Thursday, 11 December 2025

Te Hui o Te Kaunihera ā-Rohe o Heretaunga
Hastings District Council
Council Meeting

Kaupapataka

Attachments

Te Rā Hui: Meeting date:	**Thursday, 11 December 2025**
Te Wā: Time:	**1:00 PM**
Te Wāhi: Venue:	**Council Chamber** **Ground Floor** **Civic Administration Building** **Lyndon Road East** **Hastings**

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TE KAUNIHERA Ā-ROHE O HERETAUNGA

Project Number: 2-S5600.1G

Cyclone Gabrielle

Waiohiki Rd (Redclyffe) Bridge (ID 816) Report – Stage 1 & 2

CONFIDENTIAL

Part A: Feasibility Report

Part B: Options Report

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1	10/08/2023	Etienne du Plessis	Jono Watkins	Luke Leadbetter	Draft
2	6/12/2024	Jono Watkins	Michael Cowan	Luke Leadbetter	Final

Revision Details

Revision	Details
1	Part A: Feasibility Report Draft for Client's review
2	Part A: Feasibility Report for Client's approval with further geometrics, property impact assessment, and economic assessment

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Disclaimers and Limitations

This report ('**Report**') has been prepared by WSP exclusively for Hastings District Council ('**Client**') in relation to Options Report for Waiohiki Road "Redclyffe" Bridge ('**Purpose**') and in accordance with the Project Definition Sheet "Post Cyclone Bridge Rebuild – Stage 1 & 2" dated 16/05/2023 and OoS dated 03/08/2023.

The findings in this Report are based on and are subject to the assumptions specified in the Report and PDS. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

Executive Summary

Cyclone Gabrielle (13-14th February 2023) caused catastrophic damage to many areas of Aotearoa New Zealand and significantly affected the Hastings District Council roading network. This included severely damaging the Redclyffe Bridge that had been in service since 1933. A temporary crossing was opened to restore connectivity on the 8th of August 2023. The purpose of this report is to consider options to provide a permanent replacement bridge connection between the Waiohiki and Taradale communities.

A bridge crossing has been in place since 1881. The various bridges including the current temporary bridge are discussed in detail in Section 1. Factors influencing the design are discussed in Section 2. If a replacement bridge is chosen, the identified service requirements are to retain the existing level of service with two lanes of traffic and a shared user path. Constraints were identified including remaining within crown owned land, iwi and other stakeholder engagement, the Tūtaekurī river itself, bridge vertical level to increase resilience, and tying in with anticipated stop bank repairs.

Six options were examined via a multi criteria assessment in Section 3. The options were four different bridge replacement alignments, maintaining the existing temporary bridge and having no crossing. The recommended option is 2C Replace Bridge Immediately Upstream and Skewed to Existing Bridge, is the recommended option.

The recommended option provides approximately three times the economic benefits than costs as set out in Appendix C. It provides a cost efficient, modern, and resilient replacement bridge; minimises disruption to existing bridge users during construction by being built offline; does not require private land acquisition by staying within crown land boundaries; and allows the northern intersection to be improved and has the preferred geometric alignment of all options considered.

Part A – Feasibility Assessment

1 Introduction

Redclyffe bridge was one of three bridges over the Tūtaekurī River that was washed away during Cyclone Gabrielle. Temporary access via Waiohiki Road was restored on the 8th of August 2023 with installation of a temporary bridge replacing the portion of bridge washed away.

This report is prepared to consider whether a permanent replacement bridge connection on Waiohiki Road over the Tūtaekurī River is feasible and provides an alignment recommendation.

Section 1 reviews the original bridge details, damage that occurred during Cyclone Gabrielle and details of the existing temporary bridge. Section 2 reports on the factors to consider for a replacement bridge, and section 3 examines the relative benefits of different alignment options considered.

1.1 Reasons for Construction of the Structure

Redclyffe Bridge connects Waiohiki and adjacent suburbs to the western side of Napier. It is an important (performance) bridge[1] with approximately 8,000 vehicles per day using it. The bridge forms part of the detour route if the State Highway 2 Expressway between Links Road (SH50) and Meanee Road are closed.

A major portion of Redclyffe Bridge was washed away or experienced significant damage during Cyclone Gabrielle in February 2023. Only the first 50m at both ends of the bridge were reusable (spans 1-4 and 15-18), with a new temporary 130m long bridge built to replace the lost spans. The modified bridge was opened for public use on the 8th of August 2023.

1.2 General Site and Bridge Description

Redclyffe Bridge is located on Waiohiki Road crossing over the Tūtaekurī River. It is on the local council boundary between Hastings and Napier City. The site of Redclyffe Bridge and the temporary staging crossing is at 39°33'13.91"S, 176°50'09.69"E. The NZTM co-ordinates are 1929610.016, 5614724.936.

The original bridge has two traffic lanes, was 233m long with 18 spans and built in 1933. The piers were strengthened in 1976. A pedestrian walkway was added in 1996, supported on the existing pier pilecaps. The bridge was evaluated in 2011 as 100% class 1 and rated 74% gross and capable of HPMV loading.

The typical cross-section and longitudinal section are shown in the figures below. The original bridge superstructure is cast-in-situ reinforced concrete haunched T-beam with reinforced concrete deck. The pedestrian footpath comprises a precast double-T unit. The total carriageway width between kerbs is 6.1m and pedestrian walkway width is 1.3m.

The original substructure comprises reinforced concrete wall piers supported by seven or eight reinforced concrete piles (381 mm square) that were driven approximately 9m into the ground. The substructure of all piers was strengthened in 1975 by doubling the length of the pilecap and driving 6no. additional precast prestressed concrete piles (406mm octagonal) with a typical length of 13m. The most likely reason for the strengthening is damage from the June 1974 Hawke's Bay flood.

The road surface was measured to be 14.6mRL (NZVD 2016) at abutments A and T at the centerline of the road carriageway. The historical drawings show abutments A and T at the same finished

[1] HDC Bridge Asset Management Accessibility Analysis, Abley Transportation Consultants, June 2021

level with a rise of 610mm towards Pier K (~0.52% longitudinal grade). The road carriageway crossfall is 1.66% (51mm over 3048mm). The historical drawings note that 1924 flood level as 12.8 mRL (NZVD 2016).

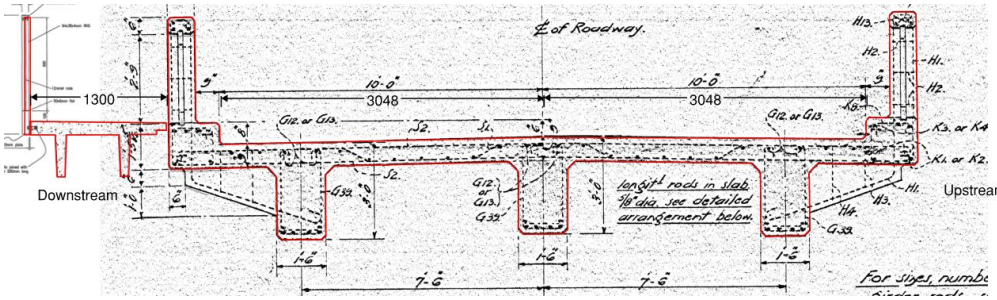


Figure 1: Cross section of Redclyffe bridge at pier mid-span (red lines denote outline)

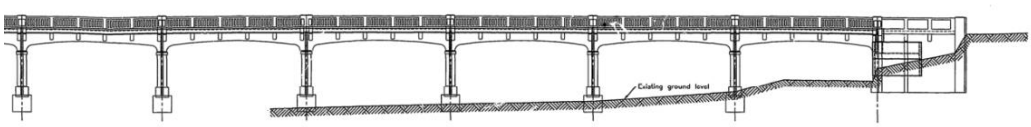


Figure 2: Partial longitudinal section of Redclyffe bridge

The first Redclyffe bridge across Waiohiki Road was opened in June 1881[2]. The one-lane bridge featured a passing facility at its center. A new bridge was planned in 1925 but was delayed for various reasons. During the 1931 Napier earthquake, the bridge was badly damaged, as depicted in Figure 4. It was repaired before the new reinforced concrete bridge was built in 1933 immediately downstream of the 'pre-1933 bridge, as shown in Figure 3.

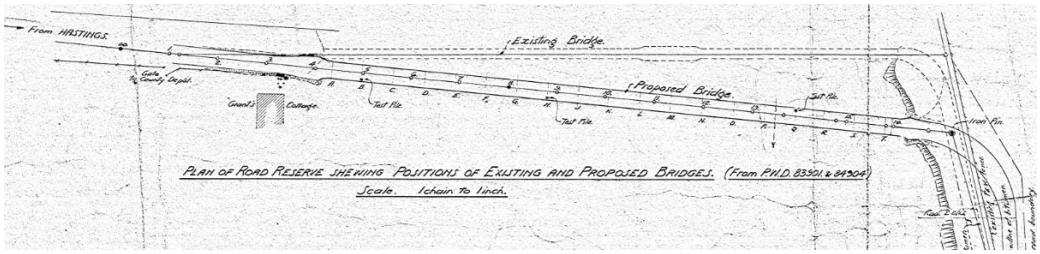


Figure 3: Plan view showing the proposed Redclyffe bridge constructed in 1933 and the bridge that existed prior to it.

[2] Opening of the Redclyffe bridge, Hawke's Bay Herald, Volume XXI, Issue 5996, 11 June 1881, Page 3

Figure 4: Original Bridge after 1931 Earthquake from NZSEE Paper[3]

1.3 Observed Damage and Failure Mechanism

The bridge sustained severe damage due to the Cyclone over the period 13-14th February 2023. Spans between Pier E to Pier K collapsed and the alignment of the bridge from Pier K to Pier P shifted transversely. This resulted in the demolition of spans between Pier E to P (5 to 14). Refer Figure 5, Figure 6 and Figure 7 below. Abutment A to Pier E and Pier P to Abutment T was the only salvageable elements of the bridge

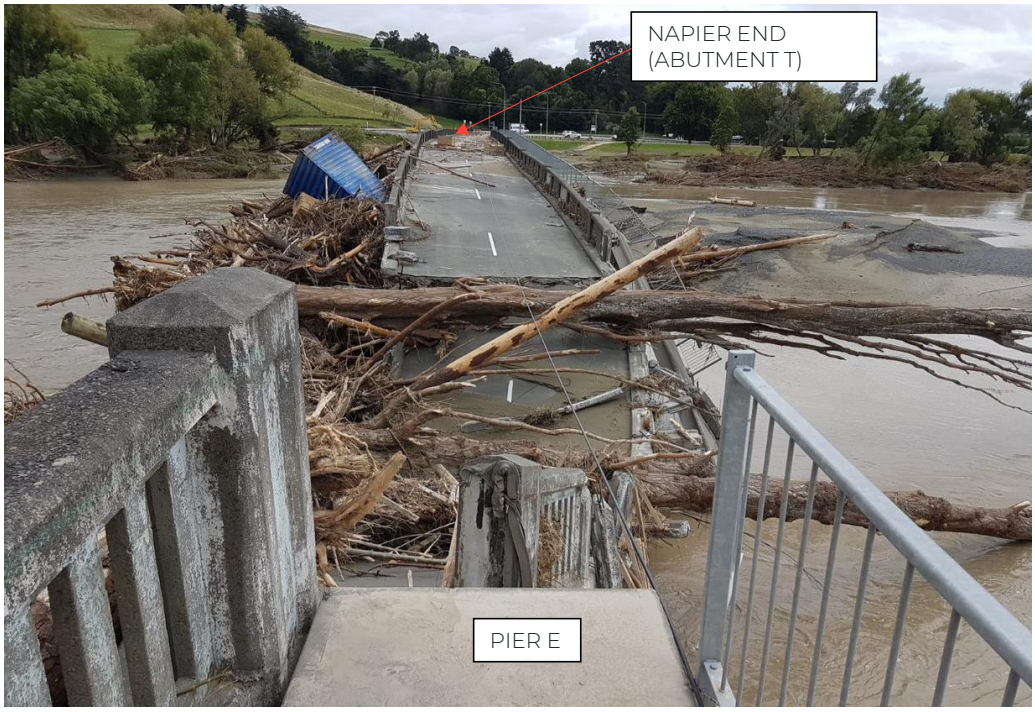


Figure 5: Redclyffe Bridge damage after Cyclone Gabrielle

[3]https://db.nzsee.org.nz/2006/Paper04.pdf

Figure 6: Redclyffe Bridge damage after Cyclone Gabrielle

Figure 7: Redclyffe Bridge damage after Cyclone Gabrielle

The high water levels and peak flows from Cyclone Gabrielle also resulted in damage, failure and overtopping of the stop banks which caused extensive flooding. The bank along Springfield Road upstream of the Redclyffe bridge was breached at several locations as shown in Figure 8. The breached stop banks resulted in flooding in this region as shown in Figure 9.

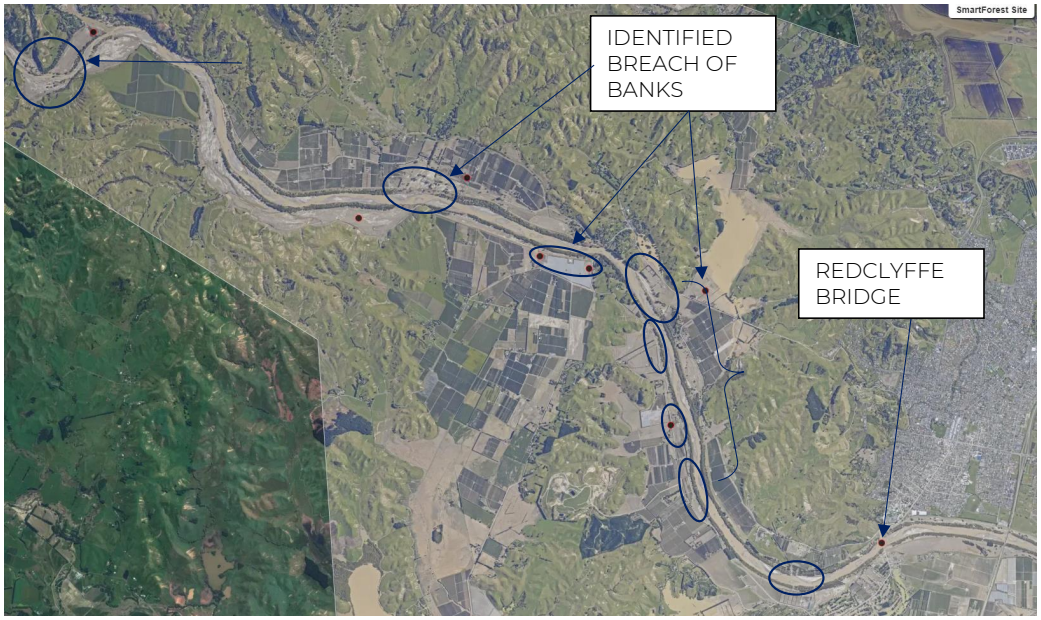


Figure 8: Aerial View of Locations of where Stop banks failed along Springfield Rd (Upstream of Tūtaekurī River)

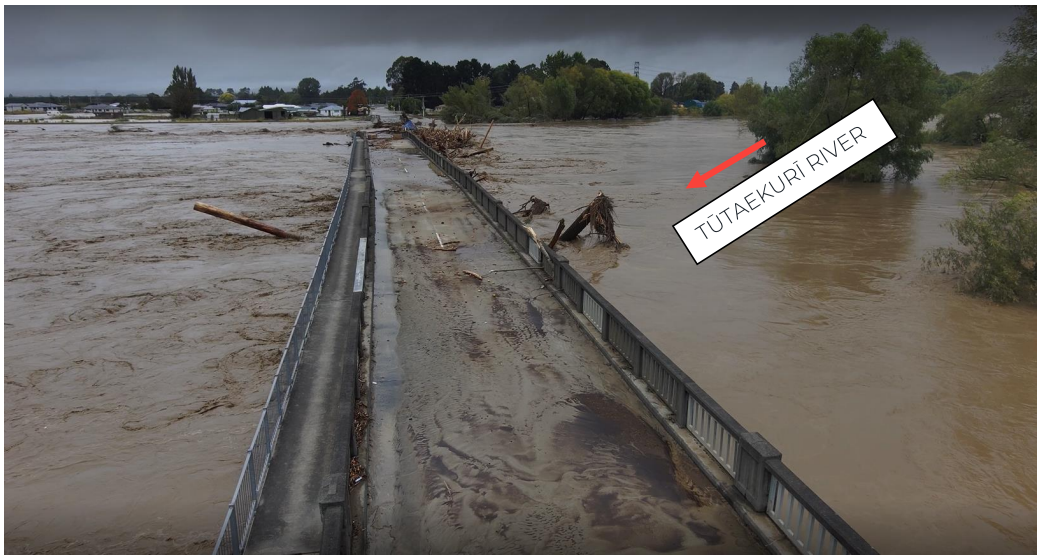


Figure 9: Redclyffe Bridge Approach View from Napier following of Cyclone Gabrielle

1.4 Existing Temporary Repair

Emergency works were undertaken to install a temporary staging bridge to replace the mid-section of the bridge that was washed away. The staging bridge was designed as a temporary structure, with a design working life of 5 years and Importance Level 2 in accordance with Table 2.1 of the Bridge Manual.

The temporary staging bridge is a 9-span steel beam and prestressed concrete deck slab supported on steel casing piles for piers as shown below in Figure 10 and Figure 11. It provides two traffic lanes (3m) and a 1.4m wide pedestrian pathway.

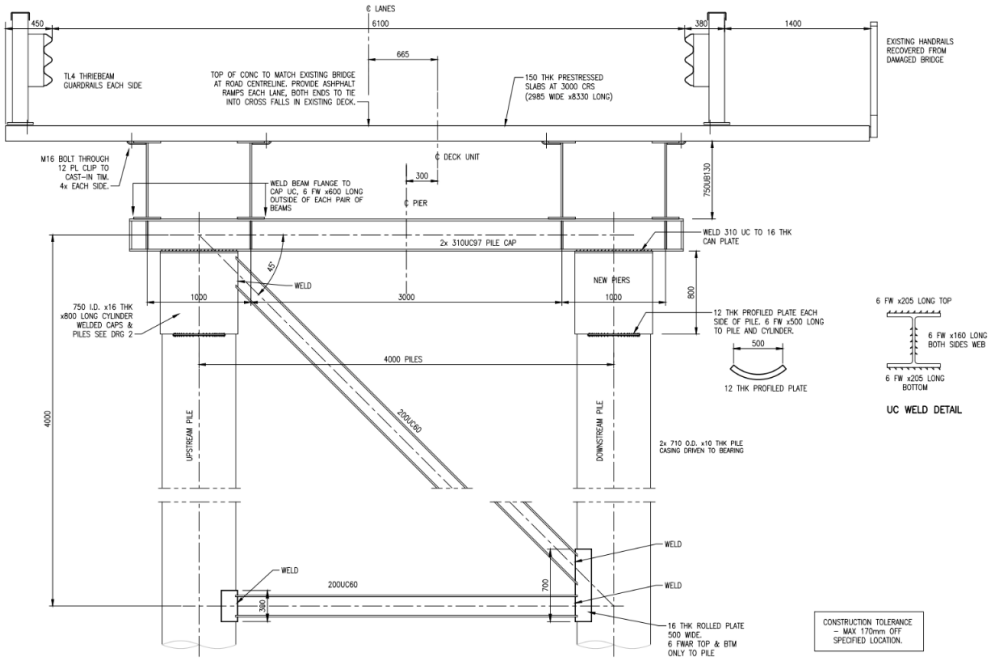


Figure 10: Temporary Staging Cross Section of Redclyffe Bridge

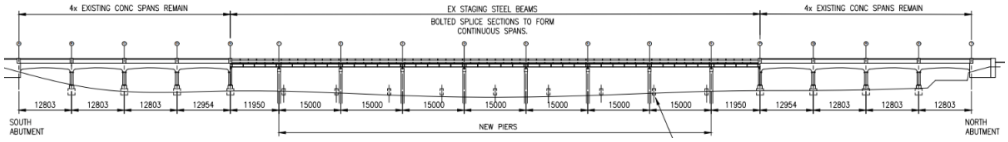


Figure 11: Temporary Staging Long section of Redclyffe Bridge

The following paragraphs are summaries of the temporary staging bridge designer documentation.

The live loads of the staging bridge have been determined in accordance with the NZTA Bridge Manual 3rd Edition for normal Vehicle (HN) only (100% of HN, HO was not considered). The staging bridge is suitable for all road legal traffic including 50MAX and HPMV as 100% HN with load combination 1A ULS factors were used for in the design. A 30km/h speed limit is strongly recommended due to likely unevenness of the bridge and onerous braking loads for the concrete deck connection to the beams.

Earthquake loads were derived in accordance with Section 5 of the Bridge Manual with NZS 1170.5 (2004 with Amendment 1) seismic design spectra. A 250-year return period was adopted for the design level earthquake (DCLS). However, the foundations were not designed for the effects of earthquake induced liquefaction or lateral spreading on the basis that this is an accepted risk by Hastings District Council.

The substructure of the staging bridge has been designed for flood and debris loading in accordance with AS5100.2 and the Bridge Manual.

The staging bridge was completed and opened to the public on the 8th of August 2023[4]. Completed photos of the temporary bridge are shown in Figure 12 and Figure 13.

Figure 12: Aerial View of Completion of Redclyffe Staging Bridge – 4th August 2023

Figure 13: Elevation View of Completion of Redclyffe Staging Bridge (Napier end, Upstream) – 4th August 2023

[4] https://www.hastingsdc.govt.nz/home/article/2838/redclyffe-bridge-to-open-for-restricted-use

1.5 Restrictions on Existing Bridge

An 8-ton gross load limit and 30 km/h speed limit on the bridge are in place. Emergency vehicle and public busses are exempt from these load restrictions. The reasons for the restrictions are concerns around the existing bridge spans capacity to support heavier vehicles and driver comfort. The temporary staging bridge also strongly recommended a 30 km/h speed limit.

Cyclone Gabrielle caused significant transverse cracking in the super structure of at least one span that was retained. A repair was carried out with partial success. Before and after photos are shown in Figure 14. A detailed monitoring programme is in place for this bridge span and further work underway to review options increase the load limit.

Figure 14: Cracks in Beams of Existing Bridge (3rd span from Napier) Before (Left) and After (Right).

2 Factors Influencing Design

2.1 Design Standards

- NZ Building Code
- NZTA Highway Structures Design Guide 1st Edition, Amendment 0
- Waka Kotahi NZTA Bridge Manual, 3rd Edition, Amendment 4 (Bridge Manual)
- Bridging the gap – NZTA Urban Design Guidelines.
- Hastings District Council's Project Description Sheet (PDS)
- HDC Engineering Code of Practice (ECOP)
- HDC Road Safety Policy

2.2 Economic Assessment

An economic assessment of one the replacement bridge options proposed has been completed in accordance with the NZ Transport Agency Waka Kotahi (NZTA) Monetised Benefits and Costs Manual (MBCM) version 1.7.2. It found a Benefit Cost Ratio (BCR) of 3.3. Refer to Appendix D for full details.

2.3 Service Requirements – Function

Briefly stated, any replacement bridge should provide the same level of service as the existing temporary bridge, two vehicle lanes and separate shared user path. It shall be designed in accordance with the Bridge Manual with departures as agreed to by local councils and funders.

2.3.1 Key Stakeholders and Road Users

The key stakeholders which have been identified during the response phase following Cyclone Gabrielle are listed within the HDC Bridge Replacement Communication Plan. See 2.11.1 for considerations in relation to cultural influence over the replacement options.

2.3.2 One Network Road Classification (ONRC)

Under Waka Kotahi's One Network Road Classification, Waiohiki Road at the Redclyffe Bridge location is classified as an Arterial Road.

2.3.3 Carriageway

The original bridge carriageway was 6.1m (20ft) wide between kerbs with two lanes. Any proposed replacement bridge should maintain the provision of two traffic lanes and be designed to current design requirements which are outlined in Section 2.6.

2.3.4 Posted Speed Limit

The existing bridge has a 30km/h speed restriction. Waiohiki Rd has a speed limit of 50 km/h[5] which was introduced in 2020, prior to this it was 70 km/h. On the Napier City Council side of the bridge, Springfield Rd has a 60 km/h speed limit and Gloucester Street 50 km/h introduced in November 2021[6], previously was 100 km/h and 70 km/h respectively. These speed limits are shown graphically in Figure 15 below. It is recommended that any proposed replacement bridge be designed for a design speed of at least 50 km/h.

Figure 15: Speed limit around bridge (from https://speedlimits.nzta.govt.nz/). Yellow is 50km/h, Orange 60km/h, Purple 70km/h. Note – SH50 outside of view is 100 km/h limit.

[5] https://www.hastingsdc.govt.nz/assets/Document-Library/Bylaws/Bylaws-10-Speed-Limits-2.pdf https://www.hastingsdc.govt.nz/services/roads-and-streets/speed-limits-review-2020/
[6] https://www.napier.govt.nz/assets/Document-Library/Bylaws/NCC-Speed-Limits-Bylaw-Docs-Update-Feb-2022.pdf https://www.napier.govt.nz/services/roads-and-streets/speed-limits/

2.3.5 *Traffic Volume*

The AADT (Annual Average Daily Traffic) on Waiohiki Road in the location of Redclyffe Bridge is estimated at 8000 vpd with 6-11% of these envisaged to be heavy vehicles. The traffic volume is from an HDC traffic count undertaken in 2020 with MobileRoad supplementing the heavy vehicle estimate. An average of 2% yearly growth from 2019 to 2022 was obtained from NZTA telemetry counter. The results from 2023 were excluded due to disruption from Cyclone Gabrielle.

The estimated AADT on Springfield Rd and Gloucester Road is 1,100 and 10,500 respectively. The traffic survey data show the primary flow is to/from Waiohiki Road to Gloucester Street.

2.3.6 *Traffic Safety*

According to the data from the New Zealand Transport Agency's Crash Analysis System (CAS)[7] , four crashes have been recorded at this location in the five-year period 2018 to 2022, comprising one minor injury crash and three non-injury crashes. The crashes around the bridge site since the year 2000 are shown in Figure 16.

Past investigation has identified that sight visibility is a problem approaching from the north when turning from Springfield Rd into Waiohiki Rd to cross Redclyffe bridge as shown in Figure 17. Replacing the barrier system to allow greater visibility was likely to reduce the lane width and require significant deck strengthening. No improvement has been implemented at this time.

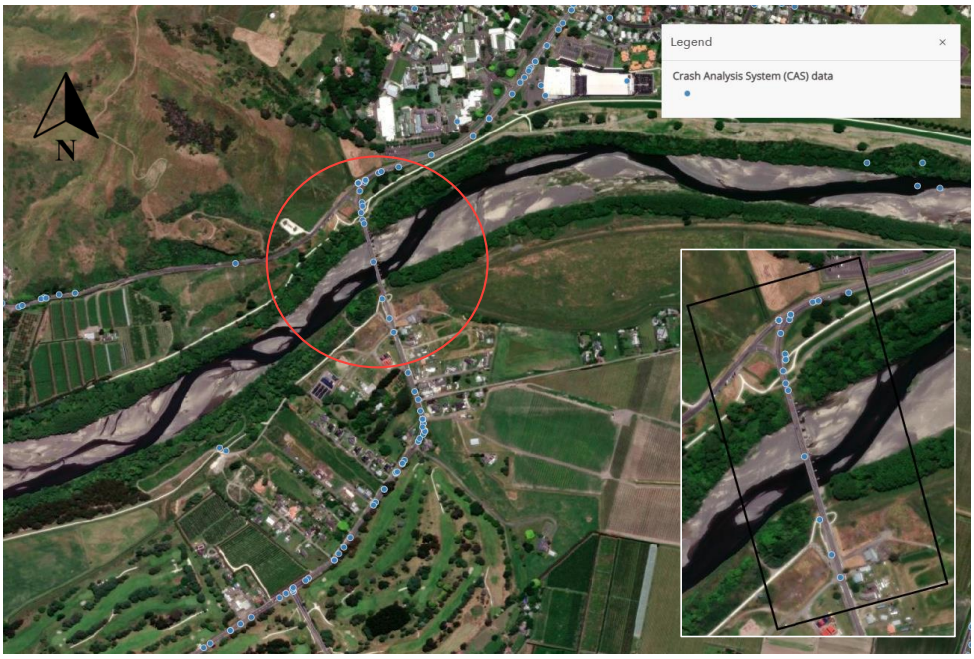


Figure 16: Crashes at and around the bridge site since 2000

[7] Crash Analysis System (CAS) data | Waka Kotahi open data (arcgis.com)

Figure 17: Approach from Springfield Rd turning on Redclyffe Bridge

2.3.7 Cyclists and Pedestrians

The existing bridge provides 1.3m wide access for cyclists or pedestrians separated from vehicles. The width for a shared walking/cycling facility is less than desirable. The current pedestrian handrails of 1 m high does not meet the Bridge Manual and New Zealand Building Code minimum height requirement of 1.1 m.

If a new bridge is the preferred option, a 2.5m wide separated cyclists/pedestrian facility is recommended. The detail of the active mode facility will be reviewed during consultation and to align with HBRC cycle plan. It is anticipated that reinstatement of the rotary pathways below the bridge at both abutments to align with HBRC cycle plan will be required as shown in Figure 18.

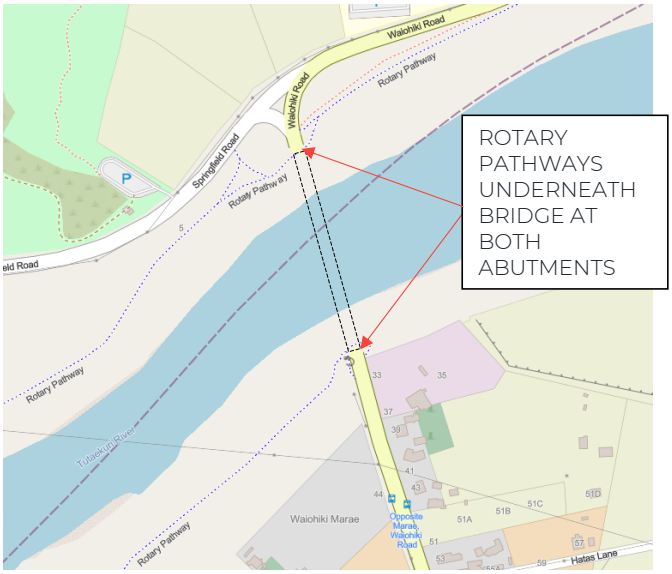


Figure 18: Prior Cyclone Gabrielle Layout of Redclyffe Bridge Rotary Pathways

2.3.8 Service Requirements

General service provisions shall be as per Bridge Manual, Section 4.12.5.

The existing bridge had chorus communication cables located on the downstream end of the bridge deck in a service pipe.

2.3.9 Stormwater Runoff

The original bridge stormwater runoff discharge directly into Tūtaekurī River off the sides of the bridge.

The provisions for any future replacement bridge are expected to be similar to the new Puketapu bridge, also crossing the Tūtaekurī River. Stormwater is conveyed along the concrete barrier faces to the abutments and piped to roadside swales. During larger rainfall events stormwater passes through overflow holes located within in the concrete barrier, discharging into the river. Stormwater on the shared user path is discharged into the river. Exact details can be examined at future design stages.

2.3.10 Design Life

New bridge options will be designed as per the Bridge Manual with a 100-year design life.

2.3.11 Importance Level

A replacement bridge shall have an Importance Level (IL) 3.

Whilst the Bridge Manual Table 2.1 recommends where the construction cost exceeds $18m Importance Level 4 should be adopted, HDC have confirmed that IL3 is more appropriate to adopt.

2.4 Foundation (Subsurface) Conditions

A high-level desktop assessment of the geotechnical risks of the Redclyffe Bridge site has been prepared and is included in Appendix A. The site seismic risk considerations have been outlined in Section 2.10. No foundation conditions were identified that preclude a replacement bridge option.

2.5 Urban Design Considerations

The surrounding area around the existing bridge includes the Otatara Pa Historic Reserve, Te Wai Mauri marae, Waiohiki golf course, Institute of Technology (EIT), Redclyffe electricity substation, farmlands and urban houses.

The original structure was a simple bridge construction type which did not have significant visual impact on the surrounding environment. The area has significant community engagement which may result in bridge finishes (barriers, footpath) and the approaches (e.g., pou whenu) requiring a higher level of urban design input than typical for a bridge of this type.

The proposed bridge replacement works will be of an appropriate scale, form, colour, and texture that reflects the landscape context and will follow the guidance set forth in the NZTA Urban Design Guidelines: Bridging the Gap.

For a proposed replacement bridge, robust, long-life vandal-proof materials should be used to minimise maintenance and ongoing maintenance costs must be factored into the design process. The application of graffiti-proof coatings must use a single product type that covers the full height of vertical surfaces (abutment walls and abutments) to minimise patchy finishes. Reference is to be made to Section 4.12.9 of the BM for anti-graffiti requirements.

2.6 Geometrics (Vertical and Horizontal Alignment)

The original geometric design parameters relating to the bridge are presented in Table 2-1. Redclyffe Bridge carried two traffic lanes within a 6.1m carriageway width. The general alignment within this section of Waiohiki Road is straight with a sharp radius north of the bridge joining Springfield Road and Gloucester Street. Redclyffe Bridge did allow pedestrian provisions. The barriers on Redclyffe Bridge were concrete barriers and kerbs, with steel railing barriers for the pedestrian bridge.

Any replacement bridge should generally comply with Austroads Guide to Road Designs: Part 3 (Geometric Design), Part 4B (Roundabouts), Part 6A (Paths for Walking and Cycling).

Table 2-1: Original geometric design parameters

Parameter	Original Bridge
Carriageway	6.1m between kerbs
Footpaths	1.3m
Side protection	Original tombstone concrete barriers on both sides of the bridge above concrete kerbs and a steel railing for the pedestrian.
Overall deck width	8.5m.
Skew	None (i.e., piers/abutments perpendicular to bridge alignment) Bridge has a skew relative to river direction
Horizontal alignment	Straight
Super elevation	1.66%
Vertical alignment	Vertical curve with crest at centre of bridge, rise of 0.61m from abutments
North Approach	Gloucester Street and Springfield Road both have reasonably sharp corners onto the bridge. The longitudinal gradient is relatively flat.
South Approach	Straight approach for preceding the 250m. Small longitudinal grade up to bridge.

2.6.1 Proposed Carriageway Width

A Redclyffe replacement bridge typical cross section is shown in Figure 19. This represents a like-for-like level of service replacement to current design standards (Bridge Manual and Austroads Guide to Road Design Part 3 & 6A). Widths for the various components are detailed in the bullet points. The 10m between barriers represents a 3.9m increase in width compared to the current bridge.

- Traffic lane width - 3.5m
- Shoulder width – 1.5m
- Barrier width (assuming TL-4 rigid barrier) – 0.40m
- Pedestrian/cyclist shared use path width – 2.5m
- Shared user path barrier handrail width – 0.24m

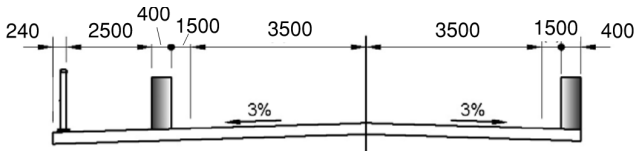


Figure 19: Proposed two-lane carriageway with shared user path

It is common that cross-section is refined (usually narrowed) during future design stages. There is likely justification for reducing the traffic lane and shoulder widths based on the traffic speed. It is also desirable to keep the width between barriers less then 9.7m to avoid the need to design for three traffic load lanes.

2.6.2 *Side Protection*

Redclyffe Bridge on Waiohiki Rd has a speed limit of 50km/hr, AADT of 8,000 vpd with 6-10% being heavy commercial vehicles. There is approximately 5.5m between the top of bridge deck and the riverbed below and the river depth is generally less than 3m. In accordance with clause B3.1.3 of the Bridge Manual the edge protection shall be a minimum of TL-4 barriers. Rigid concrete barriers are recommended over semi-rigid to increase protection to users of the shared path and decrease total bridge width.

In the next design stage consideration to use of barrier top rail to increases visibility for bridge users and provides protection to cyclists from accidentally falling into the vehicle lanes. The merits or TL-4 or TL-5 rigid barriers should also be reviewed. For the external shared user path barrier, the minimum height shall be 1.2m with 1.4m desirable.

2.6.3 *Exposure to Potential Collision*

The BM clause 3.4.18 d states that possible collision loads from shipping shall be considered. Collision loading from boats able to navigate the Tūtaekurī River will be negligible in comparison with flood debris loading.

2.7 Hydrology including Climate Change Effects

The Tūtaekurī River before and after Cyclone Gabrielle at Redclyffe bridge is shown in Figure 20. Due to torrential rains from the cyclone, the river burst its banks at numerous locations along the watercourse, overtopping and damaging stopbanks, destroying portions of the original Redclyffe Bridge and flooding the surrounding areas causing widespread damage.

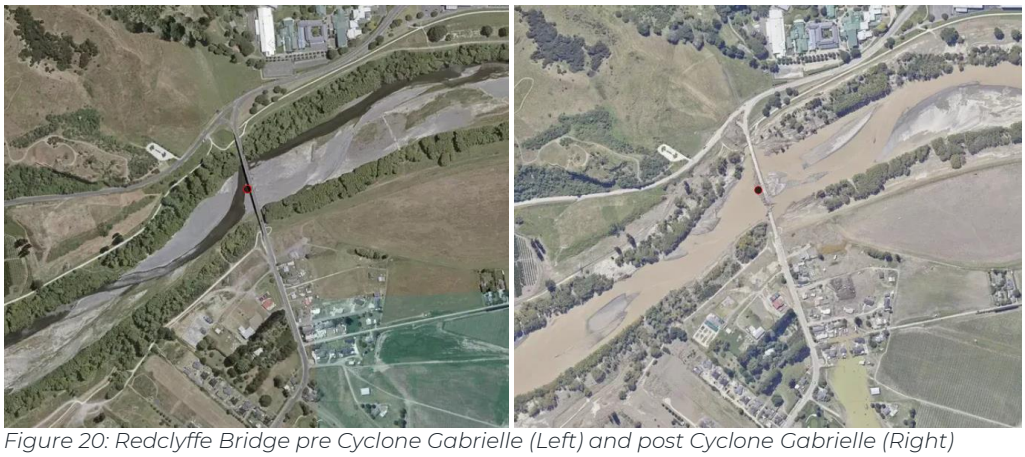


Figure 20: Redclyffe Bridge pre Cyclone Gabrielle (Left) and post Cyclone Gabrielle (Right) (source LINZ GIS)

The following images demonstrate the observed flood levels during the events of Cyclone Gabrielle. Correlating a previous inspection photo (see Figure 21) with an aerial photo taken immediately after Cyclone Gabrielle (see Figure 22) indicates the peak flood level reached approximately 14.5 to 15.5mRL (NZVD 2016). Debris and sediment on the bridge deck suggests that some blockage occurred at the bridge site and the maximum water level overtopped the bridge in some locations.

Figure 21: Redclyffe Bridge Location pre flooding Bridge Inspection taken April 2019 (Upstream)

Figure 22: Redclyffe Bridge Location Aerial View following Cyclone Gabrielle:

Hydrological and hydraulic analyses of the Tūtaekurī River following the cyclone are still being undertaken, along with high level hydraulic modelling of the Heretaunga Plains. The analyses have not reached sufficient maturity to release, and there remains uncertainty around repaired and future designed stop bank levels around the bridge. It is noted that the temporary bridge design hydrology was based on pre–Cyclone Gabrielle data so their findings have not been repeated.

The proposed design philosophy for the bridge height is to ensure that its soffit level is higher than the stopbanks with an allowance for some flow depth above this. Should future flood flows exceed the capacity of the stopbanks, water will flow over the stopbanks and result in flooding of the surrounding areas, but the bridge structure will not be overtopped. An estimate of flow depth above the stopbanks during the cyclone was approximately 0.3m based on various observations post cyclone, but this value will be subject to further refinement at the next stages of the bridge design.

The existing stopbank levels from LiDAR were reviewed and found the upstream south stop bank is approximately 13.5mRL. On the upstream north bank, the hill provides a natural stopbank like effect. The downstream stopbanks vary from 13.5 to 14.0 mRL NZVD 2016.

Refer to section 2.8.3 for proposed bridge soffit level at this stage of design.

2.8 Constraints on Span Arrangement and Clearances

2.8.1 Land Ownership

A preliminary review of property impacts for the various alignments considered as part of the feasibility report is contained within Appendix B. Also refer section 3 for further commentary.

There is a boundary bridge agreement Neighbouring Local Authority (NLA) referenced (CM:TR-2-3-19-27) between HDC and NCC. The agreement states that any bridge renewals and capital improvements in HDC long term plan shall be managed by HDC and funded equally by HDC and NCC. Any work going forward should be agreed between the parties especially with the bridge replacement option.

2.8.2 Structures in Waterway

The original Redclyffe Bridge had seventeen piers located within the waterway. Following the cyclone, the width of the riverbed has not increased. Given the width of river to be crossed, new piers in the waterway will be required if a replacement structure is adopted. The exact number of piers will depend on the preferred option and associated structural configuration. Any new piers will be designed to resist the appropriate debris and hydrodynamic loading.

2.8.3 Vertical Clearance

Freeboard is measured from the SLS2 flood event (1/100 ARI for this bridge). It is anticipated that the recommended 1.2m freeboard [Bridge Manual cl. 2.3.4 (d)] would be achieved and this would be verified at future design stages.

For the feasibility design stage, a proposed soffit height of 14.8mRL is proposed, based on an assumed stopbank height of 14.5mRL and 0.3m of flow above this. It incorporates some improvement to stopbank height in the surrounding area of the bridge but no significant increase in level. This would be refined at future design stages, particular as the HBRC stopbank intent is confirmed. This represents a bridge deck level at the abutment that is approximately 1.2-1.7m higher than the original bridge, assuming total bridge depth between 1-1.5m (commensurate with span lengths between 25 to 30m).

An alternative approach would be to take the Cyclone Gabrielle high water mark (~15mRL) and add 1.2m of freeboard as per Bridge Manual recommendation to result in a soffit level of 16.2mRL. We think this is unnecessarily conservative, with resulting difficulty tying in approaches and associated impacts on adjacent properties.

The original bridge had a vertical crest that resulted in the middle of the bridge being 0.61m higher than the abutments. We recommend a similar approach is adopted in future design stages as this increases freeboard at the centre of the river where velocities are highest.

A different vertical clearance potential constraint is that Hawke's Bay Regional Council use a track underneath the existing bridge on the southern end to undertake gravel extraction further upstream. Discussions with HBRC are ongoing but access for ongoing gravel extraction is expected.

2.9 Construction Limitations

2.9.1 Construction Materials

Consideration to be given during bridge optioneering to the availability and sustainability of readily available materials. Materials used for the construction of the bridge options will also be able to meet the durability requirements of the Bridge Manual. The whole of life cost of materials will be considered, including the cost of maintenance, traffic impacts and site constraints in undertaking maintenance works.

2.9.2 Interaction of Construction with Traffic Flows

Careful consideration of managing the approximately 8000 vehicles per day using the bridge is required for any works impacting the existing bridge spans and temporary staging bridge.

2.9.3 Access for Inspection and Maintenance

Materials and systems (including drainage) requiring low maintenance will be utilised for proposed bridge and approach works where possible. Access for inspection and maintenance works will be considered within the bridge design options. It is expected provision for maintenance access will be possible at bridge abutment locations.

2.10 Site Seismic Hazards

Site seismic hazards to be considering during detailed design based on BM recommendations and ground accelerations determined using the National Seismic Hazard model 2022.

2.10.1 Liquefaction Potential

Liquefaction tiggering is considered possible at the site given the high groundwater levels, presence of poorly consolidated Holocene sediments, and low strength of SPT blow counts from boreholes carried out at the site, as outlined in Appendix A. Further assessment is required to assess the risk of triggering and the corresponding risk to the proposed structure for considering mitigation during detailed design.

2.11 Planning, Cultural and Environmental Considerations

2.11.1 Cultural Considerations

The relationship between Tangata Whenua and freshwater resources is acknowledged in the Hawke's Bay Regional Resource Management Plan. The Tūtaekurī River is a Statutory Acknowledgement Area within the Mana Ahuriri Hapū area of interest. The southern bank of the site and river is in the Heretaunga Tamatea Settlement Trust (recently renamed Tamatea Pōkai Whenua Trust) redress area. The subject site is within the iwi and hapu areas of Te Taiwhenua O Heretaunga, Ngāti Kahungunu Iwi incorporated, Nga Hapu o Tūtaekurī and Te Taiwhenua o Heretaunga and is subject to their respective Iwi Management Plans [8].

The site is located within a culturally sensitive environment with the historic Otatara Pa located on the hill adjacent to the site.

Consultation with the relevant Mana Whenua groups is recommended early in the process and throughout the design and construction of a new bridge. A cultural impact assessment is recommended to be undertaken by the appropriate Mana Whenua groups to support the resource consent application prior to any resource consent application being lodged.

[8] Sourced from Pataka https://gis.hbrc.govt.nz/LocalMapsViewer/?map=16398cdd055a45499c5d8ce736bfd190

2.11.2 Ecology of the Site

The Tūtaekurī River is a braided riverbed which contains a variety of habitats for birds, lizards, bats, fish and other terrestrial and aquatic wildlife. The riverbed, embankments and vegetation provide a nesting area for birds and the river contains the following fish species: Black flounder, Bluegill Bully, Common Bully, Common Smelt, Inanga, Longfin Eel, Rainbow Trout, Shortfin Eel, Torrentfish.

The construction of the bridge is likely to require diversions of the water to create dry work areas and vehicles within the riverbed. The works are highly likely to be undertaken during fish spawning and bird nesting seasons. An ecological assessment of the area is recommended under options 2 and 3 to identify the ecology present within this environment and measures to avoid and mitigate the construction effects on ecology.

2.11.3 Noise, Vibration and Dust Controls

Noise, vibration and dust controls will be determined once the bridge options have been assessed. Noise, dust and vibration will need to be managed during construction, particularly due to the proximity to horticulture and residential properties on the southern side of the river.

2.11.4 Archaeological Considerations

An archaeological desktop assessment has been undertaken for Redclyffe Bridge. This identified a high number of archaeological sites within proximity to the subject site with Otatara Pa located 400m to the west of the bridge. There was widespread and significant Maori occupation on the northern bank of the Tutaekuri River. There has also been a bridge and stopbank in this area that was constructed pre-1900.

It is recommended that an Archaeological Assessment be obtained for options 2 and 3 with the view of obtaining an Archaeological Authority for the works at the site.

2.11.5 Carbon

Opportunities for reduction in the carbon footprint of the replacement structure will be investigated during the bridge optioneering phase.

2.11.6 Consenting Requirements

Option 1 is to retain the existing staging bridge. Resource consent (AUTH–130431-01) has been obtained from HBRC for the staging bridge under the emergency works provisions of the Resource Management Act 1991. This consent expires on 31 May 2029 and a further resource consent will be required to be applied for under this option if the staging bridge is to be retained permanently.

Options 2 a-c provide for the bridge to be replaced along a similar alignment as the existing bridge. The standard resource consent process can be followed for these options similar to the consenting process for Puketapu Bridge. This will require a resource consent application to Hawke's Bay Regional Council and possibly an outline plan and/or resource consent from Hastings District Council and Napier City Council.

Option 3 is to relocate the bridge to an alternative location further upstream and would have a much more complex consenting/approval pathway to the other options. There would be a significant amount of work to require land involving extensive landowner and community engagement and negotiations. A greater level of expert reporting and alternatives considerations would be required with this Option. This option would likely involve a Notice of Requirement application to designate the land for roading purposes as well as the regional resource consent applications. This option is likely to follow a more difficult and lengthy planning process which has a higher risk of delays and unexpected costs. The fast-track consenting pathway for proposals of national significance could be considered for Option 3.

A preliminary plan check of the options has been undertaken against the rules of the Hawkes Bay Regional Resource Management Plan, the Hastings District Plan and the Operative and Proposed Napier District plans below, based on the assumptions and information available. A detailed plan check will be completed once there is a confirmed approach.

A number of expert reports will be required for the consenting process including, but not limited to the following:

- Archaeological Assessment;
- Cultural Impact Assessment;
- Ecological Assessment;
- Hydrology and Hydraulic Assessment Report.

Hawke's Bay Regional Consent Requirements

Resource consent from HBRC will be required for this discretionary activity as the construction of a new bridge or retention of the staging bridge under options 1 and 2 will not meet the permitted standards of the Hawke's Bay Regional Resource Management Plan (RRMP).

Any permanent structure located in, on, under or over the bed of a river is unlikely to meet rule 72 and will trigger Rule 69. The works are likely to require vegetation removal, soil disturbance, discharge to land, a river diversion to create a dry work area to construct the new bridge and works in the river during fish spawning season, which will trigger Rules 8, 52, 59 and 69 of the RRMP.

Removal of the old bridge should be considered as part of any resource consent application as it may not meet the permitted standard under rule 66 and requires resource consent approval.

Hastings District Council Consent Requirements

The Hastings District Plan identifies the road as being designated. If the works associated with the construction of the new bridge are contained within the existing road reserve, then an outline plan may be submitted to Hastings District Councils under section 176A of the Resource Management Act 1991. Where works are undertaken outside the road reserve then the District Plan rules will apply.

The new bridge and any associated works are defined as a Network Utility activity under the Hastings District Plan. Rule NU4 provides for the replacement and upgrading of existing roads and bridges on land adjacent to the road reserves as a Permitted Activity.

The site is located in the Production Plains Zone under the Hastings District Plan and is within the River Hazard and Riparian Management overlays for all three options. No additional rules are triggered as a result of the bridge being located in these overlays.

It is anticipated that, should the permanent bridge be located in a similar location as the existing bridge and within the road reserve, an Outline Plan will need to be submitted to Hastings District Council under section 176A of the Resource Management Act 1991. However, if the permanent bridge is located in an alternative location outside the road reserve, then a resource consent may be required under the Hastings District Plan or alternatively a Notice of Requirement (NoR) to designate the land.

Napier City Council Consent Requirements

Napier City currently has an Operative and Proposed District Plan, and the rules of both plans are required to be considered. The site under all options is located within the River Conservation Zone and River Hazard Overlay under the Operative District Plan. Under the

Proposed District Plan the site is located within Natural Open Space Zone for all options and Option 2 is within the Outstanding Natural Feature overlay.

The construction of a new bridge and associated works are defined as Network utility under both plans, which also provide for the construction and replacement of roads as a permitted activity provided the relevant standards are met. The new bridge may not meet the required height limits for the relevant zones. Once plans for the new bridge are prepared an assessment against the rules will determine if resource consent is required under the Napier City Operative and Proposed District Plans.

2.12 Communication and Engagement

2.12.1 Landowner and Iwi Groups

During the emergency response phase, several key stakeholders within the community were identified. These include local landowners affected by Redclyffe Bridge, who also have knowledge of the history of the area and records taken during the storm event.

The Tūtaekurī River is within the Mana Ahuriri Hapu area of interest and statutory acknowledgement and is directly adjacent to the Heretaunga Tamatea area of interest and redress site. The bridge is within the Taiwhenua of Te Taiwhenua O Heretaunga. The location of the Redclyffe Bridge is within the Ngāti Kahungunu Iwi incorporated iwi boundary and is subject to their Iwi Management Plan as well as the Nga Hapu o Tūtaekurī and Te Taiwhenua o Heretaunga iwi management plans. Further information around the cultural considerations for Redclyffe Bridge are contained within Section 2.11.1.

2.12.2 Communication and Engagement Plan

An engagement and communication plan (following the high-level engagement and communications plan for the entire project) will be developed and implemented. This plan will be developed with the HDC communications and Māori engagement teams. Final approval will be required from HDC prior to implementation. Communications and engagement will be undertaken as per the approved plan.

3 Feasibility Assessment

The options considered are presented in section 3.1, their relative merits assessed qualitatively and quantitatively using a multi criteria analysis methodology in sections 3.2 and 3.3. The recommended option is presented in section 3.4.

3.1 Options

Six options were considered at the feasibility stage for a permanent replacement bridge connection over the Tūtaekurī River near Waiohiki Road.

- Option 1: Do Nothing (Maintain Existing Temporary Crossing)
- Option 2A: Replace Bridge on the Existing Alignment
- Option 2B: Replace Bridge Immediately Upstream and Parallel to Existing Bridge
- Option 2C: Replace Bridge Immediately Upstream and Skewed to Existing Bridge
- Option 3: Alternate Bridge Replacement Location (Links Road)
- Option 4: Non-bridge Alternative

The four alignments considered for a replacement bridge are shown in Figure 23 below.

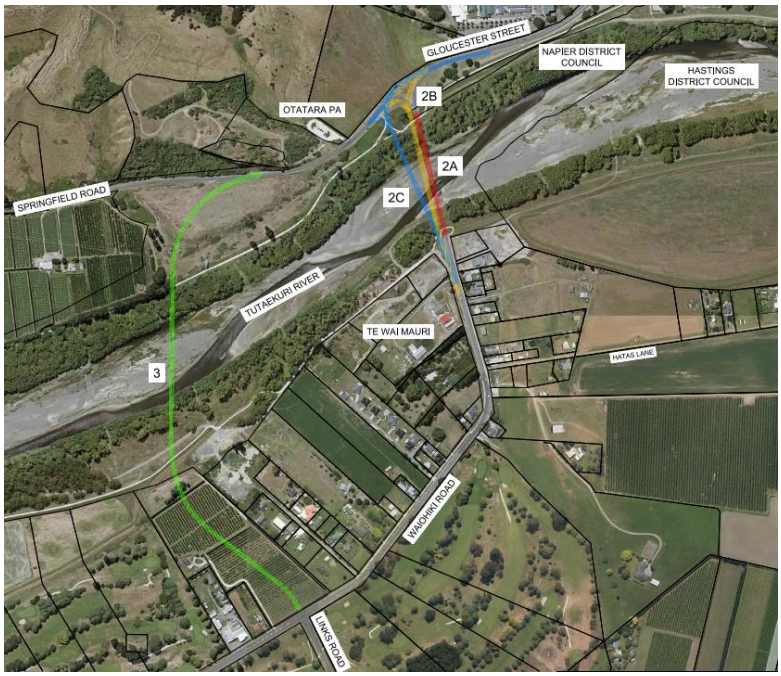


Figure 23: Alignment options considered for replacement Redclyffe Bridge

A variety of structural configurations are feasible for a modern resilient replacement bridge for all four alignments considered. For the option 2's care will be required in pier positions due to existing and prior bridge structures in the area.

Downstream options were investigated but discarded due to the impacts on sensitive and/or private property. In addition, the community engagement survey (refer 3.2.9) had only 4% of respondents prefer a downstream location.

3.1.1 *Option 1: Do Nothing – Maintain Existing Bridge and Staging Bridge*

The existing temporary staging bridge and remaining bridges currently is described in Section 1.4. A 30 km/h speed and 8-ton vehicle load limit are in place.

Extending the design life would require active maintenance as no corrosion protection was specified to the temporary staging bridge. Further repair or strengthening of the existing bridge span with cracking is likely to remove the vehicle load limit. Maintaining the speed limit is prudent given the configuration of the temporary staging bridge.

3.1.2 *Option 2A: Replace Bridge on the Existing Alignment*

The existing bridge would be demolished, and the replacement bridge built in its place as shown below in Figure 24.

Figure 24: Option 2A: Replace Bridge along the Same Alignment

3.1.3 Option 2B: Replace Bridge Immediately Upstream and Parallel to Existing Bridge

This bridge replacement option will be approximately 235m long and located immediately upstream and parallel to the existing bridge, as shown below in Figure 25.

Note that several figures show repair of the upstream true right stop bank by Hawke's Bay Regional Council, this is indicative only.

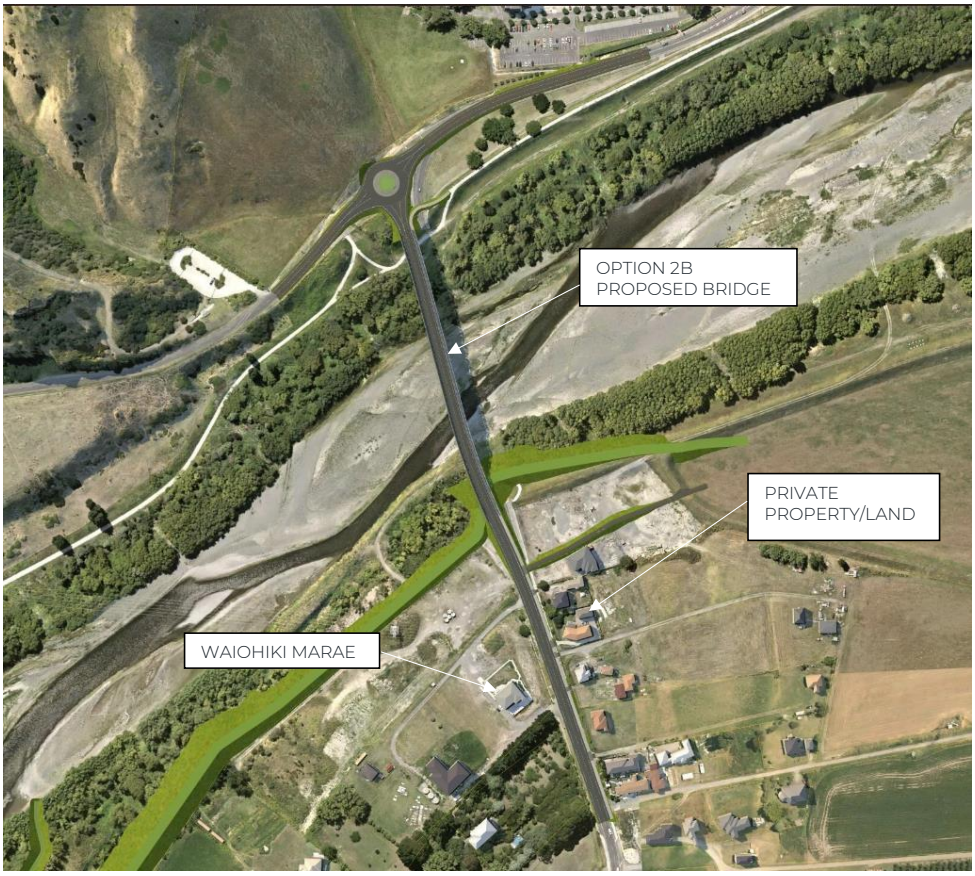


Figure 25: Option 2B: Replace Bridge Upstream of Existing Bridge next to Existing Bridge

3.1.4 Option 2C: Replace Bridge Immediately Upstream and Skewed to Existing Bridge

This bridge replacement option will be approximately 210m long perpendicular to the Tūtaekurī River and upstream of the existing bridge as shown below in Figure 26.

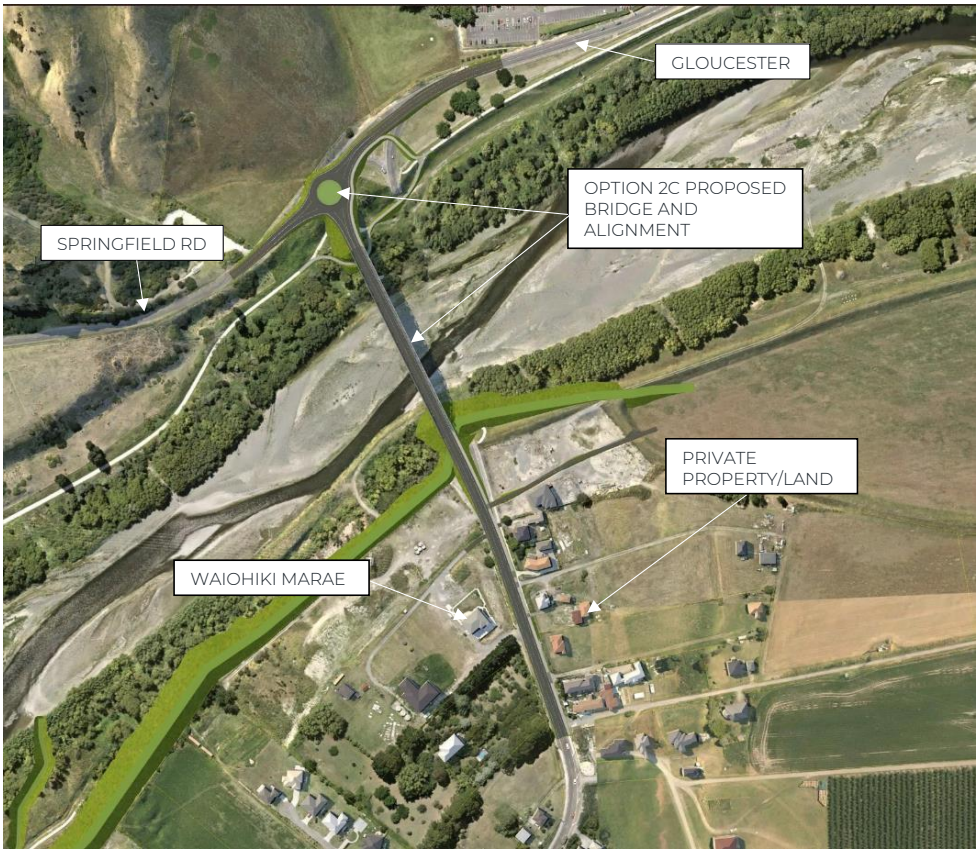


Figure 26: Option 2C: Replace Bridge Upstream of Existing Bridge with Improved Alignment

3.1.5 Option 3: Alternate Bridge Replacement location (Links Road)

The only bridge replacement location considered outside the current bridge alignment as shown in Figure 27. The proposed horizontal alignment features a curve-straight configuration on the bridge, with gentle curves on both approaches. The bridge will need to be elevated because the northern side ends on a hill, resulting in poor visibility at the vertical crest leading into the roundabout from the north.

The alternate bridge replacement location is approximately 600m upstream of the original structure. The replacement structure will be approximately 400m long, an approximately 1km new road extension via Links Rd, where it will link into Springfield Rd and then Gloucester St at the existing bridge.

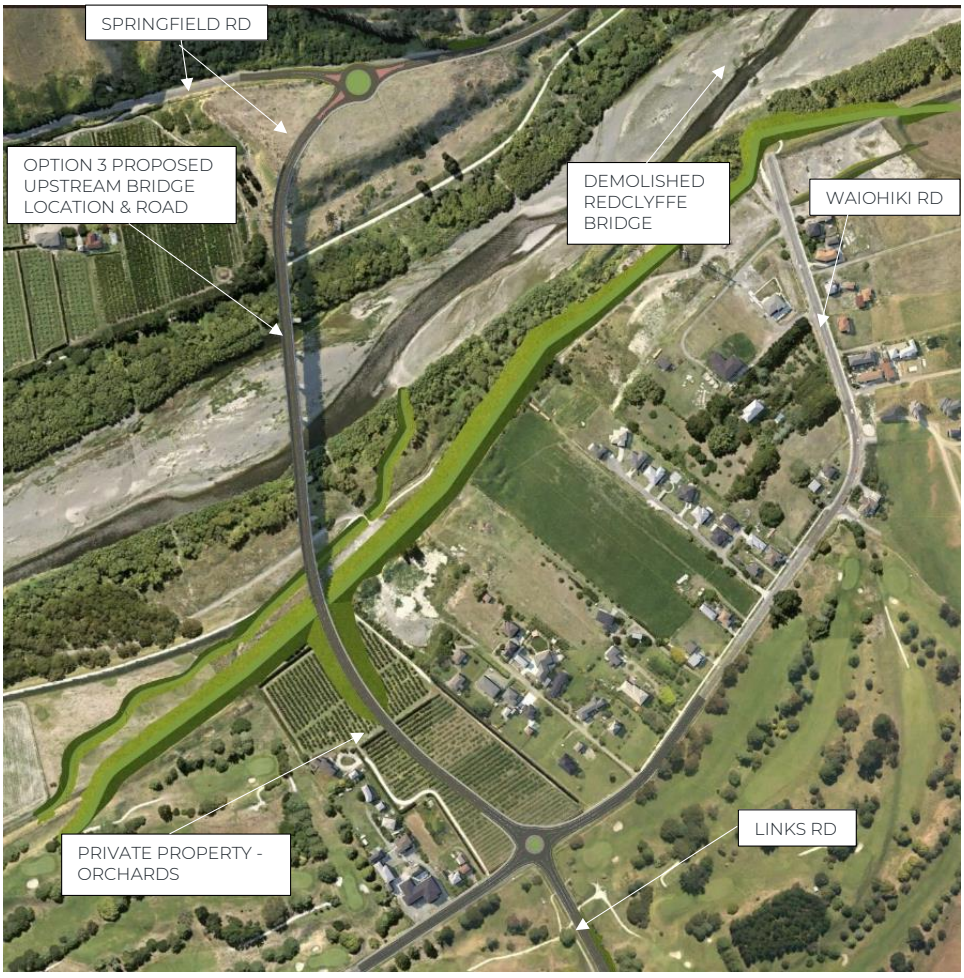


Figure 27: Option 3 Alternate Bridge Replacement Location Overview

3.1.6 *Option 4: Non-bridge alternative*

The alternate route, if there was no river crossing at Waiohiki Road is via Gloucester St, Meeanee Rd, SH2 and Links Rd (SH50) as shown in Figure 28. This detour is 8.5km long and is estimated by Google Maps to take 11 minutes.

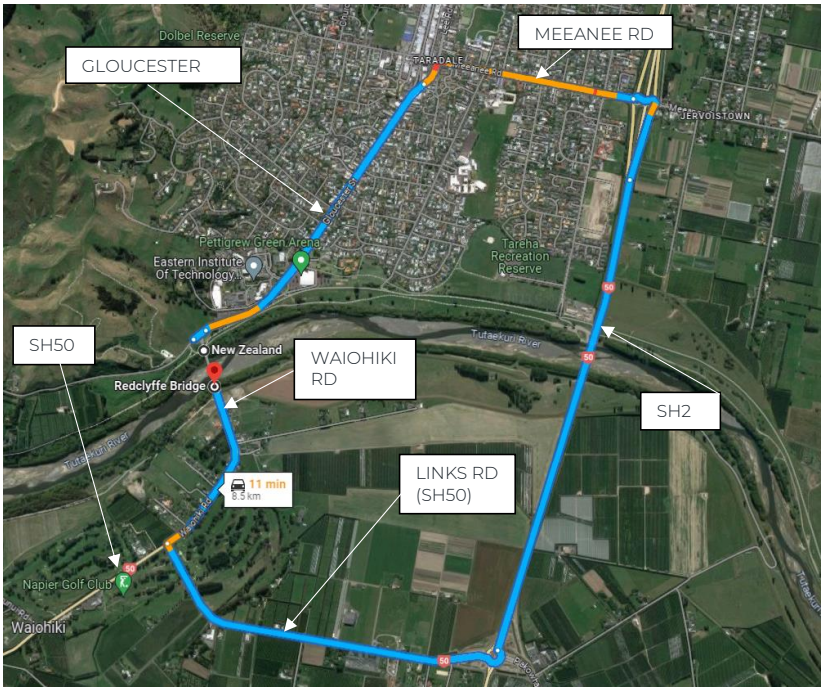


Figure 28: Alternate Access via SH2 and SH50

3.2 Option Evaluation

The criteria listed in Table 3-1 encompass the project objectives set by the Client and are used to assess each option. The criteria below are assessed and weighted based on the Client's preference in section 3.3.

Table 3-1: Options Assessment Criteria

Criteria	Description
Resilience (Project Objective)	Restore the Redclyffe Bridge to ensure it provides the right level of service. The new bridge should meet current standards and enhance the network's resilience in the Waiohiki region.
Cost and value for money (Project Objective)	Factors affecting the cost to construct the option. Achieving a balance between costs and benefits through a cost-benefit analysis.
Programme and Constructability (Project Objective)	Ease of constructing the option based on previous experience and availability of local workforce. Impact of option delivery timeframe.

Maintenance	Operation and maintenance complexities and costs over the life of the structure.
Safety and Design	Significant H&S risks associated with the option in its design, implementation, operation, or maintenance.
Visual Appearance	How the proposed option's visual appearance will affect the surrounding area.
Environmental	Effects on river ecology, water quality, stormwater, noise, vibration, visual impact, urban design, natural hazards, contaminated land, landscape, heritage, biodiversity, resource efficiency & air quality.
Sustainability – Carbon Footprint	Embodied carbon footprint, long-term carbon emissions impact.
Social & Cultural	Impacts on the community about safety, travel time benefits, services, and severance, impacts on farming and business operations.
Property Impacts & Acquisition	Impact on the nearby properties and difficulty in land acquisition.

The 7-point scoring system adopted for scoring of the criteria is shown in Table 3-2 assessment. This system is adopted from NZTA multi-criteria analysis: user guidance.

Table 3-2: Seven-point Scoring System (from NZTA Multi-criteria Analysis: User Guidance)

Magnitude	Score	
	Unweighted	Weighted
Large Positive	3	>2.5
Moderate positive	2	1.5 to 2.5
Slight Positive	1	1.5 to 0.5
Neutral	0	0.5 to -0.5
Slight Negative	-1	-0.5 to -1.5
Moderate Negative	-2	-1.5 to -2.5
Large Negative	-3	< -2.5

The following sections discuss how the proposed options address the assessment criteria, and a relative score has been provided.

3.2.1 Resilience

The term resilience describes the ability to endure through changing conditions, and to recover functionality after a disruption.

Option 1 is rated a Moderate Negative. The option represents a temporary staging structure and 90-year-old existing portions of Redclyffe bridge. Both elements are not designed to

provide a 100-year design working life to resist the level of earthquake or flood/cyclone events as required by the Bridge Manual for a modern structure. Strengthening of the bridge would increase its resilience but a modern replacement bridge would inherently have significantly greater resilience.

Options 2A, 2B, 2C and 3 represent a new bridge structure designed to modern Bridge Manual design standards therefore will be resilient, irrespective of the option chosen. A modern bridge also has improved vehicle containment if a crash occurs. Options 2B, 2C and 3 allow for intersection improvements as well. Thus Option 2 rated Moderate Positive and 2B, 2C and 3 are rated Large Positive.

Option 4 is rated a Large Negative. A lack of crossing for the Waiohiki and wider community inherently reduces resilience.

Table 3-3: Options Assessment for Resilience

Option	Assessment	Score
Option 1	Moderate Negative	-2
Option 2A	Moderate Positive.	2
Option 2B	Large Positive.	3
Option 2C	Large Positive.	3
Option 3	Large Positive.	3
Option 4	Large Negative	-3

3.2.2 Cost and Value for Money

Feasibility stage costing for up front capital costs have been developed following Programme Business Case Estimates (PBE) as per Waka Kotahi's Cost Estimation Manual 2nd edition, Amendment 1. The following assumptions are made to estimate the cost for these options:

- Unit cost of $13,000 per sqm is adopted for bridge structure.
- Unit cost of $3.0 million per kilometre is adopted for two lane road.
- Unit cost of $3,000 per sqm is adopted for MSE wall.
- Unit cost of $4.0 million per roundabout
- Unit cost of $150 per sqm for land acquisition.
- Removal of original bridge debris from the riverbed ~ $1,000 sqm.
- GST is not included.
- Preliminary and General – 25%
- Project development – 15%
- Contingency – 30%
- 20% funding risk has been considered to provide 95th percentile Project Estimate.

Costs of the different options are presented in Table 3-4. For further details of cost estimation refer to Appendix C.

Option 1 allows for some costs to paint the temporary staging bridge and strengthen two of the existing bridge spans. This should remove the 8-ton gross load limit and extend the design life beyond 5-years. It is the cheapest option and provides short term benefit of keeping the bridge crossing open so is rated as Medium Positive. This option is likely to be

rated more poorly if the whole of life costs were considered giving the increased maintenance and vulnerability to future flood/earthquakes.

Whilst Option 4 has a low cost it does not deliver value-for-money as it removes the existing connection for the community. The balance of these factors is why it is rated as Neutral.

Options 2A, 2B, 2C are relatively similar costs and all rated Neutral. Option 3 is approximately twice the cost of other replacement bridge options and thus rated as Large Negative.

Table 3-4: Options Assessment for Initial Capital Cost (95th percentile)

Option	Cost	Assessment	Score
Option 1	$2.2m	Moderate Positive	2
Option 2A	$96.2m	Neutral	0
Option 2B	$108.7m	Neutral	0
Option 2C	$99.1m	Neutral	0
Option 3	$209.0m	Large Negative	-3
Option 4	$4.5m	Neutral	0

3.2.3 Programme and constructability

Option 1 is rated as Slight Negative due to the likely difficulties to strengthen and maintain an in-use asset without causing significant traffic disruption.

Of the modern replacement bridge options, the explanation for the ratings are as follows.

Option 2A is Medium Negative because it would require approximately 18-months of temporary road closure to demolish the temporary crossing and build a new bridge. There is a possibility of installing another temporary bridge on an upstream alignment to provide access, but this would increase project cost.

Option 2B, 2C and 3 can all be built offline whilst maintaining the existing bridge crossing which is typically the preferred construction methodology.

Option 2B is very close to the existing bridge crossing which increase the complexity/risk and the proposed northern approach works overlap the existing roads which would cause disruption and increase staging complexity, thus rated Slight Positive.

Option 2C is rated Moderate Positive. The northern approach can be predominately built offline. There is good separation from the existing bridge as shown in Figure 29 below which allows the usual range of construction methodologies. Crown owned land has been identified as suitable for plant lay down areas at both ends of the bridge.

Option 3 is rated Slight Negative as the extent of works increase programme relative to the other options. There is a high risk that private land acquisition increases programme. The existing power lines may require relocation as well.

Option 4 is rated as neutral as it is relatively straightforward to demolish the existing bridge and not build anything to replace it. Given significant degradation in service to road users it was deemed inappropriate to provide this option a positive rating.

Figure 29: Option 2C Position in Relation to Existing Staging Bridge

Table 3-5: Options Assessment for Programme and constructability

Option	Assessment	Score
Option 1	Slight Negative	-1
Option 2A	Moderate Negative	-2
Option 2B	Slight Positive	1
Option 2C	Moderate Positive	2
Option 3	Slight Negative	-1
Option 4	Neutral	0

3.2.4 Maintenance

Option 1 is assessed as a Moderate Negative given the ongoing maintenance requirements anticipated.

All modern bridge replacement options are rated as Large Positive.

Option 4 is rated as neutral given there will be nothing to maintain.

Table 3-6: Options Assessment for Maintenance

Option	Assessment	Score
Option 1	Moderate Negative	-2
Option 2A	Large Positive.	3
Option 2B	Large Positive.	3
Option 2C	Large Positive.	3
Option 3	Large Positive.	3
Option 4	Neutral	0

3.2.5 Safety and Design

Some of the safety in design geometric comments that fed into the rating at the feasibility stage are:

Option 1 and 2A retain the existing northern intersection which has sight visibility issues approaching from the north when turning from Springfield Rd into Waiohiki Rd to cross Redclyffe bridge.

Option 2B has potential to improve the northern intersection with introduction of a roundabout. There is a reverse S-curve on the southern approach which is less desirable.

Option 2C is a slight improvement on 2B with a single curve on the southern approach and retaining the northern intersection roundabout.

Option 3 has overhead powerline at the northern approach which will likely require relocation.

Option 4 results in detour for cars and even more significant detour for pedestrians and cyclists.

Table 3-7: Options Assessment for Safety and Design

Option	Assessment	Score
Option 1	Slight Negative	-1
Option 2A	Slight Negative.	-1
Option 2B	Slight Positive.	1
Option 2C	Moderate Positive.	2
Option 3	Neutral	0
Option 4	Moderate Negative	-2

3.2.6 *Visual Appearance*

The existing bridge crossing is a combination of visual styles, 1933 cast-in-situ concrete and 2023 steel beams with precast deck, with limited to no architectural value, so Option 1 is assessed as Slight Negative.

Replacement bridge options allow increased span lengths, incorporation of cultural expressions, and wider rejuvenation of the area so assessed as Slight Positive.

Removing the existing bridge and restoring the natural landscape is assessed as Slight Positive.

Table 3-8: Options Assessment for Visual Appearance

Option	Assessment	Score
Option 1	Slight Negative	-1
Option 2A	Slight Positive	1
Option 2B	Slight Positive	1
Option 2C	Slight Positive	1
Option 3	Slight Positive	1
Option 4	Slight Positive	1

3.2.7 *Environmental*

The extent of river engineering on the Tūtaekurī river and adjacent rivers is well documented. One would assume all parties seek a vibrant and healthy Tūtaekurī river, which is the view this rating has adopted.

Leaving things as they currently are (Option 1) is rated as Neutral. The risk of further bridge failure during future flood events and the adverse effects this would have on the environment is noted.

Removing the bridge (Option 4) and restoring this region of river to its pre-bridge state (before 1881) is perhaps the best environmental outcome, thus rated as Large Positive.

Options 2A, 2B and 2C will have less piers in the river, increase resilience, capture stormwater run-off so represents an improvement over Option 1 and base rating of Slight Positive. Option 2C has additional advantage of squaring up to the river so slightly less length so rating increased to Moderate Positive.

Option 3 has more piers in the river than Options 2's due to its increased length and thus rated Neutral.

Table 3-9: Options Assessment for Environmental

Option	Assessment	Score
Option 1	Neutral	0
Option 2A	Slight Positive.	1
Option 2B	Slight Positive.	1
Option 2C	Moderate Positive.	2
Option 3	Neutral	0
Option 4	Large Positive	3

3.2.8 Sustainability

Sustainability encompasses many perspectives including reducing greenhouse gas emissions, efficient allocation of resources, meeting needs of society today and tomorrow cognisant of the increasing threat of climate change.

Option 1 would use the least resources to continue the bridge crossing. Having a bridge crossing reduces carbon emissions from vehicles relative to the alternative routes (assuming combustion engines). However, this option is at higher risk of extreme weather events and climate change. Considering these competing factors Option 1 is rated as Slight Positive.

All modern bridge replacement options use resources and associated greenhouse gas emissions during construction. With a longer bridge length and approach road works Option 3 would use more resources. Thus Option 2's rated as Slight Negative and 3 as Moderate Negative.

Removing the existing crossing does not use many resources but also does not meet the needs of the wider Waiohiki community. Option 4 is rated Slight Negative.

Table 3-10: Options Assessment for Sustainability

Option	Assessment	Score
Option 1	Slight Positive	1
Option 2A	Slight Negative	-1
Option 2B	Slight Negative	-1
Option 2C	Slight Negative	-1
Option 3	Moderate Negative	-2
Option 4	Slight Negative	-1

3.2.9 Social & Cultural

A survey[9] was conducted regarding the Hastings District Council's Redclyffe (Waiohiki) Bridge Rebuild between July 12 and September 30, 2023, obtaining responses from 74 participants. The survey results indicated that 68% of participants prefer the bridge to be replaced at the same location (or within its vicinity), 27% favour an upstream location, 4% prefer a downstream location, and 1% do not want a bridge at all. Although only 74 participants responded, this information is useful for understanding community preference.

The survey results also showed the majority (61%) of respondent's preference to maintain the current number of traffic lanes. The top three concerns highlighted by participants include minimising disruption to local communities and traffic flow, delays in construction and ensuring the safety of the newly constructed bridge.

Given the survey results options and considering the wider community interests all options which provide a modern resilient replacement bridge are rated as Large Positive.

Not providing a long-term connection would be seen as a poor outcome by the majority of the community and bridge users, Option 4 is rated as Large Negative. Maintaining the status quo (Option 1) does not provide the community certainty on the resilience of the crossing long term and is rated Slight Negative.

Table 3-11: Options Assessment for Social and Cultural

Option	Assessment	Score
Option 1	Slight Negative	-1
Option 2A	Large Positive	3
Option 2B	Large Positive	3
Option 2C	Large Positive	3
Option 3	Large Positive	3
Option 4	Large Negative	-3

3.2.10 Property Impacts & Acquisition

The property preliminary review memo contained in Appendix B has reviewed each of the proposed alignments and their potential property impacts. The key findings are:

- Options 2B and 2C directly impact only Crown owned (reserved) lands (i.e., no private land acquisition required)
- Option 3 significantly impacts 1 private (general land) property but will be a costly acquisition, plus requires acquisition of Crown owned (reserved) land.
- Acquisition of Crown owned (reserved) lands will be required for all options and can be a lengthy process so recommended to start this process once alignment is confirmed

The report acknowledges that cultural and heritage values of the surrounding landowners, iwi and hapu should be taken into account, particularly adjacent Māori Freehold and Māori Reserve properties.

In view of these findings Options 2A, 2B and 2C are rated as Moderate Positive. The geometrics modelling work undertaken and reported in Appendix E also showed its feasible

[9] Hastings District Council's Bridge Rebuild Survey – Waiohiki/Redclyffe, as at 1 October, 2023. Available upon request

to retain all existing property access on the southern approach. Option 3 is rated as Slight Negative.

Options 1 and 4 are rated as Neutral. They do not require any acquisition of land; the impact on property either remains as-is (Option 1) or the Waiohiki Road gets severed with the impact of this subjective depending on property owner.

Table 3-12: Options Assessment for Property Impacts & Acquistion

Option	Assessment	Score
Option 1	Neutral	0
Option 2A	Moderate Positive	2
Option 2B	Moderate Positive	2
Option 2C	Moderate Positive	2
Option 3	Slight Negative	-1
Option 4	Neutral	0

3.3 Multi Criteria Assessment Results

Options were evaluated with a Multi-Criteria Assessment (MCA) tool based on ten criteria listed in the prior section. A qualitative score was given to each criterion, and a final score for each option was derived using an unweighted criteria and weighting criterion based on Client preference adopted from other bridge rebuilds.

Table 3-14 presents the MCA table wight unweighted scoring and Table 3-15 presents the MCA table with weighted scoring. Weighted scoring is determined from the Client's preference for all considered criteria (listed in Table 3-13).

Table 3-13: Client's Weightage for Assessment Criteria's

Criteria	Client's preference	Weight
Resilience (Project Objective)	9	1.2
Cost (Project Objective)	7	0.93
Programme and Constructability (Project Objective)	7	0.93
Maintenance	8	1.07
Safety in Design	9	1.2
Visual Appearance	7	0.93
Environmental Effects	8	1.07
Sustainability (Carbon Footprint)	6	0.8
Social & Cultural	8	1.07
Property Impact and Acquisition	6	0.8
Total	75	10.00

Table 3-14: MCA Scoring (Unweighted)

Criteria	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4
Resilience	-2	2	3	3	3	-3
Cost	2	0	0	0	-3	0
Programme and Constructability	-1	-2	1	2	-1	0
Maintenance	-2	3	3	3	3	0
Safety and Design	-1	-1	1	2	0	-2
Visual Appearance	-1	1	1	1	1	1
Environmental Effects	0	1	1	2	0	3
Sustainability	1	-1	-1	-1	-2	-1
Social & Cultural	-1	3	3	3	3	-3
Property Impact & Acquisition	0	2	2	2	-1	0
Total	-5	8	14	17	3	-5
Ranking	5	3	2	1	4	5

Table 3-15: MCA Scoring (Including the Client's Preference/Weights)

Criteria	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4
Resilience	-2.4	2.4	3.6	3.6	3.6	-3.6
Cost	1.9	0.0	0.0	0.0	-2.8	0.0
Programme and Constructability	-0.9	-1.9	0.9	1.9	-0.9	0.0
Maintenance	-2.1	3.2	3.2	3.2	3.2	0.0
Safety and Design	-1.2	-1.2	1.2	2.4	0.0	-2.4
Visual Appearance	-0.9	0.9	0.9	0.9	0.9	0.9
Environmental Effects	0.0	1.1	1.1	2.1	0.0	3.2
Sustainability	0.8	-0.8	-0.8	-0.8	-1.6	-0.8
Social & Cultural	-1.1	3.2	3.2	3.2	3.2	-3.2
Property Impact & Acquisition	0.0	1.6	1.6	1.6	-0.8	0.0
Total	-6.0	8.6	15.0	18.2	4.8	-5.9
Ranking	6	3	2	1	4	5

3.4 Recommendation

A permanent replacement bridge at or near the existing Redclyffe bridge location is regionally important for connection and network resilience. The community engagement undertaken to date has confirmed strong preference for a like-for-like replacement (two traffic lanes with shared user path) at the same location or immediate upstream.

Option 2C, Replace Bridge Immediately Upstream and Skewed to Existing Bridge, is the recommended option.

A comprehensive economic assessment has confirmed the project (Option 2C) would deliver approximately three times the benefits compared to its cost.

Option 2C represents the most cost effective and resilient replacement bridge crossing of the options considered that retains access during construction. It does not require private land acquisition, improves the northern intersection, and provides an optimal geometric alignment.

For the next stage of reporting to proceed, the critical aspects requiring further resolution are as follows:

- Funding confirmation
- Ongoing iwi and stakeholder engagement
- Geotechnical factual investigation
- Archaeological investigation of the bridge constructed in 1881
- Hydraulic modelling of Tūtaekurī river including proposed stop bank repairs by Hawke's Bay Regional Council
- Undertake status investigation of crown land including the hydro parcel the project may require to determine land status and ownership/administration

HDC and NZ Transport Agency (NZTA) acceptance

<table>
<tr><td rowspan="2">Acceptance of Report</td><td>HDC representative:
Jim Mestyanek</td><td>Sign:</td></tr>
<tr><td>NZTA representative:</td><td>Sign:</td></tr>
<tr><td rowspan="2">Preferred Option
(please highlight)
Option 1: Do Nothing
Option 2A: Replace Bridge on the Existing Alignment
Option 2B: Replace Bridge Immediately Upstream and Parallel to Existing Bridge
Option 2C: Replace Bridge Immediately Upstream and Skewed to Existing Bridge
Option 3: Alternate Bridge Replacement Location (Links Road)
Option 4: Non-bridge Alternative</td><td>HDC sign:</td><td>Date:
21 Jan 2025</td></tr>
<tr><td>NZTA sign:</td><td>Date:</td></tr>
<tr><td colspan="2">Proceed to Next Phase

Detailed design phase</td><td>Yes / No
(please circle)</td></tr>
</table>

Appendix A

Preliminary Geotechnical Memo

Memorandum

To	Jono Watkins
Copy	James Grindley
From	Theo Calkin
Office	Wellington
Date	11 July 2023 (updated 21 October 2024)
File/Ref	2-S5600.1G - HDC PS – Bridge 816 Redclyffe Bridge
Subject	Redclyffe Bridge Feasibility Study Geotechnical Input

1.1 Introduction

This memo reflects a high-level geotechnical desktop study based on currently available data, which aims to provide geotechnical input for the feasibility and options development of the proposed replacement structure. We provide an overview of ground conditions and summarise the corresponding geotechnical risks. Refer to section 1 of the main feasibility memo for background on Redclyffe Bridge.

1.2 Subsurface Conditions

Desktop Geology

Geological mapping[1] of the area (see Figure 1) shows the site underlain by alluvium comprising Holocene and Kidnappers Group Pleistocene deposits.

Kidnappers Group alluvium typically comprises poorly sorted Greywacke-derived gravel and conglomerate[2], and may be difficult to differentiate from Holocene alluvium. The bottom of the gravel was not encountered in several previously drilled ~15 m deep boreholes located within 1.5 km of the bridge. The thickness of the gravel is unknown.

The nearest outcropping geological unit is Late Pliocene Taradale Mudstone of the Mangaheia Group, which generally comprises massive, uncemented, blue-grey sandy siltstone with sparse macrofossils[3]. SPT *N* values for the mudstone recorded in a borehole drilled approximately 3 km north of the bridge typically range between 20 and 30, increasing with depth[4]. Although the Taradale Mudstone is geologically classified as a rock formation, the unit is non-cemented and for engineering purposes may be considered as soil or intermediate geomaterial.

[1] Bland KJ. 2006. Analysis of the central Hawke's Bay sector of the late Neogene forearc basin, Hikurangi margin, New Zealand [unpublished PhD thesis]. Hamilton: University of Waikato. http://hdl.handle.net/10289/9030. (Unpublished ArcGIS datasets)

[2] Bland, K. J. (2006). Analysis of the central Hawke's Bay sector of the Late Neogene forearc basin, Hikurangi margin, New Zealand (Thesis, Doctor of Philosophy (PhD)). The University of Waikato, Hamilton, New Zealand. Retrieved from https://hdl.handle.net/10289/9030

[3] Bland, K. J. (2006). As above.

[4] NZGD ID:57667

WSP
Wellington
L9 Majestic Centre
100 Willis Street
Wellington 6011, New Zealand
+64 4 471 7000
wsp.com/nz

An inactive, northeast-southwest trending fault runs beneath the bridge near the southern abutment. The nearest mapped active fault on the New Zealand Active Faults Database (updated Nov. 2022) is an unnamed normal fault approximately 10 km north of the bridge.

We note that the Awanui Fault, a reverse thrust of the Poukawa Fault Zone located approximately 750 m southeast of the bridge, is shown as an active fault on the GNS 1:250,000 online QMAP. (120 000 years), however, this was removed from the latest issue of the active fault database.

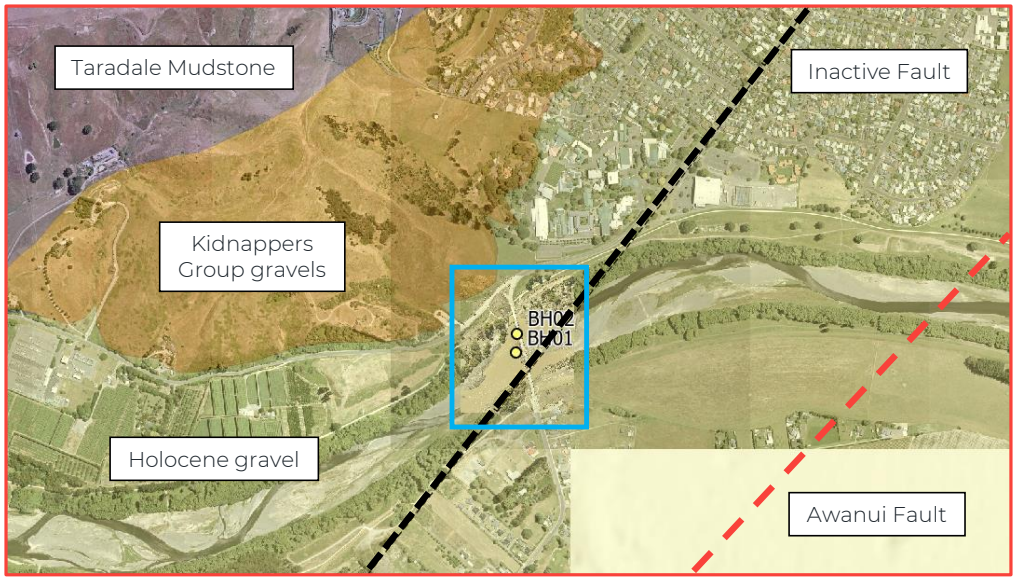


Figure 1: Geological setting of Redclyffe Bridge site; bridge shown in blue box.

Site Specific Ground Conditions

We are not aware of any bedrock outcrops near the bridge site. Construction drawings of the previous bridge indicate that fill has been placed at the site, but the distribution, thickness, and composition of it is uncertain.

Borings carried out for construction of the previous bridge in 1933 record silt, sand, "shingle", "coarse shingle", and a 0.5 m thick layer of "blue pug" to the maximum bore depth of approximately 9 m We note significant lateral variation in the depth of layers, which may influence founding conditions. The historical boring records are summarised in Table 1 below.

Table 1: Boring records from drawings from previous bridge (drawing dated September 1932). R.L. of ground surface at all bore locations within 1 m.

	Bore A	Bore B	Bore C	Bore D	Bore E
Lithology	Silt	Coarse shingle	Shingle	Shingle	Silt
Thickness/depth of base	1.2	6.1	7	7.9	2.7
Lithology	Shingle	Sand			Coarse shingle
Thickness	4	0.6			3.7
Depth of base	5.2	6.7			6.4
Lithology	Blue pug	Shingle			
Thickness	0.6	0.9			
Depth of base	5.8	7.6			

Lithology	Coarse shingle				
Thickness	3.4				
Depth of base	9.2				

As part of the temporary crossing bridge construction two sonic boreholes were completed in the river channel in May 2023; locations are shown on Figure 1 and logs are attached in Appendix 1.

The boreholes record fill and sand alluvium to 8.4 – 9.8 m depth, underlain by 2 – 3 m of silty sand/sandy silt described as "estuarine deposits". At 11.85 – 12 m both boreholes encountered artesian water, with the boreholes terminated in sandy gravel/gravelly sand at 12-12.45 m. Borehole materials are summarised in Table 2 below.

Table 2: Borehole records from sonic drilling (drilling completed May 2023)

		BH01	BH02
Depth Range		0 – 8.65 m	0 – 8.25 m
Typical lithologies		Sand with gravel, silt, organics; grey.	Gravel, sand, wood, limestone, construction waste; various colours.
Range of SPT N values		3 - 15	2 – 50+
Typical moisture content		Wet to saturated	Wet to saturated
Depth Range		8.65 – 11.85 m	8.25 – 11.45 m
Typical lithology		Silty sand/sandy silt with organics; blue grey.	Sand with silt and clay/ sandy silt with clay and pumice; bluish grey.
SPT N value		8	9 - 13
Typical moisture content		Moist to wet	Moist
Depth Range		11.85 m - unproven	11.45 m - unproven
Typical lithology		Sandy gravel with silt and clay; bluish grey to greyish brown.	Gravelly sand; blackish grey.
SPT N value		47	N/A
Typical moisture content		Saturated	Saturated

*SPT hammer ETR = 94.1%

1.3 Geotechnical Risks

We have carried out a high-level desktop assessment of geotechnical risks affecting the site, including liquefaction, abutment stability, working around the aquifer, and scour.

Liquefaction

Seismic performance is likely dictated by the susceptibility for liquefaction triggering.

We note that the bridge site is shown as a high liquefaction vulnerability site on the Hawkes Bay Regional Council's Liquefaction Land Vulnerability Map[5].

Sonic borehole drilling in the river channel shows much of the upper 10 m of the ground profile is saturated, very loose to loose, sandy alluvium and fill, and therefore likely to be subject to liquefaction triggering in a seismic event. Ground conditions at the abutments have not been investigated.

Further assessment is required to evaluate the risk of triggering and the corresponding risk to the proposed structure.

Slope/Abutment Stability

The north and south embankments are vegetated with grass and longitudinally sloped at grades of less than 20° (see Figures 2 and 3 below).

Figure 2: North embankment (image from Google Streetview; captured April 2024)

Figure 3: South embankment (image from Google Streetview; captured April 2024)

[5] Hawke's Bay Hazard Portal (hbrc.govt.nz)

We are not aware of any static stability issues associated with the previous structure and review of historical aerial photographs (1949 to present) did not identify any significant issues. The site is not contained within any landslide risk zone as mapped by HBRC.

Depending on the composition of the embankment fill and design of the new structure, ground improvement and/or retaining may be required around the abutments to achieve bridge manual stability requirements, particularly under seismic load cases.

Aquifer

Hawkes Bay Regional Council maps shown the site within the extent of the confined Heretaunga Aquifer, where artisanal pressures can exceed 6 m agl[6]. Borehole logs from the 2023 drilling in the river channel indicate potential positive pressure from 6 m bgl and suggest that the flowing artesian aquifer was intersected between 11.85 m and 12 m bgl.

The influence of the piezometric head should be considered when assessing the viability of different foundation and ground improvement options. The presence of the aquifer should also be considered from an environmental and consenting perspective.

Scour

It is not clear how much of an issue scour is at the site.

Review of historical aerial photographs suggests that the abutments are not affected by scour under typical flow conditions. However, during the 2023 Cyclone flood event floodwaters appear to have significantly eroded both riverbanks and come into contact with the northern abutment.

We also note potential historical scour of piles within the river migrating river channel recorded in pre-cyclone bridge inspection (see Figure 4 below).

Figure 4: Potential scour around piers prior to 2023 Cyclone event.

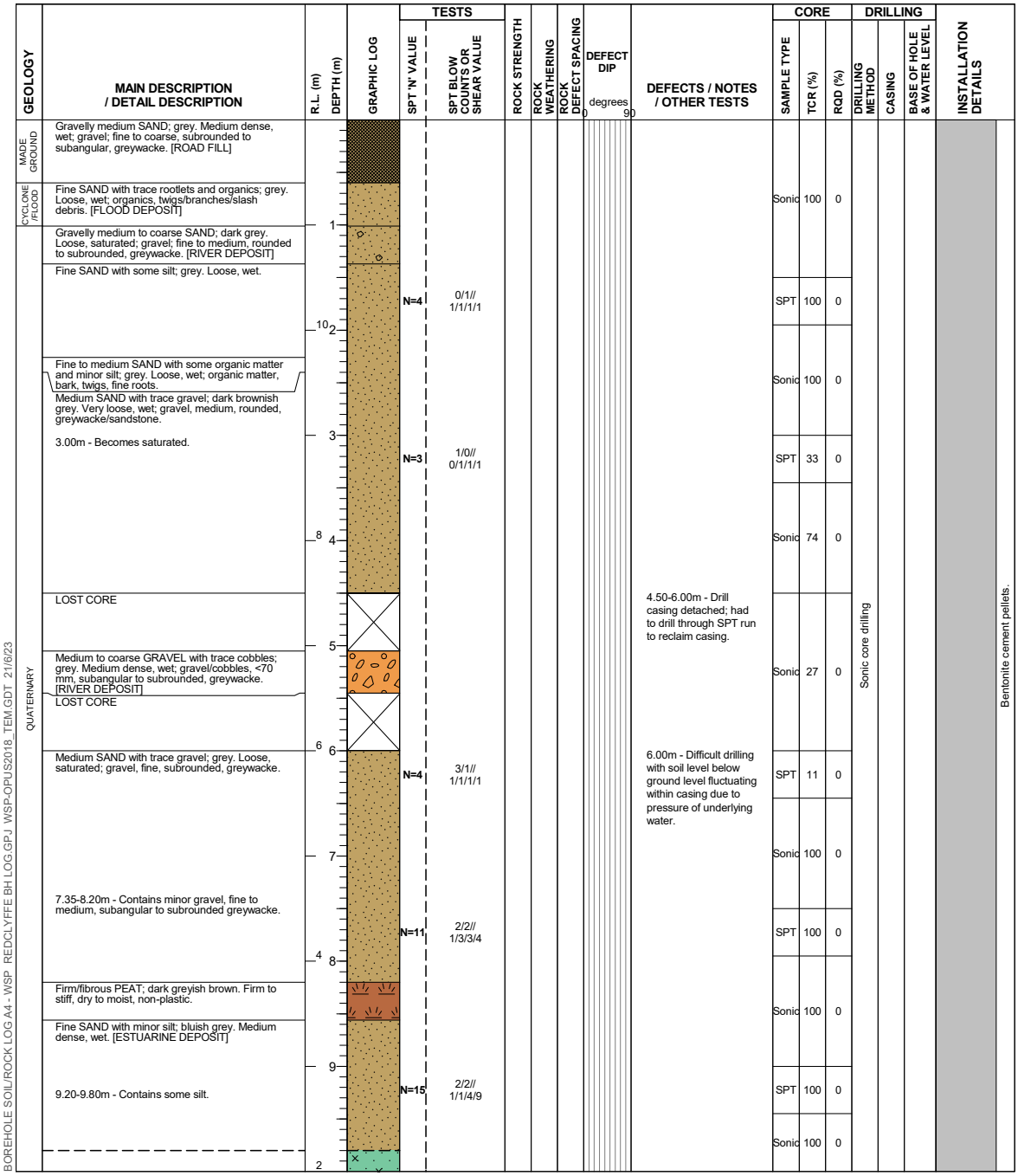
Scour hazards for the abutments and piers should be reviewed, and consideration given to armouring the approach embankment, optimising the abutment locations, and designing the piers to minimise the effects of scour.

[6]https://www.hbrc.govt.nz/environment/aquifers/

Appendix 1: Borehole Logs

Borehole No. BH01

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811085 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12.45 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		



Notes:
Sunny to overcast winter day.
Graphic log colours are not representative of the actual soil colours.

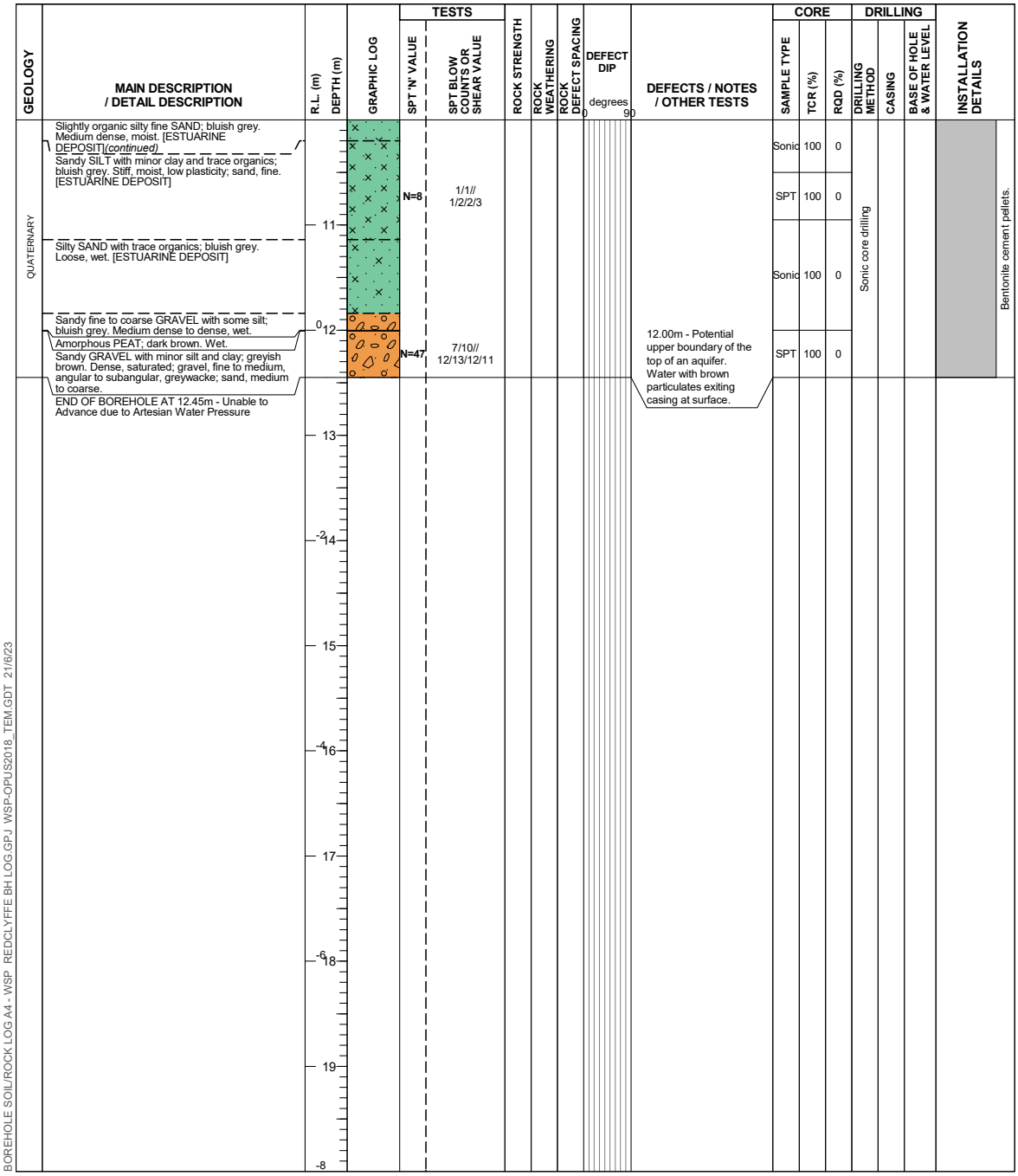
Started:	29/05/2023	*Finished:*	29/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.
Scale 1:50 @ A4

Sheet 1 of 4

Borehole No. BH01

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811085 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12.45 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		



BOREHOLE SOIL/ROCK LOG A4 - WSP REDCLYFFE BH LOG.GPJ WSP-OPUS2018_TEM.GDT 21/6/23

Notes:
Sunny to overcast winter day.
Graphic log colours are not representative of the actual soil colours.

Started:	29/05/2023	*Finished:*	29/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Sheet 2 of 4

Borehole No. BH01

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811085 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12.45 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		

PHOTOGRAPHS

Photo BH01.1
0.00 m to 2.70 m BGL

Photo BH01.2
2.70 m to 7.10 m BGL

Notes:
Sunny to overcast winter day.
Graphic log colours are not representative of the actual soil colours.

Started:	29/05/2023	*Finished:*	29/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Sheet 3 of 4

Scale 1:50 @ A4

BOREHOLE SOIL/ROCK LOG A4 - WSP REDCLYFFE BH LOG.GPJ WSP-OPUS2018_TEM.GDT 21/6/23

Borehole No. BH01

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811085 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12.45 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		

PHOTOGRAPHS

Photo BH01.3
7.10 m to 10.00 m BGL

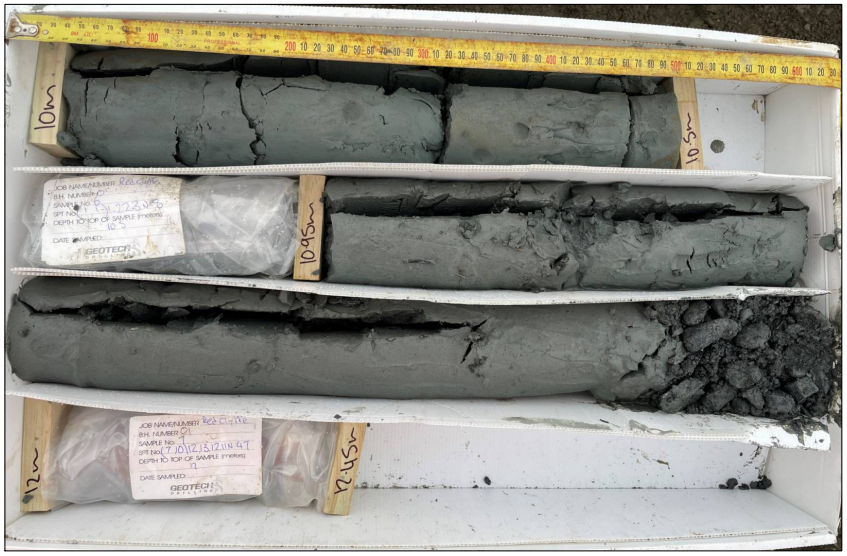


Photo BH01.4
10.00 m to 12.45 m BGL

BOREHOLE SOIL/ROCK LOG A4 - WSP REDCLYFFE BH LOG.GPJ WSP-OPUS2018_TEM.GDT 21/6/23

Notes:
Sunny to overcast winter day.
Graphic log colours are not representative of the actual soil colours.

Started:	29/05/2023	*Finished:*	29/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

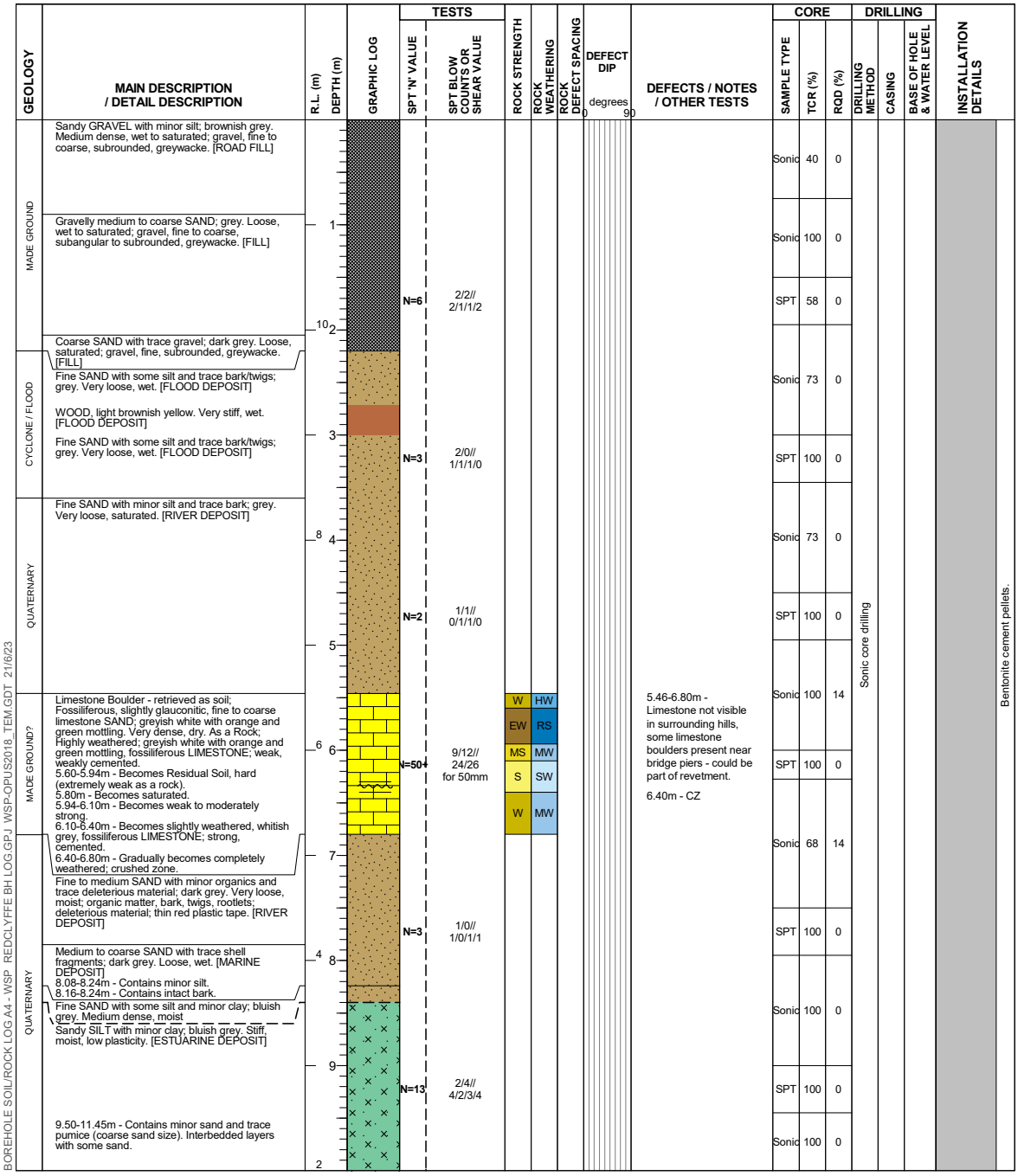
Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Sheet 4 of 4

Scale 1:50 @ A4

Borehole No. BH02

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811136 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		



BOREHOLE SOIL/ROCK LOG A4 - WSP REDCLYFFE BH LOG.GPJ WSP-OPUS2018_TEM.GDT 21/6/23

Notes:
Overcast winter day with some light rain.
Graphic log colours are not representative of the actual soil colours.

Started:	30/05/2023	*Finished:*	30/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

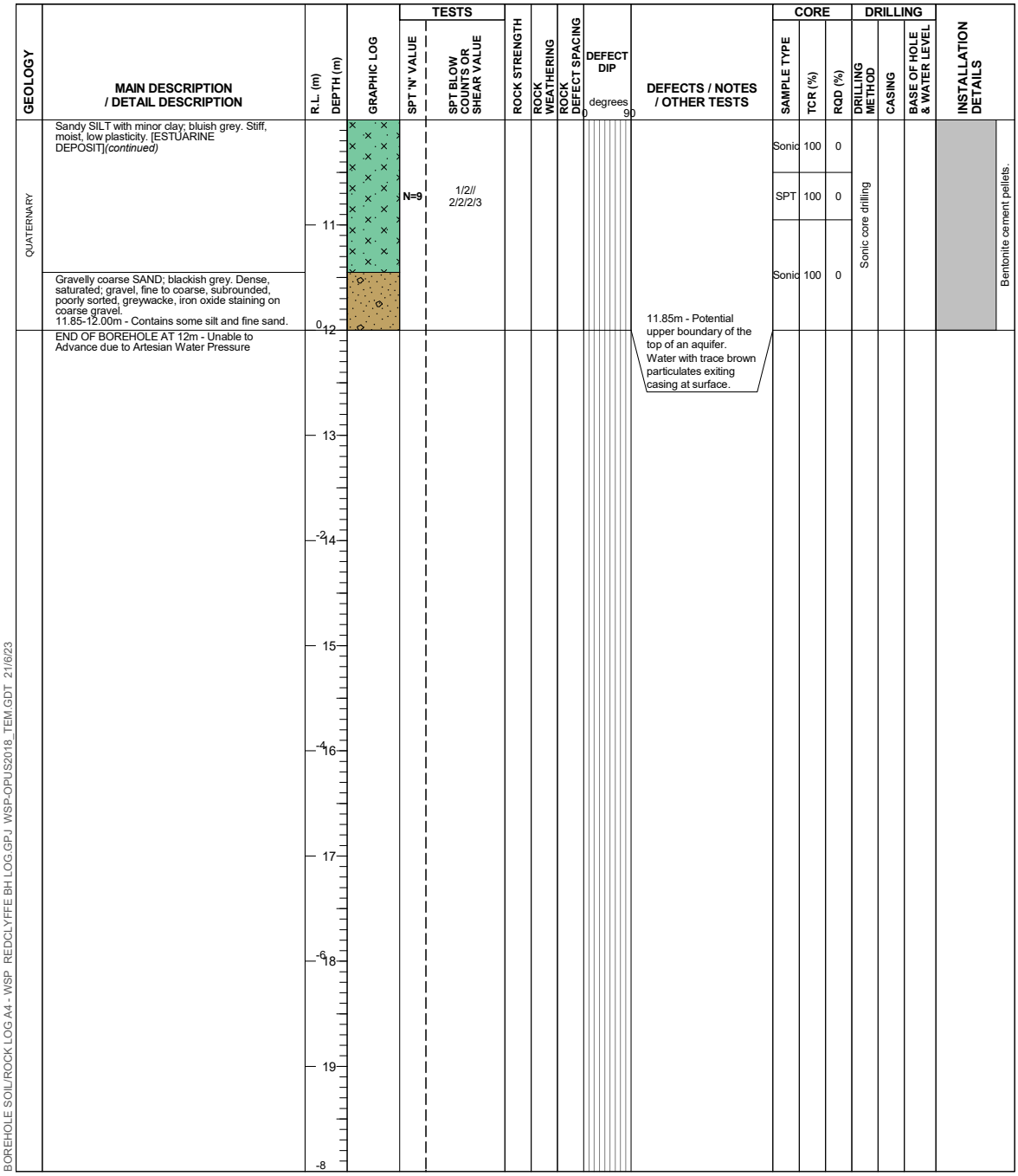
Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Sheet 1 of 4

Borehole No. BH02

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811136 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		



BOREHOLE SOIL/ROCK LOG A4 - WSP REDCLYFFE BH LOG.GPJ WSP-OPUS2018_TEM.GDT 21/6/23

Notes:
Overcast winter day with some light rain.
Graphic log colours are not representative of the actual soil colours.

Started:	30/05/2023	*Finished:*	30/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Sheet 2 of 4

Borehole No. BH02

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811136 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		

PHOTOGRAPHS

Photo BH02.1
0.00 m to 3.45 m BGL

Photo BH02.2
3.45 m to 6.275 m BGL

BOREHOLE SOIL/ROCK LOG A4 - WSP REDCLYFFE BH LOG.GPJ WSP-OPUS2018_TEM.GDT 21/6/23

Notes:
Overcast winter day with some light rain.
Graphic log colours are not representative of the actual soil colours.

Started:	30/05/2023	*Finished:*	30/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Sheet 3 of 4

Scale 1:50 @ A4

Borehole No. BH02

Project:	Redclyffe Bridge	*Coordinates:*	413950 E 811136 N		
Client:	Hastings District Council	*Ref. Grid:*	Hawkes Bay 2000	*Depth:*	12 m
Project No.:	2-S5600.13/2RCPA	*R.L.:*	Approx. 12.0 m	*Inclination:*	Vertical
Location:	Hastings Waiohiki Road, Hastings	*Datum:*	NZ Vertical Datum 2016		

PHOTOGRAPHS

Photo BH02.3
6.275 m to 9.00 m BGL

Photo BH02.4
9.00 m to 12.00 m BGL

BOREHOLE SOIL/ROCK LOG A4 - WSP REDCLYFFE BH LOG.GPJ WSP-OPUS2018_TEM.GDT 21/6/23

Notes:
Overcast winter day with some light rain.
Graphic log colours are not representative of the actual soil colours.

Started:	30/05/2023	*Finished:*	30/05/2023
Drilling Co.:	Geotech Drilling Ltd.	*Drilling Rig:*	SONIC
Logged by:	T. Roscoe	*Checked by:*	S. Hinton

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.
Scale 1:50 @ A4

Sheet 4 of 4

Appendix B
Property Preliminary Review

Memorandum

To	Hastings District Council
Copy	File
From	Property Napier
Office	Napier
Date	22 October 2024
File/Ref	2-S5600.1G
Subject	Redclyffe Bridge Rebuild – Property Preliminary Review

1 Background

The purpose of this memorandum is to provide preliminary review of property impacts into the optioneering for Redclyffe Bridge Rebuild. This memo presents desktop findings of WSP's preliminary review of property constraints resulting from reviewing the three high level options.

This is a high-level **desktop** assessment.

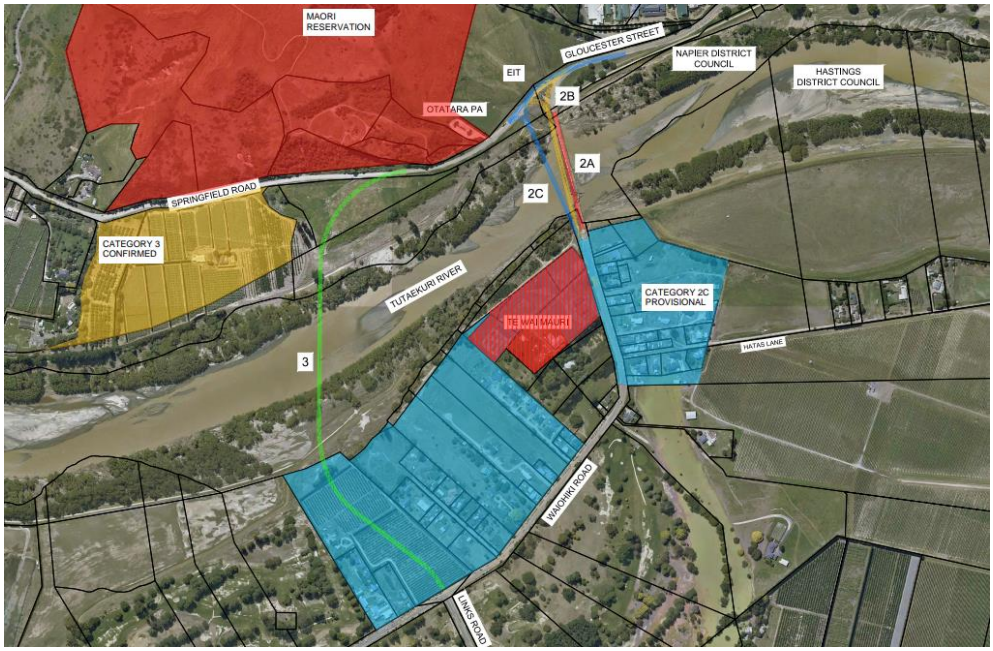
No engagement with landowners has been undertaken, therefore this assessment makes no allowance for their perspectives, position or restrictions which may further impact the property optioneering outlined below.

1.1 Rebuild Design Options

There are three options in which have been considered within this report. Bridge options 2B and 2C are of similar alignment to the original bridge and all permanent infrastructure will stay within existing legal road. However, an increase in height on the bridge and the approaches may affect adjoining properties. It is envisaged that any temporary works areas for laydown sites will be within Crown land, subject to investigation.

Bridge option 3 is an alternative alignment, connecting Links Road to Springfield Road approximately 900m west of the current alignment. This option will impact private land and will require acquisition.

All options, and existing to have acquisition and legalisation requirements in regards to the Hydro parcel and other similar blocks.



2 Overview of Property Constraints

Within this area there is a number of general types of property, that impact property acquisition requirements. Following is an overview of the property types noted in this area and an explanation of process for acquisition. A breakdown of impacted properties for each option is then provided in Section 4 below.

2.1 Māori Freehold Land and Māori Reservation

The plan in ***Appendix A*** shows the Māori Freehold land (MFL) shaded yellow and Māori Reservation shaded red in the vicinity of the design options. ***Appendix B*** provides a table of ownership of MFL, former MFL and Māori Reserve Land.

Acquisition of Māori Land (including general land managed in accordance with the Te Ture Whenua Māori Act) can be a complex and lengthy process. This is due to complicated ownership structures, unsucceeded ownership, Māori Land Court processing of Agreements, and other cultural implications.

Te Ture Wheua Maori Act 1993 (TTWMA) is the governing legislation for Māori land. The Act recognises that land is taonga tuku iho of special significance to Māori. The Act promotes retention of Māori land, facilitates the occupation, development and use of that land and ensures decisions made about Māori land are fair and balances, taking into account the needs of the owners, their whanau, and their hapu. Compliance with the TTWMA criteria throughout the whole acquisition process is essential.

From a property perspective:

- avoiding impact to Māori Freehold land is the recommended (although is possible),and
- Māori Reservation is not able to be acquired under the Public Works Act

Engagement and consultation with property owners should be managed alongside the overall community and local iwi engagement plan.

2.2 Cemetery

Three of the surrounding properties contain urupā, as shown cross hatched cyan on the map in ***Appendix A***. Two of these properties are Māori Reserve, therefor unable to be acquired. The third urupā is partly located on Māori Freehold land and any acquisition would need to be well clear of the urupā.

2.3 Sites of Significance

Archaeological and other recorded sites of significance will be captured by planning review but note that Hastings District Council and Napier City Council District Plans have identified sites of significance, as shown below.

Figure 1 https://eplan.hdc.govt.nz/eplan/property/52573/0/1215?_t=property

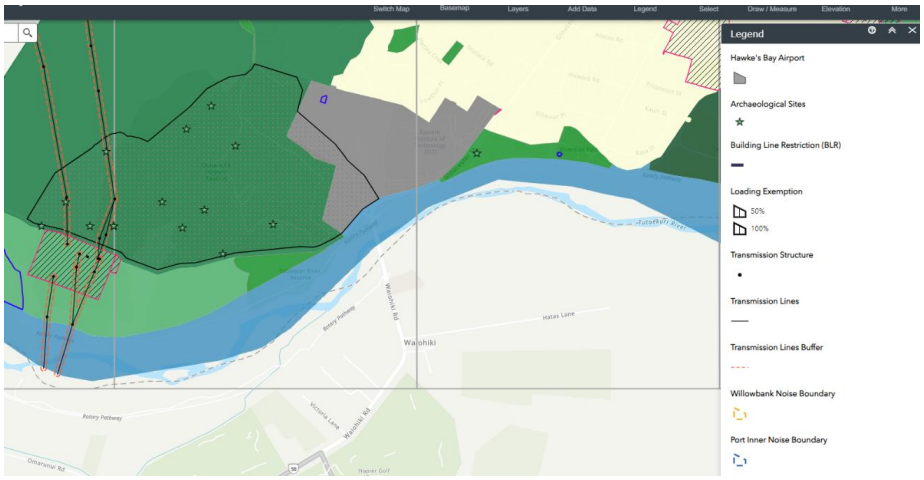


Figure 2 https://maps.napier.govt.nz/LocalMapsViewer/?map=2e0f9d03e45a4cf89c6526806b2af5f8

2.4 Soil Conservation and River Control and Reserves

Across the three options, there are seven potentially affected properties that are held for specific reserve and conservation purposes, including

- Improvement and Protection of the Tutaekuri River,
- River works,
- Recreational Reserve, and
- Soil conservation and river control.

These parcels as shown shaded green on the diagram attached as ***Appendix A***. Status reports are required to determine the ownership and administration and controlling Legislation of these parcels. The findings will then determine the process for acquisitions of land required for Road.

2.4.1 Soil Conservation and River Control

Four parcels are held for the purpose of soil conservation and river control and were originally acquired under the Public Works Act 1981. Typically land held for Public Works can be transferred between owners / administering Agencies.

2.4.2 Recreational Reserve

Recreational Reserve is held under the Reserves Act 1977 for public use for recreation, sporting activities with an emphasis on retaining open space. Reserve land can be transferred for Road but impact on any special historic, archaeological and biological features present on the site will need to be eliminated or mitigated by the proposed works.

Acquisition of Crown Reserve is administered by Department of Conservation and will take around 24 months.

2.4.3 Improvement and Protection of the Tutaekuri River

The one block of land that is held for the purpose of improvement and protection of the Tutaekuri River. Preliminary research of the parcel indicates it is most likely now held pursuant to the Reserves Act 1977, but a full status reporting is needed to confirm this. Reserve held for protection purposes, can be difficult to acquire for public work.

The old bridge, abutments and the road encroach into this parcel of land.

2.4.4 Otatara Pa

The Otatara Pa is shown cross hatched blue on the plan attached in ***Appendix A***. This is held as Historic Reserve and is a site of national significance.

2.5 Hydro Parcel (Tutaekuri River)

The old bridge (and the temporary bailey bridge) is located within the hydro parcel and has never been legalised for Road.

All three options will impact the hydro parcel and acquisition of land for Road is applicable, **regardless of which bridge option is chosen.** As part of this, a status report will need to be undertaken to determine ownership and administration rights of the hydro parcel.

Should the River be found to be Crown land, the acquisition process is managed by Land Information New Zealand and may take 18-24 months.

Acquisition of part of the hydro parcel is the best option but it is possible to acquire height limited air rights above the River.

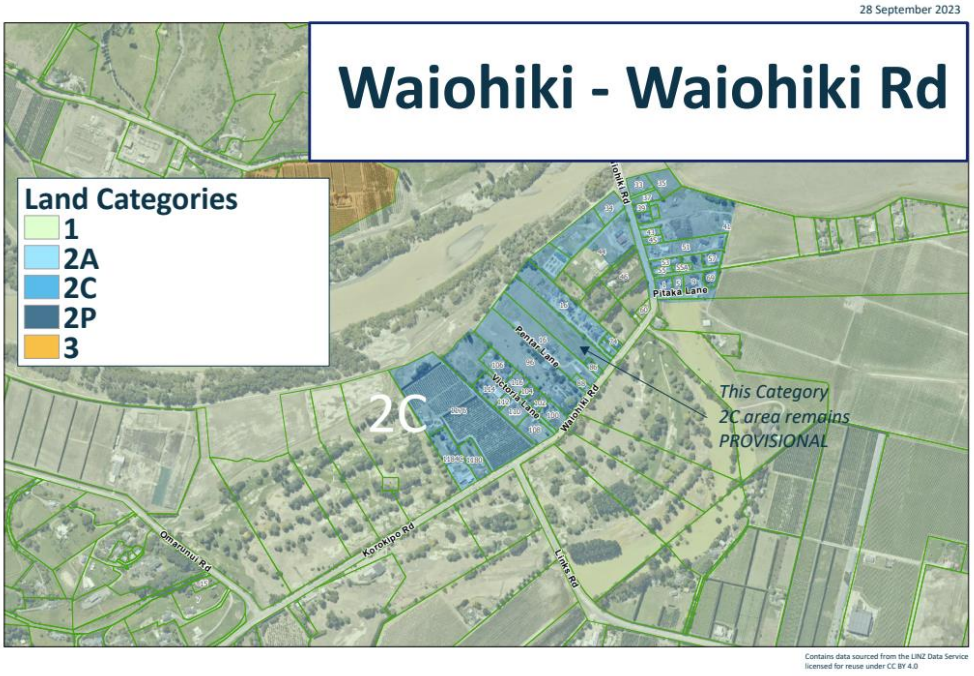
3 Voluntary Buy-out Programme

Hawke's Bay Regional Council (HBRC) has carried out a process of assessing and categorising all flood affected land. In some cases, some current land uses may remain acceptable, while for others there is an "intolerable risk of injury or death".

Only one property in the area is a Category 3, as shown below. The Category 3 property is not affected by any of the alignment options being considered.

Some of the potentially affected properties were previously in the 2C category as shown below but have since been released from 2C to category 1.

The buyout scheme does not look to be of concern, and it is assumed that no buyout is taking place due to the category reclassification. The progress of the buyout programme will need to be assessed in detail when an alignment is selected.



4 Detailed Property Impact

4.1 Bridge Options 2B and 2C

These two options have similar property impacts so are combined for analysis.

The majority of properties on the southern side of the river that have the potential to be affected are Māori Land. Although design indications show **no private land acquisition of land is required** on the southern side of the river, there may be injurious affection to the properties that could require compensation pursuant to s63 of the Public Works Act.

Interruption to cultural and heritage values to the surrounding landowners and iwi and hapu should be taken into account. Transparent and early engagement is the best approach to ensure Project is not delayed.

The table below provides a summary of land where acquisition is required to enable option 2B and 2C to proceed:

Type of Land	Appellation	Record of Title	Required Actions / Comments
Hydro	Tutaekuri River	PID 4254010	Status report required to determine ownership. **Partial acquisition**
Improvement and Protection of the Tutaekuri River	Part Section 83 SO 1265	HBY3/394	Status reports required to determine ownership / administrating authority and legislation the land is held under. **Partial acquisition** These parcels are located adjacent to the River and contain cycle / pedestrian trails and some riparian planting.
Local Purpose Reserve	Section 9 Block VII Heretaunga SD	NZGZ1989p6026	
Soil Conservation and River Control	Accretion Survey Office Plan 6465	NZGZ1988p3672	
Soil Conservation and River Control	Section 1 SO 10689	NZGZ1996p2936	

4.2 Bridge Option 3

Design indications show **one acquisition of private property is required** on the southern side of the River, being RT HBJ1/651. This could be either a partial or full acquisition.

This property is an improved lifestyle orchard. With the landowner holding a number of properties in the Waiohiki area including a nearby packhouse, on Links Road. There is an easement registered on the title which will need to be addressed as part of property negotiations.

On the northern side of the river, there is Local Purpose Reserve (Soil Conservation and River Control) land and Recreation Reserve land.

The hydro parcel will need to be partially acquired and legalised for the purpose of roading.

Type of Land	Appellation	Record of Title	Required Actions / Comments
General	Lot 5 DP 16175	HBJ1/651	Partial acquisition, but owners may require a full acquisition due to the significant impact to the property.
Hydro	Tutaekuri River	PID 4254010	Status report required to determine ownership. **Partial acquisition**
Soil Conservation and River Control	Section 9 Block VII Heretaunga SD	NZGZ 1989p6026	Status reports required to determine ownership / administrating authority and legislation the land is held under. **Partial acquisition** These parcels contain cycle/pedestrian trail, power pylon. The adjoining owner appears to use parts of the land and the remainder of land looks to be used for grazing.
Recreation Reserve	Section 6 Block VII Heretaunga SD and Section 10 Block VII Heretaunga SD	NZGZ 1981p903	

5 Conclusion

All of the proposed alignment options have impacts on outside of legal road. Potential property acquisition is restrained by the presence of Māori Freehold Land, Māori General Land, Historic Reserve (Otatara Pa) and a selection of other Crown (reserved) land in proximity to the potential alignments.

Options 2B and 2C directly impact only Crown owned (reserved) lands. But the adjacent Māori Freehold properties and Māori Reserve properties may be impacted sufficiently to warrant compensation pursuant to s63 of the Public Works Act.

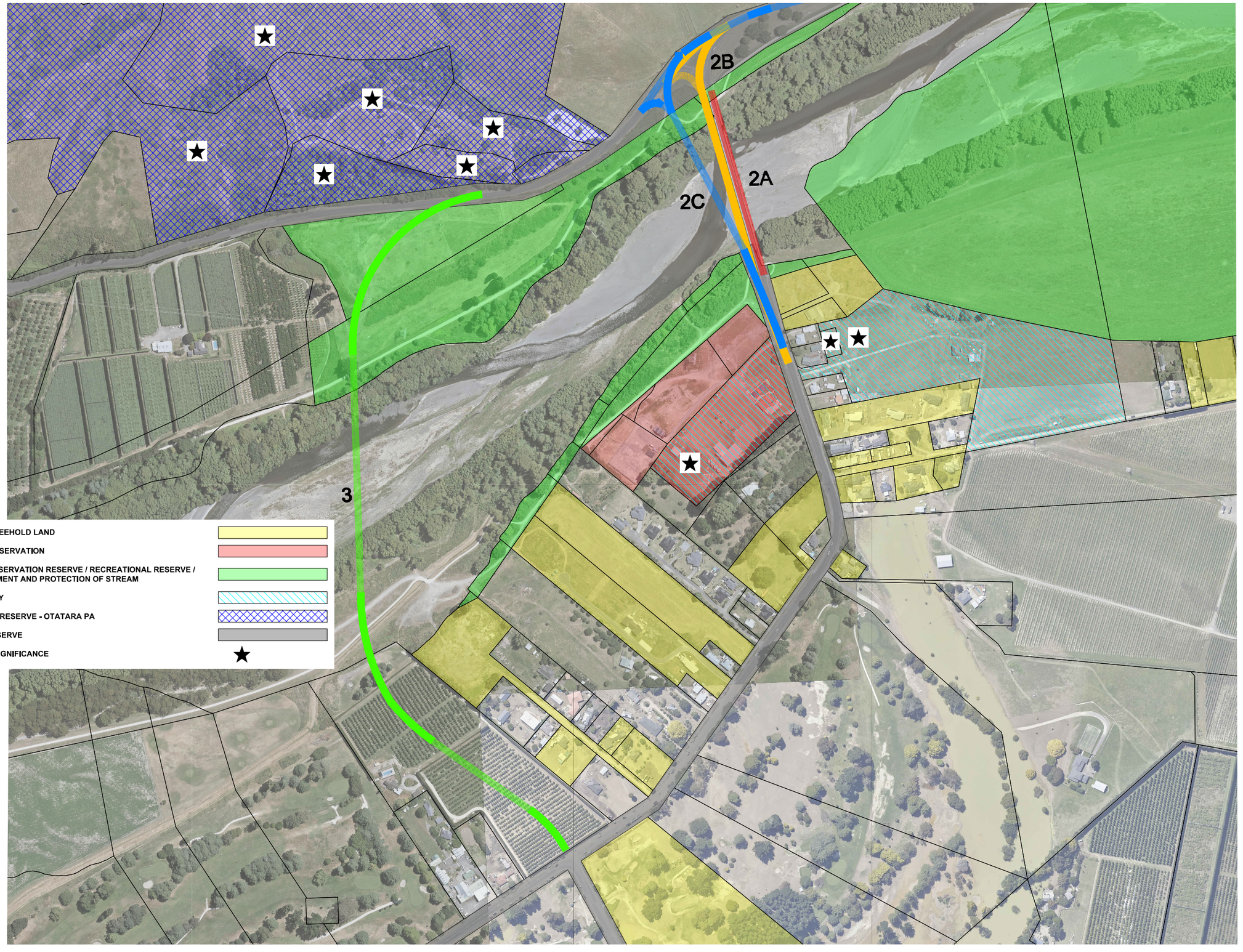
Option 3 significantly impacts 1 private (general land) property but will be a costly acquisition, plus requires acquisition of Crown owned (reserved) land.

Acquisition of Crown owned (reserved) lands will be required for all options and is a lengthy process. Property Actions would need to be initiated in parallel with design if the intended construction start is less than 24 months.

In order to minimise risk of land acquisition delaying construction start, the following property approach is recommended:

- Undertake status investigation for six parcels of Reserved land and the hydro parcel to determine land status and ownership/administration.
- Should the hydro parcel be found to be Crown owned, submit status report to the Commissioner of Crown Lands for approval.
- Upon decision of final alignment, commence land owner engagement.
- Undertake acquisition alongside detailed design.

Appendix A


2B
2A
2C
3
MAORI FREEHOLD LAND
MAORI RESERVATION
SOIL CONSERVATION RESERVE / RECREATIONAL RESERVE / IMPROVEMENT AND PROTECTION OF STREAM
CEMETERY
HISTORIC RESERVE - OTATARA PA
ROAD RESERVE
SITE OF SIGNIFICANCE

Appendix B – Māori Freehold Land and Māori Reserve land.

Type of Land	Owner	Record of Title
MFL	Albert James Gray, Josephine Florence Gray, Rapihana Te Kaha Hawaikirangi, Roberta Maraea Hawaikirangi, Alice Marie Hughes	477044
MFL	Albert James Gray, Josephine Florence Gray, Rapihana Te Kaha Hawaikirangi, Roberta Maraea Hawaikirangi, Alice Marie Hughes	482743
General (Previously MFL)	Ngareipa Hawaikirangi	HBA2/443
General (Cemetery and lease to Telecom)	Donald Fabian Pewhairangi, Telecom Limited	HBE1/802 & 509885
MFL (Cemetery)	Tamati Walker Rapihana Hawaikirangi, Nobby Te Ahi Kerei, Kawhe Toheriri	499572
General (Previously MFL)	Siosiua Aholoka Kaifa, Kessie-May Rodda	HBE1/319
General (Previously MFL)	Karen Miria Wanda Hadfield	HBA1/230
General (Previously MFL)	Roy Casey Pewhairangi, Adrienne Desiree Pewhairangi-Stok	HB166/49
Māori Reserve	Julie Ferguson, Hinewai Ann Hawaikirangi, Kath Hawaikirangi, Rapihana Te Kaha Hawakirangi, Richard Spence Hilton, Laurence Bunny O'Reilly	HBF1/1294
Māori Reserve	Julie Ferguson, Hinewai Ann Hawaikirangi, Kath Hawaikirangi, Rapihana Te Kaha Hawakirangi, Richard Spence Hilton, Laurence Bunny O'Reilly	HBW2/719

Māori Reserve	Julie Ferguson, Hinewai Ann Hawaikirangi, Kath Hawaikirangi, Rapihana Te Kaha Hawakirangi, Richard Spence Hilton, Laurence Bunny O'Reilly	HBW2/718
Māori Reserve (Cemetery)	Julie Ferguson, Hinewai Ann Hawaikirangi, Kath Hawaikirangi, Rapihana Te Kaha Hawakirangi, Richard Spence Hilton, Laurence Bunny O'Reilly	482478

11

Appendix C
Feasibility Stage Cost Estimate

Programme Business Case Cost Estimate - Replacement Redclyffe Bridge

Unit cost of bridge =	13,000	$/m^2
Unit cost of two lane road =	3,000,000	$/km
Unit cost of MSE wall =	3,000	$/m^2
Unit cost of a roundabout =	4,000,000	$/no
Land acquisition cost =	150	$/m^2
Removal of original bridge debris =	1,000	$/m^2
Strengthening of Bridge =	3,500	$/m^2
Painting of Temporary Crossing Bridge =	500	$/m^2
Assumed rise of the bridge, H =	1.20	m
Assumed slope of the approach road, 1V:		H
Preliminary and General =	25.0	%
Project development =	15.0	%
Contingency =	30.0	%
Funding risks =	20.0	%

Physical works cost

Option	Item	Length (m)	Width (m)	Number	Area (m^2)	Unit Rate ($/sqm / $/km	Cost ($ million)
Option-1: Do nothing							
	Strengthening of 2no. existing bridge spans	25.00	7.14		178.4	3,500	0.62
	Painting of temporary staging bridge	128.90	8.33		1073.7	500	0.54
	(A) Total physical works cost						**1.16**
Option-2A							
	Bridge	230.00	13.64		3137.2	13,000	40.78
	Approach road	100.00			0.0	3,000,000	0.3
	Removal of current bridge crossing	231.63	Varies		1806.9	1,000	1.81
	(A) Total physical works cost						**42.89**
Option-2B							
	Bridge	235.00	13.64		3205.4	13,000	41.67
	Approach road	330.00			0.0	3,000,000	0.99
	Roundabout			1	1.0	4,000,000	4.00
	Removal of current bridge crossing	231.63	Varies		1806.9	1,000	1.81
	(A) Total physical works cost						**48.47**
Option-2C							
	Bridge	210.00	13.64		2864.4	13,000	37.24
	Approach road	380.00			0.0	3,000,000	1.14
				1	1.0	4,000,000	4.00
	Removal of current bridge crossing	231.63	Varies		1806.9	1,000	1.81
	(A) Total physical works cost						**44.19**
Option-3							
	Bridge	400.00	13.64		5456.0	13,000	70.93
	Approach road	1090.00			0.0	3,000,000	3.27
	Land acquisition	350.00	20.00		61795.0	150	9.00
	Roundabout			2	2.0	4,000,000	8.00
	Removal of current bridge crossing	231.63	Varies		1806.9	1,000	2.00
	(A) Total physical works cost						**93.20**
Option-4							
	Removal of current bridge crossing	231.63	Varies		1806.9	1,000	2.00
	(A) Total physical works cost						**2.00**

Item	Description	Rate (%)	Option-1 ($ million)	Option-2A ($ million)	Option-2B ($ million)	Option-2C ($ million)	Option-3 ($ million)	Option-4 ($ million)
A	Total physical works cost		1.16	42.89	48.47	44.19	93.20	2.00
B	Preliminary and General	25.0%	0.29	10.72	12.12	11.05	23.30	0.50
C	Total A + B		1.45	53.61	60.59	55.24	116.50	2.50
D	Project development on C	15.0%	0.22	8.04	9.09	8.29	17.48	0.38
E	Total C + D		1.67	61.65	69.68	63.53	133.98	2.88
F	Contingency on E	30.0%	0.50	18.50	20.90	19.06	40.19	0.86
G	Project Expected Estimate (E + F)		2.17	80.15	90.58	82.59	174.17	3.74
H	Funding Risk on G	20.0%	0.43	16.03	18.12	16.52	34.83	0.75
I	95th Percentile Project Estimate (G + H)		**2.17**	**96.18**	**108.70**	**99.11**	**209.00**	**4.49**

Appendix D
Economic Assessment

Memorandum

To	Hastings District Council
Copy	N/A
From	Laura Goodman, Chris Groom
Office	Christchurch
Date	2 December 2024
File/Ref	2-S5600.1G
Subject	Waiohiki Road "Redclyffe" Bridge - Economic Assessment

Executive Summary

This economic assessment demonstrates that a permanent replacement of the Waiohiki Road "Redclyffe" Bridge is economically viable with a benefit cost ratio (BCR) of 3.3. Sensitivity testing shows a BCR range of 2.2 to 3.9, meaning the BCR does not fall below 1 under any likely scenario. The assessment was undertaken using full procedures in accordance with version 1.7.2 of the NZTA Monetised Benefits and Costs Manual.

Disclaimer

This memorandum ('Memorandum') has been prepared by WSP New Zealand Limited ('WSP') exclusively for Hastings District Council ('Client') in relation to undertaking an economic assessment for a permanent replacement of the Waiohiki Road "Redclyffe" bridge ('Purpose') and in accordance with the Project Change Notice 3 signed 8 November 2024 by the Client ('Agreement'). The findings in this Memorandum are based on and are subject to the assumptions specified in the Memorandum and the *Part A: Feasibility Report* to which this Memorandum is appended. WSP accepts no liability whatsoever for any use or reliance on this Memorandum, in whole or in part, for any purpose other than the Purpose or for any use or reliance on this Memorandum by any third party.

In preparing this Memorandum, WSP has relied upon data, surveys, analyses, designs, plans and other information ('Client Data') provided by or on behalf of the Client. Except as otherwise stated in this Memorandum, WSP has not verified the accuracy or completeness of the Client Data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this Memorandum are based in whole or part on the Client Data, those conclusions are contingent upon the accuracy and completeness of the Client Data. WSP will not be liable for any incorrect conclusions or findings in the Memorandum should any Client Data be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

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1 Introduction

Waiohiki Road "Redclyffe" Bridge connects Waiohiki and adjacent suburbs to the western side of Napier. The bridge has an important strategic function within the regional road network[1] carrying approximately 8,000 vehicles per day. The bridge also forms part of the detour route when the State Highway 2 Expressway between Links Road (SH50) and Meanee Road is closed. The location of Redclyffe Bridge is shown in Figure 1-1.

Redclyffe Bridge was one of three bridges over the Tūtaekurī River that was washed away or significantly damaged during Cyclone Gabrielle in February 2023. The other two bridges being Puketapu Bridge (upstream) and Brookfields Bridge (downstream). Funding to replace Puketapu Bridge has been approved, but plans to reinstate Brookfields Bridge have not been progressed at this time.

Temporary access at Redclyffe Bridge has been restored with installation of a temporary bridge replacing the 130 m portion of bridge washed away. The temporary staging bridge was reopened for public use in August 2023 with a design working life of five years.

The purpose of this memorandum is to document the economic assessment of a "like for like" permanent replacement of Redclyffe Bridge. This would be a two-lane bridge with shared path facilities on one side built to current bridge standards. This is compared to the 'Do Nothing' option of removing the bridge after the five year design life has expired.

The economic assessment has been completed in accordance with the NZ Transport Agency Waka Kotahi (NZTA) Monetised Benefits and Costs Manual (MBCM) version 1.7.2. The benefit streams claimed are:

- Impact on social cost of deaths and serious injuries: *crash cost savings*
- Impact on network productivity and utilisation: *travel time savings and vehicle operating cost savings*

This memorandum should be read in conjunction with the Redclyffe Bridge Feasibility Report.

Figure 1-1: Redclyffe Bridge

[1] HDC Bridge Asset Management Accessibility Analysis, Abley Transportation Consultants, June 2021

2 Methodology

2.1 General parameters

This economic assessment has been undertaken in accordance with the NZTA MBCM version 1.7.2. The economic parameters used are shown in Table 2-1. Update factors were used as per the NZTA May 2024 addendum[2].

Table 2-1: Economic parameters

Parameter	Value
Time Zero	1 July 2024
Base date	1 July 2023
Analysis period	40 years
Discount rate	4 percent
Benefit Update Factors	
Travel time cost savings (TT)	1.08
Vehicle operating cost savings (VOC)	1.35
Crash cost savings (ACC)	1.14

2.2 Options assessed

2.2.1 Do Nothing

The Do Nothing option retains the temporary staging bridge for the five year design life. During this time, a 30 km/h speed limit and an 8-tonne vehicle load limit is in place. At the end of the design life, access is removed.

2.2.2 Option 2C

Option 2C proposes a permanent replacement of the Redclyffe Bridge immediately upstream of the existing structure. This would be a two-lane bridge with shared path facilities on one side, built to current bridge standards. In addition, the intersection of Springfield Road and Gloucester Street at the northern approach will be upgraded to a roundabout. While the construction methodology is not confirmed, it is envisioned that construction could occur offline to minimise disruption.

2.3 General inputs

The general inputs which are constant across options are shown in Table 2-2.

Table 2-2: Inputs

Parameter	Value	Source
Road category	Rural Strategic	MBCM Table A46.
Average daily traffic volume	8,084 vehicles per day	MobileRoad estimate.
Heavy commercial vehicle percentage	9 percent	Based on average of 6% from HDC count 2020 and 11.9% on MobileRoad.
Traffic growth per annum	2 percent	Average yearly traffic growth in area based on 2019 to 2022 data from NZTA Telemetry counter. Note excluded 2023 due to disruptions from Cyclone Gabrielle.

[2] MBCM update factors 2023

2.4 Impact on social cost of deaths and serious injuries

2.4.1 Crash cost

The annual undiscounted crash cost savings for Option 2C compared to the Do Nothing was calculated to be $42,462.

It was assumed that:

- During the 5-year period of 2018 to 2022[3] there has been four crashes on the bridge and at the intersection on the northern approach reported to the NZTA crash analysis system (CAS). These four crashes consisted of one crash that resulted in minor injury (bridge mid-block) and three crashes that were non-injury.
- Crash costs were calculated using Method C for Do Nothing and Method B for Option 2C as the roundabout represents a fundamental change to the site.
- The intersection will have a 70 km/h speed limit under Option 2C, i.e. the speed limit from prior to 2020 will be reinstated as per the *Land Transport Rule: Setting of Speed Limits 2024*.

2.5 Impact on network productivity and utilisation

2.5.1 Travel time cost

The annual undiscounted incremental travel time cost savings for Option 2C compared to the Do Nothing was calculated to be $4.86M.

It was assumed that:

- A value of time of $49.43 (MBCM Table 16 Rural Strategic All periods).
- The bridge serves well-defined origin-destination travel patterns, facilitating trips to key employment and educational centres. This includes industrial areas in Twyford and tertiary education institution in Taradale. It is anticipated that these travel demands will continue into the foreseeable future. Even with the Hawke's Bay Expressway upgrade, the Redclyffe Bridge will remain the most direct route for these trips.
- The additional travel time for each vehicle is assumed as two minutes, calculated as the difference in travelling between Taradale and Twyford via the Redclyffe bridge versus via the Expressway (Do Nothing). The difference in travel time varies from no difference to approximately eight minutes during peak times. Two minutes has been taken as a conservative assumption. Refer to Attachment 1 Table 2-8.
- Light vehicle travel time benefits will be realised from year 4 i.e. when the temporary bridge is removed under Do Nothing scenario.
- Heavy vehicle travel time benefits will be realised from year 3 i.e. when the new bridge is opened, and heavy vehicle access is reinstated in this location.

2.5.2 Vehicle operating cost

The annual undiscounted incremental vehicle operating cost savings for Option 2C compared to the Do Nothing was calculated to be $1.04M.

It was assumed that:

- The additional travel distance for each vehicle is 0.9 km, calculated as the difference in travelling between Taradale and Twyford via the Redclyffe bridge versus via the Expressway (Do Nothing).

[3] 2023 was excluded as the bridge was closed due to damage between February and August

- Mean vehicle speed was calculated by dividing the travel times in section 2.5.1 by the distances of the respective routes.
- The gradient of both routes was taken as zero percent (i.e. mostly flat).
- Light vehicle travel time benefits will be realised from year 4 i.e. when the temporary bridge is removed under Do Nothing scenario.
- Heavy vehicle travel time benefits will be realised from year 3 i.e. when the new bridge is opened, and heavy vehicle access is reinstated in this location.

2.6 Benefit streams not claimed

Table 2-3 lists the benefit streams not claimed and the rationale for exclusion.

Table 2-3: Benefit streams not claimed

Land Transport Benefit Framework	Monetised Benefit	Rationale for Exclusion
Impact on user experience of the transport system	User benefits from new or improved facilities	Conservative approach to evaluation.
Impact on network productivity and utilisation	Cycling travel time cost savings	Assume discontinuation of cycling trips if infrastructure is lost.
Impact of mode choice on physical and mental health	Cyclist health benefits	Assume discontinuation of cycling trips if infrastructure is lost.
Impact on greenhouse gas emissions	Vehicle emission reduction benefits	Conservative approach to evaluation.
Impact on system reliability	Journey time reliability benefits	Likely to be minimal due to Puketapu Bridge replacement upstream and Hawkes Bay Expressway RoNS bridge duplication downstream.
Wider economic benefit	Benefits from Hawke's Bay Trails Great Ride	Out of scope

2.7 Capital costs

The capital cost(P50) estimate for Option 2C is shown in Table 2-4. The Do Nothing does not have any construction costs as these have already been incurred. Costs for demolition of the temporary structure have been excluded as this cost will be incurred in both options.

Table 2-4: Capital costs

	Option 2C
Start year	1.0
End year	3.0
Duration (years)	2.0
P50 estimate	$50 Million
Update factor	1
Present Value construction cost	**$46.2 Million**

2.8 Operating costs

The operating costs estimates are shown in Table 2-5.

Table 2-5: Operating cost

	Do Nothing	Option 2C
Assumptions	— Annual Principal Inspections until end of design life	— Inspections every two years. Every third inspection is a Principal Inspection. Other inspections are General Inspections. — Bridge joint replacement at 15-year intervals.
Present Value operating cost	**$9,075**	**$114,454**

2.9 Benefit Cost Ratio

The base benefit cost ratio (BCR) is shown in Table 2-6. A BCR of 3.3 for Option 2C means that for every dollar invested, there are 3.3 dollars of benefits.

Table 2-6: Benefit cost ratio ($000)

Present Value	Do Nothing	Option 2C	Incremental
Crash cost	$154	$197	($42)
Travel time cost	$959,332	$839,416	$119,917
Vehicle operating cost	$425,033	$391,565	$33,467
Total	**$1,384,520**	**$1,231,178**	**$153,342**
Capital Costs	$0	$46,240	$46,240
Operating Costs	$9	$114	$105
Total Costs	**$9**	**$46,354**	**$46,345**
BCR			**3.3**

2.10 First year rate of return

First year rate of return (FYRR) is used to indicate the extent to which benefits of the option arise immediately, or are dependent on future growth. It measures the performance of the investment over its first year. The FYRR for Option 2C is 12%.

2.11 Sensitivity testing

Sensitivity tests have been completed against capital costs, maintenance costs, traffic volumes, discount rate, and bridge speed limit as shown in Table 2-7. The results show that the BCR is at or above 1.0 under all scenarios tested. Capital cost and discount rate had the greatest influence on the BCR.

Table 2-7: Sensitivity testing

Scenario	Option 2C BCR
Base assessment	3.3
50% increase in capital cost	2.2
50% increase in maintenance cost	3.3
50% decrease in traffic growth	2.9
3% discount rate	3.9
6% discount rate	2.4

Attachment 1

Table 2-8: Typical travel time, Taradale to Twyford[4]

Time	Via SH50	Via SH2
5:00 am	14 min	16 min
5:30 am	14 min	12-16 min
6:00 am	14 min	12-16 min
6:30 am	14 min	12-18 min
7:00 am	12-16 min	14-18 min
7:30 am	12-16 min	14-20 min
8:00 am	12-16 min	14-20 min
8:30 am	12-16 min	14-20 min
9:00 am	12-16 min	14-18 min
9:30 am	14 min	14-18 min
10:00 am	14 min	14-18 min
10:30 am	12-16 min	14-20 min
11:00 am	14 min	14-18 min
11:30 am	14 min	14-18 min
12 noon	14 min	14-18 min
12:30 pm	14 min	14-18 min
1:00 pm	14 min	14-18 min
1:30 pm	14 min	14-18 min
2:00 pm	14 min	14-18 min
2:30 pm	14 min	14-20 min
3:00 pm	12-16 min	14-20 min
3:30 pm	12-16 min	14-20 min
4:00 pm	12-16 min	14-22 min
4:30 pm	12-16 min	16-22 min
5:00 pm	12-16 min	14-24 min
5:30 pm	14 min	14-20 min
6:00 pm	14 min	12-16 min
6:30 pm	14 min	12-16 min
7:00 pm	14 min	14 min
7:30 pm	14 min	12-16 min
8:00 pm	14 min	14-16 min

[4] Time differential measured using GoogleMaps for a Wednesday in November

Attachment 2

Economic Assessment Spreadsheet

Cyclone Gabrielle Recovery - Bridge Replacements
Full Procedure Economic Analysis
Redclyffe Bridge
Hastings District Council

Evaluation Summary

Manual:	Waka Kotahi MBCM
Manual Version:	Version 1.7.2, November 2024
Evaluation Revision/Status:	1.0 draft
Date of Evaluation:	29-Nov-24
Evaluator(s)	Laura Goodman
Reviewer(s)	Chris Groom

Project Details

Project Name	**Redclyffe Bridge**
Organisation	**Hastings District Council**
Project Reference	2-S5600.1G
Project Description	Like for like replacement of damaged bridge
Problem being addressed	Access
Location	Waiohiki Road

Base Date	2023	1-Jul
Time Zero	2024	1-Jul
Discount Rate	4%	

Earliest Start of Construction is	1-Jul-2025		ie at Time =	1.00
Construction Period	24	months		
Construction Period ends	1-Jul-2027		ie at Time =	3.00
Analysis Period (years)			i.e. Time=	41.00

Alternatives/Options Details

Option Names	Do Nothing	Option (bridge replacement)
Option Description	Retains the temporary staging bridge for the five year design life. During this time, a 30 km/h speed limit and an 8-tonne vehicle load limit is in place. At the end of the design life, access is removed.	Permanent replacement like for like in the same location. A two-lane bridge with shared path facilities on one side, built to current bridge standards. Roundabout on northern approach. 70km/h speed limit
Length of bridge/route (km)	0.23	0.23
Total width of bridge/route (m)	8.33	13.25

Benefits Claimed

Land Transport Benefits Framework	Monetised Benefit
Impact on network productivity and utilisation	Travel Time Savings
Impact on network productivity and utilisation	Vehicle Operating Cost Savings (VOC)
Impact on social cost of DSIs	Crash Cost Savings

Benefits Excluded

Land Transport Benefits Framework	Monetised Benefit	Rationale for exclusion:
Impact on user experience of the transport system	User benefits for new facilit	Conservative approach to evaluation
Impact on network productivity and utilisation	Cycling travel time savings	Assume discontinuation of cycling trips if infrastructure is lost
Impact on greenhouse gas emissions - vehicle emission reduction benefits	Vehicle Emission Reductior	Conservative approach to evaluation
WEBS	Hawke's Bay Trails Great Ride	Out of scope
Impact on system reliability	Journey time reliability benefits	Likely to be minimal due to Puketapu replacement upstream and RoNS duplication downstream.

Costs

Cost Component	Do Nothing	Option (bridge replacement)	Notes:
Capital Costs	$ -	$ 50,000,000	Do Nothing has zero CAPEX as cost already incurred. CAPEX cost for option is p50 estimate
Annual Maintenance	*refer to discounting tab*	*refer to discounting tab*	
Periodic Maintenance	*refer to discounting tab*	*refer to discounting tab*	
Maintenance Costs			
Property Costs	$ -	$ -	
Total Project Cost	**$ -**	**$ 50,000,000**	

General Costs Assumptions

Do Nothing has zero CAPEX as cost already incurred. CAPEX cost for option is p50 estimate
Annual Maintenance: Do Nothing - annual Principal Inspections; Option: inspections every 2 years, every third inspection is a Principal Insp
Periodic Maintenance: Expansion Joint replacement at 15 and 30 years

Project Operating Costs Assumptions

Refer to memo

Update Factors

Based on May 2024 update factors
Factor to adjust to July 2023

Benefit Update Factors		Base Date: July
Travel time cost savings (TT)	1.08	2021

2/12/2024 11:29 am

Vehicle operating cost savings (VOC)	1.35	2015
Crash cost savings (ACC)	1.14	2021
Walking and cycling benefits (WCB)	N/A	N/A
Emissions Reduction benefits	N/A	N/A

Cost Update Factors

Calendar year when cost estimate was prepared	2024	
Cost update factor	1.00	No update factor required as estimate is up to date

Traffic Inputs - TT/VOC/CO2

Traffic Data	**Do Nothing**	**Option (bridge replaceme**	**References**
Road Category	Rural Strategic	Rural Strategic	MCBM Table A46
Posted Speed Limit (km/h)	30	70	
Vehicle AADT	8084	8084	Mobile Road, estimated April 2024
Traffic Growth per annum (%)	2%	2%	Average yearly traffic growth in area based on 2019 to 2022 data from NZTA Telemetry counter. Note excluded 2023 due to disruptions from Cyclone Gabrielle
HCV % of AADT	9%	9%	based on average of 6% from HDC count 2020 and 11.9% on MobileRoad See TT-VOC sheet for assumptions

Travel Time (TT) & Congestion (CRV) cost per hou MBCM Table 16

Road Category	Rural Strategic			$/hr/vehicle	$/hr/vehicle
Period		**Hours Per Day**	**Days Per Year**	**Base TT**	**Maximum CRV**
1	Weekday all periods	24.00	245	50.70	32.33
2	Weekend/holiday	24.00	120	50.90	34.99
3	**All periods**	**1.0**	**365**	**49.43**	**32.24**

Crash Inputs - ACC

Crash analysis limited to northern intersection
MBCM recommends using Method C for Do Minimum and Method B for project options (see Figure 1)
- Crash data exists for the past 5 years, 4 crashes in past 5 years (1x minor, 3x non-injury)
- Does not meet threshold
- Project results in fundamental change (intersection upgraded to roundabout)

Note speed limit reduced from 70 to 50 in 2020, and then down to 30 when temporary bridge opened

	Do Nothing	**Option (bridge replacement)**	
Crash Trend Adjustment factor	0.90	1.02	MBCM Table A21: 2% traffic growth
Growth rate adjusment factor	-1%	-2%	MBCM Table A22
Method B adjustment	-0.01	-0.02	
Crash growth rate	1%	0%	

Sensitivity Test Checklist

	lower	**base**	**upper**
Construction costs	N/A	P50	+50%
Maintenance costs	N/A	as per above	+50%
Traffic volumes	1%	2%	N/A
Discount rate	3%	4%	6%

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TRAVEL TIME & VEHICLE OPERATING COSTS - MIDBLOCK

OUTPUTS

	Do Nothing	Option (bridge replacement)
Travel Time Cost (TT) - light vehicles	$ 35,393,206	$ 30,969,055
Travel Time Cost (TT) - heavy vehicles	$ 3,500,427	$ 3,062,874
Vehicle Operating Cost (VOC) - light vehicles	$ 12,544,790	$ 11,599,635
Vehicle Operating Cost (VOC) - heavy vehicles	$ 1,240,694	$ 1,147,217

Travel Time Cost (TT)

1	Road Category	Rural Strategic			
2	Travel Time Data				
	AADT	7356	7356		
	Traffic Growth Rate	2%			
		Do Nothing	**Option (bridge replacement)**		
	Travel Time Cost	49.43	49.43	Light vehicles	$/hr
	Time	0.27	0.23		hr
3	Annual Travel Time Cost	$ 35,393,206	$ 30,969,055		
	Value of annual travel time cost savings		-$ 4,424,151		

1	Road Category	Rural Strategic			
2	Travel Time Data				
	AADT	728	728		
	Traffic Growth Rate	2%			
		Do Nothing	**Option (bridge replacement)**		
	Travel Time Cost (Table 17)	49.43	49.43	Heavy vehicles	$/hr
	Time savings	0.27	0.23		hr
3	Annual Travel Time Cost	$ 3,500,427	$ 3,062,874		
	Value of annual travel time cost savings		-$ 437,553		

Vehicle Operating Cost (VOC)

1	Base Data				
	Traffic Growth Rate	2%			
	AADT	7356			
		Do Nothing	**Option (bridge replacement)**		
	Length of Route	14.6	13.5		km
	Roughness (IRI/NAASRA)	70	70		NAASRA
	Roughness cost	N/A	N/A		Cannot count benefits if NAASRA < 100 (Page 8
	Mean vehicle speed	54.8	57.9	Light vehicles	km/h
	Gradient	0	0		assume mostly flat
	Base cost	32	32		see MBCM Appendix 4 VOC tables
2	Annual vehicle operation cost	$ 12,544,790	$ 11,599,635		

CRASH COST

OUTPUTS

Option Component	Do Nothing	Option (bridge replacement)	
Annual Crash Cost (ACC)	$ 154,067	$ 196,530	$ 42,462

CRASH COSTS

Do Nothing

Worksheets A6: Crash cost savings

Weighted crash procedure – do minimum (Method C) **Worksheet A6.5**

	Project option	Do Nothing	Component	Northern approach intersection
	Site specific crash rate			
1	Number of years of crash records			5
2	Number of reported injury crashes over period			0
3	Number of crashes per year **(2)/(1)**			0
4	Trend adjustment factor (table A6.1(a))			0.90
5	Site-specific crash rate (crashes per year), A_s **(3) x (4)**			0
	Crash prediction model			
12	Typical crash rate (crashes per year), AT,dm (formula from appendix A6.5)			0.3542
8	Crash trends factor for adjusting typical crash rate (appendix A6.4 method B)			-0.01
14	Adjustment factor for crash trend (1 + **(8)** x (time zero year - 2006)) (appendix A6.4 method B)			0.82
15	Typical crash rate per year adjusted for crash trends, A_T **(12) x (14)***			0.290
	Weighting factor			
16	k value (appendix A6.5)			3.800
17	Reliability of crash history, w_H (default is 1.0)			1.000
18	Reliability of crash prediction model or equation, w_M (default is 1.0)			1.000
19	Weighting factor, w, **(17)² x (16) / ((17)² x (16) + (18)² x (15))**			0.929
20	Do minimum weighted crash rate, A_{Dmin} **[(19) x (15)] + [(1) - (19)] x (5)**			0.270
21	Cost per reported injury crash			$ 571,000
22	Total do minimum crash cost per year **(20) x (21)**			**$ 154,067**

Table A36 - assume 50km/h as per 2020 speed change

INPUTS

Do Nothing

Intersection

	2023	Crash Estimation Compendium (CEC)
b0	4.68E-05	Priority T
Qmajor	8084	Redclyffe Bridge (MobileRoad)
b1	0.76	
Qminor	1119	Springfield Road (MobileRoad)
b2	0.2	
CMF	1	
A_T	**0.1777**	
k value	3.8	

midblock

b0	2.60E+01
L	0.23
AADT	8084.00
CMF	1
A_T	**0.1764**

CRASH COSTS

Option (bridge replacement)

Option (bridge replacement)

Worksheets A6: Crash cost savings

Crash rate analysis (Method B)

	Project option	Option (bridge replacement)	Component	Northern approach intersection
	Crash prediction model			
1	Table used			Table 15
2	Parameter b_0			
3	Parameter b_1			
4	Parameter b_2			
5	Lowest or sideroad AADT, Q_{minor}			
	Sideroad AADT, Q_{minor}			
6	Highest or primary AADT, Q_{major}			
7	Typical crash rate (crashes per year), A_T (appendix A6.5)			**0.3796**
8	Crash trends factor for adjusting typical crash rate (appendix A6.4 method B)			-0.02
9	Adjustment factor for crash trend (1 + **(8)** x (time zero year - 2006)) (appendix A6.4 method B)			0.84
10	Typical crash rate per year adjusted for crash trends, A_T **(7) x (9)**			0.242929
11	Cost per reported injury crash			$809,000
12	Total crash cost per year **(10) x (11)**			**$196,530**

Table A36 - assume 70km/h as per 2024 speed rule

Option (bridge replacement)

single lane roundabout

	b0	Q	b1	A_T
Springfield Road	0.00	1119.00	0.58	**0.0260**
Gloucester Street	0.00	10522.00	0.58	**0.0953**
Waiohiki Road	0.00	8084.00	0.58	**0.0818**

*MobileRoad

midblock

b0	2.60E+01
L	0.23
AADT	8084.00
CMF	1
A_T	**0.1764**

File:Base Economic Evaluation Sheet:DISCOUNT Page:1 of 1 Date:2/12/2024

DISCOUNTING

Do Nothing

DESCRIPTION	START YEAR.	END YEAR	DURATION YEARS	MODELLED COST/YR.	YEAR GROWTH.	TIME ZERO COST/YR	TIME ZERO GROWTH	YEAR OF ESTIMATE	UPDATE FACTOR	PRESENT VALUE TIMEZERO		DISCOUNTING	
			n	$	%	$	%			$	SPPWF	UNSPWF	AGPWF
COSTS & MAINTENANCE													
Capital Costs			0.0	$ -	0.0%	$ -	0.0%	2024	1.00	$ -	1.000	0.000	0.000
Principal Inspection	1.00	1.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 2,404	0.962	0.000	0.000
Principal Inspection	2.00	2.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 2,311	0.925	0.000	0.000
Principal Inspection	3.00	3.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 2,222	0.889	0.000	0.000
Principal Inspection	4.00	4.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 2,137	0.855	0.000	0.000
BENEFITS													
TTC Light Vehicles	4.00	41.00	37.0	$ 35,393,206	2.0%	$ 35,393,206	2.0%	2023	1.08	$ 869,783,660	0.200	16.688	303.312
TTC Heavy Vehicles	3.00	41.00	38.0	$ 3,500,427	2.0%	$ 3,500,427	2.0%	2023	1.08	$ 89,548,810	0.200	17.560	306.360
VOC - light vehicles	4.00	41.00	37.0	$ 12,544,790	2.0%	$ 12,544,790	2.0%	2023	1.35	$ 385,358,328	0.855	16.688	303.312
VOC - heavy vehicles	3.00	41.00	38.0	$ 1,240,694	2.0%	$ 1,240,694	2.0%	2023	1.35	$ 39,674,670	0.889	17.560	306.360
Crash Cost Savings (ACC)	3.00	41.00	38.0	$ 154,067	1.0%	$ 154,067	1.0%	2023	1.14	$ 3,622,272	0.889	17.560	306.360

Option (bridge replacement)

DESCRIPTION	START YEAR.	END YEAR	DURATION YEARS	MODELLED COST/YR.	YEAR GROWTH.	TIME ZERO COST/YR	TIME ZERO GROWTH	YEAR OF ESTIMATE	UPDATE FACTOR	PRESENT VALUE TIMEZERO		DISCOUNTING	
			n	$	%	$	%			$	SPPWF	UNSPWF	AGPWF
Costs													
Capital Costs	1.00	3.00	2.0	$ 25,000,000	0.0%	$ 25,000,000	0.0%	2024	1.00	$ 46,239,663	1.000	1.850	3.675
General Inspection	4.00	4.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 855	0.855	0.000	0.000
General Inspection	6.00	6.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 790	0.790	0.000	0.000
Principal Inspection	8.00	8.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 1,827	0.731	0.000	0.000
General Inspection	10.00	10.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 676	0.676	0.000	0.000
General Inspection	12.00	12.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 625	0.625	0.000	0.000
Principal Inspection	14.00	14.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 1,444	0.577	0.000	0.000
General Inspection	16.00	16.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 534	0.534	0.000	0.000
General Inspection	18.00	18.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 494	0.494	0.000	0.000
Principal Inspection	20.00	20.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 1,141	0.456	0.000	0.000
General Inspection	22.00	22.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 422	0.422	0.000	0.000
General Inspection	24.00	24.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 390	0.390	0.000	0.000
Principal Inspection	26.00	26.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 902	0.361	0.000	0.000
General Inspection	28.00	28.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 333	0.333	0.000	0.000
General Inspection	30.00	30.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 308	0.308	0.000	0.000
Principal Inspection	32.00	32.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 713	0.285	0.000	0.000
General Inspection	34.00	34.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 264	0.264	0.000	0.000
General Inspection	36.00	36.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 244	0.244	0.000	0.000
Principal Inspection	38.00	38.00	0.0	$ 2,500	0.0%	$ 2,500	0.0%	2024	1.00	$ 563	0.225	0.000	0.000
General Inspection	40.00	40.00	0.0	$ 1,000	0.0%	$ 1,000	0.0%	2024	1.00	$ 208	0.208	0.000	0.000
Joint Replacement	18.00	18.00	0.0	$ 132,500	0.0%	$ 132,500	0.0%	2024	1.00	$ 65,406	0.494	0.000	0.000
Joint Replacement	33.00	33.00	0.0	$ 132,500	0.0%	$ 132,500	0.0%	2024	1.00	$ 36,317	0.274	0.000	0.000
Benefits													
TTC Light Vehicles	4.00	41.00	37.0	$ 30,969,055	2.0%	$ 30,969,055	2.0%	2023	1.08	$ 761,060,702	0.200	16.688	303.312
TTC Heavy Vehicles	3.00	41.00	37.0	$ 3,062,874	2.0%	$ 3,062,874	2.0%	2023	1.08	$ 78,355,209	0.200	17.560	306.360
VOC - light vehicles	4.00	41.00	38.0	$ 11,599,635	2.0%	$ 11,599,635	2.0%	2023	1.35	$ 356,324,481	0.200	16.688	303.312
VOC - heavy vehicles	3.00	41.00	37.0	$ 1,147,217	2.0%	$ 1,147,217	2.0%	2023	1.35	$ 35,240,883	0.855	16.688	303.312
Crash Cost Savings (ACC)	3.00	41.00	38.0	$ 196,530	1.0%	$ 196,530	0.0%	2023	1.14	$ 3,934,223	0.889	17.560	306.360

COST BENEFIT ANALYSIS SUMMARY

Project:	Redclyffe Bridge	**Time Zero:**	2024
Evaluator:	Laura Goodman	**Base Date:**	2023
Reviewer:	Chris Groom		

	Do Nothing	**Option (bridge replacement)**		**Incremental** Option (bridge replacement)	
Present Value Benefits					
Travel Time Savings (TTC)	$959,332,470	$839,415,911		$119,916,559	
Vehicle Operating Cost Savings (VOC)	$425,032,998	$391,565,364		$33,467,634	
Crash Cost Savings (ACC)	$154,067	$196,530		($42,462)	
Total Benefits	$1,384,519,535	$1,231,177,805		**$153,341,730**	**Benefit**
Present Value Costs					
Capital Costs	$0	$46,239,663		$46,239,663	
Maintenance Costs	$9,075	$114,454		$105,380	
Total Costs	$9,075	$46,354,118		**$46,345,043**	**Cost**
NATIONAL BENEFIT TO COST RATIO				**3.3**	

FIRST YEAR RATE OF RETURN

Based on Worksheet 5 from EEM

First year rate of return		Worksheet 5
1	Preferred project option	Option (bridge replacement)
2	Present value of total net costs	$46,345,043
3	Mid point of first year of benefits (relative to time zero)	3.50
4	Discount factor (SPPWF) for first year of benefits	0.87

Benefit	Annual benefits of preferred option (5)	Annual benefits of do minimum (6)	Net annual benefit (at time zero) (7)	Growth rate (decimal) (8)	PV of benefits in first year (9)=[1.0+(3)x (8)]x(4)x(7)
Travel Time Savings (TTC)	$34,031,929	$38,893,633	$4,861,704	2.0%	$4,534,774
Vehicle Operating Cost Savings (VOC)	$12,746,851	$13,785,484	$1,038,632	2.0%	$968,788
Crash Cost Savings (ACC)	$196,530	$154,067	($42,462)	1.0%	($38,311)
			$0		$0
			$0		$0

10	Sum of present value of benefits in first year	$5,465,251
11	First year rate of return [**(8)**/**(2)** x 100]	12%

Appendix E
Infraworks Visualisation of Options

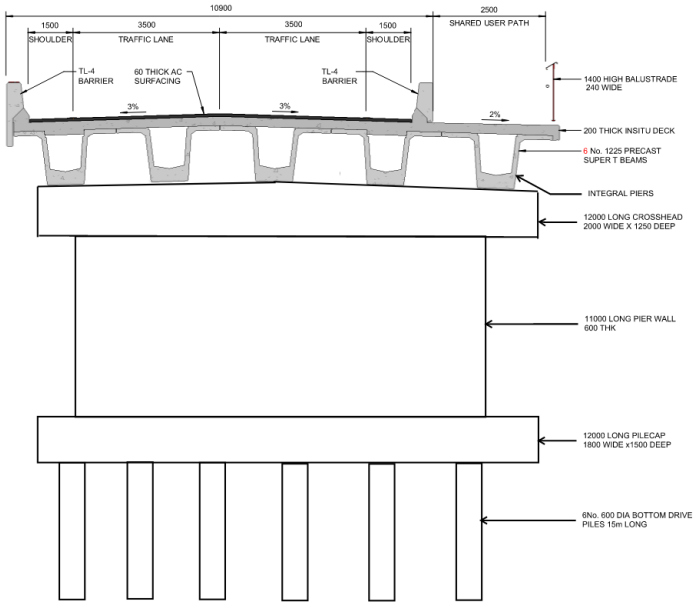
Visualisations of Options

Modelling of the proposed bridge crossings required selection of a structural option which is typically not considered at the feasibility stage. The cross-section and structural option are for visualisation purposes only. Repair of the upstream true right stop bank by Hawke's Bay Regional Council is indicative only.

- Road level flat along bridge at 16.5mRL, based on proposed soffit height of 14.8mRL as discussed in the vertical clearance section of the feasibility report.
- Total bridge width of 13.64m.
- Bridge depth of 1.485m comprising 6no. 1225mm deep Super-Tees, 200mm reinforced concrete deck and 60mm of surfacing.
- Span lengths of approximately 25m.
- Reinforced concrete leaf piers with bottom driven piles
  Bottom driven piles (600mm to 710mm in diameter) mitigate the potential risk posed by the aquifer and artesian ground water. Integral piers are required to resist longitudinal seismic actions with smaller diameter piles.

The geometric design is in accordance Austroads Part 3/4B/6A. Roundabouts were adopted for all intersections as these typically represent the safest option at the traffic volumes and design speeds in consideration.

The next design phase would consider various structural forms in detail along with further refinements to geometric alignment, more efficient pier arrangement and so forth.



Option 2B - Replace Bridge Immediately Upstream and Parallel to Existing Bridge

Option 2C - Replace Bridge Immediately Upstream and Skewed to Existing Bridge

Option 3 – Alternate Bridge Replacement location (Links Road)

wsp.com/nz

RECOMMENDATION MEMO

File Ref:

To:	PGG - Bruce Allen, Craig Thew, Jessica Ellerm, Rachael Bailey
From:	David Scrimgeour (Programme Delivery Manager – Structures)
	Matthew Lloyd (Project Manager – Redclyffe Bridge)
Copy to:	Darren de Klerk (HDC, Director Infrastructure Delivery)
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Date:	November 2025
Subject:	Redclyffe (Waiohiki) Bridge – Preferred Alignment Option

EXECUTIVE SUMMARY

The purpose of this report is to present alignment Option 2C for a permanent replacement bridge connection between the Waiohiki and Taradale communities to the Redclyffe Bridge Project Governance Group (PGG) for endorsement.

Endorsement from the PGG will supplement a paper that will be put to Hastings District Council (HDC) elected members on 11 December 2025 for decision and similarly will be put to the Napier City Council (NCC) elected members as a councillor update on 11 December 2025.

Option 2C is the preferred engineering option and is endorsed by the Redclyffe Bridge Project Reference Group (PRG) following the 26 November 2025 monthly meeting.

The community survey results, updated Multi Criteria Assessment (MCA) and addition of three new community representatives contributed to a robust discussion, with ultimately all but one PRG member aligned with a common view of Option 2C provided Waiohiki Rd safety improvements are progressed as enabling works ahead of bridge construction.

The Links Rd intersection remains a serious safety issue, and the PRG will advocate for safety improvements at Links Road, Korokipo Road and Waiohiki Road to address community concerns via the PGG and other project partners including NZTA.

1 PROJECT BACKGROUND & PROGRAMME

Cyclone Gabrielle (13-14th February 2023) caused catastrophic damage to many areas of New Zealand and significantly affected the Hastings District Council (HDC) roading network. This included severely damaging the jointly owned HDC and Napier City Council (NCC) Redclyffe Bridge. The bridge had been in service since 1933, replacing the 1881 bridge which was destroyed in the 1931 Hawkes Bay earthquake.

A temporary crossing with a five-year design life was opened to restore connectivity on the 8th of August 2023.

Part A Feasibility of the Waiohiki Road (Redclyffe Bridge) report was first completed on the 10th of August 2023 highlighting 2x preferred options, 2B & 2C shown in Figure 4. This report required further Hydrology, Hydraulic, Geometric and Property Investigations to recommend a single preferred engineering alignment.

These investigations were commissioned by HDC on the 8th of October 2024 and the revised WSP Feasibility Report - Waiohiki Road (Redclyffe Bridge) presented the engineering recommendation of alignment 2C on the 6th of December 2024.

Following an engineering recommendation, the business case was progressed with NZTA for non-construction funding which was also delivered on the 6th of December 2024 as an appendix to the revised assessment, highlighting a benefit cost ratio of approximately 3.

Engagement resumed with Community and Mana Whenua on the 23rd of July 2025 based on the three alignment options 2B, 2C and 3 (refer Figure 4) with clear communication of the preferred engineering alignment but highlighting the need for further non engineering based investigations, as outlined in Section 6.

Figure 1 below shows a full project timeline through to the completion of construction. The planned programme outlines the selection of structural form and completion of site investigations Q1 2026, Detailed Design issued Q3 2026, followed closely by Procurement with construction commencing Q4 2026 and completing Q4 2028.

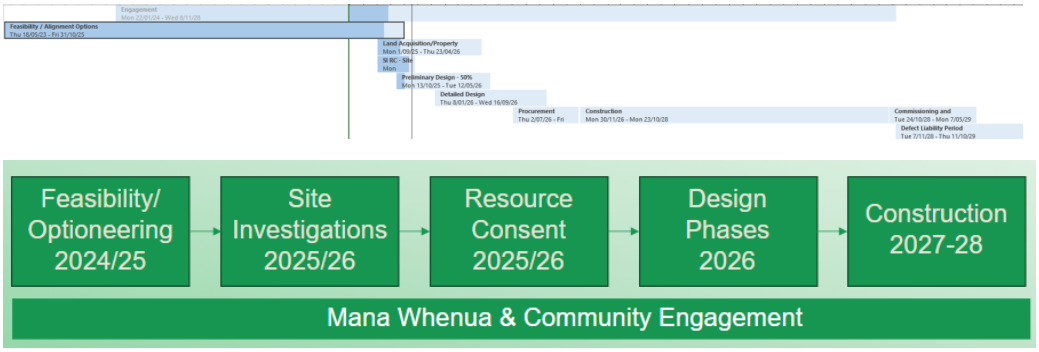

Figure 1: Project Programme

2 COMMUNICATION APPROACH

The project team identified that a multi-faceted communications approach was required to ensure meaningful and transparent engagement for the project could take place.

This is a significant infrastructure project for the Hawkes Bay region, and it is vital that both the Waiohiki and wider community's voices are heard, Mana Whenua have been engaged early, and the project team are well advised by the feedback and insight of the people who live near to and will use the new bridge.

This approach has seen members of the project team door knocking within the Waiohiki Community, present to wider community at the Waiohiki Marae, release an online survey, form and facilitate a Project Reference Group who meet monthly, continue to engage with key stakeholders and attend targeted community meetings.

The communications and engagement approaches are highlighted in Figure 2 taken from the 1st of November Waiohiki Community hui slide deck.

Figure 2: Redclyffe Bridge Communications Approach

3 DECISION MAKING FRAMEWORK

Figure 3 below shows the pathway to an Option decision, and a substantial body of work has been completed to get the project to this point.

The anticipated remaining steps are PRG endorsement (confirmed 26 November 2025), decision by the PGG (anticipated 1 December 2025), and then formal acceptance by the two presiding councils.

The alignment decision unlocks the next phase of the project including ground investigations, cultural impact assessment, structural options review and then detailed design.

Notably funding has already been secured for this phase, and timely decision making is crucial to the project's success.

In summary, the preferred Option has been confirmed as 2C and following acceptance of this memo will be presented to both HDC and NCC councils on 11 December 2025.

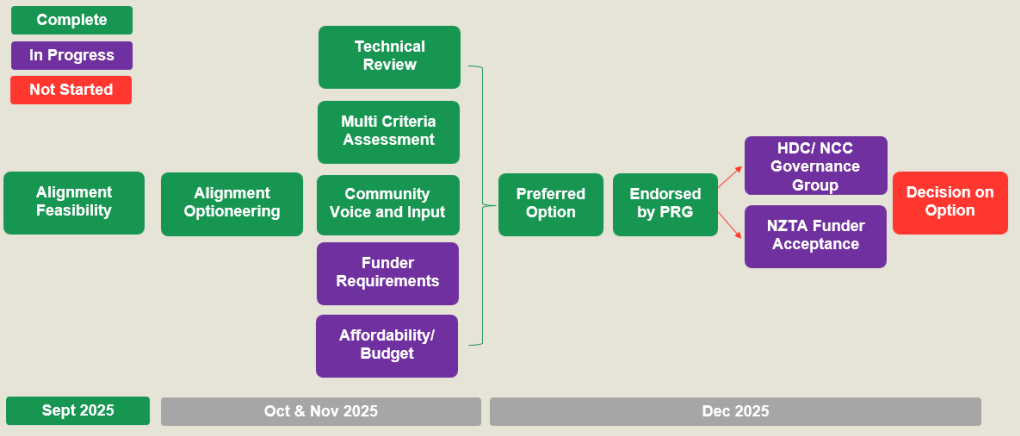

Figure 3: Alignment Decision Making Framework

4 ALIGNMENT OPTIONS

Six options were examined via MCA within the WSP Feasibility Report - Waiohiki Road (Redclyffe Bridge) issued 6th December 2024.

Three of these options were progressed (2B, 2C & 3) while the other three were discounted (1, 2A & 4). These options were:

- Option 1: Do Nothing (Maintain Existing Temporary Crossing)
- Option 2A: Replace Bridge on the Existing Alignment
- Option 2B: Replace Bridge Immediately Upstream and Parallel to Existing Bridge
- Option 2C: Replace Bridge Immediately Upstream and Skewed to Existing Bridge
- Option 3: Alternate Bridge Replacement Location (Links Road)
- Option 4: Non-bridge Alternative

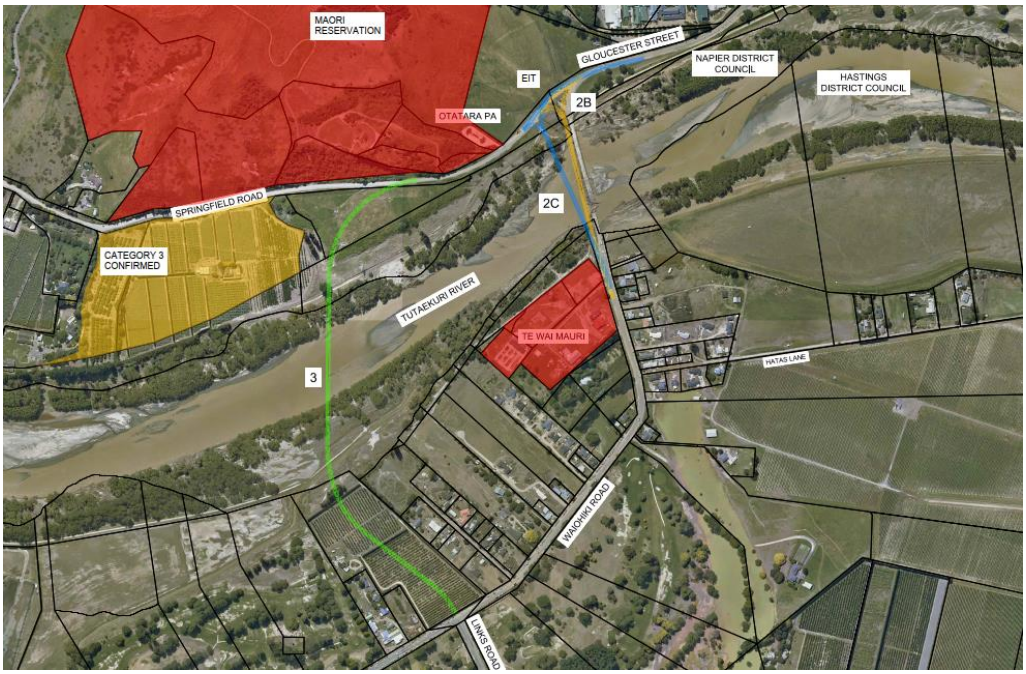

Figure 4: Aerial View of Alignment Options

Option 1: Do Nothing

The existing temporary staging bridge and remaining 4x spans either side currently has a 30 km/h speed limit and an 8-ton vehicle load limit in place. Given the nature of the staging structure, it would be prudent to keep the speed restriction in place regardless of the planned strengthening work for the existing spans. The temporary staging bridge would also need ongoing management through corrosion protection and was not designed for long term load cases. Further, the existing spans would likely need ongoing monitoring and would be at risk of further maintenance costs given its age and condition. Based on the above it was discounted.

Option 2A: Replace Bridge on the Existing Alignment

The temporary staging structure would be demolished, and the replacement bridge would be built on the same alignment. This option was discounted as it would result in the route being closed for approximately 2 years.

Option 2B: Replace Bridge Immediately Upstream and Parallel to Existing Bridge

This bridge replacement option would be approximately 235m in length and would be directly next to, upstream and parallel to the existing bridge and staging structure alignment. This option was progressed as a viable option.

Option 2C: Replace Bridge Immediately Upstream and Skewed to Existing Bridge

This bridge replacement option would be approximately 210m long, again directly next to and upstream to the existing bridge, however this alignment is skewed and squared up to the river. This option was progresses as a viable option.

Option 3: Alternative Bridge Replacement Location (Links Road)

This bridge replacement option is an alternative alignment option coming off Links Road, placing it approximately 600m upstream of the existing alignment. The replacement bridge would be approximately 400m long, requiring approximately 1km of new road extension along Links Road. This option was progresses as a viable option.

Option 4: Non-Bridge Alternative

Should no bridge go ahead at or near Waiohiki, the alternative route would be via Gloucester Street, Meeanee Road, State Highway 2 and Links Road resulting in an 8.5km long permanent detour, taking an estimated 11 minutes. Given the Economic Assessment results this option was discounted.

5 ENGINEERING RECOMMENDATION

Table 1 below outlines the original MCA which determined the preferred engineering alignment of 2C. The criteria outlined below were agreed upon in collaboration with Hastings District Council and the scoring system was adopted from NZTA's MCA analysis user guidance. Further detail on these criteria and scoring can be found in the WSP Feasibility Report - Waiohiki Road (Redclyffe Bridge) issued 6th December 2024.

Criteria	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4
Resilience	-2.4	2.4	3.6	3.6	3.6	-3.6
Cost	1.9	0.0	0.0	0.0	-2.8	0.0
Programme and Constructability	-0.9	-1.9	0.9	1.9	-0.9	0.0
Maintenance	-2.1	3.2	3.2	3.2	3.2	0.0
Safety and Design	-1.2	-1.2	1.2	2.4	0.0	-2.4
Visual Appearance	-0.9	0.9	0.9	0.9	0.9	0.9
Environmental Effects	0.0	1.1	1.1	2.1	0.0	3.2
Sustainability	0.8	-0.8	-0.8	-0.8	-1.6	-0.8
Social & Cultural	-1.1	3.2	3.2	3.2	3.2	-3.2
Property Impact & Acquisition	0.0	1.6	1.6	1.6	-0.8	0.0
Total	-6.0	8.6	15.0	**18.2**	4.8	-5.9
Ranking	6	3	2	**1**	4	5

Table 1: Redclyffe Bridge Feasibility Report MCA

Option 2C was the most cost effective and resilient replacement bridge option considered. It retained the best access for through traffic during construction, provided the best geometric result, does not require any private land acquisition and would see the existing Springfield/Gloucester/Waiohiki intersection upgraded. This option would deliver approximately 3 times the benefits compared to its costs as outlined in the economic assessment.

6 OPTION CONSIDERATIONS

Following the issue of the Feasibility Report - Waiohiki Road (Redclyffe Bridge) there was an identified need to supplement the engineering recommendations with non-engineering inputs to test the preferred alignment option. This further work focused on Ecological, Archaeological and Property impacts of the three progressed options as well as building on the community and Mana Whenua engagement processes.

6.1 Ecology

An Ecological Assessment was carried out for Options 2B, 2C and 3 which is shown in Table 2 below. The results of this assessment showed Option 2B as the slight favourite over 2C with the increased vegetation clearance on the Northern side of the Tutaekuri river being the determining factor. Option 3 was the least favoured option due to extensive earthworks and vegetation clearance required, no existing 'buffer zone' for wildlife, presence of a wetland and the likelihood of special consent requirements.

OPTION	2B	2C	3
Vegetation	**Small section of vegetation clearance required**	Small section of vegetation clearance (greater than Option 2B)	Extensive vegetation clearance required
Wetlands	**Wetland presence is unlikely**	Wetland presence is unlikely	Highest likelihood of wetlands being present.
Birds	**Bird nest checks monitoring required**	Bird nest checks monitoring required	Bird nest checks monitoring required
Bats	**Some likelihood of High-Risk Bat Roost Tree removal**	Some likelihood of High-Risk Bat Roost Tree removal	High likelihood of High-Risk Bat Roost Tree removal
Herpetofauna	**Small area of herpetofauna habitat removal**	Small area of herpetofauna habitat removal	Large area of habitat removal. Most likely requiring a permit for habitat clearance
Fish	**Fish management required**	Fish management required	Fish management required
Comments	**Preferred option. Least vegetation clearance and habitat removal required. It is unlikely any permits will be required.**	Manageable option. More vegetation clearance and habitat loss than 2B.	Least preferred option. Highly likely a herpetofauna permit is required, special consent conditions to enable works within 100m of a wetland, felling of high-risk bat roost trees and large loss of habitat.
Overall Rating	1	2	3

Table 2: Ecological Assessment

6.2 Archaeology

An archaeological assessment was also undertaken for Options 2B, 2C and 3 which is shown in Table 3 below. This assessment also resulted in 2B being the slight favourite over 2C with Option 3 being the least favourite. Option 2C is likely to be near the original 1881 bridge alignment which would require an archaeology authority to carry out the works. As Option 3 requires extensive earthworks it further increases the risk of encountering an archaeological site, or sites, especially given the cultural significance of the area and gives the least room for managing these sites plus the risk imposed by the historic 'burning tip' on Springfield Rd.

Option	Overall Risk Rating	Greatest Archaeological Risk Identified	Preliminary Likely Archaeological Authority Recommendation	Overall Preference	Comments
2B	**Low - Moderate**	**1881 bridge (not believed to be directly in this alignment).**	**ADP- subject NZPT approval.**	**1**	**Least overall earthworks. Most manageable/ predictable archaeological risk.**
2C	Moderate	1881 bridge (highly likely to be on or close to 1881 alignment).	Archaeological Authority recommended due to likely alignment of 1881 bridge and associated project risks.	2	Moderate earthworks at northern bank. Most manageable/ predictable archaeological risk.
3	Moderate - High	Pāwhakairo and river corridor associated activities.	Archaeological Authority highly recommended.	3	Considerable new earthworks. Least management/predictable archaeological risk.

Table 3: Archaeological Assessment

6.3 Property

Assessment of the effects of each alignment option was carried out for the adjacent landowners. This resulted in 2C being a slight favourite as it only intersected one Hawkes Bay Regional Council (HBRC) land parcel on the Northern side of the Tutaekuri River, where 2B intersects 2 parcels. Option 3 was the least favourite as it directly impacts a private landowner requiring acquisition of productive horticultural land for the Links Road extension.

Option	Overall Risk Rating	Risk Description	Remedial / Mitigation Requirements	Overall Preference
2B	Low	Impacts 2 HBRC Reserves and Riverbed.	DoC and HBRC Consent to declare land as Road. LINZ consent to riverbed	2
2C	**Low**	**Impacts 1 HBRC Reserve and Riverbed.**	**DoC and HBRC Consent to declare land as Road. LINZ consent to riverbed**	**1**
3	Moderate - High	Severs a high value private property (likely being a full purchase). Impacts 2 HBRC Reserves and Riverbed. Significant cost and time implications due to property acquisition and time impacts to address Reserve.	High value acquisition. DoC & HBRC Consent for Reserves. LINZ consent to riverbed	3

Table 4: Property Assessment

1.4 Community Feedback

Targeted community and Mana Whenua engagement resumed mid 2025 through the formation of the Redclyffe Bridge Project Reference Group (PRG) which was made up initially of statutory partners – HDC, NCC, NZTA, HBRC & Ngāti Pārau Hapu Trust.

The PRG was supplemented by the project communications approach shown in Figure 2 which has included meetings with the Waiohiki Community Trust and EIT to date and a workshop planned for Taradale High School January 2026.

A community hui was held at the Waiohiki Marae on the 1st of November 2025 where the project was explained and a public survey on several key project areas including the preferred alignment went live, running from the 3rd to 17th of November 2025.

The community hui was followed by 'door knocking' through the Waiohiki community on the 6th & 7th of November 2025 to further explain the project and hand out hardcopies of the survey.

Figure 5 below presents a high-level summary of the alignment survey results whereby Option 3 received 48% support, with 52% in favour of a 2B/2C location. Notably of the 79 Waiohiki residents (32% of all respondents) the 2B/2C location was favoured by 57% of submitters.

Bridge Option	Number of Votes
Option 3	117
Option 2C	102
Option 2B	27
Total Votes	246

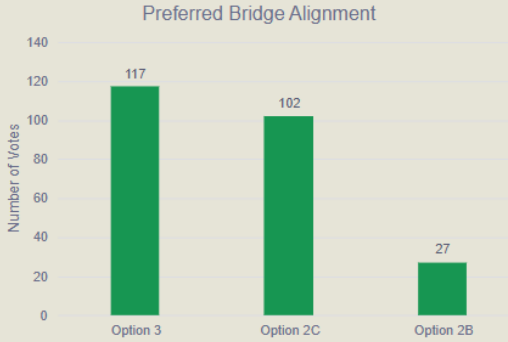

Figure 5: Public Survey Alignment Results

7 PREFERRED ALIGNMENT OPTION

The recommended engineering alignment Option 2C provides approximately three times the economic benefits than costs. It provides a cost efficient, modern, and resilient replacement bridge; minimises disruption to existing bridge users during construction by being built offline; does not require private land acquisition by staying within crown land boundaries; and allows the northern intersection to be improved and has the most preferred geometric alignment of all options considered.

Through the further investigations, Option 2B scored first in both Ecology and Archaeology, and Option 2C scored first in Property, noting there was very little separating Options 2B & 2C in all three cases. Option 3 scored third by a large margin in all three further assessments. These results have been factored into the revised MCA shown below in Table 5.

The community survey results showed that Option 3 was the slight favourite over Option 2C, with Option 2B being third by a large margin. Given the importance of the community feedback, the revised MCA has a new line for the survey results which was given the highest weighting possible within the prescribed framework, matching that of resilience.

Criteria	Option 1	Option 2A	Option 2B	Option 2C	Option 3	Option 4
Resilience	-2.4	2.4	3.6	3.6	3.6	-3.6
Cost	1.9	0.0	0.0	0.0	-2.8	0.0
Programme and Constructability	-0.9	-1.9	0.9	1.9	-0.9	0.0
Maintenance	-2.1	3.2	3.2	3.2	3.2	0.0
Safety and Design	-1.2	-1.2	1.2	2.4	0.0	-2.4
Visual Appearance	-0.9	0.9	0.9	0.9	0.9	0.9
Environmental Effects	0.0	0.0	2.1	1.1	-1.1	3.2
Sustainability	0.8	-0.8	-0.8	-0.8	-1.6	-0.8
Social & Cultural	-1.1	3.2	2.1	1.1	-1.1	-3.2
Property Impact & Acquisition	0.0	0.0	0.8	1.6	-0.8	0.0
Community Feedback	0.0	0.0	1.2	2.4	3.6	0.0
Total	-6.0	5.9	15.4	17.3	3.1	-5.9
Ranking	6	3	2	1	4	5

Table 5: Revised MCA

The PRG saw the inclusion of community representation for the 26th of November hui at which the revised MCA was presented, and the preferred alignment 2C was endorsed by the group with two important caveats:

1. Progressing the Waiohiki Rd safety improvements as enabling works ahead of bridge construction is critically important for the community.

2. Advocating for a new intersection arrangement at Links Road, Korokipo Road and Waiohiki Road – this will be escalated to the PGG and wider project partners including NZTA as the project develops.

While the PRG doesn't have decision making authority, it serves as an important link for community and Mana Whenua engagement and feedback. The PRG will continue to meet regularly as the project progresses.

8 ALIGNMENT DECISION

Project Governance Group Acceptance of the Preferred Bridge Alignment Option		
(Select from below) Option 2B: Replace Bridge Immediately Upstream and Parallel to Existing Bridge Option 2C: Replace Bridge Immediately Upstream and Skewed to Existing Bridge Option 3: Alternative Bridge Replacement Location (Links Road) The preferred option is Option:	_____ Signature(s)	_____ Date

Matthew Lloyd
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27/11/25

David Scrimgeour
Programme Delivery Manager – Structures
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27/11/25

INTERNAL REPORT

File Ref: **[Insert]**

To: **David Scrimgeour**

From: **Matthew Lloyd**

Copy to: **Darren de Klerk; Connie Mills**

Date: 28 November 2025

Subject: Waiohiki (Redclyffe) Bridge - Community Survey Summary

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EXECUTIVE SUMMARY

A community survey was conducted over 2 weeks from the 3rd to 17th of November 2025 regarding Waiohiki (Redclyffe) Bridge to gather information on community preference for the alignment, specific architecture and various other opinions. The community survey was available in paper copy and online via the Hastings District Council & Napier City Council websites.

Respondents included residents, commuters, workers, and families who use Redclyffe Bridge as a transport or pedestrian route to access schools, workplaces, marae, orchards, and wider community facilities. Many use the bridge multiple times per day, reinforcing its regional importance.

Of the 249 respondents 52% were in favour of a similar alignment to the existing bridge (Option 2B/2C) and 48% were in favour of Option 3 which signals a strong community appetite for a future-proof, resilient alignment even if it requires greater investment.

SURVEY FINDINGS

Respondents were asked to select their preferred alignment from the three options presented at the community hui and on the project webpage (please see Figure 1 below).

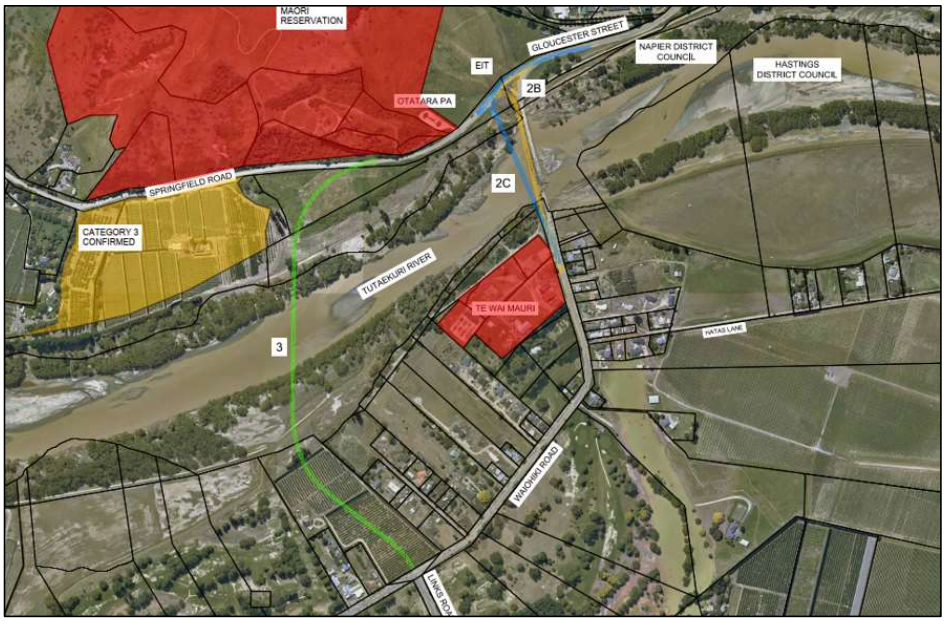

Figure 1. Bridge alignment options.

The preferred bridge alignment option:

- **Option 3** received 119 responses (48%). It proposes a new bridge alignment, estimated at $80M, valued for long-term resilience, a safer intersection at Links Road, Korokipo Road and Waiohiki Road, and separation from the Waiohiki Community, marae and urupā.
- **Option 2C** received 102 responses (41%). It offers an improved alignment, the safest approaches and line of sight, better connectivity to Taradale for Waiohiki residents at a lower cost than Option 3.
- **Option 2B** – 28 responses (11%). This was the least popular choice.

Option 2B /2C	Option 3
130 / 52%	119 / 48%

Table 1: Survey Statistics

Key Insights

- High community engagement and interest with 249 survey responses total.
- 52% of respondents were in favour of a similar alignment to the existing bridge (Option 2B/2C).
- Option 3 at 48% signals a strong community appetite for a future-proof, resilient alignment even if it requires greater investment.
- Waiohiki residents had a slightly higher favourability of a similar alignment to the existing bridge with 55% in favour of Options 2B/2C and 45% in favour of Option 3.
- It was noted anecdotally that although community members understand that Option 3 may not progress due to funding, they feel it was important to still advocate for it.
- Option 3 scored favourably for some community members as it resulted in a new, safer Links Road, Korokipo Road and Waiohiki Road intersection.

Key Themes

The key themes identified in the survey were the following:

Safety and resilience

- Strong emphasis on designing for future climate impacts and river behaviour.
- Desire for a “once-only” solution that avoids repeated repairs or vulnerability.

Traffic function and community connectivity

- Requests for improved line-of-sight and safer approaches.
- Many respondents highlighted the importance of efficient access for residents, orchard workers, freight, emergency services, and cycle commuters.

Walking and cycling

- A high number of respondents indicated they walk and cycle across the bridge.
- There is a high level of interest in including a safe cycle/walkway as part of the bridge rebuild design.
- Comments showed no strong consensus on the preferred side of the bridge for the cycle/walkway, feedback largely related to *ensuring it is included* rather than its placement.

Cultural and environmental considerations

- Multiple respondents asked that the design:
    - respect proximity to Waiohiki Marae and urupā.
    - incorporate cultural motifs or Māori design elements.
    - use planting and materials that reflect local character.
- Environmental sensitivity toward river health and biodiversity, with minimal disruption to natural systems was a recurring theme.

Minimising disruption during construction

- Several comments indicated concern about construction access and temporary detours, reflecting a desire for clear communication as the project progresses.

Other Notable Survey Findings

Use of the bridge

- Respondents included residents, commuters, workers, and families who regularly access schools, workplaces, marae, orchards, and wider community facilities.
- 84% of respondents were directly impacted by Cyclone Gabrielle.
- Many use the bridge multiple times per day, reinforcing its regional importance. 42% of respondents use the bridge every day, with a further 35% using the bridge most days.

Preferred communication channels

- Email was the most frequently requested update method.
- A significant proportion also asked for ongoing hui, public meetings, or printed updates.

SUMMARY AND RECOMMENDATIONS

The community support for a bridge alignment option was divided with 52% in favour of a new bridge in a similar location to the existing bridge (Option 2B/ 2C), and 48% in favour of an alternative alignment (Option 3).

Waiohiki residents had a slightly higher favourability of a similar alignment to the existing bridge with 55% in favour of Options 2B/2C and 45% in favour of Option 3.

People are seeking a bridge that is safe, resilient, and designed for the future. The new bridge should celebrate local cultural values, encourage walking and cycling, and enhance traffic safety.

Respondents also emphasize the importance of transparent, continuous communication as decisions about the bridge alignment progresses.

From the community feedback it is recommended that the following five actions are incorporated into this projects delivery:

1. Incorporation of a shared user pathway for walking and cycling attached to the bridge. It is recommended that the design team liaise with a community-based cycling organisation to better understand walking and cycling needs.
2. Community consultation is required to better understand the existing safety concerns and lived experiences to understand how these can be mitigated with the chosen alignment.
3. Further engagement with mana whenua to better understand the cultural narratives and significance of the area so these stories can be celebrated within the wider project.
4. Continued partnership with mana whenua to better understand traditional environmental management practices, this will allow for shared learning when implemented alongside usual ecological management practices.
5. Setting a clear expectation with the successful contractor that construction related communication is shared transparently with the community and updated regularly and that the construction methodology will require a focus on minimising disruption to motorists throughout the construction period.

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28/11/25