# **Discussion Paper**

# High Speed Rail Through Sydney

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#### Foreword

- Fastrack Australia is a not-for-profit association promoting the concept of high-speed rail in South-East Australia, linking two-thirds of Australia's population in the corridor between the Sunshine Coast and Geelong.
- Fastrackaustralia receives no funding from government or the private sector. Its work is undertaken on a voluntary basis.
- Our approach differs somewhat from earlier proposals, such as the 2013 High Speed Rail Study, in terms of:
  - Objectives
  - Staging
  - Services
  - Route
- This report focuses on the last issue in particular the route through Sydney. The proposals in this report are intended for discussion and to encourage government to undertake further detailed investigations, including of geotechnical and other aspects, which are beyond the scope of this report.
- Previous reports and presentations cover the other issues in more detail and are available on the <u>www.fastrackaustralia.net</u> website.

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# Executive Summary

#### The route through Sydney proposed in the 2013 High-Speed Rail Study:

- Was the most expensive part of the whole Melbourne and Brisbane corridor because of topography and urban development
- Included 90 km of tunnels between Douglas Park (south of Sydney) and Ourimbah (in the Central Coast)
- Used Central for the main High Speed Rail station, with other stations near Glenfield and at Hornsby

#### Since 2013 a number of developments suggest a new route for High-Speed Rail is needed, including:

- Population and Employment growth both in the Sydney basin and beyond
- New constraints and opportunities in South-Western Sydney
- The construction of new East-West Metro lines in Sydney

#### This Discussion Paper suggests a new Route via Olympic Park would have major advantages, including:

- 13km less tunnel and cost savings in today's dollars of around \$6 billion
- Improved access to Sydney and the Central Coast
- Provision of a fast new North-South Route through Sydney
- Ability to accommodate fast freight trains on parts of the High-Speed Line at night
- Reduced operating costs by using stabling and maintenance facilities at Flemington

This report details why the new route is needed, together with alignment, operations and station designs. However further detailed geotechnical and other studies would be needed to confirm the route.

#### The Old and the New Route

The proposed fast new north-south route through The previously proposed route through Sydney involved a terminus at Central, accessed by lengthy tunnels, and Sydney, has the main HSR station at Olympic Park, less Hawkesbury tunnelling and better connections. had limited connections. River **High-Speed Line High-Speed Line** Station on HSR Line Station on HSR Line Figure 21 Preferred alignment to Central Station, Sydney HORNSBY 16 Hornsby Northern Li Epping Penrith Parramatta PARRAMATIA Olympic Park Lidcombe Sydney Western Line Aerotropolis Liverpool Bankstown Glenfield Campbelltown NTS Surface alignment 0 Station site KEY Tunnel alignment 5 Excluded surface alignment — — Excluded tunnel alignment

## Key Benefits

Category	Benefit of Proposed Route Versus 2013 Study Route
Construction Cost	<ul> <li>Shorter overall route and less tunneling</li> <li>\$6 billion saving in estimated construction costs</li> </ul>
Accessibility	<ul> <li>Improved HSR access to Western Sydney, Central Coast</li> <li>Fast new cross-city routes benefits internal Sydney travel as well</li> </ul>
Environmental	<ul> <li>No impact on Koala habitats east of Campbelltown</li> <li>Low noise impacts</li> <li>Reduced carbon emissions</li> </ul>
Operations	<ul> <li>Proximity to Flemington Stabling / Maintenance Facility</li> <li>Additional Stabling at at Olympic Park.</li> <li>Enables fast freight trains to use parts of the high-speed route</li> </ul>
Flexibility	<ul> <li>Facilitates staged construction from both the North and the South</li> <li>Enables progressive service enhancements as each stage is completed</li> </ul>
Equity	<ul> <li>Reinforces key existing urban centres</li> <li>Creates new opportunities for development</li> <li>Encourages a more equitable city.</li> </ul>

# Rethinking The Route



## The 2013 Route

The Route through Sydney proposed in the 2013 Study:

- Approached Glenfield from the south-West, passing to the East of Campbelltown.
- Then tunneled all the way to Central.

The route to the north:

- Tunneled all the way from Central to Thornleigh, just south of Hornsby Station. underneath the existing main northern line
- Included stations at Central, east of Glenfield, and at Hornsby.



## The 2013 Route (cont.)

Between the approaches to Sydney from Douglas Park in the South and Ourimbah in the north, there were five main sections (see table below).

Total cost for the 156 km including stations and major bridges etc. was over \$20 billion in \$2012 (Table 1), making it likely to be of the order of \$40 billion today.

The costs / km for each section closely reflect the amount of tunneling required, and a total of 90km of tunnels was required.

Table 1

Section	Total Length km	Of Which Tunnel km	Cost 2013 \$ billion	Tunnel %	Cost / km \$ million	Stations							
1 Douglas Park - Moorebank	39.7	4.3	2.8	11%	\$71	Glenfield							
2 Moorebank - Central	31.1	31.1	5.5	100%	\$177	Central (low level)							
3 Central - Thornleigh	31.1	29.1	5.5	94%	\$177	Central (high level)							
4 Thornleigh - Mt Kuringgai	11.1	8.2	2.0	74%	\$180	Hornsby							
5 Mt Kuringgai - Ourimba	42.9	17.2	4.8	40%	\$112								
Total	155.9	89.9	20.6	58%	\$132								

Map 2: 2013 HSR Alignment through Central Coast and Sydney



The high cost of going through Sydney and the Central Coast is reflected in the graphs below, taken from the 2013 HSR Study. The segments from Sydney to the Central Coast, and Sydney to the Southern Highlands were much more expensive per km than the rest of the route, primarily because of the amount of tunneling adopted in the preferred route and the cost of Central Station.



## Need for a Re-Think

#### **Developments in South-West Sydney**

- Urban Development and environmental concerns in South-West Sydney provide new constraints on route options and suggest a new alignment is needed
- The development of a major Logistics centre at Moorebank provides new opportunities for fast freight trains to use the high-speed line

#### **Avoiding Central**

- The original route was expensive, involving significant tunneling to reach Central Station
- Modifying Central for the HSR terminal was expensive and is now in doubt from new proposals for its redevelopment.

#### **Avoiding Hornsby**

• Avoiding the climb up to Hornsby makes sense.

#### **Improving Access**

 Only three stations were proposed, limiting access to the HSR system from the wider Sydney and Central Coast Regions.

#### Wider Changes

 Changes in population and employment and new metro lines since 2013 provide new requirements and opportunities.





## South-West Sydney

New challenges and Opportunities

- Urban Development is currently underway and planned south of Campbelltown at Wilton. This may limit the previously preferred route.
- However, it also increases the need for a suitably designed HSR corridor which can provide fast commuter services to these areas.
- There are also concerns at impacts on Koala populations east of Campbelltown
- These provide further constraints on the original alignment, which traversed prime Koala habitat.
- The previously proposed Glenfield HSR station had poor connectivity to the existing station, limiting connections with the rail system.
- The previous alignment was also designed only for passenger trains, and had no potential for handling fast freight trains, for example from the new Moorebank Logistics centre.



## Avoiding Central

There are major drawbacks from using Central as Sydney's HSR Station:

- **Poor Access to Western Sydney.** Western Sydney residents would have had to travel all the way to Central to access High-Speed Rail.
- Terminating Trains. All HSR trains were required to terminate at Central and change trains, inconveniencing passengers travelling through Sydney.
- More platforms. Terminating trains meant all passengers disembarking, increasing dwell times for trains, necessitating 10 platforms.
- **Expensive Rebuild.** An expensive rebuild of Central in two levels was required to to accommodate the 10 platforms on two-levels.
- Poor road access and lack of parking. This would would limit usage of HSR compared to flying, with extensive long-stay parking at Sydney's Airports.
- **Expensive operations.** The nearest stabling site for HSR trains is at Flemington some 14km away, necessitating additional tunnels and involving additional congestion on the HSR rail lines.
- New Development Plans. Since 2013 new plans for redeveloping over Central Station have been developed which would make a high-speed rail station difficult to incorporate.



#### 2023 Plans for Building over Central



#### 2013 Study Plans for Central



# <image>

## Avoiding Hornsby

- The existing rail line from Sydney to the North was forced to wind up to Hornsby and Berowra, 200m above sea level, and then wind down to the Hawkesbury River via the notorious Cowan bank, with 2.5% grades and 80km/hour curves.
- This line is unsuitable for high-speed trains and uncompetitive with the Pacific Motorway., which has speeds of 110 km/hour and a shorter route, further improved with the Northconnex tunnel.
- The Previous HSR corridor proposed tunnels from Central to Thornleigh near Hornsby, then on the surface to Mt Kuring-gai, then tunnels back down to the Hawkesbury River.
- Experience with major tunneling projects in Sydney (such as Northconnex, Australia's deepest road tunnel) and overseas suggest new tunneling options which avoid the climb up to and back down from Hornsby.



#### Improving Access

The 2013 HSR Study proposed only three HSR stations between the Southern Highlands and Ourimbah:

- 1. Glenfield (Sydney South HSR Station)
- 2. Central Station (Main Sydney HSR Station)
- 3. Hornsby (Sydney Northern HSR Station)

This provided relatively limited access to the HSR network from much of Sydney and the Central Coast. For example:

- The proposed HSR station at **Glenfield** was not well integrated with the existing station, limiting rail access to South-Western Sydney.
- Passengers from **Western Sydney** would have needed to travel to up to an hour to Central to access the HSR.
- Access to NW Sydney and areas such as Macquarie Park was poor.
- Passengers from **Gosford or Woy Woy** would have to travel back to Ourimba to board HSR trains to get to Sydney.



#### Parramatta is rapidly growing as Sydney's second CBD

#### Other Changes

There have been significant changes in both Sydney and its region, which suggest a new route through Sydney is needed:

**Population and employment** have shifted westwards, with major developments at locations such as Parramatta, Macquarie Park, Olympic Park, etc.

•

- **Major east-west metros** (NW Metro; City and SW; Metro West) are now built or under construction. These provide new opportunities for interchanging with High-Speed Rail.
- Cities are growing both to the north and south of Sydney (Central Coast, Hunter, Illawarra, Southern Highlands, Canberra).
   This means more north-south movement through Sydney, rather than just movement to and from Sydney.



Future growth in the Sydney Region Future growth in both employment and population in Sydney will include:

- Strong growth along major rail transport routes
- Growth in eastern, central and western Sydney regions

The centre of both employment and population is already close to Olympic Park and will remain so.



# Benefits

#### **Cost Savings**

Table 1 (page 9) showed the capital cost estimates for the original route in \$2012 as \$20.6 billion. Since then, the cost of major infrastructure projects has escalated significantly, of the order of 100%. Table 2 estimates the costs for each section in \$2023 assuming costs double overall to \$41.2 billion .The estimates by section assume \$100m per km for the route (\$300m when in tunnel), plus extra costs for stations and the key Hawkesbury River Bridge).

Section	Total Length km	Of Which Tunnel km	Cost 2012 \$ Billion **	Extra	Assumed \$ Billion	Total Cost \$ Billion
1 Douglas Park - Moorebank	39.7	4.3	\$4.8	Glenfield	\$0.6	\$5.4
2 Moorebank - Central	31.1	31.1	\$9.3	Central (a)	\$2.0	\$11.3
3 Central - Thornleigh	31.1	29.1	\$8.9	Central (b)	\$2.0	\$10.9
4 Thornleigh - Mt Kuringgai	11.1	8.2	\$2.8	Hornsby	\$1.2	\$4.0
5 Mt Kuringgai - Ourimbah	42.9	17.2	\$7.7	Bridge (c)	\$1.8	\$9.5
Total	155.9	89.9	\$33.6		\$7.6	\$41.2
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Table 2

\*\* Estimated Costs exclude stations and major bridges. (a) Cost of Central bi-level station split. (b) Hawkesbury R Bridge

Table 3 provides estimates for the proposed new route using the same unit costs. Costs for the proposed stations are estimated based on their size, location (underground, cut and cover, above ground) and complexity. This suggests the new route would be around \$6 billion cheaper than the previous route via Central station.

Section	Total Length km	Of Which Tunnel km	Cost 2012 \$ Billion **	Extra (a)	Assumed \$ Billion	Total Cost \$ Billion	
(a) Douglas Park to Macarthur	27.0	0.0	\$2.7		\$0.0	\$2.7	
(b) Macarthur to Glenfield	10.0	0.0	\$1.0		\$0.0	\$1.0	
(c) Glenfield to East Hills	12.0	0.0	\$1.2	Glenfield	\$0.4	\$1.6	
(d) East Hills to Bankstown	7.0	6.0	\$1.9	Bankstown	\$0.8	\$2.7	
(e) Bankstown to Lidcombe	6.0	6.0	\$1.8	Lidcombe	\$0.6	\$2.4	
(f) Lidcombe to Olympic Park	6.0	1.5	\$0.9	Olympic Pk	\$1.2	\$2.1	
(g) Olympic Park to Homebush	3.0	1.5	\$0.6			\$0.6	
(h) Homebush Bay to Epping	8.5	12.0	\$3.3	Epping	\$1.5	\$4.8	
(i) Epping to Hawkesbury River	28.0	26.0	\$8.0	Hawks R	\$0.2	\$8.2	
(j) Hawkesbury R to Ourimbah	24.5	24.5	\$7.4	Bridge (c)	\$1.8	\$9.2	
TOTAL (incl STATIONS)	132.0	77.5	\$28.7	\$-	\$6.5	\$35.2	
** Estimated Costs exclude stations	(a) For station	s exceent for H	er Bridge	(b) Hawkesbury B Bridge			

Table 3

## Accessibility

- Sydney is developing as a multicentered city, with five major east-west routes.
- However, it lacks fast north-south routes.
- The proposed HSR route would complement existing and potential heavy rail, metro and light rail/busway networks.
- Key interchanges (each with five or more potential lines) would allow many more efficient cross-Sydney travel options
- By 2075 Sydney could have a much more complete public transport network. Apart from the high-speed line, additional options include:
  - Extension of heavy rail from Leppington to Second Sydney Airport
  - Extension of the SW Metro to Liverpool and beyond; Metro West to Maroubra and to SSA; and NW Metro to St Marys and to Mona Vale.
  - Extension and inter-connection of the existing South-East, Inner West and Parramatta light rail networks to expand the coverage of the primary transit network
  - Selected busways in lower density corridors (e.g.Olympic Park – Rhodes – Macquarie Park – Gordon).



#### Environmental

- The proposed route to the South uses the existing rail corridor between East Hills and Menangle Park. This minimises impacts on the natural environment, including the key Koala habitat areas east of the Campbelltown area.
- The route also minimises noise impacts, with most of the alignment between East Hills and Hawkesbury River being underground, and with the Glenfield to Menangle Park section in the existing rail corridor.
- The route also facilitates shifting freight from road to rail. Rail is three times more energy efficient than trucks, would be electrically hauled and use green energy, contributing to reduced carbon emissions.



South-west Sydney - Regional Koala Conservation Partnership





## Efficiency

The proposed Olympic Park Station location provides excellent access to key opportunities for stabling and maintenance facilities for trains using the high-speed line:

- Flemington is currently the key maintenance centre for Intercity Trains. However much of the space required will become redundant shortly when the Kangy Angy Maintenance facilities in the Central Coast are activated.
- It would also be possible to repurpose the existing Olympic Park station to store at least seven 200m long high-speed trains.
- Both facilities are extremely close, require no new track to provide access, and allow for efficient operations, minimising operating costs.
- It would also be possible to build over the Olympic Park station site, providing a site of approximately 200 m \* 40 m or 0.8 hectares in the very heart of Olympic Park, with high commercial value.



Kangy Angy Maintenance Facility, due to come on-line soon.



Flemington can be repurposed for High-Speed Rail

## Flexibility

The proposed route through Sydney, including the key Olympic Park Station, can be staged in a number of ways, as part of the wider East Coast Network:

- The route from the South (Glenfield to Olympic Park) is not expected to be needed until the volume
  of high-speed rail trains from Canberra, Melbourne, the Southern Highlands and Wilton / Kiama reach
  a certain level. However, the Macarthur Glenfield and Douglas Park Macarthur sections are likely
  to be needed earlier.
- The route from the North can also be staged. It is suggested that the first stage should be West Ryde

   Epping Hawkesbury River, as this would greatly accelerate commuter trains from the Central Coast
   and Newcastle as well as accelerating overnight fright trains. The section between Epping and
   Olympic Park, together with its link to Flemington, could be built subsequently as volumes of traffic
   from the north built up
- The HSRA has so far indicated it intends Sydney Newcastle as its first Priority. However, it will take some time to investigate, design and then build the long tunnels required. It is therefore considered that while the investigation and design of the Sydney – Newcastle route is underway, that the Wentworth deviation to the South (Macarthur – Mittagong) be built first.

Actual construction of the proposed route between Glenfield and Epping is not expected to be required for some time. However, it is critical that the alignments and station designs be resolved and necessary corridors protection measures be put in place urgently.

- This will be simplified by the existing rail corridors between Glenfield and East Hills, and between Olympic Park and Lidcombe. It will also be simplified by the fact that much of the rest of the route through Sydney will be in tunnel.
- Urban development is already threatening potential corridors south of Sydney. New developments in town centres in Bankstown, Lidcombe, Olympic park and Epping could cause construction difficulties in the future, greatly increasing costs or reducing the efficacy of proposed solutions.
- Failure to accelerate planning for HSR could jeopardize its future potential. The time to act is now



## Operations

#### Stage N1: West Ryde – Hawkesbury River.

Re-route Long-Distance and most Central Coast and Newcastle Intercity trains (and fast freights at night) via the new tunnel

#### Stage N2: Build Epping – Lidcombe.

Modify Flemington as the Maintenance Centre. Run Long-Distance, most Central Coast and Newcastle Intercity Trains into Olympic Park. Introduce Fast Suburban service Epping – Lidcombe.

#### Stage N3: Hawkesbury River to Tuggerah.

Re-route Newcastle Intercity and Long-Distance services via the high-speed line. Introduce Central Coast – Olympic Park service via Gosford, Woy Woy and HSR line from Hawkesbury River.

#### Stage N4: Extend to Newcastle HSR station

Re-route Long-Distance Services via Newcastle HSR Station, but keep Newcastle Flyer services starting from Newcastle Interchange Station.

TrackStationsExistingExistingHigh-SpeedHigh-SpeedConnectingCombined

The route through Sydney also allows flexibility in operations. For example, operations to the North can be built up in stages as the infrastructure is extended, as shown below.



#### Equity

- The power of rail infrastructure to influence development is clearly evident in Sydney.
- Major new developments in the CBD, North Sydney and Crows Nest are following the new metros <u>https://www.theurbandeveloper.com/articles/sydn</u> ey-major-development-projects).
- The proposed route would widen Sydney's development opportunities by:
  - reinforcing other key centres (Olympic Park, Bankstown, Epping).
  - Creating opportunities for key new or expanded centres at Glenfield and Lidcombe.
- These will help Sydney develop as a multicentered city, reducing overall commute times and creating a more equitable distribution of opportunities.



New developments planned for Sydney CBD (left) and North Sydney (right). Potential new developments envisaged for Bankstown (below)



# Alignments

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#### Proposed Sections

This section describes the alignments suggested for the route between Douglas Park (south of Macarthur) and Ourimbah (north of Gosford). It is divided into ten sections:

- a) Douglas Park Macarthur
- b) Macarthur Glenfield
- c) Glenfield East Hills
- d) East Hills Bankstown
- e) Bankstown Lidcombe
- f) Lidcombe Olympic Park
- g) Olympic Park Homebush Bay
- h) Homebush Bay Epping
- i) Epping Hawkesbury River
- j) Hawkesbury River Ourimbah

A following Section provides more details on proposed station designs.



A suburban train on the Olympic Park loop approaching the location of the proposed Olympic park HSR station.

## (a) Douglas Park – Macarthur

The new HSR line is the first section of the Wentworth Deviation \* between Macarthur and Mittagong

- It runs from a point near Douglas Park to Menangle Park, close to the existing line but with a straighter alignment, allowing much higher speeds.
- A new high-speed line bridge over the Nepean River is required just south of Menangle Park.
- The high-speed line would continue parallel with and the existing line to Macarthur station, where it would run to the north-west of Platform 3.
- The high-speed line would be electrified at 25 KV AC as far as Macarthur.
- Gradients up to 2.2% would be allowable on the highspeed line given the high power available from 25 KV AC.
- \* (See separate report on the Wentworth Deviation):



Looking south from Macarthur Station. The existing main lines are to the left, Platform 3 terminating track and freight line to the right

## (b) Macarthur - Glenfield

This section involves:

- Adding two tracks to the existing 3track line. Two alternative options are proposed for achieving this (see subsequent diagrams)
- Both options involve converting existing platforms on stations between Campbelltown and Glenfield to island platforms and removing the remaining platforms.
- Modifications would be needed at Campbelltown to stabling facilities, and additional trackage and platforms would be required at Glenfield, as detailed later.



Campbelltown Station looking south, showing entry to stabling yard. Platform 3 is on the left, and the freight line is on the far right.

#### **Option 1: High-Speed on the Western Side**



**Option 2: High-Speed on the Eastern Side** 



## (c) Glenfield – East Hills

The proposed alignment:

- Parallels the East Hills line (preferably just to the north) from Glenfield to the Georges River.
- Runs between Holsworthy station and car park
- Crosses the Georges River parallel to the existing crossing
- Continues past East Hills entering a tunnel between there and Revesby station.
- The alignment is very straight and almost level, allowing potential speeds of 150 km/hour through most of its length.

There is space within the rail reserve for the two extra tracks, although some modifications may be needed. For example:

- Holsworthy station may need to be rebuilt as an island platform, or alternatively part of the car park may need to be removed
- East Hills station may need to be moved further East to provide space for the two additional tracks.



New Freight line to Moorebank Logistics centre, from the East Hills line (left), and Holsworthy car park (right) photographed from the East Hills line.



#### (d) East Hills - Bankstown

It is proposed that the high-speed line: alignment would enter a tunnel east of East Hills station, then run to Bankstown, in part under existing roads such as Chapel Road.

At Bankstown there would be an underground station providing access to the City and South-West Metro station and the existing station for suburban trains.

- However, the opportunity might be taken to convert the Bankstown – Cabramatta Junction – Lidcombe suburban rail lines to automated light rail, with shorter, un-manned stations.
- This would simplify duplication of the freight line through Leightonfield, which will be needed to handle increased freight train volumes over time.
- It would also enable long-term extension of the metro line to Liverpool via Bankstown aerodrome.



Bankstown City Centre is planned for a major upgrade under the



### (e) Bankstown - Lidcombe

The high-speed line would continue in tunnel for approximately 6 km from Bankstown to Lidcombe, under Chapel Street and Joseph Street. The alignment is mostly straight and again would enable speeds of at least 160 km/hr.

At Lidcombe the line would curve to the north-west, passing under Lidcombe station and connecting to the existing rail corridor to Olympic Park. An underground station at Lidcombe would enable connections to the main Western Line both East and West, and to the Bankstown and Cabramatta Junction to Lidcombe line Lidcombe is already a significant sub-centre and has potential for further development given its key location in Sydney and extensive low-rise commercial development.



Lidcombe

RAILWAY SH

Rookwood

BORONIA RD

Mount Lewis

Greenacre

VAUGHAN ST

Berala

## (f) Lidcombe – Olympic Park

- The proposed HSR line would run from Lidcombe Station to Olympic Park using the existing surface rail corridor.
- This corridor will no longer be necessary for current Olympic Park services which will be replaced by Metro West and HSR Line suburban services (see later discussion)
- A significant part of Flemington Rail facilities will become redundant once the Kangy Angy Interurban maintenance facility on the Central Coast is utilised for the new fleet of Interurban trains. However, it should be retained for rail use as it would provide the ideal facility for the High-Speed line.
- An already existing grade separated junction just north of Flemington would provide fast and convenient access to Flemington Intercity Stabling, part of which would be redeveloped as High-Speed Rail stabling.
- It would also avoid any interference with freight train operations.
- The existing rail overpasses over Parramatta Road and the M4 would be used.



## (g) Olympic Park – Homebush Bay

- The Olympic Park station would be above the Metro West Line and close to the Metro station. From there, the HSR line north would cross over Australia Avenue, then drop at 2.5% using one of two suggested alignments, to run under the Parramatta River
- The line would be in a cutting or tunnel from approximately 1.2 km south of Homebush Bay to Epping, with the roof of the tunnel approximately 20m below water level where it enters Homebush Bay
- The more direct alignment under Homebush Bay is preferred, subject to detailed analysis of construction techniques to minimise any issues with contaminated sediments.
- The tunnel roof could be as deep at 30m below water level when crossing the Parramatta River. The preferred horizontal and vertical alignment would be finalized following more detailed geotechnical analysis.





View over Homebush Bay from the south. Wentworh Point on the left; Rhodes on the right. Red route would go under Homebush Bay.



View of Archery Centre on right, and Wentworth Point Apartments on right. Orange route would run between them.

## (h) Homebush Bay – Epping

Two alternative alignments are suggested for further evaluation.

• The first option Runs under Homebush Bay, then underground to Epping, with the underground connection to West Ryde near Denistone

Option (a) Option (b)

Connection

Denistone

West

Eastwood

Denistone

Meadowbank

- The second option is further west
- Both options provide similar functionality. Detailed investigation of tunneling conditions would be needed to resolve the best alignment.

Epping is already a major centre, with further development is expected given its strategic rail connections. It is the logical location for a northern Sydney High-Speed Rail station.



## (i) Epping – Hawkesbury River

- The Proposed High-Speed alignment north of Epping would be in tunnel all the way to Hawkesbury River, a distance of approximately 26km
- The tunnel would be fairly deep, with a gradients of under 0.5%, allowing low curvature and high speeds.
- The line would emerge at the western end of Hawkesbury River station, run across the Causeway at grade, then enter two singletrack tunnels through Long Island.
- It would cross the Hawkesbury on two single track bridges (one each side of the existing bridge, being careful to avoid the heritage listed piers of the original 1888 bridge.
- The line would then continue in tunnel north of the Hawkesbury



#### (j) Hawkesbury River - Ourimbah

- The final part of the proposed alignment would continue in tunnel, west of West Gosford and Kariong.
- It would follow the red route alignment examined in the 2013 study.



# Services



#### Variety of Services

Overseas experience suggests a variety of services can be accommodated on high-speed lines, e.g.

- In Japan, Nozomi, Hikari and Kodama services operate with different stopping patterns and average speeds. The fastest trains overtake slower services at certain stations. Up to 15 services per hour operate in each direction on the busiest line between Tokyo and Osaka
- In the UK, the HS1 line serves both long distance Eurostar services to Paris and other European destinations, as well as fast commuter services to Kent.
- In Spain, a variety of services with different stopping patterns, fare structures, operators and destinations operate, as shown opposite for the destination board at Atocha station, which shows:
  - A range of destinations
  - Three different operators (Renfe, Ouigo and IRYO)
  - Four types of high-speed trains (Renfe provides AVE trains as well as lower fare, somewhat slower, Avant services).



13 20	Salidas   DEPARTURES			adif
Нога	Destino	Tren I TRAIN	Número Vía NUMBER PLATFORM	Observaciones OBSERVATIONS
13:25	FIGUERES VILAFANT	renfe AVE	19725 <b>3</b>	PLTA.PRIMERA
13:45	TOLEDO	<b>renfe</b> Avant	08132	PLANTA BAJA
14:00	SEVILLA-SANTA JUSTA	renfe AVE	02140	PLTA.PRIMERA
14:15	BARCELONA SANTS	ouigo	06741	PLANTA BAJA
14:15	PUERTOLLANO	<b>renfe</b> Avant	08140	PLANTA BAJA
14:25	MURCIA	renfe AVE	05742	JEROS DESTINO
14:25	BARCELONA SANTS	iryo	06141	PLTA.PRIMERA
14:30	FIGUERES VILAFANT	renfe AVE	03143	PLTA.PRIMERA
14:35	MÁLAGA M.ZAMBRANO	renfe AVE	02142	PLTA.PRIMERA
30				

#### Likely Demand

An earlier Fastrackaustralia report\* analysed likely potential passenger demand south of Olympic Park by 2060 of the order of 40 million passengers p.a. using the High-Speed Line south of Olympic Park, including 20 million long-distance passengers and at least 20 million using shorter distance commuting and fast suburban trains.

Typically, this will require about 8-9 trains per hour departing Olympic Park southbound. In peak periods a maximum demand of up to 12 train paths per hour in each direction would be required, with some additional services starting from or returning to stabling.

Slightly higher passenger volumes would be expected on the route north of Olympic Park, with up to 16 trains per hour during peak periods in the peak direction.

\* Fastrackaustralia (2023): Freight and High-Speed Rail

Rome's Termini Station serves a wide variety of passengers. Note the high-quality food and facilities.

## Rollingstock

A variety of rollingstock is expected to be used to handle different types of service.

These would reflect principally the distance to be travelled, comfort levels, track conditions and fare structures.



Examples of high-speed trains: Talgo Dual 250 (left); Alstom Avelia (middle); Stadler Kiss (right).

Type of Service	Typical Destinations	Max Speed	Max Length	Seating Capacity	Other Features	Typical Example
High Speed Express	Melbourne, Brisbane, Gold Coast	250 – 330 km/hour	300 m	Up to 900 (double deck) Up to 600 (single deck)		Alsthom Avelia
Fast Inter- regional	Albury, Goulburn, Armidale	250 km/hr	200 m	Up to 450 (single deck)	Tilting, Dual Power	Talgo 250 Dual
Intercity Express	Canberra, Newcastle	250 – 330 km/hour	200 m	Up to 600 (double deck) Up to 450 (single deck)		Siemens Velaro
Fast Commuter	Central Coast, Southern Highlands	180 – 250 km/hour	200 m	Up to 700 (double deck) Up to 1000 (including standees)		Stadler Kiss 200
Fast Suburban	Epping, Glenfield, Wilton	150 km/ hour	200 m	Up to 900 (double deck) Up to 1300 (including standees)		New Sydney Intercity

#### Olympic Park Station: The Key Hub

- Olympic Park HSR station would be the **Central Point** of the final network, accommodating a variety of services
- However, the majority would be through services (e.g. most Fast Suburban, Fast Commuter and Fast Intercity, as well as some High-Speed Express and Sleeper Services. Most through-services would have relatively short dwell times.
- Relatively few services would terminate or commence at Olympic Park (these would include some long-distance Inter-capital or inter-regional services, as well as some peak-hour commuter and suburban services coming from or returning to Flemington stabling facility)
- Traffic and train volumes north and south of Olympic Park are expected to be fairly evenly balanced.



## Notional Timetables

The key HSR Station at Olympic Park is designed to ultimately handle:

- Up to 16 trains per hour each way between Sydney and Epping, and 8 trains per hour north of Epping
- Up to 12 trains per hour each way between Sydney and Glenfield, and 8 trains per hour each way south of Glenfield.
- Additional movements between Olympic Park and Flemington Stabling and Maintenance Centre.

Dwell times in busy periods would typically be:

- 2 minutes for suburban / fast suburban services between Epping and Glenfield / Wilton
- 5 minutes for Fast Commuter services between Southern Highlands / Kiama and Central Coast
- 5-8 minutes for Intercity Express Services between Canberra and Newcastle
- 5 to 10 minutes for Inter-capital and Inter-regional Expresses to Brisbane, Gold Coast, Melbourne, and Albury.

The indicative timetable shows trains arriving from the south and departing to the north during the busiest period. This would be expected to be between 4:30 and 6:00 pm on weekdays, when commuter and long-distance demands would both be high.

	ARRIVAL			DEPARTURES (To North)							
Arrives	From	Service	Plat	Cleared	Dwell	Forms	Train No	Departs	То	Service	Plat
16:25	Canberra	Intercity XP	5	16:30	5	NE1	NE1	16:30	Newcastle	Intercity XP	5
16:28	Stabling	Inercapital XP	4	16:36	8	BR1	S1	16:33	Epping	Suburban	6
16:31	Glenfield	Suburban	6	16:33	2	S1	BR1	16:36	Brisbane	Intercapital XP	4
16:35	Stabling	Inter-regional	4	16:42	7	GC1	S2	16:39	Epping	Suburban	6
16:38	Wilton	Suburban	5	16:39	1	S2	GC1	16:42	Gold Coast	Inter-Regional XP	5
16:43	Wilton	Suburban	6	16:45	2	S3	S3	16:45	Epping	Suburban	6
16:46	Stabling	Fast Commuter	5	16:50	4	CC1	CC1	16:50	Central Coast	Fast Commuter	5
16:52	Canberra	Intercity XP	4	16:58	6	NE2	EP4	16:54	Epping	Suburban	6
16:53	Stabling	Suburban	4	16:54	1	EP4	NE2	16:58	Newcastle	Intercity XP	4
16:58	Wilton	Suburban	6	17:03	5	EP5	EP5	17:03	Eppping	Suburban	6
17:01	Sth Highlands	Fast Commuter	5	17:06	5	CC2	CC2	17:06	Central Coast	Fast Commuter	5
17:05	Stabling	Inter-Regional	4	17:12	7	AR1	EP6	17:09	Epping	Suburban	6
17:08	Glenfield	Suburban	6	17:09	5	EP6	AR1	17:12	Armidale	Inter-Regional	4
17:13	Wilton	Suburban	5	17:15	2	EP7	EP7	17:15	Epping	Suburban	6
17:16	Stabling	Intercity XP	4	17:21	5	NE3	NE3	17:21	Newcastle	Intercity XP	4
17:19	Glenfield	Suburban	6	17:24	5	EP8	EP8	17:24	Epping	Suburban	6
17:24	Kiama	Fast Commuter	5	17:30	6	CC3	CC3	17:30	Central Coast	Fast Commuter	5
17:27	Stabling	Intercapital XP	4	17:36	9	BR2	EP9	17:33	Epping	Suburban	6
17:30	Wilton	Suburban	6	17:33	3	EP9	BR2	17:36	Brisbane	Intercapital XP	4
17:33	Glenfield	Suburban	4	17:39	6	EP10	EP10	17:39	Epping	Suburban	6
17:39	Stabling	Inter-Regional XP	4	17:45	6	GC2	GC2	17:45	Gold Coast	Inter-Regional XP	5
17:41	Canberra	Intercity XP	5	17:51	10	NE4	EP11	17:48	Epping	Suburban	6
17:46	Wilton	Suburban	6	17:48	2	EP11	NE4	17:51	Newcastle	Intercity XP	4
17:54	Sth Highlands	Fast Commuter	4	18:00	6	CC4	EP12	17:54	Epping	Suburban	6
17:54	Stabling	Inter-Regional XP	5	17:55	1	EP12	CC4	18:00	Central Coast	Fast Commuter	5
	Average				4.8						

## Fast Freight

- A separate Fastrackaustralia (a) report examined how fast freight trains, mainly operating at night, can utilise the highspeed line.
- It is not intended that fast freight trains would utilise the high-speed line between Glenfield and Epping. But they would utilise the high-speed line south of Glenfield and north of Epping, joining the high-speed line from the Dedicated Sydney Rail Freight network.
- This would allow access to existing intermodal / logistics terminals at Moorebank, Chullora, Enfield, Cooks River and Port Botany, as well as the future terminal in Western Sydney.
- Freight trains (including fast freight trains) can also run over parts of the existing heavy rail network (for example on the Western, Illawarra, Main North and Main South lines).
- However, freight trains cannot operate on metro lines, which are therefore not shown.



## Fast Freight Future



- European railways are currently expanding fast piggyback freights using new rollingstock. Italy and China are also experimenting with high-speed freight trains with speeds of 250 km/hr or more and special palletised cargoes.
- The key for freight rail is better track alignments and new intermodal / logistics terminals, These could transform intercity freight
  movement by 2040. But a start is needed now
- Failure to include fast and high-speed freight in planning for high-speed rail will prevent this transformation. Existing rail
  alignments between Melbourne and Brisbane limit the potential for rail.

Technology	Superfreighter	Fast Piggyback	Fast Intermodal	High Speed Freight
Max Speed	115 km/hr	130 km/hr	130 km/hr	160 – 250 km/hr
Power	#* High Power Diesel	High Power Hybrid	High Power Hybrid	High Power Electric
Cargo	Containers	Trucks	Containers, Pallets	Specialised pallets
Axle Load	23 tonne	20 tonne	20 tonne	18 tonne
Train Weight	3500 tonne	1500 tonne	3000 tonne	1000 tonne
Payload	2200 tonne	1000 tonne	2000 tonne	600 tonne
Train Length	1800 m	900 m	1800 m	600 tonne
Sydney – Melbourne Travel Time	14 – 16 hours, using existing line.	10-12 hours, using existing line with some HSR segments	9 hours, using Sydney - Melbourne HSR at night.	5-7 hours, using Sydney – Melbourne HSR day or night
Timing	Now	By 2030	By 2040	By 2050



https://www.railfreight.com/railfreight /2021/01/05/new-claim-for-fastestfreight-train-in-the-world-350kmph/?gdpr=accept

# Stations

M



## A New Rail Age

- High Speed Rail Stations globally have become symbols of the rejuvenation of both rail as a mode of travel, and of the cities they serve.
- Some, like Beijing's High-Speed Rail station, have been built outside the historic centres; others, like London's revamped St Pancras station, are close to the centre of town.
- Lesser-known examples include Oveido in northern Spain, which has included a major new urban square above the station and redevelopment around it.

New city square and development above

Oviedo Station in Northern Spain.



#### Station Design

- Before station or precinct designs can be begun, an operational analysis is needed to identify the space required for tracks, platforms etc.
- For example, the existing station at Olympic Park has extremely wide platforms to handle high passenger volumes for major events. However much of this will be handled in future by the new Olympic Park Metro West station.
- The proposed HSR station would handle a mix of long distance and commuter traffic, including part of the major event demand from the north and south of Sydney.
- This, plus the need for longer platforms and through rather than a terminus station means a new Olympic Park HSR Station is needed.
- The following section analyses the operational requirements and potential track arrangements for the stations proposed on the High-Speed line through Sydney.

## Changes at Glenfield

- Glenfield is a key junction, handling: ٠
  - Up to 10 suburban services per hour on the T18 line from Macarthur to the City via the East Hills line in the peak direction (and 4 services per hour in each direction in offpeak periods).
  - Up to 10 suburban services per hour in peak periods on the T2 line from Leppington to the city via Liverpool, with 6 per hour each way in off-peak periods.
  - Approximately 16 freight trains per day in each direction, mostly using the dedicated freight line.
  - Approximately 8 long distance passenger trains per day in each direction, using the East Hills and Campbelltown lines.
- Second Sydney Airport coupled with urban growth in the South-Western suburbs would require significantly increased services on the T2 line.
- It is proposed that high-speed as well as • fast regional, commuter and suburban services would stop at Glenfield (on the high-speed tracks), requiring additional platforms.
- In addition, it is expected that freight • services, especially fast freight services at night, would increase in the future.



Monday to Friday		8	8		6	8	8	8	6	5	\$	6	8	ě.	5	\$	6	8	å.	5	8	6
Macarthur		-	-	06:54	-	-	07:09	07:14	-	-	07:24	07:29	-	-	07:39	-	-	-	07:59	-	08:14	-
Campbelltown		06:52	-	06:58	07:07	-	07:13	07:18	07:22	-	07:28	07:33	07:37	-	07:43	07:52	-	-	08:03	-	08:18	-
Leumeah		06:55	-	07:01	07:10	-	07:16	07:21	07:25	-	07:31	07:36	07:40	-	07:46	07:55	-	-	08:06	-	08:21	-
Minto		06:58	-	07:04	07:13	-	07:19	07:24	07:28	-	07:34	07:39	07:43	-	07:49	07:58	-	-	08:09	-	08:24	-
Ingleburn		07:02	-	07:08	07:17	-	07:23	07:28	07:32	-	07:38	07:43	07:47	-	07:53	08:02	-	-	08:13	-	08:28	-
Macquarie Fields		-	-	07:11	-	-	07:26	07:31	-	-	07:41	07:46	-	-	07:56	-	-	-	08:16	-	08:31	-
Glenfield	ARR	07:07	-	07:14	07:22	-	07:29	07:34	07:37	-	07:44	07:49	07:52	-	07:59	08:07	-	-	08:19	-	08:34	-
Glenfield	DEP	07:08	-	07:15	07:23	-	07:30	07:35	07:38	-	07:45	07:50	07:53	-	08:00	08:08	-	-	08:21	-	08:36	-
Holsworthy		07:13	-	07:20	07:28	-	07:35	07:40	07:43	-	07:50	07:55	07:58	-	08:05	08:13	-	-	08:26	-	08:41	-
East Hills		07:17	-	-	07:32	-	-	-	07:47	-	-	-	08:02	-	-	08:17	-	-	08:30	-	08:45	-
Panania		07:19	-	-	07:34	-	-	-	07:49	-	-	-	08:04	-	-	08:19	-	-	08:32	-	08:47	-
Revesby		07:22	07:13	-	07:37	07:28	-	07:46	07:52	07:43	-	08:01	08:07	07:58	-	08:22	08:13	08:25	08:35	08:32	08:50	08:47
Padstow		-	07:16	07:28	-	07:31	07:43	-	-	07:46	07:58	-	-	08:01	08:13	-	08:16	08:28	-	08:35	-	08:50
Riverwood		-	07:18	07:30	-	07:33	07:45	-	-	07:48	08:00	-	-	08:03	08:15	-	08:18	08:30	-	08:37	-	08:52
Narwee		-	07:21	-	-	07:36	-	-	-	07:51	-	-	-	08:06	- 1	-	08:21	-	-	08:40	-	08:55
Beverly Hills		-	07:23	-	-	07:38	-	-	-	07:53	-	-	-	08:08		-	08:23	-	-	08:42	-	08:57
Kingsgrove		-	07:26	_	-	07:41	-	-	_	07:56	-	-	_	08:11	-	-	08:26	-	-	08:45	-	09:00
Bexley North		-	07:28	-	-	07:43	-	-	-	07:58	-	-	-	08:13	-	-	08:28	-	-	08:47	-	09:02
Bardwell Park		-	07:30	-	-	07:45	-	-	-	08:00	—	-	-	08:15	-	-	08:30	-	-	08:49	-	09:04
Turrella		-	07:33	-	-	07:48	-	-	-	08:03	-	-	-	08:18	-	-	08:33	-	-	08:52	-	09:07
Wolli Creek		-	07:35	07:41	-	07:50	07:56	07:59	-	08:05	08:11	08:14	-	08:20	08:26	-	08:35	08:41	08:46	08:54	09:01	09:09
International Airport		-	07:37	07:43	-	07:52	07:58	08:01	-	08:07	08:13	08:16	-	08:22	08:28	-	08:37	08:43	08:48	08:56	09:03	09:11
Domestic Airport		-	07:39	07:45	-	07:54	08:00	08:03	_	08:09	08:15	08:18	-	08:24	08:30	-	08:39	08:45	08:50	08:58	09:05	09:13
Mascot		-	07:42	07:48	-	07:57	08:03	08:06	-	08:12	08:18	08:21	-	08:27	08:33	-	08:42	08:48	08:53	09:01	09:08	09:16
Green Square		-	07:45	07:51	-	08:00	08:06	08:09	-	08:15	08:21	08:24	-	08:30	08:36	-	08:45	08:51	08:56	09:04	09:11	09:19
Sydenham		07:37	-	-	07:52	-	-	-	08:07	-	-	-	08:22	-	-	08:37	-	-	-	-	-	-
St Peters		07:40	_	-	07:55	_	-	-	08:10	-	-	-	08:25	_	-	08:40	-	-	-	_	-	-
Redfern		07:44	-	-	07:59	-	-	-	08:14	-	-	-	08:29	-	-	08:44	-	-	-	-	-	-
Central		07:47	07:50	07:56	08:02	08:05	08:11	08:14	08:17	08:20	08:26	08:29	08:32	08:35	08:41	08:47	08:50	08:56	09:01	09:09	09:16	09:24
Museum		07:50	07:53	07:59	08:05	08:08	08:14	08:17	08:20	08:23	08:29	08:32	08:35	08:38	08:44	08:50	08:53	08:59	09:04	09:12	09:19	09:27
St James		07:52	07:55	08:01	08:07	08:10	08:16	08:19	08:22	08:25	08:31	08:34	08:37	08:40	08:46	08:52	08:55	09:01	09:06	09:14	09:21	09:29
Circular Quay		07:55	07:58	08:07	08:10	08:13	08:19	08:22	08:25	08:28	08:34	08:37	08:40	08:43	08:52	08:55	08:58	09:07	09:10	09:17	09:26	09:32
Wynyard		07:58	08:01	08:10	08:13	08:16	08:22	08:25	08:28	08:31	08:37	08:40	08:43	08:46	08:55	08:58	09:01	09:10	09:13	09:20	09:29	09:35
Town Hall		08:00	08:03	08:12	08:15	08:18	08:24	08:27	08:30	08:33	08:39	08:42	08:45	08:48	08:57	09:00	09:03	09:12	09:15	09:22	09:31	09:37

#### Accordingly in the long term it is proposed that in the longer term:

- Current suburban Services from Campbelltown/ Macarthur would be extended to Menangle Park, and re-routed to the City via Liverpool, and to Windsor via Liverpool and Parramatta.
- The NW line would be extended to Second Sydney Airport, with a high-frequency fast service to the City via the East Hills line and Sydney Airport stations.
- High-Speed and fast passenger services would use the high-speed line to Olympic Park
- Fast Freight services from Melbourne would utilise the dedicated freight line when available, continuing to Moorebank Logistics Centre or further on the Sydney Freight Line to other terminals.
- Most other freight services would utilise either the dedicated freight line or the suburban lines between Macarthur and Glenfield, continuing on the Sydney Freight line to other terminals. 51

#### Glenfield

- Glenfield is a key junction. It provides an opportunity for High-Speed Rail passengers to interchange with the East Hills, Main South and South-West lines.
- An additional two tracks and a 330 metre island platform are required, ideally on the western side of the station as shown.
- Other changes to the tracks are required. The preferred arrangement requires a flyover of the high-speed tracks at the north end of the station, and an underpass at the southern end of the station under the SW line.
- It also includes a turnback track for Fast suburban trains terminating at Glenfield.
- This arrangement separates the high-speed rail platforms in normal use but allows easy interchange with the suburban services via the existing pedestrian overpass (extended). It also preserves flexibility in how the suburban services are operated.







#### Bankstown

A Draft Bankstown City Centre masterplan has been approved by the Council, and is now awaiting determination by the Department of Planning. Key transformational projects for the City Centre include:

- The Metro station, as part of the City to South-West Metro project
- A \$1.3 billion vertical campus of Western Sydney University
- A \$1 billion Bankstown Hospital



The Masterplan caters for 25,000 jobs, 25,000 students and 12,500 dwellings to accommodate these and other developments.

The addition of a new underground station on Sydney's Nort-South High-Speed Line would further add to Bankstown's potential as a key centre in South-Western Sydney

The proposed station would be a simple island platform station with a 200m long platform, with no additional points or complex infrastructure, minimizing the size of the station box.

It is proposed to be located under Chapel Street, adjacent to the metro station, bus and other rail connections, allowing seamless transfer between north-south and east-west movement.

This location not only provides a fast throughroute, but the sation is located below the food and culture zone in the city centre, which is intended to remain low-rise. This would minimise any issues with footings from high-rise buildings.

Platform screen doors would be utilised as at current metro station designs, allowing express trains to pass through safely at speeds of up to 150 km/hr, minimizing any delays for these services

It is proposed that there would be up to 8 Fast suburban services per hour would stop at the station in peak periods, providing substantial additional capacity to Bankstown as well as to / from the Bankstown metro line.

## Lidcombe

- Lidcombe is an important junction with the Main Western Line, with services from locations such as the CBD and Inner West, Parramatta, Blacktown and the Blue Mountains, as well as Fairfield and suburbs in the south-west.
- The existing platform and tracks used for Olympic Park services will be less used once the West Metro is completed and will become redundant when the North-South HSR line is built.
- It is proposed that Lidcombe HSR station be located beneath the current Olympic Park platform area, with a simple 200m long island platform and no complex trackwork.
- As at Bankstown, platform screen doors will enable long distance express trains to pass through the station without stopping.
- The HSR station would however be served by 8 Fast Suburban services per hour in each direction in peak periods, and 4-6 services per hour at other times, providing important cross Sydney connectivity.







#### Olympic Park

Olympic Park is the proposed site for Sydney's High-Speed Rail Station:

- Key centre already, with major further planned development.
- Geographic centre of the Sydney Region with good road and rail access
- New Metro West Station will provide fast and frequent access to both Sydney CBD and Parramatta
- Ample Space to cater for anticipated demand on the High-Speed Line next century

#### Proposed High-Speed Station Site will have excellent access to

- Office, Business, Recreational and Residential Development at Olympic Park
- Key Sporting Stadia and Facilities for Major Events
- Metro West Station (60 metres)
- Parramatta Light Rail and Buses
- Ideal train stabling and maintenance site at Flemington, providing key operational benefits.

# Olympic Parking Grove

High-Speed Station has three double-sided platforms (with six tracks), one 330m long. Potential for expansion in both length and wiath SUBBESTED HSR Station FOOtbrint If required in the very long term.

**High-Speed** Line south using existing rail corridor to Lidcombe

50

100 m

Sydney Olympic Park **Hockey Centre** 

rs Lounge

Ċ+13°

Olympic Boulevard SEDA College NSW raised over new rail height, providing grade separated junction with Mary **Durack** Avenue Netball

SARAH DURACE AVERUE

#### The Huddle Cafe

Sydney Olympic

Oliver Brown

Giants Shop

No existing buildings would be affected by the new HS Line or station. Impacts are limited to minor facilities (surface car parks) and some vegetation. Giants

Sydney Olympic Park

In the Shadows

Pedestrian Link Under **Olympic Boulevard** 

Institute Sport provide level platforms.

Road access to HSR station at two levels from Mary Durack Avenue and Olympic Boulevard

oir Blues The Precinct Indicative / Parramatta Light Rail Loop Stage 2 serving both stations and Approx location of new metro station Global Cafe

a Jean

Coffees

Rail line raised by approx. 4 metres to

Liv

key Olympic facilities Ribs and Rumps Discobolus Lees Hair World Piccolo Roma

The Attractor

F45 Sydney Olympic Park

**Existing single track Rail** line. Could be removed, or retained to link to Lappset additional underground itness Park stabling at current Olympic Park station site..

Supa M

BO Est. The Last Slice 🕗

Halls 5 & 6 **Existing station** could be redeveloped, or modified to joueur Sydney become a key light rail station, or chop Cafe could provide additional stablingrs Brev AISTING for HSR trains

NRMA

Universities Admissions

Centre

Rainbow Denta Practice

Exhibition

Wester

Test Ce

Sydney

🔁 Herbalife

## Olympic Park

The proposed Station would have three island platforms:

- Platform 1 and 6 (220m in length) would typically be used for Fast Suburban trains
- Platforms 2 and 5 (220 m in length) would typically be allocated to Fast Commuter Trains and Intercity Expresses
- Platforms 3 and 4 (330 m in length) would typically be reserved for Long Distance Inter-Capital and Inter-Regional Expresses

A series of crossovers and the holdover track would provide flexibility in operations.

In particular they would accommodate movements to and from Flemington stabling and maintenance centre, whilst minimizing interference with through running.

For example, it would be possible for a train from Platform 3 to depart for Flemington at the same time as a Fast Commuter train departs from Platform 2 for the Southern Highlands.







## How busy would Olympic Park HSR Station be?

- It is estimated that the proposed Sydney HSR station could handle up to 900 train movements per day (arrivals plus departures), including movements to and from stabling, using three platforms and six tracks.
- For comparison, Tokyo Central handles 4,000 trains per day using 22 tracks and 11 platforms. It is Japan's busiest station in terms of train movements. These include most of Japan's high-speed trains.
- This would make Olympic Park by 2065 threequarters as busy on average as Tokyo Central is today, measured by the number of trains per track/platform.
- Should demand at Olympic Park ever increase further, additional platforms could be provided on the northern side, with further expansion possible on the southern side if Lady Durack Drive was moved.

## Epping

- Epping HSR station would be a deep underground station, around 55m above sea level (42 m below ground) and probably located under Beecroft Road, with lifts / escalators to the NW Metro and surface platforms, as well as Beecroft Road. (For comparison, London's deepest Tube station, Hamstead, is 58m below ground).
- This would require an average 2% gradient from the Parramatta River, assuming the tunnel was 35m below water level at that point.
- It is proposed to have two island platforms with one or two central turn-backs for terminating Suburban and Fast Suburban trains. The option with two turn-backs is illustrated. These could also be used for Commuter and longer distance trains if required and would provide maximum operational flexibility.
- In stage 1 the link from West Ryde to Epping HSR station would be completed, plus the tunnel to Hawkesbury River. Once completed, long distance and intercity trains from Brisbane, Armidale, Newcastle and the Central Coast would be able to use the long tunnel, stopping at Epping HSR station, and continuing to Central Station. They would save around 25 minutes.
- Fast freight trains would also be able to utilise the long tunnel from Hawkesbury River to Epping at nights, rejoining the Northern Sydney Freight line at West Ryde.



escalators to the Metro level (below)





#### Hawkesbury River

- Hawkesbury River station is proposed with two island platforms, four tracks and crossovers between the existing line and the high-speed line in both directions, providing maximum operational flexibility. It would be located on the Causeway, north of the current station
- The third track on the Up (Sydney) side would be lowered to enter the HSR line tunnel on the northern side of the existing station. A fourth HSR track on the Down side would be added, also diving down and under the existing Down track to enter the HSR tunnel.
- The entrance to the HSR tunnel would thus be speed restricted. However, since many HSR trains would stop at Hawkesbury River (some crossing over to/from the existing main line), the additional time required for the non-stop services (e.g. those to Brisbane and the Gold Coast) is considered an acceptable compromise, given the need to service key communities in Gosford and Woy Woy with HSR trains.
- Lower speeds over the Hawkesbury River will also minimise noise disturbance.
- To the north of the Causeway, it is proposed that the high-speed tracks would be on the outside of the existing main line, using two single track tunnels through Long Island, and two single-track bridges over the Hawkesbury River.



Existing station at Hawesbury River, looking towards the Causeway.





# Recommendations

- The route through Sydney proposed in this report would have lower costs and greater benefits than earlier proposals.
- It takes into account urban growth, new transport infrastructure, potential constraints and a realistic appraisal of how high-speed rail could be operated.
- It would transform passenger movement in Australia's East Coast. It would also significantly enhance accessibility throughout Sydney itself.
- It would complement heavy rail, metro and light rail networks. It also enables integration with rail freight infrastructure, enabling fast freight to use parts of the high-speed line, especially at night
- It is <u>recommended</u> that
  - This approach be carefully studied by both the High-Speed Rail Authority, NSW Transport, and NSW Planning for its strategic, environmental and engineering feasibility.
  - Appropriate corridor protection measures be implemented as soon as practical to preserve alignments and station locations.

#### Fastrackaustralia Reports

#### Summary FastrackAustralia Presentations include:

- The Case for High-Speed Rail in Australia
- High Speed Rail in the Sydney-Melbourne Corridor
- High Speed Rail for Australia

#### Other FastrackAustralia Reports include:

- East Coast Higher Speed Rail: A New Approach
- Population Trends and Decentralisation Options
- High Speed Rail for Regional Growth in Australia
- Implementation Plan for High-Speed Rail
- Implications of High-Speed Rail for Canberra and the Capital Region May 2023
- Freight and High-Speed Rail.
- Discussion Paper on Governance for High-Speed Rail
   October 2023

#### These can be downloaded for free from <u>www.fastrackaustralia.net</u>

An up-to-date database of over 400 references to High-Speed Rail and related topics from around the world is also available on the website for downloading.



Jan 2023

Feb 2023

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June 2023

#### EAST COAST HIGHER SPEED RAIL

a new approach



#### FREIGHT AND HIGH-SPEED RAIL





Dr. Garry Glazebrook June 2023

#### Implications of high speed rail for Canberra and the Capital Region

High speed rail will accelerate the growth and development of Canberra and the capital region Planning should start now to facilitate urban and economic growth while maintaining the best qualities of the region

> Dr Ross Lowrey May 2023

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