Project Scope and Outcomes Philosophy Statement

Cross Valley Link

May 2025

Version 1 DRAFT

[RESTRICTED]

NZ TRANSPORT AGENCY
WAKA KOTAHI

Te Kāwanatanga o Aotearoa
New Zealand Government

Table of Contents

1 Introduction

1.1 General

The Petone to Grenada Link Road (P2G) is a proposed new highway that will connect the economic centres of North Wellington/Porirua and Lower Hutt. It will result in significantly reduced journey times between these cities, facilitating greater movement and increased economic activity, and will help reduce congestion on SH1 and SH2.

The Government Policy Statement on Land Transport (GPS) 2024-34 has identified the Petone to Grenada Link Road and the Cross Valley Link (CVL) as a Road of National Significance (RoNS). They are identified jointly as a RoNS to “unlock housing growth” and will contribute to the primary strategic priority of the GPS, which is to support economic growth and productivity. The National Land Transport Programme 2024-27 (NLTP) includes the P2G and CVL RoNS as a project that will unlock land for housing, improve resilience, and support economic growth.

P2G and CVL are adjacent initiatives. P2G is proposed to provide an east-west corridor between the key urban areas of Lower Hutt (SH2) and North Wellington/Porirua (SH1). CVL is proposed to connect SH2 (and a future P2G corridor) with the Seaview/ Wainuiomata areas via a new/ upgraded corridor. P2G has most recently been examined by NZTA as a state highway, while investigations into CVL have been progressed by Hutt City Council as a local road.

An Investment Case has been progressed for P2G which includes a Feasibility Study for CVL. The focus of the Feasibility Study has been to identify the alignment, form, and function that CVL needs to be to deliver on the project objective.

On completion of the Investment Case, a decision is made whether to fund P2G, and hence progress to further design, route protection, and consenting.

1.2 Purpose

In accordance with the requirements of the NZTA Standardised Designs[1], this Project Scope and Outcomes Philosophy Statement (PSOPS) has been developed to document the scope, outcomes, design criteria, key assumptions, and the principles to be applied for design development.

This draft version of the Project Scope and Outcomes Philosophy Statement (PSOPS) has been reviewed by the NZTA Office of the Chief Engineer (OCE) and endorsed by the Chief Engineer’s Advisory Group (CEAG).

The PSOPS provides an overview of the design standards, guidelines and methodology to be adopted for the design and should be read in conjunction with other project documentation prepared as the project develops (e.g. resource consent conditions and the project Minimum Requirements).

[1] NZTA Standardised design solutions for use on State Highway Roads of National Significance. V2.0 August 2024.

2 The Philosophy

2.1 Project objectives

From previous studies, the key objectives for CVL were to:

- Improve the resilience of Southern Lower Hutt by enhancing the transport network's ability to withstand and respond in a timely manner to HILP and LIHP events.
- Improve access to and from key destinations and key urban growth areas in Southern Lower Hutt.

The P2G Investment Case and CVL feasibility study have a clearly defined project objective, specifically this ***is to create an efficient transport connection between southern Lower Hutt and North Wellington/Porirua to support economic growth and productivity, and housing development***.

2.2 Key Social and environmental outcomes

The following documents have not been prepared for this stage of design.
- Environmental and Planning Constraints Report
- Environmental Screen and Constraints Map
- Urban Design and Landscape Framework

It is intended that these documents will be prepared as and when required for future design stages. At present, Appendix E of the Feasibility Study, CVL.RPT.IC.1071.PRW – Appendix E – Shortlist to Preferred, contains social and environmental outcomes considered to date.

2.2.1 Economic and regional development

CVL was investigated by Hutt City Council in 2020 via the Cross Valley Connections Programme Business Case (CVC PBC) which considered a multimodal system approach to supporting economic development and improving resilience in Lower Hutt. Included within the proposed suite of interventions is CVL, a new/ upgraded corridor that connects the Seaview/ Gracefield industrial area with the strategic network at SH2.

There is poor east-west connectivity between Lower Hutt and North Wellington/Porirua which limits economic development. There is also poor connectivity from Lower Hutt to SH1 as the predominant route to large economies to the north.

The provision of an east-west transport connection would provide much improved connectivity between the Hutt Valley and North Wellington/Porirua. Initial modelling has shown over 30,000 vpd would use this new connection (P2G). This improved access would support the agglomeration of the Hutt Valley and Porirua economies leading to economic growth and improved productivity.

A new connection would also support increasing housing supply by improving access to housing opportunities in the Hutt Valley and Porirua. The connection would boost economic productivity, by supporting agglomeration of the Lower Hutt, Wellington and Porirua economies through improved access to labour and consumers.

2.2.2 Movement and accessibility

Cross Valley Link is proposed to form a key east-west transport link through Petone and – regardless of route choice – will traverse through a complex existing urban area. This area has a wide range of users including general vehicles (cars and freight vehicles), buses, as well as active modes. A key driver of this project is to provide an additional east-west crossing of the Hutt River to improve access and resilience. It is therefore critical that the selected form and function of the CVL link can support a range of transport modes and integrate with a range of diverse land uses.

2.2.3 Future demands

Traffic modelling has been undertaken at a projected opening year of 2033. The CVL corridor is forecasted to carry approximately 20,000 vehicles per day. Approximately 5% of trips using the full extent of CVL (to Randwick Road) are coming from P2G. CVL provides decongestion benefits for the Ewen Bridge (Railway Avenue), and also small decongestion benefits for Waione Bridge (The Esplanade) and Melling.

A tolling assessment of CVL has not been undertaken, due to this being a feasibility study rather than an investment case.

2.2.4 Partnerships

The project development has been undertaken in close liaison with Taranaki Whānui ki te Upoko o te Ika and Ngāti Toa Rangatira.

Hutt City Council has had representatives present at key MCA workshops as the preferred corridor has been selected.

2.3 Resilience and natural hazard risk management

The network performance under high likelihood events (e.g. traffic accidents, storm and low intensity earthquakes) shall have a low impact on the network. The resilience design for these high likelihood (frequency) events shall focus on the robustness of the network and minimising maintenance costs through consideration of access and material selection.

The performance of structures and slopes subject to low frequency earthquake events shall be conditioned to safeguard life safety and post event functional principles, noting that structural damage and large ground displacements may be expected.

A Seismic Resilience Philosophy (SRP) document has been prepared to document the key aspects of the seismic design criteria for the CVL project.

3 Project overview

3.1 Key phases and programme

This version of the PSOPS is prepared to support the CVL Feasibility Study, submitted in June 2025.

The future phases are currently being mapped out at the time of writing this investment case and are dependent on the feedback from the NZTA Board and HCC.

3.2 Key design principles and performance measures / benchmarks

The key design principal is for the RONS standardised designs to be used to inform and accelerate the optioneering phases that include the investment case, consent and conceptual design.

The design process needs to ensure the project outcomes are aligned to the solution developed, in particular, to ensure a value outcome is achieved.

The design shall follow the industry standard approach to consider Health and Safety in design and Whole of life (maintenance) in the solutions developed.

3.3 Potential departures

The design will be undertaken to meet all aspects of the New Zealand Building Act and Building Code and in general accordance with the NZTA Bridge Manual and Waka Kotahi standards, guidelines and specifications listed in the table below except where varied through formal departure.

The key departures that are expected to be required for the CVL project are set out in this section.

Table 1 - Standards and Guidelines showing order of precedence

Precedence	Document	Reference
1	The New Zealand Building Act	Regulations and Building Code
2	Bridge Manual 3rd Ed, Amendment 4 (BM)	Bridge Manual SP/M/022 NZTA 2022
3	Highway Structures Design Guide	NZTA, 2016. Highway structures design guide (First edition, amendment 0), New Zealand: Waka Kotahi NZ Transport Agency
4	Waka Kotahi standards, guidelines and specifications	– RoNS Standardised Designs V2.0 (2024) – NZTA technical advice notes (TANs) – TNZ Specifications

3.3.1 Importance Level

Potential departures from the Importance Levels set out in the BM are likely for some or all design cases. The proposed Importance Level for the CVL route is set out in the SRP.

3.3.2 Seismic Design Criteria

Potential departures from the seismic design criteria set out in section 2.3.1.2 of the RONS Standardised Designs document and Sections 5 and 6 of the NZTA Bridge Manual are covered in the Seismic Resilience Philosophy[2] (SRP) document prepared for this project and reviewed by the Office of the Chief Engineer.

3.3.3 Flooding

Potential departure from the flow width and depth requirements set out in NZTA P46 Stormwater management and minor stream diversion design specification (2025) for the carriageway. In general carriageway elevations remain unchanged from the existing and existing flooding issues remain unchanged.

Potential departures from the freeboard criteria set out in Table 2.5 of the NZTA Bridge Manual may be required for the Hutt River bridge. There may also be new Greater Wellington Regional Council Design Specifications for the Hutt River that may require departures from for freeboard requirements.

Potential departures required from the Wellington Water Limited (WWL) Regional Standard for Water Services for surcharge above the inlet to the proposed culvert at Opahu Stream. The Opahu Stream culvert has been sized to match the level of service provided in the downstream culvert.

Potential change in overland flow paths due to the Hutt River Bridge embankments that could impact localised flooding.

[2] The CVL Seismic Resilience Philosophy (SRP) March 2025 document has been prepared as required by Section 2.3.1.2 of the RoNS Standardised Designs guide and should be read in conjunction with this PSOPS.

3.3.4 Geometrical

Geometrical parameters do not conform to the geometrical values assigned in Table 2, Section 2.2.1 of the RONS Standardised designs document.

A 50 km/h speed environment has been assigned to the route and the speeds are aligned to the ONF classification for the route.

3.3.5 Stormwater

Potential departures from stormwater standards and guidelines may be required for:

- Fish passage not being provided in Opahu Stream culvert and culvert extension.
- Stormwater attenuation not being provided for slight increase in impervious area on Hutt Road.
- Stormwater treatment and attenuation for the Hutt River bridge area if wetlands cannot be located adjacent to the Hutt River.
- Design storm event treated and attenuated by the wetlands due to tailwater levels within the Hutt River.
- Utilising the existing stormwater network on Hutt Road, Wakefield St and Whites Line W if the network currently does not meet the level of service specified in the WWL Regional Standard for Water Services. In general, the existing network remains unchanged and existing flooding issues remain unchanged.

4 Design requirements and processes

4.1 Road and geometrics

4.1.1 General

This section sets out the minimum geometric design parameters that will be used to develop the CVL corridor.

4.1.2 Levels of service

The CVL route shall be designed as an Urban connector in accordance with the NZTA ONF classification.

"Urban connectors that have a median divider and travel through non-residential areas, or carry high volumes of vehicles and have more than one lane travelling in each direction, will typically have a safe and appropriate speed of 50km/h".

4.1.3 Secondary local roads

The key secondary local roads within the vicinity of CVL are shown in Figure 1.

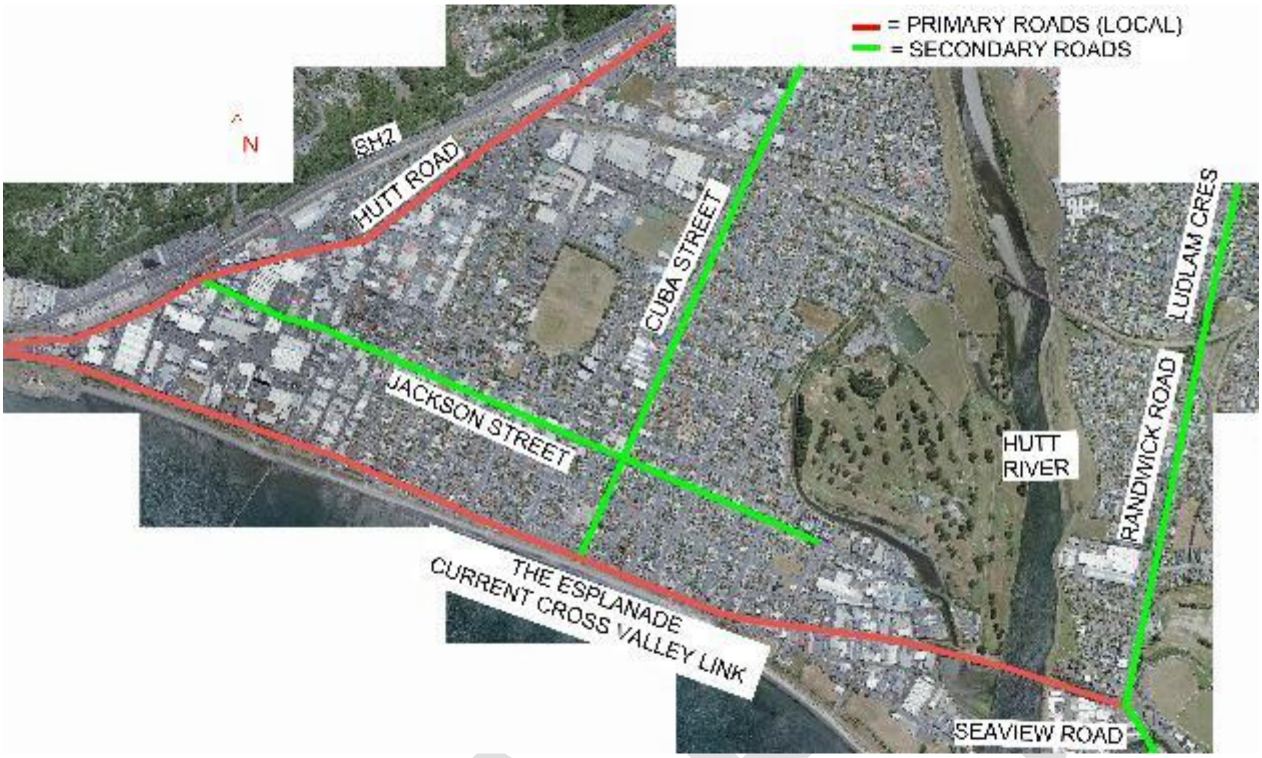

Figure 1 - Key secondary local roads

4.1.4 Other transport modes

Pedestrian activity along the CVL route is considered low, and the main pedestrian movements are expected to be across the road via designated crossing points.

Cyclist activity along the route is not well known at this stage. HCC plan to create a cycle/ shared path link from RiverLink to City Centre to Waterloo Station (approx. 2 km to the north of CVL), and the current cross valley cycle link is considered along The Esplanade via Waione St bridge (approx. 1.5 km to the south of CVL). CVL is approximately midway between the two links, and could benefit in serving cyclists from the Woburn, Waiwhetu, Moera, and North Petone suburbs. Cycle provisions should be explored at a further design stage.

Public transport modes and routes within the area are summarised in Figure 2.

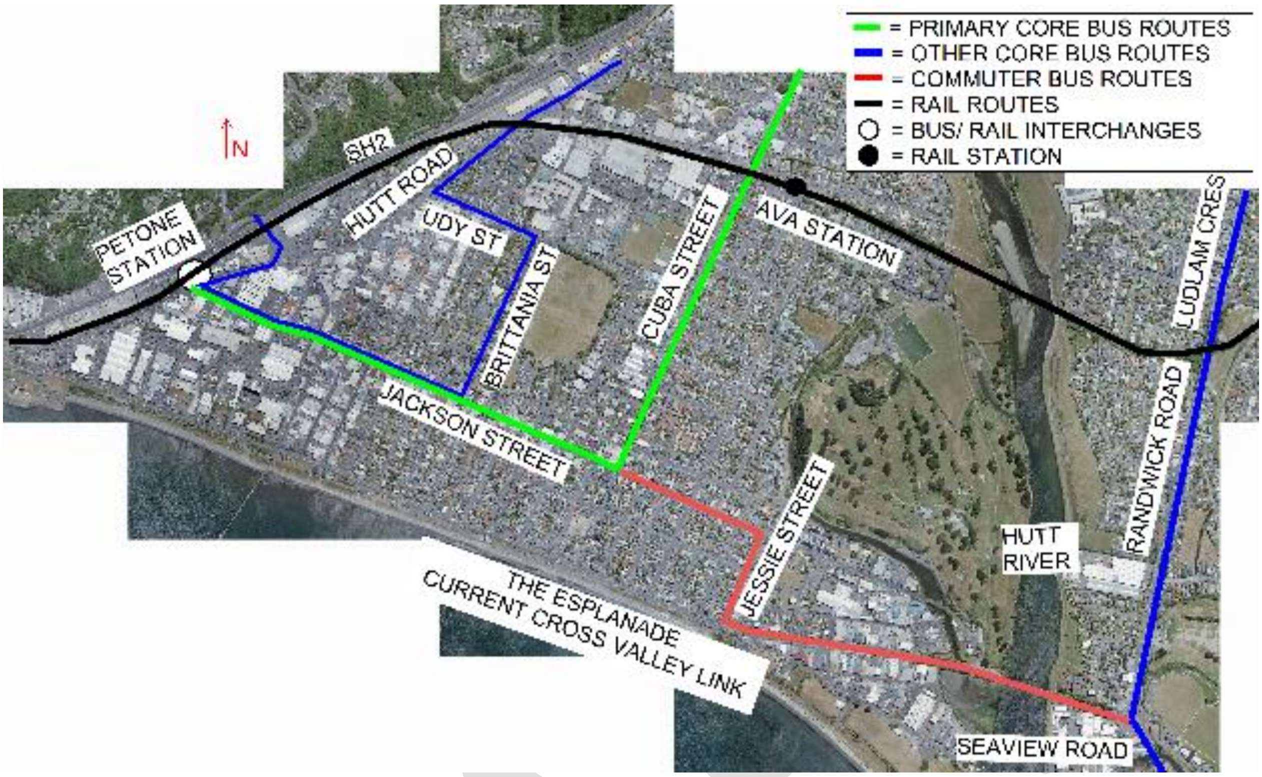

Figure 2 - Public transport modes and routes (information sourced from Metlink.org.nz, 03/2025)

Bus public transport routes are expected to be impacted by the proposed works particularly with the closure of Korokoro Road bridge, and disruptions along Randwick Road, Cuba Street, and Hutt Road. The Korokoro to Petone bus route would need to be considered at the next stage, as no bus route interconnectivity, and no dedicated bus lanes, along CVL have been allowed for at this stage.

The rail corridor is not expected to be impacted by CVL, and no additional interconnectivity benefit is expected. Current access to Ava and Petone Stations will be maintained.

4.1.5 Geometric design standards adopted

4.1.5.1 Speed environment

The safe and appropriate speed limit on urban connector roads can vary from 40-60 km/h depending on the road conditions. Under the ONF guidelines, a speed limit of 50 km/h is considered appropriate; where the road must have a median divider, and separated walking or cycling facilities.

At this stage, variable speed environment zones along the route have not been considered.

4.1.5.2 Sight distance

Stopping and approach sight distances have not been considered at this stage. Given the flat topography, and the CVL route largely following already formed roads, sight distance is not expected to be a major issue for the given speed environment.

4.1.5.3 Horizontal and vertical alignment

The desirable minimum horizontal curve radius adopted is 120 m.

The desirable minimum vertical gradient adopted is 0.5% and maximum vertical gradient is 6%. Vertical alignment has only been considered at the proposed Hutt River Bridge crossing and bridge approaches at this stage, as the remaining alignment follows existing road corridors.

4.1.5.4 Cross-sections

The typical cross section for the two and four lane options were derived from a principal road treatment excluding on-road cycle lanes, as shown in Figure 3 & Figure 4 below, for a total road corridor width of 20 m which typically matches the existing road corridor width.

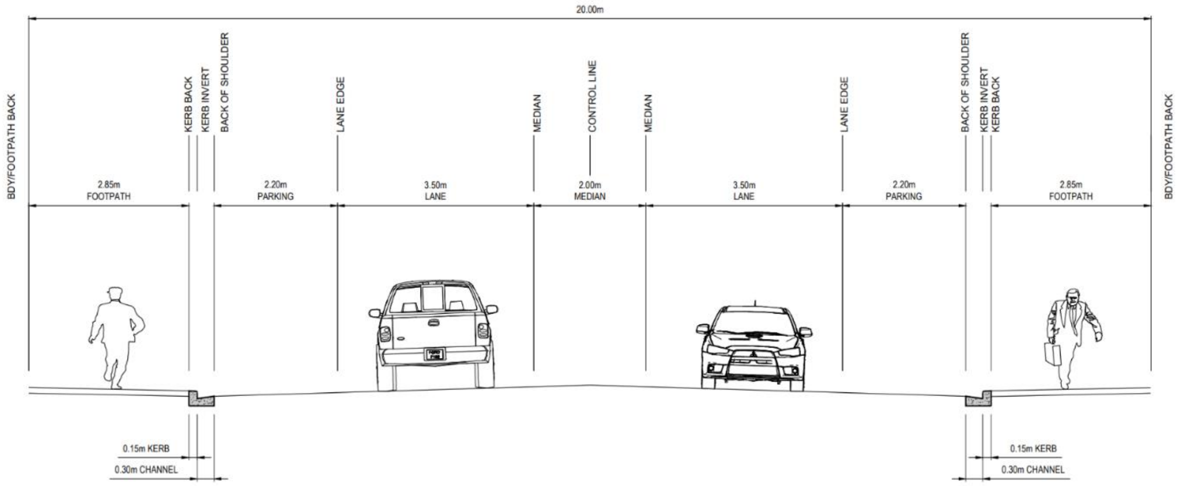

Figure 3 - Typical two-lane mid-block section

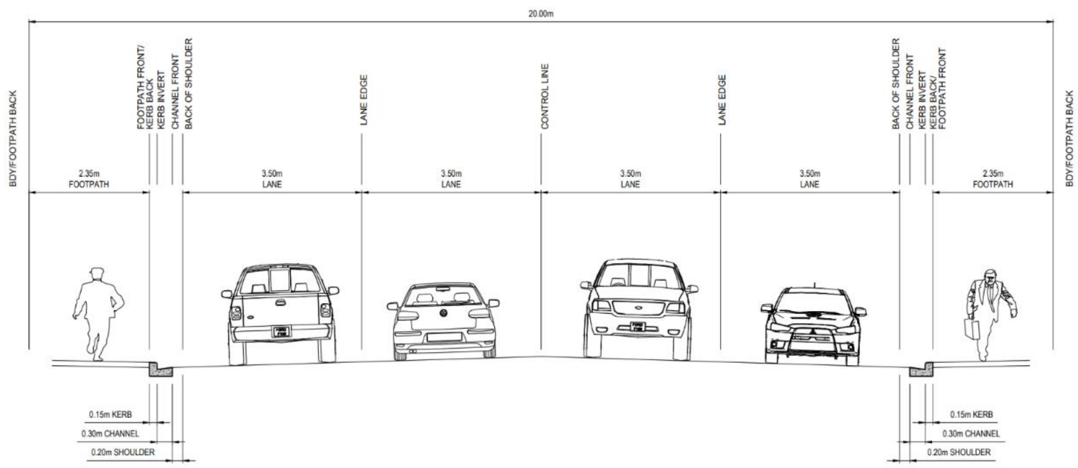

Figure 4 - Typical four-lane mid-block section

4.1.5.5 Intersections

Signalised intersections are proposed at major junctions to manage traffic flows and increase the efficiency of the roading network.

Additional lanes are required to cater for turning movements at signalised intersections. This is generally accommodated within the existing road corridor by removing roadside parking and flush medians. Minor land acquisition may be required in some locations. The final layout and requirements of the intersections are subject to outcomes of traffic modelling.

4.1.5.6 Design vehicles

The adopted design vehicle is the largest vehicle that frequently uses the road and is expected to generally remain within their allocated traffic lane.

The adopted design vehicle will either be a 17.9 m or 19.45 m semi-trailer and will be confirmed at future stages. A 17.9 m semi-trailer is the largest vehicle type generally used for service deliveries to retail, while a 19.45 m semi-trailer is generally used on freight routes (HPMV).

Design vehicle tracking and vertical clearance checks have not been done at this stage; however, it is noted that the existing Cuba St bridge has a posted vertical clearance limit of 4.3 m for Wakefield Street traffic and a 17.96 m/19.45 m semi-trailer has an overall height of 4.37 m/4.39 m respectively. Local lowering of Wakefield Street under the bridge may be required to accommodate either of these vehicles.

4.2 Pavement

4.2.1 General

The pavement design philosophy is focused on using standard local road pavement design practices for the investment case as best as practicable, as well as highlighting methods where re-use of existing pavements could be possible.

4.2.2 Scope

At this stage, only one pavement design was developed to cover the following scope extents:

- Pavement detailing for the Hutt Road upgrades.
- Pavement detailing for the new Cross Valley Link from Hutt Road to Whites Line roundabout.
- Pavement detailing for the new Cross Valley Link on Randwick Road and Seaview Road.

4.2.3 Design standards and references

The RoNS Standardised Designs V2.0 (NZTA, 2024) was not considered applicable, as CVL is classified as an urban connector road, however this standard is referenced where appropriate.

In addition to the standards listed in Section 3.2, the following table lists the key additional documents, references, and resources, expected to be used in the pavement design. In future project phases a more comprehensive list of specific standards and references will need to be referenced in the design report.

Table 2: Geotechnical Pavement design standards and references

Document	Reference
AustRoads standards, guidelines and specifications	Guide to pavement structural design, Part 2, AGPT02-24 (AustRoads, 2024).
Underlying geological reference	T+T Geotechnical Investigations web map server, to obtain reference borehole and scala penetrometer test data,
Pavement design software	Circly 6.0, Pavement Science, December 2023.
Footpath construction reference	Upper Hutt City Council engineering standards, footpath construction typical sections, revision 7, July 1998.

4.2.4 Design constraints and assumptions

4.2.4.1 Traffic loading

Traffic loading in terms of vehicles per day (vpd) and % heavy vehicles (%HV) are provided by NZTA's traffic modelling suppliers and the Wellington Transport Analytics Unit (WTAU) as preliminary estimates. 25,000 vehicles per day (vpd) and 6% heavy vehicles (%HV) shall be assumed.

Traffic loading in terms of % per year heavy vehicle growth rate (HVGR), and pavement design period, were assumed in conjunction with NZTA's traffic modelling suppliers. A HVGR of 2% over a 25-year pavement design life has been assumed. Traffic modelling has been undertaken using the Wellington regional model (WTSM) and a localised model (Aimsun) that represents local traffic movements and congestion in more detail

4.2.4.2 Subgrade

An average design subgrade CBR of 4 was assumed for the CVL road corridor, except for where new road corridor was proposed over existing greenfield areas where an assumed CBR of 3 was used. These values were obtained from an experienced Engineering Geologist based on their understanding of the underlying geology, cross-referenced with historical borehole and scala penetrometer data in the area as set out in Section 4.2.2.

4.2.4.3 Surfacing

Epoxy-modified Porous Asphalt with a nominal maximum aggregate size of 7 mm (EPA7) surfacing is specified in the RoNS Standardised Design guide although this was not considered applicable or cost effective for CVL. A Stone Mastic Asphalt (SMA) wearing course has been preliminarily selected for this project, this will be explored further in subsequent design stages.

4.3 Geotechnical

4.3.1 General

The geotechnical philosophy for the CVL project is focused on balancing the resilience and value of the transport corridor. The focus of the geotechnical design is on the proposed new bridge across the Hutt River. Section 2.3.3.1 of the RONS Standardised Designs document highlights the high costs / risks associated with geotechnical uncertainty.

The geotechnical design needs to be focussed on sufficient targeted ground investigations, robust analysis and the application of good-practice design principles that are suitable to the project's geotechnical environment.

The geotechnical design philosophy generally aligns with the NZTA Bridge Manual and RONS Standardised designs documents.

4.3.2 Scope

This section of the PSOPS covers all Soil Structures as defined by Section 6.1.1 of the Bridge Manual[3].

Retaining walls and structures associated with bridges (including major culverts) are covered within the Structures section of the PSOPS. The key geotechnical design elements of the project are expected to include:

- Fill embankments (the main embankment will be on the approaches to the proposed Hutt River Bridge).
- Soil slopes (new or re-profiled existing soil slopes on the approach to the Hutt River Bridge).
- Earth retaining structures (likely to be mechanically stabilised earth slopes to supporting the face of fill embankments).
- Ground improvement to mitigate the effects of liquefaction and lateral spreading along the banks of the Hutt River.

[3] Soil structures are as defined in Section 6.1.1 of the Bridge Manual and include cut and fill slopes (including stabilised slopes), embankments, retaining walls and earth retaining structures such as MSE.

4.3.3 Design standards and references

In addition to the standards listed in Section 3.2**Error! Reference source not found.**, the following table l ists the key additional documents. In future project phases a more comprehensive list of specific standards and references will need to be referenced in the design report(s).

Table 3 - Geotechnical design standards and references

Document	Reference
Waka Kotahi standards, guidelines and specifications	– Road Research Bulletin 84, Volume 2 - Seismic Design of Bridge Abutments and Retaining Walls Wood & Elms (1990) – Research Report 553 The Development of Design Guidance for Bridges in New Zealand for Liquefaction and Lateral Spreading Effects (2014) – Research Report: Analysis of piled bridges at sites prone to liquefaction and lateral spreading in New Zealand (2018) – Transfund New Zealand Research Report No. 239: Guidelines for Design & Construction of Geosynthetic-Reinforced Soil Structures in New Zealand (2003)
NZGS Guidance Modules 1 to 6	– New Zealand Geotechnical Society and Ministry of Business Innovation & Employment (2021)

4.3.4 Design constraints and assumptions

4.3.4.1 Design working life

Soil structures will require routine maintenance to achieve the design life, particularly the embankment slopes proposed.

Where modification to existing geotechnical structures is required, their residual design life is to be maintained or improved (if practicable).

4.3.4.2 Importance levels

Importance levels (IL) for soil structures on the Urban Connector Route shall be IL2.

4.3.4.3 Seismic loading

The overarching seismic philosophy is to balance pragmatic geotechnical design with post disaster functionality requirements. The seismic design for CVL will depart from the requirements of the Bridge Manual so that an affordable, optimal value solution can be achieved.

This is aligned to the philosophy described in 2.3.1.2 of the RoNS Standardised Designs v2. Further detail is covered in the Seismic Resilience Philosophy report.

4.3.5 Principal elements

Key geotechnical elements comprise foundation stability, slope resilience, earthworks management, ground improvement and retaining structures as listed below, with relevant sections of the Bridge Manual referenced:

4.3.6 Foundations

Design to meet the stability and bearing capacity requirements laid out in Section 6.5 of the Bridge Manual. Strength reduction factors derived and capacity design completed as specified.

Implement measures for confirmation of foundation conditions during construction.

4.3.7 Slopes

Provide for designs for stable slope based on the guidelines in Section 6.3 and 6.4 of the Bridge Manual, considering both static and seismic conditions.

4.3.8 Earthworks

The geotechnical design will coordinate with the geometrics design to achieve / minimise the balance / imbalance between cut and fill volumes. The geotechnical design will also coordinate with the construction team to maximise reuse of site-won materials.

Implement appropriate drainage measures based on the performance requirements outlined in Sections 6.2.5 and 6.3.5 of the Bridge Manual.

4.3.9 Ground Improvement

Where required, employ techniques such as reinforcement with geosynthetics, dynamic compaction, impact rolling, vibro-compaction, and soil replacement to enhance ground stability, especially in liquefiable areas, following Section 6.3.4 of the Bridge Manual.

Concrete lattice ground improvement may be implemented at locations requiring treatment at depth (i.e. >6 m deep).

4.3.10 Retaining Structures

Design retaining walls and MSE systems in compliance with Bridge Manual such that they meet overall stability, bearing capacity, and displacement requirements under dynamic loads.

4.4 Structures

4.4.1 General

The design philosophy for structures focuses on delivering safe, durable, and resilient structures that meet the functional requirements of the project while adhering to relevant design standards and constraints. The approach ensures that all structures are designed to support long-term performance under operational and environmental conditions, with considerations for future adaptability and maintenance.

4.4.2 Scope

The structural scope for the preferred corridor is limited to the Hutt River Bridge.

4.4.3 Design standards and references

In addition to the standards listed in Section 3.3, Table 4 outlines key additional documents that inform the design process for structures. These references provide technical guidance for structural components, material specifications, load assessments, and seismic resilience. During subsequent project phases, a more comprehensive list of specific standards will be included in detailed design reports to ensure compliance across all aspects of development.

Table 4 - Structures design standards and references

Document	Reference
Waka Kotahi standards, guidelines and specifications	– NZTA Bridge Manual SP/M/022 Third Edition incl. Amendment 1, 2, 3 &4 – Highway Structures Design Guide first Edition – M23 Specification for Road Safety Barrier Systems – Bridging the Gap

4.4.4 Design constraints and assumptions

4.4.4.1 Freeboard to the Hutt River Bridge

The bottom of the Hutt River Bridge deck has been set to vertically align with the existing highest stop bank level where the bridge crosses the Hutt River. The stop bank levels currently contain the 440 ARI flood (including allowance for climate change). If additional free board is required to allow for debris or increased flood levels, this will result in higher bridge embankments and potentially an increased impact to property and localised flooding.

4.4.4.2 Design Life

While the overall structure is designed for a 100-year lifespan, certain elements such as expansion joints and bearings may have a shorter design life due to their functional nature and exposure to wear. To enhance resilience and minimise maintenance costs, the inclusion of these lower design life components will be limited wherever possible. Alternative solutions, such as integral or continuous bridge designs that eliminate the need for expansion joints, will be prioritised where site-specific conditions allow.

4.5 Stormwater management

4.5.1 General

The stormwater philosophy for the CVL project is focused on providing effective drainage for the road corridor through:

- Utilising the existing stormwater network where the road corridor width is unchanged. Allowance has been made for relocating catchpits and catchpit leads due to slight changes in the kerb alignment.
- Installation of new catchpits and pipework connecting to the existing stormwater network where the road corridor has changed substantially, mainly at intersections.
- Installation of bridge drainage for the Hutt River bridge consisting of bridge catchpits connecting to new pipework.
- Runoff from the bridge and surrounding areas which increase the impervious area will be attenuated and treated through new stormwater wetlands on each side of the Hutt River.
- Existing stormwater networks adjacent to the Hutt River bridge will be diverted where required with Opahu Stream being culverted to provide access to the stormwater pump station at the SW end of Whites Line W.

4.5.2 Scope

The key stormwater design elements include:

- Bridge drainage consisting of bridge catchpits and connecting pipework.

- Catchpits and pipework connecting to the existing stormwater network where the road corridor width or location has changed.
- Stormwater attenuation and treatment through wetlands to offset any increase in impervious area.
- Diversion/extension of existing stormwater network where required including a new culvert for Opahu Stream at the SW end of Whites Line W.

4.5.3 Design standards and references

In addition to the standards listed in Table 5 the following table lists the key additional documents. In future project phases a more comprehensive list of specific standards and references will need to be referenced in the design report(s).

Table 5 - Design standards and references

Document	Reference
WWL Regional Standard for Water Services	WWL Regional Standard for Water Services
WWL Regional Specification for Water Services	WWL Regional Specification for Water Services
NZTA P46 Stormwater management and minor stream diversion design specification (2025)	NZTA P46G:2025 Stormwater management and minor stream diversion design specification
NZTA's Stormwater Treatment Standard for State Highway Infrastructure (2010)	Stormwater Treatment Standard for State Highway Infrastructure (May 2010)

4.5.4 Design constraints and assumptions

4.5.4.1 Design events

Bridge deck drainage

Bridge drainage consists of bridge catchpits and pipework that discharge to the attenuation and treatment wetlands located on either side of the bridge.

Catchpit spacing for the bridge has been determined for the 1% AEP design event, using the Rational Method with RCP 6.0 2100-2120 climate adjusted rainfall (adjusted using the method set out in the Regional Infrastructure Technical Specifications amendments for design rainfall 2020) in general accordance with the WWL Regional Standard for Water Services. Flow depths, widths and velocities have not been determined at this stage of the design.

Road drainage – Hutt Road, Wakefield St and Whites Line W

It has been assumed that the existing network can be utilised with no carrier pipe upgrades where the alignment remains within the existing road corridor. Allowance has been made to relocate two existing stormwater pipes which are 750 dia and 1050 dia that outfall to the true right bank of the Hutt River at the bridge location. Allowance has also been made to relocate catchpits and catchpit leads and household service connections through the kerb where the kerb line has changed and for new catchpits and catchpit leads connecting to the existing network at intersections, however capacity and condition of the existing network has not been assessed. This may not meet the current primary and secondary levels of service set out in the WWL Regional Standard for Water Services, in which case consultation with WWL and other stakeholders will be required to determine if the existing network requires upgrade works.

4.5.4.2 Attenuation and Treatment

Stormwater attenuation and treatment has been allowed for via wetlands for the bridge due to the increase in impervious area. The wetlands have been sized based on a fixed ratio between catchment area and the total wetland footprint area (wetland area is 6% of the total catchment area). This ratio was derived from similar projects that had detention wetlands modelled in 12d. It is expected that the works on Hutt Road, Wakefield St and Whites Line W will not increase the impervious area significantly and hence attenuation and treatment will not be required. Confirmation is required from GWRC on the wetland locations and all relevant stakeholders on the design storm event to be treated and attenuated to confirm the wetland sizes and outfalls.

A departure from the stormwater treatment and attenuation standards or additional property acquisition may be required if the wetlands cannot be located adjacent to the Hutt River.

4.5.4.3 Opahu Stream Culvert

The Opahu Stream culvert has been sized based on the current stream cross section and upstream and downstream culvert sizes. Flood modelling has not been completed to confirm the flow rate required to pass through the culvert and the subsequent culvert size. Fish passage has also not been allowed for within the culvert as it is unclear if the flood gate at the Hutt River allows fish passage or not. It is expected that stream impact mitigation works will be required to offset the impact of the additional culvert and culvert extension.

4.5.4.4 Localised Flooding

There may be some changes in localised flooding due to the increased height of the road at the Hutt River bridge abutments. Flood modelling will need to be completed at later stages in the design to determine the impact of the bridge abutments on flooding. It is expected that flooding at other locations to be generally unchanged from the present situation as the road elevation is generally unchanged and there are only minor increases in impervious area.

4.6 Landscape and environmental design

No specific items need to be highlighted at this stage. The minimum requirements for landscape and urban design will need to be determined in future stages.

4.7 Urban design and multi modal transport

No specific items need to be highlighted at this stage. Footpaths are provided as set out in other section of this document.

4.8 Utilities and services

4.8.1 General

The RONS Standardised designs document does not provide guidance on utilities and services within proposed road corridors. Therefore, the philosophy adopted is generally based on the national code of practice for utility operators' access to transport corridors sections 2 and 3 as summarised in 4.8.3.

The utilities and services' general philosophy for the CVL corridor is as follows:

- Possible clashes with existing underground three-waters and PowerCo gas utilities, as well as above ground lighting, power lines, and substations (where observable on google maps street view), which were of major or critical importance were considered. A general contingency was allowed for utilities considered to be of lesser importance than major depending on the area (intensified or undeveloped land etc).

The key utilities and services assumptions and exclusions at this stage are as follows:

- A new services corridor, within the proposed road corridor, has not been allowed for at this stage.
- Assets such as local power, gas (other than PowerCo), communications etc. are not considered at this stage. A general contingency was allowed for works within existing road corridors.

4.8.2 Scope

The scope prioritises value engineering principles which focus on identifying critical elements and mitigations as early as possible and as required to demonstrate option feasibility.

The scope for utilities and services generally involved:

- A desktop assessment of all publicly available data incorporated into the T+T GIS web map viewer, including "before u dig" application data for the full extent of the works provided by utility providers, as well as a google street view pan through of the area to identify above ground assets (where applicable).
- Utilities and services considered to be of major or critical importance were identified in the applicable drawings as well as any mitigations required. Mitigations were generally scoped as realignments matching the same specification as the existing asset (if known). If the existing asset specification was not known, it was assumed based on engineering judgement and the assumption noted in applicable documentation.

4.8.3 Design standards and references

In addition to the standards listed in Section 3.3, the following table lists the key additional documents. In future project phases a more comprehensive list of specific standards and references will need to be referenced in the design report(s).

Table 6 - Design standards and references

Document	Reference
The New Zealand Utilities Advisory Group Inc (NZUAG): Utilities National Code, version 3 - 03/10/2024	National Code - approved ver 3 Oct 2024.docx

4.9 Furniture and lighting

4.9.1 General

The general philosophy adopted for street furniture and street lighting has been to allow to reinstate what currently exists with minor upgrading where appropriate.

4.9.2 Scope

4.9.2.1 Street furniture

There is very limited existing street furniture along the proposed CVL corridor. A minor allowance has been made to reinstate existing street furniture where affected. No significant items such has bus shelters were identified as requiring reinstatement.

No allowance has been made for new street furniture beyond the provision of new directional signage for the CVL route.

Consideration of any requirements for new bus stop shelters will be undertaken at future stages.

4.9.2.2 Street lighting

Street lighting is present on all the proposed CVL corridor. An allowance has been made to relocated existing lighting and a further allowance for upgrading the lighting where the proposed carriageway width is being increased.

4.9.3 Design standards and references

Street lighting is to be designed in accordance with AS/NZS 1158 – Lighting for Roads and Public Spaces. All new lighting designs shall use LED luminaires.

All new street lighting columns and new street furniture shall comply with the requirements of Hutt City Council design guidelines.

All traffic signs shall be in accordance with the latest version of the Traffic Control Devices Manual.

4.10 Noise

4.10.1 General

The road geometrics has generally been aligned to avoid noise nuisance to nearby developments as best as practicable. Noise production and possible nuisance has not been investigated in detail, at this stage, as it is not considered a critical factor in option selection.

4.10.2 Scope

A preliminary road traffic noise calculation was completed for the selected pavement design using NZTA's online road traffic noise calculator [Road traffic noise calculator | NZ Transport Agency Waka Kotahi](#).

Average and assumed parameters were input at this stage to obtain an indicative average range of equivalent noise levels at nearby habitable buildings.

The indicative noise range obtained was compared against the allowable noise level in NZTA's state highway guide to acoustic treatment of buildings, version 1.0, June 2015. No acoustic treatments, other than change of surfacing type, has been investigated at this stage.

4.10.3 Design standards and references

In addition to the standards listed in Section 3.3, the following table lists the key additional documents. In future project phases a more comprehensive list of specific standards and references will need to be referenced in the design report(s).

Table 7 - Design standards and references

Document	Reference
Road traffic noise calculator, version 2.1, February 2024	https://nzta.govt.nz/roads-and-rail/highways-information-portal/technical-disciplines/environment-and-sustainability-in-our-operations/environmental-technical-areas/noise-and-vibration/road-traffic-noise-calculator/
State highway guide to acoustic treatment of buildings, version 1.0, June 2015.	https://www.nzta.govt.nz/assets/resources/state-highway-guide-to-acoustic-treatment-of-buildings/NZTA-Acoustic-Treatment-Guide-v1.0.pdf

4.10.4 Design considerations

The preliminary indicative noise range was computed under the following key assumptions:

- Traffic modelling inputs for AADT and % Heavy Vehicles are preliminary estimates, taken from the pavement design (see Section 4.2).
- The NZTA road traffic noise calculator is intended for assessment of a particular single sensitive receptor. As such, the height above road, distance to receiver, reflective surfaces opposite, view of road segment angle, propagation height, and ground absorption percentage, were assumed based on expected averages.
- The noise level output from the calculator is a fixed value which is not considered appropriate given the level of confidence in the inputs, at this stage. To conform it to a range, +20% was added to this value to give a maximum, and -10% was taken to give a minimum.

4.11 Resource efficiency and sustainability

The project design to date has been driven by a philosophy of the minimum viable product required to safely meet the project objectives. Inherently this approach incorporates resource efficiency and sustainability by using less resource.

The Riverlink (Te Awa Kairangi) project upstream of the proposed CVL Bridge provides proof that construction resource exists within the region to undertake a bridge design and build in the local area.

Further work could be undertaken in the consenting design stage.

4.12 Intelligent Transportation Systems

This section has not been completed for this (Investment Case) version of the report.

Refer to the Design Report accompanying the Feasibility Study documentation for a description of what has been considered and recommendations for design effort required in the consenting design phase to further quantify risks and opportunities.

4.13 Land use and property / corridor assets management

Assessment of property requirements to date has focused on temporary and permanent project footprint with the assumption that within the land parcels marked for full acquisition there will be enough area to allow for asset management considerations at the next design stage.

See Section 4.14 below for proposed design reviews relating to asset management.

4.14 Design audits and reviews

4.14.1 Design

A concept stage safe system audit has been undertaken to inform the transport safety risks associated with the project to be carried into further stages of design.

In addition to this and independent review has been undertaken of the constructability of the proposed alignment. This review focused primarily on the bridge construction.

4.14.2 Consents and approvals

No consents or approvals have been granted at this time. Refer to the Consenting Strategy document for the Feasibility Study for a list of probable consents required. Further information to be addressed at the consenting stage of design.

4.14.3 Partnership and agreement

Not Applicable. No agreements have been signed at this stage of design.