



AUSTRALIAN RAIL TRACK CORPORATION LTD

**DOCUMENT TYPE: PROJECT PROPOSAL REPORT
(PPR)**

**PROJECT DETAIL: RAIL UPGRADES AT GEELONG
PORT**

LOCATION: GEELONG, VICTORIA

A ADMINISTRATION

PROPONENT DETAILS

A1 COMPANY DETAILS

AUSTRALIAN RAIL TRACK CORPORATION

ABN 75 081 455 754

Passenger Terminal Road off Sir Donald Bradman Drive

MILE END SA 5031.

A2 PROJECT DIRECTOR

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PROJECT DETAILS

A3 PROJECT NAME

Geelong Capacity and Access.

A4 CORRIDOR LOCATION

Melbourne – Adelaide.

A5 PROJECT SUMMARY

The project being the subject of this PPR has the primary objective improving access efficiency through the Geelong area, and specifically into the Geelong port area for trains operating to and from the north of Geelong.

Geelong Capacity and Access

It is proposed to increase access efficiency by:

- Undertaking a number of associated signalling and track upgrades to facilitate access for trains arriving from the North of Geelong. (Northern access currently does not exist).
- Duplicating the track between a point immediately to West of North Geelong, through Gheringhap, a distance of 9.4km.
- Constructing a new 1800metre loop south of Lara

A6 PRIMARY PROJECT CATEGORY

Rail

- Strengthening – track upgrades throughout
- Augmentation – duplication and loop, improved Port access.
- Technology – signalling upgrade

A7 PHASES SEEKING FUNDING

This PPR seeks approval for the project scoping, project development and project delivery phases.

B STRATEGIC FIT

PROJECT IDENTIFICATION

B1 IS THE PROJECT IDENTIFIED IN THE NATIONAL LAND TRANSPORT PLAN AND / OR BILATERAL AGREEMENT?

No.

DEFICIENCIES, NEEDS AND DEPENDENCIES

B2 HOW DOES THE PROJECT SATISFY THE NEEDS OF THE CORRIDOR?

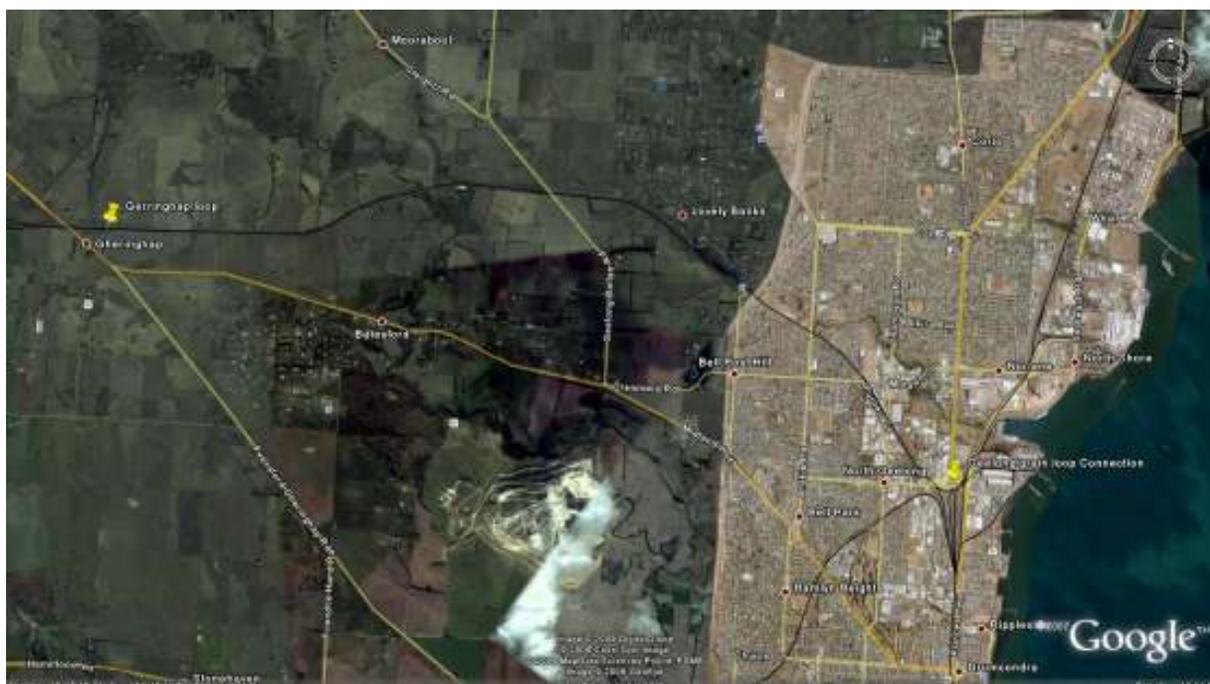
Standard gauge access to the Port of Geelong was provided in 2006 with the conversion of the grain loop to dual gauge. Works at that time provided for a single connection facing west, allowing easy access for trains to and from western Victoria. Recently completed works have extended dual gauge to the general freight area of the port.

Standard gauge trains to and from the north are required to run from Geelong to the next standard gauge loop at Gheringhap to reverse direction, creating significant additional train movements and congestion on this section, as well as operational inefficiencies. Although a scheme was developed at the time to provide a loop at Geelong to permit trains to run-around, there was insufficient funding to complete that stage of the project. The main standard gauge traffic accessing the port is grain. Log traffic is expected to switch to standard gauge in the near future.

The area around Geelong is also the next highest priority for capacity enhancement works following the loop extension projects funded under the “Nation Building” stimulus package. There is a very long section from Manor loop north of Geelong to Gheringhap loop which is the capacity limiting section on the Melbourne – Adelaide corridor and needs to be broken up to improve train capacity.

It is proposed to address both the Port access issue and the issue of capacity in the Geelong area by duplicating the line from Geelong to Gheringhap and providing the necessary facilities at the Geelong end to allow grain, log and other trains to reverse direction. The Geelong – Gheringhap section was once double track, so reinstating the second track can be done relatively economically.

The section of line is shown in the following photo:



The section of track from Gheringhap to Maroona loop uses the unique ASW safeworking system. The non-standard nature of the system and some aspects of its functionality make it difficult and costly to maintain and it is yet another safe working system to manage and operate. The extension of the double track to Gheringhap means that it will be necessary to make alterations to the ASW system and this creates the opportunity to replace the system with Phoenix Train Orders, which is the system ARTC is standardising on going forward.

The section of track where the broad and standard gauge lines interface immediately to the west of Geelong is complex. This is an artefact of the evolution of the track configuration at Geelong and creates unnecessary maintenance and operational complexity. A simpler configuration is proposed. The track arrangement also uses “gauge splitters to interface between broad, standard and dual gauge track. These are high maintenance, restrict speed and have an increased derailment risk. The proposed scope of works will allow these to be removed and replaced with modern dual gauge turnouts.

Even with duplication of Geelong – Gheringhap, a long section will remain between North Geelong and Manor loop. It is proposed to address this with the construction of an additional loop to the south of Lara. The proposed location is shown in the photo below. The nominal position of the loop is slightly to the south of the centre point of the North Geelong (Anakie Road) to Manor section on a transit time basis.



B3 IMPACTS ON / BY OTHER PROJECTS?

The proposed works will complement the extension of crossing loops between Adelaide and the Victorian border and the track upgrade from Maroona to the South Australian border both of which are being funded under the Nation Building stimulus package.

C PROJECT OVERVIEW

RISK

C1 RISK MANAGEMENT

This project can be considered low risk, All of the required activities are being undertaken by ARTC elsewhere on the network on a regular basis. Site specific risks are minimal. The current size and scope of the ARTC capital works program means that the contracting and governance arrangements are in place to ensure cost and delivery risk is small.

Specific identified risks for works of this nature are as follows:

- Coordination of access windows.
- Out of course train running effecting available work hours.
- Wet weather.
- Equipment failure and non availability of materials.
- Working during high temperature days.
- Availability of signalling resources.
- Environment and Development approvals

A risk management strategy will be put in place for each of these risks.

C2 EFFECT OF MARKET CONDITIONS ON PROJECT

With the current economic climate, the market for major rail projects has become considerably more attractive with material reductions in cost becoming evident.

ARTC also expects to gain a significant cost advantage from three sources.

First, ARTC continues to be able to procure concrete sleepers at an attractive price, which will represent the largest materials cost for the project, as a result of the large orders placed for the upgrading of the North-South rail corridor.

Second, the decline in steel prices has made rail purchase costs more attractive.

Third, as a result of the extensive concrete sleepiering work being undertaken on the North-South corridor and in eastern Victoria, ARTC has an excellent understanding of current best practice and the achievable cost of sleeper laying.

ARTC is also able to secure the necessary project management and labour resources through its existing suite of alliance contracts.

C3 PROJECT OUTCOMES VS SIMILAR PROJECTS

Works would be carried out in accordance with ARTC's developed standards for engineering, design, construction, testing and commissioning. These standards have been

Geelong Capacity and Access

developed over considerable time by ARTC and its predecessor organisations from a fit for stated purpose perspective. No element of the project would exceed normal infrastructure performance expectations.

The project will be implemented in a manner fully consistent with similar projects on the north-south and east-west corridors.

C4 GOVERNANCE ARRANGEMENTS

The project will be delivered primarily through the ARTC alliance contracting structures.

ARTC has four such agreements in place and is in a position to procure the services of any of the four for the delivery of the works.

Each alliance is governed by an Alliance Board (AB), comprising members of both ARTC and the contractor, who direct and approve all works. The Alliance Board is supported by an Alliance Management Team (AMT) with members from the alliance partners and from ARTC, who provide day to day management of projects as well as providing all technical, financial and performance reporting, analysis and recommendations to the AB for ultimate direction and approval.

Under the AB and AMT is a conventional project delivery structure.

C5 CONTRACTUAL ARRANGEMENTS

As discussed above the main contractual arrangements will be through ARTC's existing alliance contracting structures. In selecting the alliance partners ARTC called for expressions of interest, obtained detailed competitively tendered proposals from a number of railway engineering and construction organisations and carried out an extensive examination and evaluation process.

The alliances must seek, obtain and demonstrate competitiveness and value in pricing as part of each project approval process. This will ensure there is both alliance approval through the AB and ARTC internal approval through its existing processes.

Processes and management of external subcontract arrangements will all be in accordance with standard procurement systems used by the alliances with approval authority and delegation finally and ultimately resting with the AB.

In addition ARTC has sought open competitive tenders for major material supplies including rail and sleepers in accordance with its own tendering and procurement procedures.

C6 EXEMPTIONS FROM TENDER PROCESS?

The provisions of Section 24 do not apply as the recipient of the funding is not a State nor an authority of a State.

However, it should be noted that ARTC has competitively sought, received, evaluated and chosen its alliance partners to deliver its overall works program. The four alliances represent a significant cross section of the track, civil and signalling construction capacity in Australia.

Geelong Capacity and Access

Further, ARTC has competitively sought, received, evaluated and awarded major contracts for the procurement of concrete sleepers and rail.

The Alliances themselves are able to also seek competitive prices for all material supply requirements and for any major subcontract works such as works trains.

C7 Do NCOP FOR CONSTRUCTION INDUSTRY APPLY?

Yes

PROJECT SCOPING PHASE OUTCOMES

C8 OPTIONS INVESTIGATED/REJECTED?

A short options assessment paper is included as Attachment 3.

C9 PREFERRED OPTION

The preferred option consists of the following works:

- Duplicate 8.0 km of track from North Geelong to Gheringhap in standard gauge.
- Duplicate 1.4 km of track immediately to the west of North Geelong in dual gauge.
- Provide 2 additional crossovers in the vicinity of North Geelong.
- Rationalise North Geelong yard connections to eliminate inefficient junction arrangement and gauge splitters.
- Replace gauge splitter at Gheringhap with a dual gauge turnout.
- Signalling to allow the double track Geelong – Gheringhap section to be operated bi-directionally (as only one track will be dual gauge).
- Replace ASW system between Gheringhap and Maroona with Phoenix Train Order Working.
- Upgrade the existing Geelong - Gheringhap track including selected rail renewal, weld straightening, grinding and drainage works.
- Construct a new crossing loop to the south of Lara with 1800 metres clear standing room.
- The estimated cost of this option is \$50m.
- The proposed works are shown schematically in Attachment 1.

PUBLIC CONSULTATION DURING SCOPING

No public consultation was undertaken to determine the preferred scope.

Consultation has occurred with the Victorian Department of Transport.

ENVIRONMENTAL, CULTURAL AND SOCIAL ISSUES

C10 ENVIRONMENTAL OR CULTURAL LEGISLATION

The proposed works are expected to be entirely within the rail corridor and as such ARTC is its own consent authority for the works.

The major environmental issue is expected to be noise generated by coupler run-in and run-out during stopping and coupling, and locomotive idling. Careful attention will be required to turnout and signal placement to minimise impacts.

It is possible that there will be issues in association with the Commonwealth EPBC Act as the rail corridor is sometimes a habitat for threatened species.

C11 STAKEHOLDER CONSULTATION/CONSIDERATION

Local Government will be consulted as part of the process. As noted, there may be noise issues, in particular in the Braund Avenue – Anakie Road section where the rail line has residential development on both sides. These will be assessed as part of an Environmental Effects Statement process and appropriate levels of consultation undertaken.

D TECHNICAL DATA

OUTTURN INVESTMENT COSTS

The total projected cost for the full scope of works is \$50 million.

D1 PROJECT SCOPE PHASE COSTS

Due to the nature of the works, costs for this stage are negligible and no specific funding allocation is being sought.

D2 PROJECT DEVELOPMENT PHASE COSTS

Due to the nature of the works, costs for this stage are small and no specific funding allocation is being sought.

D3 PROJECT DELIVERY PHASE COSTS

The following table provides a breakdown of the current projected cost of the track upgrade works.

| | |
|--|---------------------|
| Geelong – Gheringhap Duplication and Reconfiguration | |
| Second Track | \$16,500,000 |
| Crossovers | \$3,000,000 |
| Track slewing / reconfiguration of North Geelong | \$3,000,000 |
| Signalling | \$6,000,000 |
| South Lara Loop | \$10,000,000 |
| ASW Replacement | \$5,000,000 |
| Track rehabilitation – existing track | \$5,000,000 |
| Project Management | \$1,500,000 |
| | \$50,000,000 |

D4 INDEX RATES

A discount rate of 7% has been adopted.

D5 ELIGIBILITY FOR NATION BUILDING FUNDING

This funding application is made on the basis that the total project package of \$50 million as described above would be fully funded by the Nation Building program.

TIMING

D6 KEY MILESTONES

Construction works are proposed to commence in Dec 2009.

Works are expected to be completed in a 52 week period,.

DESIGN AND CONSTRUCTION FEATURES

D7 LATENT GROUND CONDITIONS

The terrain and soil conditions along the line are generally benign and no significant costs or risks are anticipated.

D8 DESIGN LIFE OF PROJECT

Concrete sleepers have a nominal life of 50 years. Rail and turnout life is dependent on tonnage, but any rail laid would be expected to have a life of at least 30 years if properly maintained. It is not meaningful to assign a life to ballast, rail grinding and weld straightening. Signalling works have a potentially indefinite physical life, but would be expected to be technologically redundant within 20 years.

D9 PROJECT FLOODING SERVICEABILITY

There is no recent history of major flooding.

D10 PROJECT HEAVY WORKS AND IMPACT ON ENVIRONMENT

Track upgrading and signalling works would not generally be regarded as 'heavy works'. Duplication and loop works will involve some earthmoving to prepare the track base. A full assessment of the impact of the heavy works will be made in an Environmental Effects Statement and suitable impact mitigation measures will be put in place.

D11 VISUAL AMENITY AND TRAFFIC NOISE

Visual amenity and traffic noise are not considered material issues given the nature of the works.

DEMAND FORECASTS

D12 EXISTING TRAFFIC VOLUMES/COMPOSITION (PRE-PROJECT)

Current traffic volume on the section through Geelong is approximately 5270 trains per year (14.4 per day) with a total weight of 12.1 million gross tonnes.

The Melbourne – Geelong – Maroona line has two primary traffics. These are interstate (principally Melbourne – Perth, Melbourne – Adelaide and Sydney – Adelaide including considerable import / export traffic for Melbourne – Adelaide, and steel) which represent about 85% by volume and grain which represents about 10%. General freight (4%) and the Overland passenger service (1%) make up the balance.

D13 FORECAST TRAFFIC VOLUMES/COMPOSITION (POST –PROJECT)

The following table shows projected volumes for 30 years in 10 year increments. This growth is based on ARTC’s internal budgeting forecasts. It assumes a “most likely” scenario for future oil prices, exchange rates and carbon prices. Growth rates are constrained to no more than 5% in any one year. This is below the average rate of growth over recent years and in particular constrains growth in Sydney / Melbourne – Adelaide volumes to significantly below what may arise in a carbon constrained economy.

| | 2009/10 | 2019/20 | 2029/30 | 2039/40 |
|--------------|----------------|----------------|----------------|----------------|
| Trains | 5270 | 6610 | 8715 | 11419 |
| Gross tonnes | 12.12 mt | 17.29 mt | 23.42 mt | 31.06 mt |

Growth in intermodal is expected to be materially higher than growth in the other traffics, which will see a gradual increase in the proportion of traffic represented by the interstate task.

The volume of trains requiring access to the port to and from the north is difficult to forecast as it is highly dependent on traffics that can fluctuate significantly due to both climatic and competitive effects, and on changes to current operating arrangements. It has been conservatively assumed that there will be one train per day in each direction on weekdays. At this level of volume, the traffic seeking to access the port will be equivalent to around 10% of total trains.

D14 IMPACT ON OPERATIONS DURING CONSTRUCTION

Works will generally be undertaken between trains, with no impact on operations

SAFETY

D15 SAFETY AUDIT

A Safety Audit Schedule will be prepared at the commencement of the construction stage identifying the frequency of the formal safety audits that will be conducted during construction and the elements that will be reviewed during each audit.

In particular, the safety audits conducted during the construction stage will ensure;

- Compliance with the ARTC and alliance partner safety management systems.
- Compliance with relevant legislative rail and occupational health and safety requirements.
- Compliance with relevant accredited operator systems.

D16 CRASH TYPES (FAULTS AND CONDITION) IDENTIFIED

Not applicable.

D17 HISTORICAL CRASH RATES COMPARISON

Not applicable.

D18 SAFETY ISSUES ADDRESSED BY PROJECT

Not applicable.

BENEFIT COST ANALYSIS

D19 BASE CASE

The base case for this analysis is taken as no change to the infrastructure, and growth in volume as set out in section D13, until the current infrastructure reaches capacity at which time volume is held constant.

D20 EVALUATION PERIOD

The evaluation has been undertaken over a 31 year period. Expenditure is forecast to span two financial years. Some benefit will be generated in the second year. The benefit period has been set as 30 years giving a total of 31 years of cash-flow (2009/10 to 2039/40).

D21 COSTS AND BENEFITS

The benefit cost analysis has been prepared on the basis of the overall project. Key benefits are:

- A 3 minute reduction in “free running” transit time through the elimination of the speed restricting “gauge splitters”.
- Reduced crossing delay as a result of the Geelong – Gheringhap duplication and Lara loop. The size of this benefit varies with train volume.
- Reduced delay as a result of the replacement of the inefficient ASW safeworking system. The size of this benefit varies with train volume.
- A 20 km reduction in the distance involved in undertaking a run-around to access the port.
- A 17.1 minute reduction in the time involved in undertaking a run-around to access the port.
- A reduction in externalities given that in the absence of investment the line will become capacity constrained in 2031.
- Reduced maintenance cost from the elimination of the maintenance intensive “gauge splitters”.
- Reduced track maintenance costs as a result of the upgrading of the existing Geelong – Gheringhap track, in particular the need to undertake remediation works in future years equivalent to the current proposed scope.

Capital costs are as set out in section D, summing to \$50 million. In addition, there will be a small additional recurrent cost as a result of the additional running line track.

D22 DISCUSSION

A discounted cash flow and BCR calculation has been done on the basis of the costs and benefits discussed at D21.

Key assumptions are:

- Train operating cost has been valued at \$7 per minute.
- Train operating cost has been valued at \$45 per km.
- It has been assumed that loop lengthening along the rest of the Melbourne – Adelaide corridor will proceed as Australian Government funded projects irrespective of funding of Geelong, and that these projects will allow an increase in permitted train length from 1500 m to 1800 m. In the event that this does not occur, train numbers would be higher than has been assumed, which will cause further increases in delay / capacity constraints, which would give a higher economic benefit from the Geelong works.

The calculation of benefit takes account of two sources of crossing delay:

- On a single track section there will be delay where a train needs to wait for an opposing train movement (referred to as “random delay” in the analysis spreadsheet). This has been calculated as the probability of a train encountering an opposing train (which is derived from the number of trains, and the time taken to

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traverse the single track section) multiplied by the average wait time (which is 50% of the average section time).

- Delay also arises due to congestion, which occurs due to trains being held up waiting for other trains travelling in the same direction or waiting for multiple following moves in the opposite direction (referred to as “congestion delay” in the analysis spreadsheet). This is calculated using an algorithm derived from observed delay levels. At 80% capacity utilisation, there is a level of delay per train of approximately 70% of the section time.

Any initiative that reduces the section time will reduce delay as both the probability of encountering an oncoming train, and the time spent waiting in a loop, will reduce. The values associated with the calculation of delay are shown in attachment 2.

Externality benefits have been calculated on the basis of:

- An assumed average train size of 3000 gross tonnes travelling an average distance of 2000 km.
- An assumption that in the event that rail was capacity constrained, 50% of the freight forced off the rail network would travel by sea, with no associated externality penalty.
- The following values assuming a 5% / 95% split between urban and rural travel.

| Externality (\$ per '000 GTK) | Road (heavy vehicle) | | Rail | | |
|-------------------------------|----------------------|----------------|----------------|----------------|----------------|
| | Urban | Rural | Urban | Rural | |
| Accident* | \$ 0.90 | \$ 0.90 | \$ 0.12 | \$ 0.12 | |
| Air Pollution | \$ 1.01 | \$ - | \$ 0.02 | \$ - | |
| Greenhouse | \$ 3.82 | \$ - | \$ 1.33 | \$ - | |
| Road maintenance** | \$ 0.31 | \$ 0.31 | \$ 0.12 | \$ 0.12 | |
| Congestion*** | \$ 4.10 | \$ 4.10 | \$ - | \$ - | |
| Other | \$ 0.39 | \$ - | \$ - | \$ - | |
| Urban separation | \$ 0.90 | \$ - | \$ 0.31 | \$ - | |
| Water pollution | \$ 0.04 | \$ - | \$ 0.04 | \$ - | |
| Nature and landscape | \$ 1.44 | \$ - | \$ 0.31 | \$ - | |
| Noise | \$ - | \$ - | \$ - | \$ - | |
| | \$ 12.92 | \$ 5.31 | \$ 2.24 | \$ 0.23 | |
| | | \$ 5.69 | \$ | \$ 0.33 | \$ 5.35 |

D23 INCREMENTAL BCRs

Attachment 2 shows the cash flows for the project.

The proposed investment generates an NPV of \$24.4 million and a BCR of 1.53.

Attachment 3 - Geelong Options Assessment:

Six options were considered.

- 1. Original GRAIP proposal extended to 1800m**
- 2. Geelong Bypass**
- 3. Geelong – Gheringhap Double Track, Minimalist**
- 4. Geelong – Gheringhap Double Track, Ultimate**
- 5. Geelong – Gheringhap Double Track, Intermediate**
- 6. Lovely Bark Loop**

All options include:

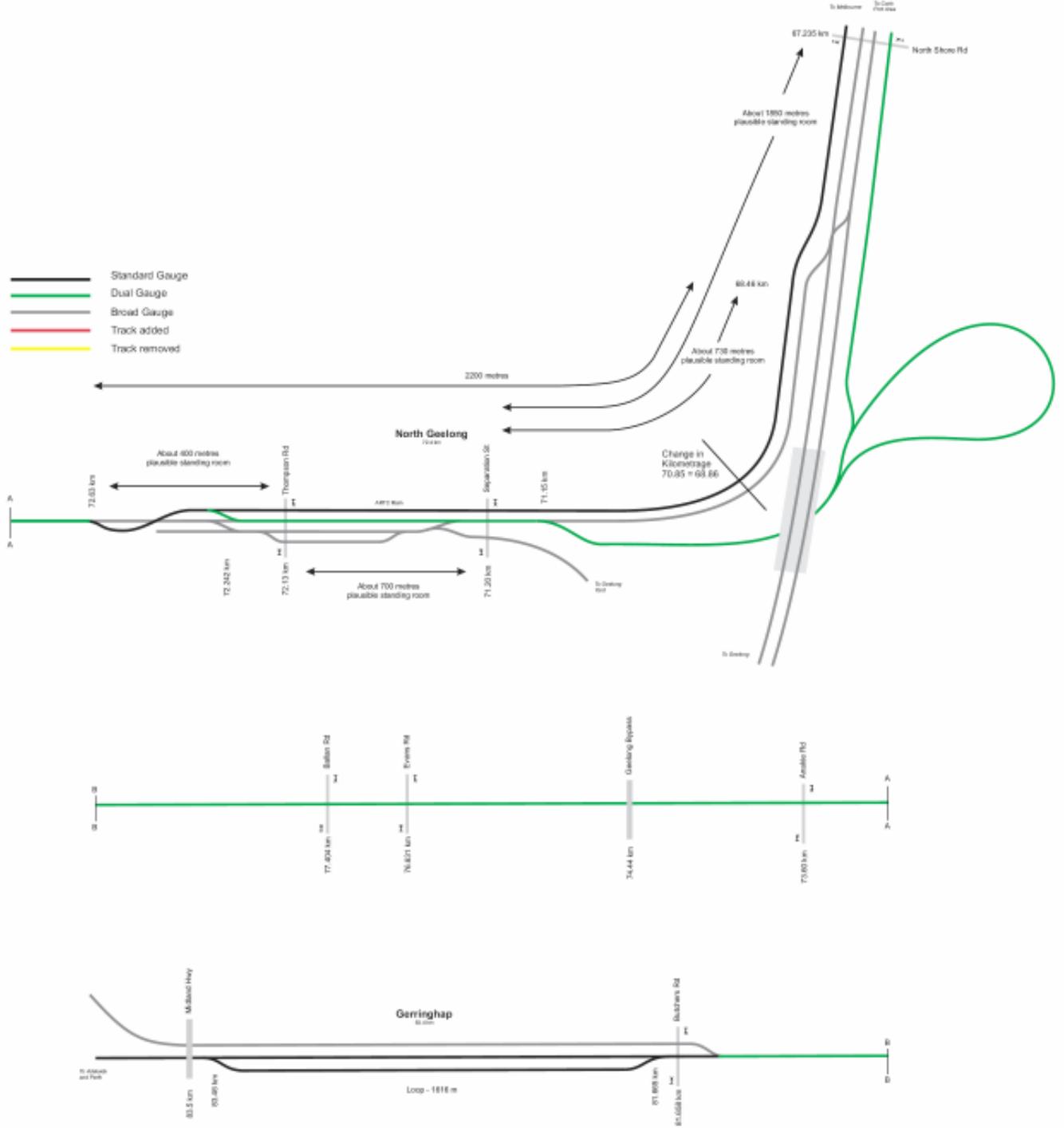
- 1. Constructing the South Lara Loop**
- 2. Replacing ASW**
- 3. Upgrading the Geelong Gheringhap Section of the track**

Options 1, 2 & 4 were discounted on the basis of higher costs.

Options 3 & 6 were discounted on the basis that trains from the North required additional running time for entry to the Port of Geelong who compared to option 5.

Option 5 is the preferred option

Current Geelong – Gheringhap Configuration



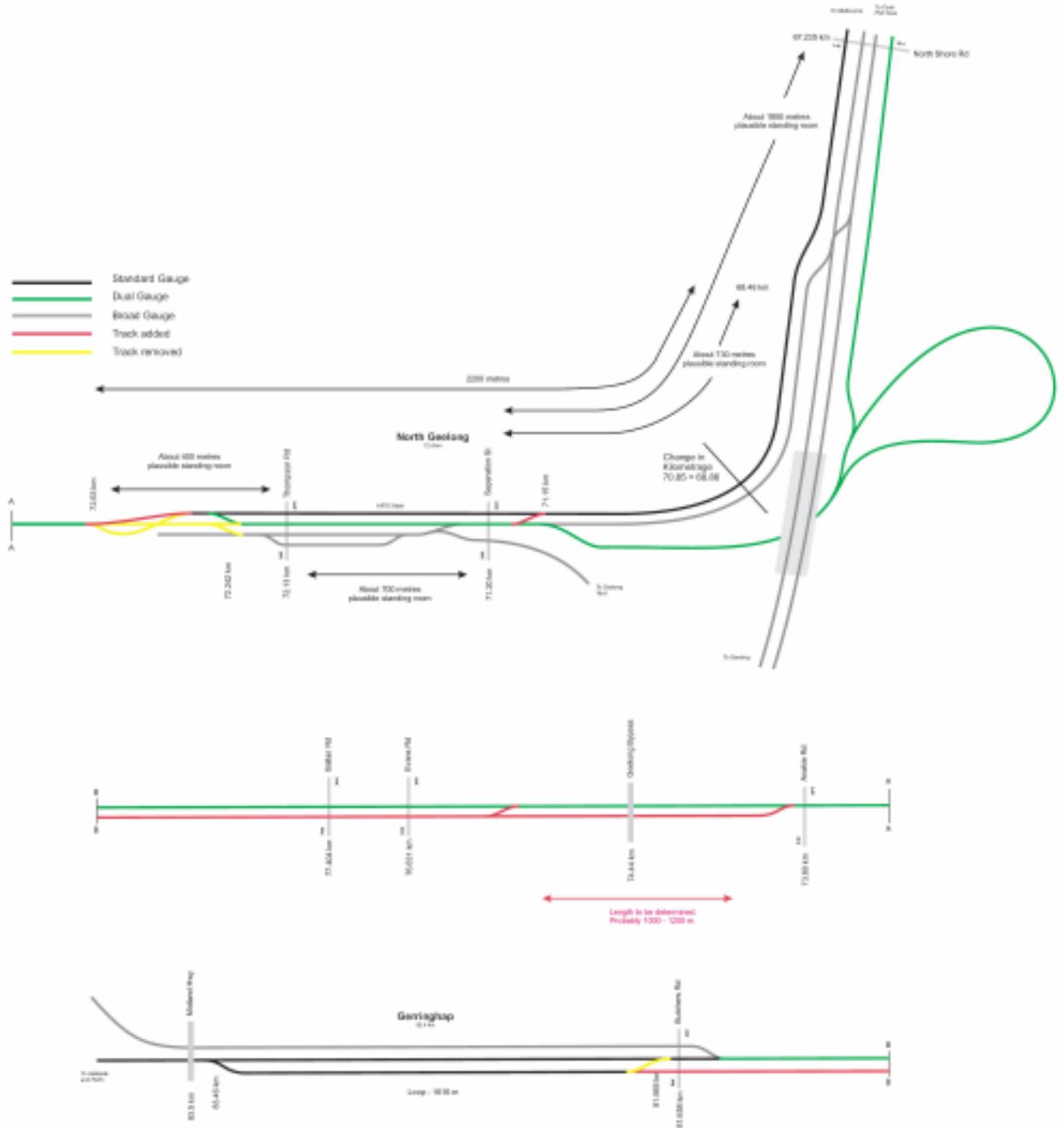
| | |
|---------------|--|
| Scope | Provide a 1,500 metre loop at North Geelong (now modified to 1800 m). Reconfigure North Geelong yard. Grade separate Separation Rd and Thompson St. |
| Costs | \$80m |
| Advantages | Minimises travel distance for Geelong – North trains. Splits long section. Eliminates 2 major level crossings. |
| Disadvantages | Cost probably exceeds allocation. Grade separations are complex and have high environmental impact. Relatively long construction timeframe. Most of the cost is associated with benefits to road users. |
| Comment | Appears poor value-for-money from a rail perspective and long construction time is inconsistent with current objective of fast project delivery. |

Option 2: Geelong Bypass



| | |
|---------------|--|
| Scope | <p>Bypass Geelong with a new alignment approximately following the road bypass alignment at the northern end and then heading basically west.</p> <p>Provide a triangle connection at the western end.</p> |
| Costs | <p>\$90m based on an escalated Interstate Audit estimate.</p> |
| Advantages | <p>Reduces rail distance by around 4.4 km.</p> <p>Reduces rail transit time by 8 minutes.</p> <p>Provides direct access for Geelong – North train ie no run-around required.</p> <p>Significant reduction in rail traffic across the 4 Geelong level crossings.</p> |
| Disadvantages | <p>Cost probably exceeds allocation.</p> <p>Very long construction timeframe.</p> <p>Viability / planning approvals uncertain.</p> <p>Would require land acquisition.</p> |
| Comment | <p>Assuming it is viable, provides the most complete solution. However, cost and construction timeframe are major drawbacks.</p> <p>Net increase of 1.8 track km (assuming existing track from the northern connection point to the Geelong Grain Loop turnout is closed).</p> |

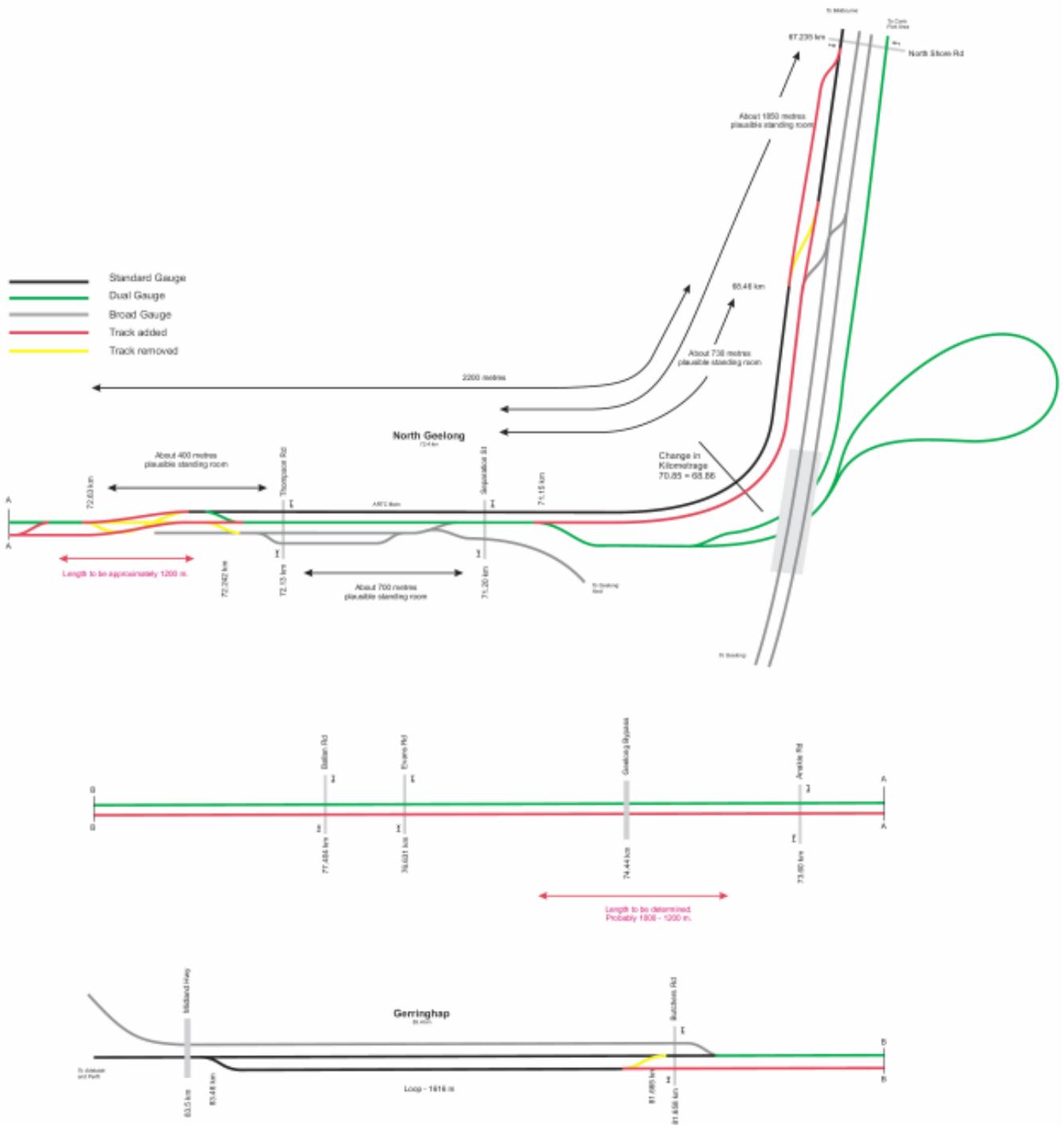
Option 3: Geelong – Gheringhap Double Track, Minimalist



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| | |
|---------------|--|
| Scope | <p>Duplicate 8 km of track from North Geelong to Gheringhap in standard gauge.</p> <p>Commence the double-track 200 m west of Anakie Road and provide crossovers somewhere to permit runarounds.</p> <p>Rationalise North Geelong yard connections to eliminate inefficient junction arrangement and gauge splitters.</p> <p>Signalling to allow the double track Geelong – Gheringhap section to be operated bi-directionally (as only one track will be dual gauge).</p> |
| Costs | \$45 m |
| Advantages | <p>Provides a passing lane for Melbourne – Adelaide traffic.</p> <p>Easy and fast construction.</p> |
| Disadvantages | <p>Geelong – North trains would need to travel a further 5 km to run-around compared to the original GRAIP option.</p> |
| Comment | <p>Meets the fundamental objective of access to Geelong while providing significant benefit to East-West traffic generally.</p> <p>Minimises risk of stranded assets if the Geelong Bypass were to ever go-ahead.</p> |

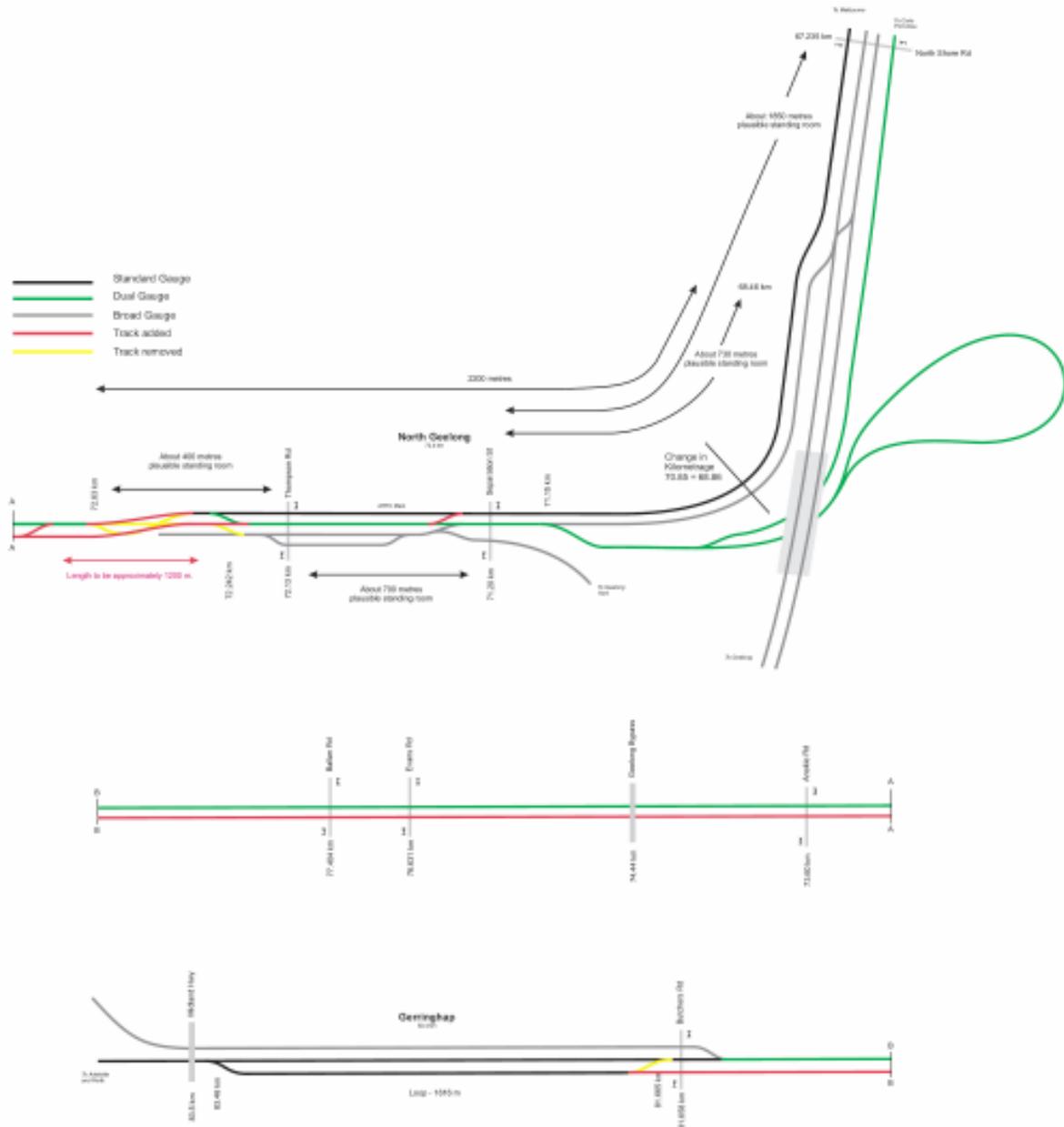
Option 4: Geelong – Gheringhap Double Track, Ultimate



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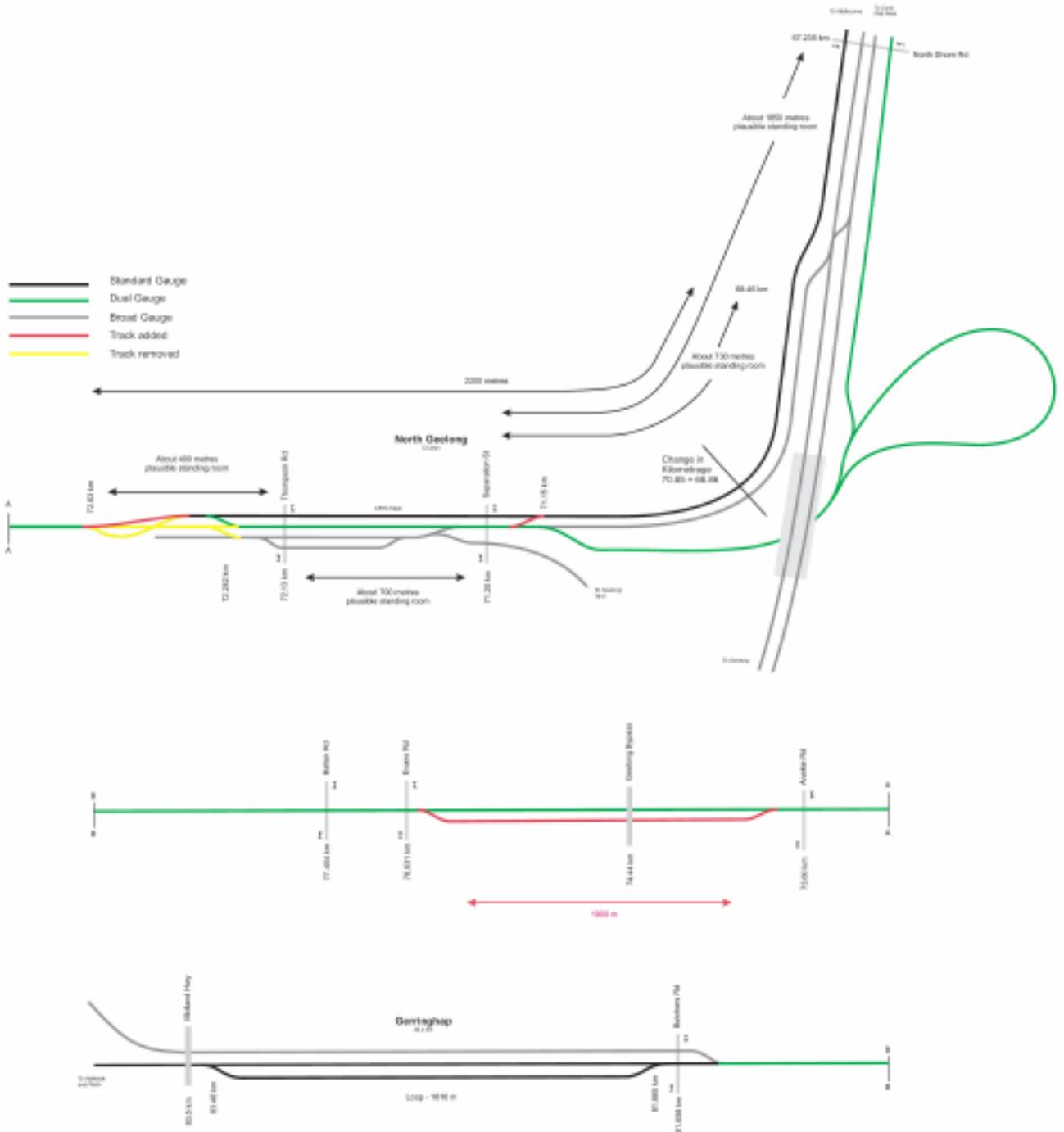
| | |
|---------------|--|
| Scope | <p>Duplicate 9.4 km of track from North Geelong to Gheringhap in standard gauge.</p> <p>Commence the double-track at North Geelong yard and eliminate inefficient junction arrangement and gauge splitters.</p> <p>Convert the Broad Gauge track 68.46 km – 71.15 km to dual gauge and extend the standard gauge mainline north to North Shore Road.</p> <p>Cross-overs between Anakie and Evans Roads to facilitate run-arounds.</p> <p>Signalling to allow the double track Geelong – Gheringhap section to be operated bi-directionally (as only one track will be dual gauge).</p> |
| Costs | \$60 m |
| Advantages | <p>Provides a passing lane for Melbourne – Adelaide traffic.</p> <p>Reasonably easy and fast construction.</p> |
| Disadvantages | <p>Geelong – North trains would need to travel a further 5 km to run-around compared to the original GRAIP option.</p> |
| Comment | <p>Maximises benefit short of the Bypass Option. Difference in scope between minimalist and ultimate options would be stranded if bypass ever built.</p> |

Option 5: Geelong – Gheringhap Double Track, Intermediate



| | |
|---------------|--|
| Scope | <p>Duplicate 9.4 km of track from North Geelong to Gheringhap in standard gauge.</p> <p>Commence the double-track at North Geelong yard and eliminate inefficient junction arrangement and gauge splitters.</p> <p>Cross-overs between Thompson and Anakie Roads to facilitate run-arounds.</p> <p>Signalling to allow the double track Geelong – Gerringhap section to be operated bi-directionally (as only one track will be dual gauge).</p> |
| Costs | \$50 m |
| Advantages | <p>Provides a passing lane for Melbourne – Adelaide traffic.</p> <p>Easy and fast construction.</p> |
| Disadvantages | <p>Geelong – North trains would need to travel a further 2 km to run-around compared to the original GRAIP option.</p> <p>Interstate trains would need to be held west of Anakie Rd due to LX.</p> |
| Comment | Generally meets the performance of the original GRAIP proposal while also providing significant benefit to interstate trains. |

Option 6: Lovely Banks Loop



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| | |
|---------------|---|
| Scope | Provide an 1800 m minimum standing room loop somewhere between Anakie and Evans Roads. Rationalise North Geelong yard connections to eliminate inefficient junction arrangement and gauge splitters. |
| Costs | \$30 m |
| Advantages | Easy and fast construction. Lowest cost solution to meet minimum functionality requirements. |
| Disadvantages | Geelong – North trains would need to travel a further 5 km to run-around compared to the original GRAIP option. |
| Comment | Lowest cost solution and minimises risk of stranded assets if the Geelong Bypass were to ever go-ahead. Least benefit to interstate services. |

Additional Geelong Capacity Projects

ASW replacement

ASW is a unique safeworking system in place between Gerringhap and Maroona loops. The non-standard nature of the system and some aspects of its functionality make it a maintenance and operational liability. The extension of the double track to Gerringhap means that it will be necessary to make alterations to the ASW system and this creates the opportunity to instead replace the system with Pheonix Train Orders, which is the system ARTC is standardising in non CTC sections of track.

Geelong-Gheringhap Upgrade

Resleepering of the dual gauge Geelong – Gheringhap section with concrete sleepers has been funded under the Nation Building stimulus package. Preparatory works for that project has identified that there is a need to undertake some rerailing and ballast and formation upgrading in the section. It would be desirable to integrate these works with the duplication (and resleepering) to maximise delivery efficiency and minimise operational impacts.

South Lara Loop

The Gheringhap – Manor section will be the longest on the corridor once the South Australian loops are extended under the current Nation Building program. Duplication into Geelong will significantly shorten the section, but the gap between the end of the double track at Geelong and the next loop at Manor, will still be significant. A complete solution to operations around Geelong would be to construct a loop immediately to the south of Lara.

Summary and Recommendations

The following table summarises the options and the estimated costs.

| Option | Base Cost | | | | Total Cost |
|---|-----------|-------------|------------------------------|-----------------|------------|
| | | Replace ASW | Geelong – Gheringhap Upgrade | South Lara Loop | |
| 1. Original GRAIP Proposal | \$60 m | \$5 m | \$5 m | \$10 m | \$80 m |
| 2. Geelong Bypass | \$70 m | \$5 m | \$5 m | \$10 m | \$90 m |
| 3. Geelong – Gheringhap Double-track Minimalist | \$25 m | \$5 m | \$5 m | \$10 m | \$45 m |
| 4. Geelong – Gheringhap Double-track Ultimate | \$40 m | \$5 m | \$5 m | \$10 m | \$60 m |
| 5. Geelong – Gheringhap Double-track Intermediate | \$30 m | \$5 m | \$5 m | \$10 m | \$50 m |
| 6. Lovely Banks loop | \$10 m | \$5 m | \$5 m | \$10 m | \$30 m |

The **recommended option is option 5**, the intermediate Geelong – Gheringhap double-track scope, plus the three additional projects. This provides:

- The most effective solution for Geelong – North trains short of the original GRAIP scheme.
- Large benefit to interstate services.
- Elimination of the undesirable ASW system and comprehensive upgrading of the Geelong – Gheringhap corridor to deliver the lowest maintenance cost infrastructure.