

Heavy Rail to Sydney's Northern Beaches

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1. Motivation for this report -- at this time.

With the reduction of tunnelling costs in recent years, attention is now being paid to one of Sydney's long-standing transport issues – improved access to the city from the Manly Vale area and regions further north.

A recent report from the Bureau of Transport and Regional Economics [1] has reviewed many options, all of which involve tunnels. The two options which the Bureau analyses in detail, and also a recent proposal running underneath Middle Harbour between The Spit and Folly Point, Cammeray¹ (promoted as NSW Liberal Party policy [2]), focus on road tunnels. These options include public transport only via the use of buses sharing the tunnel with private cars.

I write at this time because I consider that these road-traffic tunnels, without incorporation of good rail services, are against Sydney's long-term interests. Moreover, they are unworkable given that the road lanes of the Harbour Bridge/Tunnel cannot accommodate (in peak-hour) any increased city-bound traffic induced by faster road travel from Seaforth to Cammeray.

My public-transport oriented stance is consistent with the views of SHOROC, the northern Shore Region of Councils [3], but contrary to the acceptance of a car-dominated future in the BTRE report [1, p. 31].

The key to the heavy-rail project outlined below is an idea for a reasonably cheap and non-destructive connection with Sydney's existing heavy-rail network – at North Sydney. This idea is not investigated in [1], [2] or [3],

There are other pressing reasons for writing at this time. These are to allow planners of other projects to address how their own designs might accommodate the Manly Vale train project – assuming that the latter is seen as a good project by the NSW Government and interested local governments.

Until a full assessment of my scheme is made, it seems imperative that prospects for this new heavy-rail service be communicated to:

- engineers currently planning extra road lanes for the Spit Bridge, as my scheme involves a new bridge incorporating rail lines;
- those concerned with the major upgrade of North Sydney station, as it would be disappointing if their work precluded the connections that may be desirable with the new Manly Vale line;
- railway planners dealing with the operational characteristics of the new Chatswood-Parramatta line, specifically, the extent to which peak-hour passenger flows from Epping to the city absorb the rail capacity that currently exists on the Harbour Bridge.

2. Capacity on the Harbour Bridge.

A central issue when discussing improved transport between Manly Vale and the city (and between Manly Vale and suburbs of the south, east and inner-west) is the capacity of the Harbour Bridge/Tunnel. The 8 bridge-lanes devoted to road traffic are now at capacity during peaks periods and the 4 tunnel-lanes are approaching capacity. In the morning peak hour, queues often back up to Cammeray. To the extent that the Seaforth-Cammeray

¹ I shall refer to this as the “Folly Point Tunnel”, in contrast to the two DTRE options “Mosman Tunnel A” and “Mosman Tunnel B” which are routed between Seaforth and Cammeray underneath Mosman.

tunnel induces more cross-harbour road traffic from the northern beaches, it will only add to congestion on the approaches to the bridge. The queue may even back up into the tunnel!

There are, however, two lanes of the bridge which operate below capacity -- those used by Cityrail. Trains can operate at 2-minute time intervals, yet in peak times we see a regime of 13 trains per hour² across the bridge (in each direction) -- therefore an average interval of just under 5 minutes. Thus there exists spare capacity that can accommodate trains to and from a new destination such as Manly Vale.

3. A rail fly-over at North Sydney

My heavy-rail route to the northern beaches via the Mosman district starts at Milsons Point.

The height of the existing rail line between Milsons Point and North Sydney stations is well above the roadway. This would permit construction of a fly-over, allowing trains travelling north from Milsons Point to cross the Bradfield/Pacific Highway and the 'Warringah' expressway at their lowest point. Despite the large number of traffic lanes, there are a number of islands which would accommodate the supporting pillars for this rail fly-over. The fly-over would also have the height to pass above existing road bridges that cross the freeway (at High Street and Mount Street).

The fly-over would reach the eastern side of the expressway near Mount Street and then continue along Alfred Street (elevated initially to minimise impact with housing and with the expressway off-ramp which currently runs into Alfred Street).

The trains would follow Alfred Street, remaining above ground until the natural slope of the hill makes it convenient to commence a tunnel³. The line would then turn more easterly, passing under Forsyth Park.

4. Minimal impact on existing buildings in North Sydney

Rather miraculously, the commencement of the tunnel and the turn toward Forsyth Park can be done below existing roads – Alfred Street and Bent Street. The line could go underground in Alfred Street -- starting near the corner with Darley Street -- and turn from Alfred Street toward Forsyth Park along (or actually under) Bent Street.

This design impacts minimally on existing housing and existing trees in the park. I estimate that only one building (a 1920's style block of flats) might be destroyed and even that could survive if the curvature of Bent Street exactly matches the needs of the railway designers.

Very shallow cut and cover construction methods could be used under Alfred Street, Bent Street and across Forsyth Park before starting a long tunnel through the hill⁴.

5. Through the Cremorne Hill to The Spit.

Elevations are nigh perfect for a train tunnel with little or no grade. The height of the train line as it enters the hillside at Alfred Street is suitable for underground stations at appropriate places in Neutral Bay, Cremorne, Spit Junction and North Mosman and also perfect for the point of emergence just near The Spit (from the cliff-face underneath Parriwa Park).

² This figure excludes trains which start or terminate at North Sydney. These terminating trains, lightly used at present for the journey across the bridge, could be routed toward Manly Vale. Passengers bound for North Sydney itself could alight at the new Alfred Street Station. Outside peak hour, termination at North Sydney as a precursor to withdrawal from service could still take place.

³ More probably, the engineers would design the "tunnel" as two tunnels, one for each direction of train movement. This method, now being used on the new Chatswood-Epping rail tunnel, is cheaper to construct. Less excavation is involved, the circular cross-section of one such tunnel being a good fit with the boring machines employed.

⁴ Deep cut-and-cover methods are more expensive than tunnelling. Where the line crosses Forsyth Park, the roof of the final tunnel would be just below ground level, so cutting costs would be low.

Broadly speaking, the route through the hill should follow the ridge, under Military Road and Spit Road. This minimises destruction at the surface and maximises the service to the district.

A new bridge at The Spit, needed in any case for extra road lanes and to avoid conflicts between boats and cars, would carry the new train line⁵ on its eastern side.

Upon reaching the northern side of the new Spit Bridge, the road can proceed as now, with the train entering a tunnel. There exists a convenient place for a train-tunnel entrance. The route of this tunnel is best mapped out in accordance with the needs to serve established residential areas in Balgowlah and Manly Vale (and to avoid the sewage tunnel). In any case, the tunnel would probably end near the Manly Golf Course.

An above-ground train route northward toward Mona Vale could surely be found, but even if that proves impossible, the line from Manly Vale to Milsons Point (and North Sydney) would be an invaluable resource for Sydney – and a strong alternative to the road-tunnel options. At the end of this report is a comparative table.

6. Choices at North Sydney

Currently, express-bus passengers to the city from places north of The Spit cannot alight at North Sydney. This is recognised as a major problem, in view of the large and growing employment base at North Sydney. The proposed train line can provide a new station at North Sydney, without any difficulty.

There are choices, however.

- With the simple Milsons Point to Mount Street fly-over discussed above, a new station would be needed in Alfred Street, near Mount Street. This would enable quick pedestrian access into the centre of North Sydney.
- A highly desirable alternative, however, if it proves to be feasible, is to have a “two-branched” fly-over. For trains approaching from Mosman, one branch would veer toward Milsons Point (as discussed above). Another branch would turn more sharply toward North Sydney. With this design, trains from Manly Vale could stop at the current North Sydney station – perhaps saving the need for the “Albert Street” station (if the main station, by then upgraded to handle more people, has the capacity to serve the commuter traffic).
- Another advantage of two branches would be the direct linking of the Manly Vale and North Shore lines, without change of trains.

The capacity of the main North Sydney station to handle all the trains in peak-hour is an issue in the double-branched proposal. My calculations suggest that, with the current North Sydney terminators being directed toward Manly Vale, there would be no serious problems. Certainly there would be none if the Alfred Street station were built, giving North Sydney two stations.

7. Visual aspects at North Sydney and The Spit.

The current environment at North Sydney is far from beautiful. The freeway cuts a large swathe through the landscape, one which ideally should have been minimised in the early days, with a freeway “roof” between the High Street and Mount Street road bridges. On this roof could be a public park, unifying (from a pedestrian point of view) the CBD of North Sydney and the residential areas to the south-east. Noise levels from cars would be reduced.

A rail flyover need not be unattractive in design. Its height would place it above the freeway roof (were that roof also to be built). Trees and other landscaping structures in the roof-top park would shield the line from view, to some extent.

⁵ A rail project would be many years away. By that stage, the current bridge at The Spit would certainly be inadequate (even if widened a bit to improve traffic in the short term). There is, of course, the problem that any increase of capacity of The Spit Bridge would merely shift the bottle-neck for cars about 700 metres toward Mosman, making the short-term success of a bridge widening dubious unless the road between The Spit and Spit Junction is upgraded. That is a separate issue.

At The Spit, we currently have a place of beauty spoilt by a wide and busy road disconnecting the eastern and western sides of the isthmus. Noise and exhaust fumes permeate the existing "village". Under the proposed scheme, and indeed with any scheme which incorporates a new and higher bridge, the roadway (and railway) would be elevated. The Spit would then, in my view, become a quieter, connected village, much as the suburb of Milsons Point is now -- where traffic noise is non-existent and where there is connected parkland under the Bradfield Highway.

8. Links to the west

Clearly, many of the morning trips emanating in the Mosman-Warringah area and headed outside the local district do not cross Sydney Harbour. Major employment destinations not involving the Harbour crossing are North Sydney, St. Leonards, Chatswood, Parramatta and Ryde, together with other western and north-western suburbs. The rail link would offer connectivity in a major way, as would the road-tunnel alternatives in [1] and [2] (which are inadequate mainly in the provision of improved service to the city and to the suburbs in the east, south and inner-west). For morning trips in the reverse direction, those that are driven by the considerable employment in Brookvale, of residents from the west and north-west, benefit in all of the proposed schemes. Similar comments apply to afternoon commuting trips.

One issue of importance in all discussions about travel from the Warringah region is the competition for Harbour Bridge/Tunnel usage between trips which are sourced in Warringah, in the North Shore suburbs and in Sydney's north-western suburbs.

For example, there are suggestions that the new rail line from Chatswood to Parramatta may induce rail passengers, travelling from the Epping area to the city, to use the new route via Chatswood – even though there is an existing route for them via Strathfield. I do not know the projected flows per hour in peak periods from Epping⁶, but these may absorb some of the spare rail capacity on the Harbour Bridge. On a question of long-term priorities, though, it would seem more sensible to route the Epping flows via Strathfield if these jeopardised the viability of a good cost-effective rail project to Manly Vale (and beyond to Brookvale, Dee Why and the northern beaches).

To be fair, some of the current road capacity of the Harbour Bridge/Tunnel is being used by cars originating in north-western parts of Sydney. In one sense, the building of better roads between the north-western suburbs and the city via North Sydney has pre-empted the Warringah region's access to cross-harbour road capacity.

It is inconceivable that alternative crossings of the harbour, east of the Harbour Bridge/Tunnel, could be found for people from the Warringah area. Commuters from Sydney's west, north of the Parramatta River, do have, however, many alternative crossings of that river (with new crossings of a river rather than a harbour not beyond imagination when really needed in 10 or 20 years from now). A policy of channelling most traffic, from Sydney's north-west destined for the city, across the Harbour Bridge makes little sense in the very long term. This comment applies equally to rail and road traffic.

In the very long term, competition for access to roads and bridges can only be resolved with an acceptance that our train network must be expanded.

9. Comparisons

Whilst my heavy-rail proposal should be evaluated on absolute terms using the type of cost-benefit analyses seen in the DTRE studies [1], I have nevertheless made some comparisons with the road-tunnel projects listed in [1] and [2]. These comparisons are tabulated overleaf, as a close to this report.

⁶ The February03 report of Leighton Holdings, builders of the Epping-Chatswood line, cites the then NSW Transport Minister as saying that "... when complete the Epping to Chatswood section will considerably ease congestion on the Main West Line, creating capacity for up to an extra 18,000 passengers to travel by train from Western Sydney". Whether this means "travel to the city from Western Sydney", I am unsure. Travel from Epping to Chatswood, St. Leonards, North Sydney and (if my project were to eventuate) to Mosman and Brookvale, services considerable demand for travel from Western Sydney.

Feature	The road tunnels	My rail proposal
Tunnelling length	Between 5.1 and 7.4 kms depending on the option, mostly under water in the "Folly Point" case.	About 6.5 kms and not under water.
Grades in tunnel	Steep grades in the "Folly Point" and "Mosman B" cases.	Almost level.
Population served during that length.	None in the "Folly Point" case because the tunnel runs under Middle Harbour. Very limited and costly in other cases.	Residential districts along the way: North Sydney (east); Neutral Bay; Cremorne; Spit Junction; North Mosman; The Spit; Balgowlah.
Population served north of the tunnel	All residents north of Manly Vale, by car or bus only.	Similar, except now there is a future rail option to the north. Once rail reaches Manly Vale the scope to serve other areas is immense.
Major new Spit bridge	Yes, for all but the Folly Point scheme (for which The Spit problem remains unresolved).	Yes.
Estimated cost (in today's money) excluding crossings at The Spit.	\$780 million for "Mosman A" and \$530 million for "Mosman B" [1]. About \$900 million for the "Folly Point" option [2].	About \$550 million? Rail tunnels are smaller and cheaper. The recent contract for 13 kms of rail tunnel on Chatswood-Epping route, <u>double</u> the length in my scheme, plus 3 underground stations and all tracks, signals and equipment to make line operational is \$878m.
Land resumption costs	Low. Some resumption near tunnel exits.	Also very low. Virtually no land resumption is needed.
Effect on Harbour Bridge capacity.	May increase traffic on already crowded road lanes.	Utilises spare rail capacity on bridge.
Queues at Harbour Bridge	Extensive, perhaps going back into the tunnel itself.	Only timetabled merging of lines from two routes.
Energy usage in tunnel	High fuel usage on the steep grades.	Flat grade throughout. Extremely energy efficient.
Pollution effects	No reduction in total numbers of cars, though air on Military Road would improve. Ventilation stacks needed.	Permanent reduction of pollution due to a shift from individual car usage to mass transit by rail. No pollution from the tunnel itself; no stacks needed.
New construction near the expressway	Substantial flyovers at Cammeray to allow the tunnel traffic to go south and north on the expressway.	Substantial rail flyover above the expressway at North Sydney. This could incorporate a "park" covering the current mass of road.

References

[1] Improving transport on the Warringah peninsula. *Working Paper 53*. Bureau of Transport and Regional Economics. January 2003.

[2] Liberals announce policy on northern beaches tunnel. *News from Jillian Skinner*, Electioneering pamphlet, February, 2003.

[3] SHOROC Regional Transport Policy 2002.