

Ball Street Bridge Conservation Management Plan

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Abstract: This Conservation Management Plan focuses on Ball Street Bridge, a Grade II listed Victorian-era bridge in Sheffield, England, recognized for its architectural and historical significance. The plan identifies key management challenges, including structural aging, environmental impacts, community use, and the absence of heritage interpretation. A detailed action plan outlines strategies to address these issues, ensuring the bridge's structural integrity, environmental sustainability, and role as a community and heritage resource. The plan emphasizes regular structural inspections, the implementation of environmental monitoring systems, and measures to engage the community while mitigating vandalism. Additionally, it recommends the installation of interpretive signage and the development of educational programs to enhance public understanding of the bridge's historical and cultural importance. Through these initiatives, the plan aims to preserve Ball Street Bridge as a vital part of Sheffield's industrial heritage and a resource for future generations.

Keywords: Industrial; Heritage; Conservation.

1. Non-Technical Summary

This is a conservation management plan for Ball Street Bridge. Ball Street Bridge is a Victorian-era bridge located approximately 200 meters west of Kelham Island, about 900 meters from Sheffield city center. The bridge is an important historical structure from the Industrial Revolution period and is listed as a Grade II protected building due to its architectural and historical significance.

The aim of this plan is to address issues related to the bridge's structural integrity, environmental impact, community engagement, and lack of heritage interpretation. The objectives are to protect the structural safety of the bridge, enhance environmental monitoring, increase community participation, and provide educational resources about its historical significance.

The action plan recommends regular structural inspections and maintenance, the installation of environmental monitoring equipment, the organization of community activities to enhance participation, the implementation of public safety measures, and the addition of interpretive signage to educate visitors about the bridge's history and importance.

2. Introduction

Ball Street Bridge (NGR: SK3496688301) is located approximately 200 meters west of Kelham Island, about 900 meters from Sheffield city center (Figure 1). This bridge spans the River Don, connecting Kelham Island with the surrounding communities. Ball Street Bridge is an industrial bridge built in the late 19th century, featuring typical Victorian industrial design. It is an important heritage from the Industrial Revolution. The bridge is constructed from steel and stone, combining functionality with aesthetic appeal. Due to its architectural and historical significance, it was designated as a Grade II listed building (List entry number: 1246509) in 1985 [1]. Currently, the bridge is primarily used for pedestrian and non-motorized traffic.

This conservation management plan primarily focuses on Ball Street Bridge and the surrounding area within a 50-meter radius, which can be seen in Figure 2. There are four listed

sites within this area: Grade II listed building Ball Street Bridge Kelham Weir (List entry number: 1246510, NGR: SK 35000 88287)[2], Grade II listed building Ball Street Bridge (List entry number: 1246509, NGR: SK 34966 88301)[1], Grade II listed building Brooklyn Works (List entry number: 1255043, NGR: SK 34978 88253)[3], and Grade II* listed building East Range at Cornish Place Works (List entry number: 1270962, NGR: SK 34942 88277)[4].

This conservation management plan has referred to Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment [5].

3. Description of Site

Ball Street Bridge (Figure 3) is currently primarily used for pedestrian and non-motorized traffic, serving as an important link between Sheffield city center and Kelham Island. It was constructed with steel and stone, reflecting the architectural characteristics of the late 19th century Industrial Revolution. In Table 1, the heritage sites within the selected area are listed chronologically.

3.1. Archaeological and Historical Context

Ball Street Bridge Kelham Weir

The earliest records of human activity near this site coincide with the formation of Kelham Island, where Kelham Weir (Figure 4) played a pivotal role. Constructed around 1800, Kelham Weir (List entry number: 1246510)[2] is built with rows of stones and gritstone steps, extending about 100 meters in length, making it one of the earliest hydraulic engineering works in the area.

Kelham Island was formed by diverting water from the River Don at Kelham Weir in the northwest, constructing a channel, called goit, which extended to Millsands and a Grade II listed building Lady's Bridge (List entry number: 1270796) [6] in the southeast, supplying water to the Town Mill at Millsands. The construction of this channel is "one of the oldest things in Sheffield" described by Leader (1905), attributing its creation to William de Lovetot, the lord of the Manor of Hallamshire in the 12th century [7].

Ball Street Bridge

Ball Street Bridge (List entry number: 1246509) [1] (Figure

3) is a Victorian-era bridge located in Sheffield. It was originally built in 1856, rebuilt in 1864 (Figure 5), and widened in 1900. The bridge was manufactured by Milton Iron Works of Elsecar and spans the River Don, connecting Kelham Island and Neepsend [1][5].

According to Harrison (1864) and Sheffield City Council (2015), on March 11, 1864, the Dale Dyke Dam embankment collapsed at night, releasing about 65 million gallons (approximately 3 million cubic meters) of water[8][9]. This massive flood rushed down the Loxley Valley, destroying villages and urban infrastructure along its path, and caused significant damage to the city of Sheffield. The structure of Ball Street Bridge could not withstand the powerful impact of the flood, resulting in severe damage to the bridge (Figure 6). This disaster caused extensive damage to local industrial facilities, residential buildings, and public structures.

Brooklyn Works

Brooklyn Works (Figure 7) is located on Green Lane in the Kelham Island area and was built in the mid-19th century, forming an important part of Sheffield's industrial history. The factory was founded and named by Alfred Beckett in 1859 [10], producing steel, saws, and files.

According to Harrison (1864), during the Great Sheffield Flood on March 11, 1864, water rushing from the Dale Dyke Dam destroyed the boundary wall of Brooklyn Works[8]. The ferocity of the flood tore a large steam boiler from its base. Additionally, the flood damaged a vast amount of machinery, extinguished furnaces, and destroyed finished products. Brooklyn Works was rebuilt over the following years and continued to operate until the mid-20th century.

East Range at Cornish Place Works

Cornish Place Works (Figure 8) is one of Sheffield's historic industrial buildings, with the East Range originally constructed between 1851 and 1854. It was renowned for producing Britannia metal, Sheffield plate, and cutlery. Initially built between 1851 and 1854, the factory shifted towards steam power and was further expanded between 1857 and 1859, adding warehouses and a showroom. It manufactured a variety of items, which are now on display at the Kelham Island Museum.

Although the factory began to electrify during World War I, it still partially relied on steam power until the early 20th century. After the war, the factory's operations were in the doldrums [11]. By 1982, the company was nearly bankrupt and eventually closed in 1992 [12].

Interconnectivity of Sheffield's Industrial Heritage

Ball Street Bridge, Kelham Weir, Brooklyn Works, and Cornish Place Works are all located within Sheffield's industrial district, forming an industrial network. In the 19th century, these bridges and hydraulic structures supported the operations of nearby industrial facilities, including Brooklyn Works and Cornish Place Works. Incorporating these interconnected sites into a unified conservation plan allows for a comprehensive display of the historical evolution and overall layout of Sheffield's industrial district.

3.2. Site Use

Ball Street Bridge connects Sheffield city center and Kelham Island, offering good accessibility. Since 2020, Sheffield City Council has enacted legislation allowing only pedestrians and bicycles, as part of a green space transformation [13]. Pedestrians and non-motorized vehicles can reach the bridge via the main thoroughfares of the city center and multiple access points in Kelham Island. The

surrounding area features clear traffic signs and sidewalks, ensuring convenient access to the bridge.

The bridge deck is indeed more suitable for leisure activities and, without vehicle traffic, can host various events such as the Ball Street Deli [14]. The renovation, undertaken by CODA Studio, began in 2022. The first phase of the project involved installing flower beds and permanent benches on the bridge deck, with the aim of increasing green living spaces in Kelham Island and the surrounding areas to attract residents [15][16]. The surrounding ecological restoration has been relatively successful, with lush vegetation, wild ducks, and other wildlife visible on the Kelham Weir (Figure 9).

Although Ball Street Bridge holds significant historical and cultural value in Sheffield, it currently lacks dedicated information display boards or historical interpretation panels. As a result, visitors find it difficult to obtain detailed information on-site about the bridge's history, architectural features, and the damage and reconstruction it has undergone.

4. Heritage Value and Significance

This section introduces the current cultural heritage values of the site based on the value classification method stipulated in Conservation Principles [17].

4.1. Evidential Value

Ball Street Bridge and its surrounding area within a 50-meter radius provide rich evidence of past human activities. The earliest records of human activity in this area are related to the formation of Kelham Island, particularly the establishment of Kelham Weir around 1800, which is one of the earliest hydraulic engineering works in the Sheffield area. Kelham Island transitioned from an agricultural and pasture area to an industrial district in the 19th century, primarily due to its proximity to water sources and convenient transportation. It was designated as a conservation area in 1985. According to the archaeological investigation of the Kelham Rolling Mills site [18], Ball Street Bridge, as a product of the Industrial Revolution, has a construction and usage history that is closely related to the surrounding industrial sites.

4.2. Historical Value

Ball Street Bridge is a testament to the industrial strength of Victorian-era Sheffield. Its cast iron span and limestone piers reflect the engineering advancements and industrial development of that time, particularly in steel manufacturing [5]. Historically, the bridge was an important link between Kelham Island and Neepsend, facilitating the movement of people and goods across the River Don [1][19]. The surrounding Brooklyn Works and Cornish Place Works, along with the bridge and weir, formed a complete production system.

4.3. Aesthetic Value

Ball Street Bridge is composed of three cast iron spans and limestone piers, adorned with spandrels featuring trefoil and quatrefoil patterns [5]. This design combines the functionality and aesthetic elements of Victorian industrial design. The bridge spans the River Don, providing beautiful river views. After its pedestrianization, it has become a popular spot for leisure and relaxation, where many people enjoy watching the river, listening to birdsong, and savoring the tranquil environment. Beehives [20], green vegetation, and wild birds along the bridge enhance its natural beauty and ecological

value.

4.4. Communal Value

Ball Street Bridge is an important landmark for the communities of Kelham Island and Neepsend. Since its construction in 1856, it has been a crucial link for these communities. In recent years, the bridge has been pedestrianized and has become a key venue for community activities. The Kelham Island & Neepsend Community Alliance (KINCA) organized the Kelham Community Market (formerly Ball Street Deli) on the bridge [21], attracting many residents and visitors.

5. Management Issues and Vulnerability

5.1. Aging and Corrosion

Ball Street Bridge is a Victorian-era bridge that, over time, has faced issues of aging and corrosion. During restoration work carried out in 2014 and 2015, severe corrosion was discovered, necessitating surface treatment and repainting [22].

5.2. Environmental Impact

Due to the nature of the bridge, its risks are closely related to the condition of the river. Changes in the river environment, such as flooding or erosion, can potentially damage the bridge's foundational structure. Historic England (2022) points out that regular structural monitoring and environmental protection measures are necessary to prevent potential structural damage[23].

5.3. Management after Pedestrianization

Since its pedestrianization, Ball Street Bridge has become an important public space, bringing new maintenance and management challenges. With increased pedestrian traffic and community activities, the bridge, as a public gathering point, has risks such as graffiti and vandalism. There were reports of a graffiti spree on Ball Street (Figure 10), involving the spraying of red paint on the Milestone restaurant and surrounding buildings [24]. To address the graffiti problem, the Kelham Island and Neepsend communities launched an Art and Heritage Trail project (Figure 11), aimed at reducing random graffiti by transforming street facilities, such as utility boxes, into attractive artworks [25].

5.4. Lack of Heritage Interpretation

Field surveys indicate that, despite Ball Street Bridge being a Grade II listed structure, there are no interpretive signs or information boards in its vicinity. This means that visitors cannot obtain detailed information on-site about the bridge's history, architectural features, or its role in Sheffield's industrial development.

6. Aims and Objectives

The aims and objectives of this conservation management plan is to address the issues of aging and corrosion, environmental impact, heritage interpretation and management issue faced by Ball Street Bridge, ensuring the continued value of the bridge as a historical heritage and community resource. This plan will follow the guidelines set forth in the Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment

[17].

Aim 1: Protect the structural safety and integrity of the bridge, preventing risks associated with aging and corrosion.

Aim 2: Strengthen environmental monitoring and protection, particularly in response to changes in the river environment, such as flooding and erosion.

Aim 3: Enhance community engagement and public safety, preventing uncivil and antisocial behavior.

Aim 4: Provide heritage interpretation facilities to enhance public awareness and understanding of the historical and cultural significance of Ball Street Bridge.

7. Action Plan

7.1. Action 1: Conservation and Management of Structural Integrity

Regular Inspection and Maintenance

Conduct detailed structural inspections annually, focusing on corrosion and aging issues. Based on the inspection results, perform necessary surface treatments and repainting.

Monitoring and Review

Annual Reports: Publish an annual report on maintenance and repair work.

Long-term Evaluations: Conduct a comprehensive structural evaluation every five years.

Plan	
Sub code	Action
A1	Hire structural engineers to conduct detailed inspections, documenting all identified issues and damages.
A2	Implement necessary maintenance and repair work based on engineers' recommendations, ensuring repair materials and techniques meet historical preservation standards.
A3	Establish a structural maintenance record system.
A4	Develop a five-year structural evaluation plan to ensure systematic and comprehensive evaluation processes.
A5	Adjust and improve long-term conservation measures based on evaluation results.

7.2. Action 2: Environmental Monitoring and Protective Measures

Environmental Monitoring

Install water level and flow monitoring equipment to regularly monitor the hydrological conditions of the Don River, assessing potential impacts on the bridge's foundational structure.

Monitoring and Review

Data Recording: Regularly record water level and flow data and analyze them.

Protective Measures Evaluation: Evaluate the effectiveness of protective measures annually.

Plan	
Sub code	Action
B1	Install and maintain hydrological monitoring equipment.
B2	Regularly collect and analyze hydrological data to assess the impacts of environmental changes on the bridge.
B3	Implement necessary environmental protective measures based on monitoring results, such as reinforcing foundational structures and constructing flood walls.
B4	Develop an annual protective measures evaluation plan.
B5	Adjust and improve protective measures based on evaluation results.

7.3. Action 3: Community Engagement and Public Safety

Community Activities

Organize and support community activities such as historical tours, cultural festivals, and markets to enhance residents' engagement and sense of belonging.

Public Safety Measures

Enhance monitoring and patrolling around the bridge to prevent graffiti and vandalism. Collaborate with local law enforcement.

Beautification Projects

Implement art and beautification projects to transform street facilities into artworks, reducing random graffiti and enhancing the visual appeal of the area.

Plan	
Sub code	Action
C1	Collaborate with community organizations to develop an annual community activity plan.
C2	Provide support for activities, such as venues, equipment, and promotional materials.
C3	Collect feedback from activities to continuously improve the quality and content of activities.
C4	Install surveillance cameras and conduct regular patrols.
C5	Collaborate with local law enforcement to develop measures to address anti-social behavior.
C6	Collaborate with artists and community members to design and implement beautification projects.
C7	Maintain and update artworks.
C8	Organize beautification project reviews, collecting community feedback.

7.4. Action 4: Heritage Interpretation and Education

Interpretation Panels

Install interpretation panels around the bridge to provide information about its history, architectural features, and role in Sheffield's industrial development.

Educational Activities

Collaborate with local schools and community organizations to conduct historical lectures and guided tours.

Plan	
Sub code	Action
D1	Design and produce interpretation panels, ensuring accurate and informative content.
D2	Select suitable locations for panel installation to ensure visitors can easily read and understand the information.
D3	Regularly inspect and maintain interpretation panels.
D4	Develop an annual educational activity plan.
D5	Provide resources for activities, such as handouts, tour guides, and teaching materials.

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Appendices



Figure 1. The Location of the Ball Street Bridge

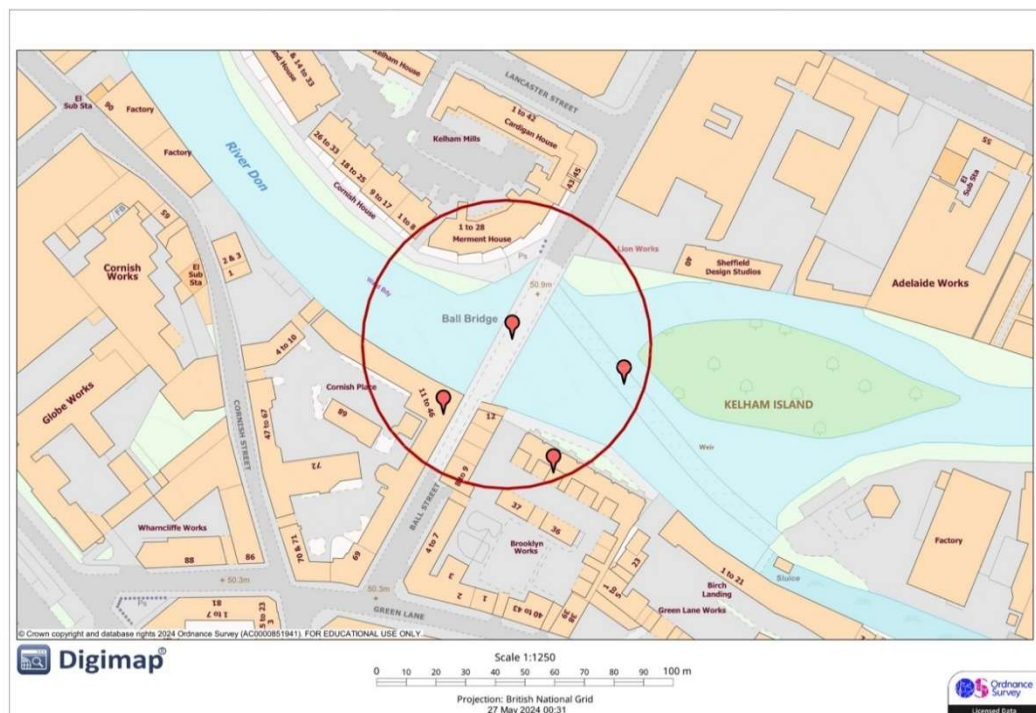


Figure 2. The Scope of the Conservation Management Plan



Figure 3. Ball Street Bridge



Figure 4. Ball Street Bridge Kelham Weir



Figure 5. Re-building of Ball Street Bridge (Picture Sheffield, 1900-1919)



Figure 6. The Flood at Sheffield: remains of Ball-Street Bridge, 1864. (Heritage images, 1864)



Figure 7. Brooklyn Works



Figure 8. Cornish Place Works



Figure 9. Ecology of Ball Street Bridge and Kelham Weir



Figure 10. Graffiti sprayed on Ball Street (Ashley Birch, 2017)



Figure 11. Kelham Island & Neepsend Arts and Heritage Trail (KINCA, 2017)

Table 1. Heritage Sites in the Selected Area Ordered by Chronology

Name	Heritage Category	Grade	List Entry Number	Date of Earliest Activity
Ball Street Bridge Kelham Weir	Listed Building	II	1246510	Around 1800
Ball Street Bridge	Listed Building	II	1246509	1856
Brooklyn Works	Listed Building	II	1255043	the mid-19th century
East Range at Cornish Place Works	Listed Building	II*	1270962	1851 - 1854