



Skyrail

Would the Victorian State Government support an elevated transit link to Melbourne Airport?

- **Complete independence from the existing rail system**
- Up to 800 persons per train
- Three minute or less headway
- 80 km/h operating speed
- A solution proven in Japan, South Korea, China, Malaysia and elsewhere
- Funded by property levies on advantaged businesses and to a lesser extent households

Image: A Hitachi monorail in Kitakyushu, Japan.

29 Aug 2015

An Independent CBD-Airport Link

Using an elevated transit system avoids adding further strain to Melbourne’s already overstretched rail system.

The proposed route also services Highpoint shopping centre, Avondale Heights and Tullamarine which all have limited public transit options.

A new commercial and hotel centre “Sky City” is proposed for vacant land to the east of the airport.



In future the system could extend south to the Melbourne Exhibition Centre, Crown Casino and Kings Way.

Myki ticketing should be used for Skyrail to provide an integrated passenger experience.

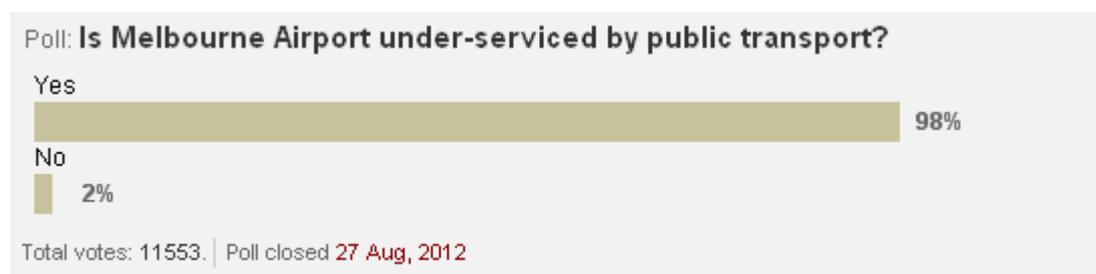
Rationale

There will be a long wait until the Melbourne Airport Rail Link (MARL) can be built due to dependence on the Melbourne Metro being completed first. The MARL solution places additional burdens on the current rail system which can be avoided using an independent system.

Unlike MARL, Skyrail would add new high-capacity public transport to areas with little public transport.

Elevated transit systems are cost-competitive with new surface rail and far cheaper than subway systems. This makes it feasible for them to be funded by property levies.

With Melbourne's population expanding rapidly congestion around the airport will become more and more of a problem.



Disclaimer: These polls are not scientific and reflect the opinion only of visitors who have chosen to participate.

System Requirements

System suppliers need to demonstrate a system:

- That has proven safety and reliability in multiple locations over many years or decades.
- Has peak capacity per train that can be increased from 200 and 800 passengers per train and has trains running in both directions.
- The ability of passengers to move through the train carriages at will. (Unlike the former Sydney tourist monorail)
- That is capable of driverless operation. Most trains would still have one staff member for safety and security reasons.
- Multiple evacuation options and fire extinguishers.

Highly desirable features:

- Back-up generators at stations and batteries on the trains to ensure trains do not get stranded when grid power is lost.
- Concrete structures to use sandstone coloured concrete and have a high quality finish. Creepers to be planted on the pillars.

Land Requirements



- Air and pillar space five meters above road easements. This would require the Skyrail Consortium to underground some existing overhead electricity and communication infrastructure at its expense. An approximately one meter square support pillar is needed about every 20 to 25 meters. We expect no paved carriageway to be impacted. (Roads where airspace is needed includes Wurundjeri Way, Dynon Road, Canning Street, Military Road, Milleara Road, Western Ring Road & Airport Drive)
- Airspace above rail easements beyond what is needed by any existing or proposed rail infrastructure.
- Space above some parkland near the Maribyrnong River. (Newel's Paddock, Footscray Park, Burndap Park & Pipemakers Park)
- Space for extensive landscaping and a 'tree-way' under the guideway where possible.



State or Local Governments could decide that placing the guide-way pillars and the "tree-way" in the centre of Canning Street, Military Road & Milleara Road would produce a better visual outcome.

That would reduce these roads to one lane each way but add more right and left turning lanes.

Option 1: Hitachi Rail



Hitachi has supplied many high capacity monorail systems over the last five decade in Japan, China, South Korea and the Middle East. Of these the Chongqing system in China is the largest at 75km total length. The Tokyo-Haneda Airport monorail commenced in 1964.



A key feature of recent Hitachi monorails is that they have an entirely flat floor as shown above.

Hitachi offers two high-capacity monorail types which can be up to eight carriages long:

- **Medium:** About 95 person per carriage at 4 persons per square meter. Length is 57 meters for four carriages.

- **Large:** About 110 person per carriage at 4 persons per square meter. Length is 59.5 meters for four carriages.

Capacity per hour per direction for eight carriage trains with three minute headway is:

- **Medium:** 15,600 passengers / hour / direction.
- **Large:** 18,160 passengers / hour / direction.

Trains can be fully automated or manually driven and are designed to operate at up to 80 km/h. Minimum curve radii is 100 meters.



Above: Okinawa monorail at a station.



Left: Hitachi monorail guide-way at Kitakyushu, Japan.

Skyrail would use sandstone-coloured concrete for the guide-way and all cabling would be concealed to improve the appearance.

Option 2: Bombardier Transportation



Bombardier produce the fully automated “Innovia” monorail product.

Since Bombardier already manufacture trains and trams in Melbourne it is quite likely they could manufacture these monorails as well.

The Bombardier monorail has a flat floor except for a wheel arch at the junction of each carriage but still achieves a walk-through design.

Capacity slightly less than for Hitachi monorails but with a much smaller curve radii of only 46 meters and claimed minimum headway of 75 seconds.



Option 3: Scomi Rail



Scomi has constructed several monorails in Malaysia, India and Brazil.

The Scomi product has wheel arches under central seats. Minimum curve radii is 50 meters. Design speed is 80 km/h. Capacity is similar to Bombardier and Hitachi 'medium'.



Option 4: Mitsubishi Heavy Industries



Mitsubishi is the only maker of a suspended monorail system with two systems in operation at Chiba and Shonan in Japan. This type has the advantage of protecting the running gear from extreme weather.

Disadvantages are that the track design is not as good as we would like and operational speed is only 65 km / h on existing systems. It is not known if these issues can be addressed by Mitsubishi.



Images on this page are modified to add a cosmetic fascia to provide a smooth finish to the guide-way.



Mitsubishi interior is of a high standard and provides for up to 79 persons per carriage. We believe an automated train could carry more people by eliminating the need for the front and rear cabs.

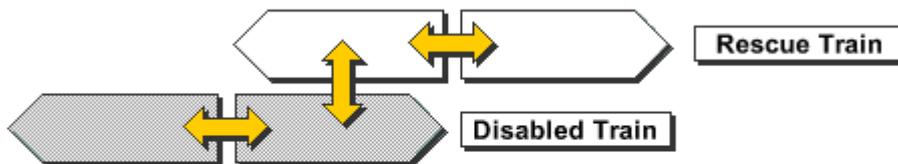


Safety & Accessibility

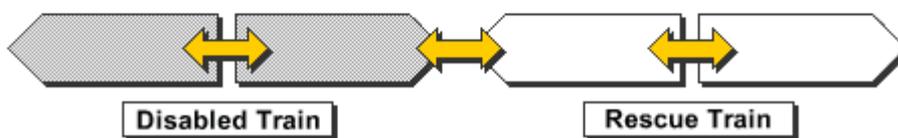
In Japan and Korea walk-ways are not fitted. Instead Hitachi relies on train-to-train evacuation and evacuation slides for emergency purposes, however an emergency walk-way was fitted for the Hitachi Palm Jumeirah monorail.

Train to Train Evacuation

▼ To train on the adjacent track:



▼ To train on the same track:



Current Bombardier monorails have a walk-way for the entire length of the system and fire extinguishers are fitted to all carriages.

In Melbourne having an emergency walk-way could create problems with unauthorised access and lead to trespassers falling from the walk-way or being hit by automated trains so it is recommended Skyrail not have a walk-way.



Mitsubishi and Hitachi have multiple train-to-train and train to ground evacuation options. (See www.escape-chute-systems.com for information on vertical escape chutes.)

Access to a monorail is by lift and escalator - the same as to a rail subway.

All systems have automatic platform screen doors.

No Advertising!

Advertising on the guide-way structure and the train should be prohibited by the government to avoid very poor visual outcomes such as with the Kuala Lumpur system.



The KL Monorail now runs four-car trains.

Renewable Powered

We envisage that most of the power for the system would be purchased from green sources.

The station roofs could have extensive solar arrays. With the Mitsubishi system it is possible the guide-way itself could carry a solar array.

Each station should have one or more diesel generators to provide sufficient power to return trains to the station if grid power is lost.

Cost

The cost of Skyrail cannot be determined accurately without full involvement of system manufacturers and constructors.

In turn manufacturers and constructors are unable to contribute without some level of government interest in the project.

Large monorail systems have been built overseas for between \$A30 and \$60 million per kilometre depending on complexity of construction, automation and number of train car units.

At this level we believe interest payments and other costs could be met by ticket revenue and a property levy on benefitted business premises. A lower levy would apply to benefitted principle residences.

State Government Support Options

Monorails Australia seeks to discover the Victorian Government's attitude to the Skyrail concept.

1. **Full Support:** Skyrail is investigated further by the State Government and built if feasible.
2. **Partial Support:** The State Government agrees in-principle that Skyrail could be built but leaves the project to a consortium of Monorails Australia, Local Governments and property owners to work out if it is financially feasible.

Without a letter of general in-principle acceptance of the project **Monorails Australia** would not investigate the matter further as it would be too hard to obtain pricing information from suppliers, get property-owner interest or obtain finance.

This in-principle support would be conditional on:

- Skyrail not impinging on any current or planned road or rail infrastructure including the proposed Transurban Western Distributor except for unused portions of easements needed for support pillars without approval.
- Relevant Local Governments approving the project.

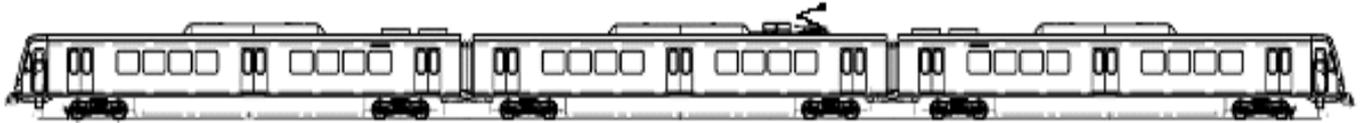
The 'Partial Support' option may have some advantages in that it reduces political risk. If the Skyrail concept is not viable then the government is at arms-length from it.

3. **No Support:** The State Government blocks Skyrail from being built.

Appendix 1: Monorails cf. Trains & Trams

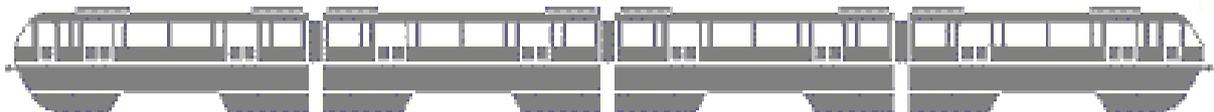
High-capacity monorail trains have a passenger capacity between a train and a large tram. However monorails and trains can run at a much faster speed. Monorails are the cheapest grade-separated option where no surface easement is available.

Melbourne Metro X'Trapolis Train



- 3.05 meters wide, **71.68** meters long for 3-car train.
- Usually 6 cars.
- 90 km/h top speed.

Hitachi "Large" Monorail



- 2.98 meters wide, 59.5 meters long for 4-car train. (**80%** of 3-car X'trapolis)
- Can be between 2 and 8 cars.
- 80 km/h design speed.

Bombardier E-Class Tram



- 2.65 meters wide, 33.45 meters long. (**40%** of 3-car X'trapolis)
- 80 km/h top speed but average is 16 km/h.
- Largest tram in Melbourne.

Former Sydney Monorail



- 32 meters long. 36 km/h. Manual operation.
- No walk-through interior. Single track.

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