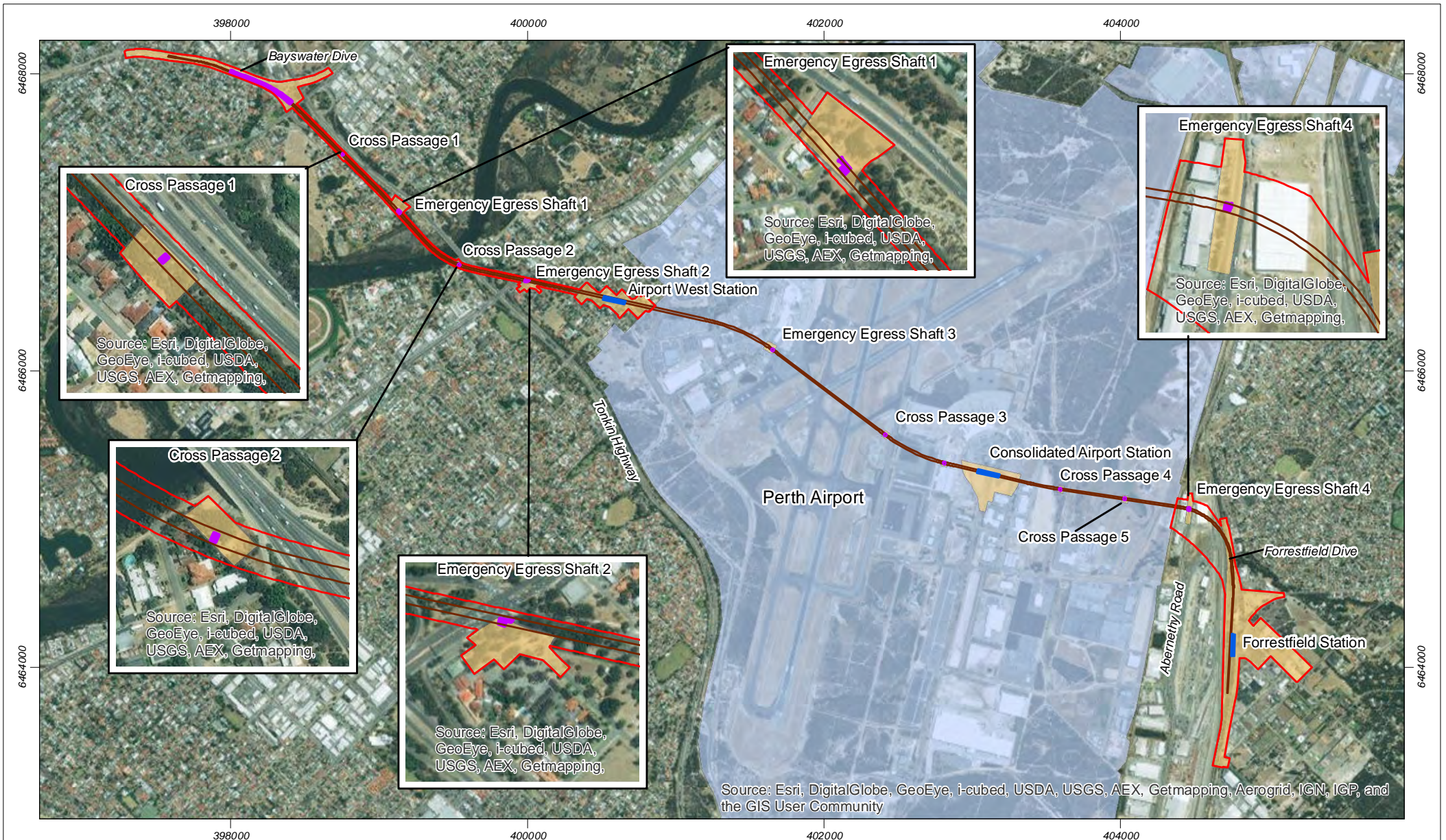


Figure 1-2: FAL Project concept design

Scale 1:35,000 at A4
 0 200 400 600 800 m
 Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.

Legend

- Forrestfield-Airport Link
- Development Envelope
- Commonwealth zoning
- Surface disturbance
- Structures
- Stations

Note: The area of the Project within Commonwealth zoning does not form part of the Proposal which is subject to assessment by the EPA.

2. The Proposal

2.1 Key proposal characteristics

The key characteristics of the Proposal have been described in accordance with *Environmental Assessment Guideline for Defining the Key Characteristics of a Proposal* (EAG1) (EPA 2012), which identifies how projects should be described under Part IV of the *Environmental Protection Act 1986* (EP Act).

As the majority of the Proposal is associated with tunnelling, the surface disturbance of the Proposal is 46.3 ha within a Development Envelope of 65 ha. Of the 9 km of rail for the Project, approximately 5 km occurs within the Development Envelope of the Proposal. The key characteristics are provided in Table 2-1.

Table 2-1: Key proposal characteristics

Summary of the Proposal

Proposal title	Forrestfield-Airport Link
Proponents name	Public Transport Authority of Western Australia
Short description	The Proposal involves an extension of the Perth rail network from the Bayswater Station/Midland line through to Forrestfield and provision of stations and associated rail infrastructure. The proposed infrastructure will comprise twin bored tunnels, structures and facilities including stations, a car park, a train stabling facility, cross passages, emergency egress shafts, signalling and telecommunication equipment. The Proposal also requires relocation of underground services and alterations to the road network.

Physical elements

Element	Location	Proposed extent
General Alignment	Figure 2-1	At surface: Clearing of no more than 13.23 ha of native vegetation in good or better condition within a Development Envelope of 65 ha. Below surface: Approximately 5 km length of twin bored tunnels, spaced approximately 7 m apart.
Stations	Figure 2-1	The Proposal includes two stations: Airport West (underground) and Forrestfield Station (at grade).
Associated infrastructure	Figure 2-1	The Proposal will include Dive Structures, Emergency Egress Shafts, Cross Passages, realignment of underground services, a Car park, a Train Stabling Facility and realignment of Dundas Road.

Operational elements

Element	Location	Proposed extent
Excavating	Figure 2-1	Excavation of Dive Structures, Airport West Station, Emergency Egress Shafts, Cross Passages and excavation from within the tunnels.
Dewatering	Figure 2-1	Targeted dewatering at Dive Structures, Airport West Station and Emergency Egress Shafts with the majority of abstracted groundwater to be re-injected into the aquifer.

The location of the Development Envelope (65 ha) which is subject to assessment by the EPA is shown on Figure 2-1. The Development Envelope specifies the areas in which surface disturbance will take place as well as the alignment of the bored tunnels. The total area of surface disturbance is approximately 46.3 ha, which will require clearing of 13.23 ha of native vegetation in good or better condition. The areas of surface disturbance are associated with the stations, the Emergency Egress Shafts, Cross Passages, Dive Structures, Train Stabling Facility, a car park and where the FAL connects to the existing Perth to Midland train line in Bayswater. Between these locations, the construction work will be fully underground associated with constructing the tunnels. Access to the construction areas will be via the existing road network or previously disturbed areas and tracks.

The Proposal is comparable to the city section of the Perth to Mandurah railway in that it comprises twin bored tunnels of a similar diameter which will be constructed at a similar depth to those in the Perth CBD.

The Proposal includes the realignment of underground services and realignment of Dundas Road, which may occur ahead of the remainder of the development.

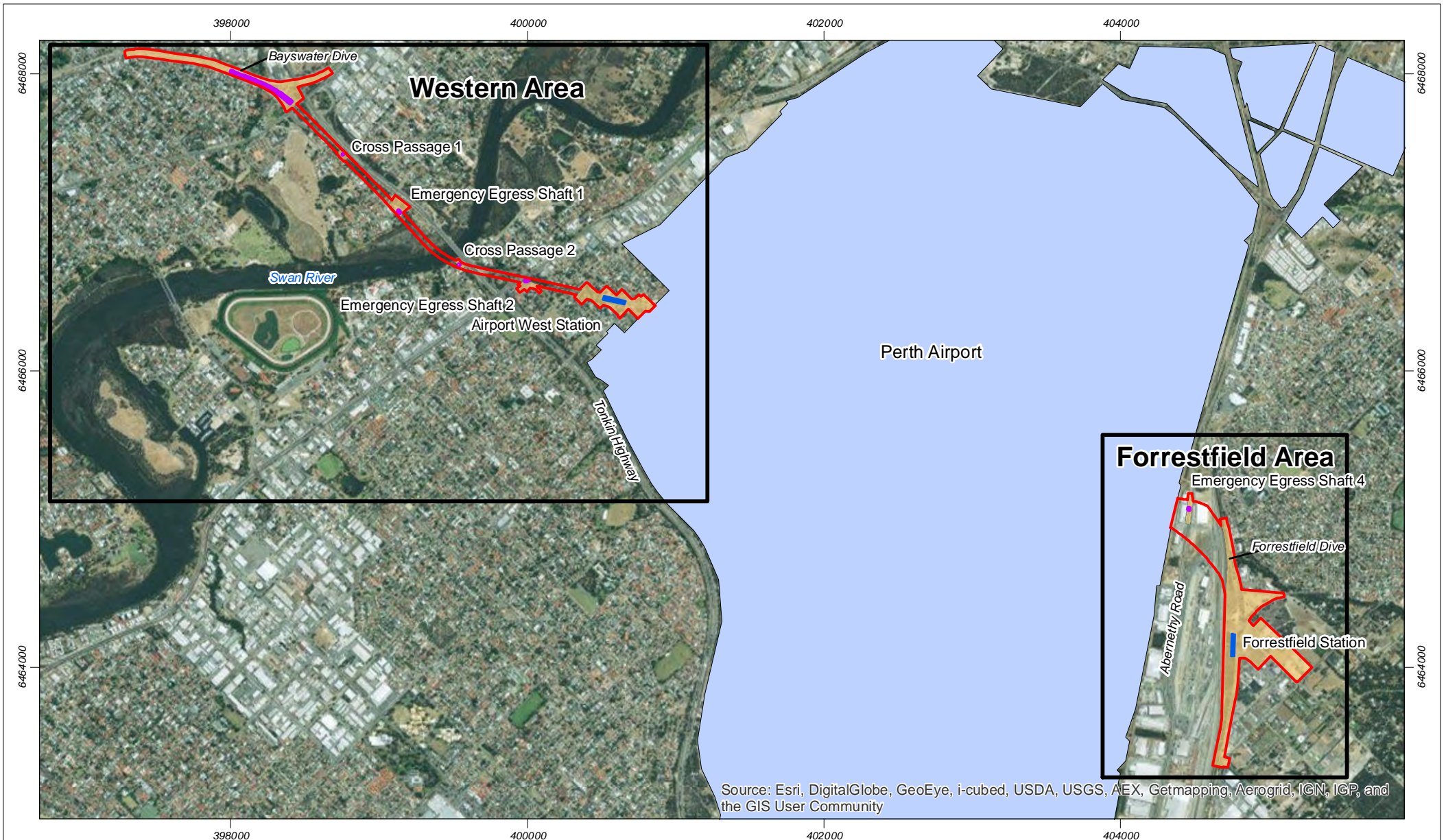


Figure 2-1: FAL development envelope and indicative design

Scale 1:35,000 at A4
 0 200 400 600 800 m
 Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 4/06/2015
 Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.

- Legend**
- Development Envelope
 - Structures
 - Commonwealth zoning
 - Stations
 - Surface disturbance

Note: The area of the Project within Commonwealth zoning does not form part of the Proposal which is subject to assessment by the EPA.



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2.2 Environmental assessment approach

The Proposal is being assessed under the WA EP Act and the Australian Government *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Proposal was referred to the EPA under s 38 of the EP Act on 14 November 2014. The EPA determined an Assessment on Proponent Information (API) (Category A) level of assessment for the Proposal on 8 April 2015.

The Proposal was referred to the Australian Government Department of the Environment (DotE) under the EPBC Act on 2 December 2014. The DotE determined that the Proposal has the potential to affect Matters of National Environmental Significance (MNES) and is 'a controlled action' under s 75 of the EPBC Act on 30 January 2015, with the controlling provisions being listed threatened species and communities (s 18 and s 18A of the EPBC Act).

As of 1 January 2015 the API (Category A) is an accredited level of assessment under the Bilateral Agreement between the Commonwealth of Australia and Western Australia (under s 45 of the EPBC Act relating to Environment Impact Assessment) on. The PTA applied to DotE for the EPA assessment of this Proposal to be authorised by DotE under the bilateral agreement, which was accepted on 15 April 2015.

The EPA prepared a Scoping Guideline identifying the following preliminary key environmental factors required to be assessed in the API document:

1. Hydrological processes.
2. Flora and vegetation.
3. Inland waters environmental quality.
4. Offsets.

The final Scoping Guideline was provided to the PTA on 28 April 2015 (Appendix 1).

The Scoping Guideline identifies that DotE must consider environmental impacts on the Commonwealth land component of the Project separately through the Major Development Plan process under the Airports Act. The Scoping Guideline also identified that the API (Category A) process must include a MNES document which is advertised for public comment for 14 calendar days.

The assessment of the Proposal contained within this report includes two areas; the Western Area and the Forrestfield Area (i.e. excluding Commonwealth land), as presented on Figure 2-1.

2.3 Purpose of this document

This document has been prepared in accordance with the EPA *Environmental Assessment Guideline 14: Preparation of an API – Category A Environmental Review Document* (EAG14) (EPA 2015b) to fulfil the requirements of an API document. This document has been structured to include the requirements identified in Section 5 of EAG14, as follows:

- the proponent and key characteristics (Section 1)
- a description of the proposal (Section 2)
- stakeholder consultation (Section 3)
- environmental studies and survey effort (Section 4)
- Assessment of Preliminary Key Environmental Factors (Section 5)
- Assessment of Matters of National Environmental Significance (Section 6)
- Other Environmental Factors (Section 7)
- Principles of the Environmental Protection Act (Section 8)
- Conclusions (Section 9).

The assessment of the potential significant impacts is contained in Table 5-6, which includes the environmental objective for the key factors in accordance with *Environmental Assessment Guideline 8: Environment Principles, Factors and Objectives* (EAG8) (EPA 2015a).

As this assessment has been authorised by DotE it also includes an assessment of MNES. In accordance with the Scoping Guideline, a MNES Document was advertised for public comment for 14 calendar days (starting 12 May 2015). This document includes the MNES Document in full in Appendix 6. This document also includes responses to comments received during the public comment period in Section 6.4.

2.4 Proposal tenure

Given the nature of the Proposal, a various types of land tenure are present within the Development Envelope. Tenure includes State (Crown) land, land managed by local government and privately-owned land holdings. Any State or local government land will be transferred to PTA with assistance from the Department of Lands. Private land will be acquired via negotiation with affected land owners. Affected landowners will be entitled to compensation from the PTA in accordance with the *Land Administration Act 1997*. Where the tunnels are proposed, there is no requirement for the PTA to own the land. However, in this instance the PTA will be required to take an interest in subsurface land with assistance from the Department of Lands. The PTA has a Land Tenure team which is responsible for land acquisition.

The land reservation required for the Proposal needs to be incorporated into the Metropolitan Region Scheme (MRS). A minor MRS Amendment will be lodged with the Western Australia Planning Commission for the Airport West and Forrestfield station footprints, the Emergency Egress Shaft on Abernethy Rd and portion of the Proposal within the Western Area. The amendment will be progressed once land tenure has been secured..

2.5 Alternative options

A detailed assessment of the route determined the most appropriate station locations, the catchments that will be served, the most efficient way to connect those catchments to the Perth CBD, and the capacity for future extension. Route planning and importantly the construction methodology for the FAL was also guided by the key environmental and heritage values identified by the PTA, including vegetation and fauna habitat, amenity (noise and vibration), surface water and wetlands.

During the route alignment appraisal process, attention focused on three options to find the best solution to accommodate existing road layouts and future upgrades, to minimise impact on landowners and traffic as well as minimise environmental and heritage impacts. The eastern portion of these alignments through and beyond Perth Airport was the same. A summary of these options is provided below in Table 2-2 and Figure 2-2.

Table 2-2: Route alignment options

Option	Description
Elevated Option (Option 1)	A combination of elevated and at grade rail running to the north of Tonkin Highway entering a subterranean section on Brearley Avenue and then into Commonwealth land. A new bridge would be required to cross the Swan River.
Partially Subterranean Option (Option 2)	A combination of at grade and subterranean rail running to the south of Tonkin Highway, with a crossing under Tonkin Highway and then into Commonwealth land. The subterranean sections would be excavated from the surface. A new bridge would be required to cross the Swan River.
Entirely Subterranean Option (Option 3)	An entirely subterranean option crossing under the Swan River and Brearley Avenue and then into Commonwealth land. The subterranean sections would be excavated below ground using tunnel boring machines.

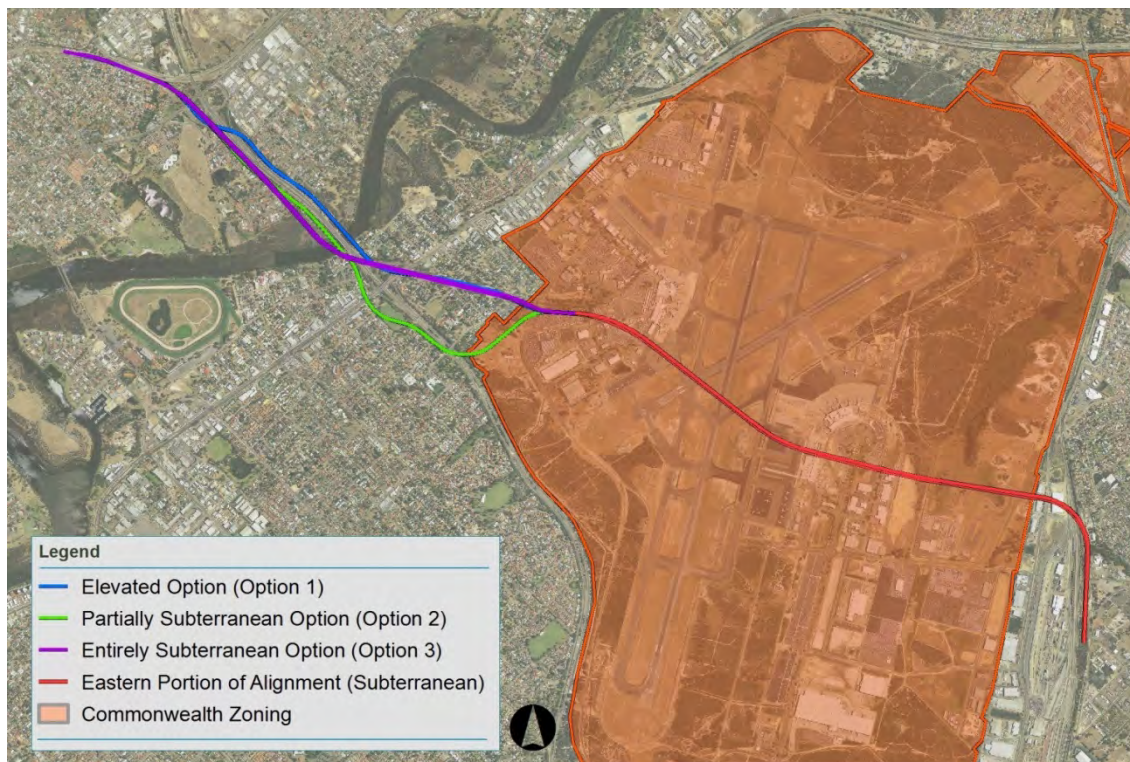


Figure 2-2: Forrestfield-Airport Link Alignment Options

An evaluation of these options was undertaken which included an assessment of the social, environmental and economic impact of each option within the Western Area. The assessment was based on the data collected during the planning phase of the Project. The results of this assessment are summarised in Table 2-3 (excluding impacts associated with Commonwealth Land).

Table 2-3: Route alignment impacts

Potential Impacts	Alignment Options		
	Elevated option (Option 1)	Partially Subterranean Option (Option 2)	Entirely Subterranean Option (Option 3)
Black Cockatoo habitat	<ul style="list-style-type: none"> Clearing 20 potential habitat trees Clearing 4.58 ha potential foraging habitat 	<ul style="list-style-type: none"> Clearing 53 potential habitat trees Clearing 6.59 ha potential foraging habitat 	<ul style="list-style-type: none"> Clearing 15 potential habitat trees Clearing 3.75 ha potential foraging habitat
Water rat habitat	<ul style="list-style-type: none"> Impacts to 0.06 ha potential water rat habitat 	<ul style="list-style-type: none"> Impacts to 0.05 ha potential water rat habitat 	<ul style="list-style-type: none"> No impacts to potential water rat habitat
Subtropical and Temperate Coastal Saltmarsh TEC	<ul style="list-style-type: none"> Clearing required within TEC 	<ul style="list-style-type: none"> Clearing required within TEC 	<ul style="list-style-type: none"> No clearing required within TEC
Noise	<ul style="list-style-type: none"> Impacts to 5 sensitive receptors (exceedance to noise target criteria) 	<ul style="list-style-type: none"> Impacts to 13 sensitive receptors (exceedance of noise target criteria) Impacts to 3 sensitive receptors (exceedance of noise limit criteria) 	<ul style="list-style-type: none"> Impacts to one sensitive receptor (exceedance of noise target criteria)

Potential Impacts	Alignment Options		
	Elevated option (Option 1)	Partially Subterranean Option (Option 2)	Entirely Subterranean Option (Option 3)
Vibration	<ul style="list-style-type: none"> No vibration impacts 	<ul style="list-style-type: none"> Potential ground borne regenerated noise exceedances at 12 receptors 	<ul style="list-style-type: none"> No vibration impacts
Surface water	<ul style="list-style-type: none"> Construction within the Swan River and clearing of riparian vegetation 	<ul style="list-style-type: none"> Construction within the Swan River and clearing of riparian vegetation 	<ul style="list-style-type: none"> No physical impacts to the Swan River (e.g. disturbance of bed or banks)
Acid Sulfate Soils and dewatering	<ul style="list-style-type: none"> Limited excavation and dewatering required 	<ul style="list-style-type: none"> High level of dewatering required which may expose potential Acid Sulfate Soils Large amounts of excavated material which may require treatment 	<ul style="list-style-type: none"> Some dewatering required which might expose potential Acid Sulfate Soils Large amounts of excavated material which may require treatment
Property values and disruption to road users	<ul style="list-style-type: none"> Significant disruption to road users over an extended period The proximity of the proposed infrastructure is likely to reduce adjacent property value 	<ul style="list-style-type: none"> Significant disruption to road users over an extended period The proximity of the proposed infrastructure is likely to reduce adjacent property value 	<ul style="list-style-type: none"> Few impacts to surrounding properties Minimal disruption to road users due to the bored tunnel construction methodology

The final alignment and construction methodology of tunnelling throughout (Option 3) was chosen in part to minimise potential environmental, social and economic impacts. The Development Envelope for this option was also modified to avoid significant environmental and heritage values within the Forrestfield Area including:

- avoidance of Poison Gully Creek bushland, which contains threatened flora (12 *Conospermum undulatum* plants), an Endangered Threatened Ecological Community, Black Cockatoo habitat and is a significant site to Aboriginal people and a Bush Forever site.
- avoidance of 2.95 ha of an Endangered Threatened Ecological Community located adjacent to the station.

2.6 Assessment timeframes

A schedule for the EPA assessment of the Proposal is shown in Table 2-4. This timeline is consistent with the EPA's *Environmental Assessment Guideline 6: Timelines for environmental impact assessment of proposals* (EPA 2013).

Table 2-4: Assessment schedule

ID	Task Name	Start
1	Level of Assessment set as API A	13 April 2015
2	API Scoping Guideline issued	28 April 2015
4	Advertising of MNES document	12–25 May 2015
6	Proponent submits final environmental review	29 May 2015
7	Office of the Environmental Protection Authority (OEPA) reviews API document	18 June 2015

2.7 Project delivery

The majority of the construction works will be procured using a Design and Construct contract and delivered by a lead contractor. The PTA will prepare the reference design for the project prior to the main construction contract being awarded. The lead contractor will be responsible for the detailed design and construction of the infrastructure. The detailed design of the infrastructure will inform the specific construction environmental management requirements of the Proposal. The PTA, being the proponent, is responsible for ensuring that the environmental obligations are met by the lead contractor and any subcontractors throughout delivery of the Proposal.

The PTA will deliver some of the works as early works packages ahead of the main construction contract being awarded. This will be associated with the ancillary works and primarily relocation of underground services.

The estimated timeframes to deliver the project are provided below:

- Q3 2015 – early works commence
- Q2 2016 – award of main construction contract
- Q4 2016 – commence construction works
- Q3 2017 – commence tunnel boring
- Q2 2019 – complete tunnel boring
- Q4 2019 – complete construction works and commence commissioning
- Q3 2020 – project complete.

2.7.1 Construction method

Construction of the infrastructure involves two methods; these are tunnel boring, and cut and cover (or cut and open). The majority of the alignment will be constructed as twin bored tunnels using the tunnel boring method. The below ground stations and the emergency egress shafts will be constructed using the cut and cover method. More detail on these methods is provided in Table 2-5.

Table 2-5: Construction methods

Method	Description
Tunnel boring	<p>Tunnel boring will be undertaken using two Tunnel Boring Machines (TBMs) designed for the ground conditions present. TBMs are commonly used to construct road and railway tunnels where access to the surface is not possible such as in dense urban areas, below infrastructure and waterways and through hills and mountains. Importantly, dewatering or alterations to the groundwater regime are not required to facilitate construction of bored tunnels.</p> <p>A TBM comprises a heavy steel cylinder with a rotating cutting head at one end. The cylinder, or shield, prevents the collapse of the soils and protects the machine operators. Behind the cutting head and within the cylinder, reinforced concrete ring segments are installed. As the machine moves forward the pre-cast concrete ring segments are moved into position mechanically from the back of the cylinder and secured, thus forming the tunnel. The tunnel is then used to convey excavated soil back to the start of the tunnel. The process is continuous except for times when the machine is halted for maintenance to take place.</p> <p>For this Proposal the machines will excavate two tunnels with a diameter of 6.7 m which in most areas will be approximately 12 metres or more below the ground surface. The lining of the tunnels will be watertight, reinforced concrete and capable of supporting the ground above plus any loading that is applied to the ground surface such as aircraft landing, taxiing or taking off and building development with certain controls in place.</p> <p>The TBMs will start their journey from a below ground concrete box structure within the Forrestfield Station Precinct and end in another concrete box in Bayswater where the FAL connects to the existing Perth to Midland train line. As they traverse the alignment, the TBMs will break into and out of Airport West Station which will be designed specifically for this purpose. Tunnelling works are anticipated to be completed by tunnel crews working day and night. All soil excavated by the TBMs will be transported within the tunnels to the Forrestfield Station precinct.</p>
Cut and over/open	<p>Airport West Station and the Emergency Egress shafts will be constructed using the Cut and Cover construction method. This will be undertaken by building diaphragm walls (D-walls), which are deep narrow trenches cut into the ground, retained open by injecting a bentonite slurry, which is then displaced as the trench is filled with concrete to form the side walls of the underground structure.</p> <p>After the walls are constructed, they will either be braced (Cut and Open) or a roof slab will be built from precast concrete planks laid between the walls (Cut and Cover). In order to form the base of the underground structure, soil is excavated down to the invert level where the base slab is then constructed. Temporary dewatering is required to facilitate excavation and construction of the base slab.</p>

Cross passages, which are underground connections between the two tunnels, will be constructed by excavating a passage between the two tunnels after they are constructed. To safely construct the cross passages the ground must be stabilised prior to the excavation between the two tunnels commencing. Ground stabilisation involves localised filling of the soil pores with cement grout using specialised drilling equipment. Only the soil which surrounds the tunnels is grouted thus creating a stabilised block of soil at the depth of the tunnels. This can be completed either from ground surface or from within the tunnels. The majority of the Cross Passages will be stabilised from ground surface.

Construction of the Proposal will generate spoil from excavations and the tunnelling process. The estimated total quantity of spoil material excavated throughout the length of the Proposal is approximately 330 000 m³ (in situ). A preliminary study undertaken by the PTA into productive use of the treated spoil material identified potential infrastructure projects which will need to source large quantities of fill material. Ongoing discussions are being held with possible users of the treated spoil material, including other government agencies and Perth Airport.

3. Stakeholder consultation

PTA has undertaken consultation with relevant stakeholders from the early stages of the planning process. Comments and advice received from government agencies and other relevant stakeholders were incorporated into the reference design of the Proposal. A summary of stakeholder consultation undertaken to date is summarised below in Table 3-1.

Table 3-1: Stakeholder consultation table

Stakeholder	Date	Topic/issue raised	Proponent response/outcome
State Government agencies			
Department of Aboriginal Affairs (DAA)	15 July 2013	Project introduction	PTA advised by DAA of the significant Aboriginal heritage sites in the vicinity of the Proposal and the importance of the consultation process
	18 Feb 2014	Geotechnical and environmental site investigations	Discussion regarding the scope of the site investigations and associated approval requirements under the <i>Aboriginal Heritage Act 1972</i> . DAA advised that approval was not required for the site investigations.
	28 August 2014	Swan River Heritage Impacts	PTA undertook an on-site Aboriginal heritage consultation survey at Claughton Reserve on the banks of the Swan River with 22 Aboriginal spokespersons. All spokespersons confirmed the presence of the Swan River Aboriginal site. All of the Aboriginal spokespersons considered that tunnelling under the river would or could affect the registered Swan River Aboriginal site. Some spokespersons gave their conditional support to the Proposal subject to a Section 18 Notice whilst others were opposed.
	15 September 2014	Poison Gully Creek Heritage Impacts	PTA undertook an on-site Aboriginal heritage consultation survey at Poison Gully Creek with 20 Aboriginal spokespersons. All spokespersons confirmed the presence of the Poison Gully Creek Aboriginal site. All of the Aboriginal spokespersons considered that the Proposal would or could affect the registered Poison Gully Creek site. Some spokespersons gave their conditional support to the Proposal subject to a Section 18 Notice whilst others were opposed.
	1 October 2014	Project approval requirements	Discussion regarding approval requirements for the project. PTA were advised that DAA will review heritage consultation survey reports prior to making a decision on approval requirements for the project.
	13 January 2015	Project approval requirements	DAA confirmed that impacts to registered Aboriginal heritage sites could be managed under the <i>Aboriginal Heritage Act 1972</i> . Section 18 Notices were subsequently lodged.
Department of Environment Regulation (DER) Environmental Noise Branch	30 August 2013	Project introduction	DER considered the fully underground (bored tunnel) option to be preferable. Discussion of assessment criteria and methodology for the noise and vibration feasibility assessment.
	20 September 2013	Assessment criteria and methodology	Assessment criteria and methodology for the noise and vibration feasibility assessment agreed with DER
	13 May 2014	Project update	PTA advised DER of the likely subterranean (bored tunnel) option
	20 January 2015	Project noise and vibration assessment criteria	Discussion of the proposed detailed noise and vibration assessment and the assessment criteria to be adopted for the project
	12 March 2015	Project noise and vibration assessment criteria	The noise and vibration assessment criteria for the project were agreed with the DER
DER Native Vegetation Conservation Branch	28 May 2014	Project introduction and approval requirements	Discussion with DER on information requirements should a clearing permit be required. DER satisfied with the flora and vegetation investigations undertaken to date. DER advised that appropriate management measures will be required to protect the native vegetation which has been retained adjacent to the Development Envelope.

Stakeholder	Date	Topic/issue raised	Proponent response/outcome
DER Contaminated Sites Branch	17 October 2013	Project introduction	PTA introduced the route options and advised that the first stage of contamination/ASS investigation will be a desk based assessment undertaken in accordance with DER guidelines and subject to a voluntary audit by a DER accredited auditor
	22 October 2014	Project update	PTA advised a subterranean (bored tunnel) option has been selected which would avoid some areas of potential contamination. PTA outlined general approach to field investigations which is subject to a voluntary audit by a DER accredited auditor. DER endorsed the proposed approach.
	12 March 2015	Project approval requirements	PTA provided DER with the proposed approach to contaminated sites and ASS management during construction of the FAL. This involved all work associated with contaminated sites being subject to a voluntary audit by a DER accredited auditor. DER provided in principle support for the proposed approach.
	20 May 2015	Project approval requirements	The proposed approach to contaminated sites and ASS management during construction of the FAL was agreed with the DER
Department of Health (DoH)	23 October 2013	Project introduction	PTA introduced the route options and advised that the first stage of contamination/ASS investigation will be a desk based assessment undertaken in accordance with DER guidelines and subject to a voluntary audit by a DER accredited auditor
Swan River Trust (SRT)	2 September 2013	Project introduction and approval requirements	Discussion regarding SRT approval requirements for the FAL. SRT advised a subterranean (bored tunnel) option was preferable and that it would be unlikely that the project would require approval by the SRT if construction in the SRT Development Control Area was fully underground.
	25 February 2014	Geotechnical and environmental site investigations	Discussion regarding SRT approval requirements for the geotechnical and environmental site investigations. PTA were advised that approval from SRT was required for all works within the SRT Development Control Area
	23 September 2014	Project approval requirements	Discussion regarding SRT approval requirements for the FAL. No definitive advice from SRT regarding approval requirements. PTA advised that the Proposal would be referred to the EPA and that SRT would be consulted as part of the State environmental approval process.
Department of Water (DoW)	12 September 2013	Project introduction and approval requirements	PTA advised that dewatering is required to facilitate construction of the Proposal and that hydrogeological investigations were proposed to understand the potential impacts to groundwater and surface water. The DoW advised that dewatering licences and accompanying management plans are required prior to the commencement of dewatering activities and of the requirement for a permit if any works are to disturb the bed or bank of a water course. DoW also provided advice on the Swan River Flood Study being undertaken by the PTA.
	15 November 2013	Dewatering Assessment	DoW confirmed their support of the scope for an assessment of the likely construction groundwater management and dewatering requirements of the Proposal. Advice was also provided on supporting scope items including contamination/ASS investigations, hydrogeological reports/pumps tests, wetland impacts and dewatering disposal options.
	4 June 2015	Dewatering Assessment	PTA met with DoW and the OEPA to discuss the revised 2015 Golder groundwater report. DoW had previously provided advice on the preliminary groundwater report that was included with the Referral. At the meeting PTA advised DoW on how their comments on the preliminary report had been addressed in the 2015 report. PTA advised that where comments were not addressed it was because they would be addressed through detailed design work conducted by the successful contractor. DoW are generally supportive of findings of 2015 report, the proposed approach to regulation/mitigation/management and that the EPA Objective for Hydrological Processes can be met

Stakeholder	Date	Topic/issue raised	Proponent response/outcome
Department of Parks and Wildlife (Parks and Wildlife)	25 March 2014	Project introduction	Parks and Wildlife noted the potential environmental impacts associated with dewatering and clearing of significant flora and vegetation communities. The GHD Environmental Investigation was provided to and reviewed by Parks and Wildlife following the meeting. Parks and Wildlife advised that the 2013 flora and vegetation survey was undertaken at a suitable time as to target any significant flora that may occur.
	27 March 2014	Threatened Ecological Communities (TECs) & Declared Rare Flora	A site visit with officers from the Species and Communities Branch of Parks and Wildlife confirmed the presence of TECs within and adjacent to the project area. The presence of <i>Conospermum undulatum</i> within and adjacent to the project area was also confirmed by Parks and Wildlife.
	10 April 2014	Declared Rare Flora	PTA requested information on <i>Conospermum undulatum</i> . The results were provided by Parks and Wildlife on 14 April 2014.
	22 May 2014	TECs	A site visit with officers from the Species and Communities Branch of Parks and Wildlife confirmed that no TECs were present in the Development Envelope on the western boundary of Perth Airport
	27 May 2014	Offsets	Parks and Wildlife advised to not take any further steps in identifying potential offset sites until the requirement for offsets has been determined by the State environmental approval process. Parks and Wildlife also advised that if offsets are required, they will work with PTA to identify and obtain appropriate sites.
	23 March 2015	TECs	Parks and Wildlife provided preliminary feedback on a detailed flora survey undertaken in Spring 2014. Parks and Wildlife confirmed the survey was undertaken in accordance with recommended methods and agreed with the recommendations for further floristic analysis
	15 May 2015	TECs	Parks and Wildlife reviewed the additional floristic analysis which was a recommendation of the Spring 2014 flora survey. Parks and Wildlife endorsed the findings that the Floristic Community Types present within the Development Envelope of the Proposal are TEC Swan Coastal Plain (SCP) 20a, and adjacent to the development envelope are a combination of TEC SCP20a and TEC SCP3c.
	26 May 2015	Offsets	PTA met with Parks and Wildlife and the OEPA to discuss potential offsets which could mitigate significant impacts to TECs and DRF. It was agreed that sufficient offset options exist and that the requirement for the provision of offsets could be a condition of the State environmental approval.
Western Australian Office of the Environmental Protection Authority (OEPA)	25 November 2013	Project introduction	PTA introduced the route options and advised the OEPA that they considered that the Proposal warranted referral to the EPA. OEPA confirmed that the EPA would not consider potential environmental impacts on Commonwealth land.
	14 May 2014	Project update	PTA advised the OEPA of the preferred project alignment and construction method. The OEPA advised that the EPA Chairman should be briefed on the Proposal by the PTA prior to the Proposal being referred to the EPA.
	25 June 2014	Project overview	PTA provided an overview of the Proposal including the potential environmental impacts and proposed mitigation and management measures to the EPA Chairman.
	7 November 2014	Referral	PTA referred the Proposal to the EPA.
	30 December 2014	Referral	OEPA advised the PTA that it was seeking more advice from relevant Decision Making Authorities before making a decision on whether the Proposal requires assessment under Part 4 of the EP Act.
	15 April 2015	Level of assessment	The EPA confirmed the level of assessment be set at Assessment on Proponent Information (API) A

Stakeholder	Date	Topic/issue raised	Proponent response/outcome
	26 May 2015	Offsets	PTA met with Parks and Wildlife and the OEPA to discuss potential offsets which could mitigate significant impacts to TECs and DRF. It was agreed that sufficient offset options exist and that the requirement for the provision of offsets could be a condition of the State environmental approval.
Australian Government agencies			
Department of the Environment (DotE)	Ongoing	Various	Periodic updates, pre and post referral discussions have taken place since 2013 with regards to potential impacts to Matters of National Environmental Significance and the environmental approval process for the Proposal. The Proposal was referred to DotE in December 2014. The Proposal was considered to be a controlled action that requires assessment and decision under the EPBC Act (EPBC Ref 2015/7399). The PTA requested that the Proposal is assessed through state assessment process under the bilateral agreement.
Department of Infrastructure and Regional Development (DIRD)	Ongoing	Various	Periodic updates and detailed discussions have taken place since 2013 with regards to potential impacts to aviation activity and the operation of Perth Airport from the Proposal.
Local government			
Shire of Kalamunda	Ongoing	Various	Periodic updates and detailed discussions have taken place since 2013 with regards to potential impacts to the community.
City of Belmont	Ongoing	Various	Periodic updates and detailed discussions have taken place since 2013 with regards to potential impacts to the community.
City of Bayswater	Ongoing	Various	Periodic updates and detailed discussions have taken place since 2013 with regards to potential impacts to the community.
Other Key Stakeholders			
South West Aboriginal Land and Sea Council (SWALSC) and the Whadjuk Working Party	Ongoing	Various	Since July 2013, the PTA has consulted with the Whadjuk Working Party on five separate occasions about the Proposal. A letter of general support for the Proposal and acknowledgement of the PTA for early engagement and following the nominated consultation process was received from the Whadjuk Working Party in January 2015.
Perth Airport	Ongoing	Various	Periodic updates and detailed discussions have taken place since 2013 with regards to potential impacts to aviation activity and the operation of Perth Airport from the Proposal.
Community Members	Ongoing	Various	Community Information sessions were held in September 2014. The PTA has also developed a website which contains general information on the Proposal as well as details of the environmental and heritage considerations. The website has a feedback section which members of the community can use to seek information about the Proposal. All queries are responded to in a timely manner.

4. Environmental studies and survey effort

Details of environmental studies and surveys undertaken are provided in Table 4-1. Table 4-1 identifies the appendix number of reports that have been prepared after referral of the Proposal.

Table 4-1: Summary of environmental studies and survey

Factor	Consultant	Survey/investigations name	Study area, type and timing	Study standard/guidance and limitations	Appendix
Flora, Vegetation and Fauna assessments	RPS (Brian Morgan)	A Level 1 Flora and Vegetation Survey of the Bayswater Foreshore Site (Morgan 2014)	May 2014	Level 1 vegetation survey	
	Bamford & Basnett	Fauna survey of the proposed Forrestfield – Airport Link Swan River Crossing (Bamford & Basnett 2014)	Study area adjacent to where Tonkin Highway crosses the Swan River in Bayswater. Desktop review and field survey. Field survey on 14 March 2014. Report completed June 2014	EPA Guidance Statement No. 56 Level 1 survey Limitations: Low level of fauna sampling due to nature of survey, time of year/seasonality.	
	RPS	Spring field survey – interim findings (RPS 2014)	Four project areas in High Wycombe and Forrestfield Field Survey Undertaken between 2-18 October and additional site visit on 25-26 October	Limitations: time of year/seasonality and variable environment	
	GHD	Forrestfield Airport Link Environmental Investigation (GHD 2014a)	Study Area commences south of Bayswater station on the existing Perth to Midland railway line and continues along the Tonkin Highway in a southeast direction across the Swan River, then along and parallel to the Great Eastern Highway, where it enters the Perth Airport, just south of Stanton Road. Desktop review and field survey 2012/13 Report written May 2014	EPA Guidance Statement No. 51 EPA Guidance Statement No. 56. Level 1 field flora, vegetation and fauna survey. Level 2 spring flora and vegetation survey Limitations: timing/weather/season and intensity of survey.	
	Glevan Consulting	Forrestfield Airport Link Phytophthora Dieback Occurrence Assessment (Glevan 2014)	Three vegetation areas in close proximity to Perth Airport. Desktop review, field survey and soil sampling. Report completed June 2014	Limitations: Vegetation disturbance meant some areas unmappable	

Factor	Consultant	Survey/investigations name	Study area, type and timing	Study standard/guidance and limitations	Appendix
	RPS (Brian Morgan)	Forrestfield-Airport Link Project RPS Floristic Community Type Report East of Dundas Road (Morgan 2015a)	Area 3 (3.0ha) bounded by Dundas Road and Maida Vale road to the west and south and Palmer Crescent and Mack Place to the North. Area 4 (3.5ha) between Ibis Place, Sultana Road, Raven street and Milner Road and includes lot 12 Ibis Place. Desktop review and field survey. 1st field survey between 4 & 12 October (mid spring) and rescored between 2 & 5 December (early summer). Report completed January 2015	EPA Guidance Statement No. 51 EPA Position Statement No. 3 Level 2 flora survey Limitations: Variable environment e.g. time of year, seasons etc. was a limitation	Appendix 3
	RPS (Brian Morgan)	Forrestfield-Airport Link targeted survey of floristic community types in High Wycombe (Morgan 2015b)	Areas 1 (0.75ha) and 2 (1.72ha) confined between Dundas Rd and the Rail Freight Terminal. Desktop review and field survey. 1st field survey completed 2 & 8 October 2014 and rescored 4 & 5 December 2014. Report completed January 2015.	EPA Guidance Statement No. 51 EPA Position Statement No. 3 Level 2 flora survey Limitations: Variable environment e.g. time of year, seasons etc.	Appendix 3
	RPS (Brian Morgan)	Additional Data Analysis for Vegetation Floristic Community Types in High Wycombe Addendum Report (Morgan 2015c)	Addendum to Forrestfield-Airport Link Project RPS Floristic Community Type Report East of Dundas Road report including revised statistical analysis.	EPA Guidance Statement No. 51 EPA Position Statement No. 3 Level 2 flora survey Limitations: Variable environment e.g. time of year, seasons etc. was a limitation	Appendix 3
	RPS (Brian Morgan)	Additional Data Analysis for Vegetation Floristic Community Types East of Dundas Rd High Wycombe Addendum Report (Morgan 2015d)	Addendum to Forrestfield-Airport Link Project RPS Floristic Community Type Report Forrestfield Station and Dive report including revised statistical analysis.	EPA Guidance Statement No. 51 EPA Position Statement No. 3 Level 2 flora survey Limitations: Variable environment e.g. time of year, seasons etc. was a limitation	Appendix 3
	PTA	Forrestfield-Airport Link Options to Avoid Areas of Environmental Value in Forrestfield (PTA 2014)	Forrestfield station precinct Alternative design options Report written June 2014	Limitations: alternative design options to minimise impact on DRF, TEC's, areas of black cockatoo habitat, a bush forever site and areas of aboriginal cultural significance	
Noise and Vibration	AECOM	Noise and Vibration Feasibility Assessment (AECOM 2014)	The three proposed 'Perth Airport Rail Link' alignments Feasibility study Report submitted 16 May 2014	AS 2670.2 Evaluation of human exposure to whole-body vibration. Part 2: Continuous and shock-introduced vibration in buildings (1-80 Hz) State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP5.4)	

Factor	Consultant	Survey/investigations name	Study area, type and timing	Study standard/guidance and limitations	Appendix
	SLR Consulting	Forrestfield-Airport Link Noise and Vibration Management Construction and Operation Environment Impact Report (SLR Consulting 2015)	Detailed Construction and Operation Noise and Vibration Assessment of the Proposal Report completed 6 May 2015	AS 2670.2 Evaluation of human exposure to whole-body vibration. Part 2: Continuous and shock-introduced vibration in buildings (1-80 Hz) State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP5.4)	
Aboriginal heritage	Waru	Desktop Aboriginal Heritage Review for the Proposed Airport Rail Link (Waru 2013a)	2 proposed rail alignments including 200m buffer either side Desktop review Report written May-13	<i>Aboriginal Heritage Act 1972 (AH Act)</i>	
	Waru	Archaeological Survey and Site Verification for Proposed Airport Rail Link - Preliminary Advice (Waru 2013b)	Site DAA #3326 "Bayswater 1-3", Site DAA #3520 "Maylands Scarred Tree", Site DAA #4033 "High Wycombe: Wittenoom Rd", Site DAA #4408 "Newburn; Bingham St", Heritage place #4090 "Wyatt Road, Bayswater". Archaeological survey Report (letter) June 2013	AH Act	
	Waru	Additional Archaeological Verification of DAA Site #4408 "Newburn: Bingham St" (Waru 2013c)	An inspection and verification of sites identified during the desktop review 2 field inspections – 17 June 2013, 29 July 2013. 2 site surveys Letter report August 2013	AH Act	
	Waru	Desktop Aboriginal Heritage Review "Gap Analysis" for Proposed Airport Railway Link (Waru 2013d)	Three additional areas to the original desktop review Area 1 (0.2km ²) – North of Railway Parade and between Clavering Road and Tonkin Highway. Area 2 (0.12km ²) – Between Memorial Drive and Wright Crescent, Bayswater. Area 3 (0.42km ²) – Bounded by Milner road, Raven street and Forrestfield marshalling yards in High Wycombe. Desktop review Report written Sept-13	AH Act	
Groundwater/Surface Water Management	Golder Associates	Preliminary Dewatering Assessment Forrestfield-Airport Link (Golder 2014a)	Proposal Area Hydrogeological interpretive study Report written April 2014	Australian Standards, 1993. AS 1726-1993 – Geotechnical Site Investigations DEC Treatment and Management of Soils and Water in Acid Sulphate Soil Landscapes	

Factor	Consultant	Survey/investigations name	Study area, type and timing	Study standard/guidance and limitations	Appendix
	Golder Associates	Addendum No. 1: Preliminary Dewatering Assessment Forrestfield-Airport Link Project (Golder 2014b)	Proposal Area Hydrogeological interpretive study Addendum added August 2014	Australian Standards, 1993. AS 1726-1993 – Geotechnical Site Investigations DEC Treatment and Management of Soils and Water in Acid Sulphate Soil Landscapes	
	Golder Associates	Forrestfield-Airport Link project stage 2 – Geotechnical investigation groundwater conditions report (Golder 2015a).	Proposal Area Hydrogeological interpretive study Draft report written April 15	Australian Standards, 1993. AS 1726-1993 – Geotechnical Site Investigations DEC Treatment and Management of Soils and Water in Acid Sulphate Soil Landscapes	Appendix 2
Contamination/Acid Sulfate Soils	GHD	Perth Airport Rail Link – Preliminary Site Investigation (GHD 2013)	The three preliminary alignment route options Preliminary site investigation Report completed October 2013	Limitations: <ul style="list-style-type: none"> Final alignment route not prepared Site inspection limited to publically accessible length of alignment Dangers goods and historical Certificate of Title (CoT) record searches were not undertaken 	
	GHD	Perth Airport Rail Link - Sampling and Analysis Plan (GHD 2014b)	Proposal Area Sampling and analysis plan Written February 2014	In accordance with the DER <i>contaminated sites management series guidelines</i> Limitations: Conditions: locations of buildings, vegetation etc and only based on information available	
	GHD	Perth Airport Rail Link Acid Sulfate Soil Sampling and Analysis Plan (GHD 2014c)	Proposal area. Desktop review and construction of SAP. Report completed April 14.	DEC ASS Guideline series DER Development of Sampling and Analysis Programs AS/NZ 5667.1-1998. Limitations: Locations of buildings, vegetation etc.	
	Golder	Sampling and Analysis Quality Plan Addendum (Golder 2014c)	Proposal area Addendum to GHD (2014b) sampling and analysis plan Report completed December 2014	Undertaken in accordance with the methodologies and general practices of the DER <i>contaminated sites management series guidelines</i> and other relevant guidelines Limitations: Conditions: locations of buildings, vegetation etc	
	Golder Associates	Forrestfield-Airport Link project – Contamination and acid sulfate soils investigation Draft (Golder in prep)	Tunnel alignment and areas of proposed excavation in proposal Field and laboratory assessment Jan – March 2015 Draft report written April 2015	DEC ASS Guideline series DER Development of Sampling and Analysis Programs AS/NZ 5667.1-1998	Draft provided upon request. Expected to be finalised by 12 June

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5. Assessment of preliminary key environmental factors

5.1 Preliminary key environmental factors

On the basis of the EPA *Environmental Assessment Guideline No. 8: Environmental Principles, Factors and Objectives* (2013b) the Scoping Guideline identified the following Preliminary Key Environmental Factors:

1. Hydrological processes.
2. Flora and vegetation.
3. Inland waters environmental quality.
4. Offsets.

Potential impacts, their mitigation and management and the proposed regulatory mechanisms for ensuring mitigation are presented using relevant studies to demonstrate the Proposal meets the EPA objective for each preliminary key environmental factor.

Environmental factors determined not to be key environmental factors are discussed in Section 7.

Table 5-1: Preliminary Key Environmental Factors Table

Factor	Envelope	Environmental Aspect	Impact
Hydrological Processes	Railway	Dewatering and recharge activities	<ul style="list-style-type: none"> • Alterations to surface water flows • Alteration of groundwater flows
Flora and Vegetation	Railway	Clearing Dewatering	<ul style="list-style-type: none"> • Clearing TECs and Conservation Significant Flora • Introduction of weed and disease • Fire • Dust • Dewatering
Inland Waters Environmental Quality	Railway	Dewatering and recharge activities	<ul style="list-style-type: none"> • Disturbance of ASS impacting water quality • Mobilisation of existing contamination impacting water quality
Offsets	Railway	-Clearing	<ul style="list-style-type: none"> • Clearing of 1.6 ha of TEC SCP 20a • Clearing of 25 DRF <i>Conospermum undulatum</i> individuals

5.2 Assessment of preliminary key environmental factors

5.2.1 Hydrological processes

Previous studies

The Scoping Guideline identifies the requirement to prepare detailed geotechnical hydrogeological investigative reports and modelling relating to the prediction of impacts on the hydrology of the site. Preliminary groundwater and dewatering assessments undertaken by Golder in 2014 were included in the referral. This initial report assessed the potential for dewatering to mobilise pollution from contaminated sites, disturb Acid Sulphate Soils (ASS), and cause temporary drawdown that could affect terrestrial flora and vegetation, wetlands, infrastructure, and nearby groundwater users.

The report concluded that groundwater management (re-injection of dewatering discharge back into the aquifer) could significantly reduce the extent of groundwater drawdown associated with construction dewatering for the proposed proposal. The report concluded that that the extent of groundwater drawdown could possibly be reduced by optimising the recharge well configuration.

Advice provided by the DoW following their review of the report identified that there was significant uncertainty in the level of understanding of the conceptual hydrogeology and the construction method, which had resulted in uncertainty in the volume of groundwater that needed to be dewatered and the extent of temporary drawdown of the groundwater table.

To provide a greater level of confidence in the hydrogeology of the site and to predict with more certainty the potential environmental impacts of the temporary dewatering and recharge, detailed geotechnical and hydrogeological site investigation and modelling was undertaken in accordance with recommendations made by the DoW (Golder 2015a). The more detailed analysis was based on site specific geological and hydrogeological data (including pumping tests at each of the deep excavation locations) and modelling of dewatering and recharge at the Dive Structures in Bayswater and Forrestfield, and at Airport West Station. Detailed modelling of the Emergency Egress Shafts was not required as the site specific data collected during the detailed geotechnical and hydrogeological investigation confirmed the findings of the preliminary assessment. The modelling was conducted to demonstrate that the Proposal can be implemented to meet the EPA objective for hydrological processes. During the detailed design phase the successful contractor will need to demonstrate a more detailed dewatering and recharge system.

Outcomes of further studies

Table 5-2 below provides the estimated dewatering rates and the extent of temporary drawdown of the groundwater table at the two Dive Structures in Bayswater and Forrestfield and at Airport West Station. The modelling assumed that 85% of the abstracted groundwater could be reintroduced back into the aquifer. This is considered to be a more realistic scenario than assuming 100% recharge. Recharge wells were modelled around the excavations to conceptually show the effect of the wells; however, the actual number and location of the recharge wells and distance from the excavation area will need to be assessed during the detailed design phase.

The use of D-Walls to construct the two Dive Structures in Bayswater and Forrestfield, Airport West Station and the Emergency Egress Shafts has also been confirmed by the PTA and will be specified as a requirement in the Design and Construct Contract. The modelling has assumed this method of construction. In the case of Airport West Station and the Emergency Egress Shafts it will be further specified that the D-Walls must extend into the low permeability bedrock in order to minimise dewatering requirements and groundwater drawdown at these locations. The use of the D-Wall construction method limits horizontal groundwater inflow into the structure and would result in mainly vertical flows upwards into the excavation once dewatering begins. Vertical hydraulic conductivity would therefore influence dewatering rates and drawdown.

The modelling used an assessed ratio of vertical and horizontal hydraulic conductivity (K_v/K_h) of 0.1. This value is consistent with standard values used on the Swan Coastal Plain and has generally been confirmed with pump tests. Groundwater extraction estimates and groundwater drawdown contours were developed for each of the dive structures and Airport West on the assumption of a hydraulic conductivity ratio of 0.1.

A sensitivity analysis identified that the most sensitivity parameter for the Forrestfield Dive Structure is the ratio of vertical and horizontal hydraulic conductivity. For the purpose of modelling a worst case scenario with an assumed ratio of vertical and horizontal hydraulic conductivity (K_v/K_h) of 1 was also modelled. This value is considered to be extremely conservative and to overestimate the extent of drawdown and volume of water that would be sourced from dewatering. The results of the base case (with a K_v/K_h of 0.1) and the worst case scenario (with a K_v/K_h of 1) are show in Table 5-2 and Figure 5-3 and Figure 5-4.

Table 5-2: Estimated dewatering rates and drawdown in Bayswater, Airport West Station and Forrestfield

Excavation Location	Hydraulic conductivity (K _v /K _h)	Dewatering duration (weeks)	Dewatering Rates		Dewatering volume (kL)	Required GWL drawdown**		
			Initial*	Average		0.1m	0.5m	1.0
Bayswater dive structure	0.1	16	8	3	39 000	70	-	-
Airport West Station	0.1	52	9	3	91 000	300	40	-
Forrestfield Dive Structure	0.1	16	18	14	138 000	210	-	-
	1	16	46	35	354 000	500	170	65

*Initial rate for the first 2 weeks to lower the groundwater level to required dewatering level

**Distance to the contours of groundwater table drawdown

Predicted residual impacts and management mechanisms

The detailed analysis identified that the extent of groundwater drawdown during the temporary dewatering activities at the Bayswater and Forrestfield Dive Structures was readily manageable and could be minimised by recharging the abstracted groundwater back into the aquifer. The dewatering rates at Airport West Station were minimal due to the confirmed low permeability bedrock and hence recharge is unlikely to be required to minimise groundwater drawdown at this location.

With reference to Figure 5-1, Figure 5-2 and Figure 5-3 the modelled outcome for the most likely hydraulic conductivity ratio value of 0.1 demonstrates that the extent of the groundwater drawdown is limited in both area and depth of drawdown. In all cases depth of groundwater drawdown from the surface is limited to an insignificant value of 0.1 m and 0.2 m. The maximum drawdown experienced is 0.5 m at the Airport West Station; however, this is localised to within 50 m of the structure.

The consequence of changes to surface and groundwater flows over the 52 week (Airport West) and 16 week (Bayswater and Forrestfield Dive Structures) dewatering campaign are demonstrated to be highly localised and limited. The modelled groundwater drawdown is within the range of natural seasonal variation and will not have a significant impact on any sensitive values.

A worst case scenario of an assumed hydraulic conductivity ratio of 1 was modelled for the Forrestfield Dive Structure. Figure 5-4 demonstrates that the extent of groundwater drawdown increases from the scenario shown in Figure 5-3 as does the depth. Under a worst case scenario the impacts of the 16 week dewatering campaign for the Forrestfield Dive Structure has a modelled impact of lowering groundwater up to 0.5 m at Poison Gully Creek. As an ephemeral Creek, it is assessed that the environment is not highly sensitive to this potential impact and the consequence of this impact is therefore limited. Management measures can however be implemented to further reduce this potential impact. Recharge wells can be adjusted by way of number or position to reduce the groundwater drawdown in the vicinity of Poison Gully Creek. The detailed design phase will provide the opportunity to further address the dewatering and recharge strategy.

In addition, the site investigation identified a perched groundwater table in the Forrestfield area. The perched groundwater table was at a depth between 0.3–3.3 m, highly variable and associated with localised and discontinuous bands of low permeability clay. As a result of the required D-Wall construction method, the perched groundwater system is unlikely to be impacted by the predicted temporary drawdown of the regional groundwater table during dewatering of the Forrestfield Dive Structure

The installation of subsurface infrastructure also has the potential to interrupt groundwater flows. Specifically the D-Walls, depending on their depth, location and orientation in relation to groundwater flow, have the potential to act as groundwater flow barriers which could result in mounding behind the D-Walls and may result in an increase in hydrostatic pressure against the D-Walls. Permanent groundwater controls in areas where groundwater mounding would occur may be required.

Mounding has been identified as potentially occurring at the Bayswater Dive Structure, with limited potential for mounding at Airport West or the Forrestfield Dive Structure (Golder 2015). Management of mounding at the Bayswater Dive Structure in the upper aquifer can be achieved by an extension of the D-Walls below the invert level of the Bayswater Main Drain and diversion of the Bayswater Main Drain.

Management arrangements have been established to ensure that the predicted impacts are achieved by the detailed design and construction management. Detailed design of the dewatering system and an Operating Strategy in accordance with Operational Policy 5.08 (DoW 2011) will be prepared by the Construction Contractor appointed to construct the project. This will be provided to DoW for approval. The Construction Contractor will also be required to obtain a dewatering licence from DoW and prepare and implement an Acid Sulphate Soil and Dewatering Management Plan (ASSDMP).

Potential impacts to flora and vegetation are discussed in 5.2.2.



Figure 5-1: Groundwater drawdown contours for Bayswater tunnel portal and dive structure after 16 weeks

Scale 1:4,000 at A4
 0 20 40 60 80 m

Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.

Legend

- Forrestfield-Airport Link
- Groundwater drawdown contour (m)
- Development Envelope
- Structures

Note: The area of the Project within Commonwealth zoning does not form part of the Proposal which is subject to assessment by the EPA.



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Figure 5-2: Groundwater drawdown contours for Airport West Station after 52 weeks

Scale 1:4,000 at A4
 0 20 40 60 80 m

Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015

Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.

Path: Q:\Consult\2015\PTA\PTA15066\ArcMap_documents\R001\RevC\PTA15066_01_R001_RevC_F005_2.mxd

Legend

- Forrestfield-Airport Link
- Groundwater drawdown contour (m)
- Development Envelope
- Stations
- Commonwealth zoning

Note: The area of the Project within Commonwealth zoning does not form part of the Proposal which is subject to assessment by the EPA.



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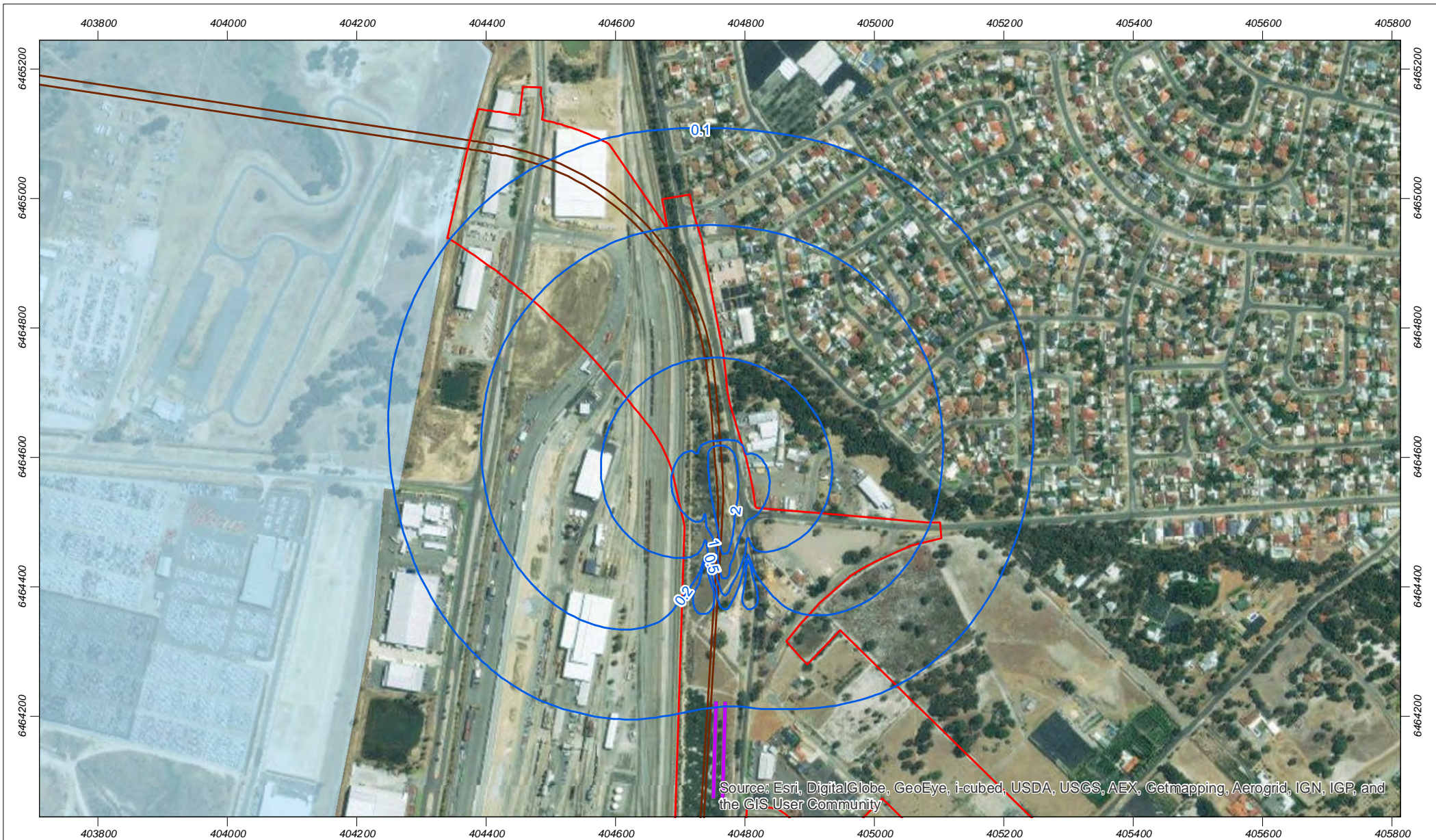


Figure 5-4: Groundwater drawdown contours for Forrestfield tunnel portal and dive structure after 16 weeks $K_v/K_h=1$

Scale 1:8,000 at A4
 0 50 100 150 200 m
 Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.

Legend

- Forrestfield-Airport Link
- Groundwater drawdown contour (m)
- Development Envelope
- Stations
- Commonwealth zoning

Note: The area of the Project within Commonwealth zoning does not form part of the Proposal which is subject to assessment by the EPA.



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5.2.2 Flora and vegetation

The Scoping Guideline identified the requirement to describe and assess impacts to TECs (specifically including SCP 20c) and Threatened Declared Rare Flora (DRF) *Conospermum undulatum*.

Vegetation surveys for the FAL have been undertaken since 2012. The majority of vegetation along the alignment has previously been cleared and comprises degraded pasture, buildings or infrastructure. The current condition of the vegetation along the proposal is presented in Figure 5-5 in the Western Area and Figure 5-6 for the Forrestfield Area.

Environmental investigations have focused on three key areas of vegetation; the Bayswater foreshore site (in the Western Area), the area of the proposed Forrestfield station and area east of Dundas road (in the Forrestfield Area). Individual studies have been undertaken at each of these locations. The key studies include:

- level 1 flora and vegetation survey of the Bayswater foreshore site (Morgan 2014)
- . Forrestfield-Airport Link project Survey of floristic community types east of Dundas road, Prepared for RPS Group (Morgan B 2015a)
- Forrestfield-Airport Link targeted survey of vegetation floristic community types in High Wycombe. Prepared for RPS Group (Morgan B 2015b)
- Forrestfield-Airport Link targeted survey of vegetation floristic community types in High Wycombe addendum report (Morgan 2015c)
- Forrestfield-Airport Link project Survey of floristic community types east of Dundas Road, addendum report (Morgan 2015d).

As identified in Section 2.5, after consideration of environmental, social and economic reasons the Bayswater foreshore vegetation has been avoided. In accordance with the Scoping Guideline this assessment considers the impacts to Threatened Ecological Communities (TECs) and the Threatened – Declared Rare Flora (DRF) *Conospermum undulatum* in the Forrestfield Area.

Threatened ecological communities

At the time of the Referral of the Proposal, initial flora surveys identified the potential to affect floristic community types (FCT) listed as either State TECs or Priority Ecological Communities (PECs), some of which are also Ecological Communities listed as MNES under the EPBC Act. The referral was based on the results of the 2012/13 flora survey (GHD 2014a), studies by Brian Morgan (2014) and a site visit by the WA Department of Parks and Wildlife (Parks and Wildlife) that identified the potential TEC SCP20c/SCP3c/SCP20a and SCP20b in the Forrestfield area. As a measure of precaution the referral conservatively predicted clearing of TEC SCP20c, which carries the highest level of protection and is listed under the EP Act as Critically Endangered and EPBC Act as Endangered.

Following referral of the Proposal, additional, detailed surveys were conducted by Brian Morgan in 2014 of the area within the proposed footprint of the Forrestfield station (2015a) and of the remnant native vegetation immediately east of Dundas Road that will not be directly affected by the Proposal (2015b). These detailed flora surveys identified the potential for TECs SCP20c/SCP3c/SCP20a and SCP20b to occur. However, the report concluded that further statistical analysis was required due to the high number of weed species which had the potential to affect the statistical analysis.

A review of the detailed flora survey reports (Morgan 2015a, 2015b) was undertaken by Parks and Wildlife. Parks and Wildlife confirmed that the vegetation study was consistent with recommended methods while also noting that the vegetation present is complex and could present a number of FCTs. As such, Parks and Wildlife agreed with the recommendation for further statistical analysis of data with the removal of weed taxa from all datasets and the inclusion of supplementary data collected by Parks and Wildlife.

Following provision of supplementary data from Parks and Wildlife, further statistical analysis was undertaken (Morgan 2105c, 2015d) in accordance with Parks and Wildlife methods. The FCT present in Forrestfield was reclassified from SCP 20c to SCP 20a (Table 5-3 and shown in Figure 5-8). Importantly, while SCP20a is listed as Endangered under State legislation (and therefore will still be subject to assessment under the API (Category A) process, it is not listed under the EPBC Act. This reclassification has been endorsed by Parks and Wildlife (English V [Parks and Wildlife] 2015, pers. comm. 15 May).

Some uncertainty was remaining over SCP3c in the area of Poison Gully Creek. Parks and Wildlife was since consulted and has endorsed the SCP3c classification for this area (English V [Parks and Wildlife] 2015, pers. comm. 15 May). This however falls outside of the Development Envelope limiting the potential for the Proposal to affect this Ecological Community. A summary of the TECs in the Forrestfield area based on the most recent data is provided in Table 5-3.

Table 5-3: TECs found in the Forrestfield area

TEC	Description	Status		Size present (ha)	Clearing
		State	EPBC Act		
SCP3c	<i>Eucalyptus calophylla</i> – <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain	Critically endangered	Endangered	1.22	
SCP20a	<i>Banksia attenuata</i> woodland over species rich dense shrublands' (Swan Coastal Plain)	Endangered		4.55	1.60
SCP 20a/21c	<i>Banksia attenuata</i> woodland over species rich dense shrublands (Swan Coastal Plain) / Low lying <i>Banksia attenuata</i> woodlands or shrublands (Community type 2c), Priority 3	Endangered		0.73	
SCP20a /20b	<i>Banksia attenuata</i> woodland over species rich dense shrublands (Swan Coastal Plain) / <i>Banksia attenuata</i> and/or <i>E. marginata</i> woodlands of the eastern side of the Swan Coastal Plain (Swan Coastal Plain)	Endangered		0.16	



Figure 5-5: Vegetation condition Western Project Area

Scale 1:20,000 at A4
 0 200 400 m
 Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.



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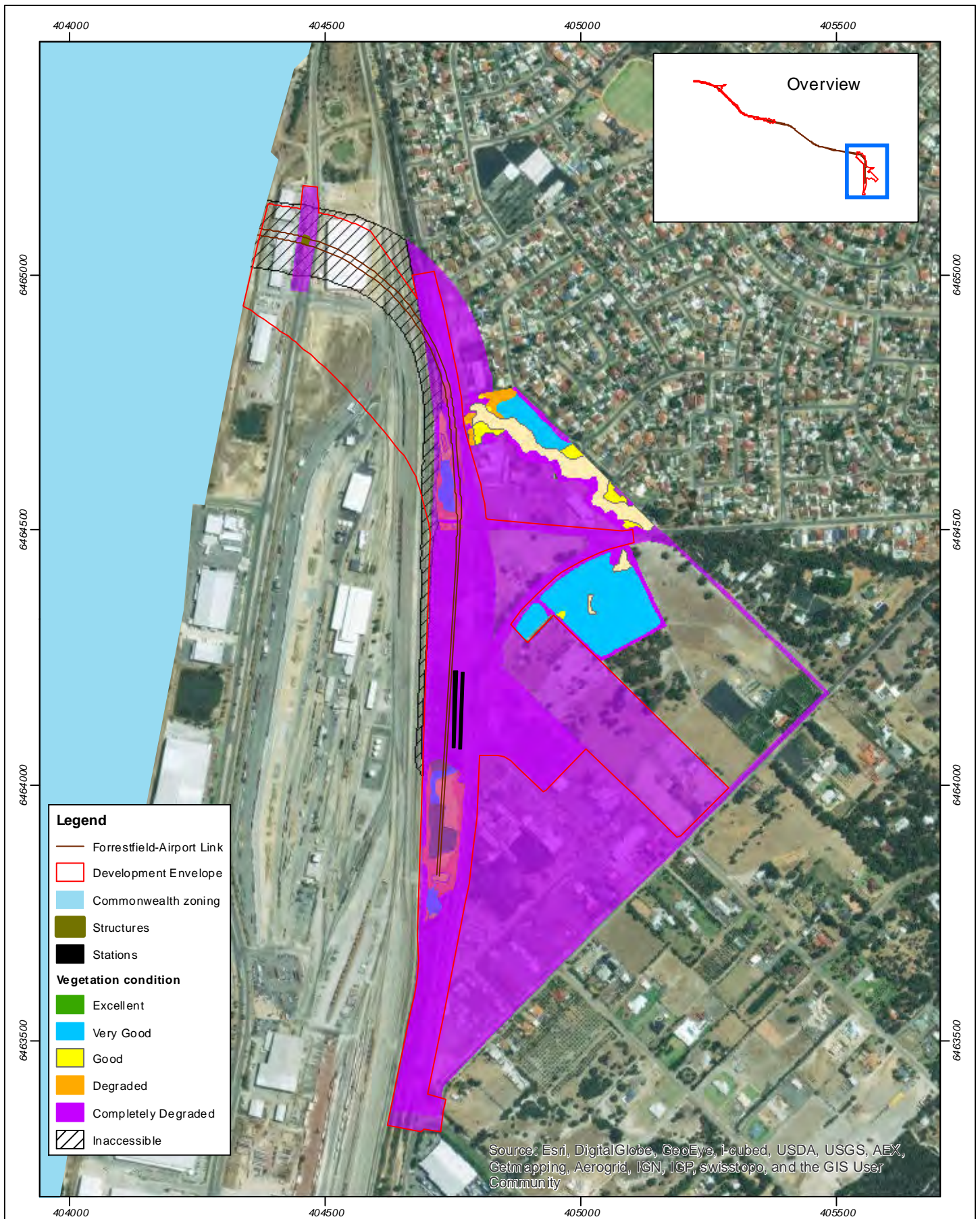


Figure 5-6: Vegetation condition Forreestfield Area

Scale 1:10,000 at A4



Coordinate System: GDA 1994 MGA Zone 50

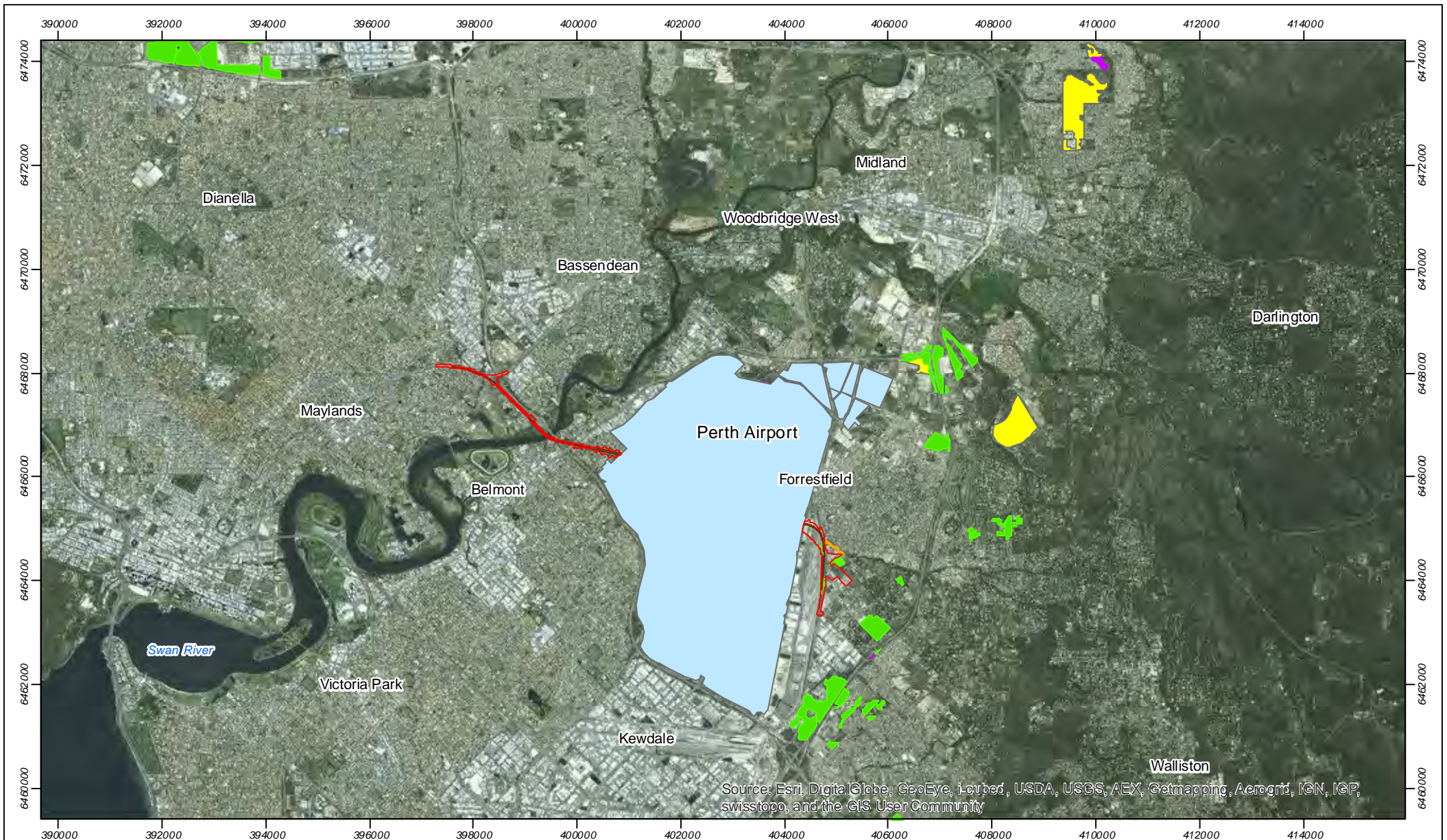
Note that positional errors may occur in some areas

Date: 29/05/2015

Author: JCrute

Source: Aerial image: ESRI online, approx. 2010. All other data: Client 2015.





Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 5-7: Regional locations of TECs and PECs

Scale 1:100,000 at A4
 0 0.5 1 1.5 2 km

Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 29/05/2015

Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. All other data: Client 2015.

Legend

Development Envelope	?3c	SCP20a
Commonwealth zoning	SCP20b	SCP20c
Forrestfield-Airport Link		

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Figure 5-8: Location of TECs at Forreestfield

Scale 1:10,000 at A4



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 29/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online, approx. 2010.
 All other data: Client 2015.

Legend

- Forrestfield-Airport Link
- Development Envelope
- Surface disturbance
- Commonwealth zoning

Threatened Ecological Community

- Structures
- SCP 20a/20b
- SCP 20a/21c
- SCP 3c
- SCP 20a

Note: Areas of SCP20a were previously recorded as SCP20c



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Flora

The referral of the project identified thirty seven (37) individual plants (over eleven locations) *Conospermum undulatum* (Wavy leaved Smokebush) were recorded during the spring surveys undertaken in 2012/13 (GHD 2014a) and RPS in 2014 (RPS 2014). The species is listed as Vulnerable under the *Wildlife Conservation Act 1950* and *EPBC Act 1999* the plant locations within the FAL are depicted in Figure 5-9.

The Proposal will result in the clearing of 25 of the 37 individual of *C. Undulatum*. The individuals to be cleared occur within highly fragmented areas of remnant vegetation which are already subject to a number of existing threats. None of the individuals being cleared are listed in the recovery plan for the species. An assessment of *Conospermum undulatum* populations occurring in the area demonstrates that the proposed impact of removing 25 individuals comprises 1.1% of the existing known plants in the conservation estate within a 10 km radius (Table 5-4). Including the known known plants on private land the clearing of 25 individuals would represent 0.2% of the total number of plants within a 10 km radius.

Table 5-4: Regional vegetation protected in reserves and national parks

	No. of plants	No. of occurrences
Within conservation estate	2258	8
Within private tenure	8439	284
total	10,697	292

Effects of groundwater drawdown

As discussed in Section 5.2.1 a detailed groundwater analysis (Golder 2015a) identified that the extent of groundwater drawdown produced by the dewatering activities at the Forrestfield and Bayswater dive structures would be minimised with the use of recharge while the dewatering rates at the Airport West Station are so low recharge is unlikely to be necessary.

The Scoping Guideline identified the requirement to consider the potential impact of groundwater drawdown on ecosystem maintenance. The potential impacts to ecosystems occur in proximity to the Forrestfield dive structure area and are limited to TECs SCP 20a and SCP 3c and individuals of *C. Undulatum*.

With reference to Figure 5-3, the groundwater drawdown effects are limited to 0.1 m over the area mapped as TEC SCP 3c and an area supporting individuals of *C. Undulatum*. A drawdown of this magnitude over a period of 16 weeks is within the natural seasonal variability and variability experienced by the values year to year. It is therefore concluded that TEC SCP 3c and *C. Undulatum* individuals are resilient to the predicted impacts.

With reference to Figure 5-4, under a worst case scenario the maximum groundwater drawdown impact to TEC SCP20a is 0.2 m. A drawdown of this magnitude over a period of 16 weeks is within the natural seasonal variability and variability experienced by the values year to year. It is concluded that TEC SCP 20a would be resilient to the predicted impacts.

Figure 5-4 indicates that, under a worst case scenario, drawdown up to 0.5 m and between 0.2 m and 0.5 m could be experienced by TEC SCP 3c and individuals of *C. Undulatum*. An impact of this magnitude has the potential to impact the health of TEC SCP 3a and individuals of *C. Undulatum*. Whilst this scenario is has been assessed by Golder (2015a) as unlikely, management measures are available to further reduce this potential impact. Recharge wells can be adjusted by way of number or position to reduce the groundwater drawdown in the vicinity of TEC SCP 3c and individuals of *C. Undulatum*.

In addition, the site investigation identified a perched groundwater table in the Forrestfield area. The perched groundwater table was at a depth between 0.3–3.3 m, highly variable and associated with localised and discontinuous bands of low permeability clay. As a result of the required D-Wall construction method, the perched groundwater system is unlikely to be impacted by the predicted temporary drawdown of the regional groundwater table during dewatering of the Forrestfield Dive Structure.

Management arrangements have been established to ensure that the predicted impacts are achieved by the detailed design and construction management. Detailed design of the dewatering system and an Operating Strategy in accordance with Operational Policy 5.08 (DoW, 2011) will be prepared by the Construction Contractor appointed to construct the project. The detailed design and modelled hydrological predictions will be provided to DoW for approval. Parks and Wildlife will also be engaged at this time to confirm the predicted impacts are acceptable.



Figure 5-9: Location of significant flora at Forrestfield

Scale 1:10,000 at A4



Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online, approx. 2010. All other data: Client 2015.

Legend

- *Conospermum undulatum* (No. of plants)
- Forrestfield-Airport Link
- Development Envelope
- Surface disturbance
- Structures
- Stations
- Commonwealth zoning



5.2.3 Inland waters environmental quality

The Scoping Guideline identified the requirement to present the outcomes of studies being prepared into the water quality, specifically associated with the disturbance/oxidation of ASS and the re-mobilisation of contaminants through groundwater dewatering or recharge activities.

Golders detailed site investigation (2015b) was complete consistent with the Assessment and Management of Contaminated Sites: Contaminated Sites Guidelines, DER 2014. The report concluded that no known contaminated sites exist within the Proposal area. The report identified that shallow groundwater contained the metal concentrations higher than LOR at all locations, elevated nutrients at Forrestfield and at the Bayswater TBM Box and had levels of TRH detected at all station sites.

Golder (2015b) undertook an assessment to understand the potential for remobilising contamination and the disturbance of ASS. Overall the ASS risk mapping for the Proposal was moderate to low, with the exception of the Swan River, which is high to moderate (Figure 5-10). The report identified that while ASS has been recorded within the tunnel alignment below the water table. The results from the groundwater models indicate that it would be possible to design a dewatering system whereby ASS or existing contamination would not affect the surface water bodies within or adjacent to the proposal.

Management arrangements have been established to ensure any predicted impacts related to ASS and contamination are managed by the DER, DoH and DoW consistent with legislative and policy requirements. Golders detailed site investigation (2015b) is subject to Contaminated Sites Auditor (CSA) review and endorsement. Additional site investigations for contamination and ASS may be required based on the findings and recommendations of the DSI. The works would be subject to review and endorsement by the CSA and the DER. The following plans related to the management of contamination and ASS will be prepared prior to construction (Table 5-5). These plans will be prepared by the lead construction contractor and approved by the relevant stakeholder as listed below.

Table 5-5: Contamination and ASS plans

Plan	Approving Agency	Informed of Plan Approval
Spoil and Contamination Management Plan	CSA	DER
Acid Sulphate Soil and Dewatering Management Plan	DER, DoW	CSA

Contaminated related matters will be regulated by the CSA during construction. Matters relating to ASS will be subject to regulation by the DER, with the Acid Sulphate Soil and Dewatering Management Plan also been subject to approval by DoW.

A final DSI report will be prepared post construction, supported by a contaminated site investigation and Conceptual Site Model and Risk Assessment, based on the end land use. The final DSI will be subject to CSA review and endorsement before being provided DER and DoH (if required) for endorsement. Similarly an ASS Close Out Report will be prepared at the completion of construction. The report will be provided to DER for review and endorsement.

5.2.4 Offsets

The Proposal will result in the clearing of 1.6 ha of TEC SCP 20a and 25 individuals of *C. Undulatum*. These are the only significant residual impacts associated with the Proposal and are therefore subject to the requirements of the Western Australian Government's Environmental Offsets Policy (2011) and will be consistent with the West Australian State Offsets Guideline (2014).

Requirements for offset will be concluded through State processes as DotE have identified that the 25 individuals do not require offsetting and SCP20a is not listed under the EPBC Act. OEPA have advised that the Commonwealth Offset calculator should be used as a starting point for offset determinations.

It has been demonstrated that a range of possible offset options could be effectively applied such that it would provide the EPA with confidence that the residual impact could be managed through an offset. A management approach has been agreed by the OEPA and Parks and Wildlife whereby approval could be granted by the EPA subject to a Condition. The Condition may require that within 12 to 24 months of the approval, the proponent shall prepare and submit a Land Acquisition, Rehabilitation and Management Plan to the OEPA, where appropriate offsets are identified for the impact to 1.6 ha of TEC SCP 20a and 25 individuals of *C. Undulatum*. At present this has yet to be considered by the EPA.

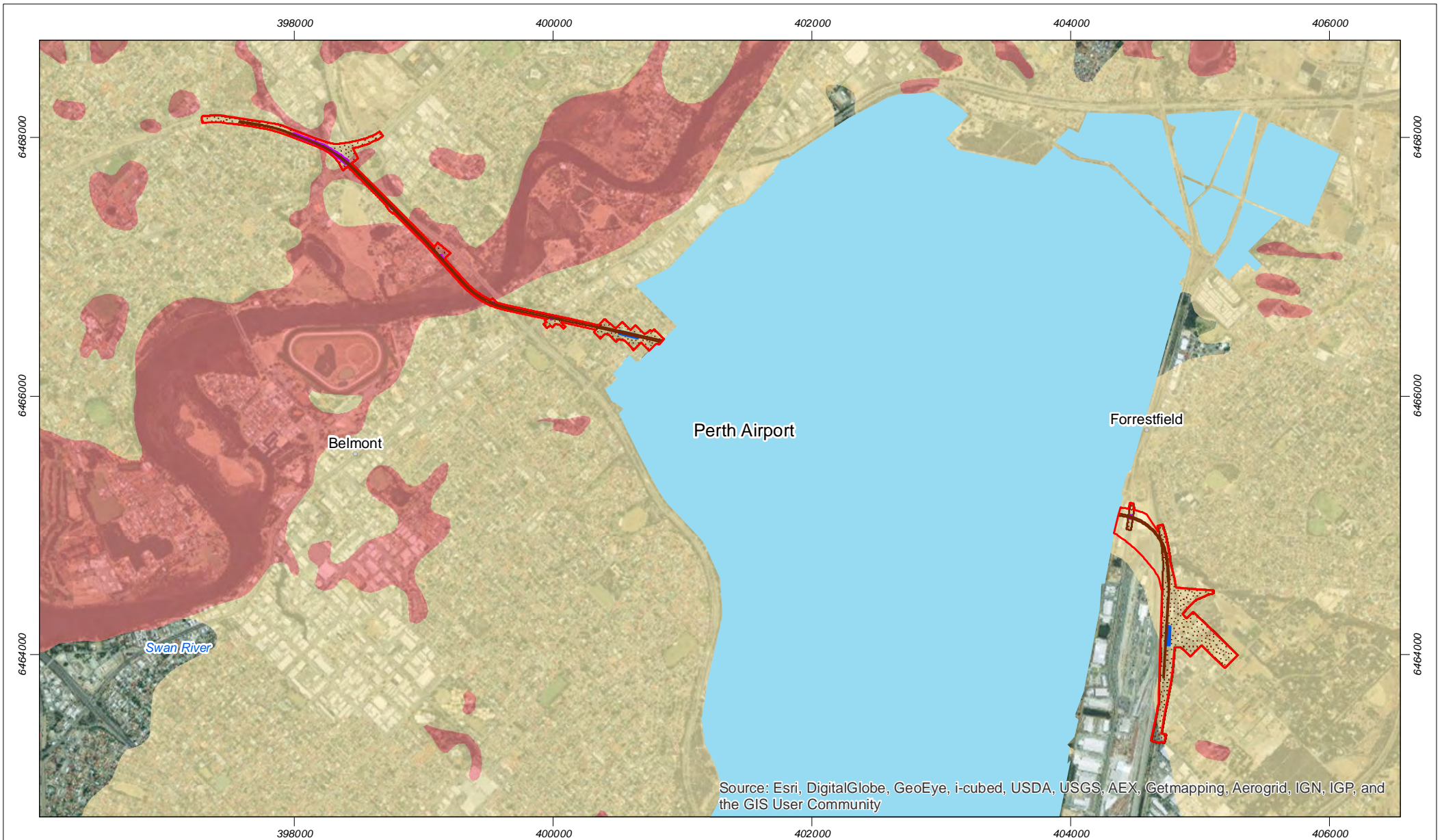


Figure 5-10: Acid sulfate soils

Scale 1:40,000 at A4
 0 0.5 1 km

Coordinate System: GDA 1994 MGA Zone 50
 Note that positional errors may occur in some areas
 Date: 28/05/2015
 Author: JCrute
 Source: Aerial image: ESRI online approx. 2010. ASS Risk: DER 2014. All other data: Client 2015.

Legend

- | | | |
|-------------------------------|-----------------------|--------------------------|
| — Forresterfield-Airport Link | ■ Structures | ASS Risk category |
| □ Development Envelope | ■ Stations | ■ High to moderate risk |
| ■ Commonwealth zoning | ■ Surface disturbance | ■ Moderate to low risk |



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Table 5-6: Assessment Table

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate that proposal meets EPA objective
Hydrological Processes - To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance are protected				
<p><u>Context</u></p> <p>Surface water:</p> <ul style="list-style-type: none"> The key surface water features within the project area and its immediate surrounds are: <ul style="list-style-type: none"> Poison Gully Creek in High Wycombe The Bayswater Main Drain The Swan River <p>Groundwater:</p> <ul style="list-style-type: none"> All materials overlying the Osborne Formation are considered to be part of the Superficial Aquifer <p><u>Key survey findings</u></p> <ul style="list-style-type: none"> Groundwater drawdown at dive structures manageable by using groundwater recharge Dewatering recharge unlikely to be required at Airport West Station Drawdown extent limited in depth and area Dewatering consequence highly localised and limited Drawdown within range of natural seasonal variation Perched groundwater table identified in Forrestfield <u>Impacts(without mitigation)</u> Alterations to surface water flows, causing flooding, sedimentation, ponding, diversions, erosion and/or reduction in surface water availability downstream Groundwater flow impeded by underground structures Over abstraction of the Superficial Aquifer Long term groundwater flow obstruction from permanent structures Groundwater table drawdown affecting significant vegetation 	Dewatering	<p><u>Avoidance</u></p> <ul style="list-style-type: none"> During the early design phases the PTA revised the footprint to avoid direct impacts to: <ul style="list-style-type: none"> Poison Gully Creek where it flows in its natural state The Bayswater Main Drain the Swan River and impediment to groundwater flow by underground structures (through selection of a bored tunnel construction method) <p><u>Minimisation</u></p> <ul style="list-style-type: none"> Prepare and implement a Construction Environmental Management Plan (CEMP) to manage impacts during construction. Key actions included will be: <ul style="list-style-type: none"> management of surface water to ensure contaminated run off from the construction site does not enter wetland(s) erection of fencing around the wetland prior to construction activities to prevent accidental clearing during construction provision of signage along the fencing to prevent unauthorised access hygiene measures to prevent the spread of any weeds or disease dust suppression surface water quality and level monitoring auditing and reporting. Minimise groundwater drawdown through the methods of re-injection of abstracted groundwater, use-of diaphragm wall, use of wet working techniques (as applicable), and with effective groundwater level monitoring via a network of bores. Minimise groundwater drawdown at Poison Gully Creek through positioning of recharge wells. Detailed design of the dewatering system and an Operating Strategy in accordance with Operational Policy 5.08 (DoW, 2011) will be prepared by the Construction Contractor appointed to construct the project for DoW approval. Prepare and implement an Acid Sulfate Soil and Dewatering Management Plan (ASSDMP) to manage dewatering activities (see Inland Waters Environmental Quality) Groundwater dewatering controls will be agreed with the DER and DoW and established within the ASSDMP. 	<ul style="list-style-type: none"> DoW - 5C and 26D licensing under RiWI Act 1914 to minimise dewatering impacts DoW – dewatering licence DER - Acid Sulfate Soil and Dewatering Management Plan Dewatering system and operating strategy in accordance with Operational Policy 5.08 – submit to DoW for approval Bed and Banks permit 	<p>Yes</p> <p>Proposal design and management measures would ensure impacts to hydrological regimes of groundwater and surface water flows are minimised to meet the EPA's objective.</p> <p>Other regulatory processes can manage the potential impacts to hydrological processes from the proposal.</p> <p>Extent to which interruption to hydrological processes indirectly impacts on flora and vegetation is included in Terrestrial Flora and Vegetation.</p>
Flora and vegetation – To maintain representation, diversity, viability and ecological function at the species, population and community level.				
<p><u>Context/Key Survey Findings</u></p> <ul style="list-style-type: none"> 24.86 ha of remnant vegetation in good or better condition Four TECs and one PEC (including two listed under the EPBC Act) occur in the vicinity of the Proposal: <ul style="list-style-type: none"> 1.22 ha of SCP3c – Critically Endangered (EPBC Act - Endangered) 4.55 ha of SCP20a – Endangered 0.73 ha of SCP 20a/21c – Endangered 0.16 ha of SCP20a/20b – Endangered 3.16 ha of Subtropical and Temperate Coastal Saltmarsh PEC (EPBC Act - Vulnerable) One species of flora listed under the EPBC Act occur in the vicinity of the Proposal: <ul style="list-style-type: none"> 37 individuals <i>Conospermum undulatum</i> within 11 locations (Vulnerable) no <i>Phytophthora</i> Dieback infestations a Bush Forever Site 45 occurring <p><u>Impacts</u></p> <ul style="list-style-type: none"> Clearing of 24.86 ha of remnant vegetation in good or better condition Clearing of 1.22 ha of SCP3c Clearing of 4.55 ha of SCP 20a Clearing of 0.73 ha of SCP 20a/21c Clearing of 0.16 ha of SCP20a/20b Clearing of 3.16 ha of Subtropical and Temperate Coastal Saltmarsh PEC Clearing of 37 individuals of <i>Conospermum undulatum</i> within 6 locations 	Clearing of native vegetation Dewatering	<p><u>Avoidance</u></p> <ul style="list-style-type: none"> During the early design phases the PTA revised the footprint to avoid direct impacts to: <ul style="list-style-type: none"> 11.63 ha of vegetation in good or better condition 1.22 ha of TEC SCP3c 2.95 ha of TEC SCP 20a 0.73ha of FCT 20a/21c 0.16ha of FCT 20a/20b selecting a bored tunnel construction method to avoid direct impacts to 3.16 ha of TEC Subtropical and Temperate Coastal Saltmarsh 12 <i>Conospermum undulatum</i> plants (DRF) Bush Forever Site 45 <p><u>Minimisation</u></p> <ul style="list-style-type: none"> Preparation and implementation of a Construction Environmental Management Plan (CEMP) to manage impacts during construction. Key actions during construction to be included will be: <ul style="list-style-type: none"> interface treatments including fencing and set backs management of access design of construction sites to ensure no machinery is parked near significant vegetation significant vegetation will be clearly marked on all construction plans as 'no go zones' surface water and drainage controls to ensure no contaminated run off (sediment, oil etc.) hygiene measures minimise groundwater drawdown as far as reasonably practicable through methods such as re-injection of abstracted groundwater, use-of diaphragm walls for deeper excavations, use of wet working techniques (as applicable), and effective groundwater level and quality monitoring via a network of bores to limit impacts to significant vegetation 	<ul style="list-style-type: none"> Future Ministerial Statement under EP Act Existing legislative requirement to obtain a licence to take flora for clearing of <i>Conospermum undulatum</i> 	<p>Proposal has been designed and would be managed to avoid or minimise impact on vegetation and flora.</p> <p>Residual impacts can be offset. The Proposal can be managed to meet the EPA objective for Flora and Vegetation.</p>

Inherent Impact	Environmental Aspect	Mitigation actions to address residual impacts	Proposed regulatory mechanisms for ensuring mitigation	Outcome to demonstrate that proposal meets EPA objective
<p>(none of these individuals are listed in the recovery plan for the species)</p> <ul style="list-style-type: none"> Groundwater table drawdown affecting significant vegetation 		<ul style="list-style-type: none"> clearly mark the location of TEC vegetation and <i>Conospermum undulatum</i> to be retained through clear construction plans, flagging plants, fencing and signage design of construction sites to ensure no machinery is parked near vegetation to reduce fire risk Key actions post construction will include: <ul style="list-style-type: none"> interface treatments including permanent fencing management of access management of surface water from the car park at Forrestfield Station <u>Residual Impacts</u> <ul style="list-style-type: none"> 1.60 ha of TEC SCP 20a 25 <i>Conospermum undulatum</i> plants (DRF) 		

Inland Waters Environmental Quality - *To maintain the quality of groundwater and surface water, sediment and biota so that the environmental values, both ecological and social, are protected.*

<p><u>Context</u></p> <p>Surface water:</p> <ul style="list-style-type: none"> The key surface water features within the project area and its immediate surrounds are: <ul style="list-style-type: none"> Poison Gully Creek in High Wycombe The Bayswater Main Drain The Swan River <p>Groundwater:</p> <ul style="list-style-type: none"> The key aquifers within the project area are: <ul style="list-style-type: none"> West zone: <ul style="list-style-type: none"> Superficial aquifer Osborne aquitard East zone: <ul style="list-style-type: none"> Perched aquifer Superficial aquifer Mirrabooka aquifer Osborne aquitard <p><u>Key Survey Findings</u></p> <ul style="list-style-type: none"> groundwater was fresh to slightly brackish, generally neutral in pH, with some elevated nutrients at Forrestfield and elevated levels of iron at Bayswater ASS occurs within the tunnel alignment Contaminants are limited Extent of groundwater drawdown will be limited Perched aquifer in Forrestfield <p><u>Impacts (without mitigation)</u></p> <ul style="list-style-type: none"> Surface Water: <ul style="list-style-type: none"> Contamination of surface water via contaminated runoff or hydrocarbon/chemical spills. Groundwater: <ul style="list-style-type: none"> Contamination of groundwater via hydrocarbon/chemical spills Groundwater drawdown reducing groundwater quality via disturbance of ASS Groundwater dewatering reducing groundwater quality mobilising contaminants <u>Groundwater table drawdown affecting the hydrological regimes of wetlands</u> Dewatering activities to impact water quality of wetlands 	Dewatering	<p><u>Minimisation</u></p> <ul style="list-style-type: none"> The PTA selected a bored tunnel construction method to minimise dewatering and disturbance of ASS The construction techniques of diaphragm walls and reinjection of abstracted groundwater minimises groundwater drawdown Prepare and implement a Construction Environmental Management Plan (CEMP) to manage impacts during construction (see Hydrological Processes) Characterisation of potential sources of contamination Prepare and implement a Spoil and Contamination Management Plan in order to manage contamination Engage an accredited Contaminated Sites Auditor Prepare and implement an Acid Sulfate Soil and Dewatering Management Plan (ASSDMP) to manage dewatering activities, key actions included will be: <ul style="list-style-type: none"> Details of the ASS investigations undertaken Description of dewatering and construction activities (including dewatering volumes, D-wall construction, groundwater re-injection etc.) Groundwater modelling information Establishing treatment for any ASS or acidic groundwater Establishing treatment requirements prior to disposal of abstracted groundwater Monitoring and contingency measures Reporting requirements Monitoring water quality of dewatering discharge Monitoring rate of dewatering discharge Groundwater quality and level monitoring (pre, during and post activities) 	<ul style="list-style-type: none"> DER - Acid Sulfate Soil and Dewatering Management Plan. Contaminated Sites Auditor (CSA) to be appointed in accordance with requirements Golders detailed site investigation (2015b) is subject to CSA review and endorsement Additional site investigations for contamination and ASS may be required based on the findings and recommendations of the DSI Spoil and Contamination Management Plan prepared by the lead construction contractor and approved by the CSA and DER (as appropriate) Contaminated related matters will be regulated by the CSA during construction. Matters relating to ASS will be subject to regulation by the DER A final DSI report will be prepared post construction, supported by a contaminated site investigation and Conceptual Site Model and Risk Assessment, based on the end land use. CSA and DER to approve as appropriate. 	<p>Yes</p> <p>Proposal design and management measures would ensure impacts to groundwater and surface water quality are minimised to meet the EPA's objective.</p> <p>Other regulatory processes can manage the potential impacts to Inland Waters Environmental Quality from the proposal.</p>
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Offsets – *To counterbalance any significant residual environmental impacts or uncertainty through the application of offsets.*

<ul style="list-style-type: none"> Direct loss of 1.6 hectares of Threatened Ecological Community (FCT SCP20a) in very good to excellent condition Direct loss of threatened flora species – 25 of 37 <i>C. undulatum</i> plants removed 	Clearing	<ul style="list-style-type: none"> Commonwealth Offset calculator to be used as a starting point for offset determinations. A management approach has been agreed by the OEPA and Parks and Wildlife whereby approval could be granted by the EPA subject to a Condition. The Condition will require that within 12 to 24 months of the approval, the proponent shall prepare and submit a Land Acquisition, Rehabilitation and Management Plan to the OEPA, where appropriate offsets are identified for the impact to 1.6 ha of TEC SCP 20a and 25 individuals of <i>C. Undulatum</i>. At present this has yet to be considered by the EPA. 	<ul style="list-style-type: none"> Future Ministerial Statement under EP Act 	<p>Offsets are proposed to counterbalance the significant residual environmental impacts or uncertainty associated with the Proposal. The Proposal will therefore meet this EPA objective.</p>
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6. Assessment of Matters of National Environmental Significance

The referral of the Proposal identified the potential to affect the following MNES:

- Threatened Ecological Community (TEC) SCP20c
- habitat for Black Cockatoo species (Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia* subsp. *naso*), Baudin's Cockatoo (*Calyptorhynchus baudinii*) and Carnaby's Cockatoo (*Calyptorhynchus latirostris*)
- occurrences of Wavy-leaved Smokebush (*Conospermum undulatum*).

The DotE original 'controlled action' decision currently still stands although the PTA has applied to DotE for a reconsideration of the decision based on the new evidence supplied regarding sections 18 and 18A of the EPBC Act (impacts to a Threatened Ecological Community). DotE has confirmed that the request is *valis* and is now being considered.

In accordance with section 6 of EAG 14 (EPA 2015b) and the Scoping Guidance this section has been reproduced from the Matters of National Environmental Significance Document that was released for public comment on 12 May for a 14 day calendar period. This Section provides the assessment of the impacts to Matters of National Environmental Significance. The full MNES Document is available in Appendix 6 been one correction, as a result of an error in calculation of the amount of TEC SCP20a proposed to be cleared. It was stated in Section 3.1 of the MNES Document that the proposed clearing was to be 3.35 ha when it is in fact 1.60 ha. This has been amended in this API. The PTA do not foresee this to be a problem as SCP20a is not a MNES. The Matters of National Environmental Significance Document only provided an assessment on MNES. All other potential environmental impacts identified in the Scoping Guidance will be assessed in the API document.

6.1 Threatened ecological communities

At the time of the Referral of the Proposal, initial flora surveys identified the potential to affect floristic community types (FCT) listed as either State Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs), some of which are also Ecological Communities listed as MNES and covered under the EPBC Act. The referral was based on the results of the 2013 flora survey (GHD 2014a), studies by Brian Morgan (2014) and a site visit by the WA Department of Parks and Wildlife (Parks and Wildlife) that identified the potential TEC SCP20c/SCP3c/SCP20a and SCP20b in the Forrestfield area. As a measure of precaution the referral conservatively predicted clearing of TEC SCP20c, which carries the highest level of protection and is listed under the EPBC Act as Endangered.

Following referral of the Proposal, additional more detailed surveys were conducted by Brian Morgan in 2014 of the area within the proposed footprint of the Forrestfield station (2015a) and of the remnant native vegetation immediately east of Dundas Road that will not be directly affected by the Proposal (2015b). These detailed flora surveys identified the potential for TECs SCP20c/SCP3c/SCP20a and SCP20b to occur. However, the report concluded that further statistical analysis was required due to the high number of weed species which had the potential to affect the statistical analysis.

A review of the detailed flora survey reports (Morgan 2015a, 2015b) was undertaken by Parks and Wildlife. Parks and Wildlife confirmed that the vegetation study was consistent with recommended methods while also noting that the vegetation present is complex and could present a number of FCTs. As such, Parks and Wildlife agreed with the recommendation for further statistical analysis of data with the removal of weed taxa from all datasets and the inclusion of supplementary data collected by Parks and Wildlife.

Following provision of supplementary data from Parks and Wildlife, further statistical analysis was undertaken (Morgan 2015c, 2015d) in accordance with Parks and Wildlife methods. The FCT present in Forrestfield was reclassified from SCP 20c to SCP 20a (Table 6-1 and shown in Figure 5-8). Importantly, while SCP20a is listed as Endangered under State legislation (and therefore will still be subject to assessment under the API (Category A) process) it is not listed under the EPBC Act. This reclassification has been endorsed by Parks and Wildlife (English V [Parks and Wildlife] 2015, pers. comm. 15 May).

Some uncertainty was remaining over SCP3c in the area of Poison Gully Creek. Parks and Wildlife was since consulted and has endorsed the SCP3c classification for this area (English V [Parks and Wildlife] 2015, pers. comm. 15 May).) This however falls outside of the Development Envelope limiting the potential for the Proposal to affect this Ecological Community. A summary of the TECs in the Forrestfield area based on the most recent data is provided in Table 6-1.

A summary of the TECs in the Forrestfield area based on the most recent data is provided in Table 6-1.

Table 6-1: TECs found in the Forrestfield area

TEC	Description	Status		Size present (ha)	Clearing (ha)
		State	EPBC Act		
SCP3c	<i>Eucalyptus calophylla</i> – <i>Xanthorrhoea preissii</i> woodlands and shrublands, Swan Coastal Plain	Critically endangered	Endangered	1.22	
SCP20a	<i>Banksia attenuata</i> woodland over species rich dense shrublands' (Swan Coastal Plain)	Endangered		4.55	1.60
SCP 20a/21c	<i>Banksia attenuata</i> woodland over species rich dense shrublands (Swan Coastal Plain) / Low lying <i>Banksia attenuata</i> woodlands or shrublands (Community type 2c), Priority 3			0.73	
SCP20a /20b	<i>Banksia attenuata</i> woodland over species rich dense shrublands (Swan Coastal Plain) / <i>Banksia attenuata</i> and/or <i>E. marginata</i> woodlands of the eastern side of the Swan Coastal Plain (Swan Coastal Plain)	Endangered		0.16	

6.2 Declared Rare Flora

The referral of the project identified that the most significant flora species observed in of the site assessments was *Conospermum undulatum* (Wavy leaved Smokebush). Thirty seven (37) individual plants (over eleven locations) were recorded during the spring surveys undertaken in 2012/13 (GHD 2014a) and RPS in 2014 (RPS 2014). The species is listed as Vulnerable under the *Wildlife Conservation Act 1950* and *EPBC Act 1999* the plants locations within the FAL are depicted in Figure 5-9.

The Proposal will result in the unavoidable clearing of 25 of the 37 individual of *C. Undulatum*. The individuals to be cleared occur within highly fragmented areas of remnant vegetation which are already subject to a number of existing threats. None of the individuals being cleared are listed in the recovery plan for the species. An assessment of *C. undulatum* populations occurring in the area demonstrates that the proposed impact of removing 25 individuals comprises 1.1% of the existing known plants in the conservation estate within a 10 km radius (Table 5-4). Including the known occurrences on private land the clearing of 25 individuals would represent 0.2% of the total number of plants within a 10 km radius.

6.3 Black Cockatoos

Surveys undertaken (GHD 2014a; Morgan 2013; Morgan 2014; Bamford 2013; Matiske 2008 & Ecologica 2013) identified 112.6 ha of black cockatoo habitat within 10 km of the Proposal. Within the immediate vicinity of the Proposal there are only 21.2 ha of potential habitat identified including 85 potential habitat trees. From this only 3.56 ha are located within areas of direct surface disturbance by the Proposal including 15 potential habitat trees, ten of which were potential breeding trees (none of which had hollows) and five were potential foraging or roosting trees.

To minimise any impacts on the habitat found within the vicinity of the Proposal avoidance and minimisation mitigation strategies have been utilised. To directly avoid impacts to the majority of the habitat (70 trees) a bored tunnel construction method was selected. The preparation of a Construction Environmental Management Plan (CEMP) would further reduce impacts to remaining black cockatoo habitat. Key actions during construction would include:

- interface treatments (fencing and setbacks) and management of access
- vegetation clearly marked as 'no go zones' and significant trees to be retained
- surface water and contamination measures to ensure no run off
- hygiene measures
- minimisation of groundwater drawdown through construction and dewatering techniques.

Post construction actions would include:

- interface treatments (permanent fencing)
- management of access
- management of surface water from Forrestfield car park.

With these avoidance and minimisation management actions in place it is believed that the clearing of black cockatoo habitat is unlikely to have a significant impact on the species based on the size of the habitat area within the immediate vicinity of the Proposal being retained (17.7 ha and 70 habitat trees).

6.4 Public consultation

A number of matters were raised through the public comment period in relation to the MNES document. The majority of these comments did not address MNES or issues within state land and thus were not relevant to this document. The submissions along with responses are shown below in Table 6-2.

Table 6-2: Response to submissions

Comments	Response
<p>Western Swamp Tortoise</p> <p>Will the proposal disturb groundwater dependent ecosystems or threatened species such as the Western Swamp Turtle/Tortoise? If so, the proposal should not proceed.</p> <p>A lower impact transport system should be devised (e.g. a monorail system).</p>	<p>The proposal will not disturb groundwater dependent ecosystems or habitats related to a Matter of National Environmental Significance and therefore is not addressed by this document.</p> <p>The Western Swamp Tortoise is listed as endangered under the Environment Protection and Biodiversity Conservation Act 1999. While the Western Swamp Tortoise recovery plan identifies potential habitat within Perth Airport land (under Commonwealth jurisdiction) the project will not impact on any known habitat for Western Swamp Tortoise, with the nearest known habitat being approximately 19 km from the Proposal.</p>
<p>Need for Redcliffe Station</p> <p>I do not see the need for this Forrestfield link to have a Railway Station at Redcliffe. The Residence don't need it, the greater Belmont doesn't need it, The main users will be commercial workers at the domestic air port. Why not have the Rail station their? It would be closer to where it's passengers will be and would not impact on the nearby residential community.</p>	<p>This is not an issue related to a Matter of National Environmental Significance and therefore not one addressed by this document.</p>
<p>Flora and Vegetation</p> <p>Excluding the bushland and wetland areas within Perth Airport, minimal natural vegetation remains within the City of Belmont- less than 2% of the original extent.</p> <p>Areas of remnant vegetation include:</p> <ul style="list-style-type: none"> • 21 hectare Bush Forever Site 313- Swan River saltmarsh, located near Garratt Road bridge and Black Swan (Kuljak) Island in Ascot • Small (<5 hectare), isolated fragments in reserves, the most significant of which are Signal Hill Bushland, Garvey Park and Tomato Lake • 10 kilometres of Swan River foreshore which forms a significant ecological corridor • Numerous wetlands, lakes and compensating basins including two Environmental Protection Policy wetlands; Tomato Lake and Centenary Park Lake <p>Not only will clearing of vegetation occur from the alignment of the rail line but also from associated infrastructure associated with rail line. For example, the provision of 500-1000 car parking places in a Park and Ride car park (Fig 1) which requires clearing of mature trees and understory which may contain listed threatened species and ecological communities. It is known habitat for Quenda and may provide habitat for the species of Black Cockatoo found in the area.</p> <p>This car park will be located on Perth Airport Land. This car park is not shown in the proponent's report, see Figure 1-2 in Government of Australia Public Transport Authority 2 Forrestfield Airport Link, Matters of National Environmental Significance. Report Prepared by Strategen. FAL-PTAWA-EN-RPT00016.</p> <p>The car park could be relocated onto already cleared land (Fig 2) within Perth Airport or onto other areas of currently clear land. In addition there are large areas already devoted to car parks that could accommodate the Park and Ride associated with the new train station (Fig 3).</p>	<p>The car park discussed in this submission within Perth Airport land is under Commonwealth jurisdiction and will be subject to environmental assessment and approval under the <i>Commonwealth Airports Act 1996</i> (Airports Act). It is therefore out of the scope of this document and not subject to assessment by the Western Australian Environmental Protection Authority (EPA) and are therefore not discussed in this report.</p> <p>The proposed alignment has been designed to minimise impacts on vegetation within and surrounding its Development Envelope. Any impacts to vegetation deemed to be a matter of environment significance have been addressed by the MNES document.</p>
<p>Human Health - Light Pollution</p>	

Comments	Response
<p>Light pollution from car parks in the vicinity of DA6 are causing light disturbance to residents. There is inadequate shading of lights in the car park entered off Dunreath Road adjacent to Kleinig Ave, which currently disturbs resident in Coolgardie Avenue. Any addition car parks should not add to the light pollution in this area and should be designed to direct light to the areas required and away from residential areas.</p>	<p>The carpark in question is located upon Perth Airport Land, which is under Commonwealth jurisdiction and will be subject to environmental assessment and approval under the <i>Commonwealth Airports Act 1996</i> (Airports Act). It is therefore out of the scope of this document and not subject to assessment by the Western Australian Environmental Protection Authority (EPA) and are therefore not discussed in this report.</p> <p>Although not directly an issue related to a Matter of National Environmental Significance and therefore not one addressed by this document, it has been recognised as an 'other' environmental factor in this API document and therefore the comment regarding additional carpark lighting has been noted.</p>
<p>Hydrological Processes and inland waters environmental quality</p> <p>The water table is close to the surface within the vicinity of the location of the proposed Airport West train station. Dewatering is required during the construction of Airport West train station. We raised concerns about the changes to the ground water during dewatering.</p> <ul style="list-style-type: none"> • In summer, from a drop in the water table and the resulting impact on vegetation and ecological processes, including disturbance of acid sulphate soils • In the winter, there is the potential to raise water tables above the normal winter levels if the dewatering process discharges water within the area rather than exporting it off site. Any discharge of dewatering material in this area has the potential to raise the water table and flood adjacent properties, especially in the cul-de-sac of Coolgardie Avenue, Redcliffe. Since 2011, improper management of water on Perth Airport land and its discharge into a compensating basin adjacent to Dunreath Drive and have caused offsite flooding impacts to the properties at 170 Coolgardie Ave, Redcliffe (Fig 4). Any increase in ground water levels especially in winter is likely to exacerbate these flooding issues. 	<p>Dewatering in the vicinity of Airport West station does not have the potential to impact Matters of National Environmental Significance and therefore is not addressed by this document.</p>
<p>Wetlands</p> <p>Currently the Southern Main Drain runs through the DA6 and adjacent to the alignment of the train corridor (Fig 4). This drain was constructed and runs in a generally straight line with right angle turns where required. Consideration should be given to the redesign of the drain to provide wetlands within DA6 with higher environmental values and to enhance ecological process. In addition constructed wetland may also provide for compensation basin during winter.</p>	<p>This is not an issue related to a Matter of National Environmental Significance and therefore not one addressed by this document.</p>
<p>Air quality including dust</p> <p>DA6 receives high traffic road volumes. Although it is anticipated by traffic modelling that the number of vehicle movements will reduce within DA6 with the closure of Brearley Avenue. Access to the domestic terminal can use Dunreath Road. Local residents have raised their concerns about the closure of Brearley Avenue and believe that this will result in cars using the quiet roads in DA6 to access areas on Perth Airport causing increased dust and noise within the area.</p>	<p>This is not an issue related to a Matter of National Environmental Significance and therefore not one addressed by this document.</p>
<p>Cultural Heritage</p>	

Comments	Response
<p>DAA 16694 Redcliffe Wetland is identified on the Register of Aboriginal Site and is located on Perth Airport land (Fig 5). Source http://maps.dia.wa.gov.au/AHIS2/</p> <p>Early on Monday 18 May 2015 unauthorised bulldozing took place at DAA 16694 Redcliffe Wetland. In response to a resident's notification, the Environmental Officer at Perth Airport, Mr Bert Hoyes advised that around 9.45 am that he had stopped the work as no Section 18 permit for Registered Site #16694 had been applied for or received. Neither had a clearing permit been applied for or received, and from an inquiry there has certainly been no prior community consultation or advice of proposed works received by local adjoining residents or the Redcliffe or Belmont community groups. Senior Swan Valley Nyungah Aborigines have requested immediate consultation with respect to this site</p> <p>This unauthorised activity only increases the community's concerns with regard to the level of care and attention that is given to environmental and cultural issues on Perth Airport land. In addition to the Aboriginal heritage values this area contains mature trees and understory plants.</p> <p>This Aboriginal site can be managed for both Aboriginal and environmental heritage values.</p> <p>Greater awareness of the location of this Aboriginal Site to Perth Airport staff is required which could be gained by having a comprehensive environmental and cultural management plan.</p>	<p>The Perth Airport land discussed in this submission is under Commonwealth jurisdiction and will be subject to environmental assessment and approval under the <i>Commonwealth Airports Act 1996</i> (Airports Act). It is therefore out of the scope of this document and not subject to assessment by the Western Australian Environmental Protection Authority (EPA) and are therefore not discussed in this report.</p>
<p>Concerns were raised about actions by Perth Airport at Little Swamp (registered Aboriginal Site #16694. Also raised past issues with the WA Airports Corp. in 2006 and would like consultation before any work is undertaken on the rail alignment, the right to monitor work plans and to have the power to stop construction work if they believe possible damage may occur to any significant site, object or sacredness.</p>	<p>The Little Swamp site discussed in this submission is under Commonwealth jurisdiction and will be subject to environmental assessment and approval under the <i>Commonwealth Airports Act 1996</i> (Airports Act). It is therefore out of the scope of this document and not subject to assessment by the Western Australian Environmental Protection Authority (EPA) and are therefore not discussed in this report.</p> <p>The issues regarding rights to monitor plans and power to halt construction are noted but not issues related to a Matter of National Environmental Significance and therefore not one assessed by this report.</p>
<p>Offsets</p>	
<p>Consideration should be given to the creation of native vegetation offsets to compensate for the potential removal of large habitat trees and native vegetation. Areas proposed as recreation and/or open space within DA6 could comprise native species of local provenance, as opposed to open parkland, to enhance ecological processes.</p>	<p>Offsets for this Proposal are being prepared in accordance with the Western Australian Government Offset Policy (2011) and WA Environmental Offsets Guidelines (2014). Offsets are intended to compensate for the residual impacts of the Proposal and should be efficient, effective, timely and proportionate to the predicted impact.</p>
<p>Recommendations</p>	
<p>From my experience as a Community Reference Group member, there is a lack of integrated management with no one agency taking responsibility or having a comprehensive overview of the environmental aspects of the project. Consequently I recommend that an Environmental and Aboriginal Heritage Management Plan be developed. This Plan would guide the environmental management of the development of the rail line and construction of the proposed Airport West train station in DA6 and surrounding Perth Airport land to protect the environmental and aboriginal heritage values of the area.</p>	<p>Noted</p>

7. Other environmental factors

The EPA Scoping Guideline identified 'other' environmental factors that have the potential to be affected by the proposal. These include:

- amenity (noise, vibration & light)
- heritage
- terrestrial fauna (conservation significant).

Due to the low level of impact, application of industry standard controls and other regulatory mechanisms, these factors are not expected to be required to be assessed in detail by the EPA. Table 7-1 provides the relevant information requested by the EPA in accordance with EAG14 (EPA 2015b).

Table 7-1: Other environmental factors

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
<i>Amenity (Noise, vibration and light) - To ensure that impacts to amenity are reduced as low as reasonably practicable</i>			
<ul style="list-style-type: none"> Elevated levels of noise, vibration and light being received at sensitive receptors during the construction and operation of the FAL 	Rail construction and operation	<p><u>Avoidance</u></p> <ul style="list-style-type: none"> Adoption of design measures such as noise barriers and resilient rail fasteners in certain sections of the alignment. <p><u>Minimisation</u></p> <ul style="list-style-type: none"> The PTA selected a bored tunnel construction method to minimise noise, vibration and light impacts during construction. Prepare and implement a Construction Noise and Vibration Management Plan (CNVMP) in order to manage impacts during construction. Prepare and implement an Operational Noise and Vibration Management Plan (ONVMP) in order to manage impacts during operation. 	<ul style="list-style-type: none"> DER – CNVMP under EP Noise Regulations 1997. Compliance with State Planning Policy 5.4 for operational noise. Agreement of noise and vibration criteria with DER DER – ONVMP
<i>Heritage –To ensure that historical and cultural associations, and natural heritage, are not adversely affected.</i>			
<ul style="list-style-type: none"> Potential impact to Aboriginal heritage sites 	General ground disturbance	<p><u>Avoidance</u></p> <ul style="list-style-type: none"> The bored tunnel construction methodology avoids physical impacts to the Swan River (Site ID 3536) The significance of Poison Gully Creek (Site ID 25023) has been recognised and any construction impacts to the bushland associated with the creek have been avoided 	Department of Aboriginal Affairs to manage under s18 of the AH Act
<i>Terrestrial Fauna - To maintain representation, diversity, viability and ecological function at the species, population and assemblage level</i>			
<ul style="list-style-type: none"> Clearing of potential Black Cockatoo habitat, Black Cockatoo habitat trees, potential quenda habitat and the disturbance of water rat and water rat habitat 	Construction of rail alignment	<p><u>Avoidance</u></p> <ul style="list-style-type: none"> Selecting the alignment and a bored tunnel construction method avoided direct impacts to 17.7 ha of Black Cockatoo habitat (including 70 habitat trees), reducing impact to Black Cockatoo habitat to 3.56 ha and 15 habitat trees Avoiding impacts to Water Rat habitat through route design Retention of 6.2ha of potential Quenda habitat <p><u>Minimisation</u></p> <ul style="list-style-type: none"> Preparation and implementation of a Construction Environmental Management Plan (CEMP) to manage impacts during construction. Key actions during construction to be included will be: <ul style="list-style-type: none"> site inductions will include management of native fauna a qualified wildlife handler will be on site during clearing of vegetation in the Forrestfield area Details on clearing methods to reduce fauna injury and mortality Undertake a trapping programme to relocate Quenda to suitable habitat interface treatments including fencing and set backs management of access design of construction sites to ensure no machinery is parked near significant vegetation 	<ul style="list-style-type: none"> An approved ASSDMP An approved CEMP A fauna relocation permit under the WC Act

Potential Impact	Aspect	Mitigation actions to address residual impacts	Proponent's proposed mechanism for ensuring mitigation
		<ul style="list-style-type: none"> ○ significant vegetation will be clearly marked on all construction plans as 'no go zones' ○ surface water and drainage controls to ensure no contaminated run off (sediment, oil etc.) ○ hygiene measures ○ minimise groundwater drawdown as far as reasonably practicable through methods such as re-injection of abstracted groundwater, use-of diaphragm walls for deeper excavations, use of wet working techniques (as applicable), and effective groundwater level and quality monitoring via a network of bores to limit impacts to significant fauna habitat ○ clearly mark the location black Cockatoo habitat trees to be retained through clear construction plans, flagging plants, fencing and signage ○ design of construction sites to ensure no machinery is parked near vegetation to reduce fire risk • Key actions post construction will include: <ul style="list-style-type: none"> ○ interface treatments including permanent fencing ○ management of access ○ management of surface water from the car park at Forrestfield Station • Groundwater dewatering controls will be agreed with the DER and DoW and established within the ASSDMP 	

8. Principles of the Environmental Protection Act

The EP Act identifies a series of principles for environmental management. The environmental principles are the highest level goals that a proposal or scheme must meet in order to be found environmentally acceptable by the EPA. The PTA has considered these principles listed in EAG 8 (EPA 2015a) in relation to the development and implementation of the Proposal. Table 8-1 outlines how the principles relate to the proposal.

Table 8-1: EP Act principles

Principle	How it will be address by the proposal
<p><u>Precautionary principle</u></p> <p>Where there are threats of serious irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</p> <p>In the application of the precautionary principle, decisions should be guided by:</p> <ol style="list-style-type: none"> 1. careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and 2. an assessment of the risk-weighted consequences of various options. 	<p>The Proposal has used existing environmental data during design and has supplemented it with a series of studies that are identified in Section 4.</p> <p>The final route alignment was selected to minimise the potential environmental impacts of the proposal. The PTA has maintained close correspondence with relevant government agencies to minimise any uncertainty surrounding the environmental impact of the proposal.</p> <p>Detailed design plans, construction management plans and post construction management plans will avoid or minimise impacts on identified constraints.</p>
<p><u>Intergenerational equity</u></p> <p>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p>	<p>The Proposal can be designed and implemented without significant impacts on the health, diversity or productivity of the environment.</p> <p>The Proposal will provide improved connectivity between the eastern suburbs, aviation hubs and the Perth Central Business District (CBD), as well as providing a viable alternative to traditional car travel between these destinations. It is also expected to results in a significant increase in residential and commercial land development in the catchment area associated with the Forrestfield Station.</p>
<p><u>Conservation of biological diversity and ecological integrity</u></p> <p>Conservation of biological diversity and ecological integration should be a fundamental consideration</p>	<p>Survey work has been used to identify and confirm the range and condition of the environmental factors within and surrounding the proposal development boundary. The findings indicate that with appropriate design, management plans and offset sites that no likely significant biodiversity or ecological impacts will result from the proposed development at local or regional scales.</p>
<p><u>Improved valuation, pricing and incentive mechanisms</u></p> <ol style="list-style-type: none"> 1. Environmental factors should be included in the valuation of assets and services. 2. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement. 3. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. 4. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which benefit and/or minimise costs to develop their own solutions and responses to environmental problems. 	<p>The extension of the rail services to Perth's eastern suburbs will enable greater accessibility and use of Perth's rail network resulting in a decrease of road transport and a long term reduction in the environmental impact of Perth's transport network.</p> <p>Environmental constraint avoidance and management costs have been considered in the design of the Proposal.</p>
<p><u>Waste minimisation</u></p> <p>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment</p>	<p>Waste will be minimised by adopting the hierarchy of waste controls; avoid, minimise, reuse, recycle and safe disposal. Excavated material not suitable for reuse will be disposed of according to the relevant management plans, guidelines and legislation as they apply.</p>

9. Conclusion

9.1 Proponents conclusion

Avoidance has been a key approach for the PTA in managing the potential environmental impacts associated with the FAL. PTA undertook to an initial assessment to identify the social, environmental and economic impacts of possible rail alignment routes. The selection of an entirely subterranean rail option avoid vegetation and fauna habitat, which substantially reduces the impact of the Proposal. In addition, the modification of the Proposal to avoid Poison Creek Gully has avoided 12 *Conospermum undulatum* individuals, and 1.22 ha of TEC SCP3c.

For significant flora species, vegetation or habitat that is unable to be completely avoided, disturbance will be minimised through the implementation of management measures. These will be outlined in the Construction Environmental Management Plan (CEMP) and will include restriction of access and drainage controls.

Offsets are required to balance the residual environmental impact of the proposal; specifically the loss of 1.60 ha of SCP20a and 25 *Conospermum undulatum* individuals.

PTA has undertaken comprehensive stakeholder consultation throughout the planning of the proposal (see Section 3). Consultation will continue to develop as the proposal progresses into the detailed design, construction and operational phases of the project.

'Key' and 'other' environmental factors have been considered against EPA objectives and relevant guidelines. Through the actions and controls identified within the design of the proposal to avoid, manage and mitigate the potential environmental impacts, the proposal is expected to meet the EPA objectives.

9.2 Application of the significance framework

The information provided in the assessment table (Table 5-6) has been integrated into a conceptual illustration (Figure 9-1) in accordance with EAG14 (EPA 2015b) to provide an overview of important environmental assessment considerations and conclusions. The figure is conceptual only and illustrates the PTA's view of the level of uncertainty remaining and the mitigation measures which are to be adopted to provide confidence to the EPA that its objectives for each 'key' environmental factor will be met.

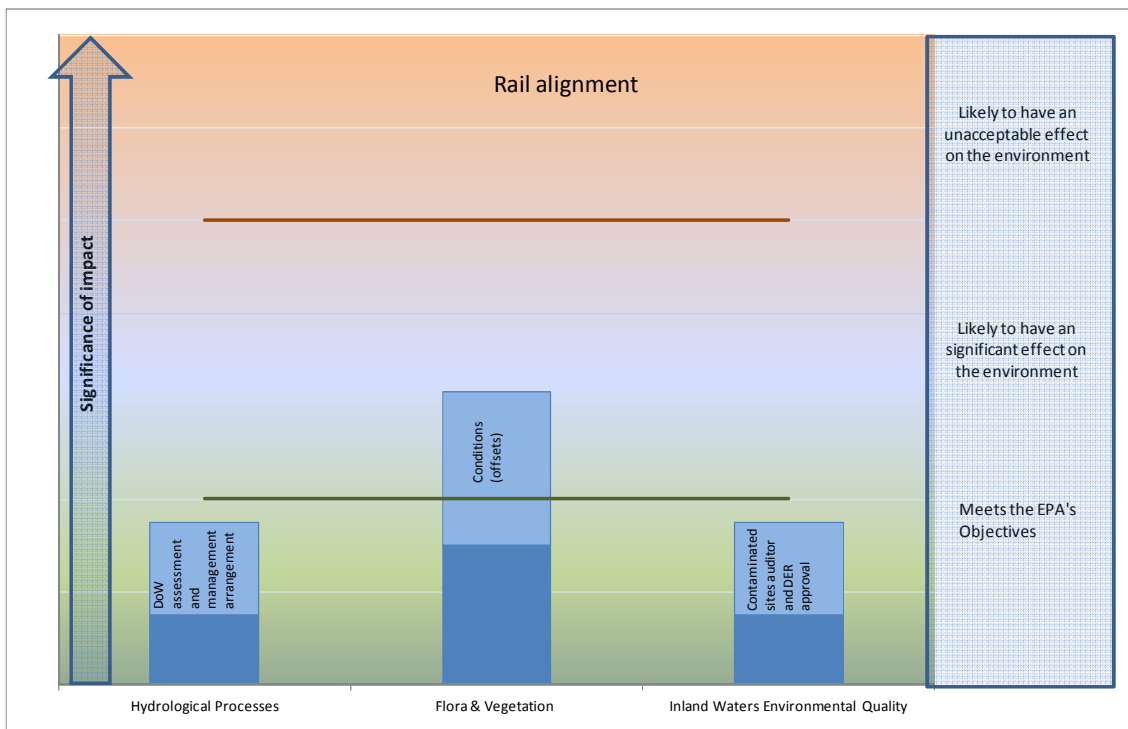


Figure 9-1: Proponent's conceptual application of the EPA's Significance Framework

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