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Cooma and Monaro Progress Association works to promote the economic development and social wellbeing of the region

COOMA AND MONARO PROGRESS ASSOCIATION (CMPA)

REVIEWS OF FEASIBILITY STUDY on CANBERRA TO EDEN RAILWAY

by Edwin Michell

July 2021

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The reviews were first published on the indicated dates at www.hotrails.net

The reviews are a sequel to CMPA's review dated 9 March 2021, published April 2021

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Canberra-Eden rail needs another look

Edwin May 11, 2021 Uncategorized

Eden, a small town on the far south coast of New South Wales, could become one of the most important places in Australia. Its natural harbour, Twofold Bay, is one of the finest anchorages in the country, yet its rugged hinterland has kept it isolated from the national freight network. Meanwhile, NSW's only significant ports (Botany, Wollongong and Newcastle) are at capacity, and so are the freight corridors that feed them. For this reason, in 2018 I was commissioned by the Cooma and Monaro Progress Association (CMPA) to prepare a concept plan to extend the existing but closed Queanbeyan-Bombala railway to Eden. The CMPA plan proposed a railway constructed by a 50-50 public-private partnership, costing $2.5-3.0 billion and having a Benefit-Cost Ratio (BCR) of 2.4, i.e., $2.40 in external economic benefits for every dollar of public expenditure.

The plan's release was met with substantial enthusiasm, and within a month it was adopted by the NSW coalition government as a major infrastructure initiative. At an August 2018 press conference at Cooma Railway Station, the Premier (Gladys Berejiklian), Deputy Premier (John Barilaro) and Transport Minister (Andrew Constance) presented it as a keystone transportation project, pledging $1 million towards a full business case. "This is not a project for a feasibility study," said Constance, "it's a project for a railway to *begin* with a feasibility study".

However, when the Government study's executive summary was finally released in October 2020, the results weren't just unfavourable, they were *dismal*. The study's cost estimate was almost double the CMPA plan's, but even worse were the projected economic benefits – a present value of just $256 million over 30 years, with a BCR of 0.04 (which was rather unhelpfully rounded down to 0.0 for the report's executive summary). The full report was confidential ("commercial-in-confidence", said the department), so it was not possible to review their methodology, but it hardly mattered – the result was so bad that even if there were some errors in the report, they could hardly be of such a magnitude to reverse the project's economic viability – or so it appeared.

The report was an embarrassment to the government, and to the individual ministers who had championed the project; they quietly dropped the policy without further mention. For me, as the author of the initial plan which had given a very positive result, it suggested a blight on my professional credibility.

The CMPA were perplexed by the disparity in the results of the Feasibility Study versus the original Concept Plan, and requested permission to review the full study. After discussions with the Snowy Monaro Regional Council, who had helped fund the concept plan and were stakeholders in the government's feasibility study, they managed to negotiate supervised access to the complete study for myself and a handful of other reviewers.

It was immediately apparent that the study was severely flawed. I was astonished at the number of major errors, every single one of which was a net detriment to the project's viability. 18 errors were over $100

million in magnitude, and of these, four were *over $500 million*. Some of the largest and/or most serious errors are listed below:

- Several very large cost items should have been excluded; these alone would reduce the capital cost by $1.6 billion:
  - An extension to Canberra Airport (which the study concluded there was insufficient demand to justify, but included its cost anyway),
  - An expansion of the Port of Eden (which should properly be excluded as an external business project, or if included, should account for the additional benefits of that project),
  - A major intermodal container facility at Hume (which, aside from being wildly overspecified for the container volumes anticipated, is entirely unnecessary – there are existing plans to build a suitable facility at Fyshwick for 1% of the cost, privately funded).

- Freight demand was estimated by analysing the existing freight flows between origin-destination pairs within the study area, and then estimating what percentage of these existing flows would switch to rail. This is ridiculous, it's akin to estimating the demand for the Western Sydney Airport by analysing pre-existing traffic flows to Badgery's Creek. The study seems to have ignored several major classes of potential freight (notably quarry products, paper and agricultural produce), including some that were identified by their own survey results.

- Passenger farebox income is estimated at $1.2m/annum on ridership of 2,404 passengers per weekday, which implies a one-way ticket price of just $1 – on the study's own numbers, this should be some 15-20x higher.

- The discount method employed is patently erroneous – the $256 million net present benefit was supposedly calculated by applying a 7% discount rate on real (undiscounted) benefits of $1,823 million earned over 30 years. That's mathematically impossible – under any reasonable set of assumptions, the amount should be around triple what has been presented.

- The study shows no income from freight operations, either in the form of access charges or haulage, despite government funded expenditure on six freight train consists over 30 years – yes, six! – each of 4 locomotives and 86 wagons. It's not evident whether the proposed operator is selling access to the railway (like the ARTC), or actually operating the trains (like Pacific National). It seems to incur the costs of both business structures, but generate the benefits of neither.

The aggregate effect of correcting these errors, in present value terms, is:

- Construction costs reduced from $5.0 billion to $2.6 billion
- Lifetime net income increased from a loss of $381 million to a gain of $962 million
- Net present economic benefits increased from $256 million to $2.4 billion
- Benefit-Cost Ratio increased from 0.04 to 1.44

In other words, far from being a repudiation of the original concept plan, the government's feasibility study, properly corrected, largely validates it.

The four other independent reviewers have also found significant flaws in the study. While these flaws do not necessarily mean that the railway is either viable or unviable, all reviewers concluded that the study's flaws are sufficient to invalidate it:

- Dale Budd (a senior adviser on the Inland Rail project and former director of the ARTC) said *"There is a great deal of material in the report whose validity can be questioned or challenged."* He singled out the lack of a clearly identified business structure for the proposed railway operator, and the lack of any direct consultation with potential freight customers, as the most severe errors.
- Nicholas Kilpatrick (logistics manager for Manildra Group for 20 years) said *"It appears like a report being fleshed out to appear more in depth than what has actually occurred… personally I cannot see any return in value for the expenditure of $1 million."* He noted the unexplained omission of freight income, low passenger revenue for the expected ridership (*"this does not compute"*), and the fact that costs had been calculated over 50 years, while benefits had been calculated over 30 years.

- Bob Nairn (independent civil engineer and author of several books on transport planning and economics) said *"The modelling and economic conclusions in the report are not convincing, and the report… has **not** proven [that the proposed railway line] is **not** feasible"*. He criticised the report's decision to ignore potential freight from the Riverina region, additional passenger demand (education, retail trading and skiing), and alternative funding models such as public-private-partnership. Also, if port upgrade costs are to be included, then the benefits of that project to the port operator, non-rail freight operators, and the wider economy should be included also.
- Colin Mellor (transport economist) said *"In summary, there seems to have been a combination of careless errors in the Feasibility Study."* In his opinion, both passenger and freight demand/revenue appear to be considerably underestimated. He highlighted the inconsistent study periods, and the study's apparent failure to distinguish between economic and financial assessments (eg, elimination of taxes and other transfer payments from economic analysis, as is standard practice).

The CMPA has reached out to the state government and relevant departments on numerous occasions for comment, but they apparently have no interest in addressing the flaws of the study. Each time, their reply has been to simply repeat, without reasons, the study's conclusion that the project is not economically viable, and as such, the study has now been closed. Furthermore, the department has pressured reviewers to sign confidentiality agreements regarding their findings, again relying on the implausible rationale of "commercial-in-confidence". There is nothing in the study that satisfies such a description; it is being used merely as a convenient excuse to avoid scrutiny of a matter of public importance. The same questionable tactic has been used to suppress other rail feasibility studies in the state – notably Narrandera-Tocumwal, Blayney-Demondrille and Cootamundra-Tumut. If these studies are as obviously flawed as Canberra-Eden, then this suppression is doing a grave disservice to the nation.

How can the NSW government be satisfied with their (our) money being so egregiously wasted? The reviews conducted by myself and others demonstrate beyond reasonable objection the Feasibility Study is fatally flawed, and therefore cannot be used to justify the rejection of this critical national infrastructure project. The NSW government should immediately instruct the Department of Transport to withdraw and declassify the study, and refer it to Infrastructure Australia for further review. If they fail to do this, either the state opposition, or the federal member for Eden-Monaro, should hold the state government to account.

List of Errors

The following table lists the errors identified in the Canberra-Eden Railway feasibility study, ordered from largest to smallest. Each error is in Net Present Value terms, using a discount rate of 7%. For readers who desire a more technical discussion, more detail will be published in an upcoming post.

Description	Error ($million, NPV @7%)	Type
Canberra Airport Link	753	Capital Cost
Port Eden Upgrade	640	Capital Cost
Land Sales	596	Lifetime Net Income
Affordable Housing	500	Economic Benefits
Discount Method	390	Economic Benefits
Freight Benefits	339	Economic Benefits
Soft Costs	326	Capital Cost
TOTAL	**$5,958 million** (increase in NPV)	

Description	Error ($million, NPV @7%)	Type
Rollingstock Capex	272	Lifetime Net Income
Intermodal Terminals	216	Capital Cost
Passenger Revenue	214	Economic Benefits
Below Rail O&M	200	Lifetime Net Income
Earthworks	189	Capital Cost
Freight benefits on higher demand	178	Demand Estimate
Track Costs	177	Capital Cost
Delay need to upgrade Port Botany	175	Economic Benefits
Passenger benefits on higher demand	159	Demand Estimate
Above Rail O&M	136	Lifetime Net Income
Passenger Vehicle Operating Costs	115	Economic Benefits
Viaduct specification	93	Capital Cost
Decentralization policy	67	Economic Benefits
Freight Access Charge on higher demand	56	Demand Estimate
Freight Access Charge	43	Lifetime Net Income
Residual Value	23	Economic Benefits
Concrete Culverts	23	Capital Cost
Passenger Access Charge	22	Lifetime Net Income
Passenger Access Charge on higher demand	19	Demand Estimate
Congestion Reduction	16	Economic Benefits
Passive Level Crossings	8	Capital Cost
Corridor Width	7	Capital Cost
Colinton Tunnel	6	Capital Cost
TOTAL	**$5,958 million** (increase in NPV)	

Errors in the Canberra-Eden Railway Feasibility Study

Edwin May 16, 2021 Uncategorized

This article gives additional detail to the numerous errors discussed in my previous article, Canberra-Eden Rail needs another look. All net-present-value figures assume a discount rate of 7%, the rate used in the Feasibility Study's central case. Throughout, the Transport for New South Wales feasibility study is referred to as the "TFNSW study", while the original Cooma and Monaro Progress Association concept plan is referred to as the "CMPA plan".

Description	Error ($million, NPV @7%)	Type
Canberra Airport Link	753	Capital Cost
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Land Sales	596	Lifetime Net Income
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Description	Error ($million, NPV @7%)	Type
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Capital Works

Capital works items have all been calculated in real (undiscounted) terms. To convert to the discounted Net Present Value in the summary table, the real values are multiplied by a factor of 0.80 (the factor applicable to the TFNSW study's proposed construction timeline).

Canberra Airport link

The report explicitly states that the projected demand cannot justify the estimated cost of the link to Canberra Airport, and that the additional economic benefits would be vanishingly small (less than $5m of incremental Net Present Benefit over 30 years). Yet its prohibitive cost is included in the base case.

In fact, although it is not published explicitly due to the strange decision to publish the final BCRs of each option to only one decimal place, the study's own figures show a superior Benefit-Cost-Ratio for Option 2A (without the Canberra Airport link) of 0.047, versus the selected Option 3A's BCR of 0.041. The report should therefore have selected Option 2A as the central case. Removing the airport link results in a capital cost saving of **$941.1m (real)**.

Canberra Intermodal Terminal

The cost estimates given for IMTs of various capacities are implausible. Three sizes are specified, with capacities of 10000, 20000 and 30000 TEU/annum, with corresponding capital costs of $30m, $100m, and $250m. Such severe diseconomies of scale are illogical – according to such a cost structure, one could build eight "small" IMTs for less than the cost of one "large", yet achieve 2.7x the capacity. This is clearly

erroneous; the cost per unit of capacity should be lower for larger facilities, not higher as this report assumes.

More worryingly, in the cost breakdown for the Canberra-Queanbeyan section, the "Hume Intermodal Freight Terminal" has a unit cost of $30m, which somehow gets multiplied by 1 and arrives at a total cost of $131,495,196.19. This strangely precise cost is not explained, though there is possibly a clue in the total section cost, which is a suspiciously round "150,000,000.00" ($240m after the addition of soft costs). It appears likely that a "desired" total cost was selected prior to development of the route costing model, with the total "rounded up" to meet this predetermined figure by overspecifying the IMT. Such methodology is highly inappropriate, to say the least.

According to a recent study (Wiegmans & Behdani 2018), a $240m total cost would be sufficient for an IMT with a capacity of 500,000 TEU/annum (approximately the current container volume handled by Port Botany). The report anticipates about a tenth of this task (52,000 containers per annum); the amount consolidated at Canberra would be smaller still (indeed, the $30m unit cost implies an expected capacity of 10,000 TEU/annum. According to Wiegmans & Behdani, such an IMT should cost no more than $5m. Retaining the costs relating to reinstating signalling at Queanbeyan Junction, and earthworks at the Hume site, the total cost should not exceed $20m. This corresponds to a **$220m saving**.

Note also, there are presently plans to build a small intermodal recycling terminal at Fyshwick, with a capacity of up to 50 full-size (40 foot) containers per week, or 5,000 TEU/annum. The expected cost is $1.2 million, including track work. It is therefore highly implausible to claim that a facility of twice the capacity should be 200 times the cost.

Other IMTs

$30m each has been allocated to small, 10,000 TEU/annum intermodal terminals at Cooma and Bombala. A terminal of such modest capacity (about twelve 40-foot containers per day) would cost $5m each per Wiegmans & Behdani, which would be a **$50m** saving.

Port of Eden upgrade

The report includes a large nominal sum ($800m) for the cost of upgrading the Port of Eden. This is unnecessary on two fronts; first, the Port of Eden is a separate business with wider utility than just the connecting railway, and therefore upgrade costs should not be lumped in with the railway business case (or if they were, then the income from incremental wharfage should also be included, as well as the benefits accruing to non-rail users, neither of which the study does).

Second, the volumes of freight anticipated under either the TFSNW study (<1mtpa) or the more optimistic CMPA study (5mtpa) could easily be handled by the existing facility's two existing berths, given a suitable intermodal or bulk handling facility, which has been allowed for separately in both studies.

Furthermore, there has clearly been no detailed assessment of the cost of such an upgrade, nor does the report give any indication of what such an upgrade would even entail.

Removing port upgrade costs would save **$800m**.

Trackwork

The study assumes direct construction costs of $1.375m/km for newly constructed track, and $1.5m/km for replacement of defunct track, coming to a total of $482.7m for the whole railway. This unit cost is 80% higher than the Inland Rail Alignment Study's inflation-adjusted estimates of $0.765m/km and $0.835m/km respectively. ARTC and international benchmarks are also in line with the Inland Rail estimate (see CMPA Preliminary Estimate). This discrepancy is neither noted nor explained in the report, and other cost items do

not show a similar discrepancy. If we adopt the authoritative ARTC/Inland Rail figures instead, this would give a saving of **221.8m.**

Earthworks

The volumetric cost of earthworks is given as $32.37 per cubic metre (the same for both cut and fill). This amount is close to the inflation-adjusted value given in the 2013 High Speed Rail Phase 2 Study for a cutting through rock in a rural area ($29/m^3, adjusted for inflation); the 2010 Inland Rail Alignment study also gives a close value. However, the TFNSW study makes no distinction between rural and urban works, or rock versus non-rock, nor indeed for cut versus fill. It is inappropriate for a study at this level of detail to employ such coarse estimation, and especially so to apply rock cutting costs to all earthworks (both cut *and* fill).

It would be reasonable to assume the majority of the deep cuttings required in the BOM-EDN section would be in rock, however there is no justification for applying the same unit cost to the embankments. Using the inflation-adjusted unit rate for "rural fill" from the HSRP2 study ($12/m^3) for the 10,004,365m^{3}of embankment specified for the BOM-EDN section results in a saving of **$203.8 million**.

Furthermore, the study has estimated a large volume of earthworks for "refurbishment" of the existing embankments and cuttings on the QBN-BOM section – 865,769m^3 for cuttings, and 755,285m^3 for embankments. This averages out to over 7.5m^3 per metre of route, which seems rather high, especially in light of the fact that the unit cost for track refurbishment already accounts for replacement or refurbishment of the capping layer. However, even without disputing the volumetric estimate, the use of the same $32.37/m^3 rock estimate is inappropriate for line refurbishment, where any displaced or damaged material will be a compacted fill rather than solid rock. Using the cost for "rural fill" would be more appropriate, which would entail a further cost saving of **$32.7 million**.

Colinton Tunnel works

The study states that a site inspection indicated that the tunnel was in structurally sound condition, however no clearance study was undertaken, and therefore a substantial sum was allocated to floor lowering works which the report speculated could be required in order to fit modern intermodal trains. This is patently unnecessary; the Colinton Tunnel is of identical design to the Pine Range Tunnels east of Queanbeyan, which are still operational with the "Narrow Non-Electric" clearance profile. They are presently used by several freight trains per week. Eliminating tunnel modification works will save **$7.7m.**

Corridor Width

The land corridor specified for the BOM-EDN section is unnecessarily wide (80m vs. 40m for the existing corridor) – it is reasonable to assume that halving the area of land acquisition would halve the cost, a saving of **$8.7m.**

Passive level crossings

The study specifies 62 passive level crossings (i.e., without lights – signs only) for private driveways and farm crossings on the Queanbeyan-Bombala section, costed at an absurd $184,888 each. However the Bombala-Eden section specifies 112 such crossings at less than a tenth of this cost: $16,049 each. This much smaller unit cost is in line with ARTC and Inland Rail estimates. Costing all passive crossings at the lower estimate would save **$10.5m**.

Culverts

455 small culverts (1m span) and 123 medium (5m span) are specified over the 214km QBN-BOM section (578 in total, about 2.7 per kilometre). The study notes that most concrete structures on the Queanbeyan-

Bombala section are in serviceable condition, and that only wooden structures would require replacement. However, the study's own asset register indicates that there are 578 culverts in total on the railway. It also appears that a significant majority of existing culverts are in fact concrete.

From this admittedly limited review, a 50% reduction of culvert cost in this section would be conservative, based on the study's own assumption that existing concrete culverts can remain serviceable with negligible refurbishment cost. This would entail a **$28.5m** saving.

Note that the "culvert" definition does NOT include small bridges, which are costed separately.

Long-span viaducts

The study specifies nine viaducts on the Bombala-Eden section, spanning 16.7km in total. Eight of these viaducts have plausible costs (ranging from $20m to $80m per km), however the shortest viaduct (at 943m) has by far the highest unit cost, at $202.7m/km. Such a high unit cost would only be plausible for a cable-stayed bridge of very long span, perhaps 750m or more (for context, the Sydney Harbour Bridge spans 503m). It is implausible that such a bridge would be necessary in the terrain of proposed route. If the bridge in question were respecified to a segmental concrete bridge consisting of three 315m spans, a cost of $80m/km would be reasonable. This would save **$115.7m**.

Grade Separations

The study specifies nine grade-separated crossings at $11.7m each: five on the Monaro Highway, two on the Snowy Mountains Highway, one on Delegate Road, and one on the Princes Highway. The criterion used to specify a grade separation rather than an active gated level crossing is not stated, however it is plausible that the crossings of the Snowy Mountains Highway and Delegate Road could both be respecified to active (gated) level crossings, which would save about $10m apiece. In the absence of a definitive safety review, the TFNSW study's specification will be accepted, though flagged for further review.

Proportionate reduction in soft costs

The study makes allowance for soft costs (preliminaries/general, client costs and contingency) totaling an additional 60% of direct construction costs; we must therefore deduct this further amount of the capital cost savings (excluding the Canberra Airport link, Canberra intermodal terminal, and Port Eden upgrade, which already include soft costs). Additional saving of **$407.6m**.

Lifetime Net Income

This section of the Feasibility Study was prepared by a subconsultant, and has used a study period of 50 years instead of the 30 years used elsewhere in the report. We have therefore adapted these values where necessary to a 30-year period in order to ensure compatibility with the economic benefit calculations.

Rollingstock capital costs

The business case has allowed for the purchase of two freight train consists, each of 4 locomotives and 86 wagons, at cost of $34 million per set. Additionally, four passenger trainsets, each of four cars, are costed at $18 million per set. Such costs should not be included in the business case of the railway operator, as in reality both the passenger and freight train operations would presumably be operated by third parties (likely NSW Trains and Pacific National, respectively). Furthermore, the study has not allowed any freight income in its analysis, either in the form of access charges or haulage – are these freight trains supposed to be hauling freight for free?

Even more strangely, rollingstock capex is accounted for in the whole-of-life financial analysis as totaling $407.7 million (undiscounted). The two freight trains and four passenger trainsets specified above come to a total of just $140 million, about a third of the total capex. It is not clear what is going on here – are the trainsets being replaced every 10 years, with a salvage value of zero? Or is the projected demand growth strong enough to necessitate a tripling of fleet size to six freight trains and twelve passenger trains? The study does not say.

We don't really need to delve into this too deeply – it is entirely inappropriate to include such costs in the case for a below-rail business entity. The entire discounted cost of **$251.1 million** should be set aside.

Operation and Maintenance

Real operating cost estimates over 50 years have been estimated at $1,347.9 million (real), or $513 million in NPV terms. This figure includes both track maintenance, as well as the operation and maintenance of both freight and passenger rollingstock. Rollingstock O&M (so-called "above rail" costs) should properly be excluded, as such costs should accrue to a separate business entity. Below-rail maintenance costs would come to around $25,540 per km-annum (inflation-adjusted estimate from the Inland Rail business case), which totals $247 million over 30 years ($143m NPV), a saving of **$370 million (NPV)**.

Land Sales

The study assumes land sales totaling 1000 dwellings spread over 5 townships (Michelago, Bredbo, Cooma, Nimmitabel and Bombala) for the first 4 years of the project. This is a highly conservative estimate of the amount of land available for development, possibly due to a decision to only offer low-density detached housing. If mixed-use development were pursued instead (as proposed in the CMPA study), the same land area would support 10x as many dwellings, although probably at a somewhat lower developer margin per property. If the number of dwellings were increased to 10,000 over 10 years, and the developer margin reduced from $100,000 to $75,000, this would increase income from land sales by $650m
(or **$596m** discounted at 7%)

Freight income

The report does not appear to have included any income from freight operations, either in the form of track access charges to 3rd party train operators, or direct freight charges to customers. Such an omission is indefensible; while by no means the largest error on a monetary basis, the absurdity of it is sufficient on its own to invalidate the entire study.

We shall assume an access charge pricing model equal to the existing ARTC access charge of about $13 per thousand net-ton-km. Freight demand is estimated at 745,000 tons per annum, over a 323km route, which would represent an access charge income of $3.04 million per annum. Assuming 1% CAGR, this would be an income of **$43.1m** over 30 years (NPV @7%).

NOTE – This does not take into account any charge for backhauling of empty wagons.

Passenger income

While we have argued that the passenger operation's capex and opex should be excluded as costs of a separate entity, such an operation would still generate access charge income for the railway owner. If charged at the ARTC rate, a typical 4-car trainset would be charged $3.21/train-km. With the report estimating 12 trains per day, doubling to 24 by 2036, and assuming operations between Canberra and Bombala, the passenger operation would cover about 34 million train-km over 30 years, and generate access charge income of $109m real ($58.2m NPV). However, as the TFNSW study included farebox income of $68.3m real, that amount should be deducted, bringing the total down to $41.3m real,
or **$22.1m** discounted.

Economic Benefits

Incorrect discount method

The overall net present value calculation is patently erroneous. Table 42 claims that the "Total Real Benefits" over 30 years come to $1,822.7m, having a present value of $255.8m when discounted at 7%. The "net present benefits" are just 12.4% of the undiscounted real benefits. **This is mathematically impossible** under any reasonable assumptions.

At a discount rate of 7%, the net present value of a 30-year annuity (ie, 30 equal annual payments) is equal to 41.4% of the sum of the real payment amounts. At the other extreme, the NPV of a single lump-sum paid after 30 years is 13.1% of the payment amount. A net present benefit of just 12.4% of the real values would only be possible if the project were to generate no benefits at all for the entire 30-year study period, and then all the benefits come at once, in the 31st year. This is of course an absurd assumption, and suggests an egregious error has been committed.

Conservatively assuming a relatively high 5% CAGR of all benefits over the 30-year study period (thus weighting the benefits strongly but not ridiculously towards the future), the discounted benefit should be 32.5% of the undiscounted benefit, or about 2.7x higher than the figure in the study. Correcting for this error would increase net present benefits by **$390.2 million.**

External freight benefits

There is a similarly glaring error in the claimed economic benefits for freight operations, shown in Table 42. The benefits of Scenario 3A (the most optimistic, highest-demand scenario) come to $237.1m in real terms. However for Scenario 1A (the most pessimistic scenario) the benefits are much higher at $373.5m – a difference of about 1.6x. There is no logical explanation for this – unless the study is claiming a net disbenefit to higher freight volumes, which is unreasonable.

It's not entirely clear what the error is here. It is possible that the scenarios have been erroneously switched in the final tabulation, in which case we would read the freight benefits as $373.5m, an increase of $136.4m real ($44.3m discounted using the corrected method as above). However this still does not compute – The freight task in Scenario 3A is significantly higher than for Scenario 1A: 743.5ktpa versus 216.8ktpa, about 3.4x higher rather than 1.6x.

It is reasonable to assume that the economic benefits of each scenario should be proportional to the freight task performed. We would therefore expect the benefits in Scenario 3A to be 3.4x higher than in 1A, ie, $1,280.9m, an increase of $1,043.8 real, or **$339.2m** (discounted).

The alternate possibility, that the benefits are correct in Scenario 3A but overestimated in 1A, is implausible. This would compel us to accept a figure of $69.1m for Scenario 1A's freight benefits over 30 years, which is not supportable.

Verification calculation – We can fairly easily make a ballpark estimation of the "Vehicle Operating Costs" item within the category of freight benefits. The study estimates freight volumes of 743,000 tons/annum in 2031. Assuming a CAGR of 1%, and that the avoided road journeys are of equal length to the rail journey (323km), 7.8 billion net-ton-km would be saved over 30 years. Assuming road freight operating costs of $84 per thousand NTK (Inland Rail business case), this would be a real cost of $651 million, or $370 million NPB discounted at 7%.

Compare this to the Table 42 value of $178.9m undiscounted – the verification example is 3.6x greater. This supports the argument that freight benefits have been significantly underestimated. We will conservatively use the factor of 3.4x imputed by the proportionate freight task of the different scenarios.

Residual value

This calculation is also seriously in error due to the inconsistent study period used throughout the report. The "Residual Value" of $886m in real terms appears to have been calculated by applying a 4% annual depreciation over 50 years. It is absurd to then calculate the present value after 30 years, of a residual value at 50 years – the timeframes have to be the same for this calculation to even make sense. Performing the same depreciation over 30 years results in a residual value of $1,939 million. Discounted at 7%, the net present value after 30 years is $254.7 million (by comparison, $886m discounts to $108.9m after 30 years). The overall result is an increased benefit of **$145.8m (NPV @7%).**

BUT – taking account of the lower construction costs estimated above, residual value after 30 years would drop to $1,005.5 million, which discounts to $132.1m NPV. Even with the lower construction cost, the correct calculation for residual value still results in a higher net present benefit than in the report, by **$23.2m**.

Consumer Surplus

While we have excluded rollingstock capex and opex from the analysis on account of above-rail operations being properly external to the business case, passenger revenue is included as a societal benefit, as it reflects a willingness to pay for the passenger rail service, and therefore a consumer surplus (this is the same rationale that the TFNSW study used as its basis for inclusion in the economic analysis).

The TFNSW report estimates passenger ticket revenue at $1.2 million per annum in 2026, or $4,615 per weekday. However the 2026 ridership estimate is 2,404 trips per weekday, which would imply an average fare of just $1.92 per trip. This is incompatible with other data in the report, which states that the majority of the demand will be between Canberra and Cooma, which is assigned a fare level of $25. All other station locations would have fares ranging from $5 to $15. Assuming an average fare level of $20, the actual fare revenue should be $48,080 per day, or $12.5 million per annum.

Furthermore, the report envisages ridership to grow to 3,962 passengers per weekday by 2036, which would generate farebox revenue of $20.6 million per annum, which would continue to grow through the rest of the study period. As per the assumption in the study, we will assume 1% compound annual growth after 2036.

Therefore, total passenger revenue over 30 years should equal $622.4 million (real), or $232.5 million (NPB @7%). The result is an increase of $**214.4 million** to the net present benefit.

Passenger Vehicle Operating Costs

The Net Present Benefit of avoided passenger vehicle operating costs appears to have been severely undercounted. Taking the central "Scenario 2" case of 2,404 trips per weekday translates to 625,000 trips per annum. Conservatively assuming the vast majority of these trips are diverted from Canberra commutes, we could expect an average avoided journey length of, say, 20km, making a total of 12.5 million km per annum. Taking the study's assumption of a 5% CAGR until 2036, and 1% thereafter, this equals 588 million avoided vehicle-km over 30 years.

The ATO's "Distance Travelled Method" is a conservative estimate of total private vehicle operating costs, at $0.68/km. Using this method would value the avoided passenger vehicle operating costs at $400.2 million over 30 years (real), or 150.3 million NPV.

Compare to Table 42's figure of $109.2 million undiscounted, implying a NPB of just $35.4m (discounted at the corrected rate). Therefore, this represents an increased benefit of **$114.8m**

Affordable housing

The study estimates 9,482 additional regional residents by 2036 but does not include this as an external economic benefit. Such a change in urban geography would generate a substantial benefit in provision of cheaper housing than available in Canberra (one of the most expensive cities in Australia), increasing the disposable income of those residents, which then flows into the wider economy. If we assume a maintainable housing price differential of $150,000, and a typical home occupancy of 2, that's a total real benefit of $711.2m by 2036. Further assuming that an equal number of houses are released each year, and no further growth occurs post 2036, the NPV is **$499.5m**.

Congestion reduction

The study does not include congestion reduction as an economic benefit. Based on a median population growth projection of 7,600 people per year (ABS), and the year-on-year rise of avoidable congestion costs in Canberra of $17.7 million per year (BITRE 2015), this implies a marginal congestion cost of $2,329 per additional resident in the 2025 financial year. Assuming that the study's estimate of 9,482 additional regional residents represents population growth diverted from metropolitan Canberra, this would represent a NPB of **$15.5 million**.

Decentralisation

The study further takes no consideration of the economic benefits of decentralisation. Various government programs to encourage regional living suggest an economic value of $10,000 per resident relocated to regional areas (see CMPA Concept Plan socioeconomic cost benefit analysis). Using the same population numbers as for the above, this would indicate a real benefit of $94.8m, or **$66.6m**discounted.

Delay Port Botany Expansion

The opening up of the Port of Eden to the freight network would delay or eliminate the expected need to expand the operations of Port Botany or Port Kembla. This would likely be a multi-billion dollar proposition. Very conservatively estimating a deferred cost of $500 million delayed by 10 years from 2026 to 2036, this would entail a net present benefit of **$175.3 million.**

Demand Estimates

Non-commuter passenger demand

The study assumes ONLY commuter demand, and ONLY on week days. This is unrealistic; non-commuter demand typically comprises approximately half of all rail journeys; we could expect significant extra demand for purposes of tertiary education, shopping, seasonal ski tourism, and others. If we take a conservative estimate that 25% of all journeys are non-commuter, this would increase average daily passenger numbers to 3,205 in 2026 (5,283 per day in 2036). This additional ridership would increase all passenger benefits, which would mean additional NPB of **$158.9m**. It would additionally increase access charge revenue by **$19.3m.** (both discounted at 7%)

Freight Demand Estimates

The study has considered three potential scenarios for freight demand capture (2031 demand figures taken from Table 20):

1. **Capture of existing flows** – assumes the railway only captures a proportion of existing freight flows to the Port of Eden. 2031 demand: 216.8ktpa

2. **Induced freight**: As for Scenario 1, but with a +15% loading for freight originating in the immediate study area (Canberra region), +5% in wider area (Goulburn, SW slopes), and no increase in outer area (Riverina, central west). 2031 demand: 252.7ktpa
3. **Capture from Botany and Kembla** – As for Scenario 2, but including some capture of containerized and bulk freight presently flowing to Port Botany and Kembla. 2031 demand: 743.5ktpa

The methodology for each of the above scenarios is entirely inappropriate. The rationale behind opening up a previously inaccessible port to the national rail network is to dramatically change the freight flows of the wider region, not to narrowly capture a fraction of the existing flows to that port. This is akin to estimating the demand for the Western Sydney Airport by analyzing the pre-existing traffic flows to Badgery's Creek. Similarly, the induced freight estimate is based on a seemingly arbitrary percentage of the flawed base freight capture, and is therefore also largely useless.

As for capture from competitive ports, the numbers appear pessimistic. The report suggests *"Huge potential for Eden to capture some of the freight task from Port Kembla and Port Botany"* – yet this does not seem to be reflected in the final demand estimation. "Scenario 3" results in just 260ktpa of agricultural produce, 161ktpa of forestry products, and 70ktpa of finished goods diverted from competitor ports. This would represent less than 10% capture of the current agricultural task of Port Kembla, and barely 1% capture of containerised traffic from Port Botany.

It is difficult to make further comment on the freight demand estimates without a much more detailed look at the methodology, which is no longer possible as TFNSW are refusing to make the full report available for further review. However there are a couple of glaring omissions which we will look at below.

Construction Aggregates

The study has an implausibly low estimate for freight demand from construction aggregates; it estimates the current annual freight market in the study area for construction aggregates (gravel, sand, etc) to be 1,900 tons per annum (which is a single B-Double load every eight days or so). This is obviously erroneous, though it's not clear how. It could easily be out by a factor of a thousand or more (possibly a case of confusing tons and kilotons??), or it could be a result of poorly selected origin-destination pairs to include in the study. Again, it's difficult to say without knowing what's in the study's black-box method.

The estimate for construction aggregates that would actually use the railway is even lower, just 300 tons per annum (one train every five years, perhaps?) – effectively nothing.

In the Queanbeyan community consultation session, a representative from Schmidt Quarries (a major sand and gravel supplier on the Monaro with several existing quarries located either on the railway line or close to it) stated that the reinstated railway would allow them to supply product competitively in the Sydney market, and that they would "greatly expand operations" if it were to go ahead. This "induced freight" does not appear to have been included in the study. Between Schmidt Quarries and other operators on the Monaro, it would be reasonable to assume a typical demand of around 1 train per day, which would equate to approximately **700,000 tons per annum**. Note: In a 2010 study, the NSW RTA estimated the total quarry product flows in the Canberra region to be over 13.4 million tons per annum; an expansion of production of this scale would represent an increase of only 5% to total flows.

Finished paper products

In the Bega stakeholder engagement session, representatives from Monaro Logging expressed interest in diverting "40 containers per day", currently going from Wagga Wagga to Port Botany, to the proposed railway. Assuming 40-foot containers, and 15,000 containers per annum, this would conservatively represent **300,000 tons per annum** in freight demand, about a third of the Visy plant's total output of finished product.

There is therefore a strong argument that freight volumes have been underestimated by at least 1mtpa, just by looking at these two sources of freight alone. This higher freight task would increase access charge

revenue by **$56 million**, and wider freight benefits by **$446 million** (both figures discounted at 7% over 30 years).