

Western Corridor transportation study

Cost and programme review update Transmission Gully Motorway and Coastal Route



Western Corridor Transportation Study

Cost and Programme Review Update Transmission Gully Motorway and Coastal Route

Approved for Release:

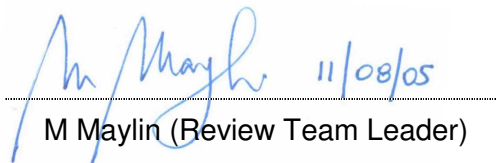

M Maylin (Review Team Leader)

Table of Contents

1	Executive Summary	1
2	Introduction	3
	2.1 Objective	3
	2.2 Team.....	3
	2.3 Process.....	3
3	Scope of Project and Assumptions.....	5
	3.1 General	5
4	Property Issues.....	8
	4.1 Confidence Levels.....	8
	4.2 Methodology/Approach	8
	4.3 Estimated Range of Property Costs	9
	4.4 Programme	9
	4.5 Key Risks	9
5	Planning Issues	10
	5.1 Scope.....	10
	5.2 The Coastal Package	10
	5.3 Transmission Gully.....	19
	5.4 Consents and Time frames	19
	5.5 Combined Analysis and Risk.....	20
6	Engineering Issues.....	22
	6.1 Coastal Route	22
	6.2 Engineering Review Findings for Transmission Gully Route (26.7 km).....	40
7	Programme	41
	7.1 Methodology	41
	7.2 Coastal Route	41
	7.3 Transmission Gully Motorway Route	45
8	Cost Estimates.....	50
	8.1 Confidence Levels.....	50
	8.2 Methodology/Approach	50
	8.3 Outputs	52
9	Other Issues.....	55

1 Executive Summary

This commission is focussed on providing a robust basis for comparing the cost and programme implications of the road components of the Coastal Route and Transmission Gully Motorway (TGM) Route as part of developing the Wellington Western Transport Corridor. To achieve this, the report focuses on planning, property and construction risks of the road component of the transport corridor between MacKays Crossing and Linden. It does not consider other project risks such as funding, affordability, political or procurement risks.

It must be recognised that both routes are at an early stage of project development and thus both have significant uncertainty which leads to a large range of possible financial and programme outcomes. Further, while this commission is labelled a “review”, there are many gaps in the information available. Where information is incomplete the review team has exercised judgement to “fill the gaps” in a manner that allows uncertainty to be recognised.

At this time, the Transmission Gully Motorway Route has a greater degree of definition and has a designation in place. The Coastal Route is subject to ongoing study and is based on more preliminary work. Thus the Coastal Route has greater uncertainty attached.

Subject to the above caveats, we are able to advise:

- (i) Our assessment of programme time to completion of the whole route:
 - a The Coastal Route option is likely to lie between 20 years and 28 years with an expected duration of 24 years;
 - b The TGM Route is likely to lie between 12.5 years and 17 years with an expected duration of 15 years.

It should be noted that significant elements of the Coastal Route can be progressed early with a likely start to detailed design and construction of the first stage within 9.5 years.

Further, it may be possible to accelerate some of the corridor works under the provisions of the new Resource Management and Electricity Amendment Act. It is recommended this is investigated further as part of developing a Designation and Consent Strategy.

- (ii) Our assessment of current costs is:
 - a The Coastal Route is likely to lie between \$665 million and \$1.425 billion with an expected estimate of \$890 million. \$571 million of the expected estimate relates to the section north of (and including) Airlie Road interchange. The remaining \$319 million relates to the southern section;
 - b The TGM route is likely to lie between \$875 million and \$1.34 billion with an expected estimate of \$1.17 billion.

We also note that we have reservations regarding the buildability and ability to gain consents for the Coastal Route as shown on the drawings provided for our review. We acknowledge that the work currently being undertaken for the Coastal Route is at an early concept stage and we have made assessments of solutions, which are generally more expensive than those shown in the drawings supplied for review, to provide a basis for valuing inherent uncertainty.

Further, we recommend that a Designation and Coastal Consent Strategy is developed and implemented to confirm the Coastal Route is not “fatally flawed” before final route selection is made. This will considerably reduce uncertainty with respect to the Coastal Route option.

2 Introduction

2.1 Objective

In late March 2005, Transit New Zealand commissioned a cost and programme review of key road components of the Wellington Western Transport Corridor.

The review was intended to provide a robust basis for comparing the cost and programme implications of the road components of the Coastal Route and the Transmission Gully Motorway (TGM) Route.

Subsequent to that review, the project team has modified the proposed scheme for the Coastal Route significantly. Accordingly, the review team has been commissioned to update its findings in this Review Update Report.

2.2 Team

The team that has undertaken this review includes:

Melvyn Maylin, Opus International Consultants, Team Leader
Neil Carr, Transit New Zealand, Property
Robert Cameron, Wareham Cameron, Property
Wayne Crowley, The Property Group, Property
Lindsay Daysh, GHD, Planning
Geoff Brown, Murray Carpenter, Pathmanathan Brabhaharan, Opus International Consultants, Engineering
Gerard Lieshout, Beca, Cost
Neil Beattie, Opus International Consultants, Programme

Each team member has considerable experience of development and delivery of major transportation infrastructure projects. Within this commission the team has been required to draw on that experience to highlight issues and pose potential solutions. The team has also had to exercise judgement and make informed assessments where information supplied is incomplete due to the current status of project development.

2.3 Process

Maunsell has a current commission for the Western Corridor Transportation Study.

Beca has prepared (March 2004) a risk based cost estimate report for the Transmission Gully Motorway (TGM).

A Review Report was issued in April 2005. Amongst other things, that report concluded that there was considerable risk and uncertainty attached to securing planning approvals for the Coastal Route. This translated into cost and programme uncertainty.

Subsequent to the April 2005 review report, the Maunsell team has further developed their solutions and significantly modified the Coastal Route concepts. Accordingly, in July 2005, the Review team was requested to update its findings and produce this Review Update Report.

It is important to note that current scope, solutions and cost estimates for the Coastal Route are conceptual solutions only for the purpose of preliminary costing and feasibility assessment as part of a strategic transportation study. By comparison, TGM has a Designation in place. Thus the uncertainty associated with the Coastal Route is considerably greater. However, both options are at an early stage of project development and thus both have a large range of possible financial and programme outcomes.

While this commission is labelled a “review”, the outputs requested include comparative estimates for both road routes. This means that, where information is incomplete, the review team has exercised its experience and judgement to “fill the gaps” in a manner that allows uncertainty to be recognised and a range of outcomes to be reported.

The process followed in this review is:

- (i) Receive and review documents (refer Appendix A).
- (ii) Seek clarification of assumptions and additional supporting information from Maunsell for the Coastal Route.
- (iii) Define a scope of work to be included in estimates for both routes.
- (iv) Undertake a review of risks (engineering, property and planning) associated with the information supplied.
- (v) Define and consider alternative solutions to resolve identified risk items (engineering, property and planning).
- (vi) Use the existing and alternative solutions to develop a range of possible cost and programme outcomes. This helps with understanding uncertainty at this early stage of the project development cycle.
- (vii) Issue review report for consideration of the project team.
- (viii) Receive modified Coastal Route concept from the project team in July 2005 and repeat steps (i) to (vii) above.
- (ix) Receive feedback from the project team on a draft of this report and make appropriate amendments in early August 2005.

3 Scope of Project and Assumptions

3.1 General

For comparisons to be made between the cost and programme for two quite distinct route options, it is essential we define the scope of work in each on a common basis.

Thus it is necessary to ensure that common scheme end points are defined and that all work likely to be undertaken is included in the scope of each route option.

Map 1 overleaf indicates the alternative route options. The end points of each option are defined as Linden to the south and MacKays Crossing to the north.

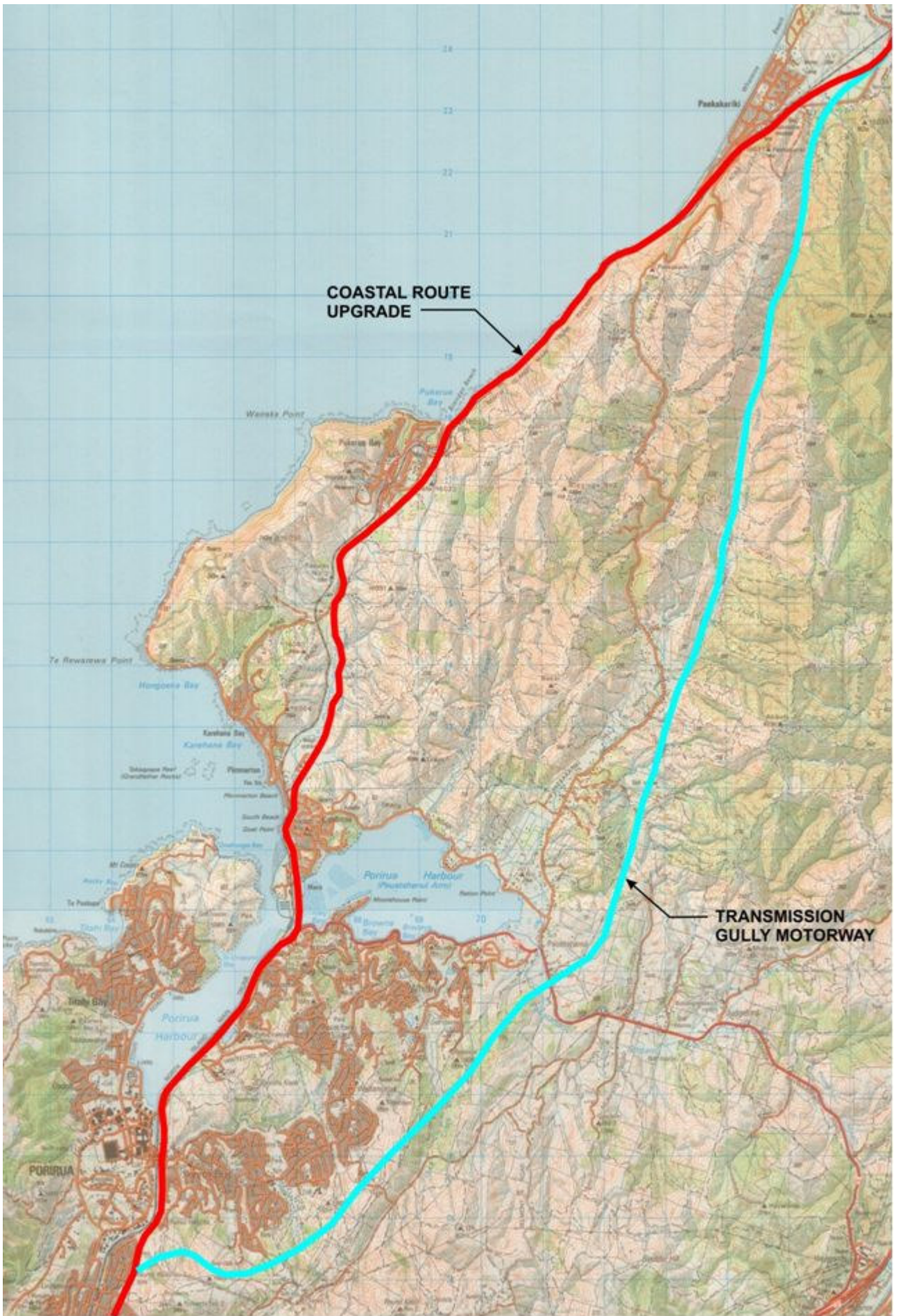
Coastal Route

The coastal route has been divided into sections A to F to match information supplied by Maunsell. These are colour coded on Map 2. The aerial plans provided by Maunsell showing their proposed scheme are enclosed in Appendix B (April 2005) and Appendix C (July 2005).

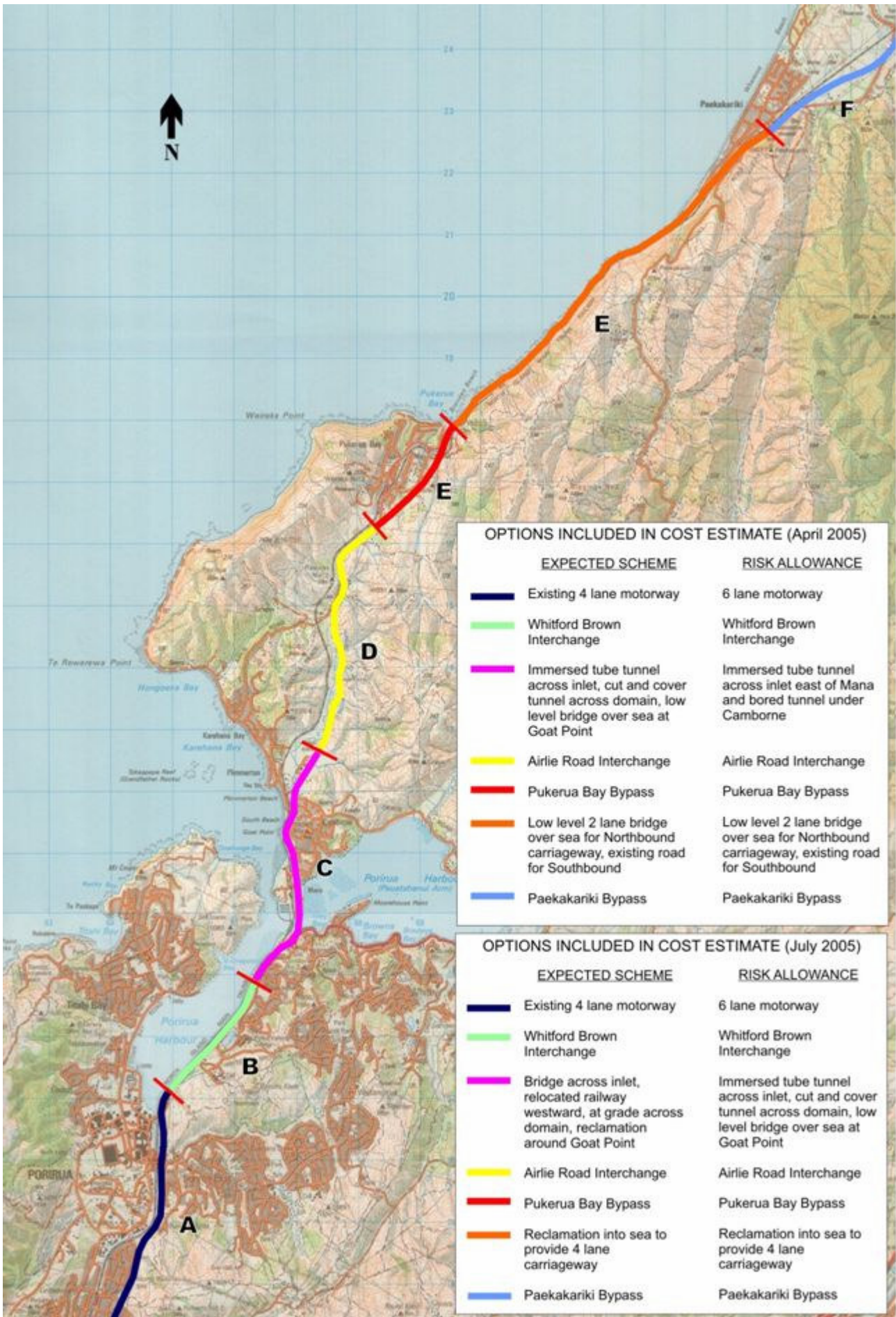
Transmission Gully

The general route of Transmission Gully is shown on Map 1. However, in considering scope of work for comparison with the coastal route we have assumed that some work will still be required on the existing state highway 1 route. This includes:

- Whitford Brown Interchange (as per the Coastal Route option)
- Mungavin Interchange (as per the Coastal Route option)
- Local improvements to the alignment in Pukerua Bay
- Paekakariki Interchange (as per the Coastal Route option)
- Provision for a cycleway along the Coastal Route



MAP 1 - ROUTE LOCATION PLAN



MAP 2 - COASTAL ROUTE SECTORS

4 Property Issues

4.1 Confidence Levels

Transmission Gully

The confidence level for Transmission Gully is categorised as 'medium' as there is a confirmed designation and detailed property information. More time has also previously been spent on estimating property costs for this route.

Coastal Route

The confidence level for the Coastal Route is considered to be 'low' because:

- The design is not developed and therefore there is no formal identification of the land required;
- There are various businesses, residences, schools and public amenities that will be affected. With the limited information and time available we have not been able to undertake robust compensation assessments.
- The significant time constraints for completing this review means that allowances for filling "gaps" have been made by assessment rather than against a schedule of known property requirements.

4.2 Methodology/Approach

Land that is already owned by Transit has been included at its' estimated current value.

For land to be acquired, 'base' costs have been estimated. These are based on anticipated full or partial acquisition requirements, inclusive of allowances for the affected owner professional fees and accommodation works.

Where applicable, the base estimates have also endeavoured to reflect business/amenity compensation/reinstatement (e.g. for service stations or playing grounds), this being consistent with the objectives of the Land Transport Management Act.

In addition estimates have been prepared that reflect 'uncertainties' that relate to potential costs because of design or engineering issues, which could mean there is a requirement to acquire additional properties. It also provides an allowance for a full rather than partial acquisition for some properties. Where full acquisitions have been assumed and there would be some land surplus to requirements after construction, we have estimated the disposal value and deducted this from our total property cost estimate.

For Transmission Gully, The Property Group has updated the property cost estimate completed in February 2004. That estimate has not changed since our April 2005 review.

For the Coastal Route, in the absence of the more detailed earlier work available for Transmission Gully, affected properties have been identified from aerial photos of the corridor. No formal identification of the extent of the land required has been possible. This has a significant adverse impact on the level of confidence that can be afforded to the Coastal Route estimates.

4.3 Estimated Range of Property Costs

A summary of the estimated range of costs (\$ millions) is tabulated below. In that tabulation our “Expected Cost” includes allowance for known items and provisions for contingency on these. We have then calculated a “Higher Bound” cost which seeks to accommodate uncertainty in scope where current designs do not detail new access to potentially valuable property.

	Expected Cost Estimate (Includes land already held by Transit at estimated market value)	Higher Bound Cost Estimate (Includes land already held by Transit at estimated market value)
Transmission Gully		
Base	\$17.3M	\$29.5M
Range	\$17.3 – \$21.0M	\$29.5 – \$36.0M
Coastal Route		
Base	\$63.4M	\$73.7M
Range	\$63.4 - \$76.1M	\$73.7 – \$88.5M

4.4 Programme

From the time of a confirmed designation free of any appeals under the Resource Management Act, it is estimated that the base timelines for acquisitions should be:

Transmission Gully	3 to 4 years
Coastal Route Sectors: A (Tawa to Porirua), B (Porirua to Paremata) D (Plimmerton to South of Pukerua Bay) E (South of Pukerua Bay to Paekakariki) F (Paekakariki to MacKays),	3 to 4 years
Coastal route: C (Paremata to Plimmerton)	5 to 7 years

4.5 Key Risks

In respect of the Coastal Route, these are:

- The number of businesses, residences, schools and public amenities that will be affected (as mentioned above);
- This is a ‘growth’ corridor – property values are rising and development continues to occur which has the affect of pushing likely acquisition costs higher over time;
- Design development may materially impact on property requirements;
- RMA issues for various parts of the corridor may also materially impact on property requirements.

5 Planning Issues

5.1 Scope

This review is to enable a preliminary evaluation of resource management matters to assist in providing a basis for comparing the cost and programme implications of the road components of the Coastal Route and Transmission Gully Motorway. In carrying out this review, it is necessary to be mindful of the following:

- There is some detailed historical and more recent information available in relation to certain parts of the Coastal route. In other parts this is more limited particularly in relation to issues such as social severance, coastal processes, impacts on future land use/ urban form and potential noise impacts.
- As the plans presented for consideration are primarily conceptual there is limited detail on pedestrian and cycling matters.
- Detail of methods of mitigation of adverse effects is in places limited, under development or still subject to further discussion and analysis.
- There is considerable history in a political and resource management sense that may have implications to a final preferred concept. This is in relation to potentially affected communities particularly at Paremata and Plimmerton.
- That there are related but consequential legal issues that will need to be evaluated in parallel with this planning analysis.
- That there is at this stage limited certainty on parts of the coastal package in relation to the potential engineering design options.
- That this review excludes any views on the adequacy of consultation but does in a general sense consider the principles of the Land Transport Management Act 2003 and the New Zealand Transport Strategy.

We have also not concentrated to any extent on the positive benefits to the wider community of having the northern access problems to Wellington resolved in the medium term. These will obviously be significant in respect of level of service to the Wellington community, safety and longer-term certainty.

The following therefore considers the key resource management issues from a community and resource management risk point of view based on the information available.

5.2 The Coastal Package

5.2.1 *Section A – Linden To Porirua (Te Whakawhitinga-o-Ngati Toa Bridge)*

Description

This section commences south of the Collins Avenue overbridge at a point where the Transmission Gully route leaves the existing State highway 1 alignment. There are no changes proposed to the current roading alignment or interchanges on this section.

Analysis

Leaving the existing alignment basically unchanged means that there is no additional risk. If there were capacity improvements in the future the most sensitive areas would be in the vicinity of Linden School and south east of Mungavin Avenue.

5.2.2 Section B – Porirua (Te Whakawhitinga-o-Ngati Toa Bridge) to south of existing Paremata Roundabout

Description

North of the Bridge but south of Paremata Roundabout a new grade separated interchange at Whitford Brown Avenue is proposed. Other widening that may be necessary is primarily confined to existing road reserve. It is assumed that the proposed coastal upgrade does not provide for any additional capacity or safety improvements south of Whitford Brown Avenue, such as at Mungavin Avenue.

Analysis

The primary environmental impact of a new Whitford Brown interchange would be visual. There is, it appears, sufficient land designated for State highway or local road purposes in order to be able to implement this part of the package. Care will be needed to avoid any cuts that may directly affect the Gear homestead that is on a significantly higher level. Subject to more detailed definition of land requirements overall risk of this part of the proposal is considered to be low.

5.2.3 Section C – South of existing Paremata Roundabout to Plimmerton (north of weigh station)

Description

From south to north the concept reviewed involves:

- A new grade separated interchange in the location of the existing Paremata Roundabout. This is complex being a half diamond arrangement with south facing ramps only. An overbridge is provided with northbound access only to a new rail station carpark at Harbourside Park, to SH58 and Whitby and via the existing bridge to Mana Esplanade. There are similar southbound restrictions with those on the expressway not able to access SH58 or the Paremata Railway Station unless they exit from Plimmerton.
- An additional 4-lane bridge across the entrance to the Pauatahanui Inlet, in between the newly constructed duplicate bridge and the rail bridge.
- A new four lane carriageway through the existing developed area west of Marina View and a consequential shifting of the rail line west onto Ngati Toa Domain north of the Marina. It is estimated that there will be an encroachment of approximately 30 metres into the existing domain and will mean the removal or relocation of some of the sports/community facilities on the Domain e.g. the Paremata-Plimmerton Rugby Club, the Squash Courts and a Play Centre. The new four-lane road then runs inside the realigned railway at grade until it meets the northern end of the Domain.
- A new bridge at Pascoe Avenue is proposed over the realigned railway and the new expressway, allowing access from Mana Esplanade to Ngati Toa Domain. It is unclear whether the new expressway will be partially in cutting at this point, [REDACTED]
- Mana Station in its current location is removed and current levels of access to the rail line are significantly diminished. It is understood that options around how and where to relocate the station are still being investigated.
- North of Ngati Toa Domain the road continues close to the existing railway alignment while the rail is formed on a coastal reclamation. This reclamation continues until the rail line meets its current alignment south of Plimmerton Station. [REDACTED]

- The proposed expressway travels at grade between the existing highway at Goat Point and the railway on reclaimed land before rejoining the existing SH1 alignment in the vicinity of the new Palmers Garden Centre. The proposal eliminates the current access to Plimmerton via Steyne Avenue [REDACTED]
- The newly built Plimmerton Domain/Ulric Street roundabout is replaced with a new three quarter diamond interchange with north facing ramps allowing southbound access and northbound egress while the new local road (Saint Andrews Road current alignment) is accessed by a south facing off ramp. This local two lane road also provides the only access between Mana, Cambourne, and Plimmerton. There is no direct northbound access to Plimmerton from the proposed expressway.
- A new connection from the interchange is provided with a new at grade rail level crossing to access Plimmerton connecting in the vicinity of the Beach Road/Steyne Avenue roundabout. This connection also provides access to the Ulric Street industrial area, Plimmerton Domain and the site of the current Palmers Garden Centre.
- The Paremata Interchange and Plimmerton interchange between them are designed to provide full local access to Plimmerton, Paremata, Mana and SH58. The existing Mana Esplanade and St Andrews Road would therefore be 'service' roads connecting the two interchanges, a distance of some 3 kilometres.

Analysis

This section covers the corridor through Paremata and Plimmerton. The plans reviewed show a complex design with some significant effects that need to be considered.

This section has also been the subject of recent litigation with the 2000 Environment Court decision on the Mana Clearways proposal known as *Middleton v Transit New Zealand*. We have had the benefit of reviewing large quantities of the information pertaining to that case and the re-evaluation of alternatives (essentially bypass options) to the scheme currently at the stage of construction completion.

There are however two key differences between what was being considered at that time and the reviewed proposal: -

- The physical length of the review of alternatives only related to Mana Esplanade north of a duplicate Paremata Bridge through to Goat Point.
- The alignment for Bypass options was for a 70-km/h-speed environment with predominantly at grade signalised intersections.

It is also known that there are community issues and undertakings and expectations that will need to be addressed. It is strongly recommended that in preparing any consents strategy that there be legal input into these matters.

The following additional aspects are particularly relevant and are broken down into geographical parts:

(i) **New Interchange south of Paremata Bridge**

This is a very large structure that will be dominant in the foreground view of a number of residential property owners although those that can see it are generally elevated and some distance away [REDACTED]

For there to be access to Paremata railway station a new parking area is required on land known as Harbourside Park, reclaimed as a result of the construction of the current alignment. This area has been designated in the Porirua City Council (PCC) District Plan as a reserve. It is understood to be in the ownership of the Crown but it is also known that PCC have been in discussions with Ngati Toa about future use

In addition, with the need to get access down to grade from the bridge structure, much of the land proposed to be used as carparking is taken up with road and embankment. How public transport users, on foot or bicycle, access the railway station from the east of the State Highway 1 is also unclear. We are assuming that there will be a need to replace the level of service from the existing pedestrian overbridge. In addition accessibility northbound from the Station to Mana Esplanade is reasonably complex.



As only south facing ramps are to be provided, local roads will remain main arterial 'service' roads between this interchange and the Plimmerton Interchange. The effects on economic development, businesses and community wellbeing will need to be addressed. In addition the need to retain local roads as arterial connections between the interchanges needs to be carefully considered.

(ii) A new Paremata Bridge

The Pauatahanui Inlet is in the highest tier of ecological significance in the Wellington region. There is known concern about the ecological health and level of siltation in the Inlet and both the Regional Council and PCC are developing an approach to halt any degradation and provide for improvements to ecological health. A new bridge presumably with piers located within the Inlet entrance will add additional obstruction to the movement of water and material through the channel.

The degree of effect is unknown however comment has been received from the study team about marine ecology. The review team has reviewed background information in a report from Beca Carter Hollings and Ferner (Beca) in 1999 in respect of the Bypass options but this did not cover an additional bridge in addition to the duplicate structure recently completed across the Inlet mouth. It is known however that there was recent debate about this issue when the new duplicate bridge was built, particularly from the local residents association. While there may be additional effects to be considered the likely actual or perceived concerns will need to be specifically addressed.



(iii) New four-lane alignment and railway relocation

This will result in a relatively substantial land take from Ngati Toa Domain. This was previously a "red flag" issue with Iwi in terms of cultural significance particularly when evaluating the material from the Mana Clearways case, the Bypass options in 1999 and the

court evidence of the Executive Director of Te Runanga o Toa Rangitira. It now appears from consultation records that Te Runanga may not be averse to considering this further.

An at grade alignment with a relocated railway will also mean the removal and/or relocation of sports clubrooms/community facilities and reduce the overall availability of land on what is a well-used area of public open space. It is understood that the project team are evaluating and further considering mitigation options and possibilities for the long-term use of the Domain.

The removal and replacement of Mana Station will need to be considered further. This particularly applies to how and where carparking will be provided, pedestrian and cycling accessibility, limiting any concerns about personal security, and integration with both Mana Esplanade and Ngati Toa Domain.

In visual terms keeping the four lane expressway at grade or even in a cutting would reduce localised visual impacts although it was acknowledged in Court in 2000 that there would be an impact on longer views from a number of areas.

(iv) Access to Ngati Toa Domain

There is a relatively substantial overbridge necessary to gain physical access to Ngati Toa domain via the Pascoe Avenue alignment. This is consistent with the 4-lane bypass considered in the 1999 review of alternatives

(v) Goat Point to Steyne Avenue

From Ngati Toa Domain the concept requires a relatively significant reclamation in the order of 20 to 30 metres in width and removes part of the South Beach at Plimmerton. In terms of coastal processes, the 1999 Beca report indicates that this will have limited effect. At present it is unknown what explicit reaction there has been from Iwi although we are informed that there continues to be dialogue and a Cultural Impact Assessment has been commissioned. In addition dialogue continues with the Department of Conservation but at this point there is no definitive record on whether reclamation has been contemplated as appropriate by consent authorities, Iwi and affected parties.

The advantage though is that the reclamation proposal eliminates the requirement for a substantial elevated structure above the existing rail corridor with consequential direct and significant visual effects.

The South Beach at Plimmerton is currently in a reasonably natural state and its current high amenity and levels of public accessibility, particular to numerous windsurfers, will be diminished. It is understood that an engineered beach replacement is being investigated as part of an overall mitigation package, which is appropriate.

The biggest single concern is the loss of direct access from Mana Esplanade/St Andrews Road into Plimmerton via Steyne Avenue. There will clearly be actual or perceived issues of social severance for the Plimmerton community with the only significant road access to be via grade separation to the north near Ulric Street then via a new level crossing dropping into Beach Road Plimmerton. There will potentially be similar issues for the Camborne and Mana communities that currently have a close relationship with Plimmerton. It is understood these matters are under consideration by the project team.

It is strongly recommended that options include a local road overbridge/underpass or at the least a safe effective pedestrian cycle facility be considered with the objective of maintaining existing levels of accessibility and reducing potential local severance for the Plimmerton and Camborne Communities. The overall effects of any reconfigured

arrangement would need to be evaluated particularly in relation to properties on the eastern side of St Andrews Road.

(vi) North of Steyne Avenue

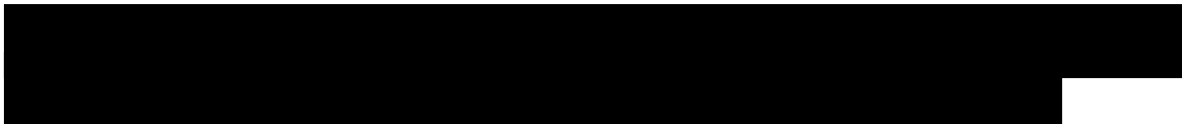
The northern section of Paremata – Plimmerton upgrade is nearly completed. A new roundabout currently serves Plimmerton Domain, Ulric Street/North Point industrial properties and James Street. The concept shows that this would be replaced with a $\frac{3}{4}$ diamond grade separation north of the new roundabout.



There is provision shown for property access to the Ulric Street industrial area and the North Point Industrial Park and to Plimmerton Domain. The difficulty is that any vehicles and in particular Heavy Goods Vehicles that wish to go to Wellington would either have to head north to Airlie Road Interchange to turn around or travel via Saint Andrews Road/Mana Esplanade and then via the SH58 southbound on ramp.

From a safety perspective we consider it undesirable in principle for there to be a level crossing serving as the primary vehicle access to this community of over 2000 people although it would replace the existing situation at Steyne Avenue. Confirmation from On Track to acceptability, or otherwise, of this would be required. We have already expressed our reservations about the closure of Steyne Avenue in relation to potential severance and accessibility matters for the Plimmerton and Camborne communities.

In addition there is likely to be substantial property impacts in order to make the intersection of Steyne Avenue, Beach Road and School Road circulate effectively and this has been raised in the engineering analysis of this report. However the extent of property impact and issues such as noise are not known at this time.



(vii) Plimmerton Weighstation

Currently there is no southbound weighing facility with the implementation of the Plimmerton – Mana Upgrade. Sufficient property was purchased for the weighstation to be duplicated directly opposite the existing facility. It is also known that Transit has been investigating a new facility with the preferred option being to duplicate at Plimmerton. This should be recognised in the Plans.

5.2.4 Section D – Plimmerton to South of Pukerua Bay

Description

From north of Plimmerton the expressway concept runs along the existing SH1 alignment. Full grade separation of the Airlie Road/Whenua Tapu intersection is shown.

Analysis

The main effects of the Airlie Road/Whenua Tapu interchange are visual and in respect of noise and property impact upon the houses to the east of the existing alignment. The area is sensitive, on an overall basis, due to the proximity to Taupo Swamp. If property issues

can be resolved this part of the package has few additional impacts that cannot be addressed by careful design.

5.2.5 Section E - South of Pukerua Bay to Paekakariki

Description

- Two new structures are proposed south of Pukerua Bay to divert and connect local traffic with the expressway. The new road then follows the alignment of the former Pukerua Bay bypass designation east of the existing community and under the railway line at Muri Road. A new rail overbridge will be of sufficient length to also serve as a local connection between properties on the eastern and western sides of the community where new local service roads are proposed. The expressway then continues to descend the hill on a combination of bridge structures and cuttings. North facing on and off ramps are provided which link to the proposed expressway approximately half way down the Pukerua Bay hill.
 - The western two lanes then follow close to the existing carriageway from the foot of the hill and on the coastal section while two new lanes are constructed on the eastern side, against or cutting into the hillside.
 - This expressway continues on the flat coastal section to Fisherman's Table as a four-lane alignment with a significant reclamation of up to 40 metres in width in places. In addition part of the expressway, particularly at the Pukerua Bay end, is staggered (i.e. split in level.)
 - At Fisherman's Table the expressway remains at grade with a new alignment to the west of the existing highway [REDACTED]
 - A full grade separation of the Beach Road/Paekakariki Hill Road intersection. The exact detail of which is still under consideration. [REDACTED]
- Beca are currently investigating three options as follows: -
- B4 An expressway overbridge crossing Paekakariki Hill Road which continues to link to Beach Road with eastern side connections to the expressway via Paekakariki Hill Road. The north bound off ramp and northbound on ramp connect at ground level in the vicinity of the existing intersection.
 - B5 An overbridge crossing the expressway south of Beach Road with the local connection linking into Ames Street.
 - B8 An overbridge crossing the expressway south of Beach Road with local access maintained over the existing level crossing. A high level eastern side roundabout provides the access to the southbound onramp and the northbound offramp.
- The project team then show a new alignment adjoining the railway line through the site known as Steam Incorporated.

Analysis

Pukerua Bay Bypass

The Pukerua Bay Bypass proposal has been known for a long time. In the late 1980's the former Ministry of Works and Development was unable to keep the designation, as at that time there was no clear intention to construct the Bypass. Since then a preferred option has been developed but no new designation has been sought. In many respects the community would explicitly benefit from a bypass, as State Highway 1 is a large barrier

between the two sides. On the east there is the rail stations while to the west are shops and the school.

The proposal in many respects reflects the historical thinking about having a grade separated interchange at either end of the community and utilising the existing SH1 as the local access route.

At the northern end where the expressway descends towards the coast, the alignment has severe, but localised, property impacts. Noise from the new alignment at 80 to 100 km operating speed will be also be significant.

Centennial Highway

Despite potentially challenging engineering, geotechnical and traffic management issues a large costal reclamation will significantly change the coastline between Pukerua Bay and Fisherman's Table. On this section environmental impacts alter from property and residential amenity matters to visual, cultural and ecological matters.

It is noted that Ngati Toa may be amenable to a widened at grade coastal section accommodating 4 lanes. This is important, as there is known ecological and natural systems significance in addition to overall significance to Maori. In addition it is understood that Ngati Toa has been commissioned to prepare a Cultural Impact Report (CIR) on the Coastal Expressway. The CIR is expected to be completed in August or September 2005.

The Department of Conservation (DoC) have been more guarded and have raised concerns. DoC has stated that the coastal escarpment and small beaches are identified in the Regional Policy Statement as being landscapes of regional importance. The New Zealand Coastal Policy Statement also makes it clear its priority to preserve the natural character of the coastal environment. It is however known that discussions with DoC about the issues, and a possible consenting approach, are continuing.

It is considered that there will need to be a satisfactory resolution of the landscape, cultural and ecological issues for the complex range of consents to be acceptable.

In addition there is likely to be requests for environmental enhancements of the marine environment in this area and possibly for some form of local access for gathering kaimoana. How this will be achieved is still to be resolved.

If there were engineering design issues regarding the acceptability of cutting into the hillside that necessitated further reclamation this would have limited additional effect to the acceptability of the concept considering the scale of reclamation envisaged,

[REDACTED]

[REDACTED]

[REDACTED]

South of Paekakariki there are substantial native trees, listed in the Kapiti Coast as having significance that will be removed. The project team is considering mitigation of this loss but what form that may take or where it would be provided, is still to be resolved.

Paekakariki Interchange

From a safety perspective the existing intersection is poor. Any solution that worked in engineering terms will significantly improve safety, accessibility and amenity for the majority

of the community. Beca are currently considering three options two of which are preferable from a planning perspective. These options confine disruption and property affect to the eastern side of the existing highway. It is also known that there has been considerable discussion with the local community on these options.

[REDACTED]

[REDACTED]

The eastern side cuts, particularly for the servicing arrangements and for the southbound on and off ramps, are likely to be significant. To reduce the extent of cut, the removal of the north facing ramps could be considered. This would be on the basis that northern local access to Paekakariki is via MacKays Crossing. This would not be favoured from a planning perspective, if the local service road needed to encroach upon Queen Elizabeth Park.

Steam Incorporated

Access into the site is currently poor. The proposed alignment requires the total removal of all parts of the Steam Incorporated complex. It should be noted that there are 6 heritage buildings or items listed in the Kapiti Coast District Plan concerning railway history all of which would be affected from absolute removal to loss of context or setting. Assuming that there is no option that does not affect those buildings removal or relocation should be considered as the only practicable mitigation. It should also be noted that Archaeological authorities would be required under the Historic Places Act 1981 which add an additional level of consenting to the whole project.

From a record of the Specialists Workshop in June of this year it is understood that a number of these buildings and structures may not be in their original location in any event. This will assist in achieving both RMA and Historic Places Act consents.

There is also a difference between the Study team's concept plans and the options being considered by Beca. This is with respect to the extent of impact upon the Steam Incorporated land. This issue requires clarification before any ongoing ramifications can be considered from both a planning and engineering perspective.

5.2.6 Section F – Paekakariki to MacKays Crossing

Description

- From Steam Incorporated north, the alignment provides a substantial cut into the eastern foothills before crossing the current alignment of SH1 [REDACTED].
- The proposed expressway then heads parallel to the existing railway line before it crosses dune farmland on the existing MacKays Crossing Stage 2 designation to meet the existing alignment of the MacKays Crossing Interchange currently under construction.
- The existing alignment of State highway 1 provides the local service road to Car Haulaways, Sang Sue market gardens and other farm and lifestyle blocks in the vicinity.

Analysis

[REDACTED]

The central section has limited overall impacts, but requires significant additional land to be purchased. It does however line up appropriately with land already designated and purchased for the MacKays Crossing Stage 2 designation intended for linking to the Transmission Gully designation. The northern section utilises the design of the MacKays Crossing overbridge.

[REDACTED]

5.3 Transmission Gully

The alignment of TGM has been through a long designation process and the proposal is reasonably well understood. There are substantial effects in places but the affected community has a longstanding knowledge of the proposal and there is general acceptance of these effects in principle. In addition Transit has purchased about a third of the number of parcels of land required to build the alignment. Each of the landowners has been approached although property purchase is not actively sought at this time.

There are however Regional Resource Consents still required. The biggest single issue is the way in which erosion and sediment control will occur, resulting from the substantial earthworks required. As has been stated previously, the ecological health of the Pauatahanui Inlet has been in decline so this will be a very significant process. As long as there is sufficient land and a state of the art stormwater management system the longstanding view is that this issue can be addressed. Preparing resource consents will however be a lengthy process and it is also expected that there may be appeals to resolve.

Other effects are primarily visual and noise. These have been considered through the designation process and the assumption is that these matters can be mitigated through detailed design.

There has also been significant work done on the environmental and resource management risks to the cost and programme. The conclusion therefore is that, subject to going through due process, consenting the construction of Transmission Gully is significantly more straightforward and would take less time than the overall Coastal option.

5.4 Consents and Time frames

If the Coastal Option was preferred it is likely that there would be significant lead in times required. It is understood that a consents strategy has been requested by the end of 2005. It is presumed that the "big picture" designations and restricted coastal consents would be sought at one time for the entire route.

An option under consideration is to apply for consents in relation to geographical areas such as, for example, the Pukerua Bay Bypass. The advantage of splitting the consents is that parts of the project could proceed while others potentially take a lot longer. The disadvantage is that the bigger picture should ideally be tested through the RMA particularly in relation to the history behind the approvals for both Transmission Gully and the Mana Reduced Upgrade. Related to this would be a hearing strategy. This could mean that hearings on philosophy/overall alternatives etc could precede hearings relating to individual parts of the preferred route.

At this point there is insufficient detail to be able to determine the parameters of a consent strategy. What is expected though is that in achieving consents for a coastal upgrade, consideration will need to be given to the consultation, and strategic analysis currently underway. There are however substantial and in some places absolute localised effects that will need to be avoided where possible, remedied where practicable or mitigated if unavoidable.

Whatever process is taken numerous consents or RMA processes would be required for

- Altering the SH1 designation
- Altering the rail designation
- Possibly altering the Mana Reduced Upgrade designation and its attached conditions from the Environment Court.
- Regional resource consents including those for bridging waterways, earthworks, discharges and erosion and sediment control.
- Restricted coastal consents for Centennial Highway and Ngati Toa Domain reclamations.
- Historic Places Act Authorisations either specifically or generally.
- A possible plan change to the Porirua City District Plan in relation to transportation objectives and policies.

In terms of timing the expected lead in, from the choice of a preferred package of options to lodging applications could easily be in the vicinity of 2 years. Assuming hearings and a decision within 6 to 8 months after that it could be another 2 years before the Environment Court considered expected appeals particularly if refinements or reinvestigations of parts of a Coastal Upgrade are considered necessary after the hearing process.

After that there may be additional legal challenges, property purchases, (some of it potentially compulsorily) and Historic Places authorisations. The review team holds a view that the consent process for the coastal option could take 5 to 7 years to complete from the time a decision is taken to proceed based on concept plans.

It may be that the Resource Management and Electricity Amendment Act, which was recently passed by Parliament, will speed the process. This is particularly in relation to Ministerial call in powers, Boards of Inquiry and referrals to the Environment Court. Whatever this may mean in terms of timing would need to be carefully considered in the consent strategy but potentially a time saving of 12 to 18 months could be found.

With respect to the TGM Route, we hold a view that it is likely to require 18 months to prepare documentation acceptable for Regional Council Consents and a further two years may be required to resolve issues. Assembly of the remainder of the land could occur concurrently or after consents have been through due process.

5.5 Combined Analysis and Risk

In isolation parts of the overall Coastal Route proposal are likely to be acceptable environmentally and to affected parts of the community. In particular this applies to the grade separation of Whitford Brown and Airlie Road.

The same could even be said for the Pukerua Bay Bypass but it is known that there is local opposition to the potential environmental effects of the proposal, which is reasonably well developed on a conceptual basis. Similarly the principle of grade separation at Paekakariki is sound but there are localised, and in cases significant, effects to be considered through the consent process. This is particularly relating to impacts upon built heritage.

The Centennial Highway section is high profile in respect of its crash history and capacity problems. If the overall concept of 4 lanes with a substantial reclamation was, in the end, supported by Iwi and DoC, this would remove considerable uncertainty.

The area with the greatest concern and risk to the coastal option gaining the necessary consents under the Resource Management Act 1991 is from Paremata roundabout to the Plimmerton weigh station. Details of the key issues are highlighted in the preceding text.

There are also five further matters that pose risk.

1. The first is whether the proposal can be developed at the same time as land use planning in Paremata and Plimmerton. Normally land use planning would determine transport infrastructure but the effects of the proposal are so significant in places that it may mean that Land Use Planning in the corridor has to be re-evaluated.
2. The second relates to noise mitigation and how that will be dealt with. The 1999 re-evaluation of options considered that existing noise was already an issue and because of this all options could be designed for and mitigated. The key difference with this proposal is that the alignment is proposed to be 100 km/h, which in the urban sections of Paremata, Mana and Plimmerton will remain a significant issue to be satisfactorily addressed.
3. The third relates to social severance. A new four-lane road will produce additional barriers to movement from one side to the other. This is a particularly acute issue when there is both road and rail to cross. While the proposal is still conceptual it would greatly assist if there were specific recognition made of how best to integrate the infrastructure in with communities. There is considered to be specific concerns in respect of consenting with the proposed closure of Steyne Avenue. In addition there is an absence of specific information about walking and cycling.
4. The fourth issue relates to legal risk particularly in relation to the existing consents package for the Mana Reduced Upgrade project, which should be considered separately.
5. The fifth issue relates to an appropriate analysis of alternatives prior to selection of the preferred option. This is essential for the Assessment of Alternatives to be robust.

Overall, there are parts of the Coastal option that we have reviewed that contain risk in terms of the provisions of the Resource Management Act 1991. It is considered that the Transmission Gully Motorway proposal does not have the same level of risk. If the Coastal package is to proceed, careful evaluation about sub options and alternatives will be necessary. It can also be expected that there will be significant and sustained opposition from some parts of the wider community to both the concept of a coastal upgrade and parts of the detail.

6 Engineering Issues

6.1 Coastal Route

The overall length of the coastal route is approximately 26 kilometres.

In assessing the proposed scheme we have identified some issues with respect to capacity and connectivity at interchanges. These are described in the text for each section below, along with some potential solutions. The connectivity issues and potential solutions are also outlined by reference to figures 1 & 2 overleaf.

6.1.1 Section A – Linden to Porirua (3.7 km)

The concepts reviewed in April 2005 and July 2005 were substantially the same.

Maunsell has supplied traffic data that indicates that widening from 4 lanes to 6 lanes is not required on capacity grounds until after 2026 and it is not intended to include this in the proposed scheme. However, the review team holds a view that for the coastal route option, 6 lanes should be included as a scope risk item at this time. This is not included in the “likely” cost estimate but does help to understand the range of possible outcomes at this early stage of project development.

Roading and Geometry

If widening is carried out it is likely that minor retaining walls will be required over a considerable length of the motorway to enable the widened motorway to remain within the existing designation for the motorway and to minimise property impacts. It is also likely that noise barriers will be required to mitigate the effects of the carriageway being located closer to areas of existing housing.

Structures

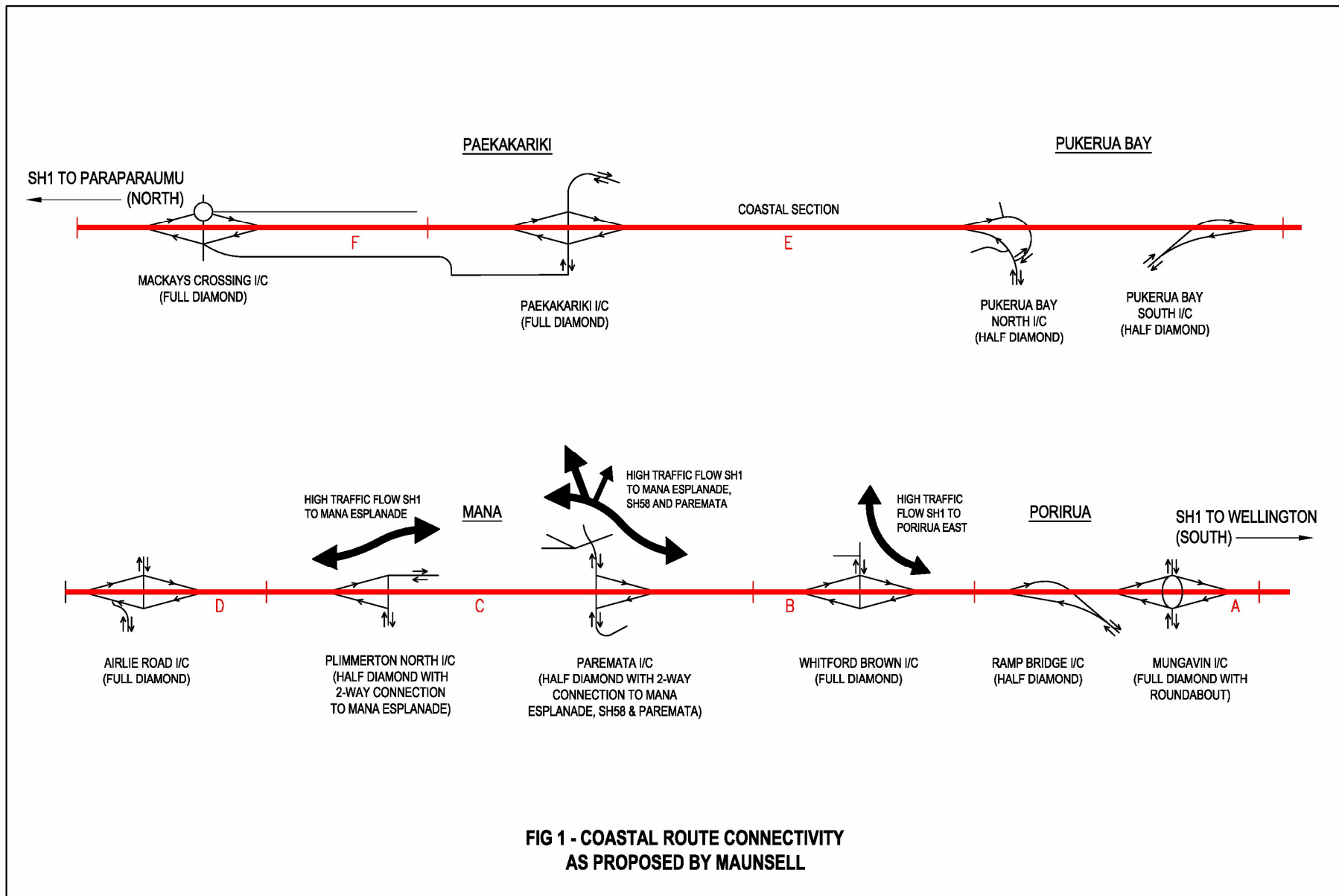
If widening is undertaken there are significant buildability issues relating to construction in the vicinity of Mungavin Interchange and the need to lengthen the bridge to allow additional lanes to pass beneath. It is likely that the bridges will need to be replaced.

Similarly, replacement of the Ramp Bridge is likely to be required if widening is undertaken.

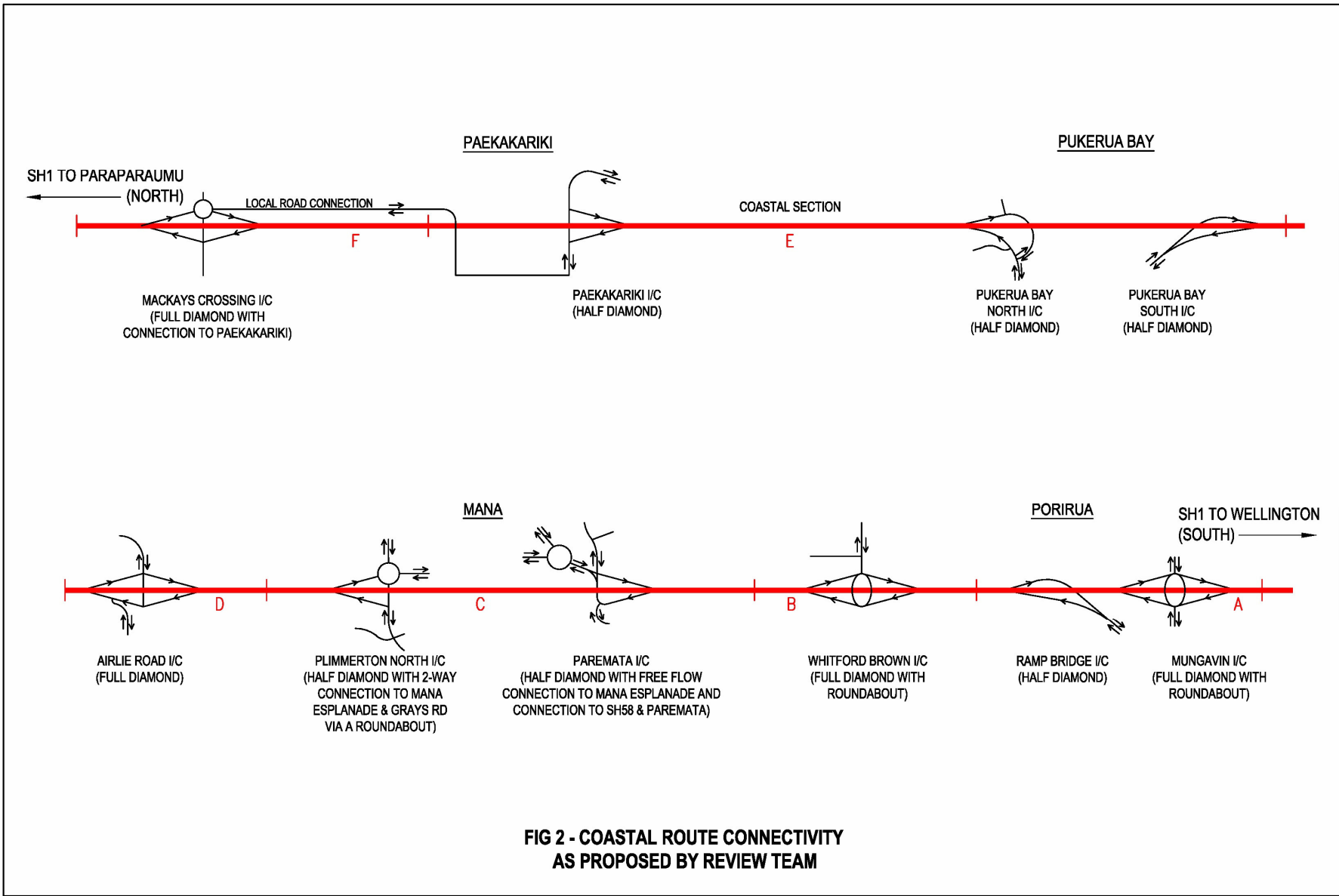
Geotechnical

It is likely that soil nailing and retaining walls will be needed to allow widening within the existing designation. It will not be possible to simply steepen cut slopes. Even with this approach, it is expected some property purchase will be required.

The ground conditions at the Ramp Bridge will require ground improvement where the widened motorway is located on the side of the estuary.



**FIG 1 - COASTAL ROUTE CONNECTIVITY
AS PROPOSED BY MAUNSELL**



6.1.2 Section B – Porirua to South of Existing Paremata Roundabout (2.5 km)

The concepts reviewed in April 2005 and July 2005 were substantially the same.

Roading and Geometry

The scheme reviewed includes grade separation of the intersection at Whitford Brown with the provision of a diamond interchange with an overbridge over the existing SH1. The review team was initially concerned that this arrangement may not have sufficient capacity for the turning movements that will occur for traffic between Wellington and Porirua East, and Porirua East and the North. An enlarged interchange with a roundabout over SH1 and two overbridges was envisaged as a possible option to cater for the traffic demands at this intersection. Subsequently, the project team has supplied the review team with data related to traffic volumes and turning movements that indicates the diamond interchange is appropriate. Accordingly, while it is shown on figure 2, provision for a larger (roundabout) interchange is no longer included in our likely outturn cost estimate.

Provision for pedestrians and cyclists is likely to be required over this section where no facilities currently exist

Structures

The location of the proposed overbridge at Whitford Brown Avenue will clash with the existing intersection and require temporary traffic diversions.

Retaining walls are likely to be required to support the proposed embankment for the on and off-ramps to be constructed alongside the railway. These could be reinforced earth walls.

Geotechnical

Ground improvement is expected to be needed for the construction of the earth embankments for on and off-ramps for the Whitford Brown Interchange and piled foundations will be needed for the overbridge due to soft ground conditions.

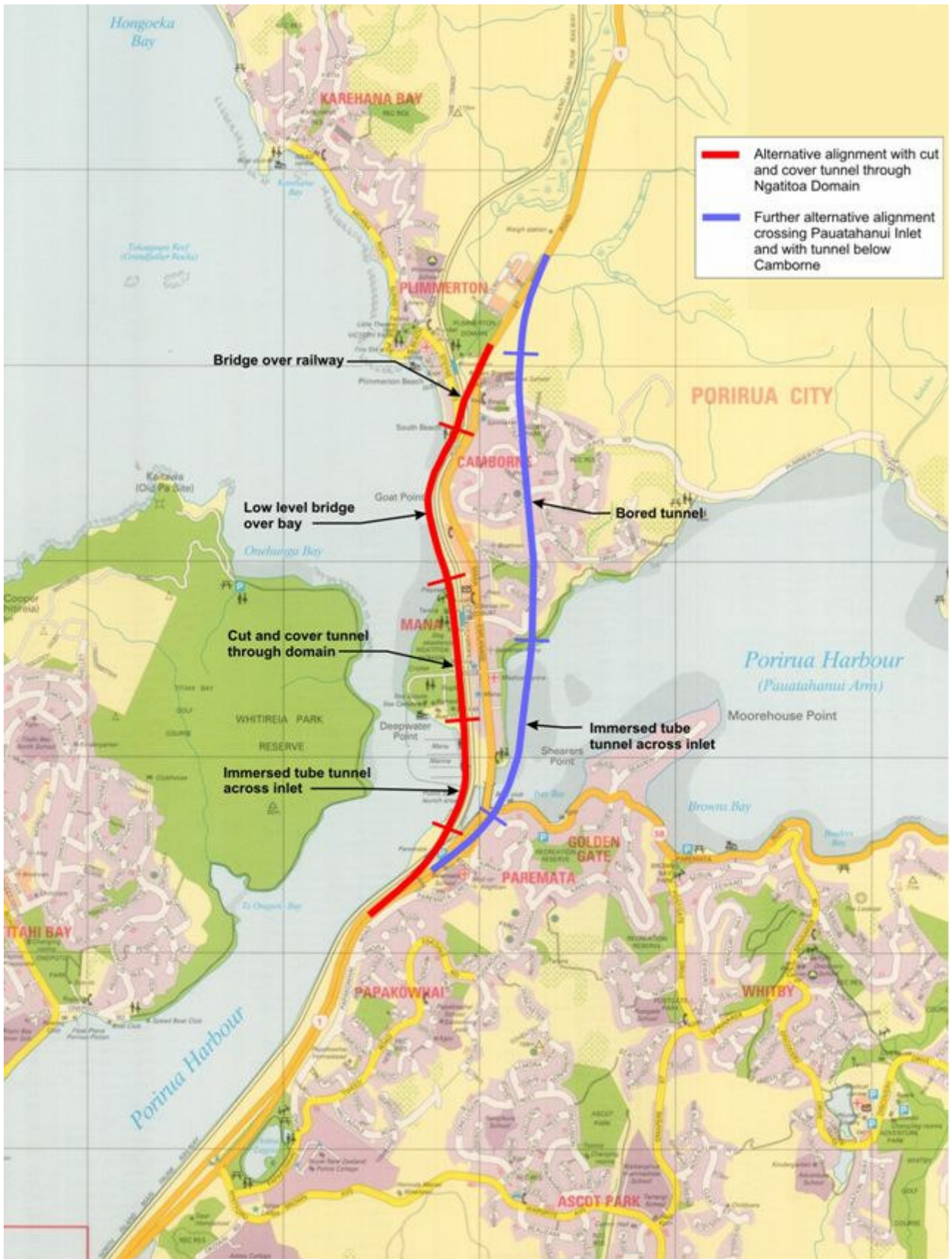
6.1.3 Section C – South of Existing Paremata Roundabout to Plimmerton (4.0 km)

In the scheme reviewed in April 2005, this section of the coastal route was identified as having the most significant planning impacts. The scheme at that time involved complex elevated structures and the review team considered that there was sufficient uncertainty associated with the proposed scheme that we should explore alternative concepts. These alternatives are shown on Map 3. It is important to note that these options have significant cost and other impacts of their own. They were not offered as the optimum solution. They were developed as a means of assessing possible costs and risks associated with the options supplied for review. In the opinion of the review team, these options demonstrated that significant additional costs (c. \$400m) were likely to be attached to resolution of planning issues at Mana.

Subsequently (July 2005), the project team has significantly modified their proposals in this area to mitigate many of the planning concerns.

Roading and Geometry

The (July 2005) scheme proposes a bypass around Mana on the eastern side of the existing development fronting Mana Esplanade. The existing railway is relocated approximately 30 m to the east into Ngati Toa Domain, with the 4 lanes of the Western Corridor, being located between the Mana commercial area and the rail.



MAP 3 - ALTERNATIVE ALIGNMENTS AT MANA

At the north end of the Ngati Toa Domain, the expressway remains at grade with reclamation around Goat Point in place of the elevated alignment over the rail proposed in the April 2005 scheme. The Mana Bypass would connect into the existing SH1 at Paremata, south of the entrance to Pauatahanui Inlet, and at the north end of Camborne and Plimmerton. The existing State Highway between these two interchanges becomes a local service road to connect Mana, Paremata, Camborne and Plimmerton with the new State Highway alignment.

This proposal provides for a grade separated interchange south of the Inlet to connect the 4 lane bypass to Mana Esplanade, Plimmerton, Camborne, SH58, Paremata and Paremata station. The proposed interchange supplied for review comprised a half diamond interchange with an overbridge and south facing ramps with the new State Highway passing under the local connection. We consider that the proposed interchange is unlikely to have sufficient capacity to efficiently cater for the traffic flows. This interchange will be the only main connection from this area to the south and Wellington and hence will be heavily used at peak times.

We consider an alternative form of interchange is likely to be required with a more free-flow movement between Mana Esplanade and SH1 south in both directions, and with full connection to SH 58. This could include a roundabout to be located between the SH1 overbridge and Paremata Bridge. The proposed interchange at Paremata will also affect the existing Paremata Station car parks and pedestrian accesses and these will need to be modified. A further alternative solution could utilise an elevated roundabout with two overbridges over SH1 and connections to Mana Esplanade, SH 58 and the Paremata Station from the roundabout.

The connection between Mana Esplanade and Ngati Toa Domain and the marina has now been relocated to Pascoe Avenue, passing over the bypass and rail on an elevated structure up to 7 m above existing ground level. This access will be supported by a combination of embankment, walls and bridge and is likely to be in a grade of up to 10% to provide clearance over the bypass and rail, even with lowering the bypass and rail at Pascoe Avenue.

Reclamation is proposed around Goat Point, to accommodate the relocated railway and the 4 lane highway, and the south end of Plimmerton Beach is affected by the alignment. The latest alignment severs the main access to Plimmerton at Steyne Avenue and provides a new access into Plimmerton via the northern interchange.

The Mana bypass will also require mitigation for noise [REDACTED]

The July 2005 scheme proposed a grade separated interchange north of Plimmerton as a diamond interchange with an overbridge over SH1 and north facing ramps as well as a two way connection to Plimmerton and south to Mana Esplanade. We consider the traffic capacity of this interchange may not be adequate as it will provide the only access between SH1 with SH58, Paremata, Camborne, Mana and Plimmerton, and there will be significant turning movements at the ramp terminals on the eastern side.

We consider that a larger interchange is likely to be required which could take the form of a roundabout on the eastern side with connections to a realigned Grays Road, as well as the proposed connection to Mana Esplanade and Plimmerton.

Steyne Avenue, the current main access to Plimmerton, would be closed. We understand that the link between the northern Plimmerton Interchange and Plimmerton is proposed to include a level crossing of the NIMT rail, similar to what currently exists at Steyne Avenue. Even if approval is given by On Track to this proposal the Review Team considers that a level crossing should not be incorporated in the design for this new facility.

As shown, this new link into Plimmerton connects to the small roundabout at the junction of Steyne Avenue, Beach Road and Moana/School Road. We consider that the connection shown does not provide acceptable access to Plimmerton. To assess likely community and cost impacts of acceptable access, we have developed an alternative connection by realigning the link approximately 30 metres further south of the roundabout and connecting to a realigned Beach road. The conceptual layout is shown on Figure 3.

The existing rail line is on an embankment between 2 and 3m above the existing ground level. It is not technically feasible to achieve grade separation of road and rail with the current rail alignment. Grade separation could be achieved by moving the rail further east (refer figure 3) and passing the road beneath the rail.

It is important to note that the concepts outlined on figure 3 have significant cost and other impacts of their own. They are not offered as an optimum solution but have been developed as a means of assessing possible costs and risks associated with developing acceptable access to Plimmerton. As an alternative, it may be possible to keep the existing access between Mana Esplanade and Steyne Avenue open by moving the bypass and rail alignment further towards the Bay. This may provide sufficient room to continue a realigned Steyne Avenue parallel, and on the eastern side of the bypass until it is low enough to pass under the bypass and rail, and connect to Steyne Avenue on the west side of the bypass.

The layout of the interchange and connection of SH1 to Plimmerton in the scheme reviewed does not take account of the new roundabout, local road connections and new development recently completed in this vicinity, and these would need to be factored into concept designs.

Severance issues are likely to need to be addressed, perhaps by the provision of footbridges or underpasses crossing the Mana Bypass.

Structures

There are buildability issues related to the grade separated interchange at Paremata on the drawings supplied for review. This includes an overbridge over SH1 which would impact on the existing roundabout. Significant traffic management will be required for construction. Similar issues will relate to the alternative interchange proposed by the review team to improve the traffic capacity of the interchange.

The proposed Mana Bypass carries the State Highway over the entrance to Pauatahanui Inlet on a new bridge to be located between the existing highway and railway bridges. As there may be siltation concerns relating to additional piers in the inlet entrance, it is assessed that longer spans than the existing structures may be required for this new bridge. These spans would be 40m to 50m in length. A longer span bridge with no piers in the inlet could also be considered.

The bridge at Pascoe Avenue, over the bypass and rail, will be conventional construction.



Geotechnical

Ground improvement will be required to construct the Paremata Interchange due to the soft ground in this vicinity. The overbridge will need piled foundations as will the new bridge across the Pauatahanui Inlet.

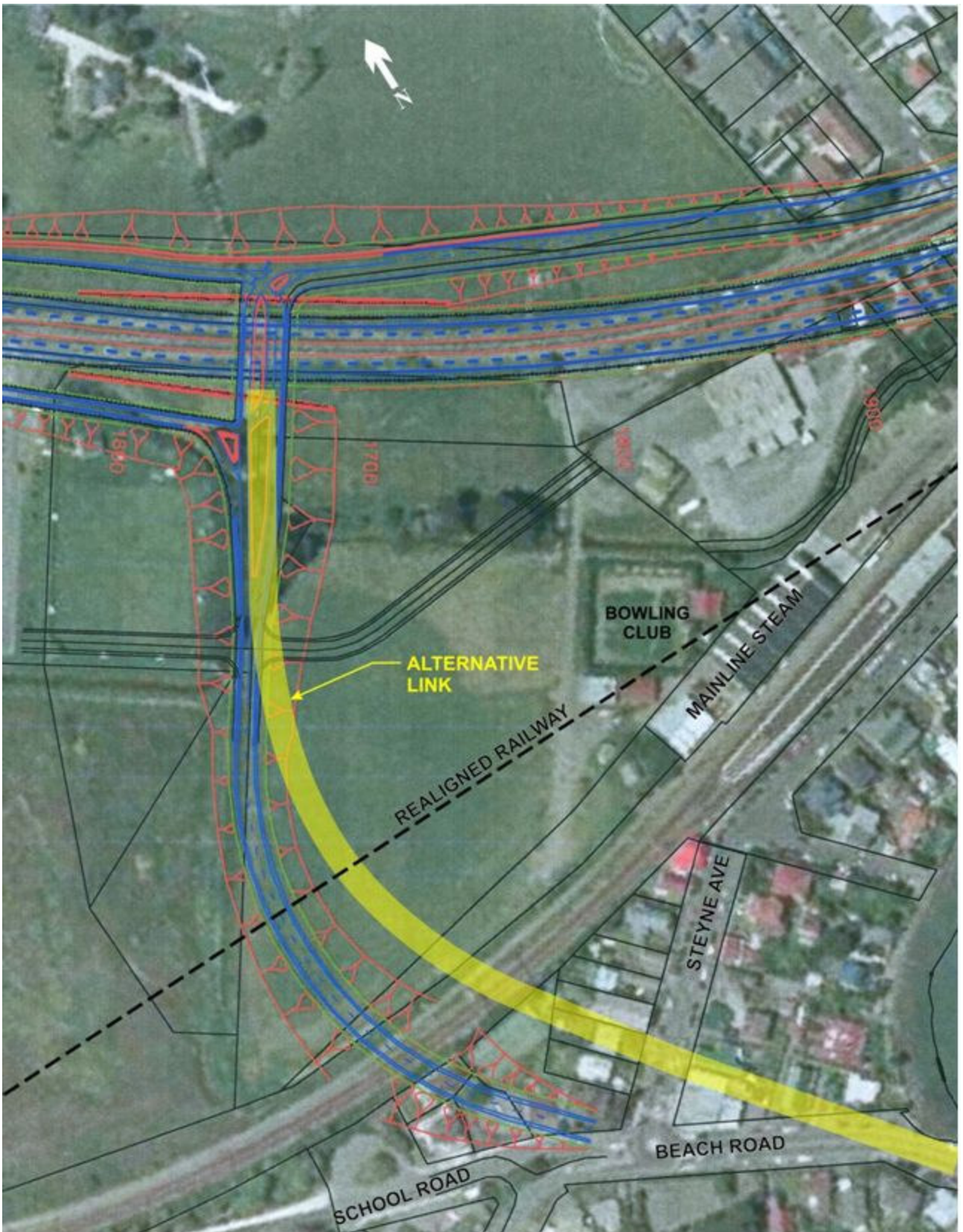


FIG 3 - ALTERNATIVE PLIMMERTON NORTHERN LINK

Construction of the Mana Bypass across the Ngati Toa Domain and around the coast to Plimmerton is expected to need ground improvement in the form of dynamic compaction and wick drains to mitigate liquefaction risks of subsidence and lateral spreading in a large earthquake. We consider that provision for improvement should be made where the alignment is close to the Coast line, where the lateral spreading is likely to be greatest. Elsewhere it would be possible to accept the risk that repairs may be necessary after a large earthquake. On balance, we consider it is likely that ground improvement will be required:

- From Pascoe Avenue overbridge south to the new Paremata bridge
- From the end of the Domain (south of Goat Point) to Plimmerton railway station.

Between Plimmerton and the weighbridge, soft ground is expected and peat is likely, requiring excavation and ground improvement techniques to be adopted (such as wick drains and preloading).

6.1.4 Section D – Plimmerton to South of Pukerua Bay (3.6 km)

We have been advised by Maunsell that the local road connection between Airlie Road and Pukerua Bay shown on the April 2005 drawings is not included in the Western Corridor scheme. The July 2005 drawings have been modified to remove this.

Roading and Geometry

There are no roading and geometry issues in this section.

Structures

There are no structural issues in this section.

Geotechnical

The northbound off ramp embankment at the Airlie Road Interchange is shown spilling into Taupo Swamp and either retaining walls or ground improvement will be required.

6.1.5 Section E – South of Pukerua Bay to Paekakariki (9.7 km)

In the scheme reviewed in April 2005, this section of the Coastal Route was identified as posing significant planning and engineering challenges. A number of alternative concepts have been developed to assist with understanding uncertainty in this section. Further detail of these is given below.

Roading and Geometry

The scheme reviewed proposed half diamond grade separated interchanges at the north and south ends of Pukerua Bay with north and south facing ramps respectively, and will only provide access for local traffic onto SH1 at each end of Pukerua Bay. Local traffic will use the local road network and the redundant length of SH 1 for their access.

The proposed interchanges at Pukerua Bay were originally (April 2005) shown with some ramps of sub-standard length, although these have since been modified (July 2005) and appear to be appropriate. There are buildability issues at the northern interchange where the Pukerua Bay Bypass crosses the existing SH1 alignment a number of times within a short length in the vicinity of the interchange. Substantial local diversions will be necessary during construction.

The Pukerua Bay Bypass reviewed has a steep southbound grade of up to 6% over approximately 2km length as it approaches the summit of the bypass. This will cause heavy vehicles to slow down and may require a slow vehicle climbing lane to be provided.

The scheme reviewed in April 2005 proposed to provide 4 traffic lanes along the coastal section by widening the existing 2 lane highway. Over the southern section the proposal showed an additional 2 traffic lanes on the landward side of the existing highway. Over this section, either cuttings were proposed into the existing steep hillside below the railway, or high retaining walls were proposed adjacent to the highway to support the widened highway on a split level basis above the existing road. This general arrangement is shown in figure 4. The existing accesses to the railway were cut off by these proposals and underpasses were likely to be required below the new southbound carriageway.

Over the northern part of the coastal section, the April 2005 scheme proposed to widen the existing highway by either constructing two additional traffic lanes on the seaward side of the existing highway in a reclamation, or directly above the existing highway on a viaduct through to Fishermans Table, where the carriageways were split to form two separate alignments at a similar grade.

The review team expressed major reservations about the practicality of constructing these concepts for the coastal section. Over the southern section it was considered that the proposed cuttings or high retaining walls adjacent to the existing highway would be extremely difficult to construct due to access and safety issues relating to the existing highway. There would also be significant slope stability issues. Over the northern section it was considered that the construction of a viaduct above the existing highway would be very expensive due to the limited opportunities to erect piers and superstructure while the highway remains operational.

Thus the review team suggested that an alternative option would be to construct the additional traffic lanes on a low level viaduct located over the foreshore on the seaward side of the existing highway (refer figure 5). This solution could be adopted over the full length of the coastal section between the Pukerua Bay northern interchange and the Fisherman's Table restaurant. This option provided significant advantages in terms of construction and lower risks related to the existing highway and railway. While such a viaduct is an expensive form of construction, we had sufficient reservations regarding the practicality of the scheme reviewed that we considered provision for this should be made in expected cost estimates. The July 2005 scheme offers a reclamation option which supercedes this structural solution and therefore these structural costs are no longer included.

The April 2005 scheme retained the existing SH1 as either the northbound or the southbound carriageway and used the existing alignment. In places this has a design speed of between 80 and 100 km/hr, which is less than the design speed that would normally be adopted for an important new highway. We considered that it would be prudent to improve the alignment of the existing SH1 on the coastal section to achieve a design speed of 100 km/hr over its full length and suggested this could be achieved by local realignment. It was thought feasible to construct the new reclamation or low level viaduct over the sea, divert all the existing traffic onto the alignment, and reconstruct the existing SH1 to the required standard.

We also considered that provision for cyclists and pedestrians should be made over the entire length of the coastal section and envisaged that this could be provided on the outside of the proposed reclamation or low level viaduct.

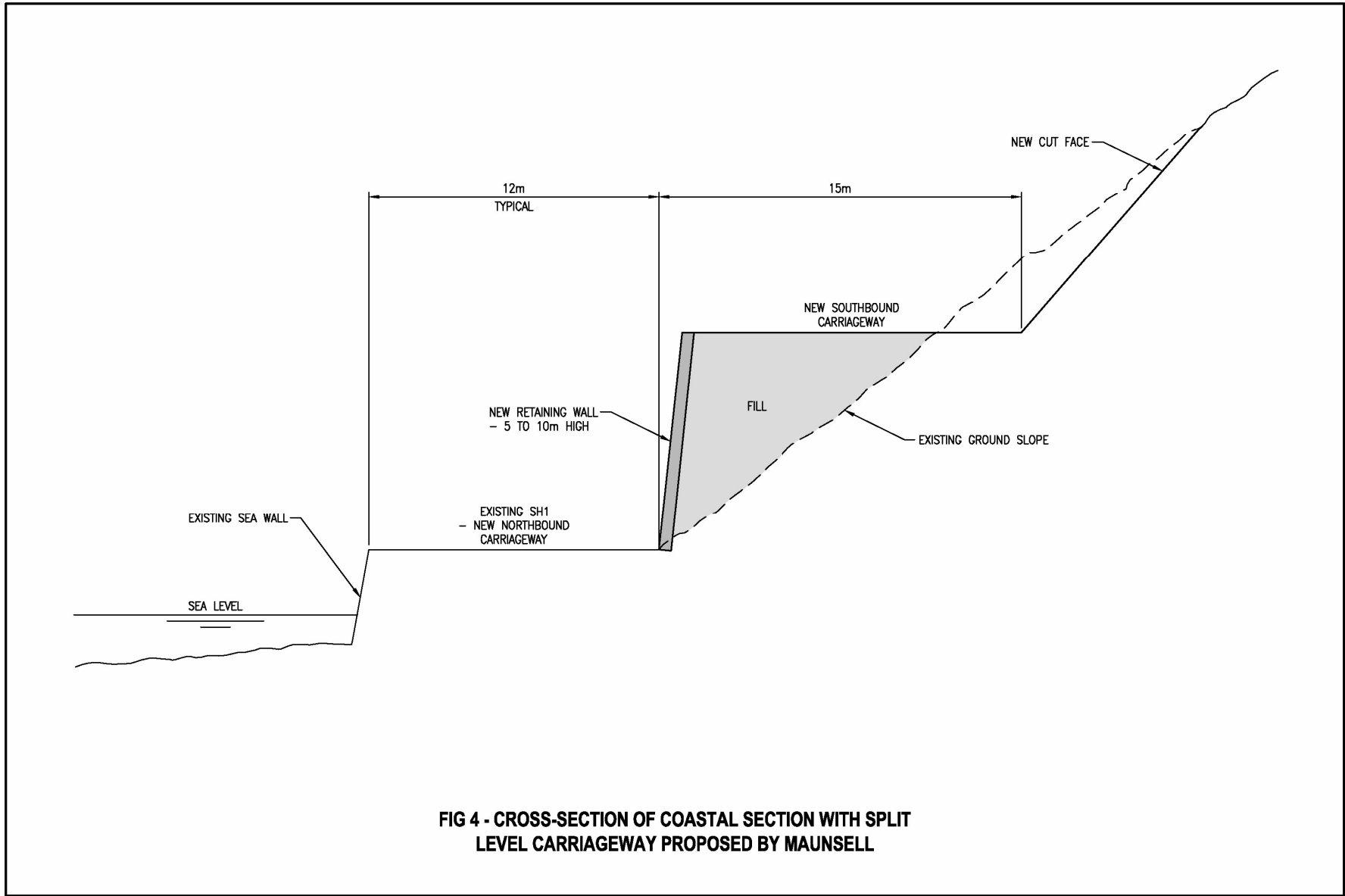


FIG 4 - CROSS-SECTION OF COASTAL SECTION WITH SPLIT LEVEL CARRIAGEWAY PROPOSED BY MAUNSELL

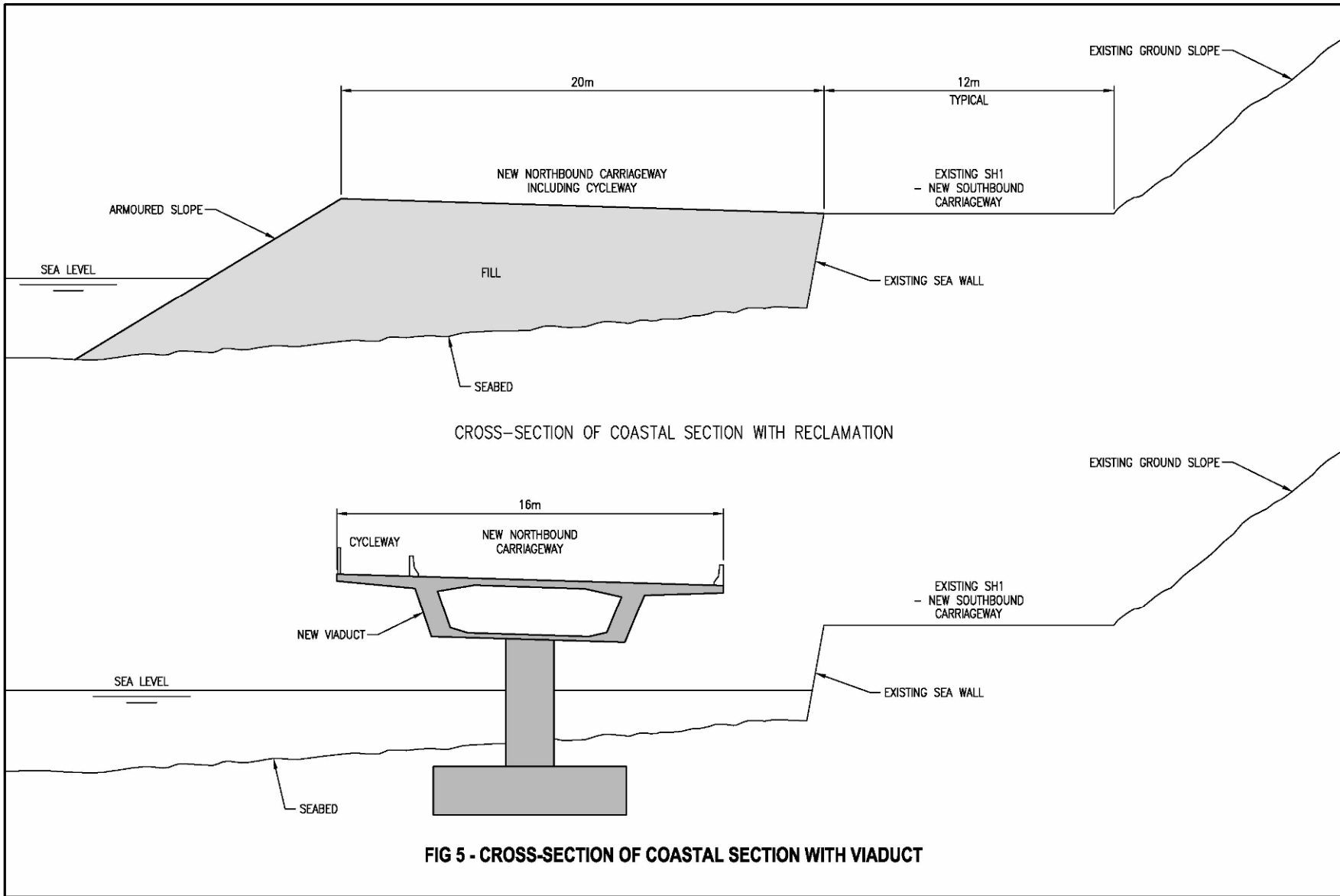


FIG 5 - CROSS-SECTION OF COASTAL SECTION WITH VIADUCT

The July 2005 scheme no longer proposes a viaduct above the existing highway on the northern part of the coastal section. The scheme now keeps the two carriageways at approximately the existing road level and reclaims onto the foreshore with a retaining wall on the seaward side. Approximately halfway along the coastal section, at the south end, the carriageways split with the southbound carriageway climbing up to 10 metres above the northbound carriageway, increasing to a maximum of 18 metres on the Pukerua Bay Hill. Over the coastal section, this southbound carriageway is generally built against the escarpment although there are a number of significant cuts into the hillside. In the vicinity of the Pukerua Bay hill, not only is there proposed near vertical walls up to 18 m between the carriageways, but also cuts up to approximately the same height on the hillside. The review team is of the view that this cross-section will be extremely difficult to construct adjacent to a busy state highway, and has significant risks not only to highway users but for some sections to the rail above. The alignment is likely to preclude duplication of the rail on the seaward side of the existing track in the future and prevent the maintenance access tracks for the rail being maintained.

The review team has some further concerns regarding the July 2005 scheme and has developed some conceptual solutions:

- The scheme seeks to minimise intrusion of the reclamation into the sea. This is a laudable objective but would include “risky” hillside cuts in some instances where a few metres of additional reclamation may be acceptable and preferable. In future scheme development, we consider it is important that reclamation width is not undersized. We are of the view that additional reclamation width say 3 to 5 metres is preferable to cutting into the hillside.
- The scheme does not provide ready access to the foreshore comparable with existing. Some access to the foreshore could be created between station 7800m and 8400m taking advantage of local promontories and reclaiming between.
- We have some reservations regarding cost and rate of construction of the proposed retaining wall on the seaward side of the reclamation. Accordingly, we have developed an alternative bund/rock protection structure (refer to Figure 6).
- At the southern end of Pukerua Bay Hill we consider the alignment should be moved out of the hillside. This would require a viaduct structure of about 600 metres in length but mitigates high risk associated with the cut into the hillside.

These conceptual solutions have been provided for in our assessment of cost and risk.

The scheme reviewed proposes a grade separated interchange at Paekakariki in the form of a full diamond interchange with both north and south facing ramps. Connection is provided to the Paekakariki Hill Road and into Paekakariki township. The interchange is shown located immediately south of the intersection of SH1 and Beach Road.

The plans supplied for the April Review showed a connection from the Paekakariki Interchange to the town via a ramp down into Beach Road. This would impact severely on the existing commercial and civic properties, including a church, on the main street. The July 2005 plans show the interchange connection with the ramps moved approximately 80 metres south of the April layout. The interchange link is now shown connecting to Ames Street.

We consider that the proposed north facing ramps are likely to be extremely difficult to install due to the very restricted width that is available north of the intersection of SH1 with Beach Road, with a major cut required into the hillside. An alternative layout suggested for the interchange (in April 2005) was to delete the north facing ramps and provide the connection with SH1 to the north via a local road to the new Mackays Crossing interchange.

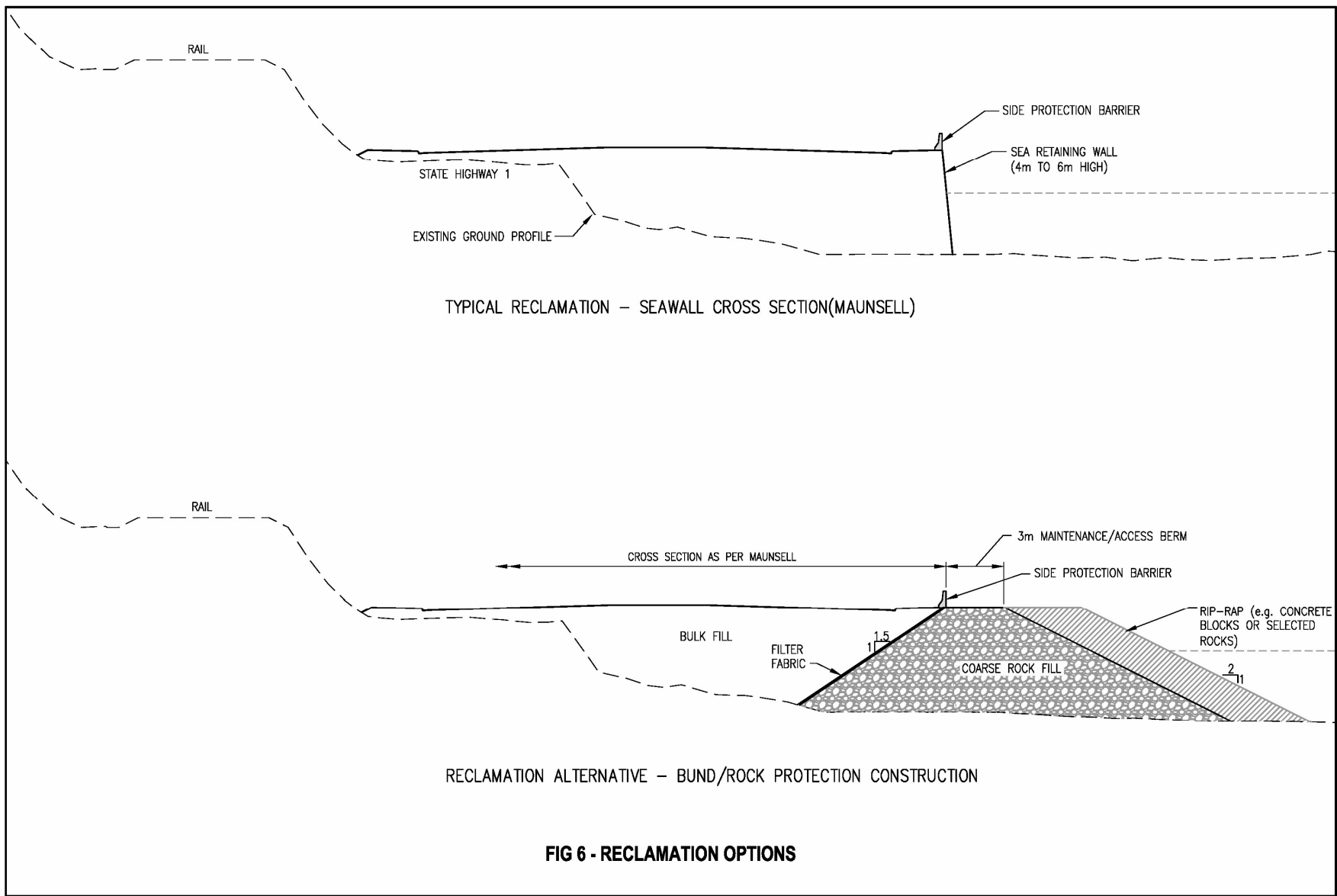


FIG 6 - RECLAMATION OPTIONS

The July 2005 concept plans show a number of modifications north of Steam Incorporated. The modified design pulls the alignment closer to the rail immediately north of Steam Incorporated, reducing the cut into the hillside compared to the April 2005 scheme. However the cuts still reach up to 28 m in height, without any provision for benches. The alignment, instead of connecting back onto the existing state highway north of the hillside, now runs parallel with the railway, passing through the Sang Sue property, before looping back to connect to the MacKays Crossing Interchange. The redundant section of state highway, between the hillside north of Steam Incorporated and MacKays Crossing, reverts to a local service road and connects back to the roundabout at the terminal of the MacKays Crossing ramps, on the eastern side. This service road is shown as being terminated at the south end where it meets the 4 lane realignment. However a variation to this layout could include this service road crossing both the realignment and the rail via bridge, to link into Tilley Road in Paekakariki. This layout would provide access between the north and Paekakariki, via MacKays Crossing Interchange, if the northern ramps at the Paekakariki Beach Road intersection were eliminated.

At the time of the July 2005 review, we have also been made aware of some preliminary investigations by Beca Carter Hollings and Ferner (Beca) into options for Paekakariki Interchange. Those investigations (although barically concentrating on the interchange near Beach Road) did extend to the north and consider alternatives to the July 2005 scheme in the vicinity of the Steam Incorporated complex. The various alignments are shown schematically on Figure 7. The Beca design uses a slightly reduced cross section combined with smaller radii to minimise the impact on Steam Incorporated. The Review Team consider the slightly lower geometric standard of the Beca design appropriate through this constrained area. The Review Team also considers it may well be appropriate to relocate the railway and modify the road geometry north of Steam Incorporated to reduce or eliminate cuts in a potentially unstable area (refer figure 7).

Structures

Construction of a viaduct above the existing SH1 over the northern section of the coastal section as proposed in April 2005 (refer figure 8) would be extremely difficult due to the access restraints and the need to maintain two lanes of traffic on SH1 during construction. It is considered that closures will only be permitted for short periods at night and during off-peak periods that would severely restrict construction of foundations and erection of piers and the superstructure. This is likely to make this option very costly. We note this is no longer proposed in the July 2005 concepts.

A bridge structure at the base of Pukerua Bay hill could be utilised to move the alignment “out of the hillside” and thereby mitigate substantial risk. Retaining walls could be used at the bottom end until walls reach say 10 metres height. Foundations for this bridge would be complex and high piers would be required.

The reclamation into the sea will need careful design and construction sequencing due to the tidal range and wave condition on the rocky foreshore. The retaining wall on the seaward side is likely to require cofferdams for construction. The Review Team consider an armoured fill slope would be easier to build, subject to availability of suitable armour material.

The proposed grade separated interchange at Paekakariki will have buildability issues relating to construction over the existing SH1 and in close proximity to the railway. It is likely that extensive use of reinforced earth retaining walls will be required to allow the ramps to be located in confined areas.

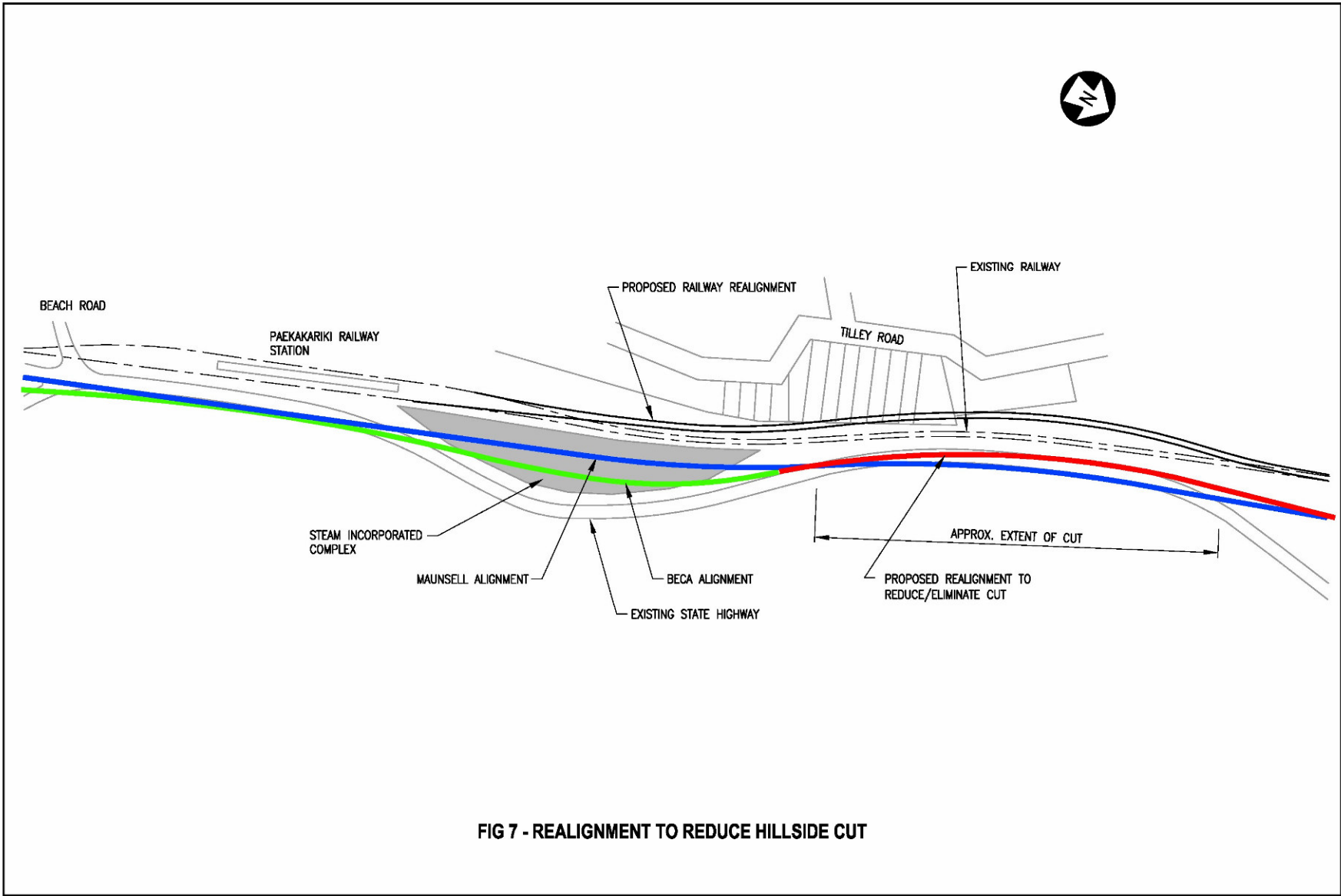
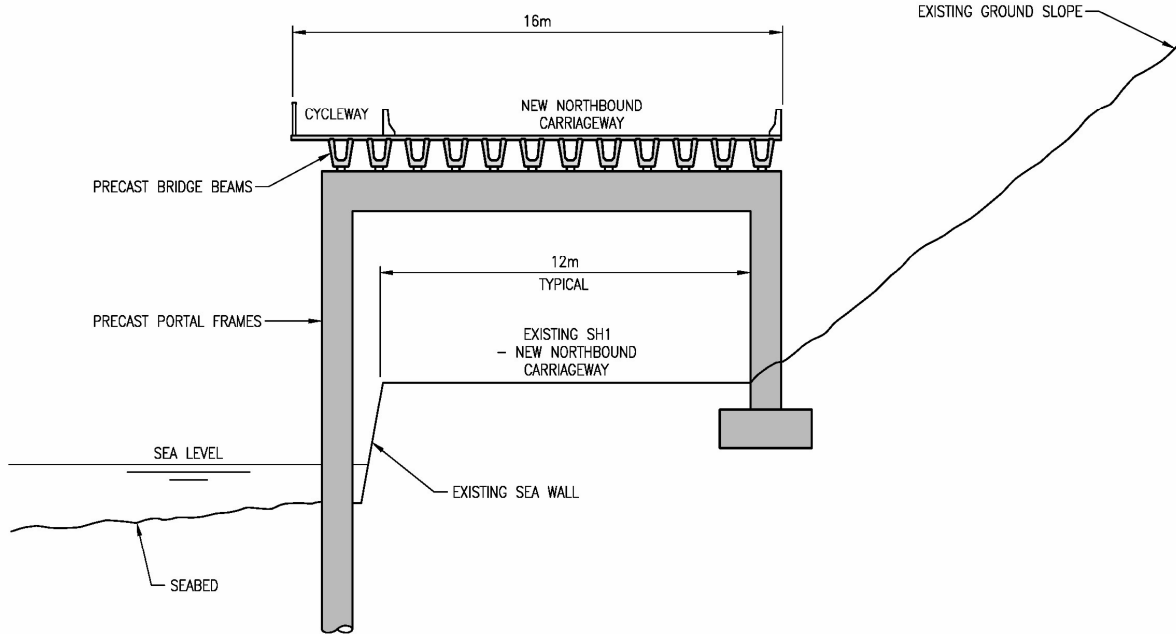


FIG 7 - REALIGNMENT TO REDUCE HILLSIDE CUT



**FIG 8 - CROSS-SECTION OF COASTAL SECTION WITH BRIDGE
OVER EXISTING HIGHWAY PROPOSED BY MAUNSELL**

Geotechnical

The cuttings proposed for the Pukerua Bay bypass are steep particularly along some sections, where a 0.25H:1V cut slope is proposed by Maunsell. It would be prudent to adopt 45° cut slopes with 3 m wide benches at about 10 m height intervals.

One of the key geotechnical issues in this section relates to the proposed cuttings into the steep slopes above the highway along the southern half of the coastal section, and the climb towards the Pukerua Bay bypass. These cuttings would be into rock as well as loose colluvium and tunnel spoil deposits along the coastal section. Along the climb into Pukerua Bay from the coastal section, the cuttings would be into poor marine deposits, known as "Otaki Sandstone", which is prone to extensive instability, which would affect the highway as well as pose a severe risk to the railway above.

The review team consider it would be prudent to maintain the highway on reclamation into the sea over the full coastal section, rather than cut into the hillside using a split level carriageway. At the southern end, the alternative would be to widen the highway on the outside of the hillside towards the sea, with the highway supported by retaining walls and a bridge viaduct with high piers.

The reclamation is expected to be largely founded on the existing seabed where bedrock is consistently exposed at low tide.

A significant quantity of fill material will be needed for the reclamation that is unlikely to be available from other parts of the coastal route upgrade.

The rockfill is expected to have to come from a quarry say in Paraparaumu or Waikanae, with the riprap having to be carted from outside the region, or barged in from the South Island.

The construction of a full Diamond interchange at Paekakariki will require cutting into the hillside. At a slope of about 45°, the hillside is very steep and the rock appears to be highly disturbed with evidence of past failures, possible large landslides, and variable depth colluvium. All schemes we have reviewed would require near vertical anchored retaining walls up to 25 metres height. Such high walls with a steep hillside above would have to resist high loads (particularly in Earthquakes). It is for this reason that we believe consideration should be given to alternative connections rather than providing the proposed north facing ramps.

The concept alignment north of Steam Incorporated requires near vertical cuts up to about 30 metres high in the steep hillside with poor rock, landslides and possibly thick colluvium/landslide deposits. The review team consider this poses a severe risk to the project and the highway in the long term. Accordingly, the review team consider it would be prudent to realign the railway and move the highway as shown on figure 7. This will reduce or eliminate this cut.

6.1.6 Section F – Paekakariki to Mackays Crossing (2.3 km)

Roading and Geometry

A key roading issues in this section is the effect of the scheme on Steam Incorporated which has now been considered in section 6.1.5 of this report due to its interdependence with the Paekakariki interchange issues.

We see no other significant roading and geometry issues in this section.

Structures

We see no significant issues.

Geotechnical

Issues with respect to Paekakariki Interchange and the hillside adjacent to Steam Incorporated have been addressed in section 6.1.5 of this report.

Widening of the state highway north of Paekakariki may involve construction of embankments over soft ground with thick peat deposits. This is likely to lead to slower construction and the use of wick drains and preloading.

6.1.7 Scheme Wide Issues

The key scheme wide engineering issues relate to the following:

- Provision for pedestrians and cyclists where the existing route does not currently provide adequate facilities. This would include a section between Porirua and Paremata and the coastal section between Pukerua Bay and Paekakariki. It is envisaged that a combined pedestrian and cycleway would be constructed. Between Paekakariki and Mackays Crossing, it is envisaged that the local access road could be provided with this facility, rather than the state highway.
- Noise mitigation in the form of noise barriers or earth bunds, with the possible requirement for low noise surfacing.

6.2 Engineering Review Findings for Transmission Gully Route (26.7 km)

If the Transmission Gully Motorway is selected, it is likely that some works must also proceed on the coastal route. These must be included in cost and programme estimates for relevant comparisons to be made. Our assumptions in this regard are identified in section 3 of this report.

In undertaking this review, we have not identified any fundamental omissions or flaws with respect to the information supplied. The documentation supplied covers areas of uncertainty in an appropriate manner for the current stage of scheme development.

7 Programme

7.1 Methodology

We have estimated a range of durations in months for each of the key elements of work:

- Project wide investigations and applications for designation and coastal consents (already complete for Transmission Gully Route).
- Further investigations and reporting leading to applications for resource consents.
- Detailed design and tender documentation.
- Property Purchase.
- Tendering and construction of physical works.

The item durations have been assigned both a minimum and maximum and have been modelled as a statistical distribution to provide a likely upper limit (95th %ile) and likely lower limit (5th %ile) along with an Expected (Mean) project duration. The risk based programme has been produced using a similar methodology to that of risk based cost estimating under Transit's SM014 Cost Estimating Manual.

Our time assessments are based on experience with current planning and construction practice. It is possible that the recently enacted Resource Management and Electricity Amendment Act will allow some acceleration compared with our assessed programme. It is recommended the potential for acceleration be investigated further in conjunction with development of a designation and consent strategy.

7.2 Coastal Route

We were not supplied with a programme for the Coastal Route and have therefore produced an indicative programme from first principles.

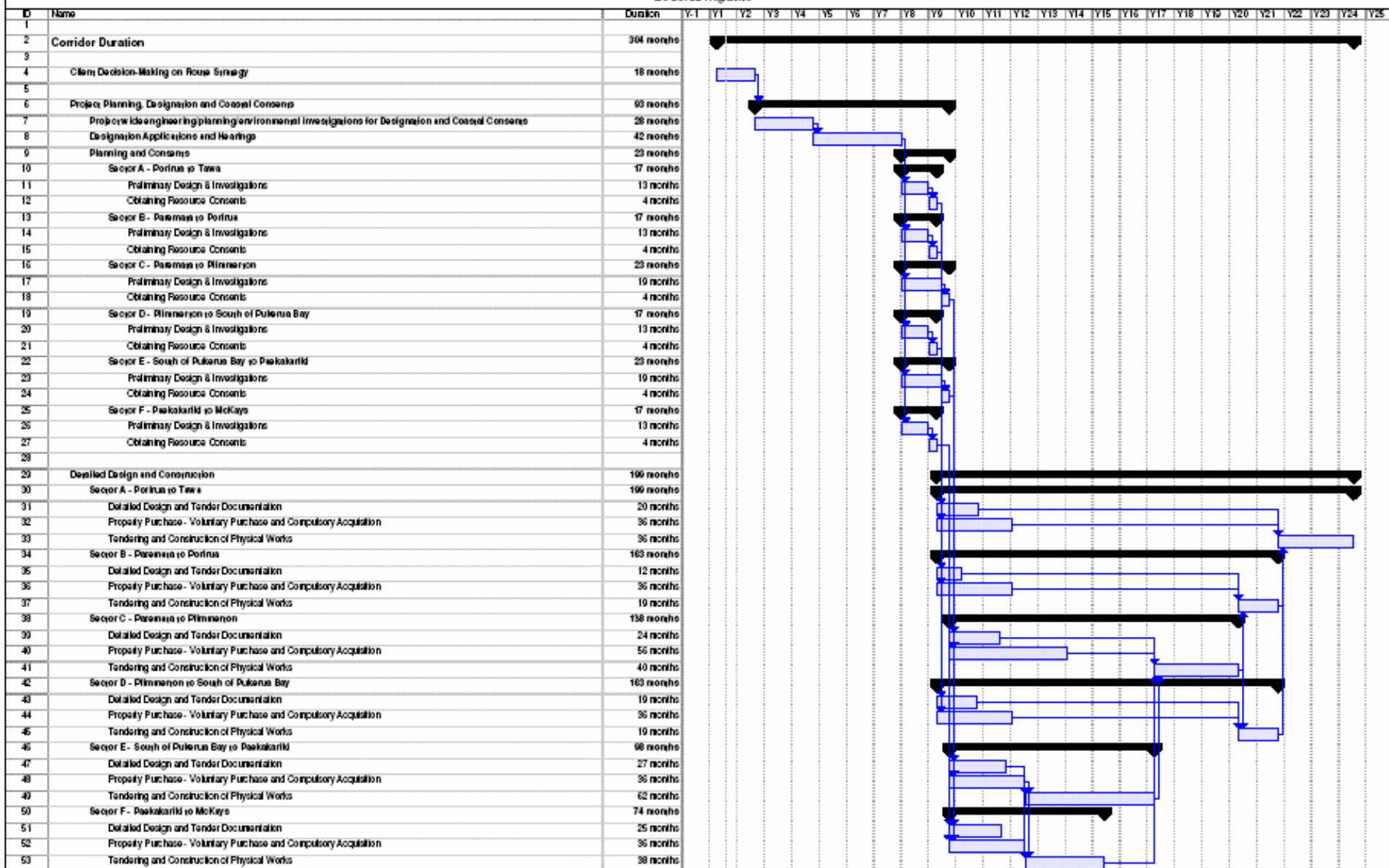
The programme for the Wellington Western Corridor Coastal Route option is likely to lie between 20 years and 28 years with an expected duration of 24 years (refer to programmes overleaf).

Assumptions

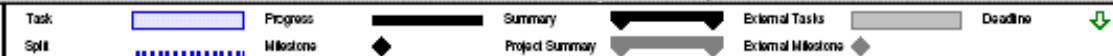
In this programme we have made the following assumptions:

- 1 Client decision making on the route strategy will be concluded and actions required to commence the subsequent phase completed within 18 months.
- 2 The client will undertake a project wide investigation and designation and consent process to "prove" the Coastal Route before commencing work on individual sections.
- 3 Work on the Coastal Route will be developed in sections as the impacts on road users would be too severe if construction of all Sectors was to proceed concurrently.
- 4 No work will occur on the development of the individual Sectors until a decision has been made on the project wide designation and coastal consents.
- 5 Once project wide designation and coastal consents have been received, further investigations and preliminary design will be required to secure resource consents.
- 6 Once a sector has achieved resource consents, detailed design will proceed. It should be noted that, while we have shown these works starting concurrently on our programme, there is float within the programme to allow "staggering" of these elements not on the critical path

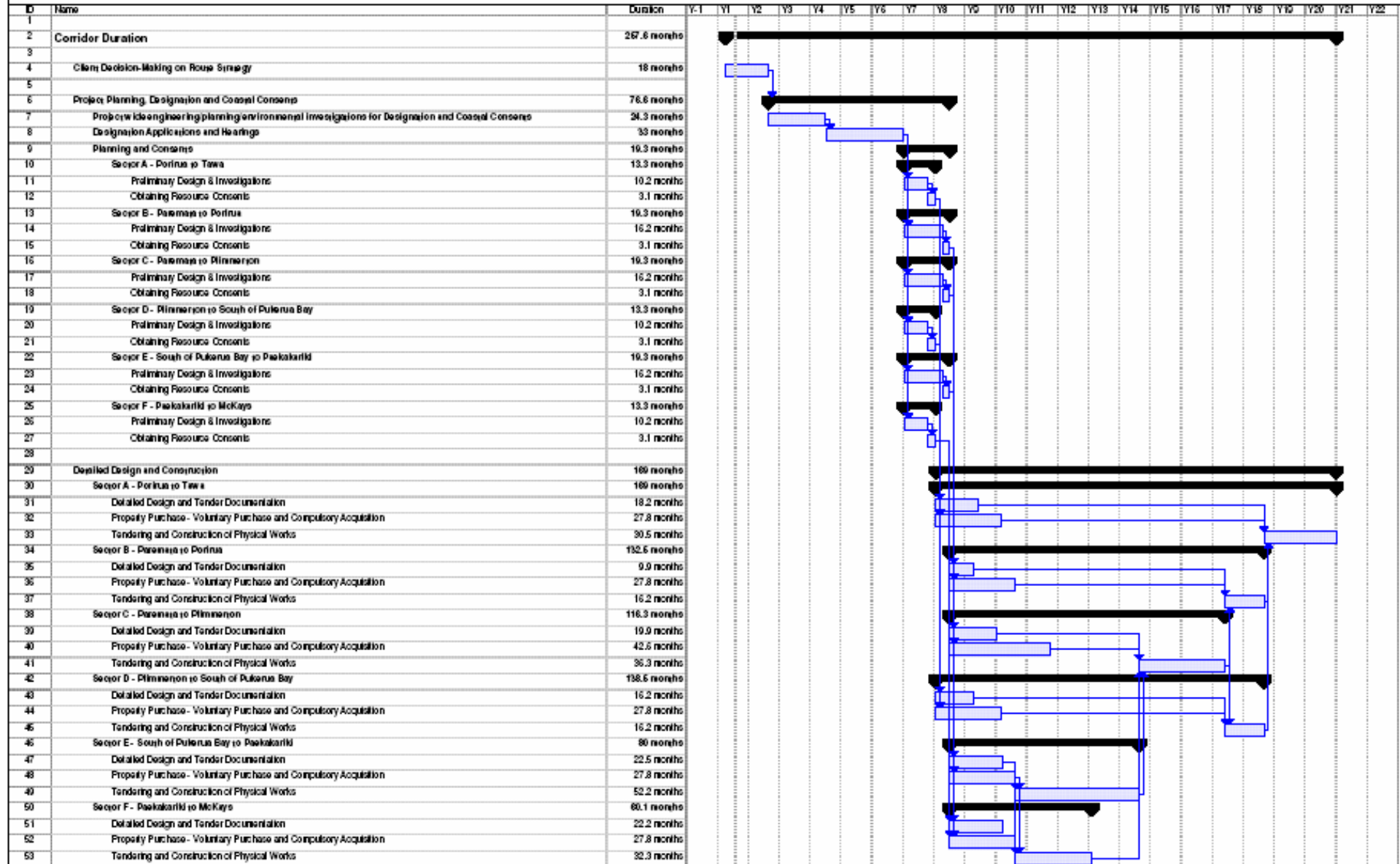
Wellington Western Corridor - Coastal Route
EFFECTED Programme



Project: Wellington Western Corridor -
Date: 31/07/05



Wellington Western Corridor - Coastal Route
 L&S Lower Limit (S/N) Programme



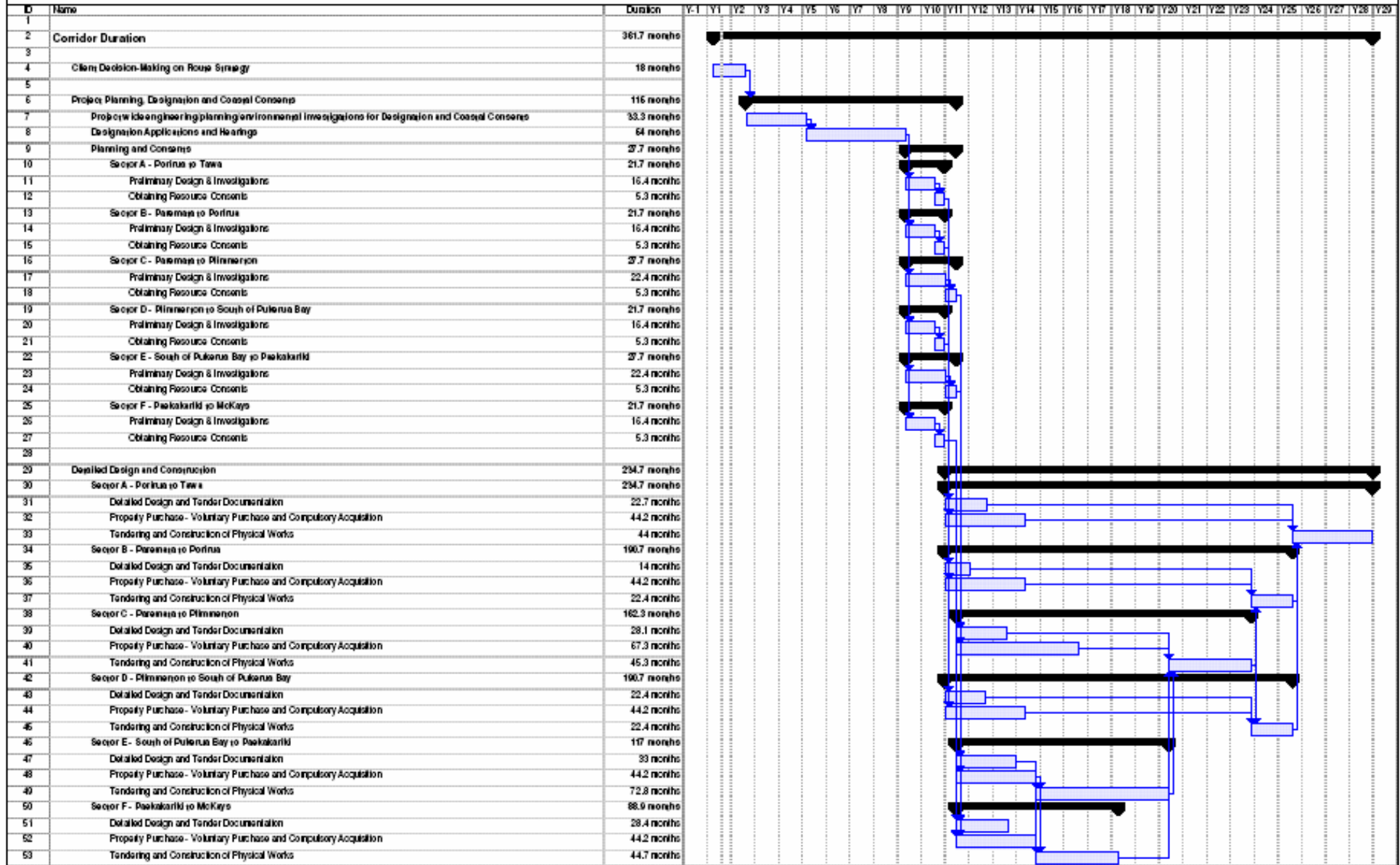
Project: Wellington Western Corridor - Date: 31/07/06

Task: [Blue bar] Progress [Black diamond] Summary [Black bar] External Tasks [Grey bar] Milestone [Black diamond] External Milestone [Grey diamond]

Split: [Dotted line] Milestone [Black diamond] Project Summary [Black bar] External Milestone [Grey diamond]

Deadline: [Green arrow pointing down]

Wellington Western Corridor - Coastal Route
 Likely Upper Limit (95th/90th) Programme



Project: Wellington Western Corridor - Date: 31/07/05

Task: [Blue box] Progress: [Black bar] Summary: [Black bar with arrow] External Tasks: [Grey box] Deadline: [Green arrow]
 Split: [Dotted line] Milestones: [Black diamond] Project Summary: [Grey bar with arrow] External Milestones: [Black diamond]

- 7 Property purchase will commence once a Sector has a confirmed designation and is free of any appeals. The programme assumes that the compulsory acquisition procedures of the Public Works Act will be invoked as soon as a Sector has a confirmed designation that is free from appeals. Note: It is likely to be prudent for the property purchase strategy to allow for early purchase of voluntary sales.
- 8 Having considered, safety, financial and traffic management issues, we have assumed construction of the corridor will be staged in the following order:
 - Sector E South of Pukerua Bay to Paekakariki and Sector F Paekakariki to MacKays Crossing
 - Sector C South of Existing Paremata Roundabout to Plimmerton
 - Sector B Porirua to South of Existing Paremata Roundabout and Sector D Plimmerton to South of Pukerua Bay
 - Sector A Linden to Porirua

Outputs

We have not sought to optimise the programme nor assume how the preliminary or detailed design works will be staggered. The critical path is driven by the need to achieve overall designation, planning consents and design for the first element, and the need to stage physical construction. We are confident elements not on the critical path can be progressed in a timely manner in order not to impact on the overall programme.

We note that the programmes enclosed are representative of a possible methodology to commission and construct the Coastal Route while optimizing benefits and minimizing delays. They indicate the following programme uncertainty:

Likely Lower Limit (years)	Expected Duration (years)	Likely Upper Limit (years)
20	24	28

We further note that the expected time to completion of project planning, designation and coastal consents is significant at 9.5 years.

7.3 Transmission Gully Motorway Route

Beca provided a programme for Transmission Gully. We have reviewed this programme and adjusted it as appropriate to reflect the considered opinion of the review team.

The programme for the Transmission Gully Motorway is likely to lie between 12.5 years and 17 years with an expected duration of 15 years (refer to programmes overleaf).

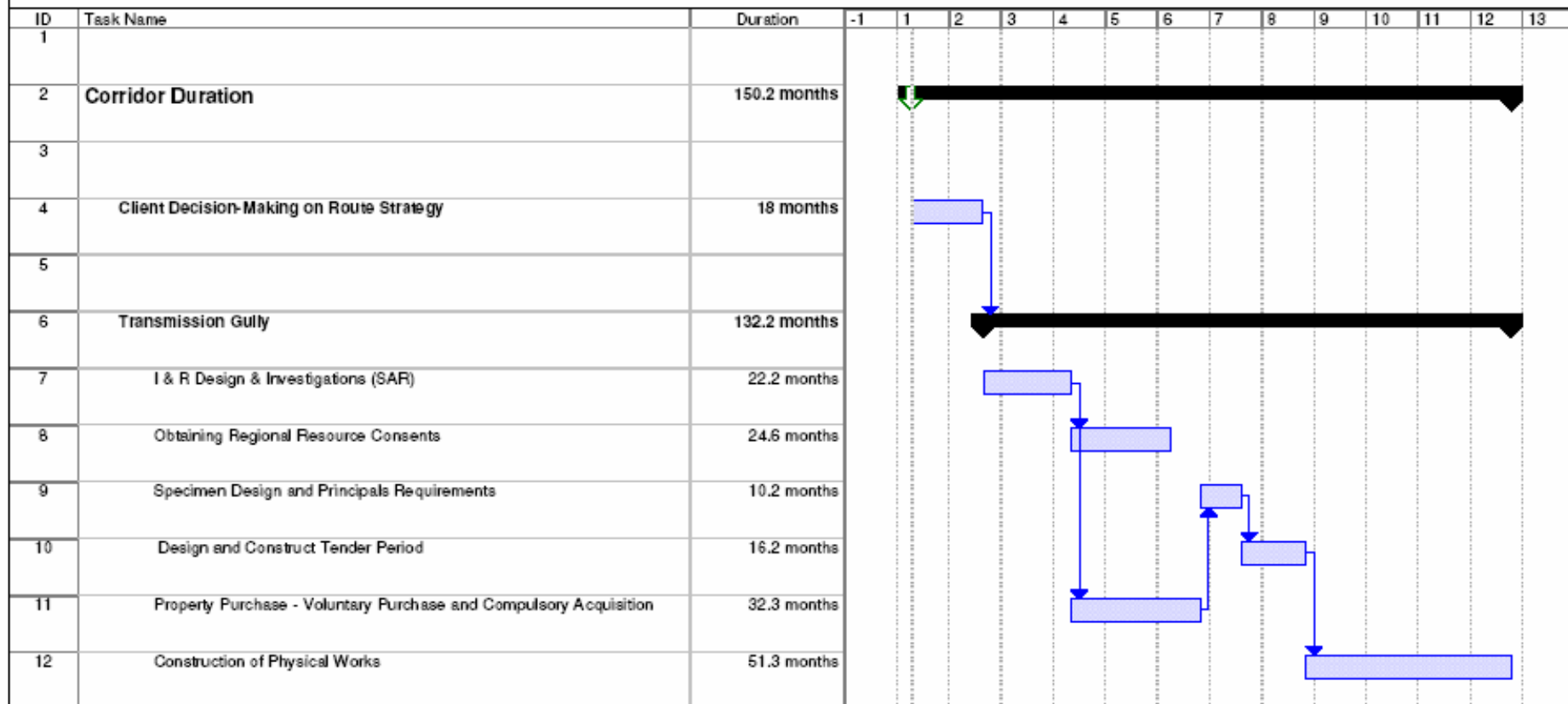
Wellington Western Corridor - Transmission Gully
EXPECTED Programme

ID	Task Name	Duration	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
1																				
2	Corridor Duration	177.4 months		↓	—————															
3																				
4	Client Decision-Making on Route Strategy	18 months		█																
5																				
6	Transmission Gully	159.4 months			↓	—————														
7	I & R Design & Investigations (SAR)	25 months			█															
8	Obtaining Regional Resource Consents	32 months				█														
9	Specimen Design and Principals Requirements	13 months					█													
10	Design and Construct Tender Period	19 months						█												
11	Property Purchase - Voluntary Purchase and Compulsory Acquisition	38 months							█											
12	Construction of Physical Works	62 months											█							

Project: Wellington Western Corridor -
Date: 11/04/05

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

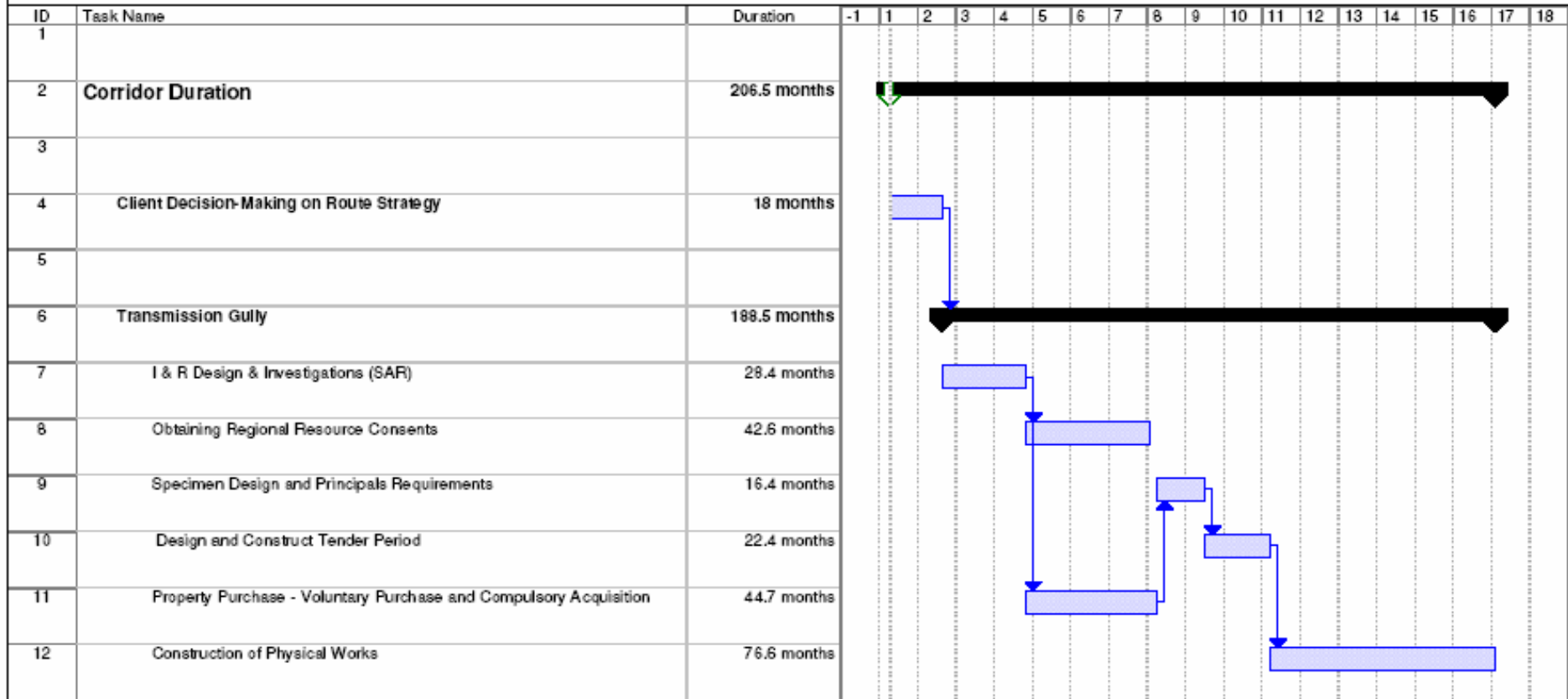
Wellington Western Corridor - Transmission Gully
 LIKELY LOWER LIMIT (5%) Programme



Project: Wellington Western Corridor -
 Date: 11/04/05

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

Wellington Western Corridor - Transmission Gully
 LIKELY UPPER LIMIT (95%) Programme



Project: Wellington Western Corridor - Date: 11/04/05	Task		Milestone		External Tasks	
	Split		Summary		External Milestone	
	Progress		Project Summary		Deadline	

Assumptions

In preparing this programme we have made the following assumptions:

- 1 Work on Transmission Gully can proceed in 1 stage as the work is generally in “green-field” sites.
- 2 18 months of the programme relates to the client decision-making process and choice between Transmission Gully and the Coastal Route.
- 3 No work will occur on the development of this project until a decision has been made on the overall strategy.
- 4 The project will be let under a Design and Construct procurement methodology.
- 5 The project is already designated however Regional Resource Consents are still required for example earthworks consents and the environmental sensitivity at Pauatahanui Inlet.
- 6 Compulsory acquisition procedures of the Public Works Act will be implemented if required [REDACTED]
- 7 Property purchase can commence at the end of the I&R phase, and upon completion, the Specimen Design and Principals Requirements phase will proceed.

Outputs

The programme produced for Transmission Gully has a critical path which goes through I&R Design, Obtaining Consents and Designation, Property Purchase and Construction. The two main variables in this programme are consents / designation and construction, with the programme being sensitive to adjustments in both of these items.

8 Cost Estimates

8.1 Confidence Levels

Transmission Gully

The confidence level for Transmission Gully is categorised as 'medium' as there is a confirmed designation and detailed topographical and property information. More time has also previously been spent on concept design and estimating project costs for this route.

Coastal Route

The confidence level for the Coastal Route is considered to be 'low' because:

- The design is not developed to a concept level throughout the length of the project – a number of the high cost components of the project are still at early feasibility stage.
- There are various options and community impacts along the alignment that could vary the final alignment and costs substantially when design and consultation is further developed.
- There is only limited design and quantity information available, as appropriate, for a strategy study.

8.2 Methodology/Approach

Transmission Gully

We have escalated the estimated costs included in the previous cost estimate undertaken in March 2004 to the latest available cost indices (March 2005) and have added allowances for the additional scope outlined in section 3 of this report.

Coastal Route

We have reviewed and adjusted the rates included in Maunsell's base estimate.

Earthwork quantities and bridge lengths are based on historical topographical information (20m sections). We have globally reviewed the quantities based on the length of the project and made an allowance in the risk assessment to cover inaccuracy.

We have also reviewed and adjusted property costs, as outlined in section 4 of this report.

These actions have culminated in a peer review comparison between Maunsell's Cost Estimate and our cost estimate for the Coastal Route in accordance with the methodology set out in Transit's Cost Estimation Manual SM014.

The comparison is presented overleaf:

Table 1 : SM014 review of Maunsell Estimate

Description	Peer Review	Maunsell
Project Property Cost	63,400,000	15,300,000
Investigation & Reporting	14,300,000	15,300,000
Design & Project Documentation	21,500,000	15,300,000
MSQA, TNZ Managed Costs, etc	18,600,000	14,600,000
Physical Works	438,100,000	376,300,000
Base Estimate	555,900,000	436,800,000
Contingency	186,600,000	177,200,000
Expected Estimate	742,500,000	614,000,000
Funding Risk	114,000,000	102,000,000
95th Percentile Estimate	856,500,000	716,000,000

The adjusted base estimate presented above - derived by our view on appropriate quantities and rates - has been used as our basis to price the “gaps” and alternative sketch options developed within the peer review team. It should be appreciated that there are some significant issues to be resolved regarding consenting and building the scheme supplied for review. To accommodate the uncertainty this creates, we have assessed costs based on options and scope assessed to be representative by the review team. Therefore, additional to the scope of work detailed in the information provided, the cost estimates also take into consideration the following assessed changes to scope:

Section A - Linden to Porirua

- Allowed for 4 lanes in the expected estimate; 6 lanes in the 95 percentile
- Additional retaining walls to stay within designation for the six-lane option.
- Additional noise barriers particularly in the area of Linden School

Section B - Porirua to South of Existing Paremata Roundabout

- Allowed for 4 lanes in the expected estimate; 6 lanes in the 95 percentile

Section C – South of Existing Paremata Roundabout to Plimmerton

Due to the identified planning risks in this location we have considered the Maunsell “at grade” solution to represent an expected estimate. We have allowed for the “further alternative alignment” shown on Map 3 for the 95 percentile estimate. We have made a number of other assessments in this section.

- Bridge over inlet
 - We have allowed for a bridge with wider span solutions than the existing bridge
- Ngatitua Park / Domain
 - The expected estimate is based on the Maunsell proposal. However we have also allowed to drop the alignment by 1-2m to enable suitable grade separation of the marina access road
 - We have allowed for ground improvement works in the Domain
 - The 95th percentile estimate allows for a cut and cover tunnel beneath the park but not relocating the railway line.

Section D – Plimmerton to South of Pukerua Bay

- We have allowed to grade separate the Plimmerton northern access from the rail line.
- Additional provision for ground improvement has been assessed in the expected estimate.

Section E – South of Pukerua Bay to Paekakariki

A provision has been made in the expected cost to allow for ground improvements that are likely to be required.

- The expected estimate includes provision for a crawler lane uphill to Pukerua Bay.
- The expected estimate includes provision for either retained coastal wall or armoured rock fill solution along the coastline.
- The expected estimate includes for providing a mitigation reclamation between chainages 7800m to 8400m.

Section F – Paekakariki to McKays Crossing

- We have provided for an alternative alignment (as per the Beca scheme) north of Paekakariki Interchange.
- We have moved the alignment north of Paekakariki due to concerns regarding cutting into the steep hillsides.
- We made assessments of the cost of improvements to accesses.
- We have made assessments of the cost of ground improvements likely to be required.

8.3 Outputs

Risk Analysis

The analysis undertaken in this review is based on a broad assessment of statistically modelled risk based on the peer reviewers experience of similar projects and their knowledge of the route.

Procurement

We have not specifically assessed the impact of scale and procurement options on cost at this time as we think the uncertainty of scope alone is sufficiently large that imposing further uncertainty assessment within our estimates would not provide meaningful differentiation between route options. However, this issue should be kept in view as the project unfolds as it could be significant.

Estimated Range of Project Costs

Comparative estimates for both TGM and the Coastal Route are included in Appendix C.

Estimates supplied for review can be summarised as:

Description	TGM (OE) \$ Millions at March 2004 Beca Estimate	Coastal Route (FE) \$ Millions at June 2005 Maunsell Estimate
Base Estimate	625	437
Expected Estimate	830	614
95th Percentile Estimate	950	716

The analysis methodology outlined in this report gives a summary of the estimated costs for each project as outlined below. These are based on rates as at 31 March 2005 and are exclusive of future escalation and Goods & Services Tax (GST). The estimates reported include our assessment of property costs.

Description	TGM \$ Millions Review Team Estimate	Coastal Route \$ Millions Review Team Estimate
Base Estimate	875	665
Expected Estimate	1,200	890
95th Percentile Estimate	1,340	1,425

It should be noted that the 95th Percentile estimate for the Coastal Route includes an allowance for providing 6 lanes south of Paremata and a Cut and Cover tunnel option under Ngati Toa Domain.

It can be seen that:

- The estimates for the TGM Route are likely to lie between \$875 million and \$1.34 billion with an expected estimate of \$1.2 billion.
- The estimates for the Coastal Route are likely to lie between \$665 million and \$1.425 billion with an expected estimate of \$890 million. The expected estimate can be split as follows:
 - Northern Section \$571 million
 - Southern Section \$319 million

The overriding conclusion of our assessment is that the expected cost estimates are higher than previously estimated for both routes.

We also note that the Coastal Route has significantly greater uncertainty attached and therefore a much greater range from Expected to the 95th percentile. This primarily relates to planning and scope uncertainty in Mana. While we have used conceptual development techniques to assess the likely magnitude of this risk, it is apparent that achieving

Designation in this location is essential for the Coastal Route and failure could be deemed a “fatal flaw”.

We have similar concerns with respect to the ability to consent the reclamation of Centennial Highway. In that case we have not been able to quantify a concept that may resolve the issues and therefore helps understand the cost certainty.

We recommend that a consent strategy is developed which includes the ability to confirm Designation and Coastal Consents on the Coastal Route before a firm preference is expressed between the routes based on cost.

9 Other Issues

As briefed, this review focussed on engineering, planning and property impacts of the proposed Coastal and Transmission Gully Motorway routes. In undertaking the review it has been necessary to recognise a wide range of issues that could have significant impact on cost and programme. We are mindful that we have made some assumptions (particularly related to programme) that could be modified by other “significant issues”.

Other “significant issues” not specifically addressed within this report include.

- Consideration of benefits (traffic, economic development, route security)
- Consideration of funding availability.
- Optimisation of expenditure to align with benefit realisation.

A decision of preference for either route could be strongly influenced by these. For example:

- (i) The Coastal Route allows progressive implementation and realisation of benefits. This could be matched to affordability (available funding) from conventional sources. In this context, the extended period for full implementation of the Coastal Route could be beneficial.
- (ii) Transmission Gully would provide a viable alternative route and thereby may enhance route security. However, it offers no significant benefit until the whole route is complete. Thus there would be greater imperative to minimise the time to completion of the whole.

Appendix A – Information Reviewed

PLANNING

The review is based on the following information:

- 1 Aerial plans showing the proposed alignment – sheets 1 to 24, 1 to 10 and 1 to 6 (out of 9), April 2005.
- 2 Revised Plans Paekakariki – Pukerua Bay Expressway HC4 (Maunsell Ltd) 21 June 2005.
- 3 Revised Plans Plimmerton – Porirua Expressway HC 4 (Maunsell Ltd) 1 June 2005.
- 4 Cross sections Paekakariki – Pukerua Bay Sea Reclamation Option (Maunsell Ltd).
- 5 Option Plans (3) Paekakariki Hill Road- Beach Road Interchange BCHF.
- 6 Porirua City Council Officers risk workshop report 1 June 2005.
- 7 Specialists risk workshop report 17 June 2005.
- 8 Mark Poynter report (Marine ecologist) 21 June 2005.
- 9 Stage 1 Consultation report
- 10 Stage 2 Consultation report (draft)
- 11 Cost estimate “Basic Summary FE estimates (June 05) updated”
- 12 Cost summary of options
- 13 Breakdown of mitigation costs
- 14 Habitat, ecosystem and landscape assessments for HT1 (Transmission Gully) and HC4 (the Coastal Package)
- 15 Air Quality assessment.
- 16 Noise assessment (incomplete).
- 17 Overall public health assessment.
- 18 Archaeology and heritage report.
- 19 A recent consultation record of meeting with Ngati Toa.
- 20 Risk Assessment Designation and Resource Consents Transmission Gully Motorway (HT1) and Coastal expressway (HC4).
- 21 Department of Conservation Consultation Response October 2004.
- 22 State Highway 1 Upgrade: Plimmerton to Paremata Section Upgrade: Volume 1, Notice of Requirement, Resource Consent Applications, Assessment of Effects on the Environment and Volume 2, Plans and Orthorectified Aerial Photographs Appendices 1-4, BCHF, August 1997;
- 23 State Highway one Paremata to Pukerua Bay: Capacity Improvement Study: Option Evaluation Report, BCHF/TDG, August 1995;
- 24 State Highway one Paremata to Pukerua Bay: Capacity Improvement Study: Option Evaluation Assessment of Effects on the Environment, BCHF, August 1995.
- 25 Mana Bypass re-evaluation Options Definition and Issues, BCHF, June 1999.
- 26 SH1 Upgrade Environmental Assessment of Mana Clearways and Bypass Options Volume 1 and Volume 2 (Plans), BCHF, August 1999.
- 27 Mana Bypass Evaluation – Motor Vehicles Emissions Comparison, NIWA, 1999;
- 28 SH1 Plimmerton-Paremata: Clearways and Bypass Re-investigation: Traffic Volumes, 23 June 1999 BCHF facsimile to Hegley Acoustic Consultants and NIWA, Doc Ref 2WF29495.DOC;
- 29 SH1: Plimmerton – Paremata Mana Bypass Options re-evaluation Effects on Coastal Processes, revision No.2, BCHF, 1999;

- 30 Options Assessment: State Highway 1 Upgrade, Paremata Bridge to Plimmerton, Validation and update of 1989 Marine Biological data: Ngati Toa Domain to Goat Point, Wear R.G;
- 31 SH1 Plimmerton to Paremata, Mana Bypass re-evaluation, Landscape Assessment, Promised Land Ltd, September 1999;
- 32 SH1 Plimmerton to Paremata, Clearways, Additional Landscape Evaluation, Hudson J., Promised Land Ltd, September 1999;
- 33 Peer Review Brief – Mary Buckland;
- 34 State Highway 1 Upgrade Plimmerton- Paremata; Re -evaluation of Mana Bypass Options and Re-Investigation of Mana Clearways, Julie Meade Rose and Associates, August 1999.
- 35 State Highway 1: Plimmerton – Paremata Notice of requirement – Clearways Option) material Issues and further Investigations, PRT report, 30 April 1999 (draft);
- 36 State Highway 1: Plimmerton – Paremata Mana Clearways Investigations Noise Study, Hegley Acoustic Consultants, August 1999;
- 37 SH1 Plimmerton – Paremata Mana Bypass re-evaluation, draft Traffic Feasibility & effectiveness of Bypass options report, Peer Review Team, April 1999;
- 38 State Highway 1 Plimmerton-Paremata: Mana Bypass re-evaluation Statement of Consultation, BCHF, July 1999 [Addendum, 5 October 1999];
- 39 State Highway 1 Upgrade Inputs to Peer Review Team Completed report, Traffic Design Group, August 1999.
- 40 Evidence to the Environment Court (May 2000 - Middleton v Transit New Zealand).
- John Hudson
 - Mary Buckland
 - David Heine
 - Dr Graham Ramsay
 - Peter McCombs
 - Julie Meade Rose
 - Noreen Barton
 - Matiu Rei
 - Keith Ballagh
 - Nevil Hegley
 - Ron Stroud
 - Bryce Julyan
 - Alan Bradbourne.

ENGINEERING

The review has been based on the information provided to the review team by Transit and their consultants for the Western Corridor Study, Maunsell Ltd, as follows:

- Aerial plans showing the proposed alignment – sheets 1 to 24, 1 to 10 and 1 to 6 (out of 9), April 2005.
- Revised Plans Paekakariki – Pukerua Bay Expressway HC4 (Maunsell Ltd) 21 June 2005.
- Revised Plans Plimmerton – Porirua Expressway HC 4 (Maunsell Ltd) 1 June 2005.
- Cross sections Paekakariki – Pukerua Bay Sea Reclamation Option (Maunsell Ltd).
- Option Plans (3) Paekakariki Hill Road- Beach Road Interchange BCHF.

- Maunsell letter dated 24th March 2005 describing the design philosophy for the coastal upgrade option.
- Maunsell Information Pack HC4 containing information on the coastal route.
- Cross sections and longitudinal sections for the coastal route.
- Transmission Gully Motorway cost estimate report dated March 2004.
- Maunsell Information Pack HT1 containing information on the Transmission Gully route.

COST

The review is based on the following information:

- Aerial plans showing the proposed alignment – sheets 1 to 24, 1 to 10 and 1 to 6 (out of 9), April 2005.
- Revised Plans Paekakariki – Pukerua Bay Expressway HC4 (Maunsell Ltd) 21 June 2005.
- Revised Plans Plimmerton – Porirua Expressway HC 4 (Maunsell Ltd) 1 June 2005.
- Cross sections Paekakariki – Pukerua Bay Sea Reclamation Option (Maunsell Ltd).
- Option Plans (3) Paekakariki Hill Road- Beach Road Interchange BCHF.
- Maunsell letter dated 24 March 2005 describing the design philosophy for the coastal upgrade option.
- Maunsell information pack HC4.
- Cross sections and longitudinal sections
- Advice from the planning and engineering review teams.

PROPERTY

The review has been based upon the information supplied.

- Aerial plans showing the proposed alignment – sheets 1 to 24, 1 to 10 and 1 to 6 (out of 9), April 2005.
- Revised Plans Paekakariki – Pukerua Bay Expressway HC4 (Maunsell Ltd) 21 June 2005.
- Revised Plans Plimmerton – Porirua Expressway HC 4 (Maunsell Ltd) 1 June 2005.
- Cross sections Paekakariki – Pukerua Bay Sea Reclamation Option (Maunsell Ltd).
- Option Plans (3) Paekakariki Hill Road- Beach Road Interchange BCHF.
- Maunsell letter dated 24 March 2005 describing the design philosophy for the coastal upgrade option.
- Maunsell Information Pack HC4 containing information on the coastal route.
- Transmission Gully Motorway cost estimate report dated March 2004.
- Maunsell Information Pack HT1 containing information on the Transmission Gully route.
- Advice from the planning and engineering review teams.

**Appendix B – Aerial Plans Provided By Maunsell
For Review (April 2005)**

**Appendix C – Aerial Plans Provided by Maunsell
For Review (July 2005)**

Appendix D – Comparative Estimates

Transmission Gully Motorway

Option Estimate

Item	Description	April 2005	March 2004	Difference	Comments
A	Project Property Cost	20,600,000	20,600,000	0	March 04 is within current range and therefore have left unchanged.
B	Investigation and Reporting (Including Geotech Investigation)	29,700,000	22,000,000	7,700,000	No Percentage change. Left at 4%.
C	Design and Project Documentation	44,600,000	22,000,000	22,600,000	Change from 4% to 6% to match Coastal and consider new Bldg Act
1	Construction				
	MSQA, Transit Managed Costs and Consent monitoring fees	34,700,000	21,000,000	13,700,000	Fee percentage unchanged at 4% \$5M allowance added for TNZ costs and monitoring fees)
	Physical Works				
	Main Highway	540,000,000	456,900,000	83,100,000	Bridges, retaining walls, pavement and traffic services rates have been escalated to match Coastal Route. The bridge and retaining wall rate increases also make allowance for changes brought about by the new TNZ Bridge Manual. Remainder of rates have been increased by 10% for general escalation.
	Interchanges				
14	Linden Interchange (SH1/TGM Connection)	11,800,000	10,200,000	1,600,000	As above for Main Highway
15	Kenepuru Interchange (Grade Separated)	28,200,000	23,900,000	4,300,000	As above for Main Highway
16	SH58 Interchange (Grade Separated)	19,800,000	16,800,000	3,000,000	As above for Main Highway
17	Warspite Avenue (Grade Separated)	11,800,000	10,200,000	1,600,000	As above for Main Highway
18	James Cook Drive (Grade Separated)	7,500,000	6,400,000	1,100,000	As above for Main Highway
	Links				
19	Warspite Avenue (2,000m - Allowance only)	10,000,000	10,000,000	0	Allowance retained
20	James Cook Drive (950m - Allowance only)	5,000,000	5,000,000	0	Allowance retained

Transmission Gully Motorway

Option Estimate

OE

Item	Description	April 2005	March 2004	Difference	Comments
	Additional Scope Items	109,000,000	0	109,000,000	Additional scope as per review report. Includes coastal cycleway, 3 interchanges & minor works through Pukerua Bay.
D	Total Construction	777,800,000	560,400,000	217,400,000	
Total Base Estimate		872,700,000	625,000,000	247,700,000	
E	Analysed Contingency	297,300,000	205,000,000	92,300,000	Same contingency percentage adopted.
Expected Estimate		1,170,000,000	830,000,000	340,000,000	
F	Analysed Funding Risk	170,000,000	120,000,000	50,000,000	Same funding risk percentage adopted.
95th percentile Estimate		1,340,000,000	950,000,000	390,000,000	

Note: These estimates are exclusive of Sunk I&R Costs, Escalation and Goods and Services Tax (GST).

Coastal Route Expressway

FE

Feasibility Estimate

Item	Description	Peer Review July 2005 Review	Maunsell	Difference	Comments / Description of Items Included
A	Project Property Cost	73,900,000	15,307,021	58,592,979	Peer review includes purchased property.
B	Investigation and Reporting (Including Geotech Investigation)	14,329,660	15,307,021	-977,361	
C	Design and Project Documentation	21,494,490	15,307,021	6,187,469	
	Construction				
1	MSQA, Transit Managed Costs and Consent monitoring fees	18,586,212	14,578,115	4,008,097	
	Physical Works				
2	Environmental Compliance	6,626,101	6,288,724	337,377	Covered under item 18.5 below.
3	Earthworks	45,950,652	45,950,652	0	
4	Ground Improvements	192,000	192,000	0	
5	Drainage	16,254,110	13,353,065	2,901,045	
6	Pavement & Surfacing	32,087,938	27,789,105	4,298,833	
7	Bridge(s) / Structure(s)	46,506,440	29,330,308	17,176,132	
8	Retaining Walls (including anchors etc)	77,657,230	75,561,230	2,096,000	
9	Traffic Services	21,998,012	21,337,416	660,596	
10	Services Relocation/Protection	2,121,000	2,121,000	0	
11	Landscaping	8,184,733	7,915,835	268,898	
12	Traffic Management & Temporary Works	21,603,615	19,475,441	2,128,174	
13	Trackwork / Realignment	3,864,245	3,391,525	472,720	
14	Rail Services	0	0	0	
15	Signalling	0	0	0	
16	Electrical Traction	0	0	0	

Coastal Route Expressway

Feasibility Estimate

FE

Item	Description	Peer Review July 2005 Review	Maunsell	Difference	Comments / Description of Items Included
17	Preliminaries & General	56,609,215	48,593,716	8,015,499	Additional costs associated with peer review teams proposed solutions. Refer peer review report. Based on Maunsell list of mitigation measures. Interchanges, Noise barriers and Stormwater treatment Reclamation of foreshore from chainage 7800m to 8400m. Pedestrian overbridges, Interchanges, Noise barriers and Stormwater treatment Additional ground treatment works for both Northern and Southern sectors
18	Extraordinary/Misc. Construction Costs				
18.1	Maunsell Mitigation Measures	109,400,000	75,000,000	34,400,000	
18.2	Northern Miscellaneous	50,000,000	0	50,000,000	
18.3	Centennial Highway - Foreshore access	15,000,000	0	15,000,000	
18.4	Southern Miscellaneous	35,000,000	0	35,000,000	
18.5	Ground Improvements	20,000,000	0	20,000,000	
D	Total Construction	587,641,504	390,878,132	196,763,372	
Total Base Estimate		697,365,654	436,799,195	260,566,459	
E	Analysed Contingency	232,634,346	177,120,273	55,514,073	
Expected Estimate		930,000,000	613,919,468	316,080,532	
F	Analysed Funding Risk	540,000,000	101,793,652	438,206,348	Includes Cut & Cover tunnel through Ngati Toa Domain and 6-laning south of Paremata.
95th percentile Estimate		1,470,000,000	715,713,120	754,286,880	

Note: These estimates are exclusive of Escalation and Goods and Services Tax (GST).

Estimate based on March 2005 Indices

Coastal Route Expressway

FE

Feasibility Estimate

Item	Description	Peer Review July 2005 Review	Revised Updated Peer Review	Maunsell	Difference Revised Updated -v- Maunsell
A	Project Property Cost	73,900,000	63,400,000	15,307,021	48,092,979
B	Investigation and Reporting (Including Geotech Investigation)	14,330,000	14,330,000	15,307,021	-977,021
C	Design and Project Documentation	21,490,000	21,490,000	15,307,021	6,182,979
	Construction				
1	MSQA, Transit Managed Costs and Consent monitoring fees	18,590,000	18,590,000	14,578,115	4,011,885
	Physical Works				
2	Environmental Compliance	6,630,000	6,630,000	6,288,724	341,276
3	Earthworks	45,950,000	45,950,000	45,950,652	-652
4	Ground Improvements	190,000	190,000	192,000	-2,000
5	Drainage	16,250,000	16,250,000	13,353,065	2,896,935
6	Pavement & Surfacing	32,090,000	32,090,000	27,789,105	4,300,895
7	Bridge(s) / Structure(s)	46,510,000	46,510,000	29,330,308	17,179,692
8	Retaining Walls (including anchors etc)	77,660,000	77,660,000	75,561,230	2,098,770
9	Traffic Services	22,000,000	22,000,000	21,337,416	662,584
10	Services Relocation/Protection	2,120,000	2,120,000	2,121,000	-1,000
11	Landscaping	8,180,000	8,180,000	7,915,835	264,165
12	Traffic Management & Temporary Works	21,600,000	21,600,000	19,475,441	2,124,559
13	Trackwork / Realignment	3,860,000	3,860,000	3,391,525	468,475
14	Rail Services	0	0	0	0

Coastal Route Expressway

FE

Feasibility Estimate

Item	Description	Peer Review July 2005 Review	Revised Updated Peer Review	Maunsell	Difference Revised Updated -v- Maunsell
15	Signalling	0	0	0	0
16	Electrical Traction	0	0	0	0
17	Preliminaries & General	56,610,000	56,610,000	48,593,716	8,016,284
18	Extraordinary/Misc. Construction Costs	229,400,000	207,200,000	75,000,000	132,200,000
D	Total Construction	587,640,000	565,440,000	390,878,132	174,561,868
Total Base Estimate		697,360,000	664,660,000	436,799,195	227,860,805

E	Analysed Contingency	232,630,000	224,930,000	177,120,273	47,809,727
Expected Estimate		929,990,000	889,590,000	613,919,468	275,670,532

F	Analysed Funding Risk	540,000,000	535,600,000	101,793,652	433,806,348
95th percentile Estimate		1,469,990,000	1,425,190,000	715,713,120	709,476,880

Note: These estimates are exclusive of Escalation and Goods and Services Tax (GST).

Estimate based on March 2005 Indices

Coastal Route Expressway - Southern
(includes all works south of Airlie Road Interchange (excluding interchange))
Feasibility Estimate

FE

Item	Description	Peer Review July 2005 Review	Maunsell	Difference	Review Updated August 2005	Review Updated Difference compared to Maunsells	Review Updated Comments
A	Project Property Cost	38,300,000	4,970,000	33,330,000	34,265,000	29,295,000	Removed local roads; provisions for Sector A; properties affected at Paremata interchange; value of disposals also recognised
B	Investigation and Reporting (Including Geotech Investigation)	4,860,000	4,970,000	-110,000	4,860,000	-110,000	
C	Design and Project Documentation	7,290,000	4,970,000	2,320,000	7,290,000	2,320,000	
	Construction						
1	MSQA, Transit Managed Costs and Consent monitoring fees	7,080,000	4,730,000	2,350,000	7,080,000	2,350,000	
	Physical Works						
2	Environmental Compliance	2,850,000	2,710,000	140,000	2,850,000	140,000	
3	Earthworks	17,210,000	17,210,000	0	17,210,000	0	
4	Ground Improvements	0	0	0	0	0	
5	Drainage	7,450,000	6,470,000	980,000	7,450,000	980,000	
6	Pavement & Surfacing	13,470,000	11,710,000	1,760,000	13,470,000	1,760,000	
7	Bridge(s) / Structure(s)	28,280,000	18,380,000	9,900,000	28,280,000	9,900,000	
8	Retaining Walls (including anchors etc)	4,540,000	4,540,000	0	4,540,000	0	
9	Traffic Services	10,570,000	10,230,000	340,000	10,570,000	340,000	
10	Services Relocation/Protection	860,000	860,000	0	860,000	0	
11	Landscaping	1,720,000	1,460,000	260,000	1,720,000	260,000	
12	Traffic Management & Temporary Works	4,540,000	3,850,000	690,000	4,540,000	690,000	
13	Trackwork / Realignment	3,860,000	3,390,000	470,000	3,860,000	470,000	
14	Rail Services	0	0	0	0	0	
15	Signalling	0	0	0	0	0	
16	Electrical Traction	0	0	0	0	0	

Coastal Route Expressway - Southern
(includes all works south of Airlie Road Interchange (excluding interchange))
Feasibility Estimate

FE

Item	Description	Peer Review July 2005 Review	Maunsell	Difference	Review Updated August 2005	Review Updated Difference compared to Maunsells	Review Updated Comments
17	Preliminaries & General	19,070,000	15,780,000	3,290,000	19,070,000	3,290,000	Deductions made: Items already provided in property estimates: relocations (etc) at St Theresa's - \$500k; playing field at Plimmerton -\$5M; squash club and facilities at Ngati Toa -\$4M; relocation of building at Paremata Intermediate (incl Mitre 10) -\$1.5M; Items south of Paremata Bridge and outside of scope: works at Mungavin interchange -\$2M; Porirua -\$1M; Whitford Brown (deduction of \$3M) from \$5M to \$2M (ground improvements still required); Other: lowering alignment at Ngati Toa (deduction of \$3M from \$6M to \$3M (slight lowering of trench greater than Maunsells depth)
18	Extraordinary/Misc. Construction Costs	93,970,000	50,000,000	43,970,000	73,970,000	23,970,000	
D	Total Construction	215,470,000	151,320,000	64,150,000	195,470,000	44,150,000	
Total Base Estimate		265,920,000	166,230,000	99,690,000	241,885,000	75,655,000	
E	Analysed Contingency	83,340,000	66,390,000	16,950,000	76,340,000	9,950,000	
Expected Estimate		349,260,000	232,620,000	116,640,000	318,225,000	85,605,000	
F	Analysed Funding Risk	Excluded*	38,040,000	n / a			
95th percentile Estimate		Excluded*	270,660,000	n / a			

Note: These estimates are exclusive of Escalation and Goods and Services Tax (GST).

* - it is inappropriate to split the project total 95th percentile value into the 2 defined sectors (northern and southern).

Estimate based on March 2005 Indices

Coastal Route Expressway - Northern
(includes Airlie Road Interchange and all works north to MacKays Crossing)
Feasibility Estimate

FE

Item	Description	Peer Review July 2005 Review	Maunsell	Difference	Review Updated August 2005	Review Updated Difference compared to Maunsells	Review Updated Comments
A	Project Property Cost	35,600,000	10,340,000	25,260,000	29,134,000	18,794,000	Removed local roads; value of disposals also recognised; allowance made for additional properties previously overlooked
B	Investigation and Reporting (Including Geotech Investigation)	9,470,000	10,340,000	-870,000	9,470,000	-870,000	
C	Design and Project Documentation	14,200,000	10,340,000	3,860,000	14,200,000	3,860,000	
	Construction						
1	MSQA, Transit Managed Costs and Consent monitoring fees	11,510,000	9,850,000	1,660,000	11,510,000	1,660,000	
	Physical Works						
2	Environmental Compliance	3,770,000	3,580,000	190,000	3,770,000	190,000	
3	Earthworks	28,740,000	28,740,000	0	28,740,000	0	
4	Ground Improvements	190,000	190,000	0	190,000	0	
5	Drainage	8,800,000	6,890,000	1,910,000	8,800,000	1,910,000	
6	Pavement & Surfacing	18,620,000	16,080,000	2,540,000	18,620,000	2,540,000	
7	Bridge(s) / Structure(s)	18,230,000	10,950,000	7,280,000	18,230,000	7,280,000	
8	Retaining Walls (including anchors etc)	73,120,000	71,020,000	2,100,000	73,120,000	2,100,000	
9	Traffic Services	11,430,000	11,110,000	320,000	11,430,000	320,000	
10	Services Relocation/Protection	1,260,000	1,260,000	0	1,260,000	0	
11	Landscaping	6,460,000	6,460,000	0	6,460,000	0	
12	Traffic Management & Temporary Works	17,060,000	15,630,000	1,430,000	17,060,000	1,430,000	

Coastal Route Expressway - Northern
(includes Airlie Road Interchange and all works north to MacKays Crossing)
Feasibility Estimate

FE

Item	Description	Peer Review July 2005 Review	Maunsell	Difference	Review Updated August 2005	Review Updated Difference compared to Maunsells	Review Updated Comments
13	Trackwork / Realignment	0		0			Deduction made for buying land to provide public access to coast at northern end
14	Rail Services	0		0			
15	Signalling	0		0			
16	Electrical Traction	0		0			
17	Preliminaries & General	37,540,000	32,820,000	4,720,000	37,540,000	4,720,000	
18	Extraordinary/Misc. Construction Costs	135,230,000	25,000,000	110,230,000	133,230,000	108,230,000	
D	Total Construction	371,960,000	239,580,000	132,380,000	369,960,000	130,380,000	
Total Base Estimate		431,230,000	270,600,000	160,630,000	422,764,000	152,164,000	
E	Analysed Contingency	149,220,000	110,730,000	38,490,000	148,590,000	37,860,000	
Expected Estimate		580,450,000	381,330,000	199,120,000	571,354,000	190,024,000	
F	Analysed Funding Risk	Excluded*	63,750,000	n / a			
95th percentile Estimate		Excluded*	445,080,000	n / a			

Note: These estimates are exclusive of Escalation and Goods and Services Tax (GST).

* - it is inappropriate to split the project total 95th percentile value into the 2 defined sectors (northern and southern).

Estimate based on March 2005 Indices