

LEGEND

- Existing Passenger Line
- Existing Station
- Existing Level Crossing
- Proposed Bridge



**RAIL ROUTE
Perth to Burswood**

ERM/28146/Fig18.in7

Figure 27

8. DESCRIPTION OF WORKS

8.1 SOUTH WEST METROPOLITAN RAILWAY ALIGNMENT, LAYOUT AND STANDARDS

8.1.1 The Route

The route of the South West Metropolitan Railway is illustrated in **Figure 18** (Section 3.3).

8.1.2 The Railway Right of Way

8.1.2.1 Perth to Jandakot

From Perth Station, the service will use the existing Armadale lines to Beckenham. **Figure 27** (opposite), **Figure 28** (following). At Crawford Street in Cannington, there will be a junction between the new and the existing railway. The new tracks will pass in a tunnel under the Perth-bound Armadale rail track, a relocated Albany Highway, the new Roe Highway and the existing Woodbridge to Kwinana freight railway **Figure 29** (following), and then run alongside the freight tracks towards Jandakot on the existing railway reserve **Figure 30** (following). From where the Kwinana Freeway flies over the freight railway, adjacent to the Glen Iris Estate, the passenger railway will turn south into the Kwinana Freeway median.

There will be transit stations at Thornlie (near Spencer Road), Nicholson Road and Canning Vale (Ranford Road), with provision for a future Jandakot Airport station at Karel Avenue.

8.1.2.2 Jandakot to Rockingham

Initially, it was not proposed to put the railway into the Freeway median because the median was too narrow. There was also a viewpoint that

transit stations would be more accessible if located at the side of the Freeway.

The railway was to be on the eastern side of the Kwinana Freeway reserve before passing under the carriageways in a tunnel to the western side of the widened freeway, just north of Berrigan Drive. It was then to continue largely within the western side of the Freeway reservation to just south of Anketell Road. Along this western alignment it would pass under the roads crossing the Freeway (with separate structures) at Berrigan Drive, Beeliar Drive, Russell Road, Rowley Road and Anketell Road. In this case, the railway would be up to 110 metres west of the Freeway median at some locations and quite close to existing and proposed residential properties. However local issues forced a reappraisal of the position of the railway within the Freeway reserve.

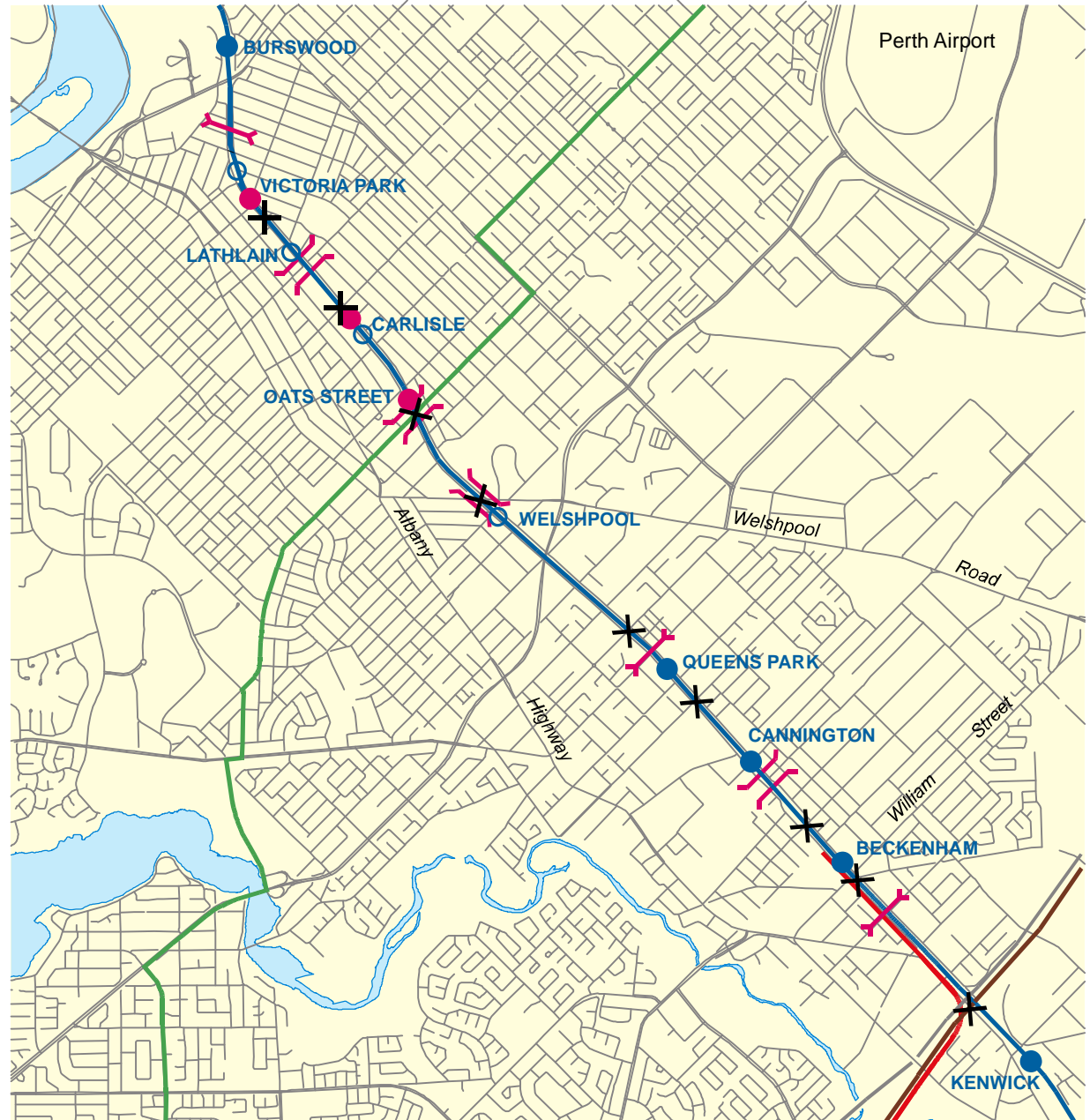
Placing the railway in the central median will make the most efficient use of the Freeway reservation and associated structures. It can be done at modest cost. The adverse environmental impacts from both the freeway traffic and railway operations will be concentrated into a more narrow band. Generally, there will be a substantial reduction in the level of railway noise, in some locations by the order of 50%. Correspondingly, any adverse effects from vibrations caused by the trains will also be reduced. Separation from residential dwellings will be maximised. Locating the railway along the edges as originally planned would require the acquisition of up to 27 hectares of additional land.

With regard to the proposed regional centre at Thomsons Lake, placing the railway in the median will release up to one hectare of land for town planning. It will also allow consolidation and improve security of the Park & Ride facility planned. Traffic associated with the transit station (now in the median), will be simplified and there will be less traffic through the city centre.

- LEGEND**
- Proposed Passenger Line —
 - Dual Gauge Freight Line —
 - Existing Passenger Line —
 - Circle Bus Route —
 - Existing Station (Closed) ○
 - Existing Station ●
 - Relocated/New Station ●
 - Existing Level Crossing ✕
 - Proposed Footbridge ⌋⌋
 - Proposed Bridge ⌋⌋

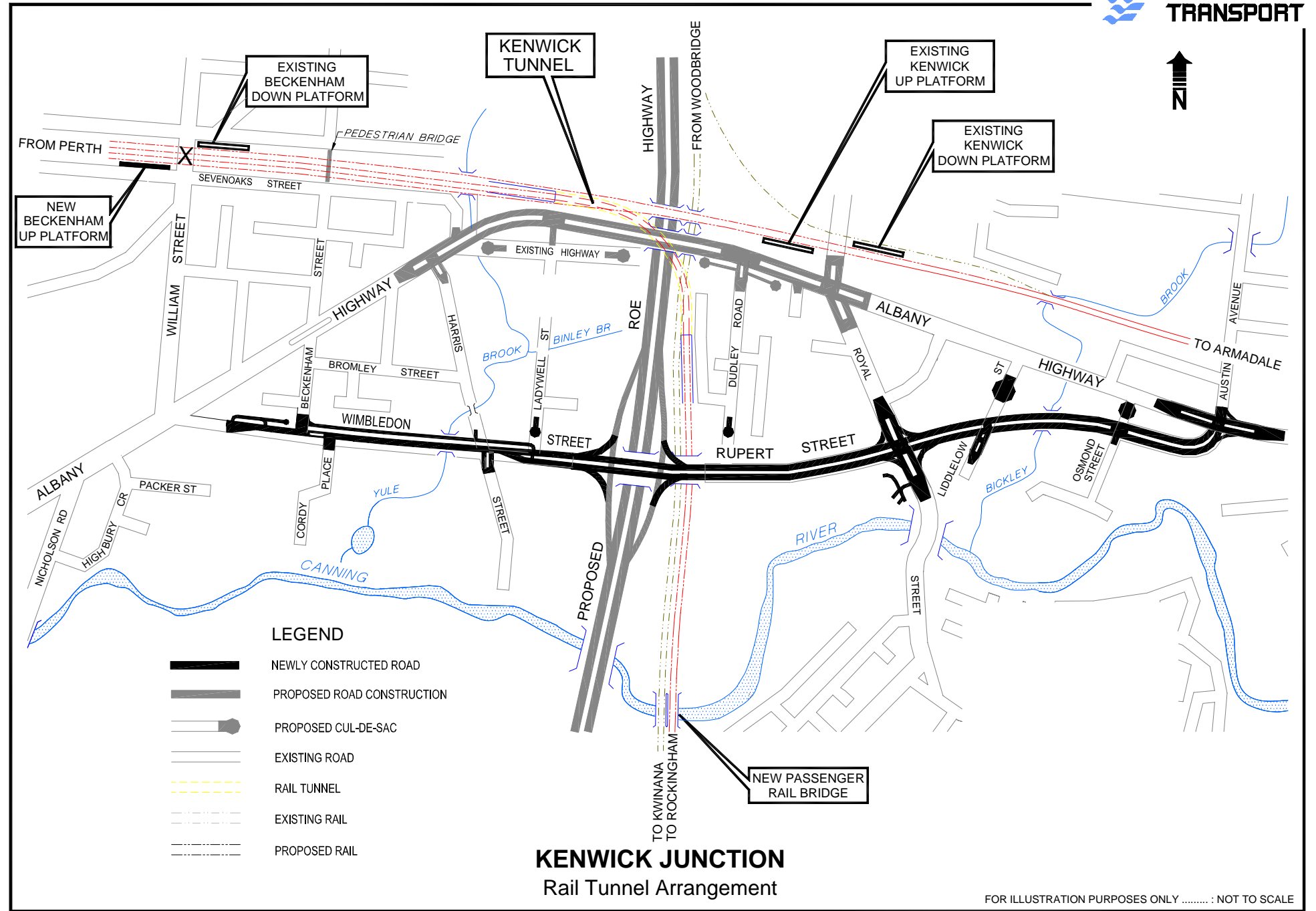


**RAIL ROUTE
Burswood to Kenwick**



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Figure 28



LEGEND

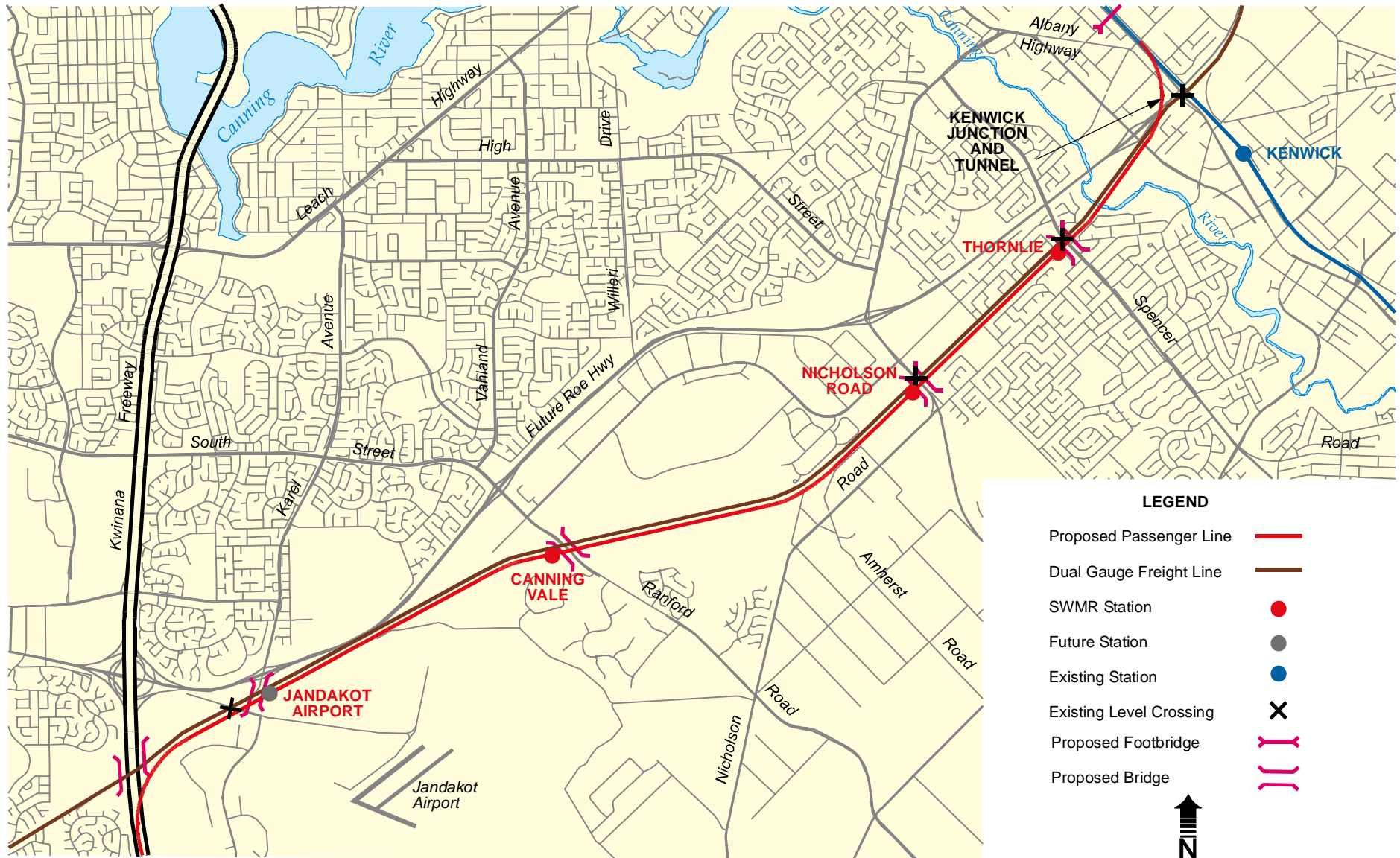
- NEWLY CONSTRUCTED ROAD
- PROPOSED ROAD CONSTRUCTION
- PROPOSED CUL-DE-SAC
- EXISTING ROAD
- RAIL TUNNEL
- EXISTING RAIL
- PROPOSED RAIL

KENWICK JUNCTION
Rail Tunnel Arrangement

FOR ILLUSTRATION PURPOSES ONLY : NOT TO SCALE

Figure 29

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RAIL ROUTE
Kenwick to Jandakot

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Figure 30

On this section there will be transit stations at South Lake (Berrigan Drive), and Thomsons Lake (Beeliar Drive). Sites for future transit stations will be protected at Success, near Gibbs Road/Russell, Mandogalup (Rowley Road) and Anketell (Anketell Road). **Figure 31** (preceding).

Railway works associated with the Kwinana Freeway

The infrastructure required to accommodate the railway in the Kwinana Freeway median is included in the package of works which make up the Kwinana Freeway Interchange and Extension Project (KFIE Project), MRWA Contract 44/99. These works include;

- a tunnel at Glen Iris (Jandakot) which takes the railway from the existing freight railway reservation on the northern side of the Glen Iris residential estate, under the southbound carriageways of the Kwinana Freeway and into the freeway median;
- rebuilding of some 15 kilometres of the Kwinana Freeway northbound carriageways from Glen Iris to Mandogalup to create a median of sufficient width to accommodate the railway;
- extending the spans of the five road overbridges to be built over the freeway from Glen Iris to Kwinana to accommodate the additional median width; and
- a railway tunnel 1.2 km south of Anketell Road to take the railway out of the freeway median, under the northbound carriageways to position the railway on its alignment through the Spectacles towards Kwinana.

South of Thomas Road, which crosses over the railway with a bridge, the railway line skirts the under Wellard Road and a new extension of Gilmore Avenue, curving right to cross over the Kwinana to Mundijong freight railway and Mandurah Road on bridges

There are intermediate transit stations just south of Thomas Road and at Leda. The site for a future South Parmelia transit station at Challenger Avenue will be protected.

8.1.2.3 The Rockingham Area and to Waikiki

Refer to Section 4 “A Transit Service for Rockingham”.

8.1.2.4 Waikiki to Mandurah

An item of railway related works that has been included in the KFIE Project, MRWA Contract 44/99, is the allowance for a bridge to span over the railway at Safety Bay Road as part of the contract roadworks in that area.

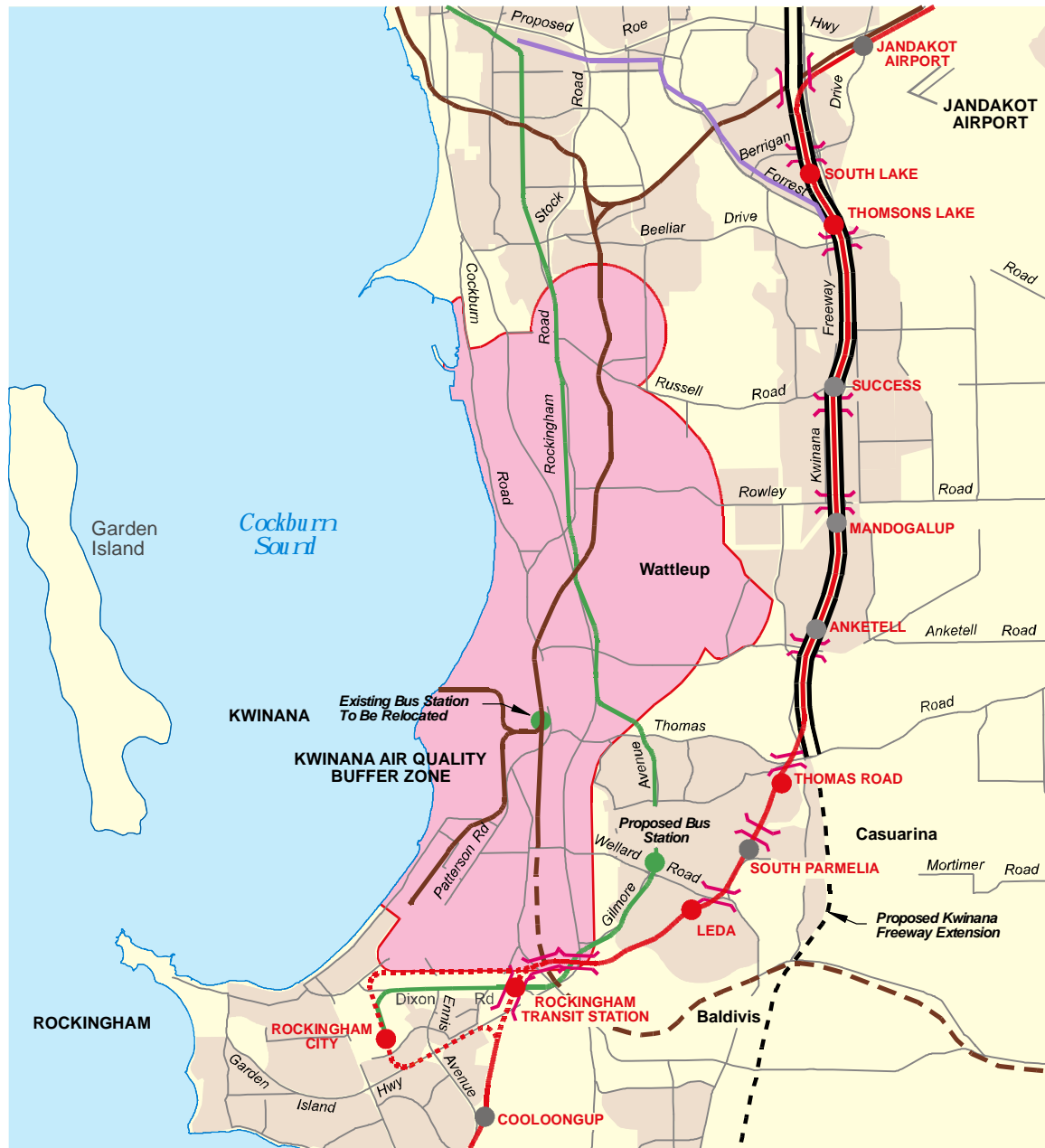
From Waikiki the line will be single track and run on the east side of Ennis Avenue and Mandurah Road, which it crosses with a bridge over Mandurah Road on the eastern side, to Stakehill Road.

South of Stakehill Road the route will run close between Mandurah Road and Anstey Swamp crossing Paganoni Road with a level crossing. Anstey Swamp is an environmentally preserved area which cannot be encroached upon. This will require the main road carriageways to be realigned further west to permit the construction of the railway line within the existing MRS reserve and avoid affecting any of the swamp area. **Figure 32** (opposite).

Thence it will run generally south, diverging to join the line of the median of the proposed Freeway route (Road “A”) through the Meadow Springs residential area to pass under Gordon Road near Kanyana Park. It will then cross to the western side of Fremantle Road in tunnel with a reverse curve to terminate at Mandurah Terminus Transit Station at Allnutt Street, approximately 81.6km from Perth Station.

Provision will be made for future transit stations at Stakehill on the south side of Stakehill Road, at Karnup (the north side of Paganoni Road), Lakelands (opposite Madora Beach Road) and at Gordon Road.

There will be level crossings at Stakehill Road, Paganoni Road and near the future Lakelands Station. These will be protected with automatic boom barriers and lights.



- LEGEND**
- Proposed Passenger Line —
 - SWMR Station ●
 - Future Station ●
 - Proposed Rockingham-Fremantle Bus Transitway —
 - Primary Cross Suburban Transit Link —
 - Existing Dual Gauge Freight Line —
 - Existing Narrow Gauge Freight Line - - -
 - Kwinana Air Quality Buffer Zone
 - Urban Zones
 - Proposed Bridge { }



RAIL ROUTE
Jandakot to Rockingham

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Figure 31

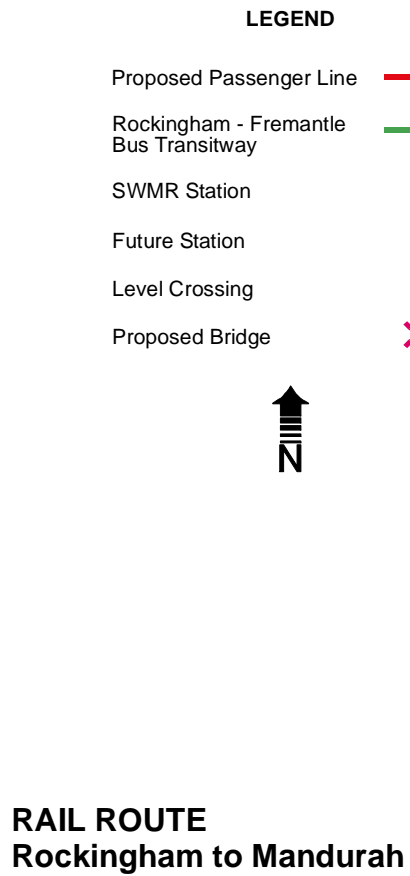


Figure 32

8.1.3 Track Gauge

The South West Metropolitan Railway gauge will be 1067mm, as an extension of the existing Perth Urban Rail system.

8.1.4 Horizontal Alignment

The minimum radius of curvature will be 800m generally on open track except where this is not possible, as through tunnels, the minimum radius is 300m.

The maximum value of applied superelevation will be 100mm. Passenger comfort will be met by limiting the unbalanced lateral acceleration to 0.5 metres per second per second. Transition curve lengths will be generous to enhance comfort.

8.1.5 Profile

The vertical curvature along the railway will be designed to appropriate standards for the line speed and will be limited to a minimum of 5000m radius.

8.1.6 Operating Speeds

The railway will be designed to standards which allow a maximum train speed of 140km/h to be achieved. There will be restrictions where this speed cannot be achieved due to current standards, curvature or other reasons.

8.1.7 Track Layout

The new railway will have two tracks from Beckenham to Safety Bay Road. The line will be single track south of Safety Bay Road to the Mandurah Terminus Transit Station.

A railcar depot for repairs, maintenance, cleaning and sidings for overnight stabling, and minor maintenance attentions can be constructed in East Rockingham, just south of Wellard Road and on the western boundary of the Kwinana-Mundijong railway reserve.

8.1.8 Track Structure

The track will be constructed for a 16 tonne axle load, generally with new 50kg/m standard carbon rail fastened with resilient fastenings on concrete sleepers and crushed rock ballast. Long rail strings will be field welded into continuous lengths to ensure a quiet stable ride with minimum maintenance.

8.1.9 Structures and clearances

The bridges and tunnels on the new route will conform with Westrail and Main Roads WA practice and standard clearances.

8.1.10 Utility Service Alterations

There are a number of locations where major utility services impinge upon the proposed railway works. In addition to these major services there are numerous individual small services and connections which will have to be dealt with in the normal progress of the works to avoid or minimise disruption to their individual users.

Some major utility services are affected at several locations. They require diversion or protection works and include electric power, water, gas and fuel pipelines. These required changes are covered in detail in associated reports.

In some cases there will be a need to negotiate with the utility owner on the proportion of the cost of the works. While there have been preliminary discussions with the utility operators in order to identify the scope and scale of the work required, it will be necessary to commence full scale

negotiations as soon as formal authorisation of the South West Metropolitan Railway project is given by the State Government.

8.1.11 Fencing and Guard-Rails/Road Vehicle Safety

These will be provided in accordance with standard Westrail and MRWA practice. Where the railway is in the centre of the freeway there will be no fencing as the freeway is already a restricted area. Allowance has been made for link mesh fencing 1.8m high to be erected along the rest of the line with lower height aesthetically appropriate fences in transit station precincts.

Crash barriers will be required along the Kwinana Freeway and in other locations where there is a likely conflict between the railway and parallel road traffic.

8.1.12 Screening

Wherever there are bridges and structures over the track, screens will be provided to standard Westrail practice to prevent persons on the structure from touching live conductors and to discourage vandalism.

8.1.13 Earthing and Bonding

This will be provided in accordance with standard Westrail codes.

8.1.14 Level Crossings

There are a number of existing level crossings on the Perth to Kenwick section of the Armadale line which will be subject to a greatly increased train frequency. These have been examined in view of the increased rail traffic and its effects.

The Lord Street level crossing will be eliminated with an overbridge, as part of the Graham Farmer Freeway Project and the rail tracks lowered marginally.

The level crossing at Moore Street will be unsustainable and if a continuous road connection is to be retained, then a road overbridge connecting Roe Street and Moore Street is the most feasible option. Funds have been allowed for this.

There are eight level crossings between Victoria Park Station and Kenwick which are affected. (Refer to **Figure 28** previously).

Through consultation with the Town of Victoria Park, the City of Canning and Main Roads WA, a strategy has been developed for alleviating this situation.

The level crossing at Bishopsgate Street, Victoria Park, will be closed. A new pedestrian crossing of the railway will be provided between Howick Street and Clydesdale Street, Lathlain. A new road over rail grade separated crossing will be constructed nearby on the alignment of Miller Street/Roberts Road.

The level crossing at Mint Street/Archer Street will remain but will be augmented by a footbridge in conjunction with works at Carlisle Station. The level crossing at Oats Street, Victoria Park will be closed and replaced by a form of rail/road grade separation crossing yet to be determined. (Refer 8.3.5.6.4 below). Similarly the level crossing at Welshpool Road will be closed, and a rail over road grade separation provided.

Level crossings at Hamilton Street and Wharf Street will remain.

The existing gated pedestrian level crossings at Queens Park will be replaced with a footbridge. A new road bridge crossing over the railway will be constructed at Gerard Street. The level crossing at Crawford Street will be closed.

The level crossing at William Street will remain but will be supplemented with a pedestrian underpass to facilitate local movement and access to Beckenham Station. This is conditional on the Roe Highway being extended to Nicholson Road.

The existing pedestrian level crossing between Beckenham Street and Dulwich Street will be closed and replaced with a pedestrian overbridge. The pedestrian level crossing at Ladywell Street will be closed.

On the freight line there are existing level crossings at:

- Albany Highway, Kenwick;
- Spencer Road, Gosnells;
- Nicholson Road, Gosnells;
- Karel Avenue/Hope Road, Jandakot.

These level crossings will be eliminated with the construction of road over rail grade separations as detailed in the following sections on Structures and Stations.

Side roads south of Waikiki intersected by the line at Mandurah Road, Stakehill, Road, Paganoni Road and near the future Lakelands Station will have level crossings protected with automatic boom barriers and lights.

8.2 STRUCTURES: BRIDGES AND TUNNELS

Works for construction of bridges or tunnels are required at:

8.2.1 Perth to Beckenham

Barrack Street, Perth

Moore Street

Howick Street - footbridge

Miller Street/Roberts Road

Mint Street/Archer Street (footbridge)

Oats Street

Welshpool Road

Queens Park Station (footbridge)

Guthrie Street/Gerard Street

William Street (pedestrian underpass)

8.2.2 Beckenham to Thomsons Lake:

Beckenham Street/Dulwich Street (footbridge)

Kenwick (tunnel)

Canning River (rail bridge)

Spencer Road

Nicholson Road

Ranford Road

Karel Avenue/Hope Road

Jandakot (tunnel)

8.2.3 Thomsons Lake to Rockingham:

Berrigan Drive

Beeliar Drive

Russell Road

Rowley Road

Anketell Road

Anketell (tunnel)

Johnson Road (footbridge)

Thomas Road

Challenger Drive

Wellard Road

Transitway (rail bridge)

Mundijong - Kwinana Railway (rail bridge)

Mandurah Road north (rail bridge)

Rockingham Area

These are covered in Section 4.

8.2.4 Rockingham to Mandurah:

Safety Bay Road

Mandurah Road south (rail bridge)

Gordon Road

Fremantle Road (tunnel)

8.2.5 Ranford Road Bridge

When this structure was duplicated in 1998 to carry the southbound traffic along Ranford Road, agreement was reached between Transport, Main Roads WA and Westrail regarding the following;

- the ultimate track layout which would comprise two narrow gauge passenger and two dual gauge freight lines, with the passenger lines generally assuming the alignment of the existing dual gauge tracks, with the dual gauge tracks being relocated adjacently on the northern side of the railway reserve;
- an additional opening to be provided on the new bridge to accommodate the realignment of the existing freight tracks to the north of the present track alignment;
- that the road level on the new bridge would be the same as on the existing bridge so as to stay within acceptable vertical geometry standards for the road, and because the cost of raising the bridge deck to accommodate clearances for the freight railway at the additional opening provided would be at least as much as lowering the freight

railway, notwithstanding the presence of a major water pipe beneath the tracks; and

- that should Westrail declare the need to operate freight traffic through that area at heights greater than those afforded by the existing situation, even before the passenger lines are required, then this would be done in a timely manner by realigning the two freight tracks through the additional opening provided. *(Note that this also implies agreement to construct an additional opening under the original bridge which now carries the northbound traffic along Ranford Road)*

8.2.6 Spencer Road, Thornlie: Provision for lowering of the Freight railway

Provision has been made in the Metropolitan Region Scheme (MRS) for the future construction of a road bridge over the Woodbridge to Kwinana freight railway dual gauge tracks at Spencer Road, Thornlie. This bridge is now essential given; the need to build two new narrow gauge tracks for the South West Metropolitan Railway alongside the freight lines; an increase in the number of trains using the crossing from less than 20 at present to over 200 each day with the advent of passenger services to Rockingham; and a projected 30,000 road vehicles using the crossing each day by 2006.

To accommodate the future ultimate height clearance for freight trains and to produce a road bridge that impacts least on the surrounding community, the freight tracks will be lowered by up to 1.8 metres through the crossing. The passenger lines and station will be built at existing ground level to ensure that the station is highly visible and the access well integrated with the roads and approach ways.

8.2.7 Victoria Park to Carlisle Grade Separation Study

The Master Plan initiatives in the Victoria Park to Carlisle area have been accepted by the Town of Victoria Park although there is local community concern regarding the impact of one of the proposals in the area, namely the retention of the level crossing at Mint/Archer Streets.

Transport and the Town of Victoria Park have agreed to conduct a planning study to examine the option of elevating the railway through Victoria Park and Carlisle.

A multi-disciplinary team of town planning, environmental / social and engineering consultants headed by Bruechle Gilchrist & Evans Pty Ltd has been engaged to carry out this study. The study commenced in late March 2000 and a final report will be available for consideration by June 2000.

8.2.8 Kenwick Tunnel works

In 1995, the government confirmed it would extend the existing suburban railway to at least Beeliar Drive in Jandakot within 10 years. In recognition of the need for a railway tunnel at Kenwick to link the Perth to Armadale railway with the line to Mandurah, and the interdependence of this tunnel with planned major road works at Kenwick, Cabinet also approved the construction of the essential elements of the railway tunnel as part of the road programme.

The essential parts of the tunnel are now under construction as part of the Kenwick Joint Project. This project includes; construction of the now completed Kenwick Link Road; construction of the required sections of the railway tunnel; a bridge to carry the Perth to Armadale passenger lines over Roe Highway and an increase in the existing rail passenger bridge clearance over the freight railway; realignment and bridging of Albany Highway over the extension of Roe Highway and the existing freight lines; and extension of Roe Highway to the Kenwick Link Road (refer Figure 29, p 67).

The Kenwick Joint Project will be completed in 2001.