

## Submission to NWRL EIS 2

### 1 Introduction

EIS 1 sought permission to initiate major construction works for tunnelling, building the Skytrain and rail station excavation in the first of a two stage approval process to expedite these long lead time activities for the NWRL. It was clearly based on double deck trains and specifically mentioned a tunnel diameter of 6.6 metres.

A subsequent Submissions Report announced a switch to single deck trains by stating:

Under the new three tier system, the NWRL would operate as a Tier 1 rapid transit single deck train system, initially operating between the North West and Chatswood, with a cross-platform interchange at Chatswood to suburban services for those customers travelling to the CBD. In line with the NWRL, an upgrade of the Epping to Chatswood Rail Link to a high capacity rapid transit system would be required as a separate project to the NWRL.

The rapid transport network would not result in any substantial changes to Stage 1 of the NWRL project as described within EIS 1.

EIS 2 describes the tunnel diameter as now being 6.0 metres, which is suitable for single deck trains but no longer able to accommodate the current profile double deck trains envisaged in EIS 1. The arguments presented in support for Tier 1 rapid transit single deck trains appear intended to achieve approval of the smaller tunnel diameter by default on a fit for purpose basis.

This submission addresses some dubious aspects of these supporting arguments, and concludes that there is insufficient justification for changing the currently approved 6.6 metre diameter tunnels and thus preventing the use of double deck trains in the longer term. Comments on other aspects of the single deck train design described in EIS 2 are also included in this submission.

### 2 Rapid Transit single deck trains.

Sydney's Rail Future announced the adoption of a three tier train hierarchy for rail in Sydney, with the following specific description for Tier 1 on Page 12:

Rapid transit trains are used to offer a comfortable, frequent, fast and high capacity link to busy inner areas.

Each single deck train offers similar total capacity to a double deck train, but with fewer seats. However more trains per hour can be run due to lower dwell time from more doors and the lack of internal stairways. Indicative capacities based on adequately wide platforms, modern signalling and unrestrictive track alignments near stations for 160 metre trains are:

Train type	Train capacity	Seats	Trains per hour	Passengers per hour	Seats per hour
Single deck	1300	35%	30	39,000	13,650
Double deck	1300	66%	24	31,200	20,800

Current double deck operations in Sydney are limited to about 24,000 passengers and 17,000 seats per hour due mainly to the above mentioned conditions not being met. Clearly there is a case for both designs, with single deck offering more passengers per hour where most passengers are willing to stand and double deck offering more seats per hour for trips longer than around 20 minutes. The key is being able to achieve an acceptable degree of market segregation in an environment where there will always be some overlap.

Rapid Transit single deck trains offer other advantages. Lower dwell times and better acceleration mean higher average speeds. Higher frequencies and simpler networks also allow freedom from a public timetable, and thus even faster average speeds under light loading conditions. Single deck trains would individually weigh less, consume less energy and have better energy recovery, cost less to buy and would be more suitable for one man operation.

### **3 NWRL in the long term**

In the longer term there will be through operation of the NWRL to the Sydney CBD with the expectation that only major centres south of Chatswood would be served. As such, the overall link looks more suited to tier 2 operation, where the majority of users would expect to be seated. However, the choice is not as clear as applies for say Campbelltown express services currently, as more travel between intermediate stations is expected. EIS 2 has used a revised Tier 1 description (on unnumbered Page 4 of the Executive Summary) as set out below to now be more inclusive of the NWRL as the first part of Sydney's rapid transit network, but by adding the words "between suburban regions" actually describes the majority of suburban services envisaged as being tier 2.

The rapid transit network would offer a comfortable, frequent, fast and high capacity rail link between suburban regions and busy inner city areas using single deck trains.

The offering of more frequent single deck services (than would have been provided with double deck operation on the NWRL) to provide approximately the same number of seats per hour, confirms the above seating expectation. The additional services negate many of the benefits of single deck trains which depend upon more passengers being willing to stand. As well as the consequent lighter loading per train reducing maximum line capacity (and thus leaving less spare capacity for a Parramatta – Chatswood shuttle), costs and energy consumption would be higher due to the provision of additional trains, and frequency is not a very significant user issue above six trains per hour. This leaves some residual time benefits due to better dwell times, acceleration and the absence of timetable recovery time allowances. The willingness to incur additional operating costs seems irrational against seeking to use budget revenue more efficiently, and suggests that there could be another (black box) agenda.

### **4 NWRL in the short term**

The decision to provide a Cudgegong Road to Chatswood shuttle service initially, designed to allow the patronage on trains between Chatswood and Central over the Bridge to be distributed more evenly, also involves the provision of additional NWRL trains with their associated higher costs and energy consumption. However, this time there are other benefits, including:

- A larger initial order;
- An isolated test bed for new technology and procedures, including ATR; and
- Higher frequency services to offset the interchange at Chatswood.

In the longer term, these single deck trains and any others purchased should then be redeployed to where the costs and energy benefits that depend on a willingness to stand can be more fully realised. South side candidates would be the four inner area lines (Hurstville, Revesby via Airport, Bankstown and Strathfield) as well as the ESR and the proposed Sydney CBD/cross Harbour link. On the north side, a tier 1 service on the existing route from Waverton (linking to the cross Harbour link) to Gordon and a new link to the Peninsula, to better utilise the additional cross Harbour capacity, would be suitable. This would leave the NWRL and the ECRL to then revert to double deck operation, with these services joining those from the upper North Shore/Central Coast over the Bridge on a new route from North Sydney to St Leonards extending through Chatswood to Gordon.

There would also be relatively more user time benefits per kilometre (a larger impact on average speed) from better dwell time and acceleration on these inner lines if converted to tier 1 operation, due to the closer station spacing. For example, the 1.1 km average spacing for the Central – Strathfield line is significantly less than the 3 km average for the NWRL; yielding around three times the impact on average speed.

## **5 Single deck train design**

A key means of reducing dwell time is through the provision of additional doorways, and 4-5 doorways per standard length car with little provision for seating can be found in many overseas metros. EIS 2 envisages a less extreme situation, with three doorways per standard car length being provided so that an appropriate level of seating for Sydney can also be provided.

It is also important to manage the gap between platform and train so that it is narrow enough to minimise delays to boarding or alighting. In this regard, a three doorway per car configuration would also have unequal gaps where deployed on Sydney's legacy curved platforms. A 400 metre radius curvature leads to an estimated 100 mm gap differential between the centre and end doorways, with inversely proportional amounts for other radii.

An alternative train configuration to achieve equal and smaller platform gaps for all doorways would use two doors per shorter car with articulation to contain the bogie count. For example, a train of 12 articulated 13.5 metre sections would also have 24 doorways and, assuming two independent halves; a total of 14 bogies (cf 16 for a train of 8 standard length cars). A 10 x 16 metre configuration with 20 doorways and 12 bogies would also be possible.

## **6 Conclusion**

Many of the benefits that can be achieved from using rapid transit single deck trains will not be realised on the NWRL due to the deployment of additional trains to build up the number of seats in response to market expectations. A more efficient long term strategy would be to redeploy the single deck trains to inner area services instead, where the majority of passengers would be more willing to stand, and to run double deck trains on the NWRL and its future westward extension.

It would therefore be imprudent to reduce the tunnel size and station clearances on a fit for purpose basis to accommodate only single deck trains, and EIS2 has not established to the contrary due to its poor differentiation between the benefits of single deck trains in general and benefits specific to the NWRL. Accordingly, 6.6 metre diameter tunnels and matching station clearances should be retained to enable double deck trains to be accommodated in the longer term.