Infrastructure Projects

Northern Programmes

The Network Rail (Huddersfield to Westtown (Dewsbury) Improvements) Order

Ming Hill Underbridge (MDL1/14) – Heritage Assessment

Network Rail

March 2021

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1. INTRODUCTION

1.1 Report Objectives

1.1.1 The Scheme is part of a wider programme of works known as the Transpennine Route Upgrade (TRU) (herein referred to as the 'Programme') which will improve the Transpennine railway between Manchester, Huddersfield, Leeds and York and improve connections between key towns and cities across the north of England; it will contribute to the overall TRU aims of increasing service capacity and offering journey time benefits through:

- Four tracking and upgrading of the existing railway line including track realignment (currently the majority of the railway in the Scheme area has two tracks);
- Electrification of the line;
- Increase in line speeds;
- Provision of sections of new railway;
- Provision of new grade-separated junction within the Ravensthorpe area;
- Remodelling of stations including platform extension works at Deighton, Mirfield and Huddersfield; and
- Provision of replacement station at Ravensthorpe.

1.1.2 As well as the works identified above, various other engineering works are necessary including strengthening and replacement of bridge decks (rail and highway); electrification of the line and provision of associated infrastructure will require raising the height, demolition of or replacement of bridge structures.

1.1.3 The Transport and Works Act 1992 introduced section 12(3A) in to the Planning (Listed Buildings and Conservation Areas) Act 1990, the effect of which is to "call-in" for determination by the Secretary of State applications to the local planning authority for Listed Building Consent where such consent is required in consequence of proposals included in an application for a Transport and Works Act Order (TWAO). The procedures in the Transport and Works Applications (Listed Buildings, Conservation Areas and Ancient Monuments Procedure) Regulations 1992 then apply to the call in of such Listed Building Consent applications.

1.1.4 Ming Hill Underbridge (MDL1/14) was designated a Grade II Listed Building in March 2018. The Historic England list description (included in full in Appendix B) names the listed bridge as "Railway underbridge MDL1/14, Ming Hill". Throughout this Heritage Assessment the structure is referred to as "Ming Hill Underbridge (MDL1/14)".

1.1.5 This Heritage Assessment has been compiled in support of an application for Listed Building Consent by Network Rail in respect of the proposed works on the Grade II Listed Ming Hill Underbridge (MDL1/14) (NHLE 1451887), Kirklees, West Yorkshire.

1.1.6 This Heritage Assessment will seek to:

- Identify and discuss the heritage significance of the listed structure;
- Present the design requirements of the Scheme at the structure;
- Present the process of design development and optioneering which has led to the design proposal for the Scheme in relation to the structure;

- Identify the impacts of the design proposal on the significance of the structure, in the context of current national planning policy and guidance;
- Discuss any mitigation and/or compensation recommended in relation to the structure; and
- Consider the public benefits to be gained from the design proposal in relation to the structure, weighed against the impact on significance, in line with current national planning policy and guidance.

1.1.7 The construction methodology for the proposals, is set out in the Code of Construction Practice (CoCP). A copy of the Part A of the COCP can be found at Appendix 2-1 in Volume 3 of the Environmental Statement (ES) submitted as part of the TWAO submission. Part B of the CoCP will be submitted to and agreed by the Local Authority pursuant to a condition to be attached to the deemed planning permission[1] prior to construction works commencing. Specific details of mitigation and compensation measures will be detailed in the Conservation Implementation and Management Plan (CIMP) for the Scheme to be submitted pursuant to a condition to be attached to the Listed Building Consent.

1.2 Current Condition

1.2.1 Ming Hill Underbridge (MDL1/14) is a Grade II listed bridge that was constructed in the mid-1840s, between 1845-1847. It is located at National Grid Reference (NGR) SE 24028 21464, approximately 465m to the south-west of Dewsbury station, on land that is currently used by a waste management business. Although the bridge carries an operational railway, it no longer accommodates any access under the railway as the north western approach to the bridge was infilled, leaving only the parapets exposed, in around 1970 to facilitate the widened A644, located approximately 20m to the north west of the bridge. The south east elevation remains open, although the space underneath the structure is already partially infilled.

1.2.2 The original structure is a cast iron beam bridge. In the early 1900s, the central portion of the deck was replaced with brick jack arches supported on riveted plate steel girders. It was noted in 2019 that new ties have been installed between all the girders that supported the jack arches. The edge girders are surviving features of the bridge's original design and construction, from which it derives notable heritage significance. The substructure consists of stone abutments and curving, raked wing walls. The bridge carries two lines, one towards Dewsbury and the other towards Huddersfield.

1.2.3 The structure was subject to a detailed examination as part of Network Rail's maintenance regime in 2017, which identified that it is in fair condition. However, it is now recognised that there are major issues present, including multiple transverse fractures, and that the structure is in a deteriorating state. Regular interventions have been required to sustain the structure's use to date. Defects have been stabilised through a series of tie-bar installations over multiple occasions to prevent lateral movement to the girders (see Inserts 1-1 to 1-7). The structure's deteriorating condition presents a significant issue and risk.

1.2.4 The bridge is expected to experience continued deterioration based on its current worsening state, evidenced by the multiple transverse fractures and lateral movement of the girders, and further structural interventions will be required to keep it in a safe condition, with

[1] On making an order under the Transport and Works Act 1992, the Secretary of State may direct that planning permission shall be deemed to be granted, subject to such conditions (if any) as may be specified in the direction.

replacement being required within 120 years.

Insert 1-1 South-eastern side of Ming Hill Underbridge (MDL1/14), showing heavily vegetated area with poor access to the structure.

Insert 1-2 Transverse fracture pointed and intact with three date tabs 30/11/15 (Network Rail (NR) Bridge Detailed Examination (DE) Report Exam ID: 9002511, 04/12/2017)

Insert 1-3 Three new tie bars on edge bays (first noted on NR DE Report 2017)

Insert 1-4 New vertical step fracture (first noted on NR DE Report 2017)

Insert 1-5 Displaced bedstone on eastern side of north-eastern abutment. (NR DE Report 2017)

Insert 1-6 Mild corrosion to bottom flange of girders and tie bars

Insert 1-7 Damping shown along the crown of the jack arches, indicative of failed waterproofing

1.3 Summary of Proposal

1.3.1 To achieve the TRU Programme objectives of improving the reliability and resilience of the railway, line speed on the two tracks carried above Ming Hill Underbridge (MDL1/14)need to be increased from 60/75 mph to 100 mph, requiring a re-alignment of the railway tracks in the horizontal and vertical direction.

1.3.2 In order to accommodate the required increased line speed, it is proposed to sympathetically infill the structure. Elements which contribute to the structure's significance, such as the cast iron girders and parapets, and the legibility of the 1840s historic form of the bridge would be retained. This would allow the historic value of the structure to be appreciated from the south-east side of the structure whilst mitigating risks associated with its deteriorating condition.

1.3.3 The proposal was developed through a thorough process of optioneering and assessment, which has included engagement with historic environment stakeholders (see Section 3.2). The proposals facilitate the wider requirements of the Scheme and the associated economic, environmental and social benefits, whilst minimising, where practical, impacts on the heritage significance of the structure (see Section 3.2).

1.4 Legislative and Policy Context

Legislation

1.4.1 The Planning (Listed Buildings and Conservation Areas) Act 1990 (as amended) governs the designation and works to listed buildings in England.

1.4.2 The Act states in **s.1 (5)**:

'In this Act "listed building" means a building which is for the time being included in a list compiled or approved by the Secretary of State under this section; and for the purposes of this Act—

(a) any object or structure fixed to the building;
(b) any object or structure within the curtilage of the building which, although not fixed to the building, forms part of the land and has done so since before 1st July 1948, shall be treated as part of the building.'

1.4.3 Under the Act, no one is permitted to undertake or cause to be undertaken any works that would affect the character of a listed building unless the works are authorised. **Section 16** of the Act identifies that whether such works can be carried out is determined by the local planning authority or the Secretary of State:

'(1) Subject to the previous provisions of this Part, the local planning authority or, as the case may be, the Secretary of State may grant or refuse an application for listed building consent and, if they grant consent, may grant it subject to conditions.

(2) In considering whether to grant listed building consent for any works the local planning authority or the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.

(3) Any listed building consent shall (except in so far as it otherwise provides) ensure for the benefit of the building and of all persons for the time being interested in it.'

1.4.4 In relation to the granting of Listed Building Consent, **Section 17** of the Act stipulates that conditions attached to Listed Building Consent may include those with respect to:

'(a) the preservation of particular features of the building, either as part of it or after severance from it;

(b) the making good, after the works are completed, of any damage caused to the building by the works; [and]

(c) the reconstruction of the building or any part of it following the execution of any works, with the use of original materials so far as practicable and with such alterations of the interior of the building as may be specified in the conditions'.

1.4.5 It is also defined in s.17 (2) that a condition 'may also be imposed requiring specified details of the works (whether or not set out in the application) to be approved subsequently by the local planning authority or, in the case of consent granted by the Secretary of State, specifying whether such details are to be approved by the local planning authority or by him'.

1.4.6 The Act also states in **s.66 (1)**:

'In considering whether to grant planning permission or permission in principle for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses'.

National Policy

1.4.7 The National Planning Policy Framework (NPPF, 2019) provides the Government's national

planning policy on the conservation of the historic environment, supported by the Planning Practice Guidance (updated July 2019). It was published in March 2012 and revised in February 2019. This Heritage Assessment aims to address relevant policy within the NPPF in relation to Section 16 'Conserving and enhancing the historic environment' and includes an assessment of significance of the heritage assets and their setting that may be affected by the proposed works, in compliance with paragraphs 189-202.

1.4.8 The following paragraphs as set out in the NPPF include key provisions considered of particular importance to this application.

- **Paragraph 189 -** *In determining applications, local planning authorities should require an applicant to describe the significance of any heritage assets affected, including any contribution made by their setting. The level of detail should be proportionate to the assets' importance and no more than is sufficient to understand the potential impact of the proposal on their significance...*
- **Paragraph 193 -** *When considering the impact of a proposed development on the significance of a designated heritage asset, great weight should be given to the asset's conservation (and the more important the asset, the greater the weight should be). This is irrespective of whether any potential harm amounts to substantial harm, total loss, or less than substantial harm to its significance*.
- **Paragraph 194 -** *Any harm to, or loss of, the significance of a designated heritage asset (from its alteration or destruction, or from development within its setting), should require clear and convincing justification*.

  a) grade II listed buildings, or grade II registered parks or gardens, should be exceptional;

  b) assets of the highest significance, notably scheduled monuments, protected wreck sites, registered battlefields, grade I and II listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites, should be wholly exceptional[2].*
- **Paragraph 195** - *Where a proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset, local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or total loss is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:*

  a) the nature of the heritage asset prevents all reasonable uses of the site; and

  b) no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation; and

  c) conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and

  d) the harm or loss is outweighed by the benefit of bringing the site back into use.
- **Paragraph 196 –** *Where a development proposal will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against*

[2] Non-designated heritage assets of archaeological interest, which are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets

the public benefits of the proposal, including, where appropriate, securing its optimum viable use.

- **Paragraph 197 –** *The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgment will be required having regard to the scale of any harm or loss and the significance of the heritage asset*.

1.4.9 The National Planning Practice Guidance (Historic Environment) (PPG) gives further information on how national policy is to be interpreted and applied locally. The PPG includes particular guidance on matters relating to protecting the historic environment. The PPG for historic environment was significantly updated in 2019 to reflect the changes made in 2018/19 to NPPF policy.

Local Policy

1.4.10 The Kirklees Local Plan was adopted in February 2019 and is now the statutory development plan for Kirklees providing a set of planning policies.

1.4.11 Kirklees Council recognises that *heritage assets are an irreplaceable resource and should aim to conserve them in a manner appropriate to their significance*[3]. Section 14.1 of the Local Plan sets out Policy LP35 relating to the historic environment. The entire text of this policy is reproduced below:

Policy LP35 Historic Environment

1. *Development proposals affecting a designated heritage asset (or an archaeological site of national importance) should preserve or enhance the significance of the asset. In cases likely to result in substantial harm or loss, development will only be permitted where it can be demonstrated that the proposals would bring substantial public benefits that clearly outweigh the harm, or all of the following are met:*

   a) *the nature of the heritage asset prevents all reasonable uses of the site;*

   b) *no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation;*

   c) *conservation by grant-funding or some form of charitable or public ownership is demonstrably not possible; and*

   d) *the harm or loss is outweighed by the benefit of bringing the site back into use.*

2. *Proposals which would remove, harm or undermine the significance of a non-designated heritage asset, or its contribution to the character of a place will be permitted only where benefits of the development outweigh the harm having regard to the scale of the harm and the significance of the heritage asset. In the case of developments affecting archaeological sites of less than national importance where development affecting such sites is acceptable in principle, mitigation of damage will be ensured through preservation of the remains in situ as a preferred solution. When in situ preservation is not justified, the developer will be required to make*

[3] Kirklees Council, Kirklees Local Plan Strategy and Policies, 2019, 144. https://www.kirklees.gov.uk/beta/planning-policy/pdf/local-plan-strategy-and-policies.pdf

adequate provision for excavation and recording before or during development.

3. *Proposals should retain those elements of the historic environment which contribute to the distinct identity of the Kirklees area and ensure they are appropriately conserved, to the extent warranted by their significance, also having regard to the wider benefits of development. Consideration should be given to the need to:*

   a) *ensure that proposals maintain and reinforce local distinctiveness and conserve the significance of designated and non-designated heritage assets;*

   b) *ensure that proposals within Conservation Areas conserve those elements which contribute to their significance;*

   c) *secure a sustainable future for heritage assets at risk and those associated with the local textile industry, historic farm buildings, places of worship and civic and institutional buildings constructed on the back of the wealth created by the textile industry as expressions of local civic pride and identity;*

   d) *identify opportunities, including use of new technologies, to mitigate, and adapt to, the effects of climate change in ways that do not harm the significance of heritage assets and, where conflict is unavoidable, to balance the public benefit of climate change mitigation measures with the harm caused to the heritage assets' significance;*

   e) *accommodate innovative design where this does not prejudice the significance of heritage assets;*

   f) *preserve the setting of Castle Hill where appropriate and proposals which detrimentally impact on the setting of Castle Hill will not be permitted*

1.5 Consultation

1.5.1 Historic England and Kirklees Council have been involved in ongoing stakeholder consultation with Network Rail through the development of the Transpennine Route Upgrade between Huddersfield and Westtown (Dewsbury).

1.5.2 Regular meetings with both these historic environment stakeholders have been held to discuss structures of heritage significance on the alignment of the railway which are subject to impacts during the construction or operation of the proposed scheme. The first of these meetings was held in September 2019[4], with subsequent meetings held approximately every six to eight weeks, each meeting covering a group of structures (with not every structure discussed at every meeting). Each meeting is referred to as a 'round' of consultation in the bullet point list below.

1.5.3 The design development and proposals for Ming Hill Underbridge (MDL1/14) were presented to and discussed with the historic environment stakeholders during meetings on the following dates:

- 4 September 2019- W3 Bridges and Structures – Historic England / Kirklees Council (Conservation) Engagement (1st round);

[4] Meeting held on 4 September 2019 in Leeds.

- 16 April 2020- W3 Bridges and Structures – Historic England / Kirklees Council (Conservation) Engagement (6th round);
- 13 August 2020- W3 Bridges and Structures – Historic England / Kirklees Council (Conservation) Engagement (10th round); and
- 17 September 2020- W3 Huddersfield Station, Bridges and Structures – Historic England / Kirklees Council (Conservation) Engagement (12th round)

1.5.4 At the **4th September 2019** meeting, Ming Hill Underbridge (MDL1/14) (Grade II Listed, NHLE 1451887), was introduced and reasons behind its significance were presented. It was explained that the bridge is in a deteriorating condition and that it has already undergone substantial alterations including deck replacement and partial infilling. The Scheme's scope at this location would be to increase line speed from 60/75 mph to 100 mph, and it was noted that although the bridge would be able to accommodate the required increase in line speed, strengthening works could be required. The two proposed options which included retaining the bridge or sympathetically infilling the structure were presented (see paragraphs 3.2.3 and 3.2.4 below for more detail) and it was confirmed that infilling would be the most cost-effective option with the greatest associated public benefit. Materials, design and reversibility of the infilling were also discussed.

1.5.5 The meeting on **16th April 2020** noted the structure's similarities with Toad Holes Underbridge (MDL 1/12) however it also pointed out that Ming Hill Underbridge (MDL1/14) is in a better condition and probably at sufficient strength to carry the Scheme's additional capacity. However, it was also noted that ongoing decisions and optioneering regarding track design and location of switches and crossings (S&Cs) for project W4 might require MDL 1/14 to be infilled. It was noted that the infilling would be undertaken in a sympathetic manner, and discussions around the bridge's deck and the infilling were raised.

1.5.6 In the **13th August 2020** meeting it was confirmed that the S&Cs for the W4 section of the route would no longer have to be located on Ming Hill Underbridge (MDL1/14). This negated the requirement to infill the structure to meet design guidelines. A full review of the structure's existing condition and capacity as well as a detailed whole life costs and embodied carbon assessment was presented and it was pointed out that although no immediate works to the structure were required as part of the TRU scope, regular maintenance works and an eventual replacement would be required into the future. It was noted that infilling the structure would be a more sustainable approach due to considerable public benefits in relation to whole life costing and embodied carbon (see paragraph 3.2.6 below). It was then recommended that the structure would be infilled in a sympathetic manner that would retain its historic features and legibility on the south eastern side; it was also noted that the infilling would also extend the lifetime of the structure's retained historic elements by reducing their load-bearing requirements. The historic environment stakeholders thought that the ability to retain the structure while still meeting the Scheme's operational requirements made it a challenging argument. It was agreed that there would need to be strong justification of the public benefits achieved through completely infilling the historic bridge. It was noted that this structure also contributed to group value of Thomas Grainger cast iron structures on the route. It was mentioned that the presence of these other similar structures could help balance the impact across the assets.

1.5.7 At the **17th September 2020** meeting, a final discussion on Ming Hill Underbridge (MDL1/14) took place to confirm agreement on the proposed works. A presentation of the proposals was given and the justification including public benefits and mitigation measures were reiterated. A recent review of track alignment was also presented. This showed that the bridge's central deck would have to be removed to achieve the proposed track alignment and safe ballast depths over the structure. This would only affect the modern portion of the

deck (steel girders and brick jack arches) and the deck removal will be conducted in an appropriate manner to protect the historic cast iron edge girders. Historic England and Kirklees Council expressed their approval of the proposed works so long as full justification and design choices were documented in a Heritage Assessment.

1.5.8 Engagement with Historic England and Kirklees Council with regards to Ming Hill Underbridge (MDL1/14) will continue throughout the period of submission and determination of the TWAO and subsequently into the discharge of conditions to be attached to the Listed Building Consents.

2. HERITAGE ASSETS AND THEIR SIGNIFICANCE

2.1 Ming Hill Underbridge (MDL1/14) (Grade II Listed, NHLE 1451887)

Historic Background

History of the Transpennine Route

2.1.1 The Transpennine Route between Huddersfield and Westtown (Dewsbury) was constructed and opened between 1836 and 1849. The route today comprises sections of rail line developed by different railway companies, characteristic of the wider Transpennine Route between York, Selby and Manchester. The complex chain of companies and projects is a typical product of the "Railway Mania" of the mid-1840s, the height of a period of commercial confidence and expansion in the railways[5].

2.1.2 Between Huddersfield and Westtown (Dewsbury), the Transpennine Route is made up of sections of:

- The Manchester & Leeds Railway, constructed 1836-39, between Ravensthorpe and Heaton Lodge;
- The Leeds, Dewsbury & Manchester Railway, constructed 1845-47, between Westtown (Dewsbury) and Ravensthorpe; and
- The Manchester & Huddersfield Railway, constructed 1846-49, between Heaton Lodge and Huddersfield.

2.1.3 The line formed a new, more direct route to the West Riding from Manchester, in competition to the earlier Manchester & Leeds Railway which had been constructed through the Calder Valley in the late 1830s. The more direct route was enabled partly through the advances in tunnel construction and large-scale engineering technology, notably realised through the construction of the 3-mile Standedge Tunnel under the Pennine watershed to connect the line between the Upper Thame and Colne Valleys. Between Huddersfield and Westtown (Dewsbury), the line is partly characterised by such examples of large scale and/or pioneering engineering structures, including tunnels, viaducts and both masonry and cast iron bridges.

2.1.4 The development and expansion of the railways and their associated infrastructure during the first half of the 19th century, was characterised by the considerable influence on those towns which experienced the development of this new mode of transport. The railways resulted in place-making and industrial growth, as towns benefited from the connections and influences which they brought with them. The Transpennine Route between Huddersfield and Westtown (Dewsbury) certainly had an influence on towns, forming an additional infrastructure element in the expansion of settlements such as Dewsbury, which was already underway as a result of the growth of textile, mining and maltings industries.

2.1.5 Ming Hill Underbridge (MDL1/14) is located on the section of the Transpennine Route constructed the Leeds, Dewsbury & Manchester Railway between 1845 and 1847. This line was constructed during the Heroic Age of railway building (1841-50), a period of commercial confidence and expansion in the railways[6]. Opening in stages between 1846 and 1849,

[5] Alan Baxter Associates, 2019. *TransPennine Route Upgrade Route-wide Statement of Significance*. 14.
[6] Alan Baxter Associates, 2019. *TransPennine Route Upgrade Route-wide Statement of Significance*. 14.

when railway mania was at its height, the Leeds, Dewsbury & Manchester Railway was constructed under the oversight of the principal engineer Thomas Grainger. Grainger was one of the leading railway engineers in Scotland at this time, working on Pioneering age railways such as the Monkland and Kirkintilloch Railway (1824-1826) and the Glasgow and Garnick Railway (1826-1831), which he delivered in conjunction with the engineer John Miller. He is best known in England for his work on lines including the Leeds, Dewsbury & Manchester Railway (1845-1848), the East and West Yorkshire Junction Railway (1846); and the Leeds & Thirsk Railway (1845-1852). Grainger's work is notable for the imaginative way in which he tailored these lines to the difficult surrounding terrain and his bold masonry and iron bridge designs[7].

2.1.6 In 1847, the Leeds, Dewsbury & Manchester Railway along with the Huddersfield and Manchester Railway were absorbed into the London and North Western Railway (LNWR), providing a more direct route from Manchester to the West Riding and enabling the LNWR to access the textile and coal industries of West Yorkshire. By 1851, the LNWR was the most prominent railway company of the period, with over 800 miles of track and was the largest joint-stock concern of its time, capitalised at £29 million[8].

2.1.7 The history and significance of the Transpennine Route is discussed at more length in the Route-Wide Statement of Significance (Alan Baxter, 2019). This was produced to characterise the overall heritage significance of the Transpennine Route as a whole and is included in Appendix 6-1 of the Environmental Statement for the Scheme (Volume 3).

Ming Hill Underbridge (MDL1/14)

2.1.8 Ming Hill Underbridge (MDL1/14) was built between 1845-1847, constructed by Thomas Grainger for the Leeds, Dewsbury and Manchester Railway. The 1852 1:1,056 town plan shows that the bridge was provided for Dam Lane leading to Ing Mill, a textile mill, on the south-eastern side of the railway line (See Insert 2-1 below).

[7] Alan Baxter Associates, 2017. *MDL1/6 & MDL 1/8 Bridges Statement of Significance*. 13.
[8] Alan Baxter Associates, 2017. *Transpennine Route Statement of History and Significance: West of Leeds.* 5.

Insert 2-1 First Edition Ordnance Survey Six-inch map of Yorkshire (surveyed 1850-51, published 1855) showing Ming Hill Underbridge (MDL1/14) (in blue circle)

2.1.9 Cast iron beams were a common form of bridge construction and were widely used for early railway bridges until the late 1840s when a series of bridge failures led to a dramatic decline in their use. There was widespread replacement due to concerns over structural capacity and safety, and so Ming Hill Underbridge (MDL1/14) is a rare survival of its type. The bridge is one of three very similar cast iron level beam bridges along a 400m length of the line that also survive the replacement phase. The other two bridges comprise Toad Holes Underbridge (MDL1/12) (Grade II Listed, NHLE 1450704) and George Street (MDL 1/16) (Grade II Listed, NHLE 1451888). A fourth bridge Jack Lane (MDL1/24) (Grade II Listed, NHLE 1452193) located approximately 1.5km north-east is another example of a cast iron Grainger designed beam bridge albeit with parapets that have a slightly different design approach.

2.1.10 Although Ming Hill Underbridge (MDL1/14) is a surviving example of a cast iron level beam bridge from the 1840s, it has undergone substantial alteration since its construction. In the early 1900s, the central portion of the deck was replaced with brick jack arches supported on riveted plate steel girders. In c.1970, the clearance of the buildings surrounding the bridge and the need for a road realignment to the north-west of the bridge, resulted in the infilling of the approach to the bridge on that side.

Description

2.1.11 The cast iron beam underbridge originally spanned a single carriageway. The bridge is supported by masonry abutments formed of coursed, squared, rock-faced masonry, finished with a robust moulded ashlar cornice which supports the bridge deck.

2.1.12 The underbridge is flanked by projecting panelled ashlar pilasters that rise from rock-faced masonry plinths and are finished with moulded cornices, with parapet end-pillars rising above. These parapet end-pillars have corniced capstones and plain plinths. Iron balustrading spans the parapet between the pillars. The balustrades consist of a plain handrail supported by closely spaced simple round balusters with mirrored tulip-formed mid-sections.

Insert 2-2 Original cast iron fascia edge beam and iron balustrading

Insert 2-3 Projected panelled ashlar pilasters and curved wing wall

2.1.13 The cast iron fascia edge beams of the bridge deck are thought to be the only surviving cast iron beams of the original bridge. They appear to be I-beams in form and are embellished with decorative panels that spring from a moulded ashlar impost band. The bridge deck is a

more modern replacement consisting of brick jack arches supported on riveted plate steel girders, dating from the early 20th century.

Insert 2-4 Modern deck consisting of brick jack arches supported on riveted plate steel girders with new tie bars between girders

2.1.14 The flanking embankments are revetted with raking, rock-faced masonry curved wing-walls, similar in style to that of the abutments. These are finished with a plain ashlar capping and divided from the retaining walls of the rest of the embankment by simple pilaster-strips.

2.1.15 The setting of Ming Hill Underbridge (MDL1/14) is largely localised due to the topography of landscape surrounding the structure. The infilling of the structure on its north-west elevation has severely degraded the structure's visibility from that side. From the north-west, only screened views of the remaining parapet can be seen from the A644 Road. On the south-eastern side, the structure's setting has also been degraded following the clearance of the original textile mill buildings and their replacement with a waste management business. The structure is also partially infilled with rubble, dirt and vegetation on that approach (visible in Insert 1-1), and it is only visible from within the waste management property and adjacent land parcels (today housing a car wash), with only heavily filtered views towards the structure from public rights of way by the River Calder. The relationship with the railway contributes to the asset's setting, though again the limited visibility of the structure limits the degree to which this can be understood. Similarly, though the embanked railway alignment over the structure provide a fortuitous view for train passengers down onto the adjacent property, such a view is only briefly glimpsed and does not enhance understanding of the structure itself.

Significance

2.1.16 Ming Hill Underbridge (MDL1/14) derives significance from its rare survival as a cast iron level beam bridge dating to the Heroic Age (1841-50) of railway development. It also derives significance from its historic association with the engineer Thomas Grainger, its ability to reveal late 19th century structural techniques and its considered architectural treatment which raises it above a purely functional engineering structure. The significance of the structure has however been diminished by its partial infilling, which has obscured the north-

west elevation.

2.1.17 Ming Hill Underbridge (MDL1/14) was designated a Grade II Listed Building in March 2018. The Historic England List Entry description[9] identifies the following elements of significance from which the structure is considered to have special interest:

- Historic interest:
  - constructed during the heroic age of railway building, being a rare surviving example of a cast iron level beam bridge, a form very widely used up until the late 1840s;
  - designed by the notable Scottish railway engineer Thomas Grainger.
  - the later replacement deck incorporating wrought iron [sic][10] beams is a good example of the way that cast iron bridges were strengthened in the later C19.
- Architectural interest:
  - although it is a minor accommodation bridge, the inclusion of features such as ashlar pilasters and cornices with embellishment also extended to the ironwork lifts the design above the purely functional.

2.1.18 The underbridge largely derives significance from its historical value as a rare surviving, albeit altered, example of a cast iron level beam bridge that was constructed during the Heroic Age of (1841-50) of railway development. This form of construction was common for early railway bridges up to the 1840s, when they were widely replaced due to concerns over structural capacity and safety after a series of bridge failures and accidents took place. The bridge also derives significance from its historic association with the Leeds, Dewsbury & Manchester Railway (1845-7) and distinguished railway engineer Thomas Grainger, who has designed several cast iron bridges on the line (see ***2.1.23*** below).

2.1.19 The structure also possesses evidential value particularly in relation to its late 19th / early 20th century deck replacement. The new deck, consisting of brick jack arches supported on riveted plate steel girders, is considered a good example of how cast iron bridges were strengthened during that time. This gives the structure value in providing opportunity to reveal information about historic construction and structural techniques sourcing of material and management of repairs, contributing to its overall significance.

2.1.20 The underbridge also derives significance from the aesthetic value of its architectural quality and design interest, which is a characteristic feature of Grainger's railway bridges. The bridge's considered architectural treatment, showcased in its ashlar pilasters and decorated cornices and ironwork, raises it above a purely functional engineering structure. Although the bridge's deck was altered in the 1900s and the north-western approach was infilled in the 1970s, the bridge still retains the elements which contribute to its aesthetic value. The limited alteration to its ashlar pilasters and decorated cornices and ironwork is testament to the quality of Grainger's design which can still be appreciated today, contributing to the underbridge's significance.

2.1.21 Although Ming Hill Underbridge (MDL1/14) is a rare example of a surviving cast iron level beam bridge, the structure does not survive in its full original form, nor does it retain its full original operational function as, although it still carries an operational railway, it does not

[9] https://historicengland.org.uk/listing/the-list/list-entry/1451887
[10] The listing description identified this as wrought iron, however an Arup assessment determined they are riveted plate steel girders.

accommodate access underneath. The substantial alterations that the bridge has undergone, including the modern deck replacement in the 1900s and the 1970s partial infilling of its north western approach, have resulted in diminishing the bridge's authenticity and legibility as well as the loss of its full historic function. This has reduced its historic significance, as it has degraded the legibility of understanding the bridge's historic use and form.

2.1.22 Ming Hill Underbridge (MDL1/14) does not derive particular significance from its setting. The structure is located in a relatively secluded position, with very limited visibility from public roads or footpaths. Similarly, though it has a relationship with the railway, the legibility of this cannot currently be widely understood, either from within the surrounding landscape, nor for those traveling by train over it, and this does not contribute to the underbridge's overall significance.

Group value

2.1.23 Ming Hill Underbridge (MDL1/14) is one of eleven Thomas Grainger-designed iron structures on the Leeds Dewsbury & Manchester Railway line. Of those, five others survive, which are:

- MDL 1/6 Calder and Hebble Underbridge (Grade II Listed, NHLE 1183783)
- MDL 1/8 River Calder Underbridge (Grade II Listed, NHLE 1313646)
- MDL 1/12 Toad Holes Underbridge (Grade II Listed, NHLE 1450704)
- MDL 1/16 George Street Underbridge (Grade II Listed, NHLE 1451888)
- MDL 1/24 Jack Lane Underbridge (Grade II Listed, NHLE 1452193)

2.1.24 In addition to the above iron structures, there are other masonry Grainger-designed structures which also survive on the route such as MDL 1/10 Occupation Underbridge (Grade II Listed, NHLE 1450702), MDL 1/35 Howley Mill Lane Underbridge (Grade II Listed, NHLE 1452199) and MDL 1/39 Churwell Underbridge (Grade II Listed, NHLE 1451051).

2.1.25 Although Ming Hill Underbridge (MDL1/14) derives some significance from group value with all the above Grainger structures, it forms part of a rare sequence of 1840s cast iron bridges which share a common design language with Toad Holes Underbridge (MDL1/12) (NHLE 1450704) and George Street Underbridge (MDL1/16) (NHLE 1451888). Together, these three bridges, within a relatively short length of line, form a group united by their architectural treatment and historic association with both Grainger himself, and the Leeds, Dewsbury and Manchester Railway.

2.1.26 The group value of Ming Hill Underbridge (MDL1/14) makes some contribution to its overall significance, as it comprises one element of the wider surviving group of structures associated with Thomas Grainger on the Transpennine Route.

2.2 Other Heritage Assets

2.2.1 The location of the heritage assets discussed below are shown in Appendix A.

Non-Designated Heritage Assets

2.2.2 The Environmental Statement (Chapter 6 of Vol 2i / 2ii) produced for the Scheme, submitted as part of the TWAO submission, has identified two non-designated heritage assets located in proximity to MDL 1/14 Ming Hill Underbridge. They comprise the former sites of Ing Mill, directly adjacent to the structure to the south and Anchor Mill Webster Hill (HER 15200) approximately 50m to its north east.

2.2.3 Both Ing Mill and Anchor Mill comprise sites of former textile mills dating to the mid-19th century. Ing Mill formed part of the complex that Ming Hill Underbridge (MDL1/14) was built to provide access to. The sites have since been demolished and currently comprise modern industrial buildings and open undeveloped ground. They derive limited significance from their historic interest as evidence of development of Dewsbury's textile industry.

2.2.4 Although the non-designated assets make some contribution to the significance of Ming Hill Underbridge (MDL1/14) in helping understand the purpose and origins of the bridge and its association with the wider industrial landscape character of the area, the clearance of the mill buildings and the subsequent partial infilling of Ming Hill Underbridge (MDL1/14) have substantially degraded the context and spatial relationship from which they derive significance from one another.

3. PROPOSALS

3.1 Background to Proposals

3.1.1 To achieve the TRU Programme objectives of improving the reliability and resilience of the railway, line speed on the two tracks carried above MDL 1/14 Ming Hill Underbridge need to be increased from 60/75 mph to 100 mph, requiring a re-alignment of the railway tracks in the horizontal and vertical direction.

3.1.2 As mentioned in Section 1.2, Ming Hill Underbridge (MDL1/14) is currently in fair condition. However, this condition appears to be deteriorating, and though the structure would have sufficient capacity to carry the new line speeds, there are major issues present (see paragraphs 1.2.3 and 1.2.4 above) which present a significant risk long-term. Regular interventions have been required to sustain the structure's use to date. Defects have been stabilised through a series of tie-bar installations over multiple occasions to prevent lateral movement to the girders, however, the structure is expected to experience continued deterioration under the new loadings, and further structural interventions will be required in the future to keep it in a safe condition, with full replacement being required within 120 years.

3.2 Design Development and Justification

3.2.1 Two options were considered during the structure's design process and appraisal these included:

- Option 1- retain the structure; and
- Option 2- infill the structure in a sensitive manner.

3.2.2 The design development process appraised these options, taking into consideration a number of elements around the suitability of the approaches. These included:

- Impact on heritage significance;
- Constructability, including any issues posed by required construction approach or programme, and health and safety; and
- Operational suitability, including whole life cost and maintenance.

3.2.3 Option 1 was to retain the structure. The underbridge had been assessed to have sufficient capacity to meet the Scheme's new line speeds, however, as illustrated in Section 1.2, major issues with the structure's deteriorating condition would present significant risks longer-term, with the structure expected to experience continued deterioration under the new loadings. Regular interventions have been required to sustain the structure's use to date. It is unclear how long the structure would retain this capacity and further structural interventions and frequent maintenance works would be required throughout its lifetime to keep it in a safe condition. The continued wear and tear and necessary interventions for repair and strengthening could further degrade the elements that contribute to the structure's significance. It was also estimated that a full bridge replacement will be required within 120 years. The regular maintenance works required would include:

- Pointing repairs to open fractures
- Pointing repairs to areas of open joints
- Re-waterproofing of the bridge deck

- De-vegetation of abutments and wing walls
- Repainting of bottom flanges

3.2.4 Option 2 was to infill the bridge in a sensitive manner. This approach would retain the elements of historic fabric and features that contributes to the bridge's significance i.e. the cast iron girders and the legibility of the structure's historic form on the south-eastern side. The infill would comprise both granular fill and foam concrete, with a new masonry wall across the south facing elevation of the structure; this would be constructed in a design which is in keeping with the existing structure's wing-walls, and slightly recessed to the face of the structure to preserve legibility of its historic design. The central portion of the bridge deck would need to be removed as part of the infill works, however any work required to the bridge deck would be to the modern brick jack arches and riveted plate steel girders , the original cast iron edge girders and parapets would be left intact. Replacing the central portion of the deck would be required in order to:

- Achieve the steep track cant proposed to deliver the increased line speed
- Meet the required vertical tie in with the section of the Transpennine Route to the east towards Dewsbury Station
- Avoid un-maintainable and unsafe ballast depths over the structure
- Avoid major earthworks on the approaches
- Avoid requirements to undertake major structural works to the nearby Watergate Road (MDL1/13), Dewsbury

3.2.5 Taking all the above into consideration, it was agreed that Option 2 was the most favourable option. This design approach delivers protection of architectural historic features, cost-effectiveness, and safety. The reasons for this are as follows (and discussed further below in Section 4.3):

- Health and Safety: There are health & safety risks associated with regular maintenance and bridge replacement works (infill proposal eliminates these risks as very minimal future works to the structure would be required)
- Sustainability: There are significant embodied carbon savings with infilling the bridge rather than retaining and replacing the bridge every 120 years.
- Historic Value: The historic elements of the structure are already under considerable strain from the current load bearing required. Further attrition on these elements would occur if no works are undertaken. Infilling would extend the lifetime of the structure's retained historic elements by reducing the stresses upon them. The structure has already been partially infilled in a careless manner and infilling could be undertaken in a more sensitive manner which retains those elements of historic fabric most contributing to significance i.e. cast iron edge girders and which also retains the legibility of the structure's form on the south side. Infilling will extend the design life of the original edge girders and parapet so that they can be appreciated for longer.
- Operation: Minimising disruption to passengers by only having one intervention. This removes the need for further disruption of the railway in the future and aligns with Network Rail's policy and commitment of putting passengers first.
- Costs: The likely total cost of repair work and replacing the bridge after 120 years is approx. £500k in excess of the estimated infill costs. Significant whole life costs are associated with continued inspection and maintenance of the disused structure.

3.2.6 The design principles of this approach have also been reflected with other associated structures on the route where infilling is proposed. At Toad Holes Underbridge (MDL1/12) and Occupation Underbridge (MDL1/10), which share group value with Ming Hill Underbridge (MDL1/14), a similar approach has been pursued. Notwithstanding the common principles in designing sympathetic infilling, the significance of each individual structure has also been taken into account, with the approach for all three structures aiming to minimise harm, respond to significance and preserve legibility in the most appropriate and effective manner for each structure.

3.2.7 The proposal carries major benefits in terms of significantly reduced whole life costs, carbon emissions and health and safety risk due to the limited future work and maintenance requirements following an infill. It would allow the historic value of the structure to be under less strain and appreciated when viewed from the south side of the structure whilst mitigating risks associated with its currently deteriorating condition. This was deemed the most cost-effective, sustainable and safe proposal for the structure.

3.3 Description of Proposals

3.3.1 As mentioned above, it is proposed that Ming Hill Underbridge (MDL1/14) is infilled in a sensitive manner that retains the structure's historic significance. The proposed works relating to the Grade II Listed underbridge comprise:

- Removal of existing partial infill;
- Removal of the central portion of the existing deck, comprising the early 20th century replacement structure; this will be done in a manner which preserves the original edge girders and parapets;
- New infill to be completed from bottom up using granular fill and foam concrete;
- Holes to be cored in the bridge deck, through which the final grouting is to be completed;
- A new masonry blockwork wall to be constructed along the south-facing elevation - this would be slightly recessed to ensure the bridge's form is still legible; and
- Sheet piling to support earthworks.

3.3.2 The infilling would be undertaken in a sympathetic manner which would retain the elements of historic fabric most contributing to the structure's significance. This includes the structure's parapets, cast iron edge girders and projecting pilasters. Similarly, the masonry retaining wall would be slightly recessed from the face of the existing structure. This would ensure the legibility of the structure's form on the south eastern side is retained and the bridge's architectural language would still be understood in the proposed elevation. The infilling would also increase the lifetime of the retained historic edge features and parapets by reducing their required loading and structural capacity.

3.3.3 The proposed works to Ming Hill Underbridge (MDL1/14) are shown in the following drawings which accompany this application:

- Location Plan (1:1250);
- Existing and Proposed Plan (151667-TSA-35-MVN2-DRG-T-LP-163920);
- Existing and Proposed Elevation (South side) (151667-TSA-35-MVN2-DRG-T-LP-163921); and
- Existing and Proposed Sections (151667-TSA-35-MVN2-DRG-T-LP-163922).

Insert 3-1 3D indicative view of proposed infill option

4. IMPACT OF PROPOSALS

4.1 Impact on Heritage Assets

Impact on Ming Hill Underbridge (MDL1/14)

4.1.1 As identified above, the proposed works would require the permanent infilling of the Grade II Listed Ming Hill Underbridge (MDL1/14) (Grade II Listed, NHLE 1451887). This would result in changes to the form of the already partially infilled structure, however, elements of its appearance and legibility which contribute to its significance would be retained through sympathetic design of the proposals.

4.1.2 Although the infilling of the bridge would permanently alter the form of the structure, Ming Hill Underbridge (MDL1/14) had already gone through major changes in the 20th century, with alterations involving the replacement of its original deck with brick jack arches supported on riveted plate steel girders as well as its partial infilling with modern material on its north-western side, causing it to lose part of its historic function as an operational accommodation underbridge. The required proposals would cause further change to the structure, however, they would not substantially impact its already degraded significance.

4.1.3 As discussed, the deck of Ming Hill Underbridge (MDL1/14) is a modern replacement with no historic significance; any works to the deck would be to the later replacement fabric and any original fabric such as the cast iron edge girders would be left intact. The south-eastern elevation of the structure would be faced with a masonry blockwork wall, of sympathetic materials and finish to the surrounding historic fabric, slightly recessed within the structure. This would maintain legibility and understanding of its historic form and function. There would be no change to the cast iron fascia beams, balustrades or pilasters which are key aspects of the structure's significance.

4.1.4 As detailed above in paragraph ***2.1.17***, Ming Hill Underbridge (MDL1/14) derives significance from its association with the historic railway and engineer Thomas Grainger, its ability to reveal late 19th century structural techniques and the quality of architectural expression in its design. While the permanent physical impact on the structure would degrade its significance through some change in form and character of the structure, notable elements which contribute to its significance would be retained, particularly by the sympathetic infilling on the south eastern side. The historical value which the listed structure derives from its associations with the Heroic Age (1841-50) of railway building, the engineering design of Thomas Grainger and with the Transpennine Route itself would still be understood in spite of the slightly altered form, and would still contribute to the structure's overall significance.

4.1.5 The infilling of the structure would result in reduced potential to further understand the underbridge from its historic fabric, thereby reducing its evidential value. Although the infilling would result in concealing the bridge's deck and therefore the elements that reveal late 19th/ early 20th century strengthening techniques, this was not an uncommon approach and there are other Grainger bridges on the route which reveal similar construction techniques and that would be able to convey the same approach[11].

4.1.6 The design of the infill on the south eastern side ensures that the architectural elements of the structure such as the ashlar pilasters and decorated cornices and ironwork, which

[11] MDL 1/16 George Street (NHLE 1451888) features a similar jack-arched deck replacement, which is likely to be of similar date.

Historic England[12] identify as lifting the design above the purely functional, would be retained. Consequently, the architectural interest of the structure, contributing to its significance, would still be appreciated and understood across this elevation.

4.1.7 As identified above in paragraph ***2.1.22***, the listed bridge does not derive particular significance from its setting. The secluded position of the structure, its partial infilling, surrounding topography and land use all limit visibility towards it, reducing the extent to which its setting can be appreciated and understood. The setting of the structure has already been severely degraded by the partial infilling on the north-western side and the change in its surroundings. Though the infilling of the structure would further alter views towards it on the south-eastern side, the proposals would not result in any further degradation of the extent to which the bridge derives significance from its setting.

4.1.8 The group value which contributes to the significance of Ming Hill Underbridge (MDL1/14) is drawn from its identity as a Thomas Grainger structure sharing common design language with others along the route, particularly in relation to the rare sequence it forms with Toad Holes Underbridge (MDL1/12) (NHLE 1450704) and George Street Underbridge (MDL1/16) (NHLE 1451888) which are united by their architectural treatment and historic association with the Leeds, Dewsbury and Manchester Railway (see paragraph ***2.1.25***). The proposed works would have a slight impact on the structure's group value; the infilling of Ming Hill Underbridge (MDL1/14), and proposals elsewhere within the Scheme to infill Toad Holes Underbridge (MDL1/12) (Grade II Listed, NHLE 1450704) would result in permanent alterations to these structures within this group. However, although both these structures are being infilled, the continued legibility of their historic form on the south-eastern side through the sympathetic design of the infilling, and the retention of the architectural elements that contribute to their significance, would mean this would result in only limited impact on the significance each structure derives from its group value. As noted above in paragraph***3.2.6***, the design approach for the infilling of these structures has been developed with an appreciation for their group value, both ensuring the appearance of the infilling is consistent while taking into account their own individual character and significance.

4.1.9 The proposals would result in less than substantial harm in line with National Planning Policy within the NPPF and meet the test of achieving substantial public benefits in line with Kirklees Council Local Plan Policy LP35.

Impact on Other Heritage Assets

4.1.10 The proposals would have no direct impact on any other nearby non-designated heritage assets. Any temporary or permanent impacts arising from the construction of Scheme have been assessed in the Environmental Statement (Chapter 6 of Vol 2i / 2ii) for the Scheme, submitted as part of the TWAO submission, and will be appropriately mitigated where possible.

4.1.11 Although an inter-relationship and historic association was present between Ming Hill Underbridge (MDL1/14) and the non-designated sites of Ing Mill and Anchor Mill Webster Hill (HER 15200), the clearance of the mill buildings and the subsequent partial infilling of Ming Hill Underbridge (MDL1/14) have already substantially degraded the degree of which they contribute to each other's significance. The proposed works to Ming Hill Underbridge (MDL1/14) would not have any further impacts on their inter-relationship and its contribution

[12] https://historicengland.org.uk/listing/the-list/list-entry/1451887

to their significance.

4.1.12 As such, the proposals satisfy the National Planning Policy within the NPPF and the Local Planning Policy within the Kirklees Local Plan Policy LP35.

4.2 Mitigation and Compensation

4.2.1 Mitigation has been used in three separate ways: embedded mitigation; additional mitigation measures and compensation. These are briefly described below and have their basis in the hierarchy of mitigation as detailed in LA 104 Environmental Assessment and Monitoring[13].

4.2.2 Embedded mitigation occurs within the design stage and is intended to include elements within the design that avoid or substantially reduce negative change to the significance of a historic asset. It can also include elements where loss of historic significance is compensated through high quality new design and use of materials. There may also be changes that enhance or improve the historic asset. Embedded mitigation is discussed as part of the design development (see above, Section 3.2).

4.2.3 Additional mitigation measures are applied post-design stage and are intended to include processes and activities that will reduce the level of negative change to the significance of an historic asset.

4.2.4 Compensation measures are applied post-design stage and recognise that the impacts cannot be removed or reduced. These measures are intended as a means of recording the negative change to the significance of an historic asset; enabling future dissemination of information about this change.

Mitigation

4.2.5 The design of the proposals has been shaped to incorporate elements which mitigate potential impacts to the Listed structure as far as possible. These elements have been developed in discussions with Historic England and Kirklees Council. Additional information with respect to these elements of design development is included above in Section 3.2.

4.2.6 The design of the infilling on the south eastern side of the structure has been developed in a manner which seeks to retain the legibility of the bridge's historic form. Taking into account the historic and architectural interest of the form of the bridge, the approach of infilling the bridge with a masonry retaining wall, slightly recessed from the existing face of the structure, would retain visibility of this special interest. By installing a masonry-clad retaining wall to the south eastern face of the structure, the legibility of the architectural design of the bridge's face would be retained, thereby reducing the overall impact on the significance of the structure. The proposals also take into account other elements of the bridge's design which contribute to its architectural interest, realising the retention of the cast iron parapets and masonry pilasters which contribute to its significance.

4.2.7 The infilling would also increase the lifetime of the retained historic edge girders and parapets due to reducing their required loading and structural capacity. The infilling would mean that the structural capacity currently required by the structure's historic elements would be reduced. This would mean these historic elements would degrade at a slower rate

[13] Design Manual for Roads and Bridges, LA 104, Sustainability & Environmental Appraisal, Environmental assessment and monitoring. Revision 1 (August 2020).

than currently, therefore extending their lifetime.

4.2.8 The ES (Chapter 6 of Vol 2i / 2ii) produced to support the TWAO application for the Scheme has identified further mitigation measures which aim to reduce potential impacts on the significance of heritage assets arising as a result of the Scheme. These additional mitigation measures would be secured by way of conditions to be attached to the deemed planning permission for the Scheme, including the CoCP and the Construction Traffic Management Plan (CTMP) and the Listed Building Consent. In the case of Ming Hill Underbridge (MDL1/14), the additional mitigation measure would be undertaken:

- Toolbox talks to disseminate best practice for reducing potential impacts in relation to construction activity associated with the underbridge, for example to help avoid accidental damage. This mitigation measure would be secured.

Recommended Compensation

4.2.9 Requirements to undertake compensation in relation to historic buildings, including Listed Buildings, where the proposals of the Scheme would result in physical impacts to them, have been outlined in the Environmental Statement (Chapter 6 of Vol 2i / 2ii) for the Scheme, submitted as part of the TWAO submission. These compensation measures would be secured as conditions of the Listed Building Consent and aim to offset some of the harm which may occur to the assets' significance as a result of the Scheme.

4.2.10 A CIMP will be produced which will further define mitigation and compensation measures for historic buildings. Those measures discussed below will be detailed within the CIMP. The CIMP will be secured via a condition of the Listed Building Consent and its contents will be agreed with the Local Authority in consultation with the appropriate stakeholders (Historic England) prior to construction works.

4.2.11 **Historic building recording**: recording of Ming Hill Underbridge (MDL1/14) will be required prior to, or during, the construction of the Scheme, as agreed with the appropriate historic environment stakeholders via the CIMP. This would help to compensate the harm to significance resulting from the infilling by recording of the structure and furthering understanding of its development and value. The historic building recording would be undertaken to Level 2 in accordance with Historic England guidance[14], and would include:

- A drawn record;
- Photography; and
- A written record.

4.3 Public Benefit

4.3.1 The proposed line speed increase and subsequent infilling of Ming Hill Underbridge (MDL1/14) are required to realise the public benefits of the Huddersfield to Westtown (Dewsbury) Scheme.

4.3.2 The Scheme, as part of the wider TRU Programme, would directly and indirectly play a role in improving connectivity through journey time, capacity and reliability improvements,

[14] 2016, Historic England, Understanding Historic Buildings, https://historicengland.org.uk/images-books/publications/understanding-historic-buildings/heag099-understanding-historic-buildings/

alongside particular improvements for Huddersfield Station enhancing some of Britain's busiest rail track.

4.3.3 The Scheme is vital in supporting the North of England's long-term, low-carbon economic growth, and better-connecting people to jobs, services, education and leisure. The Kirklees Local Plan (paragraph 10.2) recognises the critical connection between effective transport systems and local business productivity and district prosperity.

4.3.4 The infilling of the underbridge is an integral component of achieving TRU Programme ambitions and without these changes the Scheme would be unable to go ahead. Chapter 21 (Socio-economic) of the ES (Volume 2i Scheme-wide Assessment) has been referred to in identifying these benefits.

4.3.5 The TRU Programme would provide economic and social benefits. These include reduction in journey times along this part of the Scheme with the aim of achieving 43-44 minutes between Manchester Victoria and Leeds Central. This will be partially facilitated by enabling line speeds of between 70 - 100 mph along the Scheme as well as through other projects on the Route. The increase in capacity through more train services and longer trains will reduce congestion, increase passenger comfort and improve journey quality. Future passenger modelling has indicated that the numbers of people using the Transpennine Route will increase from 5.33 million to 8.22 million in 2042/43. This would be partially achieved through the creation or enhancement of four tracking along parts of the Scheme, allowing for express trains to by-pass slower trains and freight services. The increased movement of people and goods along this key part of the railway network that connects major cities, towns and transport hubs supports a more economic and socially viable transport solution. It forms part of the West Yorkshire Transport Strategy for harnessing economic prosperity through a better connected transport network.

4.3.6 As part of the Scheme, there are environmental and sustainable benefits that arise from the improvements to public transport services and the introduction of more environmentally viable energy solutions. The electrification of the line through this part of the Scheme is an investment in 'greener' energy technology meeting Network Rail's Decarbonisation Strategy and bolstering national targets for reducing harmful emissions that cause climate change, which are set out in Government legislation for achieving net zero carbon by 2050.

4.3.7 The proposed work to infill Ming Hill Underbridge (MDL1/14) would provide public heritage benefits as the infilling would extend the lifetime of the structure's retained historic elements i.e. the cast iron edge girders and parapet by reducing the stresses upon them. This would mean these historic elements that contribute to the structure's significance would degrade at a slower rate than currently and would therefore ensure future appreciation for the structure and this type of heritage.

4.3.8 The proposed work to infill Ming Hill Underbridge (MDL1/14) also carries considerable public benefit in terms of whole life cost compared to the alternative approach of retaining the structure, carrying out regular maintenance works and subsequently replacing the underbridge. A comparison between the approaches shows a large difference in the whole life cost of retaining, maintaining and eventually replacing the underbridge compared to the proposed approach of infilling the structure.

4.3.9 It has been estimated that the cost of infilling the bridge and then maintaining the structure, including regular inspections, over a design life of 120 years, would total approximately £341,000. This is compared to a cost of approximately £857,000 to retain, maintain and replace the underbridge over the same period. Overall, it is estimated that the whole life cost of infilling the structure would be approximately £516,000 less than were it to be retained,

maintained and eventually replaced[15]. This represents a considerable public benefit considering that the construction and maintenance of the structure by Network Rail is undertaken using public funds.

4.3.10 The proposed infilling of the Listed bridge also carries considerable long-term benefits with respect to embodied carbon. The construction phase of both proposals would carry with it a similar amount of embodied carbon, however after the first design life cycle, this would remain constant for the infilling option but would continue to increase for retaining the bridge due to ongoing maintenance and the need to replace the bridge after every 120 years. Though a benefit associated with long-term future time periods, minimising embodied carbon is nevertheless an important public benefit of the Scheme.

[15] Whole life cost exercise undertaken by Network Rail (2020). Cost of maintenance repairs based on other structures of similar construction (provided by Network Rail); and maintenance and replacement costs provided by the TRU scheme cost estimation team.

5. CONCLUSION

5.1.1 Ming Hill Underbridge (MDL1/14) is a Grade II Listed Building which forms an important element of the historic railway infrastructure of the Transpennine Route. The structure derives significance as a rare survival of cast iron level beam bridge dating to the Heroic Age (1841-50) of railway development. It also derives significance from its historic association with the engineer Thomas Grainger, its ability to reveal late 19th century structural techniques and its considered architectural treatment which raises it above a purely functional engineering structure. The significance of the structure has, however, been degraded by its partial infilling in the 1970s, which has obscured its north-west elevation and its modern deck replacement. While the structure does not derive particular significance from its setting, it does possess group value as one of a number of Thomas Grainger-designed structures on the Transpennine Route.

5.1.2 The proposed Scheme would result in the permanent sympathetic infilling of the Grade II Listed underbridge. This change is considered to be less than substantial harm, as defined in NPPF and meets the test of achieving substantial public benefits in line with Kirklees Council policy in the Kirklees Local Plan Policy LP35.

5.1.3 The design development process involved considerable optioneering to arrive at the proposed design approach, which has demonstrated the justification for the infilling. Although Ming Hill Underbridge (MDL1/14) has been assessed to have sufficient capacity to meet the Scheme's requirements, alternative approaches to retain, maintain and eventually replace the structure would have considerable risks and issues around continued costs of maintenance due to structural deterioration and operational viability. The design development process also took into account the impact on the structure's historic significance, and embedded mitigation through the sensitive design of the infilling on the south-eastern side. The process involved extensive engagement with the statutory historic environment stakeholders, including working alongside Historic England and Kirklees Council to consider the feasibility of the various possible design approaches.

5.1.4 Although the infilling of the bridge would permanently alter the form of the structure, Ming Hill Underbridge (MDL1/14) has already gone through major changes in the 20th century, with alterations involving the replacement of its deck with brick jack arches and riveted plate steel girders as well as its partial infilling on its north-western side, causing it to lose its historic function and identity as an accommodation underbridge which provides access below the railway. The proposals would result in further change to the structure, however, they would not substantially impact its already degraded significance.

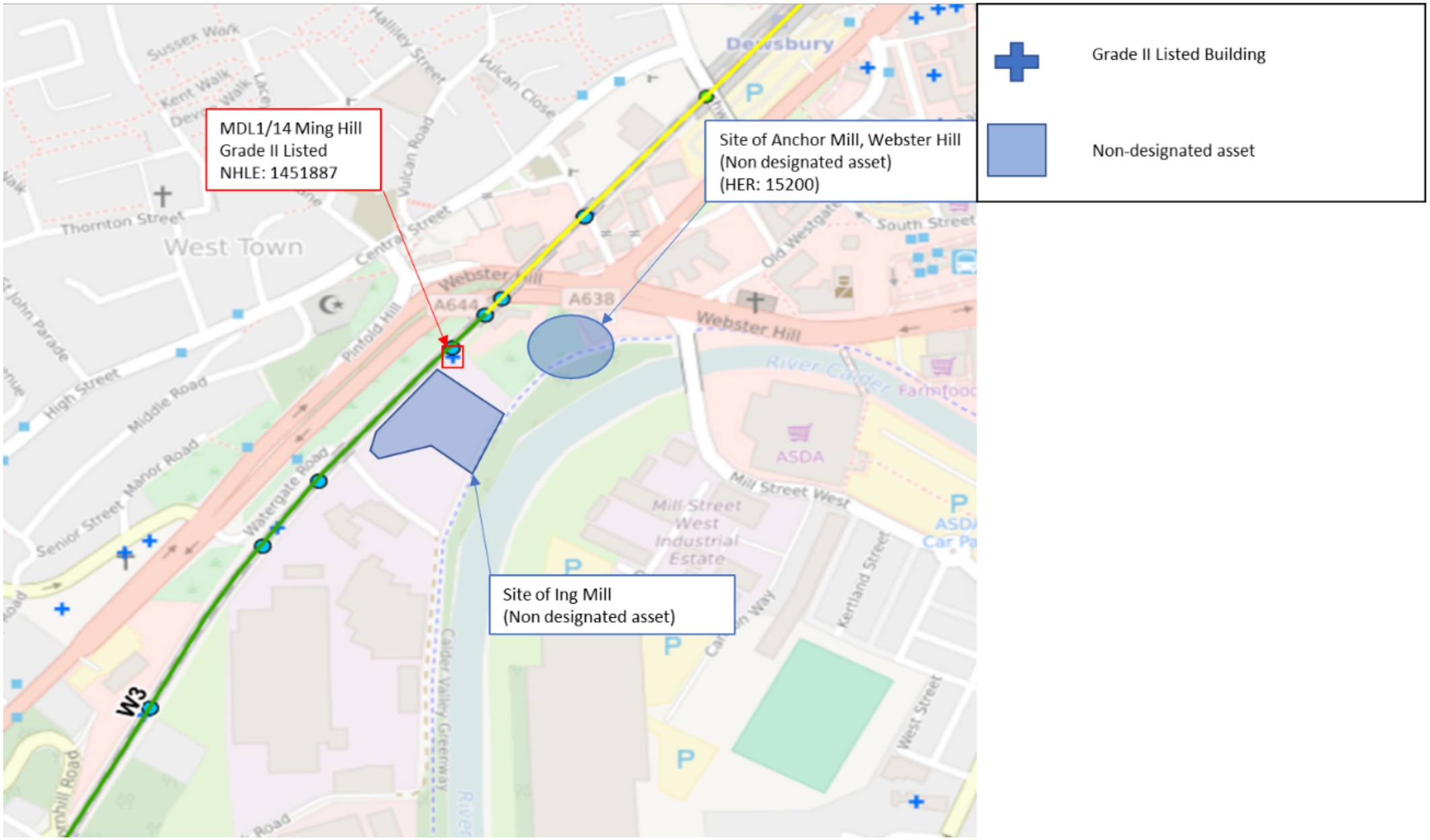
5.1.5 The historical value which the listed structure derives from its associations with the Heroic Age (1841-50) of railway building, the engineering design of Thomas Grainger and with the Transpennine Route itself would all still be understood in spite of the change in form, and would still contribute to the structure's overall significance. The structure's evidential value will be reduced by the infilling as a result of concealing the bridge's deck and therefore the elements that reveal late 19th/ early 20th century strengthening techniques, however, there are other Grainger bridges on the route which reveal similar construction methods, and the historic building recording (see Section 4.2) will also offer the opportunity for some of the structure's evidential value to be realised through increased understanding of the historic fabric. The design of the infill on the south eastern side would ensure that the architectural elements of the structure such as the ashlar pilasters and decorated cornices and ironwork, which contribute to its aesthetic value, would still be appreciated and understood across this elevation. The continued legibility of the structure as a Grainger bridge and the retention of the elements that contribute to its group value with other Grainger bridges on the route, particularly Toad Holes Underbridge (MDL1/12) (NHLE 1450704) and George Street Underbridge (MDL1/16) (NHLE 1451888) , would cause limited impact on the significance

derived from its group value.

5.1.6 The proposal carries major benefits in terms of significantly reduced whole life costs, embodied carbon and health and safety risk due to the limited future work and maintenance requirements following an infill. As an element of the wider Scheme of interventions, which will bring significant economic, environmental and social benefits across the north of England through the improvements to the rail line between Leeds and Manchester, the required work to the Grade II Listed underbridge is integrally linked to the major public benefit realised by the overall TRU Programme.

5.1.7 The less than substantial harm caused to the significance of Ming Hill Underbridge (MDL1/14) would be outweighed by the public benefits of the proposed TRU scheme.

APPENDIX A – LOCATION PLANS



APPENDIX B – HISTORIC ENGLAND LIST DESCRIPTION

Overview
Heritage Category: Listed Building
Grade: II
List Entry Number: 1451887
Date first listed: 23-Mar-2018
Location Description: Approximately 50m south west of the railway bridge over Webster Hill, Dewsbury

Location
The building or site itself may lie within the boundary of more than one authority.
Location Description: Approximately 50m south west of the railway bridge over Webster Hill, Dewsbury
District: Kirklees (Metropolitan Authority)
Parish: Non Civil Parish
National Grid Reference: SE2402821464

Summary
Cast-iron beam bridge, built 1845-1847 as a railway underbridge for a former lane, designed by Thomas Grainger for the Leeds, Dewsbury and Manchester Railway.

Reasons for Designation
Ming Hill bridge (MDL1/14), a cast iron level beam bridge constructed in the mid-1840s by Thomas Grainger for the Leeds, Dewsbury & Manchester Railway, is listed at Grade II for the following principal reasons:

- Historic interest:
* constructed during the heroic age of railway building, being a rare surviving example of a cast iron level beam bridge, a form very widely used up until the late 1840s;
* designed by the notable Scottish railway engineer Thomas Grainger;
* the later replacement deck incorporating wrought iron beams is a good example of the way that cast iron bridges were strengthened in the later C19.

- Architectural interest:
* although it is a minor accommodation bridge, the inclusion of features such as ashlar pilasters and cornices with embellishment also extended to the ironwork lifts the design above the purely functional.

- Group value:
* one of a sequence of three bridges (Toad Holes (MDL1/12), Ming Hill (MDL1/14) and George Street (MDL1/16)) all sharing a common design language within a relatively short length of line.

History
In contrast to the main trunk lines of the late 1830s that were constructed by single railway companies the route from Stalybridge to Leeds had fragmented origins and was the work of three different railway companies: the Huddersfield & Manchester Railway, Leeds, Dewsbury & Manchester Railway, and the Manchester & Leeds Railway.

The Huddersfield & Manchester Railway was authorised in 1845 and followed the route of the Huddersfield Narrow Canal for much of its length, including a railway tunnel through the Pennine hills set alongside the earlier Standedge Canal Company tunnel of 1811; in 1846 the railway company also acquired the canal. Joseph Locke and Alfred Stanistreet Jee were appointed to survey and design the new line, the two engineers having already worked together on a major project linking Manchester and Sheffield. Jee became the lead engineer for the Huddersfield line, which passed through challenging terrain, assisted by resident engineers that included his brother Moreland Jee (until 1848) and Herbert F Mackworth. Construction of the line was divided into various contracts, with many contractors being

only responsible for a single cutting, viaduct or tunnel portal. The largest contract for the Standedge Tunnel between Diggle and Marsden was let to a single contractor, Thomas Nicholson in 1847. The tunnel's completion in 1849 marked the opening of the line.

The Leeds end of the route, which was also authorised in 1845, was constructed by the Leeds, Dewsbury & Manchester Railway. The engineer was Thomas Grainger who had previously largely worked in Scotland, and the line was completed in 1849.

A short three-mile section of the route between Heaton Lodge Junction and Thornhill Junction near Mirfield was developed by the Manchester & Leeds Railway and was constructed between 1837 and 1840, with George Stephenson as the chief engineer. The structures on this line were designed by Thomas Gooch under the oversight of Stephenson. In 1847 the railway company changed its name to the Lancashire & Yorkshire Railway.

In 1847 the Huddersfield & Manchester Railway and the Leeds, Dewsbury & Manchester Railway were acquired by the London & North Western Railway (LNWR) so that the company could access the city of Leeds and the textile towns of West Yorkshire. This pitted them as rivals to the Lancashire & Yorkshire Railway, although at points on the route the two companies had to work together. By 1851 the London & North Western Railway had an overall mileage of railway track of 800 miles and it became the most prominent railway company in the country and the largest joint-stock concern in the world in the late C19. Although the LNWR had a general manager, Captain Mark Huish, the lines of the Stalybridge to Leeds route still managed their own affairs. LNWR later carried out expansion works, including the widening of tracks and bridges, the construction of additional tunnels, and station alterations. In 1923 the line became part of the London Midland & Scottish Railway, and subsequently part of the nationalised British Railways in 1948.

Ming Hill Bridge, a railway underbridge, was built as part of the original construction of the Dewsbury and Manchester Railway between 1845 and 1847. The 1852 1:1,056 town plan shows that the bridge was provided for Dam Lane leading to Ing Mill on the south eastern side of the railway line. Around 1970, clearance of buildings and road realignment resulted in the infilling of the north western approach to the bridge.

Ming Hill Bridge is one of three very similar bridges all built along a 400m length of the line, all being cast-iron, level beam bridges. Cast-iron beams were very widely used for early railway bridges, their use dramatically declining for new bridges following the Dee Bridge Disaster of 1847. Subsequent bridge failures such as Inverythan, Aberdeenshire (1882) and Norwood Junction, London (1891) led to the wholesale replacement of cast iron bridges carrying railway lines, with some examples, such as Ming Hill, being retained with replaced, strengthened decks. Ming Hill’s deck is of brick jack arches spanning between wrought iron beams, a design consistent with C19 practice and thus thought to be the work of the London and North Western Railway. The designer of the bridge, the civil engineer for the Dewsbury and Manchester Railway, was Thomas Grainger (1794-1852). He had been a leading advocate and designer of early railways in Scotland from 1823 onwards, but worked on a number of Yorkshire railways in the 1840s until his death following a railway accident in 1852.

Details
Railway underbridge, 1845-1847 by Thomas Grainger for the Leeds, Dewsbury & Manchester Railway, deck strengthened late C19 by the London and North Western Railway.

MATERIALS: cast-iron, wrought-iron and Pennine Lower Coal Measures Sandstone; later strengthening with brick and wrought iron.

DESCRIPTION: cast-iron beam bridge spanning a single carriageway, supported by masonry abutments with wrought-iron parapet balustrades set between ashlar end-pillars. Replacement deck of brick jack arches supported on wrought-iron beams. The flanking embankments are revetted with raking, curved wing-walls.

The abutments are of coursed, squared, rock-faced masonry, finished with a robust moulded ashlar cornice which supports the bridge deck. Flanking the carriageway are panelled ashlar pilasters that rise from rock-faced masonry plinths and are finished with lighter-sectioned moulded cornices above which rises the parapet end pillars. The pilasters are slightly wider at the base than at their tops, emphasising their height. The parapet end-pillars above have corniced capstones and plain plinths. Spanning between the pillars is the iron balustrading that consists of a plain handrail supported by closely spaced balusters that have mirrored tulip-formed mid-sections, but are otherwise simple round bars. The facia beams of the bridge deck are thought to be the only surviving cast-iron beams of the original bridge, appearing to be I beams in form, embellished with raised strapwork to imitate panelling. The wing walls are of rock-faced masonry similar to that of the abutments, finished with a plain ashlar capping, and divided from the retaining walls of the rest of the embankment by simple pilaster-strips. The north-western approach to the bridge has been infilled to the level of the deck, burying the wing walls, the parapet remaining exposed. The south-eastern side of the bridge remains open, being partly infilled beneath the arch.

Sources

Other

TransPennine Route Statement of History and Significance: West of Leeds V3.1. Prepared for Network Rail, March 2017. Alan Baxter Ltd.

Legal

This building is listed under the Planning (Listed Buildings and Conservation Areas) Act 1990 as amended for its special architectural or historic interest.
End of official listing

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