COMHAIRLE NAN EILEAN SIAR

ASSETS, FINANCES AND RESOURCES

BERNERA BRIDGE

REPLACEMENT FIXED CROSSING

ENVIRONMENTAL IMPACT ASSESSMENT
SCREENING REPORT

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REPORT

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REVISIONS

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GENERAL PROJECT DETAILS

1.0 INTRODUCTION

Comhairle nan Eilean Siar (CNES) as part of its obligation to maintain all infrastructure within its network proposes to replace the original Bernera Bridge structure, S132. Replacement structure shall be a modular type truss bridge with a minimum lifespan of 30 years. Original structure shall be retained in place for the foreseeable future but shall not be accessible to vehicle traffic and shall be subject to regular inspections.

Structure to be replaced following Principal Inspection, February 2020, and Invasive Inspection, August 2020. These inspections and assessments revealed poor condition of embedded tendons and multiple defects to the existing bridge superstructure. Following further analytical assessment of the bridge, which took into consideration these defects, the structure was deemed unfit to sustain 40t traffic loading. Given the structures form and condition it was also considered unsuitable for strengthening or remedial works.

The existing bridge provides the only fixed link between the Island of Bernera and the Island of Lewis, which is separated by a 130m wide channel. Prior to completion of the existing structure in 1952 the only link with Lewis was a ferry service, consisting of a small rowing boat. Stormy weather, heavy seas and swift currents made the crossing hazardous and at times impossible, resulting in considerable hard-ship to the 400 inhabitants of the island. Following restrictions imposed to the bridge in August 2020 and delays to the construction project, Comhairle Nan Eilean Siar have had to revert back to providing a ferry service for goods and large service vehicles running between Uigean slipway (Valtos, Uig) and Hackclete (Valasay, Bernera) again causing hardship to the 350 residents currently inhabiting Bernera.

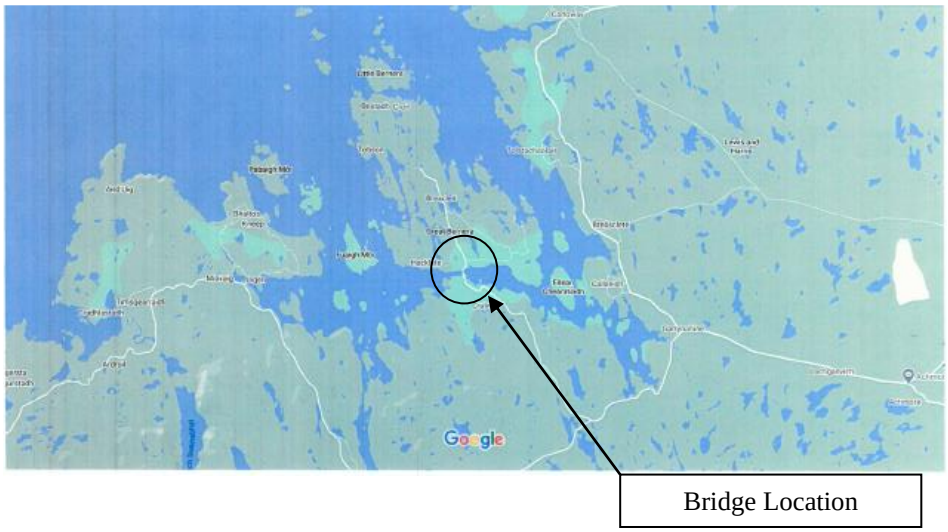
Works have been scheduled for October 2020 but are subject to the provision of a Marine License for works below MHWS. Bridge superstructure steelworks order, which has a 15 week lead period, will not be placed until the Comhairle receives agreement from statutory bodies that there is no objection in principal to the scheme.

Provisional programme has been revised for consultations and currently assumes the following time line:

Bridge order	-	19-10-20
EIA screening	-	30-10-20
Marine License Application	-	05-11-20
Marine License Assessment	-	4 weeks
License granted	-	04-12-20
Contractor Mobilisation	-	24-11-20
Abutment Work	-	27-11-20
Bridge Fabrication on-site	-	01-02-21
Completion	-	10-04-21

Programme is subject to the relevant agreements and licenses being in place.

Location map



See Appendix A for additional Location Plans.

2.0 NATURE OF PROJECT

An outline of the proposed replacement bridge scheme as it currently stands is shown in General Arrangement Drawing 2B (5B 40) 001 Rev E contained within Appendix B.

Substructures

The works require the formation of rock fill embankments either side of the channel through little Loch Roag using locally sourced quarry material as the main fill, compacted in layers and protected with large 2.0-3.0t rock armour as scour protection. These embankments form the sub-structural support for reinforced concrete foundation plinths on which the bridge superstructure shall be supported.

Armour stone shall be quarried rock laid in a 1.3m thick layer with a minimum density of 2.6 t/cu.m of approximate size 1.0 x 1.2m for outer layers and slightly larger 1.0 x1.5m for toe of embankment. Under layer of armour shall be smaller 150mm diameter stone in a 0.7m thick layer. In the vicinity of marine environments armour stone layers shall be placed on the exposed outer faces of the embankment from top of embankment to seabed. Along the embankment edge, below water level, the armour shall be trenched into a seabed to form a toe or key providing additional stability and scour protection to the embankment.. This trench shall be a shallow trench 1.0 deep by 1.5-2.0m wide. The main embankment structure shall comprise graded rock fill material (6F1 or 6N) placed from shoreline in compacted layer until the embankment is formed. The rock fill material specified shall be graded rock fill stone ranging from 75mm diameter stone to a fines fraction. North abutment shall not require significant imported infill as the foundation is expected to be founded on rock with

rock fill being re-used from excavated material. Armour stone shall be provided for protection and for consistency of appearance.

Approximate Quantities below MHWS

Location	Armour Stone (tonnes)	Rock Fill (tonnes)	Footprint (m^2) (Reclaimed form sea)
North Abutment	1500	3800*	378
South Abutment	1700	3200	737

* Includes re-used excavated materials.

Following seabed survey dated 15th September the north abutment configuration was amended to reduce the amount of fill required and avoid reducing the navigable channel. Considering the channel depths surveyed there should be no long term restriction to vessels currently using this channel.

The north abutment shall be founded on rock with a concrete levelling plinth dowelled into the rock profile and reinforced columns formed to required abutment level. Amount of concrete required is to be determined following excavation. Initial estimates suggest around 30-50 cu.m. per abutment placed using tremie concrete (with anti-washout admixture) below MHWS springs or using conventional methods above MHWS. Concrete base, if below MHWS, shall be shuttered using sealed formwork and excess water pumped out. Dowels shall be installed using conventional coring and grouting techniques from the top level of the mass concrete base (coring through concrete into rock) with excess fluid from coring bunded and extracted to prevent runoff. Activity is not considered to be excessively noisy in relation to other site activities.

Infill to north abutment shall consist of non-structural rock infill using original suitable site-won material faced with armour stone to provide a protective face for consistency of appearance. Material shall be re-used from material produced from the north abutment excavation. This material below MHWS shall be reinstated adjacent to the structure within the same level and location as it was excavated from, hence reducing or possibly negating material to be removed off site from below MHWS.

Superstructure

The main structure shall comprise a 100m clear span steel trussed modular bridge. The bridge members shall be delivered using artic vehicles and assembled on site using cranes and tele handlers. As the steel structure is assembled it shall be launched out across the channel on temporary supports using a winch system. Temporary supports shall be provided on southern approach land strip with no requirement for any supports, temporary or otherwise, in the water. Overall width of the structure is 8.0m and the height is 4.5m. The structure shall accommodate one lane of traffic and a 1.05m wide walkway.

Load capacity: 40t.
Finish: Galvanised.
Design Life: 30 years (first major maintenance).

Clear span shall not restrict marine traffic. Clearance from high water shall be marginally increased from the existing structure.

From HMWS, clearances to the north channel are approximately:

Existing Clearance	-	2.5m
Proposed Bridge Clearance	-	3.0m

Approach Roads

The existing approach roads shall require some re-alignment to tie into the new bridge. South approach shall require re-alignment and adjusting of the existing road level by approximately 1.5m at the bridge bearing to tie into the existing road 40-50m from the bridge. The road approach to the existing bridge shall be blocked using either large stones or vehicle restraint barriers.

3.0 METHOD STATEMENT

Traffic management

Works shall be restricted to Comhairle's standard working conditions: 8:00am to 18:00pm from Monday to Friday with permission required for Saturday working. Sunday working shall not be permitted unless there are extenuating circumstances. Current restrictions limit the crossing to light vehicles under traffic management and limit traffic to a single vehicle at a time until the new bridge has been commisioned. Consequently works traffic management shall not severely restrict local residents any more than the current arrangements.

- The works are to be carried out under traffic management.
- Signage shall be erected advising the public of the planned works 3 weeks prior to start date.
- Traffic shall continue to use the existing bridge under load restriction until the replacement is in place.

The works total duration shall be approximately 20 weeks.

Rock fill

Rock fill and armour stone shall be imported natural rock from Breedon's Stornoway quarry using 6 or 8 wheel tipper lorries using the existing road network. The main embankment fill shall be graded structural fill (Class 6N or 6F1 - 75mm stone to fines fraction distributed evenly within a random sample) compacted in accordance with the Specification for Highway Works. Rock fill shall be tipped from the shoreline and the embankment formed using excavators and compacted in layers until the finished profile is established.

Abutments

South abutment shall be constructed on compacted rock fill overlaid with a depth of structural mass concrete as required. Abutment shall be conventional reinforced concrete plinths with wingwalls backfilled on completion with 6N or 6F1 structural fill (For quantities of fill and armour stone below MHWS refer to Section 2.0). Base area of substructure shall be approximately 4.5m x 11.0m.

North abutment currently shown as being constructed on reinforced columns taken to a concrete foundation plinth. Columns shall comprise 8 nr 900mm dia reinforced concrete columns formed using pumped concrete placed within sealed formwork. Approximately 25 cu.m of concrete is required as a preliminary estimate, however final quantity is dependent on the excavated rock profile. Actual founding depth is to be confirmed on site once the location is excavated and rock profile established. Depending on rock profile and depth some rock breaking or infill concrete may be required to form a

level plinth. If rock depth is high there may be no requirement for extended columns with abutment on a conventional mass concrete used for levelling.

Bridge: Description and Installation

The new bridge super structure shall comprise a clear spanning modular steel truss bridge approximately 8.0m wide and 4.5m high from bearing level. The structure shall be open girders of a depth no greater than the existing below road level. An artistic impression of the bridge is contained within Appendix C.

The bridge shall be installed using a launching sequence from the southern abutment under one continuous launch sequence. No temporary works shall be required in the marine channel and only limited temporary works shall be required on the southern embankment and approaches.

Bridge shall accommodate one 3.1m wide lane of traffic and one 1.05m wide pedestrian walkway.

It is proposed that the bridge shall have lighting from the top girder and street lighting on each road approach.

Approaches

The approaches shall be re-aligned from the existing road network to the new bridge. Northern tie-in shall be at the same vertical alignment as the existing road. Southern tie-in shall be aligned vertical from the bridge, approximately 1.5m above existing, to tie in 40-50m from the bridge extents to the existing road.

Road sub structure shall be conventional compacted rock fill and bitmac surfacing.

4.0 CONSULATIONS

A number of statutory consultees have been consulted with regards to the proposed development, these include:

- Marine Scotland.
- Scottish Environmental Protection Agency (SEPA).
- Northern Lighthouse Board (NLB).
- Maritime and Coastguard Agency (MCA).
- Crown Estates Scotland.
- Nature Scotland.

- Western Isles Archaeologist.
- Historic Environment Scotland.
- Land owners.
- Planning.

SEPA, NLB, MCA and Nature Scotland have no objections to the scheme. Appendix D contains responses from these statutory consultees.

A number of the consultees are currently still being engaged in active discussions regarding the works.

Land acquisition and access permits are currently being sought in areas affected by the works.

Hebrides Mussels have a mussel farm on the east side of the existing bridge. Mitigation measures shall be taken into consideration to reduce any pollution or effects on their working arrangements. Mitigation measures may be consideration to reduce fines content of the imported fill or only placing rock fill on outward tidal flows away from mussel the farm.

Nature Scotland requested an Otter License prior to engaging in any works within the vicinity. Otter survey was carried out 29th September 2020 on behave of Nature Scotland by an experienced ecologist and a report has been forwarded to assess any mitigation measures which may be required. Report indicates Otter activity within 200m of the proposed site and one likely shelter under the existing bridge.

Planning application has been submitted 07th October 2020 to Comhairle Nan Eilean Siar's Planning Department.

Local archaeologist has been consulted and response contained within Appendix E together with Protocols for Archaeological Discoveries (Crown Estates) which shall be used as the reference point for procedures should anything of note be discovered during the works. Two scheduled monument were noted:

- Tursachan', Barraglom, (SAM5548).
- Dun Barraglom,broch,cup marked rocks,fish traps and settlement (SAM5429).

These monuments are outwith the site boundary and will not be effected by the works. Several other issues were raised regarding visual impact of the proposed structure, non-designated sites noted nearby and potential request for desk study or walkover study by Historic Environment Scotland. Historic Environment Scotland have been notified directly and will respond formally through the planning process.

5.0 LAND OWNERSHIP AND ACCESS

Landowners to the approaches have been identified and written correspondence has been sent with regards to the extent of ground to be permanently or temporary required for the purposes of the bridge construction.

North approach on Bernera is owned by Bernera Estates. Response received 28th September 2020 Solictitors that they have no objection in principal to the scheme.

South approach through Earshader is part of Grimersta Estates. No response received to date.

Temporary occupation may be required for Croft 3 Earshader and the landowner and Grazing Clerk for Earshader has been notified. Common grazing and croft occupier have no objections to the scheme and temporary occupation of land.

Channel shall be navigable for the duration of the works with marine notifications to be in place warning marine traffic of the works. As Comhairle Nan Eilean Siar is the marine authority for the channel this can been undertaken fairly readily as the works progress. Other relevant coastal authorities have been informed of the works

6.0 ENVIRONMENTALLY PROTECTED AREAS

Nature Scotland site maps were referenced to identify any areas of environmental protection, conservation or scientific interest. No areas were identified in the proximity of the works.

National scenic area bounds the west side but is considered sufficiently outwith the proposed works site. Designations checked include: SSSI, SAC, SPA, Ramsar, NSA, LNR and MPA's.

Appendix F contains Nature Scotland map showing these areas. https://sitelink.nature.scot/map

7.0 ALTERNATIVES CONSIDERED/COMPARISON

Type	Est cost	Design life	Cost/yr	Notes
Causeway	3,000,000	50 +	60,000	Best long term option if allowed, which is unlikely – a steer on environment/ marine should be got to rule out. Could potentially be built relatively quickly and cheaper as costs based on imported rock.
Bridge with piers	5,000,000	50	100,000	Good from marine and planning perspective. Bad from upfront cost and timescale perspective.
Causeway with 20m bridge section	4,000,000	50	80,000	Probably a bit cheaper and quicker than full bridge but with all the environmental problems of causeway
Semi- permanent bridge (current)	2,000,000	25	80,000	Quick, cheapest upfront, probably more costly than a causeway long term but cheaper than full bridge.

8.0 EXISTING BRIDGE

The current bridge was not considered a viable option for strengthening or remedial repairs due to its condition and form. The bridge currently has limited live load capacity but still retains an ability to

carry its own self weight. Several utilities are still present on the bridge and utilities providers will be given the opportunity to divert services onto the new structure if they wish to do so. However there is no proposal at this stage to demolish the existing bridge. Existing bridge shall be closed off using barriers or stones and shall be subject to periodic inspections.

9.0 ENVIRONMENTAL EFFECTS

The works shall limit and mitigate any risk of pollution or contamination of watercourses or marine environment using standard construction protocal, risk assessments and method statement subject to approval from the overseeing organisation or statutory bodies. General site practice will ensure compliance with Scottish Environmental Protection Agency's regulation which will be incorporated into the Tender Specification Documents. Potential risk of pollution and residues which could cause contamination shall, as is typical for large construction projects, consist of refuelling, oil spills and use of cementitious products. General site practice will address these risks using designated re-fuelling areas away from water courses, daily vehicles checks, sealed formworks, cement products containing anti-washout additives and designated storage areas.

Noise and dust shall be reduced or contained using current best construction practice as specified in the contract documents using water spray, limiting any rock drilling or pecking to daytime hours and mechanical noise abatement techniques. A twenty four hour working day is not considered necessary at the current stage.

Otter survey has been conducted. Otters have been identified as inhabiting the area, with a shelter under the existing bridge. The Comhairle has applied for an otter license and we await response from Nature Scotland with regards to measures to mitigate or minimise interference for the duration of the works. Following works completion the structure shall not adversely affect the otter population.

Visual impact has also been considered with artistic impressions forwarded to Historic Environment Scotland and Planning Department for comment. Initial response from HES suggests they have no objection to the structural form and location, nor do they think it will affect any of the historical sites within the vicinity of the works.

Any other reasonable mitigation or protective measures requested by statutory bodies to limit or prevent residues, emissions and the production of waste will be similarly incorporated into the Tender Documents.

Scheme has mitigated environmental disruption by limiting the extent of the works in the marine channel using the formation of extended rock fill embankment sub structures and reinforced concrete abutments on the foreshores to support a clear spanning structure. The structure type, span and launching scheme avoids the requirement for marine channel temporary works and/or permanent pier structures.

The rock fill will be natural locally sourced stone material comprising rock armour boulders and graded embankment rock fill. Where required, the scheme has limited channel fill where possible. On the north foreshore, following seabed survey, it was considered that excessive fill would distort the channel hydrology, cause unnecessary disturbance to the channel bed, prevent marine vessel

access and expose the structure to potential scour problems. As such the substructures were changed to an abutment founded at bed rock level with a reduced footprint.

Works will also endeavour to re-use excavated material wherever possible. Excavation to the north abutment foundation shall be useable as non-structural fill to structures (see Section 2.0 substructures). Material for re-use shall be stored on site until required.

APPENDIX A

Bridge Location Plan

APPENDIX B

GENERAL ARRANGEMENT

APPENDIX C

ARTISTS IMPRESSION

APPENDIX D

CONSULTATIONS

APPENDIX E

ARCHAEOLOGISTS

APPENDIX F

CONSERVATION MAPS

APPENDIX G

PHOTOGRAPHS