

Wairau Blue-green Network - Stage 1 AF Thomas Park

Cost Benefit Analysis
Final Report



Disclaimer

This report has been prepared solely for the purposes stated in it. It should not be relied on for any other purpose.

No part of this report should be reproduced, distributed, or communicated to any third party, unless we explicitly consent to this in advance. We do not accept any liability if this report is used for some other purpose for which it was not intended, nor any liability to any third party in respect of this report.

Information provided by the client or others for this assignment has not been independently verified or audited.

Any financial projections included in this document (including budgets or forecasts) are

prospective financial information. Those projections are based on information provided by the client and on assumptions about future events and management action that are outside our control and that may or may not occur.

We have made reasonable efforts to ensure that the information contained in this report was up to date as at the time the report was published. That information may become out of date quickly, including as a result of events that are outside our control.

MartinJenkins, and its directors, officers, employees, agents, consultants, and advisers, will not have any liability arising from or

otherwise in connection with this report (or any omissions from it), whether in contract, tort (including for negligence, breach of statutory duty, or otherwise), or any other form of legal liability (except for any liability that by law may not be excluded). The client irrevocably waives all claims against them in connection with any such liability.

This Disclaimer supplements and does not replace the Terms and Conditions of our engagement contained in the Engagement Letter for this assignment.



Contents

Key findings	1
Introduction	2
Overarching assumptions	5
The current state	6
The alternative scenario	8
Monetised benefits	10
Quantified costs	15
BCR range	18
Unquantified costs and benefits	20



Preface

This report has been prepared for Te Kaunihera o Tāmaki Makaurau | Auckland Council by Nick Carlaw and Ana Rodriguez from MartinJenkins (Martin, Jenkins & Associates Ltd).

For over 30 years MartinJenkins has been a trusted adviser to clients in the government, private, and non-profit sectors in Aotearoa New Zealand and internationally. Our services include organisational performance, employment relations, financial and economic analysis, economic development, research and evaluation, data analytics, engagement, and public policy and regulatory systems.

We are recognised as experts in the business of government. We have worked for a wide range of public-sector organisations from both central and local government, and we also advise business and non-profit clients on engaging with government.

Kei te āwhina mātau ki te whakapai ake i a Aotearoa. We are a values-based organisation, driven by a clear purpose of helping make Aotearoa New Zealand a better place. Our firm is made up of people who are highly motivated to serve the New Zealand public, and to work on projects that make a difference.

Established in 1993, we are a privately owned New Zealand limited liability company, with offices in Wellington and Auckland. Our firm is governed by a Board made up of Executive Partners and Independent Directors. Our Independent Directors are Jenn Bestwick and Chair David Prentice. Our Executive Partners are Sarah Baddeley, Nick Carlaw, Allana Coulon, Nick Davis, and Richard Tait. Michael Mills is also a non-shareholding Partner of our firm.



Key findings

This report presents a cost benefit analysis (CBA) of Stage 1 flood mitigation works at AF Thomas Park.

Scope

The CBA assesses the impact of flood-protection wetlands, dry detention, and associated amenity at the park, comparing it to a counterfactual scenario where no flood mitigation is implemented.

Future recreation use of AF Thomas Park is subject to separate decision making by the Kaipātiki Local Board and will be assessed separately.

Approach

The analysis adopts a societal perspective, taking into account the impacts both on individuals and on wider society, and it uses a 100-year timeframe. Sensitivity testing is done across key variables such as discount rate, construction costs, and the growth of future construction prices.

The analysis explores alternative scenarios involving Takapuna Golf Course to gain an understanding of the impact on the benefit cost ratio (BCR).

Benefit cost ratio

The BCR ranges from 0.5 to 1.4. It is presented using a range to avoid overstating certainty.

This range is:

- different to the 0.72 – 1.59 in the Concept Feasibility report on 4 July 2025 because, after completing our analysis, we consider it prudent to extend the lower end of the range and use more conservative design and build costs to estimate the upper end of the range
- marginally higher than the upper end of the benefit cost ratio in the business case approval paper of 0.5 – 1.36, presented to TRIC on 3 April 2025.

Avoided property damage is the largest benefit, comprising up to 87% of total benefits, estimated using flood modelling and Auckland Council's Flood Damage Assessment tool.

The biggest cost is the design and build, which makes up 62% to 80% of total costs depending on the assumptions used.

Unquantified benefits

Several benefits were not monetised (but could be included in future analyses). All else being equal, these benefits could increase the BCR. The unquantified benefits include:

- flood-protection benefits from future stages of the project
- avoided damage to public infrastructure and utilities
- recreational benefits from future park uses
- urban density impacts.

Next steps

A comprehensive CBA will be developed for the detailed business case in 2026, incorporating refined assumptions, broader benefit categories, and more detailed modelling.

That comprehensive CBA should result in a narrower BCR range because of a higher level of certainty about the inputs.



Introduction

The Wairau catchment experienced severe flooding during the Auckland Anniversary floods in January 2023. The event caused widespread damage in the area, including loss of life.

In response, the catchment was identified as a priority Blue-Green Network focus area in the Making Space for Water programme.¹

Planning for the Wairau catchment project is grouped into three stages (shown in Figure 1 to the right).

Stage 1 would see AF Thomas Park upgraded to hold more stormwater, including wetlands and dry detention areas. In stage 2, improvements would be made across the wider catchment, including upgrading ponds, widening streams, and improving stormwater pipes. In stage 3, the system would be connected and expanded so that it works together as a whole flood-protection system.

Purpose

To inform its Concept Feasibility report for stage 1, Auckland Council assessed the economic implications of integrating flood storage with recreational facilities at AF Thomas Park.²

As part of that assessment, the Council asked MartinJenkins to peer-review and augment a cost benefit analysis (CBA) done by engineering firm WSP.

The work will be followed by a comprehensive CBA prepared in partnership with the Chief Economist as part of a detailed business case due in 2026.

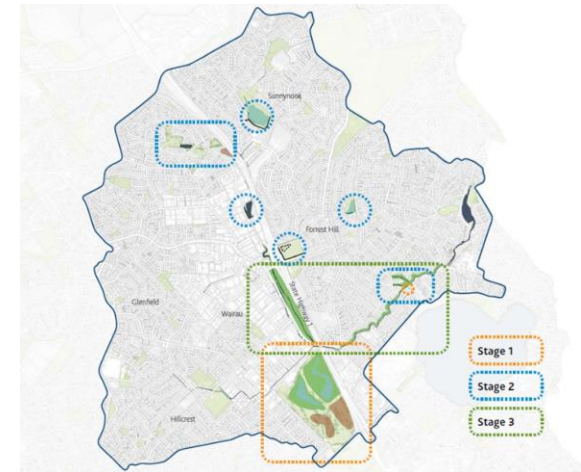
Scope

The scope of this analysis was confined to the stage 1 works described in the Concept Feasibility report

Figure 2 shows an artist's impression of AF Thomas Park with flood-protection wetlands, dry storage, and associated amenity.

We did not consider any costs or benefits associated with removing Woodbridge Lane Bridge or any subsequent stage 2 or 3 works.

Figure 1: Wairau catchment showing stage 1, 2, and 3 works



¹ [Making Space for Water](#)

² <https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-by-laws/Documents/a-f-thomas-park-concept-feasibility-report.pdf>. Accessed July 2025.



Figure 2: Artist impression of stage 1 at AF Thomas Park



Future recreation use at AF Thomas Park was not considered

Golf is currently the primary activity at the park, and the implementation of flood protection measures will either reduce or stop this activity.

When stage 1 is complete, parts of the park could be developed for different types of recreation use – for example, open spaces, sports fields, and golf.

Future recreation use is a decision for the Kaipātiki Local Board, to be made in consultation with mana whenua and the local community, and

would depend on factors such as community need, feasibility, funding and commercial viability.

The CBA compared the current AF Thomas Park (the counterfactual) to a future scenario involving flood storage wetland, dry detention, and associated amenity³

Variations on this scenario were also explored – all of which were assumed to meet the flood storage requirements (>550,000m³).

Approach

Our approach was shaped by the relatively short time available to do the analysis

We prioritised the most significant costs and benefits that could be monetised.

We took a societal perspective – that is, we considered the costs and benefits both to individuals and to wider society.

Our approach included the following steps:

- Reviewing the CBA done by WSP and its supporting models.
- Reviewing the existing literature about CBAs of pluvial flood protection systems to

identify typical costs and benefits, and any additional costs and benefits that could augment the WSP CBA. We took note of costs and benefits that could be considered in the comprehensive CBA that would be part of the detailed business case.

- Re-creating the WSP CBA in our own model and augmenting the analysis with some additional costs and benefits. As part of this step, we modified a model that MartinJenkins developed for Auckland Council in 2019 to assess the Takapuna golf course.⁴⁵
- Testing the model outputs through a sensitivity analysis, and identifying the variables that had the biggest impact on the benefit cost ratio (BCR).
- Estimating the lower and upper bounds of the benefit cost ratio using a scenario-based approach.

³ Consistent with our terms of reference.

⁴ https://ourauckland.aucklandcouncil.govt.nz/media/qp0d0d01/2018_golf_cba-model-and-methodology.pdf. Accessed July 2025.

⁵ https://ourauckland.aucklandcouncil.govt.nz/media/3x0lrto/cbas-may-2018-remaining-courses_status-quo-scenarios-final_not-a-policy.pdf Accessed July 2025.



Interpreting the results

The benefit cost ratio is the present value of the quantified benefits divided by the present value of costs

A BCR of 1 is the point where quantified benefits equal the costs. A BCR higher than 1 indicates more quantified benefits than costs (and vice versa).

The BCR in this report does not include all costs and benefits

It includes those that could be quantified and monetised at this stage. There are qualitative benefits that should also be considered as part of the investment decision, for example community resilience and environmental benefits, flood-protection benefits from subsequent stages of work, and future recreation use of the park.

There is no ideal benefit cost ratio for pluvial flood protection – it depends on the characteristics of each investment

The BCR for pluvial flooding protection can be lower than for river or coastal flood protection because it is usually more localised, and with lower per-event damages (even if the events are more frequent).

This report presents the BCR in the form of a range because the design is at the concept stage and there is uncertainty about the underlying assumptions and inputs

Our use of a range avoids overstating certainty and allows decision makers to identify risks. This approach ensures that multiple possibilities are considered in the analysis and it shows how particular assumptions and inputs could affect the project's outcome.

Data sources

The BCR is based on information that is subject to change and will be developed further in the detailed business case

Much of the information we used in this analysis was prepared during the Concept Feasibility stage and is at a level of detail necessary to assess the viability of concept options and their potential for success.

We relied on outputs from other models

As we discuss in the report, avoided property damage is the biggest monetised benefit in the analysis. To estimate the value of this benefit, we relied on the outputs from two models:

- WSP provided flood-modelling projections, and

- Auckland Council's Flood Damage Assessment (FDA) tool was used to estimate the cost of flood damage.

We relied on cost estimates provided by Alta Consulting.



Overarching assumptions

We estimated the upper and lower bounds of the benefit cost ratio using a range of assumptions. We discuss assumptions about the timeframe and discount rate below. Other assumptions are set out in following sections of the report.

Timeframe used in the analysis

We estimated the benefit cost ratio over a 100-year timeframe and tested the impact on the BCR using shorter timeframes (25, 50, and 75 years)

The New Zealand Treasury and overseas jurisdictions provide different guidance about how to determine the timeframe for analysis. For example, the UK's flood-appraisal guidance recommends a default 100-year timeframe.⁶ In contrast, US FEMA guidance ties the timeframe to the project's useful life (for example 35–100 years for major infrastructure like dams and levees).⁷

The appropriate timeframe is a matter of judgement. Shorter timeframes (50 years for example) may omit significant future damage avoidance and climate-change impacts, and so may under-report the BCR. On the other hand, a

100-year timeframe introduces more uncertainty because there are so many more unknowns, and projects could appear to be more beneficial due to accumulated future gains.

In this analysis, we use a 100-year period to fully capture the long-term benefits of the pluvial flood protection, especially for rare but severe events like 1-in-100-year floods and for evaluating resilience from climate change. Also, the flood mitigation is wetland and dry detention and will have a much longer useful life than a mechanical flood-protection system.

Discount rate

We estimated the BCR range using scenarios that applied discount rates of 1.5%, 2%, 4%, and 8%

The discount rate represents the diminishing value of costs and benefits over time. The choice of discount rate significantly affects the present value of future costs and benefits and, therefore, the benefit cost ratio.

Lower discount rates give greater weight to benefits occurring in later decades, supporting

the use of extended analysis timeframes for projects.

In cost benefit analysis for public infrastructure, Auckland Council recommends a standard real discount rate of 4%. The Treasury recommends a real discount rate of 2% for analysing social or non-commercial investments that have a useful life of 1–30 years, and a lower rate of 1.5% for assessing investments over longer periods (31–100 years). The Treasury also advises testing a higher discount rate of 8%.

⁶ https://assets.publishing.service.gov.uk/media/613205c1d3bf7f05b9705049/The_full_technical_FCERM_appraisal_guidance.pdf. Accessed July 2025.

⁷ https://www.fema.gov/sites/default/files/2020-04/fema_bca_reference-guide.pdf. Accessed July 2025.



The current state

In this section, we describe the main assumptions used to define the “current state” – that is, the scenario that would exist if Auckland Council left AF Thomas Park as is, without any flood storage wetland and dry detention.

The current state scenario has an important role in the cost benefit analyses – it is what we compare the alternative scenario to (the one with flood storage wetland and dry detention).

Flood risk

We assumed that no alternative flood-protection measures would be put in place beyond what exists now

This assumption means that existing houses would be prone to the same level of flood risk as they are now (all else being equal).

The assumptions about whether flood-protection mechanisms would be implemented in the current state is important because it has an impact on the damages-avoided benefit. For example, if some form of flood protection is implemented in the current state, the size of the avoided-damages benefit may be smaller.

Climate change

We assumed that flooding would become more intense over the 100-year timeframe

We assumed that the impact of climate change would result in higher levels of flooding and therefore more properties would be damaged and the damage would be more severe. We describe the approach to flood modelling later in this report.

Future land use

We assumed no significant changes in land use

AF Thomas Park would continue to exist for recreation use.

Housing stock

For simplicity, we assumed no change to the level of building density or improvements to existing buildings

This assumption impacts benefits in a number of ways. First, if a property inside the catchment area is subdivided, then more properties would be at risk of flood damage, and benefits such as avoided damage would be greater.

Similarly, if an existing property is upgraded then the avoided cost to repair it would be greater.

Greater urban density upstream of the catchment area also has an impact. It means more hard surfaces for water run-off and greater flooding impacts – resulting in more avoided property damage.

However, we could not meaningfully forecast any changes to housing density or property values in the time available and so left this out of the analysis (we recommend examining this in the comprehensive CBA).

Category 3 properties

We assumed no change to the number of properties currently rated category 3, as the process has finished

Properties assessed as Category 3 pose an intolerable risk to life, with no practical way to reduce that risk. They were eligible for a voluntary government buy-out.

Assumptions about the number of category 3 properties would have an impact on the avoided property damages benefit. For example, if – under the current state – additional properties were rated category 3 then, all else being equal, this benefit would be smaller.



Existing golf course

We assumed North Shore Takapuna Golf would continue to operate an 18-hole course at AF Thomas Park

It currently operates on a month-by-month lease (the previous lease was for 33 years and expired in February 2025). Under the current state, we assumed that the lease would continue to be renewed.

Areas for further analysis

As we noted earlier, the time available for our analysis was relatively short, and a more comprehensive CBA will inform the detailed business case.

Throughout the report, we recommend areas to explore in further analysis. In relation to the current-state assumptions, we recommend:

- Confirming whether any additional flood-protection mechanisms would be put in place, beyond what is there now.
- Confirming North Shore Takapuna Golf's operating costs, membership numbers, and quantifiable benefits.
- Confirming assumptions about whether any additional properties in the catchment area would be rated as category 3 over the 100-year term.
- Confirming whether there would be any changes to housing density or the value of the existing commercial and residential stock.



The alternative scenario

In this section, we describe the main assumptions used to define the “alternative scenario” involving flood storage wetland, dry detention, and associated amenity at AF Thomas Park.

We also describe the variations to this scenario that we used to determine the upper and lower bounds of the benefit cost ratio.

Flood mitigation

We assumed that this scenario delivered the necessary flood-storage capacity, and all variations on this scenario provided the same level of flood protection

The Healthy Waters concept design and North Shore Takapuna Golf’s concept design involve different amounts of wetland and dry detention, but both meet the flood water storage requirements (>550,000 m³).

This assumption means that flood-related benefits such as avoided property damage (which is the largest benefit) would be the same under all variations of the alternative scenario.

Housing stock

We assumed no change to the level of building density and no improvements to existing buildings over time

As noted in the previous section, we could not meaningfully forecast any changes to density or property value in the time available and so left this out of our analysis.

This approach potentially undercounts the benefits because:

- property owners would possibly be more likely to invest in new buildings or upgrades if their property is less likely to be flooded, and
- greater housing density upstream will increase flood impacts around AF Thomas Park – which would be avoided under the alternative scenario.

Recreation use

Golf

We explored two alternative golfing scenarios to test the impact on the BCR

Golf is currently the primary activity at AF Thomas Park. Implementing the flood-protection measures will either reduce or stop this activity.

As we noted above, decisions about future recreation use are for the Kaipātiki Local Board and any impacts resulting from these decisions are outside the scope of our analysis.

However, we explored two alternative scenarios to test the impact of different levels of golfing activity on the BCR:

1. Takapuna Golf Course stops operating altogether. Construction of the wetland, dry detention, and amenity would take two years, beginning in 2027.
2. The other scenario is North Shore Takapuna Golf continuing to operate a smaller nine-hole course (without any further investment) during the timeframe of the construction.



Under this scenario, Council advises development would start at the same time but take one year longer to accommodate golf and construction happening side by side.

For each option, we made assumptions about the displacement of golfing activity – how many people who played at Takapuna Golf Course would shift to other clubs, and how many would stop playing golf altogether. This is discussed further in the section on benefits.

Cycle and walkways

We assumed that new walkways would result in more walking and cycling

The proposed Healthy Waters design includes approximately 1.5 km of new walkways, similar to the North Shore Takapuna Golf design. We assumed this walkway would exist whether or not there is golf at the park or other types of recreation use.

Other assumptions

All other assumptions are the same as under the "current state"

- We assumed that climate change would mean flooding would become more intense over the 100-year timeframe.
- We assumed AF Thomas Park would continue to exist for recreation use.

- We assumed no change to the number of properties currently rated category 3.

Areas for further analysis

Future work to inform the comprehensive CBA should:

- Examine whether the level of building density, improvements to the value of existing commercial and residential stock, and the number of category 3-rated properties would change over time because of the existence of flood-protection measures.
- Confirm whether it is feasible for North Shore Takapuna Golf to continue operating in a reduced capacity during the construction phase and without any further investment (this will inform whether the comprehensive CBA should assess this scenario or not).
- Determine whether future recreation uses should be included in the analysis (for example developing a new golf course or other recreational facilities).



Monetised benefits

This section describes the benefits used to determine the lower and upper bounds of the BCR.

Consistent with the scope of work, we have sought to monetise the most significant benefits within the time available to do the analysis. We have identified where further effort could be directed for the comprehensive CBA.

There are other benefits that aren't quantified in this analysis, like the avoided damage to public infrastructure. These are discussed further in the section on qualitative benefits (and could also be a focus of the comprehensive CBA to see if they can be monetised).

Avoided property damage

By far, this is the biggest benefit, making up 27% to 87% of the total benefits, depending on the assumptions used.

Methodology

Natural hazards, such as flooding events, involve high levels of uncertainty around timing, frequency, and severity

To estimate the value of this benefit, a method called Annual Average Damage (AAD) was used. This approach estimated the present value cost

of flood damage to buildings in the catchment area over the 100-year timeframe.

It considered a range of possible flood events, from frequent minor floods (for example 1-in-2-year flood events) to rare, major ones (such as 1-in-100-year floods), and calculated the expected damage for each based on how likely they are to occur.

By comparing the AAD before and after implementing the flood protection measures at AF Thomas Park, we estimated how much property damage would be avoided.

The calculation relied on the outputs from two models

We took the outputs from both models at face value:

- WSP provided flood-modelling projections for different types of flood event severities inside the catchment area.
- We used Auckland Council's Flood Damage Assessment (FDA) tool to estimate the cost of flood damage to individual commercial and residential buildings and their contents, based on the flood-modelling projections.

The approach to estimating the avoided property damage benefit involved the following steps

1. WSP modelled three flood events (a 2-year, 10-year, and 100-year event) for different scenarios – a current and a future climate scenario, and pre- and post-flood protection measures at the park.
2. We used Auckland Council's FDA tool to estimate damage costs for residential and commercial buildings and their contents for each flood event and scenario.
3. We calculated the value of the benefit by comparing the pre- and post-flood protection measures. The impact of climate change was linearly interpolated to reach the climate change AAD by year 100. Avoided damages were not counted until the flood-protection measures were built.
4. We repeated the calculation using three slightly different methods to see if there was a material difference in the value of the benefits (the results were similar).
 - We followed the method used by WSP, which annualised the avoided damages.



- We tested this against the Council's FDA tool, which calculated the total net present value but did not annualise.
- We used the New South Wales flood tool method, which also annualised damages.⁸

The value of the avoided property damage was very sensitive to three assumptions in the CBA

Discount rate. The benefits are realised over a long timeframe and the higher the discount rate used in the CBA, the lower the benefit (and vice versa).

Timeframe for the analysis. The same applies to the timeframe – if the analysis is conducted over a shorter timeframe, the accumulated benefits are smaller.

Assumptions about the future cost of construction and materials. Both the New South Wales tool and the approach taken by WSP can be adjusted for construction costs rising above general inflation over time. All else being equal, if an inflator is applied to construction costs, the avoided property damage benefit would be greater.

We looked at different construction indices over the last 25 years, which showed construction-

related costs had been 1% to 1.5% higher than general inflation over the last 10 years and the last 25 years.⁹

We tested scenarios that involved 0% (that is, assuming construction costs would grow in line with general inflation only) and growth in construction costs above inflation by 1%, 1.5%, and 2.5% per year – in some cases this was year-on-year growth over the 100 years. In other scenarios, we increased construction costs above inflation for the first 50 years only.

The result of this analysis is summarised in the section on the BCR range.

Reduction in golf expenditure

Under the alternative scenario, we assumed the North Shore Takapuna Golf's operating costs would decrease. If it stopped operating altogether, there would be no ongoing costs. If it continued with a smaller nine-hole course, costs would be less than the 18-hole course.

In the cost benefit analysis, we treat this cost reduction as a benefit, and in the same way we treat the reduction in golfing-related benefits as a cost. It comprises 0% to 36% of the total benefits (\$0 – \$36.7 million in present value terms) depending on the assumptions used.

Assumptions

The value of the benefit is sensitive to two interrelated assumptions. The first is displacement – that is, the net amount of golfing activity that continues across all clubs after Takapuna Golf Course either ceases to operate or reduces its course size.

The second assumption relates to the net impact on costs associated with operating golf courses.

For this CBA, we used simplified assumptions to explore the impact of different golf scenarios on the upper and lower bounds of the benefit cost ratio.

At the end of this section, we identify further work for the comprehensive CBA, including confirming that there is capacity at nearby golf courses to take the Takapuna Golf Course players.

These assumptions are discussed further below.

Displacement

Displacement of golfing activity is a function of several factors. For example:

- If Takapuna Golf Course reduces its size to a nine-hole course, new golfers might play because they prefer a smaller course.

⁸ [NSW Treasury Disaster Cost-Benefit Framework | NSW Government](#)

⁹ For example, the average annual growth rate for the capital goods price index over the last 25 years was 1.4% higher than general CPI, and 2.5% higher over the last 10 years.



Existing members might play more or fewer rounds.

- Some regular golfers might stop playing altogether because they only want to play at an 18-hole course at Takapuna Golf Course.

Of those golfers, some might take up other physical activity (which offsets lost health and other benefits), or they might not do any physical activity and so the benefits decrease.

- We assumed that most of the current golfers at the Takapuna Golf Course would continue to play but at other courses, to a greater or lesser extent.

Displacement assumptions also result in other impacts such as changes in travel emissions or out-of-town visitor expenditure.

For the purposes of this CBA, we applied a simplified assumption that 80% of existing golf played at Takapuna Golf Course would be displaced to other golf courses.

This assumption was based on a literature review of publicly available information and the number and location of other golf courses in the region. We tested the impact on the BCR if 50% of the golfers stopped playing altogether.

Golf operating costs

We also used simplified assumptions about changes to golf operating costs. The assumption is a function of:

- a reduction in North Shore Takapuna Golf's costs, and
- an increase in other clubs' costs as they take on additional players from North Shore Takapuna Golf.

Based on a literature review and previous work for the Council,¹⁰ we assumed that, although there is a direct relationship between displacement of golfing activity and operating costs, this relationship is not linear. This is because a golf course has fixed costs that are less sensitive to the number of golfers or rounds played.

On this basis, we assumed that:

- if Takapuna Golf Course stopped operating, 80% of its golfers would play at other courses (a net reduction in golfing activity of 20%) and the operating costs of other golf courses would increase by a smaller proportion (50%) – which is an increase to the variable costs only.
- if Takapuna Golf Course continued with fewer holes, total operating costs (across all

courses) would still decrease but not by as much (15% compared to 50%) because Takapuna's fixed costs would continue.

We tested the impact on the BCR by varying the assumptions about reduced cost, using a cost reduction of 0% (no change in overall cost), and a 15%, 50%, and 75% reduction in cost.

Other benefits

We assessed the other benefits that were included in WSP's CBA. We supplemented this with a literature review to see if any other benefit types could be included (either now, or as part of the comprehensive CBA). We also did a benefit mapping exercise to make sure there was no double counting.

As a result, we incorporated most of WSP's benefits into the CBA and added a health benefit to account for additional walking and cycling activity around the park.

The value of each individual benefit was relatively small compared to the avoided property damage. Together, they made up 5% to 53% of the total benefits, depending on the assumptions used.

The benefits are summarised below.

¹⁰ https://ouraukland.aucklandcouncil.govt.nz/media/3x0lrto/cbas-may-2018-remaining-courses_status-quo-scenarios-final_-_not-a-policy.pdf Accessed July 2025.



Creation of open space – the value that households get from interacting with parks; measured using the annual use-value for households near neighbourhood parks.

Avoided flood-related fatalities and injuries – based on a 1-in-100-year flood event and measured using the Value of Statistical Life (VoSL) lost and cost of serious injury values.

Walking- and cycling-related health benefits – physical activity resulting from the new walkways (roughly 1.5 kms long), measured by distance travelled and health value per kilometre. We assumed this activity would happen whether or not there was golf at the park.

To avoid any double counting with the use value from the creation of open space, walking and cycling benefits were reduced by the proportion of users that are located nearby.

Avoided income loss from displacement – accounts for preserved income when individuals do not have to relocate because of flooding; based on a 1 in 100-year flood event and measured using values derived from the 2011 Christchurch earthquakes.

Property value uplift – compares the increase in property values within the catchment (after flood mitigation) with properties outside the catchment; measured using analysis by WSP.

Emergency services cost avoided – based on a 1 in 100-year flood event and a small percentage of property damage.

Avoided trauma from flooding events – based on a 1 in 100-year flood event and measured using the cost of trauma (intolerable and habitable).

Additional carbon sequestration from the wetlands – the benefits were assumed to be the same whether or not a golf course continued at AF Thomas Park.



Benefit summary

The table below lists the economic benefits. Our scenario analysis used values within the ranges set out in column 2 of the table.

Benefit type	Present value amount (millions) Lower and upper values, and median	Proportion of total benefit	Comment
Avoided property damage	\$6.1-\$168.8 Median \$41.3	27%-87%	Relied on outputs from WSP and Auckland Council models. Sensitive to discount rate and growth of future construction costs.
Reduction in golf operating expenditure	\$0-\$36.7 Median \$24.4	0%-36%	Sensitive to assumptions about displacement of golfing activity.
Creation of open space	\$4.6-\$5.6 Median \$5.5	3%-26%	
Avoided flood-related fatalities and injuries	\$2.2-\$2.6 Median \$2.6	1%-9%	
Walking- and cycling-related health benefits	\$0.2-\$1.0 Median \$0.8	<1%-5%	
Avoided income loss from displacement	\$0.5-\$0.6 Median \$0.6	<1%-3%	
Property value uplift	\$0.5-\$0.6 Median \$0.5	<1%-3%	
Emergency services cost avoided	\$0.4-\$0.5 Median \$0.5	<1%-2%	
Avoided trauma from flooding events	\$0.2-\$0.2 Median \$0.2	<1%-1%	
Additional carbon sequestration	\$0.1-\$0.1 Median \$0.1	<1%	

Areas for further analysis

Further work to inform the comprehensive CBA should:

- Use the Council's i-Tree model to value benefits associated with different types of vegetation, including carbon sequestration, removal of pollution, and avoided run-off costs. The i-Tree model will probably replace some benefits in this report to avoid double counting.
- further, more detailed analysis to confirm the displacement assumptions about golf activity, including: whether other clubs can accommodate the North Shore Takapuna Golf's members; resulting revenue and cost impacts on those clubs; the impact on out-of-town visitors coming to play golf; and the impact of additional travel.
- Consider what other benefits should be included in the analysis (the final section of the report contains a list of ideas).



Quantified costs

This section summarises the economic costs that we used to estimate the benefit cost ratio.

One-off cost

Design and build

By far the biggest cost is the implementation of the flood storage wetland, dry detention, and associated amenity (making up 62% to 80% of total economic costs, depending on the assumptions used).

Given this, we explored the impact on the benefit cost ratio by using base, P50, and P95 cost estimates by Alto Consulting.¹¹

	Base cost	P50 cost	P95 cost	Timing
Healthy Waters design	\$42.51m	\$55.26m	\$74.39m	Incurred in yrs 1 & 2
North Shore Takapuna Golf design	\$49.13m	\$63.87m	\$85.98m	Incurred in yrs 1-3

We also tested what the impact would be if construction costs were to increase materially higher than general inflation between now and the start of construction (by adding 1.5% per year to the development cost).

We applied a deadweight cost of taxation of 20% to Crown and Council funding portions, and on the Council's advice, tested a lower deadweight cost (10%) for the local funding portion.

Ongoing costs

Maintenance

Annual maintenance makes up the smallest proportion of total cost. It covers activities like removing rubbish after extreme events, controlling invasive weeds and pests (community groups may provide volunteer support), minor desilting, and general maintenance. We estimated a present value cost of \$0.2 – \$1.7 million (up to 3% of total costs).

We tested the impact on the BCR should some of the built assets need renewing, using an arbitrary

value of \$10 million incurred at year 50 – with and without the impact of rising construction costs (about \$4.8 to \$9.0 million in present-value terms).

Reduction in recreational and health benefits for golfers

We looked at the impact of:

- lower recreation benefits from individuals enjoying a round of golf, and
- lower health benefits from golfers taking part in physical exercise while being outdoors.

We estimated the present value of this cost using the CBA model and methodology developed previously for the Council.¹²

Health benefits are a function of distance walked on the golf course and a health value per kilometre. The recreational benefit is equal to the cost to those golfers of playing.

The values were most sensitive to assumptions about whether Takapuna Golf Course stopped operating or not, and the resulting displacement.

¹¹ P50 and P95 cost estimates represent probabilistic forecasts where P50 is the cost with a 50% chance of being exceeded, and P95 is the cost with only a 5% chance of being exceeded (a conservative, high-confidence estimate).

¹² https://ourauckland.aucklandcouncil.govt.nz/media/qp0d0do1/2018_golf_cba-model-and-methodology.pdf and https://ourauckland.aucklandcouncil.govt.nz/media/3x0lrto/cbas-may-2018-remaining-courses_status-quo-scenarios-final_-_not-a-policy.pdf Accessed July 2025.



Given this, we explored the impact on the benefit cost ratio by testing several alternative inputs.

Our estimate of the economic cost from reduced recreational and health benefits for golfers varied widely, from \$2.7 million to \$25.3 million in present-value terms (between 3% and 28% of the total economic cost).



Cost summary

The table below lists the main economic costs. Our scenario analysis used values within the ranges set out in column 3 of the table.

Cost item	Frequency	Present value amount (millions) Lower and upper values, and median	Proportion of total cost	Comment
Design and build of wetland, dry detention and amenity	One-off	\$41.3-\$73.9 Median \$54.9	62%-80%	Based on estimates provided by Alta Consulting
Reduction in benefits to golfers	Annual	\$2.7-\$25.3 Median \$10.3m	3%-28%	Depends on whether Takapuna Golf Course continues to operate and how much golfing activities are transferred to other golf clubs
Deadweight cost of taxation for central and local government funding	One-off	\$8.3-\$14.8 Median \$9.7	10%-16%	
Maintenance (above current levels)	Annual	\$0.2-\$9.0 Median \$1.4	<1%-11%	Upper end of range assumes some asset renewal at year 50

Areas for further analysis

Future work to inform the comprehensive CBA should:

- Confirm what the costs associated with maintaining AF Thomas Park are.
- Confirm the volume assumptions used to estimate the reduction in golf-related benefits (for example, the number and type of members, rounds played, and distance walked).
- Consider what other costs should be included in the analysis (the final section of the report contains a list of ideas).



BCR range

Summary

The analysis produced a benefit cost ratio between 0.5 and 1.4

We have presented the BCR using a range because the design is at concept stage and there is uncertainty about the underlying assumptions and inputs.

This range is:

- different to the 0.72 – 1.59 in the Concept Feasibility report on 4 July 2025 because, after completing our analysis, we consider it prudent to extend the lower end of the range and use more conservative design and build costs to estimate the upper end of the range
- marginally higher than the upper end of the benefit cost ratio in the business case approval paper of 0.5 – 1.36, presented to TRIC on 3 April 2025.

The comprehensive CBA to be completed for the detailed business case should result in a narrower BCR range because of certainty about the inputs.

Testing

We did sensitivity analysis to identify the assumptions that had the biggest impact on the benefit cost ratio

Then we developed a range of scenarios to identify the lower and upper bounds of the BCR range.

The scenarios were developed using different combinations of the following variables:

- Discount rate – using 1.5%, 2%, 4%, and 8%.
- The extent to which future construction costs rise – using 0% (no growth), 1%, 1.5%, and 2.5% annual growth rates. This was applied over 100 years and an alternative scenario of the first 50 years only.
- Design and build costs of the wetland, dry detention, and associated amenity using the base, P50, and p95 cost estimates, with and without an annual growth rate of 1.5% to account for rising construction costs between now and the start date.
- A lower deadweight cost of taxation for the local-government funding portion – we applied 10% as well as 20% (the same as for central-government funding).

- Significant investment in asset renewal in year 50 of \$10 million, with and without the impact of construction costs rising 1.5% per year above general inflation.
- Alternative golf scenarios where Takapuna Golf Course stopped operating altogether, and a hypothetical scenario where it continued to operate a smaller nine-hole course (but without any further investment). As a result, the main assumptions we varied were:
 - reducing the amount of golf played at Takapuna Golf Course by 20% and 50% (accounting for displacement to other clubs), and
 - reducing the amount of North Shore Takapuna Golf's operating costs by 15%, 50%, and 75%, and a scenario of no change.

We also removed all golfing-related costs and benefits from the analysis to test whether the BCR range was appropriate.

We tested the impact on the BCR by shortening the timeframe for the analysis

We used a 100-year scenario that had a benefit cost ratio of close to 1 (0.98). Shortening the



timeframe to 75 years had a relatively minor impact on the BCR (reducing it from 0.98 to 0.92).

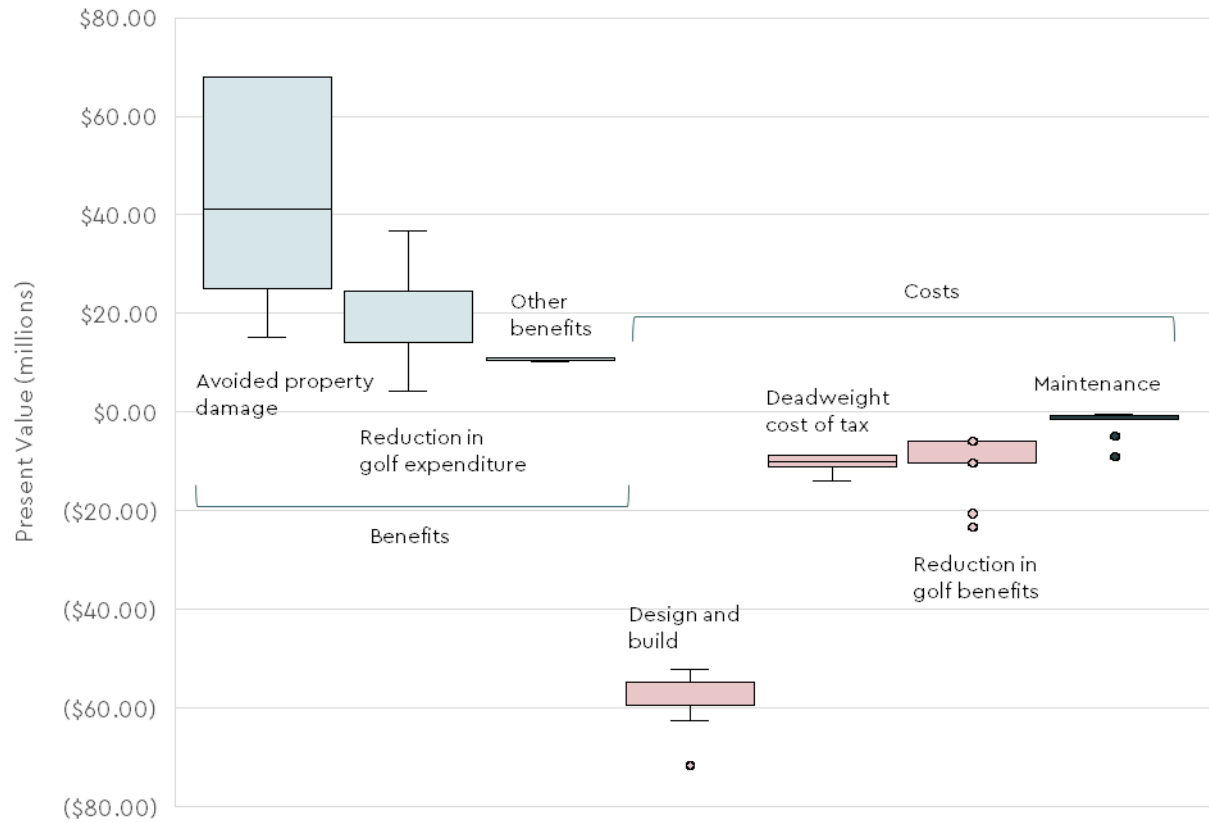
However, the impact on the BCR was greater when the timeframe was reduced to 50 years and 25 years (0.78 and 0.62 respectively).

BCR inputs

The box and whiskers graph shows the spread of the costs and benefits that were used to determine the upper and lower bounds of the BCR.

The avoided property damage benefit has the biggest spread because the scenarios tested a range of different assumptions about the growth of future construction costs – these had a large impact on the value of the benefit.

By contrast, the maintenance costs were not varied much in the scenarios except for a large asset renewal in year 50 (represented by the two outlier dots in the graph).



Reading the graph: The line within the box represents the median. The box goes from the first quartile to the third quartile. Whiskers extend from the box to the minimum and maximum values (1.5 times the height of the box). Any data points beyond the whiskers are considered to be outliers and plotted as individual dots.



Unquantified costs and benefits

This section lists costs and benefits that aren't quantified in this analysis and therefore don't contribute to the benefit cost ratio.

The reasons for not including them in the analysis are due to factors like the additional time it would take to monetise them – not because of their importance or significance.

Although they are not included in the analysis, these costs and benefits should still be considered as part of the investment decision-making process.

They can also be a focus of the comprehensive CBA, to see if they can be monetised and included in future benefit cost ratios.

Unquantified costs

- Government spending on flood response and accelerating recovery of economic activity
- Injuries sustained while at the park
- Less spending from out-of-region visitors

Unquantified benefits

- Flood-protection benefits from stages 2 and 3 of the project that are unlocked by stage 1 works
- Avoided damage to public infrastructure such as schools and roads
- Avoided damage to utilities (including critical infrastructure like power substations and wastewater systems), meaning less interruption to other parts of Auckland, and less cost to fix
- Recreational benefits from new facilities at AF Thomas Park (for example, sport fields or golf facilities)
- Greater urban density upstream of the catchment area meaning more hard surfaces for water to run off and greater flooding impacts – which are avoided

- Ability to make use of category 3 land (after flood-protection measures are in place)
- Benefits arising from additional properties in the catchment area (for example, if an existing property was subdivided) and upgrades to existing property
- Improved water quality from avoiding overflow at Alma Road pump station during significant flood events and potential for wetlands to remove pollutants from water
- Avoided loss in business productivity
- Non-use benefits of the park
- Reduction in pesticide run-off for different recreation uses
- Benefits from social connection and volunteering.



MARTIN JENKINS



Wellington T +64 4 499 6130
Level 1, City Chambers, Cnr Johnston and Featherston Streets, Wellington 6011, PO Box 5256, Wellington 6140, New Zealand

Auckland T +64 9 915 1360
Level 16, 41 Shortland Street, Auckland 1010, New Zealand

info@martinjenkins.co.nz **martinjenkins.co.nz**