Preliminary Present Value End of Life (PVEOL) Analysis

Network area:	Highway:	RP:	BSN:	Structure name:	Owner:	Far North District Council
Northland	Puhata Rd	2162		**Puhata Road Bridge No. D50**	RCA:	Far North District Council

General Structure Data	
Year constructed:	1950
One Network Road Classification (ONRC):	Access (low volume)
Vehicles per day:	<50
% heavy vehicles:	10.0%
Number of Spans	1
Total Length of Bridge	9m
Road width between Kerbs/rails	2.8m

PVEOL Questions:	Yes/No
Is the bridge over 80 year old	No
Is there significant maintenance required in the next 3 years	Yes
Is the bridge inspected in accordance with NZTA-S6	Yes
Is the bridge on special inspections	Yes
Has a live load assessment been carried out based on the known condition	Yes
Are there any brittle and/or vulnerable details on the bridge	Yes
Are there live load or speed restrictions across the bridge	Yes

Brief explanation of restrictions

The bridge is in an extremely poor condition and posted accordingly at 30% of class one, 7000kg axle limits and speed restrictions of 10km/hr.

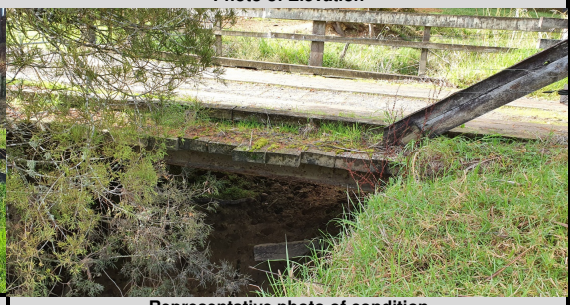
Structure description

The road bridge is a single lane, single span structure and is approximately 9 m long x 2.8 m wide between kerbs. It has a steel beam superstructure and timber decking. There are no abutments however, with the beams sitting on timber planks which sit on the ground. The bridge was constructed 1950.

The structure was not considered a council asset for a significant portion of its life, and hence, has never been maintained.

Photo from Road Level

Photo of Elevation



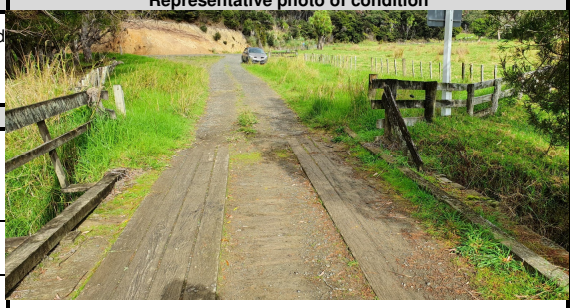
Current Condition: Parapets / Barriers / Surfacing

Briefly explain the current defects

The deck is in a heavily deteriorated state. Timber elements are heavily worn, and spongy when wet. Railings are only present on one side. These are in a rotten state.

Maintenance Interventions Required	Year	Cost ($k)
1.) Install new handrails	2021	$15
2.) Replace severely worn portions of deck	2021	$15
3.) Replace severely worn portions of deck	2026	$15
4.)		

Representative photo of condition



Current Condition: Superstructure

Briefly explain the current defects

The steel beams have significant corrosion and section loss across most of the beams. Due to the ends of the beams being covered in layers of mud for a significant period, the beam ends are severely corroded at bearing positions.

Maintenance Interventions Required	Year	Cost ($k)
1.) Repair/strengthen existing beams	2021	$30
2.) Replace superstructure	2031	$125
3.)		
4.)		

Representative photo of condition

Current Condition: Substructure

Briefly explain the current defects

As noted in the structure description, on inspection, no abutments were identified. The structure is founded on wooden planks in-ground. The adjacent picture shows the end of one of the beams when exposed from behind. End fixity is non-existent.

Maintenance Interventions Required	Year	Cost ($k)
1.) Construct new piled abutments	2021	$125
2.)		
3.)		
4.)		

Representative photo of condition

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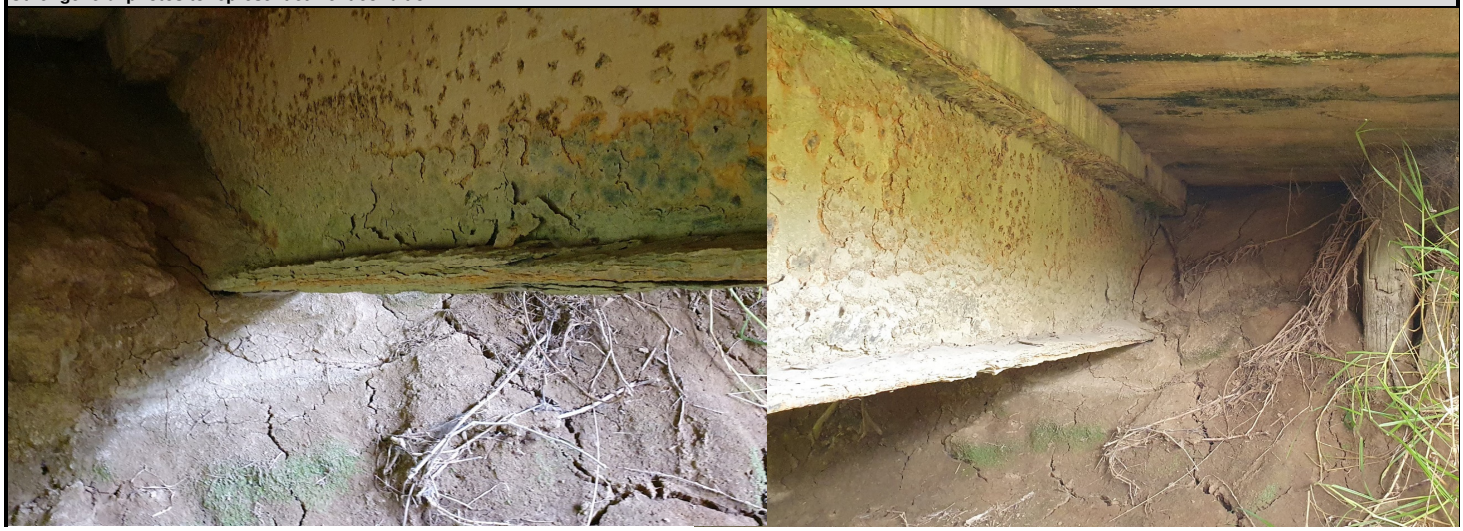
Other general photos to represent current condition



Hypothetical "like for like" bridge Replacement		Brief discussion
Total Length of Bridge	9m	Costs include for establishment, traffic management and nominal approach works. Costs do not include for consultancy fees, resource consent fees or geotechnical investigation fees. An additional $25,000 has been added as an overhead power line will be required to be moved.
Road width between Kerbs/rails	4m	
NZTA replacement rate (m2)	$6,600	
Replacement cost	$262,600	

Maintenance Scenarios

Scenario 1 - Minimal / Routine Maintenance and look to replace the bridge as early as possible (1-3 years)

Component	Maintenance Interventions Required	Year	Cost ($k)	NPV ($k) 4% discount
All	Replace bridge	2021	$262	$252
		Totals	**$262**	**$252**

Scenario 2 - Maintain the bridge in the medium term (3-10 years) followed by bridge replacement

Component	Maintenance Interventions Required	Year	Cost ($k)	NPV ($k) 4% discount
Handrails	Install new handrails	2021	$15	$14
Deck	Replace severely worn portions of deck	2021	$15	$14
Substructure	Construct new piled abutments (move power line at the same time)	2021	$150	$144
Superstructure	Repair/strengthen existing beams	2021	$30	$29
Deck	Replace severely worn portions of deck	2026	$15	$12
All	Replace bridge superstructure	2031	$125	$81
		Totals	**$350**	**$295**

Proposed Strategy

Having considered the condition of the bridge, there is potential that significant, potentially catastrophic, failure may occur within 1 to 3 years if maintenance actions or replacement are not undertaken. The PVEOL analysis over 10 years of asset life gives a 15% ($43K) saving which shows that the bridge is at the end of its economic life, and therefore the preferable option is to replace the structure immediately. Due to the deterioration of the structure, the bridge will require replacement in the short to medium term, irrespective of the maintenance works level chosen. At 71 years old, and with little to no maintenance during it's lifetime, the structure is also effectively at the end of its useful life.

Document preparation

Prepared by:	**Tess Fulton**	**Title:**	Intermediate Engineer - Civil	**Date:**	**29/09/2021**
Approved by:	**Dewi Todd-Jones**	**Title:**	Work Group Manager - Bridges, Civil & Structures	**Date:**	**29/09/2021**

Document review - Waka Kotahi response

Reviewed by:	Liam Coleman	**Title:**	Team Lead Structural Performance	**Date:**	30/09/2021
Outcome:	**Comments:**				
APPROVED	$6600/m2 replacement value needs to be used but it wont change the decision in this case.				