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Foreword from the Premier

Western Australia's economic prosperity and enviable lifestyle has seen our community grow at the fastest rate in the country. With the State’s population predicted to grow to more than 2.6 million by 2031, pressure on services and infrastructure is increasing exponentially. The State Government is tackling this issue head on through its visionary transformation program that is building a firm foundation for long-term growth and prosperity. This program includes ambitious plans to grow our transport network to meet community needs in the growth areas of our State and our capital city.

Perth's eastern suburbs has emerged as a major growth centre – encompassing the State’s major aviation hubs, several industrial centres and many new and existing residential communities. Greater demand for aviation services and expanding residential and commercial populations has increased road congestion in the east and placed pressure on both road and public transport infrastructure.

This growth has demanded a solution – a new commuter rail service.

Hon Colin Barnett MLA
Premier of Western Australia

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Foreword from the Minister

Cabinet has approved the Project Definition Plan for the Forrestfield-Airport Link rail project, meaning the procurement process can begin in 2015.

This Summary Document contains the final route details, station locations and concept designs as well as details about the 8km of tunnelling east of Bayswater Station to Forrestfield. The new underground rail line offers the least impact to the land above, minimising environmental impacts and delivering a sustainable transport solution to the communities of the eastern suburbs, foothills and surrounding catchment area.

Once completed, the Forrestfield Line will add an expected 20,000 daily trips to the suburban rail network by 2021. It is expected to provide not only two bus-train interchange stations – Airport West and Forrestfield, but also a completely underground station at the Perth Airport to meet expected development and growth in our state.

The project is due for completion in 2020.

Hon Dean Nalder MLA
Minister for Transport; Finance
Executive summary

Forrestfield-Airport Link is a new passenger rail service that will link the eastern and foothill suburbs with the existing suburban rail network. The rail line will provide rail services to the Perth Airport and improve the frequency of services on the Midland Line and integration with other suburban stations. It will meet existing and future public transport demand by connecting more people with more places in the eastern suburbs and its surrounds.

More connections
The Forrestfield Line will integrate with Perth’s existing rail network and deliver:

- an 8.5km rail extension from the Midland Line east of Bayswater to Forrestfield via Perth Airport;
- three new stations – Airport West, Forrestfield (both with associated park-and-ride and bus transfer facilities) and Consolidated Airport; and
- expanded and new bus feeder services.

The new rail line will streamline the journey from Forrestfield to the CBD from up to 45 minutes by car in peak times to 20 minutes by rail, and halve the current 70-minute (peak) journey from Kalamunda to the CBD via the improved feeder bus service to Forrestfield Station. Services will also double from Bayswater to Daglish during the existing 10-minute frequency peak-hour services.

More choice
The new rail line will provide a viable alternative to traditional car travel between the eastern suburbs and Perth – alleviating road traffic, easing congestion and reducing travel times for many people living and working in Perth’s eastern suburbs.

By 2021, the Forrestfield Line is expected to generate 20,000 boardings on the suburban rail network every day – increasing to 29,000 daily by 2031.

The services will accommodate significant growth beyond 2031, ensuring that the new rail line provides the State with long-term infrastructure which will continue to meet the needs of commuters across the suburban rail network into the future.

More benefits
The rail line will provide a quick and efficient connection between the CBD and Perth Airport and promote connections onward to tourism centres, such as Fremantle. It will also reduce car dependency and relieve traffic congestion, therefore improving productivity and the available capacity of the road network.

The new rail line will also contribute to:

- boosting employment, residential and economic growth by promoting new and existing centres including Airport West and Forrestfield; and
- minimising the impact of the airport as a physical divide in the area, improving social equity and quality of life for Perth’s community.

Much more than a ‘train to the airport’, the new rail line will deliver enormous benefit to the State’s economy and to the communities along the route.

More opportunities
It will ensure Perth has a more balanced and sustainable suburban public transport system. In the same way the Mandurah and Joondalup Lines have underpinned urban development in Perth’s southern and northern corridors, the Forrestfield Line will help drive growth by opening up multiple opportunities in the eastern corridor and beyond.
By 2021, the Forrestfield Line is expected to generate 20,000 boardings on the suburban rail network every day – increasing to 29,000 daily by 2031.
A spur line will separate from the Midland Line, east of Bayswater Station, at ground level.

The line will descend below ground, passing under the Midland Line before leaving the existing rail reserve.

The line will pass under Brearley Avenue and continue in a tunnel before arriving at Airport West Station.

The line will travel underground in a tunnel, passing under Guildford Road and the interchange slip roads until it reaches the Swan River.

The line will travel around the southern abutment of the Redcliffe Bridge and under Tonkin Highway at the Great Eastern Highway Interchange.

8.5 kilometres of new rail line
The line will continue in a tunnel, passing under the airport aprons and runways on the approach to the Consolidated Airport Station.

The line will continue under the location of the proposed new parallel runway before turning south-east towards Forrestfield Station where it will pass under the existing freight rail marshalling yard.

The line will ascend to ground level on the approach to Forrestfield Station.

The line will terminate at Forrestfield Station.
Selecting the route for Perth’s new rail line

Forrestfield-Airport Link will provide a much-needed new rail line for suburban commuters. It will be an essential part of Perth’s public transport network – generating an extra 29,000 trips on the suburban rail system by 2031 and significantly improving rail services to Perth’s eastern suburbs and the airport.

Key to the success of the new rail line is the route the railway will take. To determine that route, it was necessary to look to the future – at population growth patterns, projected demand, economic and infrastructure plans and stimulus potential.

A detailed assessment process 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 for the new rail line was also guided by:

- the need to cater for Perth’s future consolidated domestic and international airport terminals;
- future demand created by planned redevelopment of the land vacated by the current domestic terminal and surrounding area;
- the need for a station at Forrestfield, given the considerable future population to the east of the airport; and
- in the longer term, the potential for future connection of the Forrestfield end of the new rail line to the broader rail network to the south.

Route alignment options between Bayswater and the airport were investigated to find the best option to accommodate existing road layouts and future upgrades to minimise impact on landowners and traffic as well as minimise costs.

Ultimately, it was decided the most appropriate rail route would run in an underground tunnel from Bayswater Station (on the Midland Line) along Tonkin Highway and Brearley Avenue into the Perth Airport Estate and on to Forrestfield.

The route will travel through the Midland Line rail reserve, Tonkin Highway road reserve, Brearley Avenue road reserve, Perth Airport Estate and the PTA rail reserve in Forrestfield. As the line will be located almost entirely underground, the impact on surrounding communities will be minimal, both during construction and once the line becomes operational.
Forrestfield Station to CBD | 20 mins
Consolidated Airport Station to CBD | 18 mins
Airport West Station to CBD | 15 mins
The majority of the new rail line will be underground in twin bored tunnels. The tunnels will minimise the impact of the new rail line construction and operation on the communities at ground level. This approach will avoid any interference with vital aviation infrastructure within the airport ground, and reduce the need to occupy valuable surface land with rail infrastructure.

Various options were explored before finalising this approach, particularly in relation to the rail line between Bayswater and the airport that will cross major roads and the Swan River. The options considered for this area of rail line included:

- elevated structures including a number of bridges;
- cut-and-cover structures located immediately below ground level; and
- bored tunnels that are deeper underground.

Ultimately, it was determined that bored tunnels would provide the best solution. This approach reflects similar rail projects around Australia and overseas, where the trend is increasingly to locate key transport infrastructure below ground.

Tunnel benefits

The twin 6.2m internal diameter bored tunnels will deliver a range of benefits over other options considered, including:

- reduced disruption to road users during construction and operation;
- reduced ongoing maintenance costs;
- greater safety through improved emergency access in the event of an incident;
- less impact on adjacent properties during construction and operation;
- less impact on property values for properties located near the rail lines;
- greater visual appeal and less impact on amenity; and
- better environmental outcomes including less drawdown on the water table, fewer vegetation disturbances and reduced noise and vibration during construction and operation of the rail line.
The tunnels will minimise the impact of the new rail line construction and operation on the communities at ground level.
Today's modern tunnel boring machines are magnificent feats of engineering. The first tunnelling shield was developed by Brunel in 1825 to excavate under the Thames. His 400 metre tunnel took 18 years to complete. Since then, a lot has changed and we expect our two machines to dig their way from Forrestfield to Bayswater in just under 2 years*.

* Approximate timeframe

The tunnel will be an average of 15m below the surface, with the diameter of the tunnel being 6.2m. That's big enough for a typical family car to fit sideways or stand up end on end.

The tunnel structures are built to withstand major environmental and man-made catastrophes. Currently, around the world, there are more than 2,000 kilometres of tunnels running beneath cities, carrying trains and passengers. The longest tunnel in the world is in Switzerland and is 54 kilometres.

The Forrestfield-Airport Link tunnels will journey below the Swan River, just like rail tunnels in many other cities around the world which go below rivers.

Tunnelling under the Swan River will be a first for the Perth landmark and we’re taking all necessary measures to ensure there will be no impact to the river bed or surrounding soils and environment.

Currently, around the world, there are more than 2,000 kilometres of tunnels running beneath cities, carrying trains and passengers.

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The first underground rail tunnels bored by a Tunnel Boring Machine (TBM) in Perth were built for the Mandurah Line project.

There have been nearly 1 million train trips, moving around 160 million passengers* through Perth Underground since then.

* Figures approximate on Joondalup and Mandurah lines 2008-July 2014

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Why Tunnels Work
Tunnels allow for effective, secure train operations and are a viable alternative to above ground systems. Tunnels save space, money and reduce impact on existing residential and business areas.

Health and environment
Impact to health or environment or indeed your home or business is also very unlikely given the tunnels depth and method of construction.

Sshhh
Despite their huge electric and hydraulic powered motors, tunnel boring machines will only make a quiet noise and cause minor vibrations as they cut the soil and rock in their path. Once the tunnels structures are complete it’s unlikely you’ll even know the trains are passing by.

The tunnel will be an average of 15m below the surface, with the diameter of the tunnel being 6.2m.

That’s big enough for a typical family car to fit sideways or stand up end on end.

The tunnel structures are built to withstand major environmental and man-made catastrophes.

Nationally and internationally, tunnelling is becoming a favoured solution as cities look to expand transport networks where above ground options are exhausted and society places a high value on land at the ground service.
New stations connecting the community

The Forrestfield Line will add three new stations to the suburban rail network – Airport West, Consolidated Airport and Forrestfield. These stations will be conveniently located, accessible and easy to use, with a range of amenities for commuters.
Airport West Station

Airport West Station will be underground, west of the current domestic terminal.

The station will service an expected population catchment area of 20,000 people and generate more than 4000 trips daily on the network by 2021.

Between 500 and 1000 park-and-ride bays will be provided and, with almost half of all trips to the station expected to be via bus, provision has been made for six active bus bays and three bus layover bays.

Drop-off bays and pedestrian and cyclist infrastructure have also been included to ensure all commuters can access the station as easily and efficiently as possible.

The station will offer excellent connectivity and amenity between the bus interchange and the station building. At this early planning stage, the station entry foyer includes passenger toilets, ticketing and information services, a kiosk and customer service/transit officer facilities typically required for a staffed station.

Access from the concourse to the train platform will be via a (SmartRider) fare-controlled gate to stairs and two escalators, with two lifts providing universal access.

The concept design includes a 150m island platform at a lowered track level similar to the Perth Esplanade Station. The platform will feature information displays and systems, lighting, CCTV, public address systems and seats. The platform will also have features which support railway operations.

Snapshot

- Bus interchange with six bays
- Drop-off bays
- Pedestrian and cyclist facilities
- Parking for 500-1000 cars
- 6000 daily boardings added to network by 2031
Consolidated Airport Station

Consolidated Airport Station will be underground, adjacent to the current international terminal and to the south of the existing airport control tower – ideally located for convenient passenger access to each of the planned domestic and international terminals.

Passengers arriving at the 150m island platform from the suburban rail network will use a combination of lifts, stairs and escalators to link up with the connections to the terminals.

The entrance area will be a traditional entry concourse with staff and passenger services and facilities, including passenger toilets, ticketing and information services, a kiosk, customer service/transit officer facilities and fare gates.

Snapshot

- Underground station
- Direct access to airport terminals
- 11,000 daily boardings added to network by 2031
Forrestfield Station

Forrestfield Station will be at ground level, east of the Forrestfield freight rail marshalling yard and west of the existing Dundas Road alignment, near the intersection with Maida Vale Road.

Forrestfield Station’s large and growing residential catchment of around 60,000 includes the suburbs of High Wycombe and Forrestfield, Maida Vale, Gooseberry Hill and extends into Kalamunda. An estimated 9800 daily trips on the network will be generated by the station by 2021.

Designed as an end-of-line station, Forrestfield will provide easy passenger transfer between rail services and bus, car, bicycle or foot traffic.

It is expected that more than 90 per cent of passengers will arrive by car or bus, so the station will be a major transport interchange. It will include eight active bus bays, four layover bus bays, parking for between 2000 and 2500 cars, including drop-off bays. Early concept design also incorporates infrastructure for those walking or cycling to and from the station.

It includes 150m platforms with a station entry on the eastern side of the rail line. Passengers will enjoy access to amenities and facilities similar to Airport West Station and proceed to the platform through a fare-gated access point.

It also will provide a possible future rail connection southwards.

Snapshot

- Ground level, end-of-line station
- Major transport hub with eight bus bays
- Parking for 2000-2500 cars
- 12,000 daily boardings added to network by 2031
The Forrestfield-Airport Link is a priority project, due for completion in 2020. It is designed to provide high-quality, sustainable transport, delivering community benefits now and for generations to come.

It will:

• connect more people to more places – improving lifestyle and amenities for people living in, and moving to, Perth’s eastern suburbs;
• deliver more accessible transport for all Western Australians;
• increase Perth’s rail capacity and productivity by improving frequency of services and capacity on the Midland Line and providing services to more destinations;
• reduce traffic congestion, particularly around Perth Airport; and
• stimulate economic activity around Forrestfield and Airport West, and town centre improvements around Bayswater Station.

A catalyst for growth

The new rail line will benefit people living and working around Forrestfield Station by reducing travel times, reducing traffic congestion (through increased public transport use), and thereby improving traffic flow, particularly for freight transport along key routes.

The rail line is also expected to be a catalyst for further land development around Forrestfield Station, including high density residential and commercial development opportunities – generating new employment opportunities and economic stimulus.

Potential business opportunities around the Airport West Station may also be generated by improved public transport once the domestic and international terminals are consolidated. The airport has the
potential to become a major employment hub in the eastern suburbs, similar to Sydney Airport which is the city’s fifth largest employer with around 56,000 people working in the precinct.

**Better airport accessibility**

More than 30 million passenger movements are expected to take place at Perth Airport each year by 2031, with the rail line delivering easier and more efficient access to Perth city and other strategic centres for business and leisure travellers. A train trip from the airport to the CBD will take less than 20 minutes, easing reliance on road travel, easing congestion in the process and providing reliable journey times.

**Local heritage valued**

Environmental and heritage considerations are a key priority for the Forrestfield-Airport Link.

Extensive research has informed the development of the project – from engineering studies to environmental testing, patronage demand studies to heritage investigations, risk assessments to geological surveys.

Four registered Aboriginal heritage sites have been identified along the route corridor – Swan River, Munday Swap, Poison Creek Gully and Newburn Bingham Street. All have been considered during the early planning process, with the route and construction methodology selected to minimise any impact.

The Government will work with Aboriginal groups to carefully manage potential impacts to Aboriginal heritage during construction and operation of the new rail line.

**Environmental outlook**

Station facilities for pedestrians and cyclists, combined with the improved rail service itself, are all expected to drive commuters away from vehicle use to public transport – literally. This will benefit the environment by reducing greenhouse gas emissions, fossil fuel use, air pollution and overall carbon footprint.

**Active engagement**

A variety of key stakeholders – including government agencies, Perth Airport Pty Ltd, the Commonwealth Government, the City of Belmont, the Shire of Kalamunda, interest groups, environmental
consultants and experts in their respective fields – have had input into the planning of the project. This collaborative approach has ensured that planning for the new rail line and stations encompasses a variety of views so that the rail service will meet the needs and expectations of Western Australians today and into the future.

Stakeholders who have been actively engaged on the project so far:

- Perth Airport Pty Ltd
- Department of Infrastructure and Regional Development (federal)
- Department of the Environment (federal)
- Environmental Protection Authority
- Office of the Environmental Protection Authority
- Department of Environment Regulation
- Department of Health
- Department of Water
- Department of Aboriginal Affairs
- Department of Premier and Cabinet
- Department of Transport
- Department of Treasury including Strategic Projects
- South West Aboriginal Land and Sea Council
- Whadjuk Working Group
- Department of Parks and Wildlife (Swan River Trust)
- Department of Planning
- Western Australian Planning Commission
- City of Belmont
- Shire of Kalamunda
- Main Roads

Community Engagement

Planning for the project’s success requires active and consistent community engagement. Working with community members, special interest groups, industry bodies and local government will be key to ensuring continuous, collaborative relationships.

Transperth has plans for bus feeder services supporting the new train services and expects to go out to the community for consultation on these services about 6-12 months before train services start.

It is expected that community consultation will help inform elements of the stations’ design, amenities and layout.
Moving forward – the next steps

Forrestfield-Airport Link is an important part of Perth’s transport infrastructure for the future.

In the 2014-15 State Budget, the Government committed $2.021 billion to fund the project and announced the new rail line would be completed in 2020.

It is estimated construction of the new line and stations as well as the rail cars and buses will cost approximately $2 billion. The total cost will be confirmed closer to late 2015 when the tender process is expected to be complete.

Extensive planning has already been undertaken to develop the project – led by the Public Transport Authority of WA in partnership with other government agencies, stakeholders and technical specialists.

This culminated in the development of the Project Definition Plan (PDP), which was submitted to Cabinet in August 2014 for endorsement.

The cost to operate the rail line in its first year has been estimated at $35.7 million, with revenue streams offsetting that cost by $10.5 million.

Ongoing annual operational costs have been estimated at close to $37 million, with revenue offset of close to $14 million.

Revenue streams include commuter fares, as well as revenue from future car parking and advertising.

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**Forrestfield Station entrance – concept**

**Airport West platform – concept**

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**Mid 2014**
- Project Definition Plan completed
- Environmental studies
- Geotechnical investigations
- Reference design begins

**We are here**
- Government decision to commence procurement
- Initiate approval applications to relevant State and Federal Authorities

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**Mid 2016**
- Contract award

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**Late 2016 - 2020**
- Detailed design
- Construction
- Commissioning

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**2020**
- First train operating
Investment flow-on

The Forrestfield Line has an extensive operational life and is a crucial and long-term investment for the State. As well as improving connections between Perth’s eastern suburbs and the CBD, the rail line is expected to stimulate economic growth in the eastern suburbs and beyond.

While these financial benefits cannot be directly offset against project expenditure, they are expected to include:

- increased land values around the project area (generating returns for landowners, Perth Airport Pty Ltd and, potentially, local government authorities);
- new retail opportunities to service passengers (generating taxes); and
- potential new land development (generating returns for developers, residents and government through transfer duties and land taxes).

Schedule/staging

Planning for the new rail line is well under way, with $12 million allocated and approved to undertake project scoping this year (2014-15), with another $57 million allocated for further detailed planning, design and procurement in 2015-16.

On-the-ground works are scheduled to begin in 2016. These works will be undertaken over four years and include tunnel boring, tunnel ventilation and related mechanical and electrical works, station and track construction and station fit-outs.

New buses and rail cars are scheduled to be delivered in 2019-2020, providing time to install and test the new infrastructure before the line begins operating.

In 2020, the new rail line will be open to passengers – delivering a new rail service to people living, working and travelling to and from Perth’s eastern suburbs and beyond.
More information
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