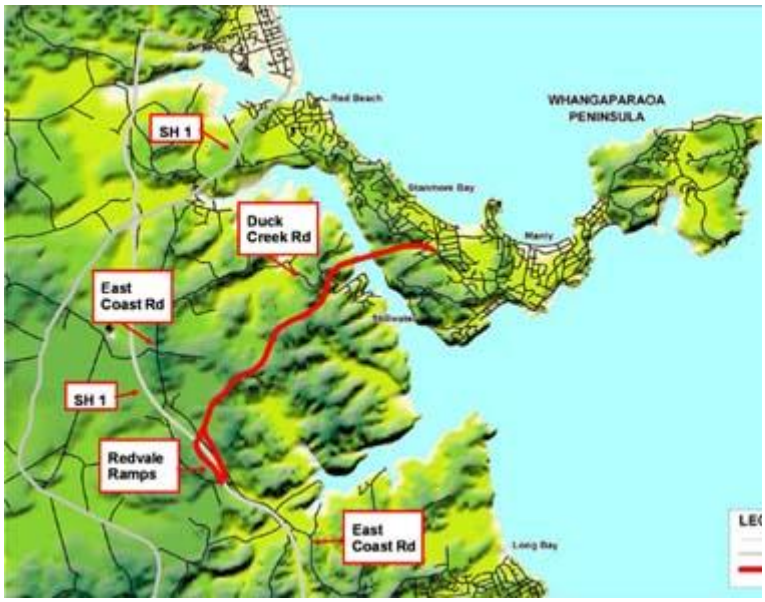
PENLINK Review



FINAL SUMMARY REPORT

- Version 3
- 26 October 2010

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Executive Summary

This review has been undertaken for the Auckland Regional Transport Authority (ARTA). The focus of the review has been guided by the following two questions:

- Whether the PENLINK business case is robust and therefore justifies funding ahead of other projects in the programme; and
- Whether the revised scheme satisfies the original designation requirements and is sufficiently robust to meet its objectives and future needs.

PENLINK as now proposed is a modified version of that put forward during the designation process. The modifications relate to a changed alignment which provides the same functionality at a lower total capital cost.

The review has confirmed that technical work to evaluate the modified proposal, such as engineering and demand assessment, has been undertaken in accordance with accepted standards.

The review has identified an alternative scheme being the widening of Whangaparaoa Road which would defer the need for PENLINK for several years. This option would not however provide the additional network resilience that PENLINK provides.

The business case has been updated through the review process and is summarised as follows:

Total Capital Cost	$172.3m
BCR_G	2.4
BCR_N	2.7
IRR	7.5%

On the basis of these figures, the business case is considered robust.

The revised scheme does meet the original designation requirements and is sufficiently robust to meets its objectives and needs. It is noted however that the designation for the project will need to be extended to accommodate the revised scheme and that new resource consents are also required.

1. Introduction

1.1. Review Purpose

This review has been commissioned by the Auckland Regional Transport Authority ("ARTA") following an updated funding application being received from Rodney District Council ("RDC") for the PENLINK project. ARTA commissioned this review with a view to increasing confidence that the PENLINK proposal has been adequately considered in terms of strategic fit, economic efficiency, and affordability.

The Terms of Reference for the review defined that the purpose of this review is to consider:

- Whether the PENLINK business case is robust and therefore justifies funding ahead of other projects in the programme; and
- Whether the revised scheme satisfies the original designation requirements and is sufficiently robust to meet its objectives and future needs.

1.2. Review Scope

A review scope has been agreed between ARTA, RDC and the New Zealand Transport Agency ("NZTA"). Key tasks to be considered within this review are as follows:

- Review of updated PENLINK scope against designation requirements
- Review of demand analysis and traffic modelling
- Consideration of alternative solutions
- Engineering assessment of the sample design
- Cost estimate
- Examination of the business case
- PPP/Tolling and Funding issues

Each of these matters is dealt with specifically within this review.

1.3. Review Process

The review process has been undertaken in two stages. An initial review was undertaken which resulted in a number of issues arising for which additional information was required to enable a conclusion to be reached. These issues primarily related to confirming details associated with the revised alignment which was partially outside of the designated corridor but resulted in a lower construction cost. RDC provided additional information relating to this issue and also provided additional information in response to the initial review findings. This additional information was then reviewed separately. This report consolidates the findings of the two stage review process.

Each of the review areas identified above has been assessed by an independent reviewer. This report consolidates the findings of the Review Team as reported by each team member.

1.4. Review Team

The Review Team consisted of the following team members:

- Review Team Leader – Richard Hancy (SKM)
- Review of PENLINK scope, Consideration of alternative solutions – Ross Rutherford
- Review of demand analysis and traffic modelling – David Young
- Engineering assessment of the sample design – Matt Hawkes (SKM)
- Cost estimate - Ian Bond
- Examination of the business case, PPP/Tolling and Funding issues – John Bolland

2. Review Summary

2.1. Review of PENLINK scope

The original technical analysis presented a good justification for the notice of requirement.

Revisions to the PENLINK project since the original notice of requirement have modified and refined the Weiti crossing alignment and the intersections. The designation was altered in 2004 to incorporate structures that accommodate electronic tolling and ensure that PENLINK connected with the Redvale Interchange. These changes did not alter the original concept of an arterial road and associated intersection and bridge structures commencing from East Coast Road, crossing the Weiti River and connection with Whangaparaoa Road in the vicinity of Cedar Terrace.

Whangaparaoa Road is no longer to be widened between D'Oyly Drive and Ladies Mile, a distance of 3.5km, but between Brightside Road and Arklow Lane, a distance of 1km. This differs from the designation wording, and may not be "generally in accordance with" the specified plans. This is unlikely to be raised as an issue, but it may be worth stating that the widening of the remainder of the section between D'Oyly Drive and Ladies Mile is a later stage of the project.

The reasons why the designation is needed (which are stated in the notice of requirement) still apply. These are:

(a) *To provide for long term and strategic access to the Whangaparaoa Peninsula via an alternative route to the only existing route which is Whangaparaoa Road*

(b) *To improve upon the safety and efficiency characteristics of Whangaparaoa Road*

(c) *To provide an urban arterial type link between the Whangaparaoa Peninsula and the realignment of State Highway One (ALPURT) in the vicinity of Bawden Road/East Coast Road.*

(d) *To assist in the separation of conflict between commuting traffic between the Whangaparaoa Peninsula and Albany, Takapuna and the Auckland CBD and local traffic wanting access to and around the adjacent residential areas of the Whangaparaoa Peninsula.*

A subsequent proposed reason, which is to accommodate the projected growth in traffic resulting from planned development in the Silverdale North area (refer below), does not conflict with the above.

It has also been confirmed through the review process that the original designation (and associated assessment of environmental effects) provides for a two lane cross section (not a four lane cross section). The description of the crossing in the Environment Court decision refers to a two lane

road, although the designation wording itself does not. Two lanes were considered by RDC to provide sufficient capacity given the proposal was to develop PENLINK as a toll road. It should be noted that if PENLINK was to progress as a free road, traffic demands may rise to the point where a four lane cross section could be required. This review has not considered what modifications would be required to the proposal to accommodate a four lane cross section.

The initial overall conclusion of this review is that the scope of the PENLINK project in its current form is generally consistent with the description and purposes of the designation as amended in 2008.

The documentation reviewed highlighted the ability of the Weiti Crossing to accommodate a three lane tidal flow arrangement should additional capacity be needed in the future. The Weiti Crossing bridge deck, in the reviewer's opinion, is barely adequate for a possible future three lane peak period tidal flow operation. It is suggested that the deck would need to be widened by 2.5m to a total of 17.9m to enable it to provide such operation safely.

The information provided indicates that the proposed Redvale Interchange design can accommodate a future extension of the Northern Busway located on the eastern side of the northern motorway. Greater certainty should, however, be given to this through a plan or plans indicating the critical horizontal and vertical clearances to be provided.

Subsequent to the initial review, it was confirmed by RDC that the project being put forward for consideration is a modified design which enables a lower construction cost, but falls outside of the current designation. As such, the designation would need to be modified to accommodate the updated design. In addition, resource consents are soon to expire, and will need to be applied for once again as they cannot be extended.

RDC advise that the existing designation can be altered on a non-notified basis with the land owners consent. Resource consents, however, cannot be extended and will need to be to be re-applied for. The ARC is not in a position to confirm whether any new resource consent applications would be public notified. Accordingly, there is some uncertainty with regards to planning process outcomes and timing which are associated with the updated design as submitted by RDC.

2.2. Review of demand analysis and traffic modelling

Toll modelling was undertaken in 2007 and the latest benefit-cost ratio (BCR) modelling in 2010, with the differences between them being the land use forecasts (the main difference being at Silverdale) and a partially updated base year model.

From an overview perspective, the reviewer advises that the model validation seems reasonable.

The forecast household and employment data input into the modelling does not seem unreasonable compared with historical growth and taking account of planned localised development. The key issue is the differences between the two sets of forecast data; the later forecasts, those used with the latest BCR modelling, have higher growth generally, and in particular in the Silverdale area.

The growth in traffic on Whangaparaoa Road is higher than household growth on the peninsula between 2006 and 2011, and lower between 2011 and 2021. This is likely due to the timing of development at Silverdale combined with the structure of the model in which the growth in commuting trips is constrained to match the growth in employment rather than households.

The level of diversion away from PENLINK due to tolls seems reasonable and within the range expected when compared with other toll modelling projects.

Comparing flows between the two models indicates that the higher employment in the latest BCR modelling results in more travel between the peninsula and Silverdale, and – given the model's structure – less travel between the peninsula and the southern externals of the model.

The analysis indicates that the level of traffic using PENLINK, as predicted by the models, is dependent on growth not only within its catchment, but also on the timing and extent of development elsewhere, particularly employment-related development at Silverdale. The 2007 toll modelling was based on land use inputs that had lower growth at Silverdale resulting in higher traffic levels on PENLINK.

Without PENLINK, the level of congestion on Whangaparaoa Road and possibly Hibiscus Highway is predicted to become considerably worse.

The initial review of PENLINK highlighted that an alternative solution – widening Whangaparaoa Road – could have merit in terms of deferring the need for PENLINK (this option is described in more detail in the following section). As a result, further modelling work of the widening of Whangaparaoa Road, between Hibiscus Coast Highway and Red Beach Road, has been undertaken. This alternative could allow the deferral of PENLINK for some years yet still provide for the full development of the Silverdale North area.

The independent reviewer advises that the additional modelling to investigate this issue has been undertaken appropriately, within the agreed scope and with the agreed input assumptions.

2.3. Consideration of alternative solutions

During the course of the review, the widening of Whangaparaoa Road to provide 4 lanes arose as a potential alternative to constructing PENLINK. This scheme would provide additional capacity along Whangaparaoa Rod which is currently a bottleneck at peak periods, relieving congestion while also providing for additional traffic expected due to the development of Silverdale North.

The 2006 Silverdale North Traffic Assessment concluded that the Silverdale North development could be accommodated with traffic operating at the agreed Level of Service D provided the Hibiscus Coast Highway including the Hibiscus Coast Highway/ Whangaparaoa Road intersection was upgraded and as long as Whangaparaoa Road was widened. Traffic modelling assumed that Whangaparaoa Road was widened over the full 5.2 km distance to Arklow Lane.

The subsequent Silverdale North Consent Order stated that Stage 5 of the Silverdale North development can proceed once the following is completed:

- *The commencement of construction of PENLINK and associated local road improvements on the Whangaparaoa Peninsula or the Whangaparaoa Road Widening Project (widening to four lanes between Hibiscus Coast Highway and Arklow Lane) and arrangements are in place including contractual arrangements, so that these improvements will be completed within 3 years of construction commencing on or by 1 January 2016, whichever is earlier). (Note this rule does not oblige the Council to construct PENLINK in any particular time frame).*

Information obtained as part of this review indicates that the large majority of the benefits of widening Whangaparaoa Road are achieved over the 1.5km long western section between and including the Hibiscus Coast Highway/ Whangaparaoa Road and Red Beach Road/ Whangaparaoa Road intersections. It appears that more detailed analysis is likely to have concluded that the necessary widening of Whangaparaoa Road to accommodate the full Silverdale North development is limited to between Hibiscus Coast Highway and Red Beach Road and not to the full length between Hibiscus Coast Highway and Arklow Lane. The former widening is far more achievable and far less expensive, particularly if it can be limited to adding a second eastbound lane only, as appears to be the case.

It should however be noted that planning, design and land purchase activities would need to be undertaken to enable this option to be viable. These processes could be expected to take a number of years to work through. Once those processes had been completed, construction could then commence. In order to better understand these processes and associated time frames, a scheme assessment would be required for the widening alternative.

In summary, the independent reviewer reached the following conclusions with respect to this option:

1. *The additional information provided convincingly demonstrates that the 4-laning of Whangaparaoa Road between Hibiscus Coast Highway and Red Beach Road is the preferred option using conventional cost benefit analysis. It costs substantially less than PENLINK and has a much higher benefit cost ratio than PENLINK.*

2. *The consent conditions for Silverdale North include a requirement that traffic operation on Hibiscus Coast Highway in 2016 is no worse than Level of Service (LOS) D. The revised traffic modelling concludes that the higher traffic projections for 2016 now reduce the LOS for the Hibiscus Coast Highway from LOS D to LOS E, and hence this condition is not met. The level of service calculations for Hibiscus Coast Highway are based on the assumption that the highway is a Type I arterial as defined in the Highway Capacity Manual 2000. This report argues that the Hibiscus Coast Highway is quickly evolving from a high speed arterial route to suburban arterial route as defined in the Highway Capacity Manual, and hence should be assessed as a Type II arterial for planning purposes. On this basis, the revised traffic speed on the Hibiscus Coast Highway for the year 2016 corresponds to LOS D not LOS E and the relevant consent condition is still met.*

3. *The 4-laning of Whangaparaoa Road between Hibiscus Coast Highway and Red Beach road does not meet all the reasons for PENLINK in the original notice of requirement. In particular, it does not* "provide for long term and strategic access to the Whangaparaoa Peninsula via an alternative route.....", *nor does it* "assist in the separation of conflict between commuting traffic between the Whangaparaoa Peninsula and Albany, Takapuna and the Auckland CBD and local traffic wanting access to and around the adjacent residential areas of the Whangaparaoa peninsula". *For these reasons it is not an alternative to PENLINK. It is however, an economically efficient means of delaying the major capital expenditure involved in constructing PENLINK.*

2.4. Engineering assessment of the sample design

A geometric review of the PENLINK preliminary specimen design has been undertaken to determine compliance with Austroads standards

The initial review highlighted that the design speed for the project needed to be updated to 110kph in order to meet Austroads standards, and to address safety audit concerns. Additional information has been supplied demonstrating the impacts on the design of this change in design speed.

The independent reviewer advises that the updated mainline design complies with the Austroads standards, with a few minor variances. These variances could be expected to be addressed in subsequent detailed design.

The independent reviewer also advises that the information supplied in regards to earthworks quantities and retaining walls is sufficient to enable "ballpark estimates" to be developed. In order

to get greater certainty with respect to quantities, more detailed work (for example, developing updated cross sections) would be required.

The adopted design speed of 50km/h for the proposed upgrade of a 1km section of Whangaparaoa Road to four-lane dual carriageway was considered too low. Increasing the design speed to 60km/h would have an impact on the horizontal and vertical alignment and be likely to increase project costs.

The PENLINK Design Assumptions state that a cycleway is proposed from Whangaparaoa Road to the Duck Creek Road intersection. A 3.5m wide cycleway is provided across the southern side of the proposed Weiti River Bridge, separated from the traffic lanes by a road safety barrier. However, details of the proposed cycleway either side of the bridge are unclear. There does not appear to be specific provision in the preliminary design for pedestrians or cyclists between East Coast Road roundabout and Duck Creek Road intersection.

It was also noted that all of the required sight distance checks have not been undertaken in a number of locations (e.g. Redvale southbound off ramp, East Coast Road roundabout, Whangaparaoa Road intersections). Modifications may be required to the design to ensure that adequate sight distances are provided. Such modifications, along with others required to ensure compliance with Austroads, are likely to increase overall project costs.

2.5. Cost estimate

Independent estimates have been undertaken for the following sections of the project;

- Weiti Crossing Alternative Alignment
- Redvale Interchange
- East Coast Road Realignment
- East Coast Road Roundabout
- Whangaparaoa Road PENLINK Intersection including Whangaparaoa Road Widening (Brightside - Arklow)

The estimates have been developed in accordance with NZTA's Cost Estimation Manual SMO14. The reviewers Expected Estimate (for construction only) is $147 million excluding GST. This represents the likely final out-turn cost of the physical works component of the project taking into account uncertainty and risk.

The estimates are based on market rates and conditions applying prior to the current recession. It is acknowledged that if this project was being tendered today, significant discounts would apply, which have been assessed as being be up to $10 million in value. No provision has been included for escalation in the pricing parameters.

For the purposes of compiling this estimate it has been assumed that the contract will be undertaken by a major contractor who would self-perform the majority of the works and sub-let packages such as earthworks, pavement and/or drainage.

A construction programme with an overall duration of 45 months from contract award to commissioning has been assumed. The principal programme determinant is the earthworks operation on the PENLINK section. The material is of poor quality and will be weather sensitive, and the earthworks were assessed as requiring three summer seasons to complete. The programme is based on an award in March to allow the successful contractor to complete the design and to mobilize and establish on site in time to start construction at the beginning of October. If this optimal timing is not achieved, the overall duration could be longer and that would increase the time-related costs.

It has been assumed that the work will be let as a single Design and Construct contract and the estimated Preliminary and General, Design and Construction Monitoring and Risk Contingency has been assessed on that basis.

A comprehensive risk evaluation has not been carried out, and the assumed contingency is an assessment based on recent experience on similar projects. It is considered that there is a number of major risks on this project including the sensitivity of the ground conditions as it impacts on the contractors methodology, production and therefore programme; the uncertainty around scope definition, standards and design development; and quantities.

From the Value for Money Review report dated February 2010, it would appear that the Projenz estimate for construction is $117 million compared to the estimate developed by this review of $147million. Although a reconciliation of this estimate with the Projenz estimate has not been carried out, it would appear that the major differences relate to retaining walls and the contractor's site overhead and margin.

After consideration of the issues raised in the initial review, including the updated construction costs as recommended by the reviewer, RDC has calculated a figure of $172.3 million as the updated total capital cost. This figure was derived from a total capital cost $183m (based on the reviewers construction cost estimate), less $10.7 million for retaining walls that RDC does not consider are required. This figure has been used to update other information (in particular the business case) as required.

2.6. Examination of the business case

A number of matters arose from the initial PENLINK review that impacted upon the business case. The independent reviewer has worked further with the PENLINK team and additional information has been supplied relating to the business case. In reaching a conclusion, the reviewer considered the following key matters.

The NZTA has advised that use of the National Toll Collection System should be allowed for in the Business Case. The NZTA has indicated it would be willing to work with ARTA and RDC to develop a PENLINK specific toll collection cost, however this could take 3-6 months. In the interim, the NZTA suggested that the Tauranga Eastern Link (TEL) project would be an example for comparative purposes. The NZTA has estimated a toll transaction cost of 65c for the TEL, which is the value that has been adopted by the independent reviewer for the PENLINK project.

Agglomeration benefits have been promoted for the project, but there is no substantive analytical evidence to support the quantum of benefits that could arise. The reviewer has adopted a value of 5% in his assessment, which is consistent with the value used by the RDC team in their updated analysis.

An updated total capital cost of $172.3 million (as advised by RDC) has been used in the updated assessment. This figure is some $10 less than the expected total capital cost based on the reviewer's construction cost estimate. The difference in the figures is related to assumptions regarding provision for retaining walls. Adopting the higher figure recommended by the independent cost reviewer would reduce the BCR.

In September 2010 NZTA issued draft revised update factors for the benefits from travel time savings and these have also been taken into account. Assuming the latest capital costs, a transaction cost of 65c and agglomeration benefits at 5% of the total, the National BCR (BCR_N) for Penlink is 2.7.

In October 2010 the following advice was received from NZTA:

- For developer contributions, if they are part of the local share, then they cannot be counted as supplementary funding and the costs in the Government BCR (BCR_G) will be the same as in the BCR_N. NZTA do not make any distinction between local share funding sourced from rates or from developer contributions in any funding applications
- In relation to tolls, if they are a mechanism to fund local share and central government still has to fund its FAR on the total cost, then again NZTA would not regard this as supplementary funding
- Also in relation to tolls, they would be taken into account in the calculation of benefits in the BCR_G (but not the BCR_N).

The implication of this advice is that the BCR_G will be less than the BCR_N. This is because costs in the two BCRs would be calculated in the same way, since developer contributions and tolls would be excluded in the BCR_G, but tolls would be deducted from the benefits in the BCR_G.

In conclusion, the BCR_G for Penlink is 2.4 and the BCR_N is 2.7. Both these would give a Medium for efficiency in terms of the NZTA assessment framework.

2.7. PPP/Tolling and Funding issues

The criteria on which potential financiers make decisions on whether to bid for particular schemes are complex and depend on a range of factors including cost and risk.

The recent history of toll roads in Australia has not been good, with the failure of both the Cross City and Lane Cove Tunnels. More generally the recent global economic downturn may have made financiers more risk averse than before. This could mean less private funding in general and less spending on roads than other areas.

Additionally, PENLINK is competing with other road schemes which are likely to have higher patronage and there is no NZ precedent for privately funded toll roads (unlike in Australia). The fact that all traffic risk is borne by the financier is good for RDC (and its successor the Auckland Council) but would be a deterrent for the financiers themselves. Even so, if the concessionaire defaulted or went bankrupt (as has happened recently in Australia) then the Auckland Council would be financially responsible for the project.

Developer contributions (DCs) play a key role in the planned funding of PENLINK. With the initially advised total capital cost of $148m they amount to $17.2m but this amount would increase if the outturn capital cost was higher. DC funding would be paid by RDC on construction of PENLINK but would not be collected for several years until the relevant developments take place, assuming they do.

The way the DC mechanism works is that the Council converts the future DCs into capital up front, taking an amount equalling the proportion of project cost allocated to growth. The Council finances this using its general debt facilities and the Council bears the risk on capital recovery through DCs. In the future these amounts would be a debt burden on and a possible risk for the Auckland Council, although they would be small in terms of the Council's overall budget. For example, if DCs amounted to $20m and were not collected until 10 years after PENLINK is built, the financing cost would be around $15m in total or $10m in PV terms (for comparison the PV of capital costs is $125m).

Use of the NZTA national toll system can be seen as both a risk and an opportunity for PENLINK. If using the NZTA system was a condition of funding, that would be seen as a risk by financiers who are likely to want to use a system they are familiar with. On the other hand, using a one-off system there would be no options for synergies with other toll roads utilising the national toll system (in particular the Northern Gateway, which is close by).

A key measure used by potential financiers is the Internal Rate of Return (IRR) and this has been explored for a range of inputs. The reviewer advises that it is not possible to give a threshold below which financiers would not be interested in a scheme but anything below 10 – 11% is unlikely to be of interest. The reviewer also notes that advice from the UK Treasury is that private finance initiatives should give a rate of return in the range 13 – 18%.

The reviewer advises that with a total capital cost of $172.3m and 65c transaction cost, the IRR is 7.5%.

3. Summary

3.1. Overview

The purpose of the review was to consider two distinct issues, as discussed below.

- Whether the PENLINK business case is robust and therefore justifies funding ahead of other projects in the programme; and
- Whether the revised scheme satisfies the original designation requirements and is sufficiently robust to meet its objectives and future needs.

3.2. Whether the PENLINK business case is robust and therefore justifies funding ahead of other projects in the programme

The benefits assessment has been based on a robust transportation assessment process. While it is noted that there is some inconsistency between the data used in different assessments, this is not expected to have a material impact on the overall benefit assessment.

The assessment of alternatives has highlighted that there is an alternative investment choice (widening Whangaparaoa Road between Red Beach Road and Hibiscus Coast Highway) which would enable a significant proportion of the benefits to be realised for a substantially lower cost.

The review of costs (undertaken as part of the initial review) has highlighted some significant issues. The reviewers cost estimate is higher than that put forward by the proponent. The design review has also highlighted matters which may result in the cost moving higher still. On this basis, it appears that the likely overall cost of the project will be higher than proposed.

The business case assessment has raised a number of issues in relation to the determination of funding allocations, cost of toll transactions, and as a result the attractiveness of the project to potential private partners. Having clarified these issues, and in the light of advice from NZTA, the BCR_G and the BCR_N for the project have been evaluated at 2.4 and 2.7 respectively. On this basis, the project has a robust business case.

3.3. Whether the revised scheme satisfies the original designation requirements and is sufficiently robust to meet its objectives and future needs.

The initial review process confirmed that the design as put forward is broadly consistent with that put forward through the designation process. The corridor provides sufficient width for a two lane toll road with cycle and walking facilities between Stillwater and Whangaparaoa.

However, the project now sits outside the designation and the designation therefore needs to be modified to accommodate the updated project footprint. Resource consents are also due to expire in the near future, and new consent applications will need to be lodged with the ARC.

On this basis, the scheme satisfies the original designation requirements and is sufficiently robust to meet its objectives and future needs.

3.4. Conclusion

The project as put forward is consistent with the proposal put forward as part of the designation process, and would deliver the same functionality with that proposed at the time the PENLINK project was designated.

The proposal as it now stands will require planning processes to be revisited, in particular to amend the designation to provide for a section of route realignment, and to renew resource consents which are soon to expire.

There is a risk that the cost of the project may be higher than that put forward by RDC due to changes in the design which are yet to be fully quantified, and higher than estimated rates. In order to resolve this issue, the cost estimation process would need to be completed.

On the basis of the updated cost estimate of $172.3m as submitted by RDC, the project has a BCR_G of 2.4 and a BCR_N of 2.7. In view of this the project has a robust business case.