



*Auckland Transport*

# **Beach Road Cycle Facilities**

**Peer Review**

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*Auckland Transport*

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# Beach Road Cycle Facilities

## Peer Review

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# Executive Summary

Opus International Consultants Limited (Opus) has been engaged by Auckland Transport (AT) to carry out a Peer Review of the Scheme Assessment Report of the proposed Beach Road Cycleway between Stanley Street and Britomart Place. The scheme assessment was carried out by AECOM Limited for Auckland Transport.

On review of the report a number of issues were identified. The following is recommended to address these issues:

- Establish if crash analysis is required for all crashes along the route and define the analysis period.
- Provide traffic signal analysis for the intersections affected by the proposal.
- Further examine the access to private properties and in particular the access to the Service Station.
- Refine the proposed option layouts addressing the safety concerns raised.
- Correct the Multi-Criteria analysis scores.
- Provide the full cost estimate spreadsheet.
- Carry out the economic evaluation using full procedures. Alternatively establish that the use of simplified procedures is permitted.
- Add in maintenance of the cycle lanes to the option cost.
- Establish the disbenefits to the other modes of travel along the route.
- Refine the cycle and traffic growth rates and the discount factors are dependent on these values. A change here will alter the benefits and may affect the value obtained for the BCR.
- Establish the source of the population density values.
- Carry out an incremental BCR calculation using three discarded options. At the moment the Option C is chosen using a qualitative rating against several criteria. This evaluation should ideally be augmented by an evaluation of traffic operations, traffic safety and a robust economic analysis of each option.

# Peer Review

## 1 Introduction

Opus International Consultants Limited (Opus) has been engaged by Auckland Transport (AT) to carry out a Peer Review of the Scheme Assessment Report of the proposed Beach Road Cycleway. The cycleway runs from The Strand/Stanley Street/Parnell Rise intersection in the south to Britomart Place in the north a distance of 800 metres. The cycleway is partly on road and partly off road over this length. The scheme assessment was carried out by AECOM Limited for Auckland Transport.

Four individual options have been examined but only the preferred option has been taken to the economic evaluation stage.

It is understood that the New Zealand Transport Agency (NZTA) is working on a cycleway project that will join the north-western motorway cycleway to Beach Road. The connection point will be at Churchill Street. Much of the anticipated cycle traffic expected to use the Beach Road cycleway will come from this connection. Plans for this proposal have not been sighted by the peer reviewers.

Option C is the preferred option and the report has concentrated on this option.

Safety issues have not been evaluated as it is understood that a separate safety audit is being carried out. It is noted however that the authors of this peer review have concerns regarding the safety of the two-way on-road cycleway only being separated by a flush chevron marked separation zone between the traffic lanes and the cycleway. These can be elaborated on if required.

This document reports the results of the peer review undertaken by Opus.

## 2 Site Location

Beach Road is located on the fringe of the Auckland Central Business District. The route runs between The Strand/Stanley Street/Parnell Rise intersection in the south to Customs Street East at the Britomart intersection in the north. It passes a number of significant intersections along this route, such as Mahuhu Crescent, Tangihua Street, Anzac Avenue and Britomart Place.

Beach Road carries 21,000 vehicles per day and appears to be reducing in volume when compared with the historic traffic counts.

Britomart Place, Tangihua Street and Mahuhu Crescent are important links to Quay Street and the proposed cycleway designs recognise this as part of the project.

## 3 Presentation of the Report

The report was well presented and easy to follow.

## 4 Report Review

### 4.1 Previous studies

The previous studies are listed. Only brief descriptions of these studies are included in this report. It is noted that the benefits for this Beach Road Cycleway are highly dependent on the successful completion and operation of other cycleways including the NZTA project.

### 4.2 Site Description

The site is adequately described in the report. The adjoin land use is identified. Features such as bus services, bus lanes, the nearest cycle facilities and the lack of cycle facilities on this route are identified.

### 4.3 Traffic data

#### 4.3.1 Crash Data

The CAS crash database has been interrogated. The cycle crashes have been listed and the printouts included in Appendix A. Crashes to all other vehicles have not been considered so any effects the cycleway may have on these have not been evaluated.

It would appear that six years of crash data has been interrogated in CAS however there are cycle crashes in only four of those years. It is normal to analyse five years of data.

#### 4.3.2 Traffic Signal Analysis

The report states that SCATS data has been obtained however this has not been included in the report.

No modelling of the existing traffic signals at intersections appears to have been carried out. It is noted that there are changes to the lane layouts at a number of the intersections and this is likely to reduce the capacity of these intersections. The existing and proposed layouts should be ideally modelled using a programme such as SIDRA to evaluate the effects and capacity of the amended layouts. The areas of concerns are, one fewer lane for traffic exiting Mahuhu Crescent, and the left and right turns to both intersections of Te Taou where there will be some additional controls to allow the cycle lane to operate in the opposite direction to the adjacent traffic flow.

### 4.4 Services

Underground services have been identified and plotted on drawings. The cycle lanes are on the surface and very little earthworks will be necessary so it is considered that there will be only minor effects on them.

### 4.5 Topographical Survey

A topographical survey has been carried out; however this has not been included in the report. The plans provided have aerial photograph backing and it is not clear if these plans are based on the aerials or the topographical survey.

## 4.6 Parking Surveys

The existing parking survey results are shown on a diagram in Appendix C of the scheme assessment report.

An assessment has been made of the available on-road car parking spaces. A parking survey has been carried out for the morning peak and the mid-day inter-peak. No survey has been recorded in the report for the evening peak.

The existing parking survey has identified the parking availability on and in close to the propose cycle facilities project. This has been carried out to assess the possible loss of parking associated with the proposed cycle facility. A quick assessment from the aerial photograph would indicate that this survey is reasonably accurate.

## 4.7 Vehicle Accesses Survey

An assessment has been made of the amount of usage of the vehicle access points. The survey has been carried out for the morning peak and the mid-day inter peak. No survey has been recorded in the report for the evening peak.

Most vehicle access points are lightly trafficked which is expected except for the entrances to the Z-Petrol Service Station at 150 Beach Road which is heavily trafficked.

At this location we have a two-direction cycleway on the eastern side of Beach Road and special controls will be needed as drivers entering and exiting the service station will not be expecting cycles coming from both directions.

## 4.8 Option Development

Four options have been developed for the cycleway along Beach Road. In addition four connection options to linking the cycleway from Beach Road to Quay Street have been developed. The do-minimum option is doing nothing, that is not installing the cycleways and leaving the road just as it is. This is reasonable for the base case.

## 4.9 Option Drawings

The option drawings are presented in Appendix B. the comments on each of the options are as follows.

### 4.9.1 Option A

The two directions of the cycleway are on the western side of Beach Road. This is an unusual contra flow for the southbound cyclists south of Mahuhu Crescent. There is minimal separation between cycles in the southbound cycle lane and the northbound traffic on Beach Road where there is an unexpected direction of cycles to the left of northbound vehicles.

At Stanley Street the two direction cycle lane ends. The southbound cycles appear to have nowhere to go at this point and end up facing oncoming traffic.

The connection to Churchill Street is good but some signage to advise of the give way condition for cycles exiting Churchill Street is necessary. From this point if the destination is The Strand or

Parnell Rise the preference may be to cross directly to Beach Road at this location, however there is no guidance to do this or cycle facility on the eastern side of Beach Road. It is considered unlikely these cyclists would want to ride on the “wrong side” of the road facing the free left turn from Stanley Street.

At the intersection of Te Taou Crescent advance Stop Boxes (ASB) are provided for right turning cyclists. However, the northbound cyclists need to be watchful of through southbound cyclists while accessing these ASB's. no signage is provided to warn cyclists of the possible conflict at this point. The green pavement marking going across the two cycle lanes into the intersection implies a priority and this may reduce the sensitivity for cyclists to be aware of the opposing cycles.

At Mahuhu Crescent cyclists can cross Beach Road at either crossing. However if they choose to cross on the northern side of this intersection there is no cycle connection between the kerb and the cycle lane. This area appears to be shared with pedestrians but no guidance for either.

The southern pedestrian crossing at Mahuhu Crescent could be used by both cyclists and pedestrian however on the eastern side there are no pedestrian facilities.

At Britomart Place the eastbound cycle lane has a drop-down kerb but it is not clear what the on-road cycle facility is beyond this point.

#### 4.9.2 Option B

The simplicity of a single cycle lane each side of the road is appreciated as this layout is easily understood by drivers and cyclists alike.

At the end of the proposed Grafton cycle facility where there is two directions off road there will be the need to cross Beach Road if the destination is The Strand of Parnell Rise. No cycle facility is provided to aid crossing of Beach Road and this close to the intersection of Stanley Street it would be difficult to provide any. The barrier kerb provided directly across the road from Churchill Street, presumably to stop vehicles tracking onto the cycle lane, will also be a barrier to any cycle that tries to cross Beach Road at this location.

There is a disconnection between the on-road cycle facilities at the Te Taou intersection and the off-road cycle lanes. Cyclists must cross the footpath and there is no guidance to either pedestrians or cyclist to do this.

There is also a disconnection between the off-road cycle lanes either side of Mahuhu Crescent. The cycle lane turns into Mahuhu Crescent but it also needs to cross Mahuhu Crescent and there are no facilities provided to allow for this.

At Britomart Place the eastbound cycle lane has a drop-down kerb but it is not clear what the on-road cycle facility is beyond this point.

#### 4.9.3 Option C

The connection to Churchill Street is good with the two-way off-road cycleway continuing along Beach Road to a new crossing point. However cyclists with the destination of The Strand or Parnell Rise are unlikely to use this crossing possibly favouring crossing directly to the eastern side cycle lane at the Churchill Street intersection. This point is also at a very sharp bend in Beach Road. There are no facilities, such as a ramp to Churchill Street to allow this to occur.



At the new crossing point on Beach Road, the green cycle lane markings appear to be only one lane wide however both directions of the cycleway are required to cross Beach Road at this point and a 3.0 metre wide green marking may be better. There is also a pedestrian crossing shown at this location but no indication as to how this area should be shared by cyclists and pedestrians.

From Churchill Street to the new crossing point on the western side and from the new crossing point to Mahuhu Crescent on the eastern side, there are two-direction on-road cycleways. These are separated from the southbound traffic with a painted chevron marking. This is referred to as a median in the report, but a median is usually in the middle of the road so it really can't be called a median. Ideally there should be a solid island or barrier dividing traffic from this two-way cycle lane over this length.

At the intersections the right and left turning motorists cross over two cycle lanes to access the side roads. At those locations, cyclists are required to give way. Only a limit line is marked for cyclists. It is not clear if this will be adequate for such a complex situations. Perhaps further signage will be needed to alert cyclists to this unusual arrangement at the intersections.

At Britomart Place the eastbound cycle lane finishes abruptly with no connections to exist roading network indicated. It also finishes adjacent to a large service chamber and tree which may create a pinch point for both cyclists and pedestrians.

#### 4.9.4 Option D

If the Grafton cycle way project does not proceed then this option has merit for its simplicity of keeping the cyclists on the normal left hand side of the road for both directions until the off-road cycleway is reached at Mahuhu Crescent.

At Britomart Place the eastbound cycle lane has a drop-down kerb but it is not clear what the on-road cycle facility is beyond this point.

#### 4.9.5 Scoping Report Options

Appendix D investigates the connection between Beach Road and Quay Street. Four alternatives are evaluated and it is concluded that two of the alternatives are viable for this connection purpose. Connection 2 is well chosen but Connection 4, Britomart, is a busy, cluttered road and may be less desirable to cyclists even though it has ticked all the evaluation boxes. A cycle facility is considered necessary if cyclists are going to be encouraged to use this road.

### 4.10 Multi-Criteria Analysis

This section and the data contained in Appendix E, evaluates the 4 alternative options against 14 different criteria. The scores are quite subjective, being a collective opinion on the worth of that particular route and the effects on the environment. Care needs to be taken when using such evaluation frameworks to ensure that the criteria and weighting don't unduly bias option evaluation or mask significant costs, advantages, or disadvantages in any area. Adding scores can also give outcomes an empirical differentiation that is not warranted.

It is noted that there is an arithmetical error in the spreadsheet and the scores for each route should be as follows:

Option A      15      was 16

Option B	14	was 19
Option C	21	was 25
Option D	14	was 19

This has not changed the relative order of the options.

It appears that the chosen option, Option C, has mainly been chosen on environmental factors. The intersection efficiency, geometric layout and road safety of the network has played a minor role in the choice of the option.

## 4.11 Economic Evaluation

The worksheets for the economic evaluation are presented in Appendix F.

The Economic Evaluation has been carried out using simplified procedures Worksheet SP11. As the project cost is estimated at \$1,970,425 and there is a signalised crossing planned, simplified procedures should not be used. See EEM Volume 2 Section 13.1.

### 4.11.1 Cost Estimate

- Only the summary sheet is supplied for the costing of the project. Therefore it is not possible to verify these costing and establish if all items have been included.

### 4.11.2 Worksheet 1 – Evaluation Summary

- Project Cost is estimated at \$1,970,425 and there is a signalised crossing involved. The EEM Volume 2 Section 13.1 indicates that simplified procedures should only be used where the undiscounted capital cost of walking and cycling facilities is up to 1 million and that it is not applicable to signalised crossings. See the extract from the EEM below:

Walking and cycling facilities

Simplified procedure SP11 for walking and cycling facilities may be used where the undiscounted capital cost of walking and cycling facilities is up to one million dollars. Where the undiscounted capital cost is greater than one million dollars the economic evaluation must be completed in greater detail on a case-by-case basis. The simplified procedure is not applicable to signalised crossings over roads.

The simplified procedure may be used as part of a composite evaluation also covering travel behaviour change (TBhC) activities and infrastructure and passenger transport service improvements (refer to section 9.6).

### 4.11.3 Worksheet 2 – Cost of do-minimum

- The cost of maintaining the existing facility has not been identified. This is reasonable as the cycle lanes do not exist. The cost of general road maintenance is considered to be similar for the existing and any of the options, therefore general road maintenance costs would cancel out.

#### 4.11.4 Worksheet 3 – Cost of the Option

- Maintenance of the cycle lanes has not been allowed for. This could be a substantial figure as the pavement markings and the green pavements are expensive and have reasonably short service life. An allowance for the on-going maintenance of the cycle facilities needs to be included in the calculations. For example the on-going safety of the recommended option and in particular the effectiveness of the divider markings will depend on regular maintenance.

#### 4.11.5 Worksheet 4 – Travel time cost savings

- Do minimum cycle flow has been estimated at 200. In Section 2.6.2 of the Scheme Assessment Report there were 66 cyclists recorded (34 in and 32 out) in the morning peak 2-hours. Doubling this to add in the evening peak is 132 cycles, leaving 68 for the rest of the day and the night. The figure of 200 is considered reasonable but may not be exact.
- No allowance for negative travel time savings (disbenefits) for all other classes of vehicles has been made. It is likely that there will be additional travel time incurred due to the possible reduction in capacity at the intersections.

#### 4.11.6 Worksheet 5 – Benefits for walking and cycling facilities

- Additional cycle trips per day NTD is taken as 400. This gives a total of 600 cycles per day on the route when added to the 200 already using the route. This point is not clear in the report. The bulk of the benefits for the project come from this one value making the whole project viability very dependent on the accuracy of the 400 additional cycle trips. It is also noted that the value is to a large extent is dependent on the completion of the Grafton Cycleway.
- Traffic growth rate taken as 1.5% which is reasonable.
- Cycle growth rate has been taken as 3%. This value is difficult to assess as the cycle lane does not exist thus making any recording of data impossible. This value influences the discount rate as can be seen below, and then the benefits. We understand that Auckland Council undertakes annual corridor surveys of the CBD and it may be possible to use this data to derive a growth rate for cycles.

Table 1: Discount factors (DF) for different growth rates for years 2 to 30 inclusive

Growth rate	0%	0.5%	1.0%	1.5%	2.0%	2.5%	3.0%	3.5%	4.0%
DF	10.74	11.30	11.87	12.43	13.00	13.50	14.13	14.69	15.25

- If the cycle growth rate is inaccurate, then the benefits could be over stated.

#### 4.11.7 Worksheet 6 – Accident cost savings

- Years of analysis stated to be 5 on worksheet 6 but in Appendix A the titles on the crash data sheets indicate 2006 to 2011, which is 6 years. There are however only 4 crashes involving cyclist are recorded in this period.

#### 4.11.8 Worksheet 7 – Cycle demand

- The population density values used in line 2 of this spreadsheet are not explained in the text so it is unclear as to how this has been derived.

#### 4.11.9 Worksheet 8 – Incremental BCR analysis

- Incremental analysis of the four options has not been carried out. With four options presented in the Scheme Assessment Report incremental analysis should be carried out to establish the most economically viable option. Options 1, 2 and 4 have been eliminated on multi-criteria analysis and not on economic analysis. This is a potential flaw in the evaluation regime in that it will not necessarily arrive at the most cost effective solution.

### 4.12 Risk Register

Risks have been identified and evaluated in this excel spreadsheet contained in Appendix G. The list is comprehensive and appears to cover all the expected items.

### 4.13 Workshop Meeting Minutes

Appendix H contains records of the internal AT meetings. This has not been peer reviewed but used as background information during the peer review process.

### 4.14 Social and Environmental Assessment

Appendix I, the Social and environmental assessment, section has identified the environmental issues associated with the cycle lane construction. Items evaluated are as follows:

- Noise,
- Vibration,
- Air Quality,
- Erosion and Sediment Control,
- Water Resources,
- Social Responsibility,
- Culture and Heritage, Ecological Resources,
- Spill Response and Contamination,
- Resource Efficiency,
- Visual Quality,
- Urban Design,
- Landuse and Transport Integration,

- Public Health,
- Cycling Infrastructure,
- Traffic Management,

Different issues are identified under these headings during construction and when the cycleway is in operation. The issues are similar for all four options as the options only differ in technical detail.

## Conclusions

The report describes the Beach Road Cycleway project adequately and identifies the environmental issues.

It is recommended that additional work be carried out on the effects of the cycleway operation on the existing intersections and possible reductions in capacity for all other classes of vehicles at these intersections.

More detail for the cost estimates should be included in the report. This has most likely been completed but has not been presented in the report.

It will be necessary to carry out the economic evaluation using full procedures or at least establish from NZTA that the use of simplified procedures is allowable for this project. More robust economic evaluation is needed which includes identifying the disbenefits of the proposal on the road traffic at intersections, and then including it in the cost/benefit analysis.

This is obviously not a safety audit but there are concerns with the two-direction on-road cycle lanes only being separated from the general traffic lanes by a paint marking, and the effects of two-way cycle operation on one side of the road for the busier vehicle crossings such as is found at the fuel service station.

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## Economic Evaluation Peer Review Tracking Form

Project: Beach Road Walking and Cycling Improvements

Stage of Audit undertaken: Stage 2

Auditor: Opus

Designer: AECOM

Client: Auckland Transport

Recommendation	Designer's Comments	Client's Decision
<i>Carry out an incremental BCR calculation using three discarded options. At the moment the Option C is chosen using a qualitative rating against several criteria. This evaluation should ideally be augmented by an evaluation of traffic operations, traffic safety and a robust economic analysis of each option</i>	If the client is happy with the result of the multi-criteria evaluation, there is only one option - Option C. The client should be made aware that comments pertaining to other options in this case are not relevant. Also - it can safely be assumed that the economic benefits will not differ markedly between all options. Incremental analysis is therefore of little benefit to differentiate between options.	Agree with designer there is little benefit in carrying out an incremental BCR calculation.

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<p><i>Carry out the economic evaluation using full procedures. Alternatively establish that the use of simplified procedures is permitted.</i></p>	<p>This is an important issue. The SP11 procedure uses only the number of cyclists to derive economic benefits. The full analysis takes into account the disbenefits to traffic in addition to the cycling benefits. For this it would be beneficial to undertake a traffic assessment of the corridor such as optimisation of signal phasing (which could be undertaken in detailed design – once the preferred option is certain).</p> <p>If the client is happy with the simplified procedure, we are fine. If he agrees with the reviewer that SP11 is not enough, the BCR will be knocked down by including the detrimental effects on vehicular traffic (unless we complete a corridor optimisation assessment). Currently BCR stands at 2.2 and it will be difficult to prevent it falling under 2.0.</p>	<p>The use of SP 11 in this instance is appropriate.</p>
<p><i>Establish the disbenefits to the other modes of travel along the route.</i></p>	<p>See my previous comments.</p>	<p>See previous comment</p>

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<p><i>Refine the cycle and traffic growth rates and the discount factors are dependent on these values. A change here will alter the benefits and may affect the value obtained for the BCR.</i></p>	<p>For traffic growth the EEM was used, legit, but cycle growth rate needs some justification. 3% was used, which seems to be pretty conservative. In any case SP11 is not very sensitive to this.</p>	<p>Agree with designer. Cycle growth rates are assumed. Considering there was about a 28% growth in cycle numbers recorded this year using the Northwestern cycleway and this scheme is connecting into this facility it is safe to say that the designer has been conservative. The use of a 3% growth rate is also consistent with that used for the Grafton Gully cycleway economic evaluation. The use of a 3% growth rate is accepted in this instance.</p>
<p><i>Establish the source of the population density values.</i></p>	<p>I used the values from the previous analysis, which is a regional standard.</p>	<p>Agree with designer</p>
<p><i>Establish if crash analysis is required for all crashes along the route and define the analysis period.</i></p>	<p>There were two cycling accidents, both minor injury. The accident analysis was done in the SP11 format. The recommendation to conduct the analysis for all accidents along the route does not seem to be justified, because apart from the installation of the cycle lanes, no other changes affecting traffic safety have been proposed.</p>	<p>Agree with designer</p>

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