Wellington to Hutt Valley Cycle and Pedestrian Link Programme: Addendum to Business case for implementation

October 2018

VERSION 5

Wellington to Hutt Valley Cycle and Pedestrian Link Programme

Detailed Business Case Addendum to proceed from Initiation to Implementation

More information

NZ Transport Agency
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If you have further queries, call our contact centre on 0800 699 000 or write to us:

NZ Transport Agency
Private Bag 6995
Wellington 6141

This document is available from the NZ Transport Agency on request.

APPROVAL

PREPARED BY	REVIEWED BY	ENDORSED BY	ENDORSED BY
AECOM NZ Ltd	Michael Siazon	Kesh Keshaboina	Carolyn O'Fallon
Consultants	Senior Project Manager	Project Sponsor	P&I Case Manager
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GLOSSARY OF TERMS

ABBREVIATION	TERM
AEE	Assessment of environmental effects
AO	Approved organisation
BCR	Benefit-cost ratio
CAPEX	Capital expenditure
CBD	Central business district
CEMP	Construction environmental management plan
CVIU	Commercial vehicles investigation unit
D&C	Design and construct
DE	Design estimate
EEM	*Economic evaluation manual*
EIR	Environmental impact report
EOI	Expression of interest
EPA	Environmental Protection Authority
FYRR	First year rate of return
GPS	Government Policy Statement
GW	Greater Wellington Regional Council
HCV	Heavy commercial vehicle
HNO	Highways and Network Operations
HNZ	Heritage New Zealand
I&F	NZTA Investment and Finance Team
IAP2	International Association for Public Participation
ILM	Investment logic map
IRS	Investment and revenue strategy
ITS	Intelligent transport systems
KiwiRail	KiwiRail Ltd
KPI	Key performance indicator
LLR	Lessons learnt review
LTMA	Land Transport Management Act
MOU	Memorandum of understanding
MVKT	Million vehicle kilometres travelled
NES	National environmental standards
NIU	National infrastructure unit
NLTF	National Land Transport Fund

NLTP	National Land Transport Programme
NOR	Notice of requirement
NPC	Net present cost
NZCID	New Zealand Council for Infrastructure Development
NZTA (or the Agency)	The New Zealand Transport Agency
NZTS	New Zealand transport strategy
OPEX	Operating expenditure
PIKB	Planning and Investment Knowledge Base
PI	Performance indicator
PMS	Project management services
PoPS	Portfolio procurement strategy
PPFM	Planning Programming and Funding Manual
PPM	Principal Project Manager
PPP	Public Private Partnership
PT	Public transport
PWA	Public Works Act
RAMM	Road Assessment and Maintenance Management
RFP	Request for proposal
RLT	Regional Land Transport
RLTS	Regional Land Transport Strategy
RMA	Resource Management Act
RoNS	Road of national significance
SAR	Scheme assessment report
SE	Scheme estimate
SH(#)	State Highway (number)
SOI	Statement of intent
SSC	State Services Commission
SDD	System Design and Delivery
SSEMP	Site specific environmental management plan
TA	Territorial Authority
TDM	Traffic demand management
TOC	Total outturn cost
VAC	Value Assurance Committee (formerly SSRC)
VMS	Variable message sign
WCC	Wellington City Council
WEBs	Wider economic benefits

Add more as appropriate.

EXECUTIVE SUMMARY

Facilities for cyclists and pedestrians between Ngauranga and Petone are sub-standard, which has been reinforced in various regional transport strategies and plans over the course of a number of years. As a result, existing cyclists and pedestrians are putting themselves and state highway motorists at risk, and the existing retrofitted facilities are not attractive (e.g. very narrow and the pavement is rough). Furthermore, this existing facility is incomplete (e.g. there is an 800m gap between the Petone Overhead Bridge and the existing facility). Overall, this facility does little to increase the perception of safety nor offer a level of attraction for future users. A total of 9 serious accidents and 32 minor injury accidents were recorded for cyclists on this section from2013-2017.

The Wellington to Hutt Valley Cycle and Pedestrian Link (W2HV Link) Programme Detailed Business Case (DBC) was approved in 2015.

This DBC Addendum updates the DBC 2015 with regards to the two sections of the W2HV Link Programme that are yet to be constructed, which are as follows:

- Ngauranga to Petone (N2P);
- Petone to Melling (P2M).

The section of the W2HV Link between the Wellington CBD and Ngauranga was completed by Wellington City Council in mid-2018. For avoidance of doubt, there is no technical update for this section of the Link provided in this DBC Addendum.

Key Recommendations

The key recommendation for the W2HV Link Programme specifically for the N2P section is to seek the necessary consents for the recommended option (Option 3F), which is a 4m shared path (with 0.5 shoulders) to be located on the seaward side of the Hutt Valley Rail Line.

The recommended option will achieve the following outcomes:

- Provides for the increased number of walkers and cyclists who cycle or walk between Wellington and the Hutt Valley;
- Provides a separated walking and cycling facility that will increase the safety for walkers and cyclists;
- Reduces the impact of storm events and sea level rise will have on the Hutt Valley Rail Line;
- Minimises the extent of proposed reclamation, whilst also incorporating necessary measures to mitigate adverse effects for consenting purposes.
- Provides for operational resilience wherein the W2HV Link could act as a response and recovery route in the event of a landslide event along SH2 between Ngauranga and Petone;

The Addendum DBC also recommends that the next step for the P2M section is for the implementation phase to recommence. That is, in 2017, the Transport Agency decided to undertake a construction cost review for this section of the W2HV Link Programme. A

re-evaluation of other P2M route options such as on SH2 and Hutt Road as part of the wider W2HV Link was also carried out.

Recommencing the implementation phase will require further commercial negotiations with the previously identified preferred tenderer or re-tendering the project. It will also involve further discussions with KiwiRail.

It is proposed that construction to commence early 2019 and complete by June 2020.

Background

The DBC for the W2HV Link Programme was approved in August 2015. For the N2P section, it recommended a shared path to be located on the seaward side of the Hutt Valley Rail Line. This option was referred to as Option 3 in the DBC and comprises a 5m reclamation (4m shared path with 0.5m shoulders) and a new seawall to improve the resilience of the Hutt Valley Rail Line, which is vulnerable to closure in storm events. It would also provide safety and health benefits for walkers and cyclists.

It is noted that an on-road cycling and walking facilities were considered as part of DBC 2015, however these were rejected because the walking and cycling facility would still be exposed to landslide risks in an earthquake and therefore the Investment Objective associated with resilience could would not be achieved.

For the P2M section, the strategy of providing a continuous separated cycling (only) facility to maximise safety benefits for cyclists by reducing cycling on SH2's shoulders have been pursued.

This DBC Addendum updates Sections 3-5 on the W2HV Link Programme (N2P), and seeks funding to commence the Pre-Implementation phase for N2P section and the Implementation phase for P2M section.

The DBC Addendum also reports on possible procurement options for the N2P and P2M sections of the W2HV Programme.

The management case for this DBC Addendum has been developed specifically for the consenting phase in line with the N2P section. Once the necessary N2P consents have been secured, it will be updated to reflect the next steps for the N2P section of the W2HV Link Programme.

Strategic Context

Problems and Investment Objectives

When the W2HV Link Project was initiated in 2013, the business case approach was still in its early stages and thus the project didn't go through an investment logic mapping exercise that usually identifies the problems and investment objectives. Instead, Project Objectives were developed, and used to provide guidance for identifying and assessing options in line with the RMA consenting process.

The DBC 2015 contains a significant amount of information and evidence on the problems, and in particular the lack of a safe walking and cycling facility along the SH2 corridor from Ngauranga to Melling.

In 2018, an ILM workshop was held to develop specific problem statements. These were defined taking into account the latest evidence, and strategic context provided in the recently completed Wellington Transport Resilience Programme Business Case and the SH2 Ngauranga to Te Marua PBC. The strategic objectives of the Government Policy Statement (GPS) 2018 were also taken into account.

The updated WH2V Link Programme's problem statements (for the N2P and P2M sections only) are as follows:

Problem 1: Lack of suitable walking and cycling facility between Wellington and Hutt Valley leading to low walking and cycling usage.

Problem 2: SH2 cross-section configuration results in an unsafe corridor for cyclists and walkers.

Problem 3: Poor resilience to seaward side storm events leads to closures of the transport corridor adversely affecting multi modal performance

The ILM workshop attendees confirmed the project objectives and outcomes for W2HV have not changed since the original DBC, namely:

- To provide walking and cycling infrastructure linking Wellington and Hutt Valley that improves safety for pedestrians and cyclists, and that is a catalyst for increased use of walking and cycling between these destinations
- To improve the connections and integration of walking and cycling infrastructure between Petone and Ngauranga and the strategic cycling and walking planning of Hutt City and Wellington City
- To consider transport resilience in providing a walking and cycling facility
- To manage the social, cultural, land use and other environmental impacts of the project in the project area and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, design and conditions

Government Policy Statement 2018

The GPS sets out the Government's investment priorities for the land transport system for 2018 to 2027. It has four strategic priorities as follows:

- Safety
- Access
- Environment
- Value for money.

The W2HV Programme is specifically mentioned in GPS 2018 as follows:

"GPS 2018 supports investment in delivering critical missing links in the urban cycle network in areas of high demand (for example between Wellington City Centre and Lower Hutt)." See GPS 2018: page 17

Accordingly, the W2HV Link Programme strongly aligns with the strategic priorities in GPS 2018.

Alternative and Option Assessment

Three MCA processes, including the options assessed and the outcomes of each MCA process are summarised in more detail in this Addendum. This report also details the additional decision-making processes undertaken for the N2P section.

Hutt Valley Rail Line Straightening Options

In discussion with KiwiRail, an option for straightening the rail lines between Petone and Ngauranga was considered. The purpose of the straightening was to lift the line speed from the current 70km/hour to 100 km/hour.

An economic assessment of the travel time benefits quantified the rail benefits at $8.37M at an estimated additional cost of $8M excluding reclamation costs and environmental mitigation.

When including the costs of reclamation, the estimated incremental cost to straighten the rail lines is $29M. Thus, the cost of straightening the rail lines was found to exceed the benefits based on this analysis.

Subsequent discussions with KiwiRail and Greater Wellington have indicated that rail straightening of the two curves on N2P is not a current priority for them but may be considered again in ten years' time. The rail straightening option was therefore discounted and excluded from the scope of the W2HV Link Programme.

Ngauranga to Petone Section

With rail straightening being discounted as part of the N2P section, the project team undertook further design and assessments of Option 3 (as identified in the 2015 DBC). This involved assessing a number of sub-options, which focussed on the extent of reclamation and the seawall design and took into account the necessary ecology, coastal, and amenity mitigations.

The project team's preferred option is **Option 3F** for the purposes of the DBC Addendum. This entails the 5-metre sealed shared corridor (4m shared path with 0.5 shoulders) with a varied revetment profile. The optimised profile for Option 3F has also been considered by the key specialists in urban and landscape design, ecology, coastal processes, cultural values and CPTED.

Petone to Melling Section

Following the delivery of the 2015 DBC, the Transport Agency's former Value Assurance Committee directed the project team to further investigate options and alignments for cyclists from the Petone Overhead Bridge to Melling.

A cycle only path from the Petone Overhead Bridge to Melling was investigated. The identified preferred option effectively runs in parallel with the Melling Rail Line to the Western Hutt Train Station. From the train station, the cycle path connects to the existing Hutt River Trail which is already connected to Melling Station via the Hutt River Trail. There would also be connections to the existing cycling connections on the Petone Esplanade. Between the Overhead Bridge and Melling, pedestrians would use the local road network.

The project team has worked with KiwiRail to progress the project and to mitigate the impacts and effects on the rail lines. KiwiRail have provided an Agreement in Principle for the design of a cycleway along the rail corridor.

The construction of the P2M section was put out to tender in 2017. Tenders were above the available funding. As such, the implementation phase was put on hold and a cost review and assessment of procurement and delivery options was undertaken.

Recommended W2HV Link Programme

The recommended options for the three sections that make up the W2HV Link Programme, are as follows:

Sections 1-2: Wellington CBD to Ngauranga

The construction of Sections 1 and 2 as an off road 5m shared pathway (3m cyclists, 2m pedestrians) is already complete and opened in July 2018. This has been delivered by Wellington City Council.

Sections 3-4: Ngauranga to Petone

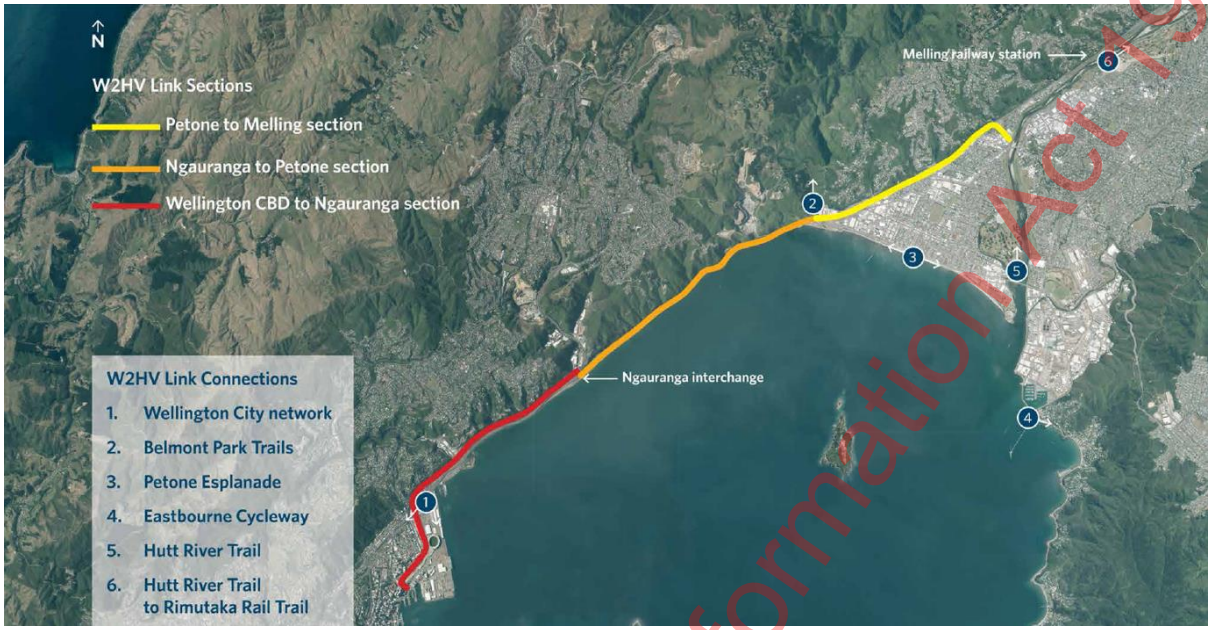
Option 3F is the preferred seaward side option for the N2P section. This consists of a typically 5m reclamation, which might be slightly more or slightly less in some locations depending on existing land form, with a 4m sealed shared path and 0.5m sealed shoulders together with coastal, ecological and amenity mitigation features.

Sections 5-8: Petone to Melling

The recommended option for the P2M section is a cyclist only path from the Petone Overhead Bridge to the Western Hutt Train Station. From this Train Station the cycle path will connect to the Hutt River Trail and to the north. Between these two locations pedestrians will use the local road network.

A off road cyclist facility was considered the preferred option as it would provide safety benefits for cyclists compared to on-road options (which would have significant residual safety risks due to the high-speed environment of state highway traffic).

Figure 1: W2HV Link Sections



Economic Summary

The total W2HV Link Programme has an expected cost $117M, with an NPV cost $99.5M, expected benefits NPV of $114.7M giving it a BCR of 1.2.

For the N2P section, the expected outturn cost in 2018 dollars is:

- Consenting and design $7.3M;
- Construction and MSQA $75.8M
- Total: is **$83.1M**
- The 95th percentile cost is $99.9M.

For the P2M, the expected outturn cost in 2018 dollars is:

- $24.9M (excludes Transport Agency managed costs)

The economic sensitivity testing shows the W2HV Link Programme has a BCR range of 0.9 to 1.4.

IAF Results Alignment

In terms of results alignment, the Walking and Cycling Improvements Activity Class from the Investment Assessment Framework (IAF) for 201821 has been assessed for the N2P and P2M sections. The criteria for this activity class states the following to achieve a Very High results alignment:

*A walking and cycling activity may be given a **Very High** results alignment rating if the activity addresses one or more of the following criteria:*

- *Safety:*
  - *addresses a very high predicted walking or cycling safety risk*

- *Access – thriving regions:*
  - *addresses a critical missing link in a strategic network connection*
- *Access – liveable cities:*
  - *addresses a critical missing link in a strategic network or multi-modal interchange in major metros."*

Completion N2P and P2M sections of the W2HV Link Programme addresses all these criteria and is therefore its results alignment is assessed by the project team as being **Very High.**

The Very High results alignment and BCR of 1.2 means the project is Priority Order 1, the highest priority.

Peer reviews

All the necessary peer reviews were completed for the 2015 DBC. This included parallel estimates, a safety audit and a peer review of the BCR.

Although no peer reviews for this DBC Addendum have been undertaken, the project team has used the P2M tendering costs from 2017 as guide for assessing construction costs for the N2P section. As a result, implementation costs have been updated.

Consenting Strategy

A consenting strategy for only the N2P section has been prepared. This is because the necessary consents/permits have been obtained for the other two sections.

Recommended consenting pathway

The recommended consenting pathway is to take the "traditional" resource consenting pathway (commonly referred to as the two-stage consenting process). It is expected that the main consenting processes will be led by Greater Wellington Regional Council.

This consenting pathway is the favoured for the following reasons:

- The consent application can be determined via a joint hearing (of the three councils) and by independent commissioners
- Consultation to date on the principle of a reclamation has not drawn any adverse feedback
- Matters of contention can be narrowed prior to an Environment Court hearing (if required), and
- The traditional consent process is likely to be more cost efficient than a Board of Inquiry (BoI) process.

The likely consents required are:

- Coastal permit(s) from GWRC;
- Resource consents from WCC and HCC, with NZTA being the requiring authority;
- Designation of the shared path upon currently titled land via a Notice of Requirement.

Property Strategy

The proposed shared path (including all reclamation) occupies land owned the Crown, Port Nicholson Block Settlement Trust and the NZ Railways Cooperation. Ownership of the seabed (needed for reclamation) resides with the Crown with statutory acknowledgement of the seabed shared with Taranaki Whanui.

The Taranaki Whanui are represented by Port Nicholson Block Settlement Trust and Wellington Tenths Trust and Ngati Toa Rangatira, who are represented by Te Tatau o Te Po Marae.

The property strategy, ownership and titling of reclaimed land will be determined during the pre-implementation or consenting phase.

Key uncertainties for the N2P Section

The following key uncertainties have been identified as the project team progresses to the consenting phase of the N2P section:

- The classification of reclaimed land;
- Responsibility for the operation and maintenance of the shared path with local councils and KiwiRail;
- Linkages with the implementation decisions on the P2M section,
- Uncertainty regarding the status of the Petone to Grenada Link Road project;

These uncertainties will be address during the pre-implementation/consenting phase. This is assessed as appropriate because they are not considered to be matters that need to be addressed for the granting of Resource Consents.

Key risks for the N2P Section

As well as the identified uncertainties, the project team has identified the following critical risks associated with the next phases of the project:

- Consenting risks
  - The process of reclaiming land and the titling requires confirmation;
  - Formal agreement with existing landowners (e.g. KiwiRail) is required;
  - Detailed environmental mitigation measures need to be designed;
- Design risks
  - Final design of the reclamation and revetment is likely to be dependent on the type and quantum of specialist construction plant required for construction;
  - Whether the bridge near Ngauranga Interchange will be designed for light or heavy vehicles to address resilience;
- Construction risks
  - Whether international contractors with specialist plant, currently not used in NZ, will tender for the construction contract, which directly affects the methodology adopted, which impacts the detailed design process;
  - Longer construction period if utilising currently available plant in NZ;
  - Control of sediment plumes during construction.
- Operational risks

    - Funding arrangements, correlated to responsibility of the shared path, are still to be determined.
- Stakeholder risks
    - Stakeholders and the public may raise questions about the project from a transport system perspective (e.g. should the reclamation be wider for future proofing purposes in line with wider system capacity and resilience).

The consenting critical risks will be addressed during the consenting phase, whilst the design, construction and operational critical risks will be addressed during the implementation phase.

PART A – THE CASE FOR THE PROJECT

BACKGROUND

The Wellington to Hutt Valley Cycle and Pedestrian Link (W2HV Link) Programme Detailed Business Case (DBC) was approved in 2015. The 2015 DBC can be found here:

https://www.nzta.govt.nz/assets/projects/wellington-to-hutt-valley-walking-and-cycling-link/Part-A-Detailed-Business-Case-Final-V8.pdf

This DBC Addendum updates the DBC 2015 with regards to the two sections of the W2HV Link Programme that are yet to be constructed, which are as follows:

- Ngauranga to Petone (N2P);
- Petone to Melling (P2M).

The section of the W2HV Link between the Wellington CBD and Ngauranga was completed by Wellington City Council in mid-2018. For avoidance of doubt, there is no technical update for this section of the Link provided in this DBC Addendum.

Ngauranga to Petone

The 2015 DBC compared on-road and off-road options types as follows:

- Options 1 and 2: **roading options** which proposed a cycleway in the existing SH2 corridor.
- Option 3: **a separated shared path** on the seaward side of the existing rail lines that includes a 5m reclamation (4m shared path with 0.5m shoulders).

The preferred option selected was the seaward side Option 3. This option included a new sea wall to improve resilience for the Hutt Valley Rail Line, which is vulnerable to closure in storm events. A new shared path also provides operational resilience benefits in the event of SH2 closures due to natural events. It will also provide greater safety benefits for cyclists and pedestrians.

On road cycling and walking facilities were considered as part of DBC 2015, however these were rejected because the walking and cycling facility would still be exposed to landslide risks in an earthquake and therefore the Investment Objective associated with resilience could would not be achieved.

Further option analysis has been carried out on the N2P section including consideration of rail straightening options and wider reclamation width options. These are reported on in this Addendum. The cost estimate for N2P has been updated for the preferred option based on tendered rates received for P2M section in 2017.

Petone to Melling

Following the delivery of the 2015 DBC, the Transport Agency's former Value Assurance Committee directed the project team to further investigate options and alignments for cyclists from the Petone Overhead Bridge to the Melling Train Station.

The preferred cycle only option from the Petone Overhead Bridge to the Western Hutt Train Station was identified as follows:

- From the Western Hutt Train Station the cycle path would connect to the Hutt River Trail and to the north;
- Between the Petone Train and Western Hutt Train Stations pedestrians would use the local road network.

The strategy of a continuous separated cycling facility from Ngauranga to Petone was continued for the Petone to Melling section to maximise safety benefits for cyclists and avoid a less safe cycleway immediately adjacent to SH2. By providing a safe and consistent path through, it is expected that there will greater uptake of walking and cycling between the Hutt and Wellington.

Detailed design has been completed for the Petone to Melling section (sections 5-8 referred in the 2015 DBC), with the construction phase being out to tender. Tender prices received were higher than the approved budget allocation and the tenders are currently on hold. This DBC Addendum reports on possible procurement and delivery options and recommends a procurement strategy for the P2M section moving forward.

This DBC Addendum covers what has changed (i.e. costs, BCR's), and what still needs to be delivered to complete the W2HV Link Programme.

Technical and evidential work since August 2015 is included in the Addendum appendices.

STRATEGIC CONTEXT

The original Strategic Case is included in the 2015 DBC, and the strategic case investment logic map (ILM) is included in the original DBC, which was mainly based on the SH2 corridor strategic case ILM.

Programme Purpose

The purpose of the W2HV Link Programme is to develop a consistent dedicated facility for cyclists and pedestrians between the Wellington CBD and Melling. At Melling the cycleway will connect to the Hutt Valley River Trail which in turn connects to the Rimutaka cycle route to the Wairarapa. This will provide a major tourism opportunity for a continuous cycle route from Wellington Airport to the Wairarapa region,

Walking and cycling context for the region

There are two programme business cases (PBC) which provide the overarching context for the programme.

- SH2 Ngauranga to Te Maura PBC (2016): Transport context for the W2HV Link Programme is given in this PBC;
- Wellington Region Land Transport Resilience PBC (draft, 2018). The resilience context for the W2HV Link Programme is given in Wellington Region Resilience PBC.

These two PBC's are discussed in more detail below:

SH2 Ngauranga to Te Marua PBC (August 2016)

The PBC for SH2 between Ngauranga and Te Marua was developed collaboratively with the NZTA, Greater Wellington Regional Council, Upper Hutt City Council, South Wairarapa District Council, Carterton District Council, Masterton District Council, and KiwiRail

The corridor carries over 115,000 multi-modal commuters and 4,000 heavy vehicles per day as well as significant volumes of rail freight connecting to CentrePort, one of New Zealand's largest ports. SH2 is also a vital corridor in the national network, linking Wellington and Auckland along the east coast of the North Island.

Problems and Benefits:

The PBC identifies the following key problems:

- ***Problem one:*** *"Poor configuration and operational environment of SH2 and associated local network results in poor multi-modal network performance." (50%)*
- ***Problem two:*** *"High traffic volumes and insufficient network capacity results in peak delay and unreliable journey times that adversely affect regional productivity." (30%)*
- ***Problem three:*** *"Constrained topography, the geology and lack of alternative routes results in poor network resilience." (20%)*

The evidence supporting the problem relevant to the W2HV cycleway is:

- Minor events (e.g. rear-end non-injury crashes) have large, network wide, impacts.
- The corridor is at risk of flooding, landslides, tsunami, climate change impacts, earthquakes and liquefaction.
- In the last five years the highway and rail lines have been closed on multiple occasions, including a storm in June 2013 which washed out the rail line for over a week. These events have a massive impact on commuters as there is no simple alternative route.

The PBC identifies the following investment objectives:

- Improve travel time reliability on SH2 between Ngauranga and Te Marua
- Improve public transport in the Hutt valley
- Improve the safety of the transport corridor by reducing the number of deaths and serious injuries
- Increase availability along the transport corridor by reducing the number of journeys impacted by natural closures and delays.

The W2HV Link Programme seek to address some of the above key problems. For example, the poor configuration of the state highway for cycling, lack of a cycle and walking link and vulnerability of the rail lines to closure during a storm. Increase uptake or mode shift to walking and cycling may also help reduce the congestion problem on SH2 especially during peak periods. Corridor capacity issues, lack of an alternative state highway route and resilience of the wider transport system/network are being addressed by other business cases including a re-evaluation of the Petone to Grenada Link Road, which is due for a report back at the end 2018.

Wellington Region Transport Resilience PBC (Draft August 2018)

This PBC identified a programmes of land transport investments to improve the resilience of the Wellington Region's transport network.

The PBC identifies the following problem statements:

- **Problem 1:** A major hazard event will result in the fragmentation of the Wellington Region's land transport network disrupting distribution of essential supplies, delaying recovery
- **Problem2:** A major hazard event will sever routes into and out of the Wellington Region resulting in a significant period of isolation for the population
- **Problem 3:** The Wellington Region's land transport network is vulnerable to hazard events resulting in community severance

The PBC identifies the following benefit statements:

- Benefit 1: Land transport network routes enable recovery
- Benefit 2: Enable improved external access post major hazard events
- Benefit 3: Minimise economic impact of hazard events.

The W2HV Link Road seeks to address part of the above problems. If SH2 and the Hutt Valley Rail Line is shut during an earthquake or landslide event, then the N2P and P2M sections should be able to provide emergency access by cycling and walking. The vulnerability of the rail lines to closure during a storm will be reduced by the new sea wall that will be included in the N2P section, which is also designed to allow for predicted sea level rise.

PROBLEMS, OPPORTUNITIES AND CONSTRAINTS

Problems and Investment Objectives (Refresh at August 2018 meeting/workshop with Project Team)

When the W2HV Link Programme was initiated in 2013, and as the business case approach was still in its early stages, the programme didn't go through an investment logic mapping exercise which usually identifies the problems and investment objectives. Instead, Project Objectives were developed which were used guide option identification and assessment in line with the RMA process.

The W2HV Link Programme did have a wealth of information and evidence (see 2015 DBC report) on the problems of the lack of a safe walking and cycling facility along the SH2 corridor.

The N2P project team held a workshop in August 2018 at which the problem statements were redefined to take into account the strategic objectives of GPS 2018 and the strategic context provided in the Wellington Region Transport Resilience PBC and the SH2 Ngauranga to Te Marua PBC.

The output from this workshop updated WH2V Link Programme problem statements as follows:

- **Problem 1:** Lack of suitable walking and cycling facility between Wellington and Hutt Valley leading to low walking and cycling usage.
- **Problem 2:** SH2 cross-section configuration results in an unsafe corridor for cyclists and walkers.
- **Problem 3:** Poor resilience to seaward side storm events leads to closures of the transport corridor adversely affecting multi modal performance

In line with these problem statement, key investment objectives were defined as follows:

- **Investment Objective 1:** Increase the number of walkers and cyclists who cycle or walk between Wellington and the Hutt Valley from 425 to 850 by 2030.
- **Investment Objective 2:** Make the section of SH2 between Ngauranga and Petone safer by reducing the number of deaths and serious injuries associated to walking and cycling.
- **Investment Objective 3:** Reduce the number of journeys (on SH2 between Ngauranga and Petone) impacted by seaward side events that lead to closures and/or delays.

The workshop attendees also confirmed that the Project Objectives and outcomes for W2HV Link have not changed since the original 2015 DBC, namely:

1. To provide walking and cycling infrastructure linking Wellington and Hutt Valley that improves safety for pedestrians and cyclists, and is a catalyst for increased use of walking and cycling between these destinations
2. To improve the connections and integration of walking and cycling infrastructure between Petone and Ngauranga and the strategic cycling and walking planning of Hutt City and Wellington City
3. To consider transport resilience in providing a walking and cycling facility
4. To manage the social, cultural, land use and other environmental impacts of the project in the project area and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, design and conditions.

The formulated N2P section problems and investment objectives are based on overarching and supporting PBCs, and GWRC and WCC priorities as shown in Appendix A.

Opportunities

The following opportunities have been considered since completing the 2015 DBC.

- Opportunity to increase rail capacity / straighten rails;
- Opportunity to increase Resilience – wider platform options;
- Future proofing opportunities arising from the relevant work identified in the SH2 PBC;
- Opportunity to procure and construct the N2P and P2M sections jointly at the same time as a cost efficiency delivery option;

These opportunities are discussed in the Alternatives and Options section below.

GOVERNMENT POLICY STATEMENT

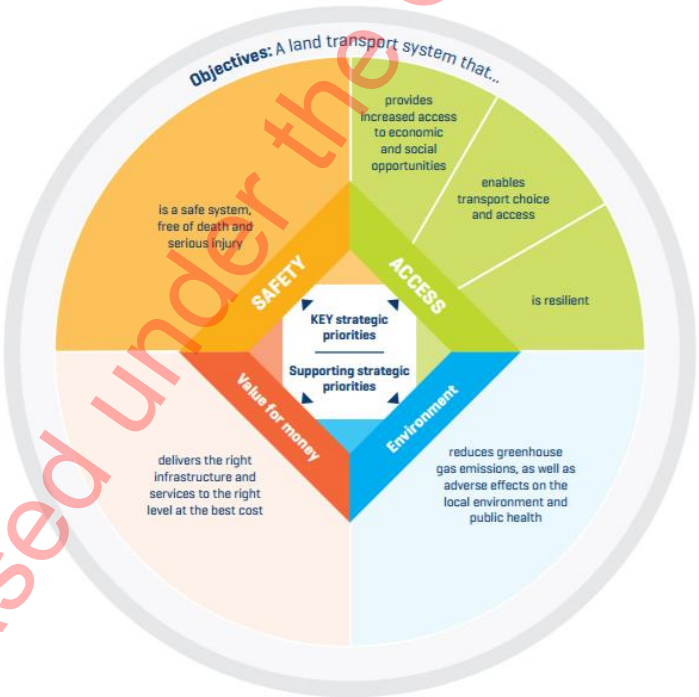
The GPS 2018 sets out the Government's land transport investment priorities for the 2018-27 period. It has four strategic priorities as follows:

- Safety
- Access
- Environment
- Value for money.

Safety and access are the key strategic priorities for the Government and reflect the transport system that it is striving for. To advance these outcomes investments should demonstrate benefits for the environment and offer value for money. For this reason environment and value for money need to be supporting priorities.

Each strategic priority has associated objectives and long-term results (for a 10-year period). Figure 1 from GPS 2018 below outlines how the strategic priorities and objectives work together.

Figure 2: GPS 2018-2021 Strategic Direction



Safety in GPS 2018:

- Reflects a significant increase in the level of ambition for delivering a land transport system free of death and serious injury
- Drives improvements in safety outcomes for all road users, including increased investment in footpaths and cycleways to support access to, and uptake of, active travel modes.

Access in GPS 2018:

- Has a new focus that prioritises improving New Zealanders' access to economic and social opportunities.

The increased focus includes:

- urban areas (cities and towns)
- nationally important freight and tourism connections that are safe, efficient, resilient and minimise greenhouse gas emissions
- improving resilience of the land transport system by placing greater focus on resilience to climate change impacts.
- The increased focus on urban areas is to ensure that transport and land use planning reduces the need to travel by private motor vehicle (excluding commercial vehicles) by:
- supporting a mode shift for trips in urban areas from private vehicles to more efficient, low cost modes like walking, cycling and public transport.

Environment in GPS 2018:

- prioritises reducing greenhouse gas emissions from transport and supports a mode shift to lower emission forms of transport, including walking, cycling, public transport and lower emission vehicles (such as electric vehicles)
- links to the wider environmental commitments of the Government, such as achieving the Paris Agreement target of reducing greenhouse gas emissions to 30 percent below 2005 levels by 2030, and setting a more ambitious reductions target for 2050
- recognises the public health benefits of reducing harmful transport emissions and increasing uptake of walking and cycling
- recognises the importance of urban form for creating liveable cities that value public space and improve access.

W2HV Link Programme Alignment with GPS 2018

The objectives of the W2HV Link Programme are aligned with the objectives of GPS 2018. Furthermore, the programme is specifically mentioned in the GPS:

"GPS 2018 supports investment in delivering critical missing links in the urban cycle network in areas of high demand (for example between Wellington City Centre and Lower Hutt)." See GPS 2018: page 17

STAKEHOLDERS and ENGAGEMENT

INVESTMENT PARTNERS

The partners for delivering the W2HV Walking and Cycling Link Programme are:

- NZTA – responsible for delivering the N2P and P2M sections of the W2HV Link Programme.
- Wellington City Council – responsible in delivering the Wellington CBD to Ngauranga section which has been fully funded by WCC. In addition, WCC has also committed to contribute $5M to fund the construction of the N2P section.
- Hutt City Council – The Council is responsible in delivering the Esplanade to Eastbourne Cycleway and connecting it to the W2HV Link.
- Greater Wellington Regional Council – strongly supports the W2HV which is in alignment to the RLTP focus on active modes. The Council has committed to contributing $2M to fund the construction of the N2P section.

KEY STAKHOLDERS

Key stakeholders with a statutory or regulatory interest in the project were identified early in the project and engaged throughout the development of DBC. The key stakeholders are identified in Table 1:

Table 1: Key Project Stakeholders

Organisation	Role
Greater Wellington Regional Council (GWRC)	Statutory, transport planning and design roles. Potentially also a landowner.
Wellington City Council (WCC)	Statutory, transport planning and design roles. Potentially also a landowner.
Hutt City Council (HCC)	Statutory, transport planning and design roles. Potentially also a landowner.
KiwiRail	Infrastructure provider and landowner.
Wellington Tenths Trust	Iwi
Port Nicholson Settlement Trust	Iwi
Department of Conservation	Statutory role in line with the NZCPS

OTHER STAKEHOLDERS AND WIDER PUBLIC

The 2015 DBC sets out the details with regards to wider consultation with other stakeholders such as advocacy groups and the wider public with regards to the overall strategy and options selection for the W2HV Link Programme.

2017 ENGAGEMENT

Consultation with the wider public was undertaken in 2017 to consult on the recommended option for the P2M section. Key stakeholders and the public were provided with an update on the assessment of options for N2P in line with coastal, ecology, and amenity mitigations as well as opportunities for rail straightening.

A copy of the 2017 engagement report is available on this link: https://www.nzta.govt.nz/assets/projects/wellington-to-hutt-valley-walking-and-cycling-link/W2HV-April-May-2017-consultation-report-summary-201706.pdf

In line with the N2P section, the project team worked closely with KiwiRail in exploring and assessing the viability of straightening the Hutt rail line. The recommendation of excluding the rail straightening to the scope of the W2HV Link Programme has been discussed with KiwiRail at officer level.

N2P ENGAGEMENT DURING CONSENTING PHASE

The project team has been constantly in consultation with the GWRC, WCC, and HCC Councils and with KiwiRail.

As part of recommending the final N2P and P2M option and recommended next steps to the Transport Agency Board, the project team has been liaising with the Councils with regards to integration to local walking and cycling facilities, agreement on the current design and next steps, and funding commitment and opportunities in delivering both sections of the W2HV Link.

As discussed in the attached consenting strategy, a comprehensive engagement with key stakeholders identified in Table 1 as well as the public will be undertaken in 2019 during the pre-implementation/consenting phase for the N2P section.

ALTERNATIVE AND OPTION ASSESSMENT

It is well established that the Wellington to Hutt Valley transport corridor is a key strategic transport link for the Wellington region. It provides a vital connection for users of the road network, including SH1 and SH2, and the rail network (KiwiRail's Wairarapa Line, which is utilised for both Melling and Upper Hutt commuter rail services as well as freight). There are no other direct alternatives.

Additionally, the corridor provides the only cycling and pedestrian facilities between Wellington and Lower Hutt. However, the facilities for cyclists and pedestrians between Ngauranga and Petone in particular, are considered to be sub-standard.[1] As a result, existing cyclists and pedestrians are putting themselves and motorists at risk, and the current facilities do little to increase the perception of safety, nor offer a level of attraction for future users.

The NZTA (Transport Agency) has been developing a preferred option for an upgraded shared walkway and cycleway for the N2P section of the W2HV Link Programme since 2013. This is being carried out with the assistance and support of Wellington and Hutt City Councils (WCC and HCC), Greater Wellington Regional Council (GWRC) and KiwiRail Ltd (KiwiRail).

To date, three Multi Criteria Analysis (MCA) processes have been undertaken to aid option selection for the N2P section. The first MCA (MCA1) was undertaken in 2015, the second (MCA2) in 2017 and the third (MCA3) was undertaken in 2018.

This section of the DBC Addendum provides a summary of the option selection process for the N2P section only. The three MCA processes, including the options assessed and the outcomes of each MCA process are summarised in more detail in the following sections. This Addendum also provides additional information on the decision-making processes undertaken since completion of the DBC in 2015.

2015 Detailed Business Case – N2P Section Update

The project investigations commenced in 2013 with the outcome of these investigations being documented in the 2015 DBC.[2] The DBC was prepared after several previous studies and project feasibility reports had identified the need for improved walking and cycling facilities between Wellington and the Hutt Valley.

For the N2P and P2M sections, the substandard width, the lack of any separation between Horokiwi and Petone and the overall poor nature of the existing walking and pedestrian facilities had been identified as needing to be addressed at the strategic level within the Hutt Corridor Plan, which is a component of the Wellington Regional Land Transport Plan 2015.

An option/alternatives development and assessment process was undertaken to inform the 2015 DBC process. For the N2P section, this evaluation process identified seven

[1] Wellington Regional Land Transport Plan 2015, page 105
[2] Wellington to Hutt Valley Cycle and Pedestrian Link - Detailed Business Case - Final Report December 2014 AECOM NZ Ltd.

long listed options for Section 3 (Ngauranga to Horokiwi Road) and 13 long list options for Section 4 (Horokiwi Road to Petone). The long list of options was subsequently refined through consultation with the stakeholder and working groups, with the final short list of options agreed upon as follows:

- **Option 1: Roadside Option** – utilises the existing cycle path at grade but closes the missing section between Horokiwi and Petone;
- **Option 2: Roadside Option** – similar to Option 1 as it utilises existing cycle path, some of which raised above grade;
- **Option 3: Seaside Option** – by reclaiming on the seaward side of the railway lines.

The final DBC recommended that a dedicated facility for cyclists and pedestrians be pursued and this should be located on the seaward side of the existing Hutt Valley Rail Line, between the Petone Overhead Bridge and the Ngauranga Interchange. This option required reclaiming some of the Wellington Harbour due to the significant limitations on width to provide for the transport requirements of State Highway 2 (SH2), the existing railway lines, as well as safe and accessible walking and cycling facilities.

Following completion of the 2015 DBC, three further options were considered for sensitivity testing purposes. These were:

- **Option X1 (now known as Option 4)** – Widened Roadside to full standards by shifting the railway lines onto reclaimed land north of Horokiwi
- **Option X2 (now known as Option 5)** – Cliffside Reclamation to cater for a 3m shared path where the coastal escarpment is reclaimed where necessary and the State highway shifted to provide sufficient width for a roadside cycleway between the road and the rail.
- **Option X3 (now known as Option 6**) – a 20 metre seaward side reclamation that can be used for other transport improvements.

All six short list options where taken forward to be considered as part of the first MCA process.

Multi Criteria Assessments

Three MCA assessments have been undertaken for the N2P section of the W2HV Link Programme. The purpose of these MCA assessments was to inform reclamation option selection and seawall or revetment design in line with the preparation of the resource consents for the N2P section.

The three MCA assessments are summarised in the following sections.

MCA1

The first MCA (MCA1) was undertaken in 2015[3] following the completion of the 2015 DBC. The purpose of MCA1 was to review the work that had been completed, including through

[3] W2HV Workshop Report - Final, prepared by Incite Wellington Ltd, dated 19.11.15.

the DBC process (and the recommended option) correlated to the requirements of the RMA.

The outcome of the subsequent MCA process was to identify 6 feasible options from a long list of alternatives that could potentially meet the project objectives which were identified as follows:

1. To provide walking and cycling infrastructure linking Wellington and Hutt Valley that improves safety for pedestrians and cyclists, and that is a catalyst for increased use of walking and cycling between these destinations;
2. To improve the connections and integration of walking and cycling infrastructure between Petone and Ngauranga and the strategic cycling and walking planning of Hutt City and Wellington City;
3. To consider transport resilience in providing a walking and cycling facility; and
4. To manage the social, cultural, land use and other environmental impacts of the project in the project area and its communities by so far as practicable avoiding, remedying or mitigating any such effects through route and alignment selection, design and conditions.

There were three assessment components to MCA1, which were undertaken by the project team, a range of specialists and representatives from the key stakeholders. There were three components to the MCA1 assessment as follows:

- **Long list review:** This involved reviewing the long list of options identified in the 2015 DBC to determine whether all appropriate options had been identified, and the reasons for discounting options had been well considered**;**
- **Short list review:** Ensuring that any other options that should have been on the short list were added by considering each of the short list options was given a score relative to specialist areas of expertise. The short list options included the three original options as well as the further three applied as part of the sensitivity testing and any other practical options identified from the long list review. A short report from specialists will be finalised after the workshop.
- **Workshop weighting:** This involved applying a scale ranking to each of the specialist areas in terms of the ability to meet Part 2 of the Resource Management Act (RMA).

The MCA1 process included a do nothing / do minimum option as part of the short list review. In addition to the six options identified as part of the DBC process, Option 7 (cliffside shared pathway), was identified during the MCA1 workshop. In total MCA1 considered nine short list options.

Following confirmation of the long and short list options, each specialist scored the options in respect of their own area of expertise. The options, including the do nothing and do minimum options were scored on a scale of +3 significant positive through to -3 being significant negative with a 0 representing neutral, de minima or not applicable. Specialists who were not present at the workshop scored the options separately and provided the scores to the project team.

Once this was completed, the project team considered the options against the Project Objectives. A further sensitivity analysis was also undertaken to determine whether a change in weighting would produce any different results from the raw aggregated scores achieved after the scoring exercise. It was stressed through the instructions that all

options needed to be considered in terms of the overarching principles reflected in Part 2 of the RMA. In addition, as some of the options included a coastal reclamation, significant attention needed to be given to the reclamation provisions (Policy 10) of the NZ Coastal Policy Statement (NZCPS).

MCA1 Results

It was clear from the raw scores that the two seaward side options were broadly meeting the Project Objectives. The roadside options had deficiencies (e.g. safety) and, in some respects, did not achieve the Project Objectives. The cliff side options scored poorly on a number of criteria particularly ecology and landscape due to the large cuttings required into the hillside at the bluffs.

Option 1 was rejected as it would provide less protection for cyclists and pedestrians because the path would still be located on SH2 with a wire rope barrier which would provide some protection. Cyclists and pedestrians exiting at Petone, if continuing north, would still be required to use the Petone off-ramp, albeit with a barrier. The path would also have a sub-standard width in parts which may compromise safety for pedestrians and cyclists. This option would still be located within the SH2 corridor, albeit with a wire rope barrier, which is less likely to attract new users and would not be as safe as option 3 (which is located outside the road and rail corridors). This option would still be located within the SH2 corridor, albeit with a wire rope barrier, which is less likely to attract new users and would not be as safe as option 3 (which is located outside the road and rail corridors).

Of the seaward options, Option 3 (the 5-metre seaward side reclamation) was the most aligned to Policy 10 of the New Zealand Coastal Policy Statement (NZCPS). Option 6 (the 20m seaward side reclamation) scored very well as it has a number of positive opportunities, including improving transport corridor resilience. However, Option 6 also had a number of negative aspects; for example, it scored lower for coastal ecology and coastal processes due to the size of the reclamation required. To meet Policy 10 of the NZCPS further buy in from stakeholders and evidence for a larger reclamation would be required. It would also require a recasting of the project objectives to consider the wider transport corridor benefits.

Following MCA1, it was considered that implementing Option 3 or 6 would provide "significant regional benefit" and that these two options were significantly preferable in terms of positive and adverse effects under the RMA as compared to the other options considered. On this basis, it was recommended that, notwithstanding Policy 10, either Option 3 or, if justified, Option 6 be pursued.

Following completion MCA1, the Transport Agency publicly announced that a seaward side option (Option 3) was preferred for N2P section of the W2HV Link Programme.

MCA2

MCA2 was undertaken in 2017.

Following the outcome of MCA1, the project team undertook further investigation into the operational requirements and future form of the shared path facility. Importantly there was also a request from KiwiRail to consider 'rail future proofing' options for the Hutt Valley Rail Line, particularly for the out of context curves located immediately to the south of Petone. Future proofing would require additional coastal reclamation.

Consequently, three coastal reclamation options were identified for the N2P section as follows:[4]

- **Option 1 –** A five metre shared walkway and cycleway with the reclamation being kept to the minimum. This involves a reclamation of approximately 8 hectares and excludes rail straightening;
- **Option 2 –** A reclamation that provides for enhanced rail as well as walking and cycling. This option involves a reclamation of approximately 11 hectares;
- **Option 3 –** A reclamation to provide for enhanced rail, walking and cycling and for enhanced coastal mitigation. This option involves a reclamation of approximately 14 hectares.

There were two key assessment components for MCA2 undertaken as follows:

- **Option review:** Each specialist provided a score for each option in accordance with their area of expertise. A short report from each specialists was completed following the workshop. The specialists then applied a scale ranking to each of the specialist areas in terms of the ability to meet Part 2 of the RMA;
- **Project Objectives Assessment:** Following completion of the workshop and the specialists finalising their scores, the project team consolidated the scoring and assessed the options against the original walking and cycling Project Objectives.

When reviewing the options, the specialists used the same methodology as used in MCA1. Specialists who were not present at the workshop scored the options separately and provided the scores to the project team.

Following the specialists scores the Project team compared the workshop weightings to a number of further sensitivity tests.

MCA2 Results

The outcome of MCA2 was largely inconclusive. This is due to the conflict that arose between some key specialists based on the size of reclamation required. The specialist raw scores showed that Option 1 scored better overall than options 2 or 3. Option 2 was least preferred in terms of landscape and urban design, while Option 3 provided the greatest overall landscape, urban design and Crime Prevention through Environmental Design (CPTED) benefit. Of the specialists, cultural, ecology and coastal processes all scored Option 3 the most negatively, on the basis that the larger the area of land to be reclaimed the worse the magnitude of adverse effects.

As a result of MCA2, it was recommended that all Options proceed to a more detailed assessment of effects, including development of mitigation prior to any consultation with the public or key stakeholders.

Due to the inconclusive nature of MCA2, the workshop report was never finalised. The report remained in draft as the project team recognised that further work needed to be done to justify the larger reclamation for rail improvement purposes. The viability of the rail straightening options was to be determined from the economic analyses that was yet to be completed during the time the MCA2 was undertaken.

[4] Note: The numbering for the coastal reclamation options should not be confused with the option numbering in the 2015 DBC.

MCA3

Following MCA2, a qualitative and risk-based assessment of the available alternative options (MCA3) was carried out by the project team. MCA3 considered the same three options as MCA2 and one additional option which is the equivalent of Option 1 with additional reclamation for amenity (known as Option 1B).

After concluding that rail straightening was not a fundable option, a third MCA3 was undertaken wherein the purpose was to assess the mitigation requirements for the preferred option (option 3 from 2015 DBC).

The workshop discussion was based on the project team agreeing on an absolute rating of high, medium or low to give a qualitative measure of the project's consistency with benefit and risk criteria including SH2 PBC objectives, benefits, future proofing, costs and the difficulty of implementation. A similar process had recently been undertaken to inform programme business cases, such as Nelson Southern Link and was considered to be consistent with the Transport Agency's MCA guidelines. The process was adapted to suit the particular context of the Ngauranga to Petone corridor and the Project.

The workshop was informed by the further work undertaken by the Transport Agency, KiwiRail and the project team following MCA2. This further work was primarily to:

1. Consider potential capacity and resilience outcomes, particularly the effect on the corridor of landslides;
2. Quantify the benefits of rail for all the options;
3. Update the overall costs and the benefits of the project;
4. Consider methods of project funding; and
5. Carry out discussions with project partners as to support for the project objectives.

In relation to point one above, the project team decided that it needed to investigate additional wider reclamation opportunities (for the purpose of capacity and landslide resilience improvements) to tell a complete story as part of the project. As part of this process the project team reviewed the SH2 Ngauranga to Te Marua PBC and confirmed that the outcomes within were still relevant for the W2HV project. They also confirmed the associated assumptions within the SH2 Ngauranga to Te Marua PBC related to state highway capacity and landslide resilience were accepted. The project team has aligned the Ngauranga to Petone project scope (options 1, 2 and 3) with the approved SH2 programme. Longer term improvements involving wider reclamation for the purpose of capacity and/or landslide resilience is still to be decided by the Transport Agency Board in line with the Wellington Transport Resilience PBC.[5]

In addition to the further work undertaken above, the SH2 Ngauranga to Te Marua PBC Investment Objectives were used to inform MCA3. The four investment objectives are set out below:

1. Improve travel time reliability on SH2 between Ngauranga and Te Marua;
2. Improve public transport in the Hutt Valley;

[5] PBC_DRAFT REPORT: https://infohub.nzta.govt.nz/otcs/cs.dll/link/33878951

3. Improve the safety of the transport corridor by reducing the number of deaths and serious injuries; Improve the quality of infrastructure by increasing the KiwiRAP Star Rating; and
4. Increase availability (resilience) along the transport corridor by reducing the number of journeys impacted by natural closures and delays.

MCA3 considered the same three options as considered in MCA2 plus one additional option. This option was equivalent to Option 1 from MCA2, but included additional reclamation for coastal, ecology and amenity improvements. This option was named Option 1A. The options are summarised below:

- **Option 1:** A five metre shared walkway and cycleway with the reclamation being kept to the minimum;
- **Option 1A:** A five metre shared walkway and cycleway with the reclamation providing for varied revetment/enhanced coastal, ecology, and amenity mitigation;
- **Option 2:** A reclamation to also provide for enhanced rail as well as walking and cycling;
- **Option 2A:** A reclamation to provide for enhanced rail, walking and cycling and for a varied revetment/enhanced coastal, ecology, and amenity mitigation.

Through the MCA3 process it is important to note that the specialist assessments from MCA2 remained unchanged. Specifically, it is considered that the larger the reclamation, the greater the cultural, ecological, and coastal process effects would be. Conversely, the options with the varied revetment, and consequently a larger reclamation, had less environmental effect in terms of landscape and urban design.

MCA3 Results

MCA3 confirmed that:

- All four options rank 'high' for walking and cycling journey times (and reliability), walking and cycling safety and coastal resilience.
- All four options rank 'low' for capacity improvements and landslide resilience in terms of future proofing.
- Options 1A and 2A, with higher amenity and a varied revetment, ranked better than Options 1 and 2 for mitigating landscape and visual effects.
- On the other hand, the larger the reclamation the greater the effects on cultural, ecological and coastal process effects and a more expensive cost.

The project team concluded that the preferred option (option 1A above) should be considered for public consultation as part of the consenting phase.

Kiwi Rail straightening options considered

In conjunction with KiwiRail, an option for straightening the rail lines between Ngauranga and Petone was considered. The purpose of the straightening was to lift the line speed from the current 70km/hour to 100 km/hour. These were the options named Options 2 and 2A as above.

An economic assessment of the travel time benefits by Aurecon quantified the rail benefits at $8.37M, and at an estimated additional cost of $8M (excluding reclamation costs and environmental mitigation costs). The Aurecon report is in Appendix E.

When including the costs of additional reclamation, the estimated incremental cost to straighten the rail lines is $28M. Thus, the cost of straightening the rail lines was found to exceed the benefits based on this analysis.

Subsequent discussions with Kiwirail and Greater Wellington Regional Council have indicated that rail straightening of the two curves between Ngauranga and Petone is not an immediate priority but may be considered in about ten years' time. The rail straightening option was therefore discounted and is not recommended to be included in the scope of the N2P section.

Further refinement of N2P Option 3 and value engineering

Based on the above results and in consultation with Transport Agency officers, the project team decided that rail straightening options are to be excluded from the scope of the W2HV Link Programme. Consequently, the project team further refined Option 3 (Option 1 and 1A from the MCA process) thru a value engineering exercise to come up with a 'consentable' and affordable option for the N2P section. This involved further investigating value for money opportunities being cognisant of the consenting risks (i.e. as identified by the key technical specialists in urban and landscape design, ecology, coastal processes, cultural values and CPTED).

Sub options were developed further for the preferred Option 3 from the DBC 2015 that were considered with updated cost estimates included:

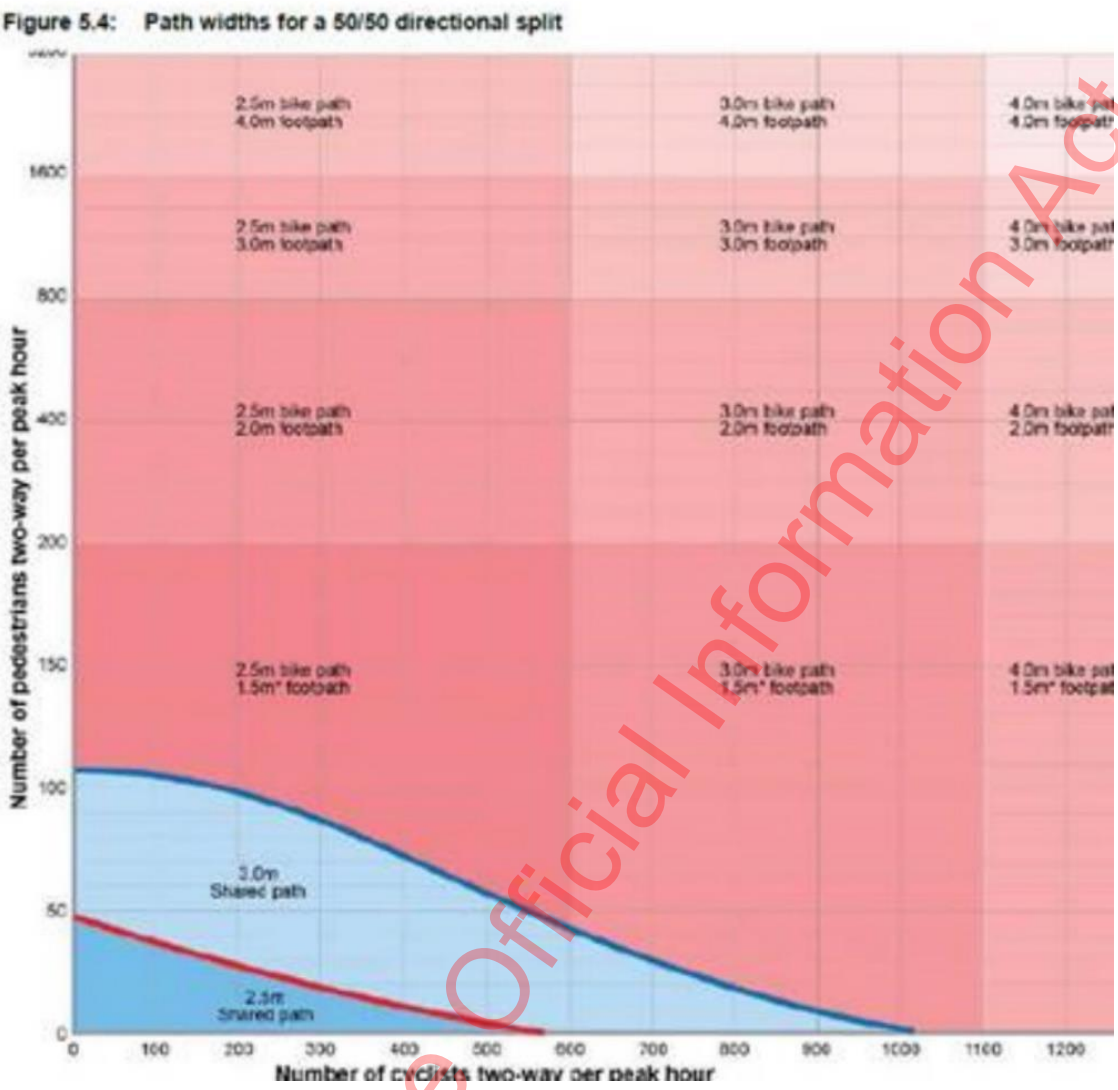
- **Option 3** is the original W2HV DBC 5m reclamation path (4.0m shared path with 0.5m shoulders) with a revised revetment with a cost of $65.3M;
- **Option 3B** is the same as Option 1 and includes environmental mitigation and infrastructure for recreational opportunities at a cost of $92.5M;
- **Option 3C** is a 4m reclamation (3.0m shared path with 0.5m shoulders) with a larger reclamation for amenity opportunities with a cost of $79.8M;
- **Option 3D** is the same as Option 1C but allowance for a non-structural retaining wall between KiwiRail and the path is included with an overall cost of $78.7M;
- **Option 3E** is the same as Option 1D without walls between KiwiRail and the path with a cost of $79.6M;
- **Option 3F** is a 5m reclamation without any walls between KiwiRail and the path, optimised environmental mitigation and inclusive of an iconic bridge at a cost of $83.1M.

Options 3C, 3D and 3E all included a 4m reclamation (3.0m shared path with 0.5m shoulders) which produced a $12M cost saving over the 5.0m reclamation. However, consideration of the capacity of a 3.0m shared path versus the potential future demand for walking and cycling led to these options being subsequently discounted.

Shared Path Width Required for future demand

The width of the shared path will be required to cater for future cyclist and pedestrian demand. The proposed width of 4.0m (plus 0.5m shoulders) was assessed against the Austroads guidance as set out in the table below:

Figure 3: Recommended Shared Path Widths for 50/50 directional split (Austroads)



Highest demand is predicted at the weekends for tourist and recreational trips.

Looking at the projected cyclist numbers over the first 25 years, the likely weekday peak hour numbers are approx. 250-300 cyclists and up to 100 pedestrians. This puts the forecast demand into the 3.0m shared path width. Shoulders need to be added and using 0.5m shoulders. For this situation, 4m is the appropriate shared path width.

For the weekends and the weekdays after the first 25 years, the likely numbers averaged over a year is more than 300 cyclists per hour and up to 200 pedestrians per hour. This puts it into the 4.0m path width (with shoulders to be added) category. A 5m path (with shoulders) would meet standard for the average weekend but not a 4m path (with shoulders).

As the reclamation is likely to have a design life of 100 years and noting that the cost ($12.7M) to widen a 4m wide shared path by 1m to increase capacity within the same physical works project, and that there were limited transport benefits to be gained, the project team concluded that a 5m shared path would achieve value for money. The

costs to widen the shared path after completion to take account of the capacity increases is significantly more than $12.7M and is estimated at a minimum of $20M. Therefore, there it was concluded that a 4.0m (plus 0.5m) shoulders was sufficient.

For the avoidance of doubt, 5m was the recommended width in the original DBC of 2015, with a 3m path and 1m shoulders. Subsequent work since 2015 and a check against current standards has confirmed that a 5m corridor is required, which now comprises a 4m path with 0.5m shoulders.

The preferred option is named Option 3F to maintain consistency with the original Option 3 from the DBC of 2015.

DBC 2015 Addendum – P2M Section

Following completion of the DBC 2015, the Transport Agency decided to further investigate cycling and walking options and alignments north of the Petone interchange to the Melling Train Station.

From the Petone Overhead Bridge to the Western Hutt Train Station a 3.5m wide cycle path is to be provided, effectively running in parallel with SH2. From the Western Hutt Train Station to Melling, a shared path to the Hutt River Trail is to be provided. Connections at to the existing shared path on the Petone Esplanade would also be provided. Pedestrians will be encouraged to use the local road network through signage at the entry points to the proposed cycleway. It is noted that early investigations determined that there was insufficient width within the Melling rail corridor to provide a shared path to Austroads standards.

The project team has worked with KiwiRail to progress the project and mitigate the impacts and effects to KiwiRail. KiwiRail has now provided an Agreement in Principle for the concept design.

Together with HCC, the project team investigated and refined two options to link the cycle path from the rail corridor near Normandale overbridge to the Hutt River Trail via a shared path and this is shown on the drawings in Appendix L. These options identified the impacts on parking availability for Parliament, Pharazyn, Bridge and Marsden Streets.

HCC have a preference for the option that utilises the area under the Normandale overbridge, provided the area could be cleared of vegetation and sight lines improved. This option has the least impact on the number of parking spaces needing to be removed and meets HCC's desire to provide road crossing points for the shared path that are away from intersections. This option also followed the general philosophy of providing an off-road facility between Petone and Melling.

Concerns were raised regarding the safety of users at night. Both the project team and HCC concluded that, although the area under the Normandale overbridge would be improved and monitored by CCTV, concerned users would have the option of using the existing footpaths and roads to mitigate those concerns.

The project team had a small preference for the option under Normandale overbridge, which was adopted as the preferred option after feedback from the public engagement undertaken during May 2017 was received and taking into account HCC's wishes.

The P2M construction phase of the project was put out to tender in 2017. Tenders received were above the available funding and the project was put on hold. Consideration was given to procure and deliver the N2P and P2M sections jointly at the same time with the aim of obtaining cost efficiencies from a larger combined construction project with lower preliminary and general costs. However, the next step for the N2P section is to obtain resource consents which could take some time and would delay construction of the P2M section, which is ready to proceed now, by 2-3 years, thereby negating any cost efficiencies that might be achieved from a combined N2P and P2M construction project. Also, there is an opportunity to make use of contractor resources that have become available due to a slowing in the industry. The preferred option is therefore to proceed with P2M now and progress the consents for N2P. This is discussed further in the Commercial Case in Part B.

Re-Assessment of P2M alignment options

The Project Team was directed to re-assess the route alignment options investigated in 2015. Below is a summary of the pros and cons of the different route alignment options considered.

Table 2: P2M Section Route Alignment Options

Route Alignment	**Hutt Road Option**	**SH2 Option**	**Rail corridor Option**
Alignment with W2HV Investment Objectives			Highly meets the W2HV investment objectives in line with safety and increase uptake of cycling for mode shift.
Description	2-way cycle lanes from Hutt Road to Pharazyn Street.	Underpass from N2P cycleway to Petone station to SH2 via McKenzie Avenue utilising shoulders of SH2 as far as Dowse.	Dedicated/separated cycleway facility within the Hutt Rail corridor as described above.
Safety	Safety risk at intersections/driveways Opening doors from parked cars Side friction with local road traffic Connection with N2P cycleway SB through Petone RAB	Side friction with SH2 traffic (vehicles @ 80-100kmh speeds). Insufficient shoulder width north of Dowse to act as cycle lane	Cycle facility separated from local road and SH2 traffic.
Uptake of new cyclists	Lower uptake from non-confident cyclists	Lower uptake from non-confident cyclists	Higher uptake especially for non-confident cyclists

Costs	$10-15M	$10-20M	$25M
P2M Section Benefits P2M section BCR	$5-7M <1.0	$5-7M <1.0	$22M 0.9
Wider W2HV Benefits (NPV) Wider W2HV Costs (NPV) W2HV Link Programme BCR	$103M $83-85M 1.2	$103M $85-94M 1.0-1.2	$117M $100M 1.2
Implementability risk	High - HCC does not support, Risks working within local road. Loss of carparks	Medium, risks working within SH corridor . Linkages to/from Dowse exit/entry ramps is sub-standard requiring clip-ons or reduced standard cycle lanes and/or reduced number of lanes on slip roads	High, complex, risks working within rail corridor
Connectability to W2HV facility and cycling network	Connected to wider local road network. Further improvements required on local road network.	Connected only at Petone interchange/station, Dowse interchange, and Melling intersection.	Local Road connections only from Petone interchange, Dowse interchange and Parliament Street.
Access from different communities	Direct access at multiple points.	Direct access at Dowse and Melling intersections Indirect/circuitous route from northbound users	Direct access at Petone rail station, Dowse interchange, Bridge Street, and Rivertrail from Melling.
Political support	Option not supported by HCC	Some degree of support from HCC, GWRC	Option supported by HCC, KiwiRail, and GWRC
Overall summary	High safety risk and perceived safety will result to lower uptake of new and less confident cyclists.	High safety risk and perceived safety will result to lower uptake of new and less confident cyclists.	Provides greatest safety benefits being separated from SH2 and local road traffic. Higher perceived safety and direct

	Higher connectivity and accessibility from Eastern suburbs. Does not maximise benefits for overall W2HV Link.	Accessible at Petone, Dowse, and Melling intersection. Does not maximise benefits for overall W2HV Link.	connection to the N2P section maximises uptake for new and less confident cyclists. Accessible at key connections. Route acts as a cycling motorway being a direct and continuous link between W2HV. Maximises benefits for overall W2HV Link.

Based on the assessment of the above, the project team recommends the P2M alignment within the rail corridor as this best achieves the investment objectives of the W2HV Link Programme.

The project team have also consulted with Transport Agency cycling and multi-modal subject matter expert advisors and they agree with the recommended P2M option within the rail corridor.

RECOMMENDED W2HV LINK PROGRAMME

The recommended options for the sections that make up the W2HV Link Programme are:

CBD to Ngauranga (Sections 1-2)

The construction of Sections 1 and 2 as an off road 5m shared pathway (3m width for cyclists and a 2m width for pedestrians). This section is now complete and was officially opened in July 2018.

N2P (Sections 3-4): Recommended Option

Option 3F is the preferred option for the N2P. This consists of a typically 5m reclamation, which may be slightly more or slightly less in some locations depending on existing land form, with a 4.0m sealed shared path and 0.5m sealed shoulders together with coastal mitigation features that provide coastal, ecological and amenity mitigation improvements.

P2M (Sections 5-8): Recommended Option

The recommended option for P2M follows the strategy of N2P of providing an off-road facility to maximise the number of new cyclists travelling between the CBD and Melling and improve overall safety for active modes.

From the Petone Overhead Bridge to the Western Hutt Train Station a 3.5m wide cycle path is to be provided, effectively running in parallel with SH2. From the Western Hutt Train Station to Melling, a shared path to the Hutt River Trail is to be provided. Connections at to the existing shared path on the Petone Esplanade would also be provided. Pedestrians would use the local road network.

Recommended Option Drawings

Drawings associated with the recommended option are located in Appendix L.

RECOMMENDED OPTION – N2P SECTION ASSESSMENT

Outcomes

Option 3F is the option that best addresses the investment and project objectives as it:

- Provides for the increase in the number of walkers and cyclists predicted between Wellington and the Hutt Valley;
- Provides a separated walking and cycling facility between the full length between Ngauranga and Petone thereby maximising the increase in safety of the route for walkers and cyclists;
- Reduces the impact of storm events and sea level rise on the rail line and therefore meets the improved resilience objective;
- Provides for operational resilience wherein the W2HV Link could act as a response and recovery route in the event of a landslide event along SH2 between Ngauranga and Petone;
- Minimises the extent of proposed reclamation, whilst also incorporating necessary measures to mitigate potential adverse effects; and
- The proposed footprint provides ecological and amenity improvements to the project, which assists in providing sufficient mitigation through the project consenting phase.

Implementability

Constructability

Accessibility to site is constrained by the narrowness of the reclamation, correlated to the proximity of the live rail lines. Minimal turn around areas means reclamation material is likely to be deposited by truck from north to south. Trucks will need to tip and drive out before next truck can deposit. The possibility of use side cast rail carriages at night will be investigated during the pre-implementation phase of the project.

Standard NZ based construction machinery (diggers, tip trucks, cranes) will be used. Specialist marine-based machinery (likely to be from overseas) will be required to create the toe of revetment and to deposit primary and secondary armour in conjunction with land-based machinery.

The difficulty to construct the reclamation is a function of the constraints related to accessibility to site (as above). As work progresses southwards (general fill followed directly behind by armouring to protect the reclamation fill from erosion), then the distance for single file trucks to travel becomes longer and time to construct is a function of travel distances and the management of multiple operations occurring at once within a limited corridor width. The urban design build-outs provides an opportunity for turnaround areas, thereby reducing the length of single file tip and drive activities before the next truck can deposit.

Operability

There are no operational costs associated with the recommended options other than routine and periodic maintenance activities. The organisation responsible for the maintenance of the shared path is still to be determined. We currently think it will be the NOC operator, but further discussions will happen in the future.

Consenting Strategy

A consenting strategy for only the N2P section has been prepared. This is because the necessary consents/permits have been obtained for the other two sections.

The Consenting Strategy (2018) is attached as Appendix I

Statutory Requirements

The Resource Management Act 1991 (RMA) is the principal statutory framework for consideration of the consent requirements prior to implementation of the W2HV Link. It provides the framework under which statutory development can occur.

Part 2 of the RMA sets out the statutes "sustainable management" purpose (s5), various matters of "national importance" which decision makers must recognise and provide for (s6), other matters which decision makers must give "particular regard to" (s7) and Treaty principles which decision makers are required to consider (s8). Essentially Part 2 defines the central policy drivers of the RMA. All decisions on projects (whether by way of consent applications, notices of requirement or plan changes) must be scrutinised by reference to these Part 2 matters. In relation to the N2P section of the W2HV Link Programme which involves reclamation, section 6 and 7 matters are very relevant matters to be considered.

NZ Coastal Policy Statement

The Resource Management Act 1991 established a coastal management regime based on a partnership between the Crown and the community through their regional and local authorities. The Act requires a New Zealand Coastal Policy Statement (NZCPS) to guide local authorities in their day to day management of the coastal environment

Policy 10: Reclamation and de-reclamation is of particular relevance to the N2P section as it considers reclamation.

The NZCPS is a powerful document that sits at the apex of National Policy Statements and Plans. It is considered that the Project fits within the exclusions to avoid reclamation in the coastal marine area in Policy 10(1) for the following reasons.

- The Ngauranga to Petone corridor is constrained for width between the coastal escarpment and the already reclaimed foreshore.
- Alternatives for transport corridor widening that involve excavations into the coastal escarpment are seen to be have considerable risk from a geotechnical engineering perspective and have been able to be discounted.
- Being in a coastal environment the existing corridor is at some risk from coastal inundation. A wider and higher coastal barrier would provide for much greater levels of resilience.

- As a consequence of the safe widths and the requirements for highway, rail and cycling and walking facilities on a strategic transport corridor with no feasible alternative route, reclamation is required.
- Local mana whenua have been included in all stages of the option selection process for the Project through their selected representatives. Extensive consideration has been given to the relationship between the existing landscape and reclamation area.

Regional Statutory Documents under the RMA include the Regional Policy Statement, the Operative Regional Plans (i.e. Regional Coastal Plan for Wellington Region and the Proposed Natural Resources Plan (PNRP), which are written and implemented by GWRC.

Recommended consenting pathway

The recommended consenting pathway is to take the "traditional" resource consenting pathway (commonly referred to as the two-stage consenting process). It is expected that the main consenting processes will be led by Greater Wellington Regional Council.

This consenting pathway is the favoured for the following reasons:

- The consent application can be determined via a joint hearing (of the three councils) and by independent commissioners
- Consultation to date on the principle of a reclamation has not drawn any adverse feedback
- Matters of contention can be narrowed prior to an Environment Court hearing (if required), and
- The traditional consent process is likely to be more cost efficient than a Board of Inquiry (BoI) process.

The likely consents required are:

- Coastal permit(s) from GWRC;
- Resource consents from WCC and HCC, with NZTA being the requiring authority;
- Designation of the shared path upon currently titled land via a Notice of Requirement.

Property Impacts

The N2P section (including all reclamation) occupies land owned by the Crown, Port Nicholson Block Settlement Trust and the NZ Railways Cooperation.

Ownership of the seabed that is required for the reclamation resides with the Crown with statutory acknowledgement of the seabed shared with Taranaki Whanui, who are represented by Port Nicholson Block Settlement Trust and Wellington Tenths Trust and Ngati Toa Rangatira, who are represented by Te Tatau o Te Po Marae.

The ownership and titling of reclaimed land will be determined during the consenting phase which will remain a risk to the project until it is addressed.

Assessment of N2P Section Impacts

Design and cost of the recommended option was informed by the specialist requirements on the following disciplines. The impacts below are summarised from the technical specialists individual reports contained in Appendix C

Amenity and Visual mitigation

The project team's environmental, urban design, landscape and ecological consultants considered various mitigation options which may be required to meet RMA requirements and to obtain the necessary consents for the project to proceed.

All options include a large cycle/foot bridge which includes an element of urban design given its prominent location at the gateway to Wellington.

To provide mitigation for the loss of the landscape aspects of natural character as well as visual amenity, visual variation and interest, enhanced safety, terrestrial habitats and opportunity for cultural expression, the project team designed three profiles that create a varied revetment:

1) High Tide Bench – Consisting of a 4–5m wide hightide bench at Mean High-Water Springs visually anchored with architectural rocks;

2) High Tide Outcrop – a modulated upstand within the coastal marine area (CMA) at High tide;

3) Offset Standard – similar in profile to the standard revetment but offset further into the CMA.

The proposed Option 3F is scaled to the existing landforms of the coastal escarpment and the Wellington Harbour itself. It is the result of a collaborative design process, with inputs from the wider project team and specialists following selection of a seaward option. More recently the design response has been refined to consider mitigation for ecology effects and cultural expression opportunities in more detail.

The location and form of all revetment buildout areas are derived from extending spurs or scaling to logical landscape units such as between streams and associated valleys within the escarpment, and as such the design is sympathetic in nature. The design mitigates the curvilinear nature of the shoreline by inserting the revetment buildouts (High Tide Bench, High Tide Outcrop and the Offset standard). These interventions are placed approximately or adjacent to the Ngauranga spurs so that they are understood as belonging together, greatly aiding the notion that the shared path is embedded within the overall landform, again reinforcing the perception that they belong in this coastal landscape. Recognising the strongly vertical/horizontal nature of these elements, the revetment profile intervention extension into Wellington Harbour is controlled by the existing rocky headlands to which they are subservient.

The revetment and reclamation provide for public access through a shared path and will provide greater opportunities for the project objectives to be met including appropriate

mitigation for natural character, adverse ecological effects and allow Mana Whenua to re-establish connection to the coastal marine area via the north-western harbour edge.

Urban design elements including the path variation at the revetment buildouts, materiality, design and planting as welling lighting and wayfinding signage will complement the experience on this edge. The landscape prospect across the harbour to Matiu/Somes Island, toward the Wellington heads and eastern ranges provide a very strong sense of place on which the project will draw in terms of the immediate experience for cyclists and pedestrians and flow on benefits optimised and enhanced by the varied revetment.

Ecology

Overall, while the landscape design proposed for Option 3F has taken ecological matters into consideration and incorporated some mitigation measures into the design, the level of ecological effect associated with the reclamation is still significantly greater than the benefit derived from these measures. Given the physical separation of a safe habitat for avifauna will not be achieved, the ecologists have recommended that dogs not be allowed on the shared pathway to minimise effects on nesting and roosting avifauna. The project team will investigate the feasibility of a dog-free pathway as part of the consenting phase. Signage will also be erected informing and educating people about the avifauna using the coast.

Offsetting may be required in order to address the residual effects not able to be mitigated for through the landscape design.

Crime Prevention through Environmental Design (CPTED)

In summary:

- Urban and landscape design treatments for developing nodes and pause points which add amenity and interest, and utilisation options for a wider cross-section of the community, is considered an essential part of the project and is therefore highly endorsed;
- The most effective CPTED strategy which is complementary to assuring success as a cycle/walkway, is the approach of maximising activation (walking and cycling activities);
- How each end of the N2P section is "knitted into" the other sections of the W2HV Link Programme, and made safe, are important considerations for activation and utilisation;
- Successful treatment of the KiwiRail storage yard near Horokiwi would have a positive impact on the project

These recommendations will be developed during the consenting phase.

Cultural

Overall the biggest set of cultural impacts relate to reclamation however there are a number of elements which help mitigate those effects. The material used at the faces of the reclamation should be similar to the rocky shoreline that is being replaced such that algae and other marine life can re-establish in the inter-tidal zone. Although from a fisheries perspective this is not regarded as being highly valuable in comparison with the

outer Wellington Harbour, it does however add to the overall eco-system that is the harbour.

The seaward side location of the N2P section will serve to protect both the Hutt Valley Rail Line and SH2, but in particular the railway. This will provide benefits in times of southerly storms which cause wave build-up in this part of the harbour.

One of the impacts of particular interest to the waka community (waka ama and other waka), is that there will be a significant improvement in the landward access to this length of coastline for both cyclists and walkers and for spectators for what could be a full rowing course at the Petone end of the N2P section.

Port Nicholson Block Settlement Trust own the land known as Honiana Te Puni Reserve as a part of the 2009 Treaty settlement. Accordingly, they have an interest in both present and future uses of that space. Although there are no specific development plans for the reserve these are being considered in combination with the various parties in the vicinity.

Along the course of the N2P section there are connections particularly via the streams that flow from the neighbouring harbour escarpments such as Waihinahina Stream (Horokiwi Quarry), the Waitohi Stream (Ngauranga) and others. These areas can form part of the interpretation along the route as places of interest. These areas are assisted by the revetment areas which extend out into the harbour which provide not only an area to rest off the shared pathway, but can also provide areas the equivalence of the rocky shore reef. They are also areas with views of Matiu/Somes and Mokopuna along with the rock stacks around the Islands in the Harbour.

There can be positive cultural impacts as a part of this project. This could include revitalising the shoreline which has suffered considerable neglect over the years and for which mana whenua had little access. The project will positively add to the utility of Honiana Te Puni Reserve which will serve as a destination along the route where family groups can picnic and enjoy the surroundings.

In summary, from the cultural perspective, any losses of the coastal margins on the harbour can be offset against gains by ensuring the edge of the reclamation mimics the old rocky coastline that has changed radically over the years with previous reclamations for road and rail. The effect of the rail in particular was to exclude walkers and fishermen from this part of the shoreline.

This is the best area of the harbour for water sports, such as, rowing and waka ama, and enhancing the access along the shoreline will have benefits for these water users.

Coastal Processes

The project team developed performance criteria for users on the shared path to enable the revetment profile to be designed. Bathymetric and topographical surveys were combined to produce a 3-dimensional model from which wave forces, correlated to the performance criteria, were modelled and a revetment profile determined:

Water level scenarios evaluated:

- Present day;
- 2050 for 35 year consent lifetime and 0.3m Sea Level Rise (SLR);

- 2115 for 100-year design lifetime and 1.0m SLR.

Design conditions:

- 1-year Average Recurrence Interval (ARI) average overtopping discharge < 0.004 l/s/m (not dangerous to pedestrians, possible minor damage to building fittings/signs/posts, no revetment damage);
- 1% Annual Exceedance Probability (AEP) (100-year ARI) extreme storm conditions not causing damage to revetment.

Berm features:

- Berm width 2m;
- Minimum berm elevation is 0.2m WVD-53, which meets design conditions until SLR exceeds 0.7m (approximately 2080);
- Berm slope is horizontal.

To comply with the 1-year ARI overtopping condition in 2115 a 2m wide berm at 0.2m WVD-53 elevation may be adapted by increasing its elevation to 1.5m WVD-53. A 3m wide berm at 1.2m WVD-53 does not require adaptation by increasing the elevation but increases the overall footprint on the seabed and project construction cost.

The preliminary baseline assessment addresses the current and likely future effects of the environment on the project which are not expected to change materially during the detailed modelling, other than the local contribution of swell through Wellington Harbour entrance, which hasn't previously been considered. The detailed assessment to be undertaken in the consenting phase of the project will address these effects in more detail (including results from the modelling phase) along with the effects of the project on the environment including the temporary construction effects and ongoing operational effects.

The key points to note to date are:

- **Geology**. The existing road and rail transport corridor from Wellington to Petone is built on a raised beach and wave-cut platform which was uplifted and tilted by 1.2-1.5m during the 1855 Wairarapa earthquake. The prominent Wellington Fault is also aligned sub-parallel to the project corridor, positioned approximately 250-400m offshore from the Ngauranga to Petone shoreline and is uplifting on its western side.

- **Seabed sedimentation** adjacent to the project corridor has accumulated at rates of 26 mm/year with a thick layer of muds overlying basal sediments. Over the past decade of GPS measurements, the Wellington area has been subsiding at a rate of 2mm/yr. due to inter-seismic slow slip.

- **Bathymetry**. The bathymetry of Wellington Harbour drops rapidly to 15m depth at 60m from Ngauranga shoreline but less dramatically closer to Petone Beach to 5m depth at 140m offshore from Horokiwi Road. A bathymetry survey was conducted in 2016 to update the bathymetry model of the harbour around project foreshore, combining it with various other bathymetric and terrestrial surveys of the Harbour and environs.

- **Tides**. The tidal range within Wellington Harbour is relatively small at 1.25 m for mean spring tides. For the Harbour, this corresponds to small tidal exchange with Cook Strait (5% of Harbour volume on average per tide) and slow tidal currents (< 3 cm/s). The weak background tidal currents suggest the sedimentation regime

within the wider harbour, away from sediment sources such as river/stream mouths or storm water outlets, is strongly dependant on wind-driven circulation processes. Consequently, the critical timing for the advection and dispersal of construction discharges is during calm periods when winds and waves are not present to mix and disperse the suspended sediments. If dispersion processes are weak, a more constrained turbid plume may slowly move depending on the circulation pattern at the time, and more localised settling of particulates will be enhanced.

- **Storm tide**. The predicted sea level during a 1% AEP storm-tide (excluding wave effects) is 1.32 m relative to WVD-53.

- **Waves**. Wave conditions within the harbour result from both ocean swell propagating into the harbour and from locally generated wind waves. The probabilities of large waves from these two sources were combined to estimate the design 1% AEP significant wave height of 2.6 m on average for the whole project corridor (excluding storm tide elevation).

- **Combined probability of storm tide and waves**. The probability of an extreme storm tide occurring simultaneously with large ocean waves and also coinciding with large local waves is likely to be very rare. A design 1% AEP combined probability event was estimated from the joint and independent probability distributions. We present an event which has multiple combinations of storm tide and total waves (ocean + local) with equal probability of occurrence. Designers should consider each combination for the worst-case resulting conditions for wave overtopping or inundation volumes. The 20 June 2013 washout event provides another analogue to consider following the modelling phase.

- **Climate change**. The current national guidelines MfE (2008) recommended to consider a range of higher sea levels and at least consider 1 m sea-level rise (SLR) by 2115 (extended from 0.8 m by 2095), taking into account the minimum 100-year timeframe required in the New Zealand Coastal Policy Statement (NZCPS). More recent peer-reviewed literature on the plausible contribution by melting polar ice sheets suggest that higher sea levels above 1 m, up to 1.5+ m, cannot be ruled out, depending substantially on progress with global emission controls. The 2008 MfE guidance manual adopts a risk-based approach for selecting an appropriate SLR, taking into consideration the flexibility for future adaptation measures e.g., staging the raising of the transport corridor or revetment.

Given the N2P section will provide protection for regionally significant transport infrastructure and potentially act as an earthquake evacuation/access lifeline, a minimum of 1.0 m SLR should be included in the design over a 100-year planning timeframe, and at least consider future-proofing (e.g. ground treatment, sufficient footprint) or retrofitting options for higher sea levels. Considering a 1 m SLR over the required planning timeframe of 100 years, doesn't necessarily mean the project needs to be initially constructed to accommodate that SLR but could entail an adaptive staged approach with successive raising of the berm in tandem with regular "monitor and review" phases that assess the ongoing rate of local SLR and the performance of the revetment in extreme wave/storm conditions relative to the level of service adopted. The influence of potential climate-change driven increases to storm-tide and wave-conditions on the proposed reclamation design are negligible compared to the effects of sea-level rise.

Coastal processes will be updated with the completion of further desktop study, field investigations (deployment of in-situ instruments seabed sediment/contaminant sampling), numerical modelling of the harbour and reclamation, and combined with expert appraisal of potential effects of the Project (both construction and operational). Potential effects will be

aligned with requirements in relevant statutory instruments to assess whether effects are minor or otherwise, and whether mitigation or remediation is possible with some suggested monitoring conditions.

Do-minimum option

The do minimum option is to do nothing and maintain the existing walking and cycling facility between Ngauranga and Melling.

The existing walking and cycling facility between Ngauranga and Petone consists of a 1.5m to 3m corridor separated from SH2 between Ngauranga and Horokiwi, over a distance of about 3.8km. The southern end of this section is separated from SH2 by a series of crib walls. The northern section is generally separated from SH2 by a wire rope barrier. Connections to the Ngauranga Gorge occur via the Hutt Road to the paths alongside Centennial Highway (SH1). The surface is poor quality, uneven and maintenance less than desirable which results in debris building up on the path. Vegetation along the path is not maintained.

Between Horokiwi and Petone, cyclists (and pedestrians) are forced to use the SH2 southbound shoulder. The southbound shoulder is approximately 1.5m wide, however there is no physical separation from motor vehicles.

Between Petone to Melling, the section of SH2 under the Petone Interchange does not have any shoulders and considered to be a critical safety risk for cyclists using SH2. Please refer to the 2015 DBC for evidence on existing safety hazards for cyclists.

RECOMMENDED OPTION – ECONOMIC ANALYSIS

Economic Analysis – updated assumptions

The BCR for the preferred option (Option 3F) for N2P section has been updated to reflect the refinements to the recommended option (as set out in this DBC Addendum). Whilst the new BCRs have not been peer reviewed, we have relied on the peer review from the 2015 DBC which found the methodology to be sound and which we have therefore not changed. In particular forecast cyclist demand remains the same as the 2015 peer reviewed cyclist demand.

The following updated assumptions (i.e. from the DBC 2015) were used in the calculations of the BCRs for this Addendum.

- General comment. The DBC 2015 had a parallel estimate, safety audit and economics peer review This addendum did not have these re done as the changes relate to cost increases (based on latest tender prices for the P2M section) and changes to accident benefits based on the latest crash statistics, both of which are matters of fact rather than changes in the way costs and benefits have been calculated. (See comment on electric bike demand in next bullet).

- Forecast cyclist numbers remain the same as the original DBC 2015 forecast for cyclist numbers. This is because no new cyclist counts on N2P section have been undertaken, and therefore there is no new evidence to change the demand forecast. This approach is considered conservative as the increase in the use and average trip distance for electric bikes is likely to increase the demand forecast in the future, but currently lacks an evidence base to quantify (this approach was discussed and agreed with I&F personnel);

- The possible increase in demand due to a high uptake of electric bikes and also due to higher than forecast cyclist numbers on the completed Hutt Road sections of the project has been covered by a sensitivity test of the BCR to cyclist demand;

- We have assumed width requirements do not change as a result of electric bikes. We have based widths on current Austroad standards

- Costs for P2M and N2P sections have been updated to reflect the actual tendered rates received for the P2M section:

- Changes to the project phasing have been made to reflect CBD to Ngauranga being completed first, then P2M, followed by N2P sections;

- Crash costs have been updated to the latest five-year crash history which has shown a reduction in crash costs since the DBC was undertaken. Nevertheless, it is still a high crash rate for cyclists. A total of 9 serious accidents and 32 minor injury accidents were recorded for cyclists on this section from2013-2017.

Economic summary of recommended W2HV project option

Table 3: Economic summary table

TIMING				
Earliest implementation start date			1 July 2017 (Section 1 and 2)	
Expected duration of implementation			4 years	
ECONOMIC EFFICIENCY				
Time zero			1 July 2016	
Base date for costs and benefits			1 July 2016	
Present value of total project cost of do minimum			$0 m	
Present value net total project cost of recommended option			**$99.5m**	
Present value net benefit of recommended option (exc. Wider Economic Benefits (WEBs))			**$114.7m**	
BCR (exc. WEBs)			**1.2**	
BCR (inc. WEBs)			N/A	
First year rate of return (FYRR)			N/A	
P50 COSTS				
			Present value	
	Do minimum	Recommended option	Do minimum	Recommended option
TOTAL IMPLEMENTATION COST	$ 0m	$117.0m	$ m	$99.5m
TOTAL P50 PROJECT COSTS	$ 0 m	$117.0m	$ m	$99.5m
BENEFITS				
			Present value	
			Do min	Recommended option
Commuter cyclists			$ m	$ 53.4m
Walkers			$ m	$11.5 m
Accident cost savings			$ m	$ 19.5m
Cycling Tourists			$ m	$ 11.2m
Resilience			$ m	$ 18.4m
		PV total net benefits	$ m	**$ 114m**

Sensitivity analysis

Cost/Benefit variability

The table below summarises the sensitivity analysis undertaken and what the impact on the project BCR are.

Table 4: Sensitivity Analyses

SENSITIVITY TESTING					
Variable	Base case	Lower bound		Upper bound	
		Value	BCR	Value	BCR
Cost variability	$99.5m				
Construction / implementation	$99.5 m	+20%	0.9	-20%	1.4
Cyclists health	$53.4 m	-20%	1.0	+20%	1.3
Walkers health	$11.5 m	-20%	1.1	+20%	1.2
Tourists	$11.2 m	-20%	1.1	+20%	1.2
Crashes	$19.5 m	-20%	1.1	+20%	1.2
Resilience	$18.4 m	-20%	1.1	+20%	1.2

The sensitivity testing shows the total W2HV Link Programme (expected cost $117M, NPV cost $99.5M, expected benefits NPV of $144M) has an expected **BCR of 1.2** with a range of 0.9 to 1.4.

The BCR of 0.9 relates to a construction cost of +20%.

However, the cost estimate has been updated to reflect latest tender costs on P2M which mitigates this risk to some extent. The rate used for rock for the 5m reclamation is a high risk as the P2N section cost is very sensitive to this. On the other hand, benefits which are driven by forecast cyclist numbers, are conservative due to the possible up side to demand from electric bikes. Installing a permanent cycle count station on SH2 would provide more evidence on cyclist demand and should be considered in the next phase.

Overall the **BCR of 1.2** with a range of 0.9 to 1.4 is therefore considered realistic.

Investment Assessment Framework

NZTA's IAF is used as part of the decision-making process to assess and prioritise activities for investment from the National Land Transport Fund for inclusion in the National Land Transport Plan (NLTP). It ensures that projects are delivering on the Government's desired outcomes and priorities set out in the GPS.

The IAF is made up of two assessments; results alignment which examines the significance of the case in relation to the GPS and a cost benefit appraisal which inspects the efficiency of the proposal. The assessment profile can then be used to prioritise activities for NZTA investment.

The IAF sets out how the agency will give effect to GPS 2018 as in outline the above "GPS Outcomes" Section of this Addendum. The Agency's IAF procedures are set out in detail in the Planning and Investment Knowledge Base.
https://www.nzta.govt.nz/resources/planning-and-investment-knowledge-base/

For walking and cycling activities, the Agency's Planning and Investment Knowledge Base (PIKB) states'

> *"In order to deliver complete end to end journeys, walking and cycling activities are expected*
>
> *For activities to be accepted as a single programme/package (with a single assessment profile), the Transport Agency requires evidence that the activities in the programme/package are interdependent and that the programme/package is able to be delivered within a reasonable timeframe.*
>
> *A programme/package is assessed based on its primary corridor and the single assessment profile may result in the smaller collector routes, in the programme/package, gaining a higher profile than if they were assessed on a standalone basis.*
>
> *Delivering activities as a programme/package of works should be a more effective and cost-efficient way to deliver them and this should be reflected in the ratings for the results alignment and cost-benefit appraisal factors in the assessment."*

Although the W2HV Link Programme is being delivered in sections, each section forms part of an overall programme that will significantly improve walking and cycling between Wellington and the Hut Valley. Each section of the link is interdependent and vital to completion of the whole route. If any link on the route is missing, the route will not be able to function safely and effectively or meet predicted uptake of walking and cycling in the future.

Results Alignment

The priority criteria considered to form the main basis of the results alignment appraisal are three of the four key priorities of the GPS; Safety, Access (thriving regions or liveable cities) & Environment.

The Agency's prioritisation process is outlined in the Investment Assessment Framework in the following table under the Walking & Cycling Activity Class.

As stated previously, the W2HV pedestrian and cycle facility has a "very high" results alignment. The Very High Results alignment and BCR of 1.2 mean the project is Priority Order 1, the highest priority.

Table 5: Results Alignment – Walking and Cycling Activity

Results Alignment – Walking and Cycling Activity Class			
A very high results alignment may be given if the activity addresses one or more of the following criteria:		**How the activity achieves the requirements**	**Rating**
Safety – a safe transport system free of death and serious injury	• (VH)**Addresses a very high predicted walking or cycling link safety risk.** • Addresses a high perceived safety risk to use this mode. • Address a high predicted walking and cycling safety risk.	There is an opportunity to achieve significant safety improvements on the SH2 corridor by providing a dedicated walking and cycling facility between Wellington and the Hutt Valley.	VH
Access to opportunities, enables transport choice and access, and is resilient – **Thriving regions**	• (VH) **Addresses a critical missing link in a strategic network connection.** • Targets the completion and promotion of network in major metros to enable access to social and economic opportunities. • Addresses a high or very high resilience risk in a corridor in a main urban area,	The N2P and P2M sections will significantly improve walking and cycling between Wellington and the Hutt Valley. The current situation is unsafe and deters people from using active modes. The WRLTP defines this section as missing link in the strategic network. Improving safety is expected to increase the uptake of walking and cycling between two major metros. The new seawall will be provided as part of the N2P section. It will increase resilience for a vulnerable section of the vital SH2 multi modal transport corridor. In particular, the wall protects the rail and SH2 from storm surges that disrupt multi modal corridor. It also takes into account future sea level rise. The N2P shared path will also provide for operational resilience acting as a response and recovery route in the event	VH

Results Alignment – Walking and Cycling Activity Class			
A very high results alignment may be given if the activity addresses one or more of the following criteria:		**How the activity achieves the requirements**	**Rating**
		of major natural events which may close SH2 and the Hutt rail line.	
Access to opportunities, enables transport choice and access, and is resilient – **Liveable cities**	• (VH) **Addresses a critical missing link in a strategic network or multi-modal interchange in major metros.** • supports development of the connections to the NZ Cycle Network and Te Araroa Trail, including the premium tourism trails • addresses a significant problem with the ability to use existing facilities including promotion, and use by people who identify as disabled and young people • addresses a very high resilience risk in a corridor	The N2P and P2M sections will significantly improve walking and cycling between Wellington and the Hutt Valley. The current situation is unsafe and deters people from using active modes. The WRLTP defines this section as missing link in the strategic network. Improving safety is expected to increase the uptake of walking and cycling between two major metros. The new seawall will be provided as part of the N2P section. It will increase resilience for a vulnerable section of the vital SH2 multi modal transport corridor. In particular, the wall protects the rail and SH2 from storm surges that disrupt multi modal corridor. It also takes into account future sea level rise. Both N2P and P2M connects in with the regionally and nationally significant Hutt River Trail/Remutaka Cycle Trail. It also connects with the recently completed shared path on the Petone Esplanade that was opened using Urban Cycle Funds.	VH
Environment – Reduce adverse effects on the climate, local environment and public health	• enables a significant modal shift from private motor vehicles	Both N2P and P2M sections will provide a safer and more reliable connection between Wellington and the Hutt Valley. Improved facilities and safety perceptions will help to encourage more people to walk and cycle between two major metros.	H

RESULTS ALIGNMENT	COST BENEFIT APPRAISAL	PRIORITY ORDER
Very high	L/M/H/VH	1
L/M/H	Very high (BCR 10+); PV_EoL	2
High	High (BCR 5-9.9)	3
High	Medium (BCR 3-4.9)	4
Medium	High (BCR 5-9.9)	4
High	Low (BCR 1-2.9)	5
Medium	Medium (BCR 3-4.9)	5
Medium	Low (BCR 1-2.9)	6
Low	High (BCR 5-9.9)	7
Low	Medium (BCR 3-4.9)	8
Low	Low (BCR 1-2.9)	Exclude

Overall Assessment Profile

The assessment profile for the overall W2HV Link Programme is likely to achieve **VHL** score based on the assessment detailed in the cost benefit appraisal. The Analysis of the benefit and cost appraisal with a project BCR of 1.2 results to a **Low Efficiency** rating (1.0–2.9).

The Very High results alignment and BCR of 1.2 means the project is Priority Order 1, the highest priority.

FINANCIAL CASE

Project delivery costs update

This section will outline the key cost assumptions, including:

The consenting phase is due for completion within 6 months of approval to commence the next phase. Beyond the consenting phase, the likely timeframe for design and construction is estimated to be 2 years.

The expected cost estimates to complete the remaining sections of the W2HV Link Programme are set out in the table below:

Table 6: W2HV Section cost estimates

W2HV SECTION	ESTIMATED TOTAL COST	ESTIMATED CONSTRUCTION COST
CBD to Ngauranga section (completed)	$10M	$9M
N2P section	$83M	$76M
P2M section	$27M	$26M
W2HV Link Programme Total	$120M	$111M

An updated Capital Cost Estimate for N2P section is attached at Appendix D. The estimates are based on the timeframes presented in the "Scheduling" section of Part B Readiness and Assurance.

The property purchase, design (including statutory application costs), construction costs are summarised below.

Table 7: N2P section cost estimates

DESCRIPTION	BASE ESTIMATE	EXPECTED ESTIMATE	95%ILE ESTIMATE
I&R, D&PD, NZTA Managed costs	$4,989,284	$5,737,674	$6,984,994
Property Costs	$1,300,000	$1,512,250	$1,859,113
Construction & MSQA	$64,059,002	$75,853,615	$94,229,155
N2P Total	**$70,348,286**	**$83,103,539**	**$103,073,262**

In 2015, the NZTA approved a funding commitment of $35M to implement the N2P section of the W2HV project. Current comparable costs are $75.8M. The difference between what has been previously funded compared to the current outturn cost is attributable to:

- Escalations costs have been allowed for at a rate of 3% per annum.
- The original estimate assumed that pre-implementation costs were sunk costs (as per normal practise) and did not include property costs

- The revetment profile assumed in 2015 was a singular batter slope interfacing with the seabed, whereas the current design incorporates a 2m wide berm within the revetment profile resulting in additional quantities of fill and rock armour. This change is to reflect the mitigation required to secure the necessary RMA approvals;
- Changes to standards resulted in the use of LED lighting rather than sodium lighting;
- Although the 2015 estimate was independently peer reviewed and verified, the revised estimate uses 2017 rates from the tendering of the P2M section, which had some significant increases in specific items, particularly the preliminary and general item.
- The 2015 cost estimated were based on a conceptual design, the design now is considered to be at scheme level.

Ongoing maintenance and operations costs

There are no on-going operational costs associated with the shared path.

Maintenance costs will be determined in more detail during the next phase of the project – the consenting phase. Currently, average maintenance costs are anticipated to be in the order of $200,000 per annum to cover both routine and periodic maintenance costs over the life of the asset.

Funding options

N2P Section

For the N2P section of the W2HV Link Programme, the expected outturn cost in 2018 dollars is:

- Pre-Implementation (Consenting and Detailed Design): $7.3M;
- Implementation (Construction and MSQA): 75.8M
- **Total: is $83.1M**
- The 95th percentile cost is $99.9M.

A joint funding agreement with GWRC and HCC was put in place for the N2P section in 2015. Both councils agreed to contribute $2M and $5m respectively towards implementation costs.

GWRC's funding contribution has been confirmed in its Long-Term Plan 2018-27.

WCC funding contribution has been confirm in its Long-Term Plan 2018-27.

The balance of the funding needed for the N2P section will be sourced from the National Land Transport Fund, and in particular the Walking and Cycling Activity class.

The NLTP 2018-27 has confirmed $43m for the pre-implementation and implementation phases of the N2P section. I&F have confirmed that the balance of $40m will be accessed from the NLTF under the Walking and Cycling Activity Class. Because the construction phase will be carried over to the next NLTP 2021-24, NLTF funds under the Walking and Cycling Activity Class will have to be committed

No alternative funding sources, such as public/private partnerships (PPP), have been explored.

P2M Section

For the P2M, the expected outturn cost for construction in 2018 dollars is $24.9M (excluding Transport Agency managed costs).

The NLTP 2018-27 has carried over/confirmed $17m for the construction of the P2M section. The $17m available funding comes from the Urban Cycleway Fund ($6m), HCC contribution ($1m), and the NLTF ($10m). I&F have confirmed that the balance ($8m plus estimated NZTA managed costs ($5m) will be accessed through the NLTF under the Walking & Cycling Activity Class.

PART B – READINESS AND ASSURANCE

COMMERCIAL ANALYSIS

N2P section: The consenting phase is due for completion within 12-18 months of NZTA Board approval to commence the Pre-implementation phase. Beyond the consenting phase and once consents are granted, the likely timeframe for design and construction is estimated to be 2-3 years.

The procurement strategy for the N2P and P2M sections have been developed to reflect the differing stages of development of the sections, as set out in the table below:

W2HV section	Project status
CBD to Ngauranga section	• Construction complete
Ngauranga to Petone section	• DBC Complete • Consents not obtained • Tenders not yet called
Petone to Melling section	• Consents complete • Construction tenders back • Ready to start construction

Procurement options

The tenders received on P2M section were much higher than expected. A key reason for the extra cost was that the work in the rail corridor adjacent to live rail tracks was considered to be complex work, and the tenderers had fully priced this risk.

As a result, two procurement options have been considered:

- Option A: Retendering P2M and N2P as a single combined package from Ngauranga to Melling (N2M).
- Option B: Advancing P2M and N2P as separate contract packages. P2M to advance to construction now on the basis of existing tenders. N2P to be tendered separately once consents obtained at a later stage.

There are advantages and dis-advantages to the options shown in the following table.

Option A: Retendering P2M and N2P as a single combined package from N2M.

Advantages	Dis-advantages
Larger combined package would lead to contractor overhead efficiencies	P2M is ready to proceed to construction. Significant delay to P2M (1 – 3 years) if to wait for N2P section to start construction.
Potential for lower overall cost from reduced P&G costs	Delay to P2M sections of 2-3 years could lead to higher price in 2021/22 when prices are likely to have risen.
N2M would be delivered in one contract which could make the whole of N2M available to cyclists on opening.	The type of work in N2P and P2M is very different. One is a reclamation project, the other is land based working in rail corridor.
	Risk that N2P consents for seaward side option cannot be obtained leading to need to reconsider N2P options for cycle way in SH corridor. This leads to delay and less cyclist benefits in the long term.

Option B: Advancing P2M and N2P as separate contract packages. P2M to advance to construction now on the basis of existing tenders. N2P to be tendered separately once consents obtained at a later stage.

Advantages	Dis-advantages
P2M is ready to proceed to construction. This would lead to the earlier opening date for P2M. Whilst benefits and cyclists numbers would be lower initially these benefits would start sooner.	Potential for higher overall cost from increased P&G for 2 separate contracts
The type of work in N2P and P2M is very different. One is a reclamation project, the other is land based working in rail corridor. Separate contracts would mean the best contractor for each type of work would be appointed. Also, de-coupling the two distinct risks.	Risk that N2P consents for seaward side option cannot be obtained leading to need to reconsider N2P options for cycle way in SH corridor. This leads to delay and less cyclist benefits in the long term. P2M benefits/cyclist numbers may be reduced as a result.
P2M ready to proceed so risk of higher prices in 2021/22 eliminated for P2M	
Consents for N2P is being led by NZTA who is the best organisation to manage this risk. Once consents are obtained the project lends itself to D&C to	

transfer detailed design construction risks	
Construction industry is currently complaining about delays to their pipeline of work. This would give the industry work to progress P2M now rather than delay it 2-3 years.	
N2P could be delayed further if the wider resilience programme recommends further investigation of a wider reclamation which could further delay P2M which can proceed now.	

On balance there are more advantages and less disadvantages for Option B (when compared to Option A). It is therefore recommended:

- P2M section be advance to construction now on the basis of existing tenders;
- N2P section be tendered separately once consents obtained at a later stage.

Output based specification

Once the project is consented the N2P lends itself to Design and Contract (D&C) for the remaining design. The advantages of a D&C approach for Implementation is that the contractor is best placed to manage the final design and construction risks. During the tender process, it will also allow contractors to offer innovative construction methods potentially reducing the cost. A D&C is therefore recommended for N2P for Implementation once it is consented and the design 30-50% complete.

An Alliance approach would not be needed as the reclamation work is not complex enough to warrant a shared risk approach. An Alliance would add unnecessary administration costs to the project setting up the Alliance and could lead to a cost-plus approach by the contractor who has no incentive to take on the construction risk.

Implementation Strategy

Recommended consenting pathway

The recommended consenting pathway is for the two-stage resource consenting process, to be led by the Greater Wellington Regional Council. This is the favoured approach for this application because:

- Despite there being three local authorities involved the consent application can be determined via a joint hearing and by independent commissioners
- Consultation to date on the principle of a reclamation has not drawn any adverse feedback
- The process allows for greater public participation during the hearing
- Matters of contention can be narrowed prior to an Environment Court hearing (if required), and,

- The two-stage process is likely to cost less than the Board of Inquiry (BoI) process.

It can also be observed that in terms of potential opposition there are no parties identified to date through discussions, observations or comments that have outlined concerns in principle with a coastal reclamation associated with a shared path. However, it is recommended that a detailed risk assessment be undertaken in the next phase of the project, including potential stakeholder risks and how those can be managed.

Next Steps – N2P section Consenting

As has been outlined the project has been through a long period of development. Recent activity has been the development of an optimised design for the purposes of firstly Transport Agency approval, and then for consultation preparation purposes. Part of the time taken has been through the necessity to investigate whether rail straightening options were economically viable.

Taking the project forward the following activities are recommended for preparing and then lodging applications for consenting of the N2P section:

1. Prepare a consenting risk management strategy, including recording key risks and approaches to manage them.
2. Prior to Transport Agency approval and wider public consultation, meet with:
   a. GWRC as a project funding supporter;
   b. GWRC as the regulatory authority for coastal permits and regional consents;
   c. WCC and WCC as project funding supporters;
   d. WCC and HCC as the regulatory authorities for designations, district resource consent applications and applications under any relevant NES;
   e. KiwiRail as the requiring authority for land required for the project above Mean High Water Springs;
   f. Te Runanga o Toa Rangatira and Port Nicholson Block Settlement Trust (PNBST) noting that the Chair of PNBST has been actively engaged throughout the development of the Project;
   g. If required, the EPA if the authorisations are through a Board of Inquiry process noting that this is not the current preferred consenting route; and
   h. Department of Conservation.
3. Upon Transport Agency approval, meet with:
   a. Cycling and walking user groups;
   b. Recreational user groups (Rowing, Waka Ama, Water Skiing, recreational fishing);
   c. Public consultation on what has been investigated and feedback on the recommended option through open day(s).
4. Prepare specific technical reports and prepare Assessment of Environmental Effects.
5. Seek views of consenting authority as to draft assessments once complete.

6. Lodge the RMA authorisations sought.
7. Prepare evidence for hearing.
8. Once consents are received, consider Environment Court appeal options (if required)

The full Consenting Strategy for the preferred option is attached in Appendix I

Uncertainties

The following key uncertainties have been identified for progressing the N2P section to consenting:

- The status of the shared path once the land is reclaimed;
- Ownership/stewardship/responsibility of the shared path with local councils and KiwiRail;
- Unclear dependencies associated with procurement implementation decisions on the P2M section,
- Uncertainty regarding the status of the Petone to Grenada Link Road project.

These uncertainties will be address during the consenting phase. Ongoing discussions with Councils and KiwiRail will continue to occur to address the uncertainties and ensure there is an agreement in principle from Kiwirail and a level of commitment from Councils prior to lodging consents.

Risks

As well as the identified uncertainties, the project team has identified the following critical risks associated with the next phase of the project (the consenting phase):

- Consenting risks
  - Detailed environmental mitigation measures need to be designed
  - The process of reclaiming land and the titling thereof (including timeframes) requires confirmation ;
  - Formal agreement with existing landowners (KiwiRail) is required;
- Design risks
  - Design of the reclamation and revetment is directly correlated to the type and quantum of specialist construction plant;
  - Whether the bridge near Ngauranga will be designed for light or heavy vehicles to allow for heavy vehicle access for recovery purposes;
- Construction risks;
  - Whether international contractors with specialist plant, currently not used in NZ, will tender for the construction contract, which directly affects the methodology adopted, which impacts the detailed design process;
  - Longer construction period if utilising currently available plant in NZ;
  - Control of sediment plumes during construction.
- Operational risks
  - Funding arrangements, correlated to responsibility of the shared path, to be determined.

The consenting critical risks will be addressed in the next phase of the project (the consenting phase), whilst the design, construction and operational critical risks will be addressed during the phase following the consenting phase.

Procurement options

Services beyond the consenting phase will be procured via the NZTA standard methods of procurement. Refer to the Management Case.

Payment mechanisms

To be considered further during the design phase.

Pricing framework and charging mechanisms

To be considered further during the design phase.

Contract length

N2P section: The consenting phase is due for completion within 12-18 months of NZTA Board approval to commence the Pre-implementation phase. Beyond the consenting phase and once consents are granted, the likely timeframe for design and construction is estimated to be 2-3 years.

P2M section: Once additional funding is approved; the procurement will take 2-3months and construction is estimated between 1-1.5 years.

Contract management

The project will be managed through the remainder of the pre-implementation phase and the implementation phase by the Transport Agency staff within the SD&D group.

Schedule

The timeline for seeking Transport Agency approval and the tasks that need to occur is shown below. Beyond Board approval, the next steps for the N2P section are to obtain the required resource consents and address the uncertainties and critical consenting risks. The timeframe for completion of these next steps is estimated to be 6-9 months for resource consents and up to 2 years to address the uncertainties. It is worth noting that addressing the uncertainties is not considered to be a dependency for obtaining resource consents or undertaking the detailed design or construction phases.

The implementation phase (design and construction) is estimated to take 2 years and will commence once resource consents are granted, thereby a likely start date for construction being the summer of 2019/20 with completion 18 months later.

The design, construction and operational critical risks will be addressed during the phase following the consenting phase.

The next step for P2M is to re-start the construction phase through negotiation with the previously identified preferred tenderer or re-tendering the project. It is proposed that construction to commence early 2019 and complete by June 2020.

Key Task	Schedule
1. Approval of the preferred option for the overall W2HV Link Programme and funding for next phases	December 2018
2. Procurement for professional services for N2P pre-implementation phase	January – March 2019
3. Procurement for P2M physical works	January – March 2019
4. Public consultation and stakeholder engagement on W2HV Link Programme (primarily to inform N2P consenting phase)	April/May 2019
5. N2P Assessment of Environment Effects and Preparation of Consents Detailed Design for consenting	May – December 2019
6. P2M Construction (1.5 years construction period)	May 2019 – June 2020
7. Lodgement of Consents and Notice of Requirement process	Jan – March 2020
8. Consents and Hearings Process, Approvals	March – December 2020
9. Procurement for Design and Construction	Jan – March 2021
10. N2P Construction (2-3 years construction period)	March 2021

Risk allocation and transfer

The Transport Agency still retains reputational risk if the D&C contractor does not perform or if the quality of the final product is not to NZTA's satisfaction. This risk is mitigated by the 30-50% specimen design being done by the Transport Agency's consultant as the basis for the tender specifications and ensuring that quality is scored highly in the tender process. This will ensure that a suitably qualified and experienced contractor is appointed rather than tender selection being based purely on lowest cost.

The current project risk register is located in Appendix G.

Year by year phasing of costs

The funding forecast is provided in the table below.

FORECAST ($)	FINANCIAL YEAR STARTING 1 JULY					
	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
N2P Costs						
Design	$1.5m	$2.5m	$1.0m			
Statutory applications		$0.2m	$0.5m			
Property purchase		$0.5m	$1.0m			
Property management						
Property disposal						
Pre-imp Total	**$1.5m**	**$3.2m**	**$2.5m**			
Construction / implementation			$20.0m	$25.0m	$25.0m	
External impact mitigation						$6.0m
Other capital (e.g. insurances)						
Capital risk management						
TOTAL N2P IMPLEMENTATION COST	$1.5m	$3.2m	$22.5m	$25.0m	$25.0m	$6.0m
TOTAL P2M IMPLEMENTATION COSTS	$5.0m	$22m	$3.0m			

MANAGEMENT CASE

This management case sets out the planning, governance structure, risk management, communications and stakeholder management, benefits realisation and assurance processes relevant to the **consenting phase** for the N2P section. At the end of this phase, and prior to commencement of the D&C phase (if approved), the management case will be reviewed. This approach has been taken as project roles and responsibilities within the Transport Agency will be transferred to the System Design Delivery in order to complete the remainder of the pre-implementation phase (and implementation phase).

1.1. Project roles and responsibilities

The NZTA Project Team for the consenting phase will comprise of:

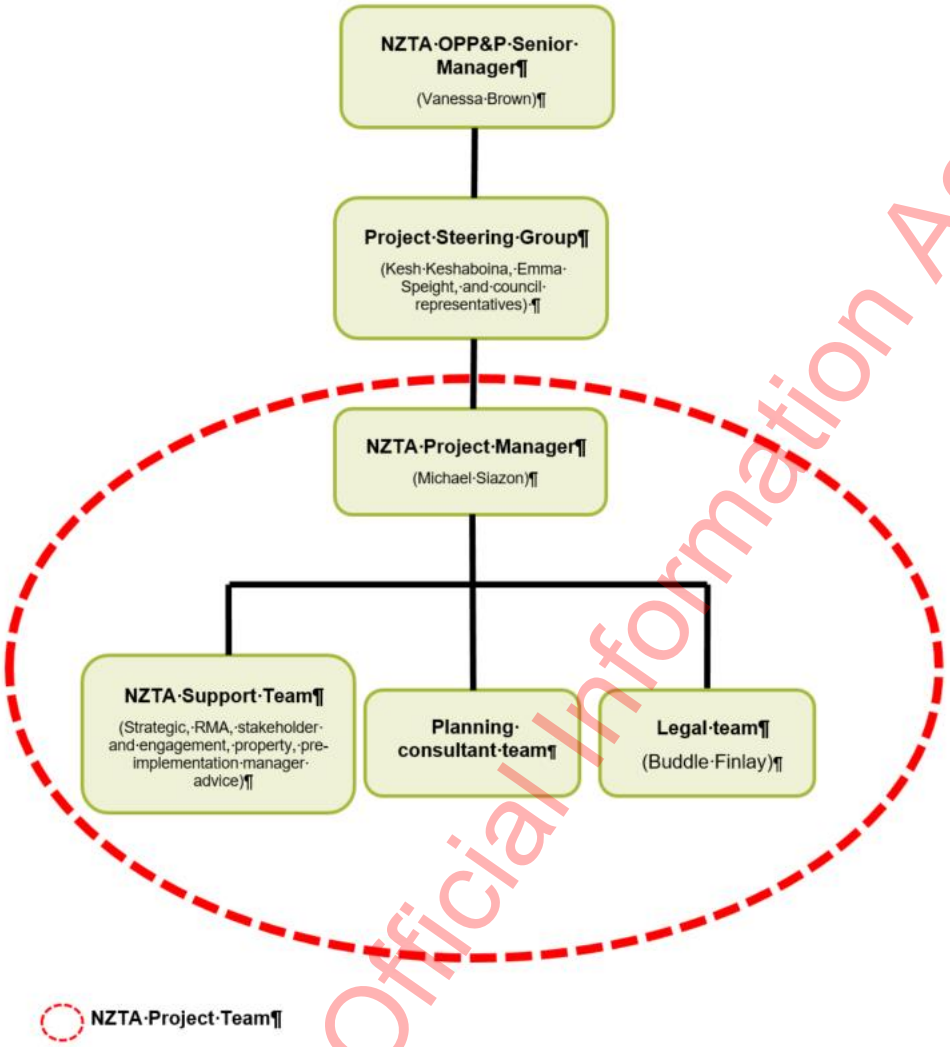
ROLE	NAME
Project Sponsor (SDD)	Kesh Keshaboina
Case Manager (I&F)	Carolyn O'Fallon
Project Manager	Michael Siazon (supported by a consultant team)
Strategic Advisor	Selwyn Blackmore (consultant)
Project Manager, Pre-Implementation (System Design Delivery)	Chris Nally (TBC)
RMA Consents Advisor	Belinda Petersen
Stakeholder and Communications Manager	Raewyn Pudsey
Property Manager	Louise Jones
Project Spokesperson	Emma Speight
Senior Legal Counsel	Buddle Finlay

1.2. Governance structure

The governance structure for the consenting phase consists of two core elements:

1. The NZTA Project Team – which includes the NZTA Support, Planning Consultant and Legal Teams
2. Project Steering Group – which includes senior representatives from the SD&D, the Director Regional Relationships, and representatives from GWRC, HCC and WCC (i.e. those who aren't directly involved in the consenting process).

The diagram below sets out the governance structure in more detail:



1.3. Assurance and acceptance

All consent documentation will be peer reviewed, endorsed and approved during the consenting phase.

The key reviews will take place prior to lodgement of the consent documentation with the councils, in particular, the coastal permits with GWRC. Each specialist technical report will be peer reviewed by NZTA's in-house expert, as well as NZTA's RMA Consents Advisor. The Legal team will also undertake a legal review of each report. It is also expected that each specialist technical report will be peer reviewed by the council's relevant technical experts prior to lodgement. Following feedback on the specialists' reports, the NZTA Project and Legal Teams will consider any changes that may be required to the specialist reports and AEE documentation.

Once the Project Team is satisfied with all the necessary consent documentation, the Project Manager will seek endorsement to lodge the consents with the Project Steering Group, prior to seeking final approval from Vanessa Brown.

The table below summarises the key assurance and acceptance steps:

ITEM	ASSURANCE RESPONSIBILITY	DESCRIPTION
Specialist Technical Assessment	NZTA technical specialists/RMA Consents Advisor/Legal reviews	Peer review of key specialist technical reports
Council reviews	Council reviews	Council to peer review specialist technical reports (and possibility the AEE)
Final consent documentation	Final review undertaken by NZTA RMA planner and legal team	Planning and legal review prior to seeking approval to lodge consents
Endorsement to lodge applications	Project Steering Group	Endorsed consent documentation
NZTA OPPP	Vanessa Brown	Final approval to lodge consent applications (No/go decision)

No/go decision point

It is expected that the final no/go decision by Vanessa Brown, Senior manager OPPP will be predicated on the quality of the documentation, and a full understanding of consenting risks (as identified at the time), rather than being a no/go investment decision. The risks that are likely to require consideration are listed below.

If major issues arise during the preparation of the consent documentation, or as a consequence of feedback on the reviews, it is noted that these issues will be escalated to the Project Steering Group in the first instance.

1.4. Cost management

Expected construction costs for the project have increased following approval of the DBC in 2015, and it is expected that completion of the mitigation package for the consent documentation over the next 9 months presents further opportunities for project cost increases. In addition, there is a risk that the decision on the consent applications by the RMA decision-makers may also increase project costs.

The costs of the mitigation package to be lodged with the consent documentation will be considered during the final endorsement/approval stages, including by the Project Steering Group and by Vanessa Brown. As part of this process, the consenting risks associated with the mitigation package will be identified for consideration during these stages.

Following receipt of the final consent decision, a cost risk assessment will be immediately undertaken in order to identify if any of the granted consent conditions pose risks for implementation, and/or cost risks that will need to be considered for appeal. The final decision appeal will reside with Vanessa Brown, the Senior Leadership Team (including the Chief Executive), and

1.5. Issues Management

The issues requiring formal management are likely to relate to the preparation and lodgement of the necessary consent documentation.

A key issue is the risk that costs of the "mitigation package" will increase as a consequence of stakeholder engagement (undertaken prior to lodgement of the consents), and/or through the formal consent process. Other key issues that will need to be managed include stakeholder concerns relating to:

- Delays to the project
- Adverse effects of coastal reclamation
- Design of the revetment and , the proposed new Ngauranga Overhead Bridge
- Proposed mitigation package
- Cultural impacts
- Property impacts
- Future proofing of the Hutt Valley Rail Line
- Design width of the shared path
- Integration with other transport projects (e.g. P2G Link Road, Wellington Resilience PBC).

All pre-lodgement issues will be managed by the NZTA Project Team, and escalated when required to the Project Steering Group.

1.6. Change Control

For the consenting phase, most change control issues will relate to the preparation and lodgement of the consent documentation. A key issue will be increased costs as a consequence of further refinement of the design of the shared path, and stakeholder feedback. Accordingly, any change control required to approve design changes will be escalated through the assurance processes outlined above.

All contractual issues with the consultant and legal teams will be treated in accordance with standard Transport Agency contract management guidelines and delegations. Variations will be dealt with in accordance with the schedule of delegated authority.

APPENDIX A – UPDATED W2HV LINK PROGRAMME INVESTMENT LOGIC MAP

The original investment logic map can be found in the original DBC dated 2015.

Below is the detail on the output from the 2018 workshop to update the Problem Statements.

Supporting document	Problems	Investment objectives	Key Performance Indicators (KPIs):	W2HV formulated Problems	W2HV formulated Benefits	W2HV formulated Investment Objectives	Measures
SH2 PBC	Problem 1: Poor configuration and operational environment of SH2 and associated local network results in poor multi-modal network performance. (50%) Problem 2: High traffic volumes and insufficient network capacity results in peak delay and unreliable journey times that adversely affect regional productivity. (30%) Problem 3: Constrained topography, the geology and lack of alternative routes results in poor network resilience. (20%)	• Improve travel time reliability on SH2 between Ngauranga and Te Marua. • Improve public transport in the Hutt valley. • Improve the safety of the transport corridor by reducing the number of deaths and serious injuries. • Improve the quality of infrastructure by increasing the KiwiRAP Star Rating. • Increase availability along the transport corridor by reducing the number of journeys impacted by natural closures and delays.	• Travel time reliability by mode. • Death and serious injuries by mode. • KiwiRAP rating for state highways. • Reduce the number of journeys impacted by natural closures (LIHP).	**Problem 1:** Lack of suitable walking and cycling facility between Wellington and Hutt Valley leading to low walking and cycling usage. **Problem 2:** SH2 cross-section configuration results in an unsafe corridor for cyclists and walkers. **Problem 3:** Poor resilience to seaward side storm events leads to closures of the transport corridor adversely affecting multi modal performance	• A quality walking and cycling facility constructed providing enhanced mode choice and accessibility • Safe walking and cycling facility provided between Wellington CBD and Hutt Valley • Reliability of the transport corridor from seaward side events and sea level rise improved • N2P shared path can be used as a response and recovery route in the event SH2 and the rail line is closed due to a major landslide event.	IO 1: Increase the number of walkers and cyclists who cycle or walk between Wellington and the Hutt Valley 425 to 850 by 2030. IO 2: Make the section of SH2 between Ngauranga and Petone safer by reducing the number of deaths and serious injuries associated to walking and cycling. IO 3: Reduce the number of journeys (on SH2 between Ngauranga and Petone) impacted by seaward side events that lead to closures and/or delays.	The number of walkers and cyclists using the facility (Annual Average Daily Number) Average number of walker and cyclists DSI's per annum reduced from 1.8 per annum to 0 per annum for facility users measured over a minimum three year period Reduce the number of rail closures due to seaward side events from 0.25 days per annum by 95% measured over a five-year period.

Resilience PBC	Problem 1: A major hazard event will result in the fragmentation of the Wellington Region's land transport network disrupting distribution of essential supplies, delaying recovery. Problem 2: A major hazard event will sever routes in to and out of the Wellington Region resulting in a significant period of isolation for the population Problem 3: The Wellington Region's land transport network is vulnerable to hazard events resulting in potential community severance	IO 1: To improve availability of the land transport network for response and recovery by reducing closure times after a hazard event. (60%). IO 2: To reduce the isolation of the Wellington Region's population following a hazard event by faster restoration of access. (15%). IO 3: To minimise the economic and social impact of hazard events that effect the Wellington Region's land transport network. (25%)	• State highway and rail availability after a LIHP event. • Recovery period after a LIHP event	Problem 4: Topography and the lack of alternative routes results in high resilience risks from LIHP events (flooding, storm/sea surge, sea level rise)	N2P shared path can be used as a response and recovery route in the event SH2 and the rail line is closed due to a major landslide event.		

APPENDIX B – MCA1, MCA2 AND MCA3 REPORTS AND MCA SUMMARY REPORT

APPENDIX C – SPECIALIST REPORTS AND MEMOS

APPENDIX D – CAPITAL COST ESTIMATES

APPENDIX E – ECONOMIC ANALYSIS

W2HV Updated Economics

Incremental Rail Straightening Economics

APPENDIX F – IMPLEMENTATION FUNDING FORECAST

Refer to the section headed “Year by year phasing of costs” within Part B of the main document.

APPENDIX G –PROJECT RISK ANALYSIS

APPENDIX H –REVIEWS AND AUDITS

No additional reviews or audits have been undertaken since the completion of the original DBC in 2015.

A safety audit and a parallel estimation of the construction estimate is planned to be undertaken during the design stage.

APPENDIX I – CONSENTING STRATEGY

APPENDIX J – PROPERTY STRATEGY

Although the area of land required to support the preferred option within the DBC Addendum is larger than the original option, for which the property strategy is appended, the underlying principles behind that strategy remain unchanged.

APPENDIX K – PROCUREMENT STRATEGY

APPENDIX L – RECOMMENDED OPTION DRAWINGS

N2P Option 3F drawings

P2M preferred option drawings