

Application for Listed Building Consent

Refurbishment and repairs to River Neath Swing Bridge

Heritage Impact Assessment

Date: September 2021



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1 Introduction

- 1.1 The Heritage Impact Assessment has been prepared by Network Rail in support in support of an application for Listed Building Consent (LBC) for a scheme of refurbishment and repair at River Neath Swing Bridge.
- 1.2 This Heritage Impact Assessment and Access Statement incorporates an assessment of the proposed works, details on the works, planning policy, and heritage. This Statement is divided into the following sections:
 - Site Description and historical context and background;
 - Current condition
 - Proposed works;
 - Planning Policy Framework;
 - Assessment of the proposals; and
 - Conclusion

2 Site Description, Historical Context and Background

Site Description

- 2.1 River Neath Swing Underbridge is located West of Neath and approximately 1km south of Skewen Village, and is a swing bridge over the River Neath and forms part of the Swansea District Line. The structure is located at Linear reference SDI 1 207m 63CH, and the grid reference is SS 730 693.

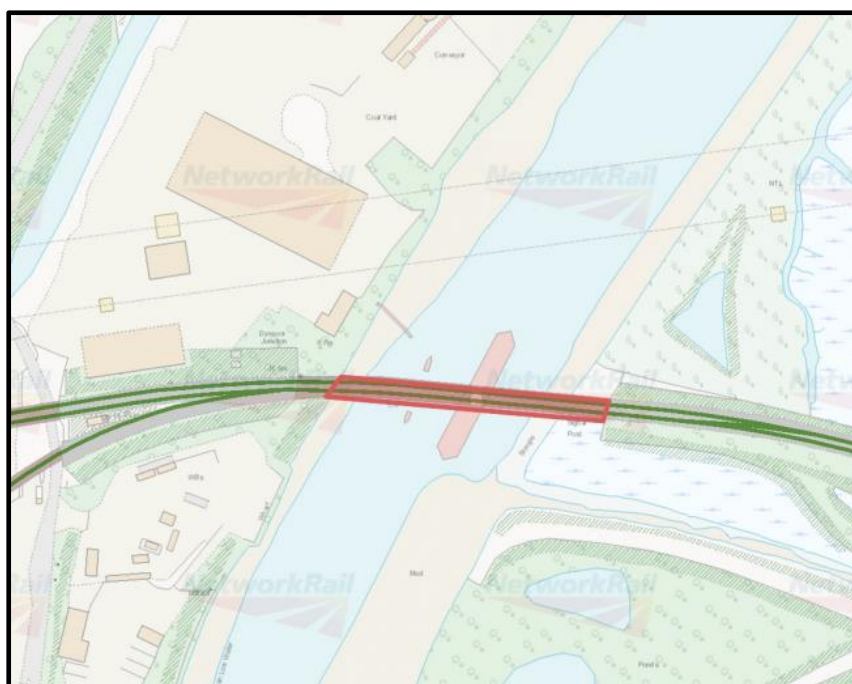


Downside Elevation

Upside Elevation

- 2.2 The structure is a six span underbridge. Five out of the 6 spans are simply supported. The swing span, which is no longer operational, was designed to pivot open on its central support. The swing span comprises a rivetted steel through truss, Cross Girders and steel deck with overhead lateral restraints. It is supported at each end on cylindrical piers and centrally on a circular cluster of 9 wrought iron cylindrical piers.
- 2.3 Each of the five simply supported spans comprises of two longitudinal steel plate girders, cross girders, rail bearers and a steel deck, supported on pairs of braced cylindrical or masonry abutments. There is no footway on the structure and the structure carries 2 no. ballasted tracks of the Swansea District Line.
- 2.4 The site location plan and principal dimensions and construction are outlined below:

Site location Plan (1:2500)



Principal Dimensions	
Span Length	Span 1: 16.38m – Girder A, 16.81m – Girder B (trapezoidal span) Span 2: 17.38m Span 3: 17.01m Span 4: 49.91m (swing span supported on pier at midspan) Span 5: 16.90m Span 6: 13.08m
Width	Varies up to 9m
Skew	Span 1: 25° Span 2,3,4,5 and 6: 17°
Footway Width	No footway
Track type	Flat bottomed rails on timber sleepers – check rails cross the structure
Form of Construction:	Superstructure consists of 5 simply supported plate girder through decks and one centrally supported (non-operational) swing span. Five simply supported spans: Span 1: Half-through rivetted steel main girders, cross girders, rail bearers and floor plate (original structure). Spans 2,3,5 and 6: Half-through welded steel plate girders and welded prefabricated floor units of twin transverse beams, rail bearers, and floor plate. There is a central underslung maintenance access gangway under spans 2,3 and 5. Span 4 (Swing span): Through truss swing span supported centrally and at the ends, comprising rivetted steel truss girders, cross girders, rail bearers, and floor plate. There are overhead restraint beams above the central support The intermediate piers comprise pairs of transversely braced riveted wrought iron cylinders which are banded by steel straps. The central pier consists of a circular array of 9 no. cylinders with a cast iron ring beam carrying the now redundant swing mechanism.
Number of Spans	6 (5nos. fixed; 1 no. swing)
Bearings	Spans 1, 2, 3, 5 & 6 are each simply supported by intermediate piers (and on abutments for end spans) via plate bearings. The bearings are generally encased in steel shells which are installed on shim plates on a layer of cement grout laid on top of pier caps. Span 4 is supported and bolted centrally to the original rotation mechanism (which are treated as pinned supports) and the ends of the deck are supported on sliding (horizontal restrained) guided bearings.
Substructure	Masonry abutments and wingwalls.
Parapet Type	Steel post and rail parapet connected to main longitudinal girders and truss girders.

Historical Context

- 2.5 The Rhonda and Swansea Railway was incorporated in 1882 and was completed in 1900 after the original plans were extensively altered. The line between Neath and Swansea, crossing the River Neath was authorised in 1892, with the underbridge being built between 1892-4 with a swing portion of 52 metres and a gross weight of 1422 tonnes.
- 2.6 The Chief engineer was S.W Yockney, the resident engineer was FE Goldwyre and the contractor was George Palmer. The steelwork was supplied by Finch and Co of Chepstow. The swing mechanism was originally hydraulically operated, and the wing mechanism machinery was supplied by William Armstrong of Newcastle.
- 2.7 The swing bridge element of the structure is now fixed. The swing bridge was fixed after many years of decline in condition and use. Records indicate that in total it was used 14 times in 1947, 3 times in 1948 and only once in 1949 and once again in 1956. The last operation was only for testing purposes at the request of Neath Harbour Commissioners.
- 2.8 In 1985 the British Railways Board proposed to cease operating the swing bridge over the River Neath due to the ongoing maintenance cost, and the apparent lack of need for an operational swing bridge at this location. The decision was made to weld the bridge shut permanently, and the structure has been maintained as such since.
- 2.9 River Neath Underbridge underwent substantial maintenance, including repairs to the steel superstructure and cylindrical caissons in 1914 following a number of elements failing on the structure. More recently following the deterioration of the structure and a subsequent fire that destroyed its dynamos and pumps the structure was partially reconstructed in 1973. This work in 1973 is the most recent wholesale refurbishment and repair works that have been carried out on the structure.
- 2.10 Much of the Rhonda and Swansea Bay Railway route is now closed, however this structure still forms part of the operational railway forming part of the diversionary good and passenger traffic route over the Swansea District Line.
- 2.11 The underbridge including the ancillary components is Grade II listed. The listed status is outlined in three listing descriptions under references 11830, 23310 and 23068. The structure was first listed on 05/01/1989 and has since had amendments to the listings in 2000.
- 2.12 The historic interest in the structure lies in its industrial archaeological interest of the Rhonda and Swansea Bay Railway and being the only previously opening bridge of this type in Britain built both on the skew and on a curve.

3 Current Condition of the Underbridge

- 3.1 Network Rail have commissioned an extensive Inspection survey to understand the current condition of the asset in order to identify in detail the minimum interventions required as part of this scheme of repair and refurbishment. Arcadis undertook this assessment in 2019, and their full report is submitted to support this Listed Building Application under document reference 152093-ARC-REP-ECV-000001. This supporting document will summarise the findings of this inspection report and provide an overview of the current condition.
- 3.2 The structure is in generally fair to poor condition. Spans 1, 2, 3, 5 and 6 were found to be in fair condition. The swing span is generally in fair to poor condition due to significant corrosion. The abutments and intermediate piers are generally in fair condition with no visible signs of buckling or movements. The overhead girders are in very poor condition with significant corrosion, with similar condition being noted to the underslung access gangway.
- 3.3 Full photos and descriptions of specific conditions can be found in 152093-ARC-REP-ECV-000001.
- 3.4 The inspection report identifies that there are elements of immediate works required in order to mitigate risk of elements falling onto the operational railway, while other works are required in order to mitigate the further deterioration of the structure, in order to safeguard the operational status of the asset for the next 25 years.

4 Optioneering of Proposed Interventions

- 4.1 In developing the proposals subject to this Listed Building Application Network Rail have undertaken a robust optioneering exercise to ensure that the most appropriate intervention to safeguard the listed structures character and appearance while ensure it remains a safe and useable operational railway asset.
- 4.2 The options considered as part of this development process are outlined below:
- Option 1 - Repainting with no steelwork repairs;
 - Option 2 - Repainting with minimal steelwork repairs to meet the required capability;
 - Option 3 - Repainting the steelwork repairs in accordance with the designers scoping report plus any additional information gained from the recent examinations and investigations;
 - Option 4 - Replacement of the swing span, with repairs to the other spans as above.

Option 1 – Repainting with no steelwork repairs (Discounted)

- 4.3 The first option considers repainting the structure, but with no steelwork repairs. This was considered to be the quickest and lowest capital cost option and would cause only minimal disruption to the railway, with possessions only required at night to complete trackside faces of the works.
- 4.4 A full scaffolding arrangement would need to be designed with full encapsulation required in order to grit blast the structure.
- 4.5 This option not repair or strengthen measures to the assessed failed elements, and therefore was discounted as it does not meet the key requirements for maintaining a safe operational structure, while preserving the structures listed character and appearance for a 25 year period.

Option 2 – Repainting with minimal steelwork repairs to meet required capability (Discounted)

- 4.6 Option 2 involves repainting with the minimal repair works to the bridge that will bring the structure back to the availability of the route. This will include strengthening works to the cross girders on the swing bridge to increase capacity to the relevant specification.
- 4.7 The strengthening works will make use of the scaffolding system set up for the grit blasting and paint works, and will therefore come at a minimal increase in cost.
- 4.8 Despite this solution being cost effective and relatively simple to complete (given existing scaffolding access) this option has been discounted. While the solution identifies solutions to existing failures, the solution does not propose to carry out any preventative repair works, and only proposed to correct the existing failures. The risk with pursuing this option is while it will preserve the short-term operation of the railway, it will however not safeguard the listed structure from further irreversible deterioration. This further deterioration will likely result in a more significant scope of replacement of fabric of the structure in the short term, which if a full repair was carried out now would preserve as much of the listed structure and fabric as possible and would safeguard the listed structure for an additional 25 years.

Option 4 – Replacement of the swing bridge, with repairs to the other spans (Discounted)

- 4.9 Option 4 considers replacing the swing bridge with a like-for-like structure. These works would include all works listed in the other options to repair all defects in the rest of the structure and would have safeguarded a new superstructure with a 120 year design life.
- 4.10 This solution is the most invasive intervention to the listed structure, with a significant proportion of the structure being replaced in a like-for-like manner. This solution was considered the highest upfront cost of all options, with significant constraints in deliverability and environmental impact.
- 4.11 This solution was discounted on the basis that swing span is in serviceable condition, and therefore it would not be justified to remove this element of a Grade II listed structure, and it was considered essential that the minimum impact on the character and appearance was pursued.

5 Preferred Option 3

- 5.1 Following the above optioneering the favoured solution was considered to be option 3, repainting and steelwork repairs in accordance with the designers scoping report plus any additional information gained from the recent examinations and investigations.
- 5.2 The third option will incorporate the previous two options, but with the addition of further steelwork repairs to all elements that have been highlighted in the investigations and condition surveys. These repairs should return the structure to a good condition and remove all assessment failures on the structure. This option includes the grit blasting and repainting of all spans and plate repairs to numerous members. Full details of the repairs can be found in the supporting plans submitted as part of this listed building consent, and in the summary provided below.
- 5.3 The works will be carried out to the swing span while full operation of the railway is maintained in order to reduce the number of possessions required to carry out the works.
- 5.4 The benefits of this option include managing costs while providing the most extensive repairs of any solution therefore reducing the future repair costs. The intention of this solution is to mitigate any major maintenance for 25 years. Option 3 also provides a solution with minimal disruption to the operational railway. Most importantly this solution allows for a wholesale repair of the listed structure while retaining all of the existing structure, with repairs being the minimum intervention to safeguard the future of this listed structure. The repairs will no impact the overall character and appearance of the listed structure.
- 5.5 Despite the advantages of option 3, there are some notable disadvantages such as the solution will require the longest working time onsite, will require extensive and expensive scaffolding costs, and containment for grit blasting.

Summary of Proposed Works

- 5.6 A full schedule of works, plans, sections and designs are submitted as part of this application. However I will provide a summary of the key works below.

Steelwork repairs and replacement

- 5.7 Steelwork repairs and replacement have been developed utilising the key Network rail Specifications. The type of steel work repairs includes the full replacement of bracing members; cutting back the corroded sections to sound material and over plating and replacing pin headed and missing rivets. Full detail of the steelwork repairs can be found in the 'proposed repair schedules' submitted with this application (52093-ARC-DRG-ECV-000028-29-30-31-32). Full plans and Sections have been submitted for all repairs and replacement steelwork, all interventions have been designed not to detract from the overall appearance of the structure and include the minimal intervention possible. Where possible the maximum original fabric is proposed to be retained, with authentic over plating proposed to remain in keeping with existing character and appearance.
- 5.8 Strengthening and repairs to the structure are required to meet the published route availability rating of RA8 and heavy axle weight permission rating of RA10 at the published line speed of 20mph. Route Availability (RA) is the system by which the permanent way and supporting works (bridges, embankments, etc.) of the railway network of Great Britain are graded. All routes are allocated an RA number between 1 and 10. The rating of RA8 is ≤ 22.8 tonnes and RA10 ≤ 25.4 tonnes.
- 5.9 The steelwork repairs detailed in this submission are based on upon the inspection undertaken in November 2018. While the location and extent of the repairs are to be confirmed post blast cleaning of the structure, we only expect minor additions to the repair schedule propose in this application. We would request that your authority consider whether there is an opportunity for additional minor repairs to be controlled via condition, with any additional minor repairs to be submitted to your authority for approval via a discharge of condition application prior to being carried out.
- 5.10 Repairs and strengthening works to the superstructure will be undertaken from the scaffold erected for the grit blasting and painting works. The capacity of the strengthened elements of Span 4 is derived from stress analysis of the section.
- 5.11 It is proposed that the overhead bracing of the swing bridge is replaced due to the extremely poor condition of the existing, with a total loss of section meaning over-plating is not appropriate. They are currently considered

a risk of falling debris on the operational railway. The replacement elements proposed are as close as reasonably possible for like for like as the originals.

- 5.12 It is envisaged that any works to the substructure, including the replacement of bracing between the cylindrical piers will be undertaken utilising a crane or large excavator on a jack up barge.
- 5.13 Examples of the over plating finish and appearance can be found in appendix 1 below. This is an example of finished and painted over plating on a similar structure.

Bearing repairs

- 5.14 In order to prevent the observed deflections at the supports of the swing span, the method of repair included re-centring all cast iron sliding bearings blocks on the cast iron base blocks. To prevent any longitudinal movement, the sliding blocks will be bolted between the channels to prevent restraint. Once the sliding blocks are in place, packer plates will be installed between the cast iron bearing blocks and the main girders to remove the 'free floating' aspect to the bearing assemblies. We propose an element of steelwork to replace the bevel gear wheel.

Steelwork surface Preparation and repainting

- 5.15 All steelwork will be subject to paint removal by conventional grit blasting techniques (achieving Sa2.5 surface preparation). This approach will be possible by providing full encapsulation to the underside and on the elevations of the structure, which comprises the outside faces of the external main girders on the approach spans.
- 5.16 The entire metallic structure and caissons will be subject to repainting to a depth of 1m below water level. All repainting will be completed on a like for like basis, with the relevant colour matches beings carried out onsite.

Masonry repairs

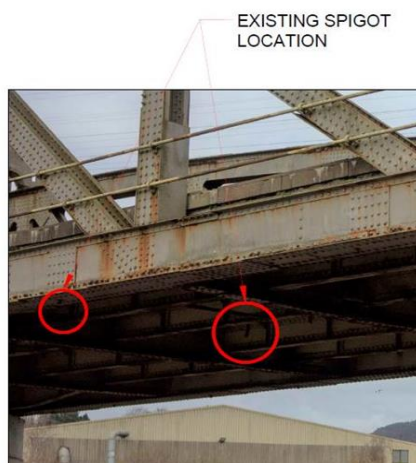
- 5.17 All masonry substructure elements require repointing and repairs. These repointing and repairs work will be completed on a like for like basis, with mortars and repairs matching the existing. We propose to carry out basic mortar analysis and carry out samples to ensure a suitable mortar match is used. Unfortunately, we are unable to carry out these mortar samples until we have possession of the structure once works commence, and therefore this information is not currently available for submission. We however would accept if considered expedient, a condition for mortar samples to be submitted to your authority via a discharge of condition application prior to commencing with this element of work.
- 5.18 Currently we anticipate that the total area of repointing will be less than 1 % of the total masonry. Cleaning of the masonry abutments and wingwalls will include minor de-vegetation works and works to remove moss growth and other debris.

Waterproofing

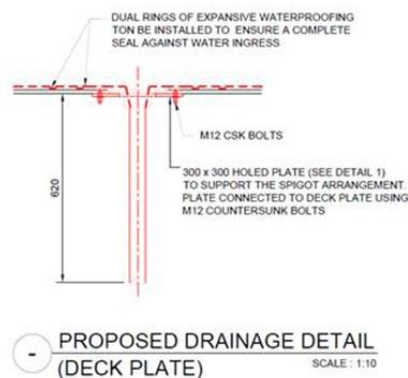
- 5.19 The swing span (span 4) will be waterproofed with a loose laid membrane system on the deck plate, which will be connected to the ballast plate upstands. The inside faces of the bottom boom of the truss will be waterproofed with a sprayed applied system.

Ancillary Works

- 5.20 Corroded spigots beyond repair and missing downpipes will be replaced like for like where required. The location of the spigot replacement, and a sectional plan can be found below:



Repair Detail



Example of repaired spigot



Proposed Access Staircase

- 5.21 As part of these works Network Rail propose to install an access staircase to assist with the ongoing maintenance of the structure. These works are located to the west of the structure and does not include any works to the listed structure and has been considered to not impact the listed structure directly. Therefore, as these works fall outside of the 'curtilage' it does not trigger the requirement for Listed Building Consent and is considered Permitted Development under Part 17 of the General Permitted Development Order 1995 (as Amended).

6 Planning Policy Framework

- 6.1 This section summarises relevant planning policy and guidance in the consideration of this application for Listed Building Consent.

Historic Environment (Wales) Act 2016

- 6.2 The Act gives more effective protection to listed buildings and improves the sustainable management of the historic environment.

Planning (Listed Buildings and Conservation Areas) Act 1990

- 6.3 The Planning (Listed Buildings and Conservation Areas) Act 1990 for England and Wales sets out the Government's policy and guidance to Local Planning Authorities on the operation of the planning system and the identification and protection of historic buildings, conservation areas, and other elements of the historic environment.
- 6.4 Section 66 of the Act requires Local Planning Authorities, in the consideration of whether to grant permission for development which affects a Listed Building or its setting, to have special regard to certain matters, including the desirability of preserving the listed building or its setting, or any special features of architectural or historic interest which it may possess.

Planning (Listed Buildings and Conservation Areas) (Wales) Regulations 2012 and Planning (Listed Buildings and Conservation Areas) Wales (Amendment) Regulations 2017

- 6.5 The 2012 Regulations sets out the framework and procedures in relation to the submission of applications for Listed Building Consent. This includes the requirements in terms of the content of such submissions, the scope of the accompanying Design and Access Statement and the timescales for consultation.
- 6.6 The 2017 Amendment requires applications for listed building consent to be accompanied by a heritage impact statement which examines the impact of the proposed development upon the special architectural or historic interest of the listed building.

Planning Policy Wales (Edition 11, February 2021)

- 6.7 PPW Edition 11 reflects the Historic Environment (Wales) Act 2016. It is identified that change which has an impact on historic assets must be managed in a sensitive and sustainable way.
- 6.8 Para. 6.1.6 identifies that one of Welsh Government's objectives is to:
"safeguard the character of historic buildings and manage change so that their special architectural and historic interest is preserved".
- 6.9 PPW sets out a general presumption in favour of the preservation of a listed building and its setting with the primary material consideration being to have special regard to the desirability of preserving the building, its setting or any features of special architectural or historic interest it possesses with the aim of finding the best way to protect a listed building's special qualities. The proposed remediation works have been designed to protect, repair and conserve the special character of the footbridge.
- 6.10 It is noted that LBC applications must justify the proposals and show why the alteration of a listed building is desirable or necessary.

Technical Advice Note 12: Design (March 2016)

- 6.11 Within Section 5.6 (The Historic Environment) of TAN12 achieving good design within the historic environment is identified. The benefit of pre-application discussions is also highlighted to ensure the preservation or enhancement of specific qualities of the historic environment.

- 6.12 With respect to areas of architectural and / or historic value sustaining character is recognised as important.
- 6.13 Para. 5.6.3 states that in the design of alterations or extensions to listed buildings professional expertise is necessary to assess the elements which make up the special interest of the building and achieve a balance between sensitive change and maintenance of integrity. Para. 5.6.4 goes on to say that in the alteration of listed buildings efforts should be made to use local materials or materials which have equivalent appearance, colour and weathering characteristics.

Technical Advice Note 24: Historic Environment (May 2017)

- 6.14 TAN24 replaces Welsh Officer Circular 61/96 'Planning and the Historic Environment: Historic Buildings and Conservation Areas' and provides current guidance on the considerations for the assessment of proposals within the setting of listed buildings which include the significance of the asset and its setting, its prominence, and non-visual factors affecting the setting of the historic asset such as noise (para. 1.26).
- 6.15 The Advice Note identifies that applicants for listed building consent require a heritage impact statement to ensure that the significance of the building is taken into account in the development and design of proposals. Consequently, this report includes a Heritage Impact Statement in sections 2 and 5.
- 6.16 Advice is given to local planning authorities on LBC considerations, which include the importance and grade of the building and its intrinsic architectural or historic interest; the physical features of the structure which justify its listing and contribute to its significance; the contribution of the setting of the listed building; the impact of the proposed works on the building's significance; and the extent to which the proposed works would bring substantial community benefits (para. 5.13).

Managing Change to listed Buildings in Wales (Cadw)

- 6.17 Managing Change to Listed Buildings in Wales supplements Planning Policy Wales 1 and Technical Advice Note 24. It sets out general principles to consider when making changes to listed buildings and explains how to apply for listed building consent, including the roles and responsibilities of owners, local planning authorities and the Welsh Government's Historic Environment Service (Cadw).
- 6.18 This document has been used to consider the appropriateness of the proposals, specifically in the use of a modern material such as Polycarbonate. In particular the requirement to: "Retain all historic materials and finishes wherever practicable; repair where necessary; respect inherited character in any renewal." (p5)

Local Planning Policy

- 6.19 Neath Port Talbot LDP (2011-2026) was adopted on 27th January 2016. The Neath Port Talbot LDP is the primary planning policy document for the County Borough. It sets out the planning policies and land use allocations that will shape the future of the County Borough area and will guide development management decisions. The LDP replaces the Neath Port Talbot Unitary Development Plan (2008). The key policies for consideration of these proposals are outlined below for convenience:
- 6.20 Strategic Policy SP21 Built Environment and Historic Heritage outlined your authority's objective that the built environment and historic heritage will, where appropriate, be conserved and enhanced. One of the key aspects of this policy is to safeguard features of historic and cultural importance and enable protection of listed building and their structures. The works proposed as part of this application are to ensure and safety and longevity of the listed structure and is therefore compliant with this policy.
- 6.21 The proposals held within this Listed Building Application have been developed with the above legislative and policy considerations in mind, and we consider that the proposals comply with all the relevant requirements.

7 Assessment of the Proposals

Current Condition

- 7.1 Following extensive investigative works on the structure (152093-ARC-REP-ECV-000001) it was identified that the asset was in fair to poor condition, and there was a requirement to undertake works to safeguard the safe operation of the railway and to mitigate the ongoing deterioration of the listed asset, in order to preserve its historic significance. This triggered a process of optioneering to identify a scope of works most appropriate for the listed asset and the ongoing safe operation of the railway.

Assessment of Impact

- 7.2 The structure is Grade II listed for its industrial archaeological interest of the Rhonda and Swansea Bay Railway

and being the only previously opening bridge of this type in Britain built both on the skew and on a curve. The underbridge has had significant works carried out since its original construction and has had a number of more modern alterations, however overall, it remains close to the original design despite the swing element no longer being operation.

- 7.3 While the proposals include extensive repairs, strengthening and refurbishment all of the repairs have been carefully designed to look authentic, matching the broader appearance of the structure, and where possible will be completed on a like-for-like basis. The absolute minimal historic fabric is proposed to be removed from the structure, while meeting the relevant railway loading and safety standards.
- 7.4 The general repainting works will be completed to a high standard, matching the existing colours of the structure. The steelwork repairs and strengthening will not impact the over appearance of the asset from any public vantage point, and once repainted the repairs will be in keeping with the wider structure. The repairs will however be identifiable on close inspection, providing a true representation of the ongoing repairs and maintenance over time to the structure. The proposed repairs are designed to mitigate the replacement of large amounts of the structure by over plating.
- 7.5 The introduction of waterproofing, renewed spigots/drainage, modern preparation and painting methods and treatment will safeguard the structure from further deterioration and will mitigate any further major intervention for a period of 25 years.
- 7.6 Based on the above assessment and information, the supporting inspection reports, plans, schedules, and sections it is considered that the repairs proposed are the minimal intervention to maintain this asset as an operational structure, while protecting the character and appearance of the structure as a whole. The proposals have been developed in accordance with key legislative and policy documents including Managing Change to listed Buildings in Wales (Cadw) and the Local Development Plan.

8 Conclusion

- 6.1 Network Rail is seeking listed building consent to undertake repairs, strengthening and refurbishment of River Neath Swing Bridge. For the reasons outlined in this Supporting Statement Network Rail believes the proposed development to be in accordance with both national and local planning and heritage policy. We therefore trust that Neath Port Talbot Council will support the proposal submitted under this application for Listed Building Consent.

Appendix 1 – Steel Over Plating Examples





Network Rail (Property)

www.networkrail.co.uk