Heritage Statement and Impact Assessment

Kings Weston Iron Bridge and associated assets

City Design Group

March 2019 (version 0.2)
City Design Group

Contents

City Design Group
Planning and Sustainable Development
Neighbourhoods and City Development
Bristol City Council

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Version 2.0

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Introduction

What is this document?

Kings Weston Iron Bridge

In November 2015 the Grade II listed Iron Bridge crossing above Kings Weston Road was struck by a lorry. Serious damage to two of the cast iron spandrels has led to the bridge having been closed to pedestrians and held up by scaffolding since that time.

This report has been commissioned to further understand the historic and architectural significance of the Kings Weston Iron Bridge prior to key decisions being taken for its long-term future. It is intended that this assessment will explore and understand the special interest of the bridge and abutment structures, and their setting, so that it can be protected in repair works and any proposed alterations. Proposals may also impact upon other designated assets including the Grade II listed viewing terrace to the west and the setting of The Old Inn to the east.

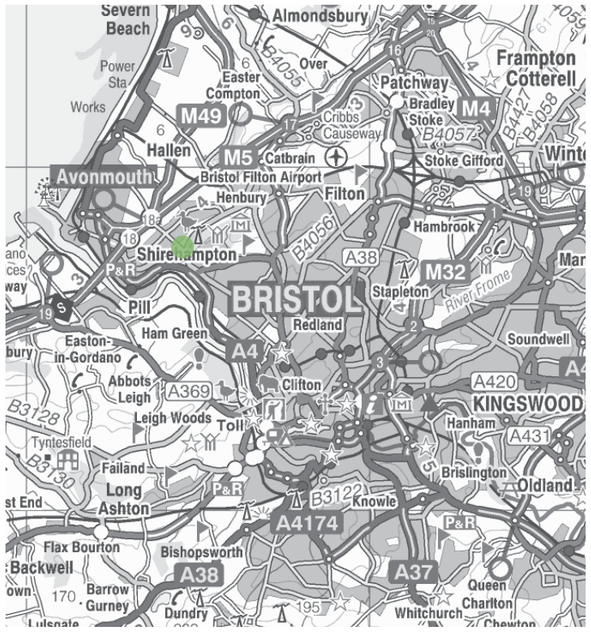
Location and Context

Kings Weston Iron Bridge is a Grade II Listed structure within the Registered Grade II historic parkland surrounding Kings Weston House. The bridge and park lie within the Kingsweston and Trym Valley Conservation Area, approximately 3.5 miles from the city centre of Bristol.

The bridge spans Kings Weston Road where it passes through a cutting into the rock at the low-point along the ridge of Kingsweston Hill. The bridge unites the eastern and western portions of the historic parkland either side of the road and, for the last two centuries, has enabled visitors to enjoy the landscape without having t negotiate the increasing level of traffic.

The bridge is a single-span structure springing from two masonry abutments built into the bare rock of the cutting. Its narrow deck was designed only for pedestrian use whist vehicle traffic passed either below or along Shirehampton Road to the south.

A short way to the east of the bridge is the former Kingsweston Inn (Grade II Listed), a tall formidably built structure that overlooks the southern side of the landscaped parkland from an elevated position on the ridge. Contiguous with the west abutment of the bridge is the Grade II Listed Eighteenth Century viewing terrace which also forms the boundary between the once-private grounds around the house and the public paths leading in the direction of Penpole Point and Shirehampton. Adjacent to it is the Grade I Listed Echo; a small but distinguished work by the eminent baroque architect Sir John Vanbrugh. Below the bridge, at the start of Kings Weston Road, is the Grade II Listed Park Lodge, once one of the small houses that stood sentry at the park gates.



The setting for this group of historic structures is pastoral and almost rural; its verdant nature stretching unbroken along the ridge but for the now-busy road hidden in the cutting. All this was formerly enjoyed as the estate of Kings Weston house, but now is all part of Bristol City Council managed park. The historic views from the inn have been somewhat eroded by the

Fig.1 Site location

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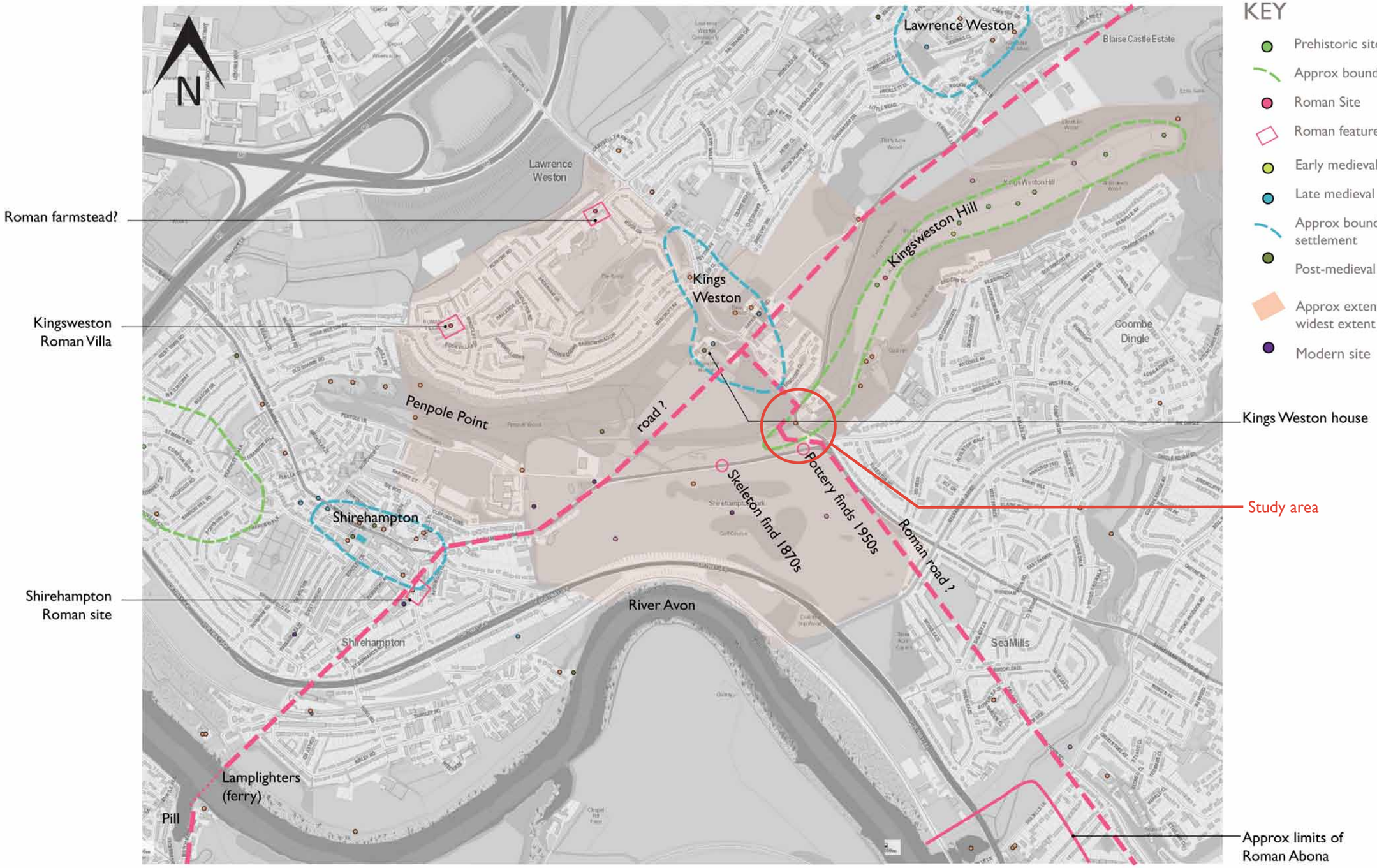
Understanding the History

Early History:

The road that crosses Kingsweston Hill at the bridge may date to at least Roman times. The proximity of the port town of Abonae and the likely ferry crossing of the Avon as Lamplighters in Shirehampton may have necessitated an important junction in Roman Road from Gloucester in the vicinity of the present bridge. The Kings Weston ridge is dotted with prehistoric burial mounds and scattered evidence of Roman settlement along the lower slopes on both sides.

The road alignment across the ridge has meandered on several occasions. If indeed the original Road was Roman then it assailed the hill along the alignment of the present Shirehampton Road until it adopted a typical zig-zag across the steepest section just to the west of the present Park lodge, and then doubling-back on the leeward side of the ridge just behind The Echo; this alignment appears to have continued in use when the landscape of Kings Weston park is first recorded on W. Hallett's estate plan of 1720. Whether the original road continued towards Gloucester by means of the present Kingsweston Road, or by means of a junction closer to modern Napier Miles Road is conjectural.

The gradual enlargement of the park around the former manor house of Kings Weston has affected numerous changes to the landscape. Before the Eighteenth Century the grounds were limited to the Home Park immediately around the late-Tudor mansion. A medieval chapel and a small settlement are known to have existed, probably either side of the present Kings Weston Lane, and the road across the Kingsweston Ridge was its most direct road connection to the city of Bristol. At this time though the majority of traffic passing through the area would have been east-west, between Gloucestershire and Somerset via the Ferry to Pill.


N
Lawrence Weston
Blaise Castle Estate
Lawrence Weston
Roman farmstead?
Kingsweston Roman Villa
Kings Weston
Kingsweston Hill
Coombe Dingle
Penpole Point
road ?
Kings Weston house
Skeleton find 1870s
Pottery finds 1950s
Roman road ?
Study area
Shirehampton
Shirehampton Roman site
River Avon
SeaMills
Lamplighters (ferry)
Pill
Approx limits of Roman Abona
KEY
Prehistoric site
Approx boundary of Prehistoric activity
Roman Site
Roman feature
Early medieval site
Late medieval site
Approx boundary of late-medieval settlement
Post-medieval site 1540-1700
Approx extent of Kings Weston park at its widest extent
Modern site

The Southwell Era and the Terrace

The Kings Weston Estate was purchased in 1679 by the diplomat and politician Sir Robert Southwell. He, and the generations that followed him, keenly set about expanding their estates and developing it for agricultural, and ornamental purposes. If the former Roman Road did pass directly through the parkland adjacent to the old house it had certainly been diverted by 1710. This work may have been undertaken by Sir Robert, or one of the preceding families create more private grounds and would have forced the traffic to the ferry from Gloucester to divert across the ridge before following a new alignment to the west.

By 1720, immediately prior to radical new changes to the park, the road is shown as a tree-lined serpentine path dodging around the current site of the bridge and the substantial hill that stood there at the time. Also shown on the Hallett Plan of this date are two routes westward from it heading westwards Shirehampton, both of which seem to be outside the boundary of the private gardens already developed southward from the house.

Swiftly, in the years that followed, The Southwell's redesigned the landscape in conjunction with the architect Sir John Vanbrugh. The Echo, a garden pavilion immediately to the north of the Iron Bridge was built in around 1724 and marked the termination of the formal gardens. A new alehouse, Kings Weston Inn, was added on the higher ground to the east of the Echo where it could take advantage of spectacular views across Somerset to the south. This building too appears to have begun as one of Sir John Vanbrugh's designs.

A drawing, dated 1719, and held in Bristol Archive hints at the ambitious scale of developments in the park; it's a surveyed section through the landscape from the house, along its principle garden axis, and across the ridge of Kings Weston Hill. Here we see the previous road alignment marked as the "old road" and clearly on the north side of the hill immediately behind the Echo. We also see the land rose steeply to the south and peaked at a summit roughly where the Iron Bridge is today. The drawing also intimates that there are proposals to level that hill and create a terrace overlooking the extended parkland descending down to the river Avon; This would have required a herculean effort to quarry away up to thirty feet of rock from the hill.

Although other works across the estate continued apace the plan to level the hill was postponed, and the undesirable arrangement with the public road zig-zagging up the hill and passing within feet of the new garden building persisted until the 1730s; However, it was not forgotten, and in 1732 we find the Caledonian

a. Kings Weston House

b. Kings Weston Lane

c. Kings Weston Road

d. Shirehampton Roads

e. The South Walk

f. Kingsweston Hill

g. Site for the inn

h. Furture site of the Echo

i. projected route of pre-1732 road.

j. Approximate course of modern road

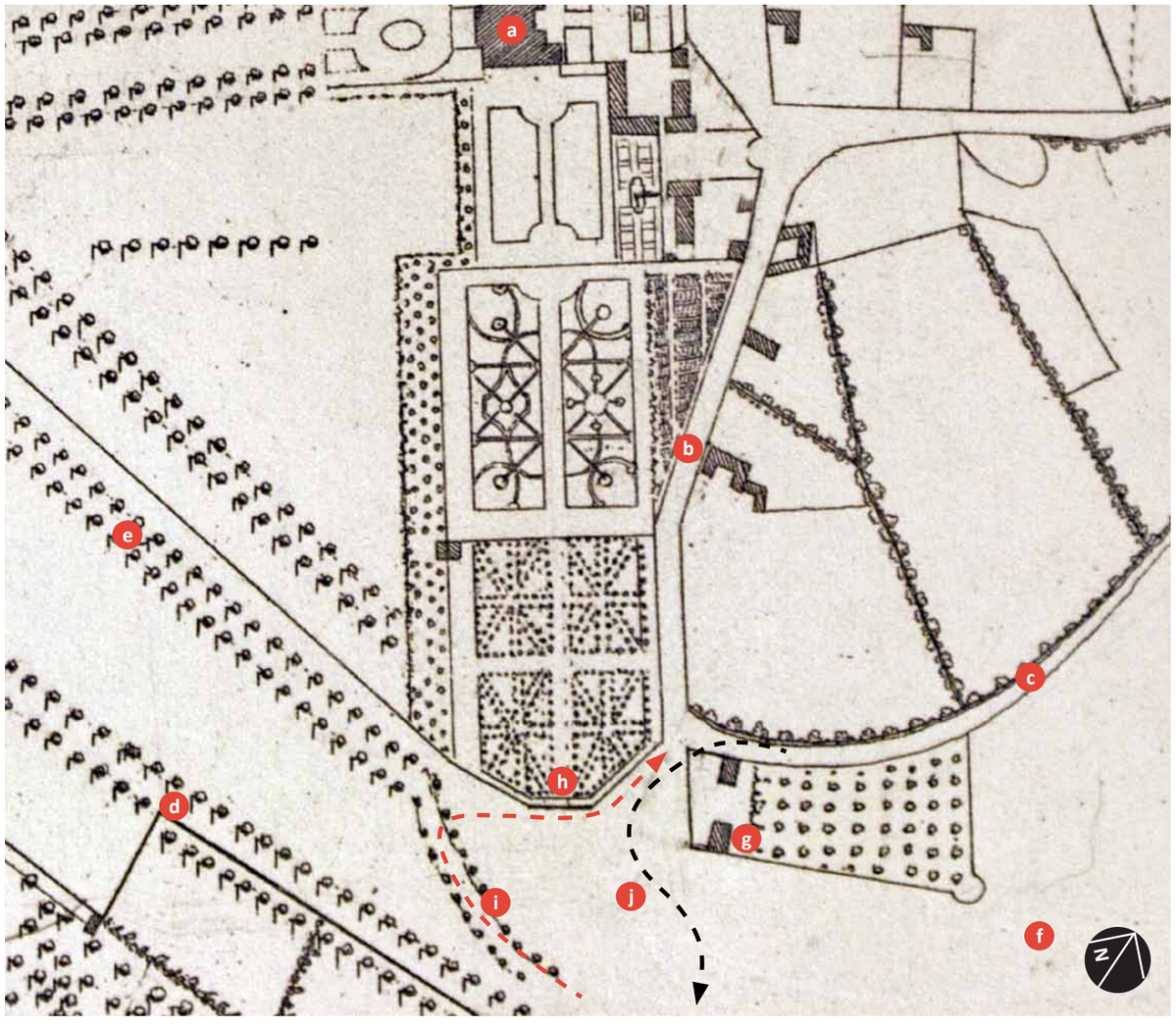


Fig.3 Extract from the 1720 Halett Survey of Kings Weston Estate, BRO 4196-1

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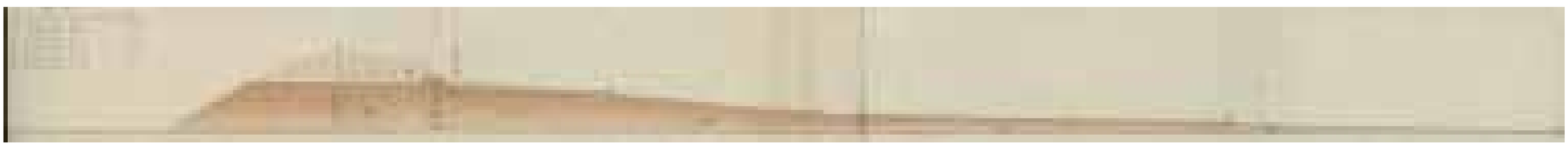
Fig.4

1 Diagram of Levels in Kings Weston Garden 1720, BRO 33746 43

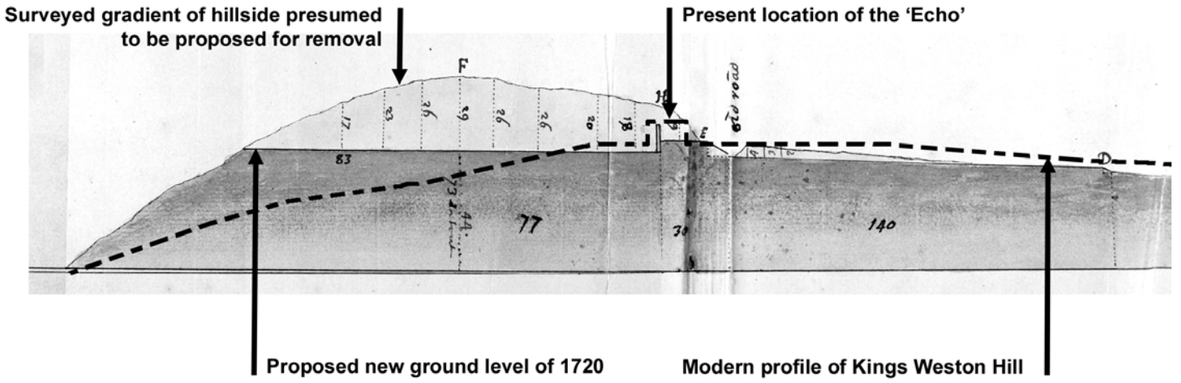
2 Modern cross-section overlay

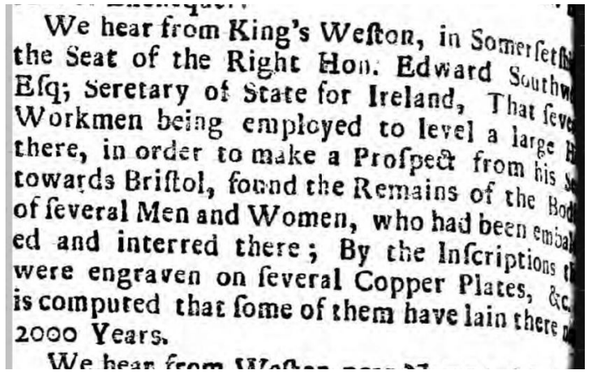
3 Caledonia Mercury reporting the discovery of prehistoric remains during the “levelling of a large hill” in order to” make a prospect” between Kings Weston House and Bristol, 1732



In the removal of hundreds of tons of limestone from the hill these works will have enabled not only the creation of the present viewing terrace, but the rerouting of the road across the ridge away from the private parkland and grounds. In effect its new route would equate roughly to the current route of Kings Weston Road, but at surface level, and having to negotiate steep approached from both north and south. The lane that leaves Kingsweston Road at its junction with Shirehampton Road, and crosses the high-point outside the inn, before descending back to the road junction with Kings Weston Lane, is a vestige of this earlier route.

The terrace formed behind, and to the west of, the Echo represented the formal boundary between the private grounds immediately around Kings Weston house, and the open landscaped parkland that could be enjoyed by the public, a public who were visiting the park in increasing numbers to enjoy its natural delights and spectacular views.





We hear from King's Weſton, in Somerſetſh
the Seat of the Right Hon. Edward Southw
Eſq; Seretary of State for Ireland, That ſeve
Workmen being employed to level a large H
there, in order to make a Proſpect from his S
towards Briſtol, found the Remains of the Bod
of ſeveral Men and Women, who had been embal
ed and interred there; By the Inſcriptions t
were engraven on ſeveral Copper Plates, &c.
is computed that ſome of them have lain there
2000 Years.

2. Understanding the History

By the late Eighteenth Century the Kings Weston estate was at the height of its fame. The landscape and house were attracting visitors from across the continent including influential courtiers from the French Court and German and Russian royalty. One of the most noted features of the park were the views; these included the View from the top of Kingsweston Hill, The view from the house across the Severn, the Prospect from Penpole Point, and also that from Kings Weston Inn and the viewing Terrace southwards across the Avon and towards Somerset. It was the French Lawyer, Minister, and Statesman Guillaume-Chrétien de Lamoignon de Malesherbes who in 1785, on seeing this latter panorama, described it as a “charming, prospect; this is a pretty valley whose side is covered with houses and whose lively appearance is matchless in England.”

Guillaume-Chrétien de Lamoignon de Malesherbes

Voyage en Angleterre

1785

Bath, Monday, May 9th
The mansion is in the garden, and the garden in the park, but this garden is separated from the pleasure walk by a barrier so that the sheep can also enjoy the same garden and so that it is not necessary to lavish on all the grounds the huge expense required in keeping lawns. This is the general arrangement almost everywhere. This walk could not be better maintained, planted with varied and beautiful trees, but still young, the “allées francaises” having been changed only fourteen years since. A great number of old trees which comprised them have been preserved with great art. Following this pleasant route, we find another different and also charming prospect; this is a pretty valley whose side is covered with houses and whose lively appearance is rare in England. I nearly forgot an echo that is worthy of note. It repeats, very clearly, a whole line of alexandrine verse and is located in the lodge facing the mansion.

2. Understanding the History

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2

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Fig.5

1 View across Shirehampton Park from the Georgian viewing terrace in 1905, courtesy of Know Your Place, HC3707

2 Modern view from Georgian terrace

3 View of the listed terrace wall looking towards the Kings Weston footbridge and Kings Weston Inn beyond

Kings Weston Inn

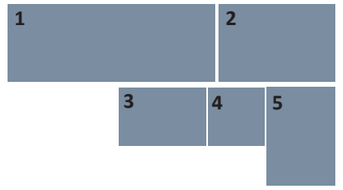


Fig.6

1 Design for an alehouse for Kingsweston Hill by Sir John Vanbrugh in the 1720s, courtesy of Know Your Place, HC3412

2 As above

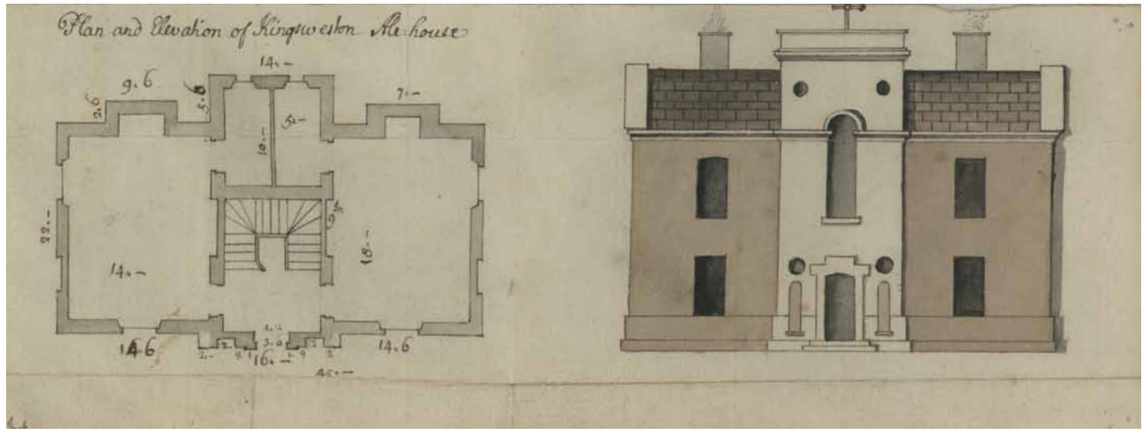
3 Southwell coat of arms on Kings Weston Inn

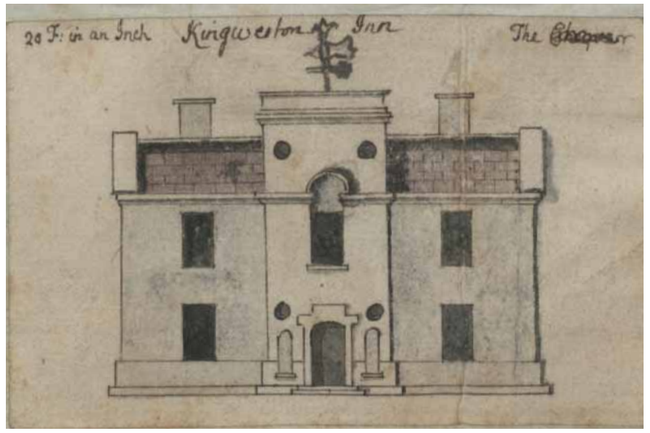
4 and 5 Proposed designs for the alehouse by Sir John Vanbrugh

Needless to say the Inn thrived on the custom brought by tourism from spa visitors. The original building of circa 1724 was extended at several periods to cope with expanding trade. Although designed to take advantage of the spectacular views towards Somerset afforded by the raised location further benefit could be enjoyed from the central tower of the building which provided an even more elevated platform from which to take in panoramas on all sides.

The building was designed over three floors with a basement storey incorporated to the rear of the building. Here there was a cistern fed by a natural spring, and kitchens serving the inn above. Beer would have been brewed on site, or perhaps brought up from the estate's brew house behind Kings Weston house itself. The floors were connected through a single stair at the rear of the central tower element and off a small hallway immediately behind the central front door on the south elevation of the building; this door was given a decorative effect by a heavy stone surround and the incorporation of some decorative fragments of stonework from the original Tudor kings Weston house.

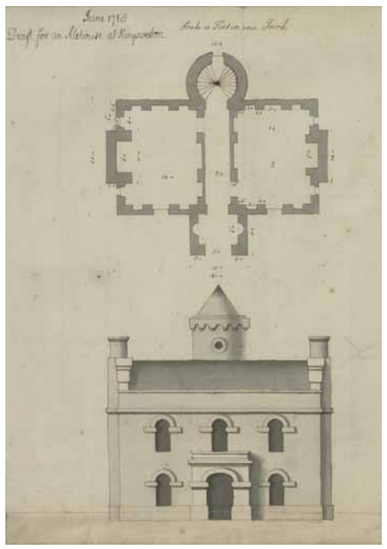
Immediately to the north were stables and cottages to serve the inn. A short, low, wing added to the south façade of the building, and the eastward extension of the building by two bays had been executed before 1772, but the square-topped central tower remained as a key feature until refurbishment in the 1840s or 1850s when the present gable roof was added by William Skinner Miles as part of a major overhaul of the estate's buildings; The design adopted is likely to have been his own.



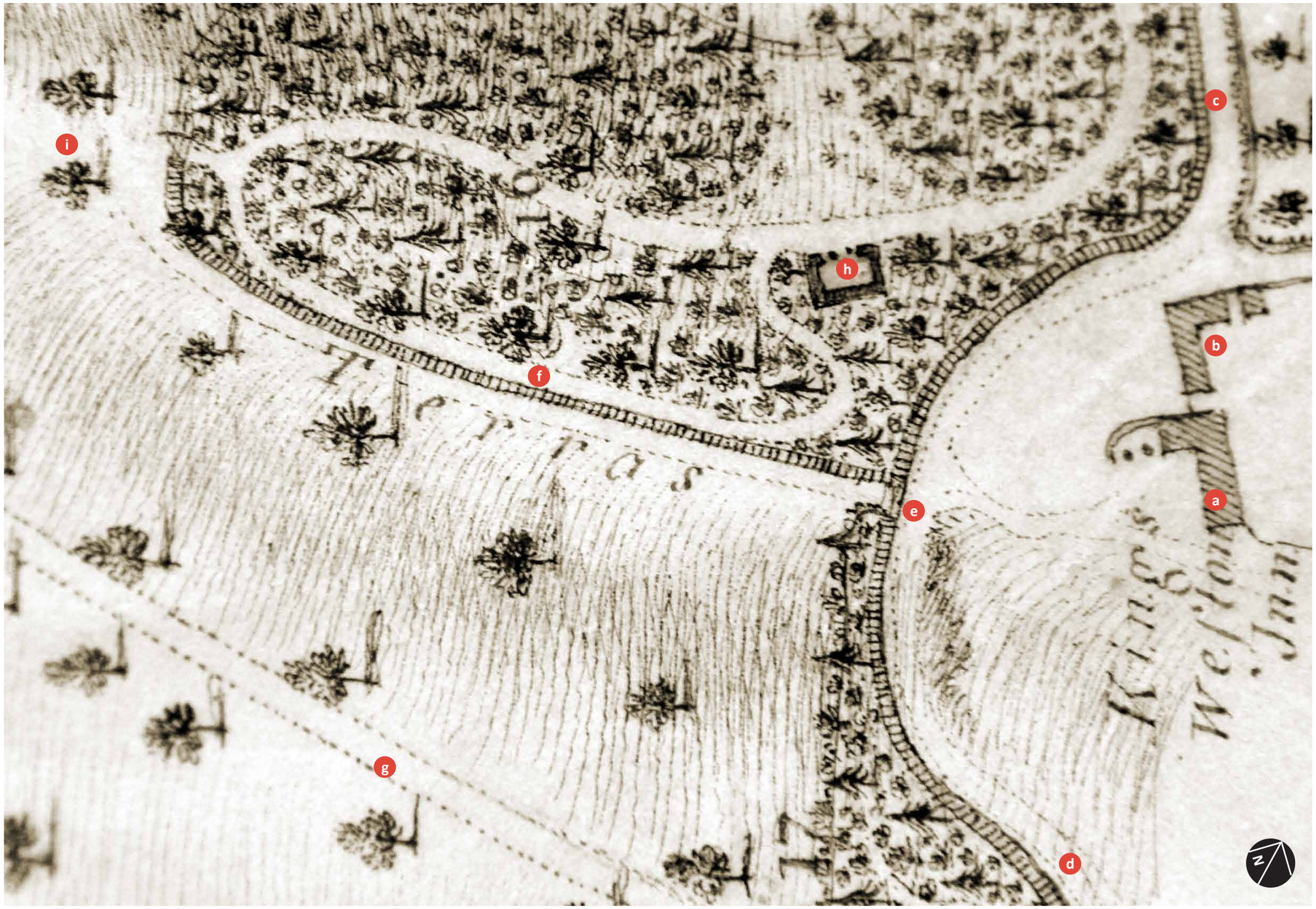


The inn was perched high above the main roads from Bristol and Gloucester that headed towards the ferry across the Avon at Shirehampton. The dramatically poised building would have had an imposing presence from the highway, no doubt encouraging trade. The inn was a frequent resort for visitors to Bristol's Hotwells; no doubt this was its originally intended purpose. Although not unique Kings Weston Inn was amongst the very first such purpose-built amenities provided for visitors to grand estates; The closest comparisons are the New Inn at Stowe dates from about 1732, and the Spread Eagle at Stourhead sometime after.

Regular excursions could be made to it for breakfast and it was popular too for taking tea in the afternoon, and for meals. It was regularly mentioned in published excursions from both the Hotwells and Bath spas and in 1782 a coach service was begun to serve the



Kings Weston Inn



a. **Kings Weston Inn (Grade II)**

b. Stables and servant's accommodation

c. Kings Weston Lane

d. Kings Weston Road

e. Modern location of the Iron Bridge (Grade II)

f. Viewing Terrace wall (Grade II)

g. Shirehampton Road

h. The Echo (Grade I)

i. The South Walk

Fig.7. Extract from Isaac Taylor's plan of lands at Kings Weston, 1772, BRO 27570

Kings Weston Inn

tourist traffic to the estate; The Bush Tavern in the city centre offered a meal booking service where food orders were relayed across to the inn by messenger to be ready for guests at the end of their ride out. The inn had good stables where visitors were encouraged to leave their carriages on arriving on visits, and the servants would also be accommodated at the inn until the time came for the return journey back into the city.

"There is a public house to which the company of the wells frequently resort either to dine or drink tea."

(Richard Pococke, Bishop of Meath: Journal of travels through parts of England: 1764)

"The lawn, which the [Kings Weston] house looks upon, is very beautiful; but for a prospect, you must go up the hill, a little beyond where the breakfasting house for the hot-well company is situated; "

(A six week tour thru the southern counties of England and Wales" published by Arthur Young. 1769)

"William Weeks has taken to Kingsweston Inn where he "has laid in a stock of best wines, rum, French brandy, holland, geneva etc.". "Dinner dressed for any number at the shortest notice, by leaving their orders at the Bush Tavern in Corn Street".

(Farley's Bristol Journal Sat 27th Dec 1777)

"On a knoll of inconsiderable height above the eastern extremity of the park is a house called King's Weston Inn much resorted to by those who visit lord de Clifford's as being a convenient place to leave their carriages and servants at. The down above this house is frequented by morning parties from the Wells its elevation and pure air are great inducements with invalids."

(1793 Ibbetson)

"The lofty eminence on which the inn at King's-Weston is placed, overlooks a prospect, the variety and beauty of which would well deserve description,"

(Richard Warner, The Topographical Works of the rev Richard Warner, 1802)

.Kingsweston inn, to which parties continually resort to enjoy the prospect, and where the citizens of Bristol relax on Sunday evenings over a dish of tea, is pleasantly situated, at the Southern extremity of the hill; and the ruins of a windmill, in the centre, serve to point out the greatest elevation."

(First Impressions: or Sketches from Art and Nature, Animate and Inanimate. James Peller Malcolm, 1807)

"On the left is King's Weston Hill; upon this eminence is erected a very commodious Inn, with large stabling, &c. which proves extremely convenient to those parties who leave Bristol to admire the prospects of Pen Pole, and to visit the House and Paintings of Lord de Clifford."

(Pierce Egan, Walks through Bath, 1819)

Fig.8. Kingsweston Inn from Kings Weston Road, c.1820, watercolour from the Neath Antiquarian Society Archives, Know Your Place HC66402

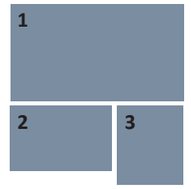


Fig.9

1 ‘Old Kings Weston Inn’, early 1900s postcard, BRO 43207/32/1/35

2 ‘The Old Inn’, early 1900s postcard, Know Your Place HC2987

3 Existing entance

Kings Weston Inn

“K*ings Western inn and tavern to be sold by auction by Mr Pope. Without the least reserve on the premises Kings Weston inn on Tuesday and Wednesday next 10th and 11th of October. All the useful household furniture glass linen China brewing utensils and other effects of Mr Ogborne, quitting the premises in consequence of a failure in agreement in the person who agreed to take the whole at a fair valuation.*

The household furniture consists of prime featherbeds; bolsters and pillows; 4- post and tent bedsteads with cotton furniture; mahogany chest of drawers; dining, card, and Pembroke tables; wash stands; dressing tables; Kidderminster carpets; pier and swing glasses; mahogany brass-nail chairs kitchen furniture; copper and tin cutlery articles, earthenware glass et cetera; capital mangle, nearly new; eight day clock in mahogany case; copper furnace; coolers; several large pieces; tubs; a variety of casks; market cart; narrow wheeled ditto; malt-mill et cetera”

(Bristol Mercury, Oct 9 1820)

Throughout the Eighteenth and early nineteenth Century the inn was the regular venue for auctions, principally of livestock or property, but the most significant being one of the major sales that dispersed the contents of Kings Weston house on the demise of the last of the direct line of the Southwell family, Lord de Clifford, in 1832.

An estate plan of 1772, part of an extensive survey of the Southwell Family’s lands, was undertaken in 1771 and drawn-up in 1772. This shows the arrangement around the Viewing terrace and the Inn as it stood for between 1732 and 1821. The road across the hill can be seen taking a broadly similar route to that which it does today and the estate wall is shown along its western side. A shallow embankment is located above the road on the eastern side, perhaps formed as consequence of the 1732 works to lower the hill. The inn is sat in splendid isolation with open land stretching away to the south, unencumbered with the woodland that now covers the area.

The Echo, Vanbrugh’s grand alcove, or pavilion, is sited a short distance to the west looking back towards the main mansion house along a wooded viewing corridor. Behind the building a smaller path winds up the gradient to meet the eastern end of the viewing terrace that stretches for another 30m westwards along the ridgeline. The ground behind the terrace is densely planted with trees and shrubs. Below the terrace are dotted a few deciduous trees on the slope leading down to Shirehampton Road; this is planted either side by an avenue of trees known from other sources to have been elm.

McAdam and the bridge: 1821

The incremental realignment of the Gloucester-Shirehampton road in the Seventeenth and early Eighteenth Century resulted in the main highway crossing directly over the Kings Weston ridge: a major encumbrance to travellers. On both the north and south sides of the hill there were heavy gradients that carriages and waggons needed to negotiate which were both inconvenient and dangerous.

By the Eighteenth Century Britain's Roads had fallen into a terrible state; Inconsistent maintenance, a lack of responsibility, and a rise in traffic had resulted in an almost impossible network of muddy, rutted and potholed tracks. Turnpike Trusts were set up as a method for local businessmen to apply to Parliament to take in hand the repair, maintenance, construction and improvement of roads. To ensure that the trusts remained sustainable, and prove some profit for investors, Government allowed the levying of tolls. Bristol turnpike Trust was on of the earliest, created in 1727, and grew to become one of the largest in the country.

In 1758 the Trust were granted powers to attend to the rote between Stoke Bishop and Shirehampton, and the road from there to the Ferry at Aust. This would have ensured that the principal road through the Kings Weston estate was brought under Turnpike control. This was later extended with an Act in June 1819 " (by this Act intended to be made Turnpike) diverging from the said last mentioned Road at the Entrance into Lord De Clifford's Park to or into the said Road in the Village of Henbury" .

In 1816 the famous highways engineer John Louden McAdam (1756-1836) was appointed Surveyor to the Bristol Turnpikes Trust and the 149 miles of road then in their control. His pioneering decision was to remake the roads in his care with well-compacted layers of consistently sized and layered rocks and gravel, the raising of the road surface above the surrounding ground, and introducing a gentle camber for the runoff of rainwater. This system of construction, the Macadam road, was first used between Marsh Street and Ashton Gate in Bristol in 1816, and would later be adopted nationally.

McAdam published promoted his ideas through pamphlets and books. It is from one of these, Observations on the management of Trusts for the care of Turnpike Roads (1825) that we know most about the project to drive a new road, not over, but through Kingsweston Hill by means of a deep cutting; Such major civil engineering works were not unfamiliar to Turnpike Trusts who, on occasion, had straightened or completely diverted roads to improved courses, thrown up great embankments and bridges, and even, on occasion, driven tunnels through hills; However these were not works that went without cost and effort.

On extending their network in 1819 McAdam records only that he had "improved Parish Road from Kingsweston to Henbury, when made Turnpike". The nature of these works is not known, but in other areas of the city where he'd work his approach had been to provide quick fixes to make the roads at least serviceable before more substantial works could be planned or afforded. It was not until 1821 that the Trust embarked on "Lowering hill and building walls" at Kingsweston Hill. This work relates to the excavation of the new cutting approximately 5m in depth through the limestone bedrock of Kingsweston Hill, the forming of a new road surface, the building of a new road across the high ground to access the inn and replace that lowered, and the building of parapet walls along the edges of the new cutting.

As a consequence of these works the access between the inn and the parkland onto which it faced was severed. McAdam sought to maintain connection by providing a new, modern, iron bridge for pedestrians.

As will be discussed later the use of iron for bridge was not unusual by this time, though there were some minor innovations included in the Kings Weston bridge that appear to be a development from similar examples. Though it's not known where the bridge was cast it would not be unusual for it to have been commissioned from the Coalbrookdale Iron Works. Although the design of conjoined circles in the spandrels was a typical Coalbrookdale trait it had become more widely adopted by regional imitators and there's potential that it was cast locally in Bristol, or nearby.

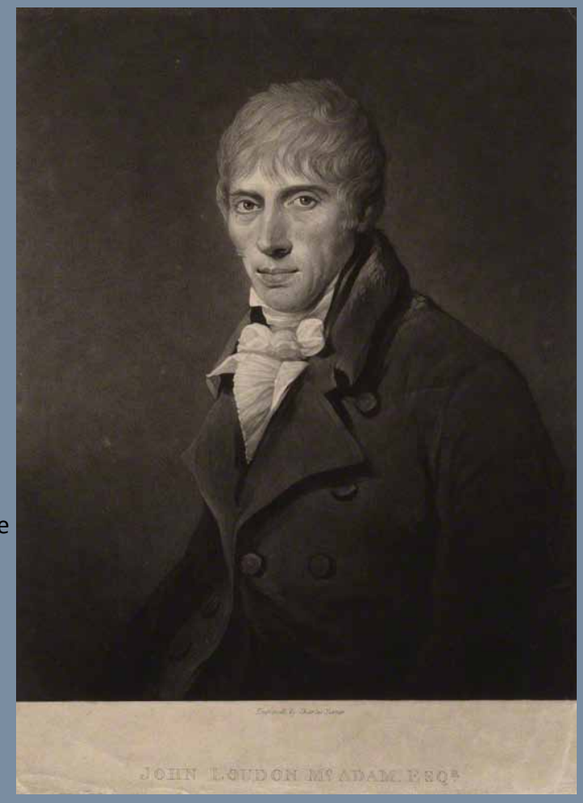
John Loudon McAdam 1756 - 1836

Civil Engineer

Born in Scotland, as a Young man in 1770 McAdam moved to New York where he operated as a British agent during the American revolutionary war. Returning to Britain in 1783 he was appointed as a trustee of the Ayrshire Turnpike Trust where he became particularly involved in the physical construction of the roads and methods used.

He moved to Bristol in 1802 and became General Surveyor for the Corporation of Bristol before being appointed surveyor of the Bristol Turnpike Trust in 1816. He worked from the Office of Roads, then located in Small Street in the city centre. From here he developed his own method of road construction that proved to be both revolutionary and durable. The majority of Bristol Roads in his care were remade using his techniques.

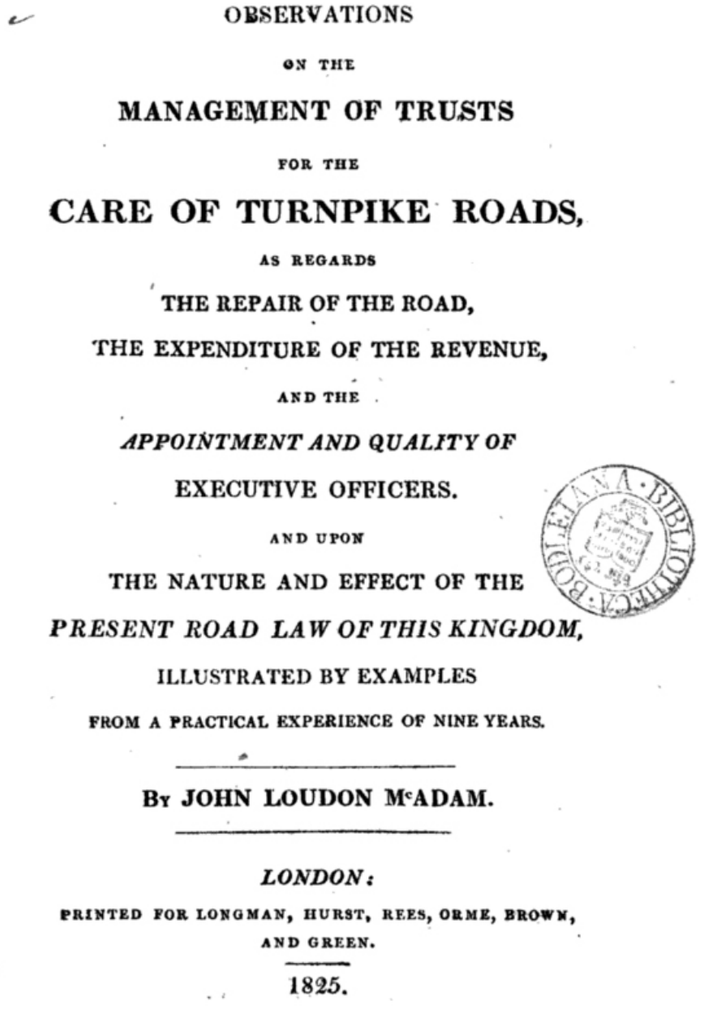
His works have been described as "the greatest advance in road construction since Roman times," and he espoused his accomplishments in a series of publications that were widely circulated internationally; most of the main roads in Europe were subject to the McAdam process by the end of



McAdam and the bridge: 1821

The bridge was carried on masonry abutments either side of the cutting and was a simple structure comprising cast iron spandrels and decking plates with wrought iron balustrade. The visual simplicity of the finished structure belied considerable intricacy in the casings, and construction techniques that brought together over 200 individual components. Unlike similar bridges it relies entirely on gravity to stay in place without direct fixings into the rock or abutments. Structural rigidity is provided through the interlocking deck plates and central stretcher-beam; only eight bolts were used to connect this with the spandrels. All other components were mortice and tennon joints fixed with tapered cotters (wrought iron wedges).

McAdam's approach to road building was refined for use across natural earth. He expressed that "The greatest difficulty has been found in making Roads over naked rock: experience I soon discovered that a road, placed between the wheels of carriages 'and the rock, was worn away in a- comparatively short time; and it was found profitable to remove part of the rock, and to replace it with road sweepings, common soil, or any soft material." The excavated course of the new road would have presented him with such a challenge, though there is little evidence of how he would have overcome these issues below the bridge where traffic was concentrated.



OBSERVATIONS

ON THE

MANAGEMENT OF TRUSTS

FOR THE

CARE OF TURNPIKE ROADS,

AS REGARDS

THE REPAIR OF THE ROAD,

THE EXPENDITURE OF THE REVENUE,

AND THE

APPOINTMENT AND QUALITY OF

EXECUTIVE OFFICERS.

AND UPON

THE NATURE AND EFFECT OF THE

PRESENT ROAD LAW OF THIS KINGDOM,

ILLUSTRATED BY EXAMPLES

FROM A PRACTICAL EXPERIENCE OF NINE YEARS.

By JOHN LOUDON McADAM.

LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME, BROWN, AND GREEN.

1825.

Fig.10. Early 1900s view of the footbridge

Fig.11

Extract from the 25” Ordnance Survey 1880s map

Later History

The death of Lord de Clifford in 1832 resulted in a change of ownership of the Kings Weston estate, including the inn. ,The new owners, the affluent Miles Family had different attitudes to the public access arrangements that had encouraged visitors, and their desire for greater privacy saw the popularity of Kings Weston as a visitor destination dwindle. The cutting of the carriageway into the hill meant that traffic no longer crossed the hill in front of the inn and passing trade dried up. The end appears to have come in April 1838 when the entire contents of the inn were sold at auction, including a beer machine. The property was advertised for immediate let by lease, but there is no further reference made to the inn as a commercial enterprise after this date.

“*Kingsweston Inn: Will sell by auction*

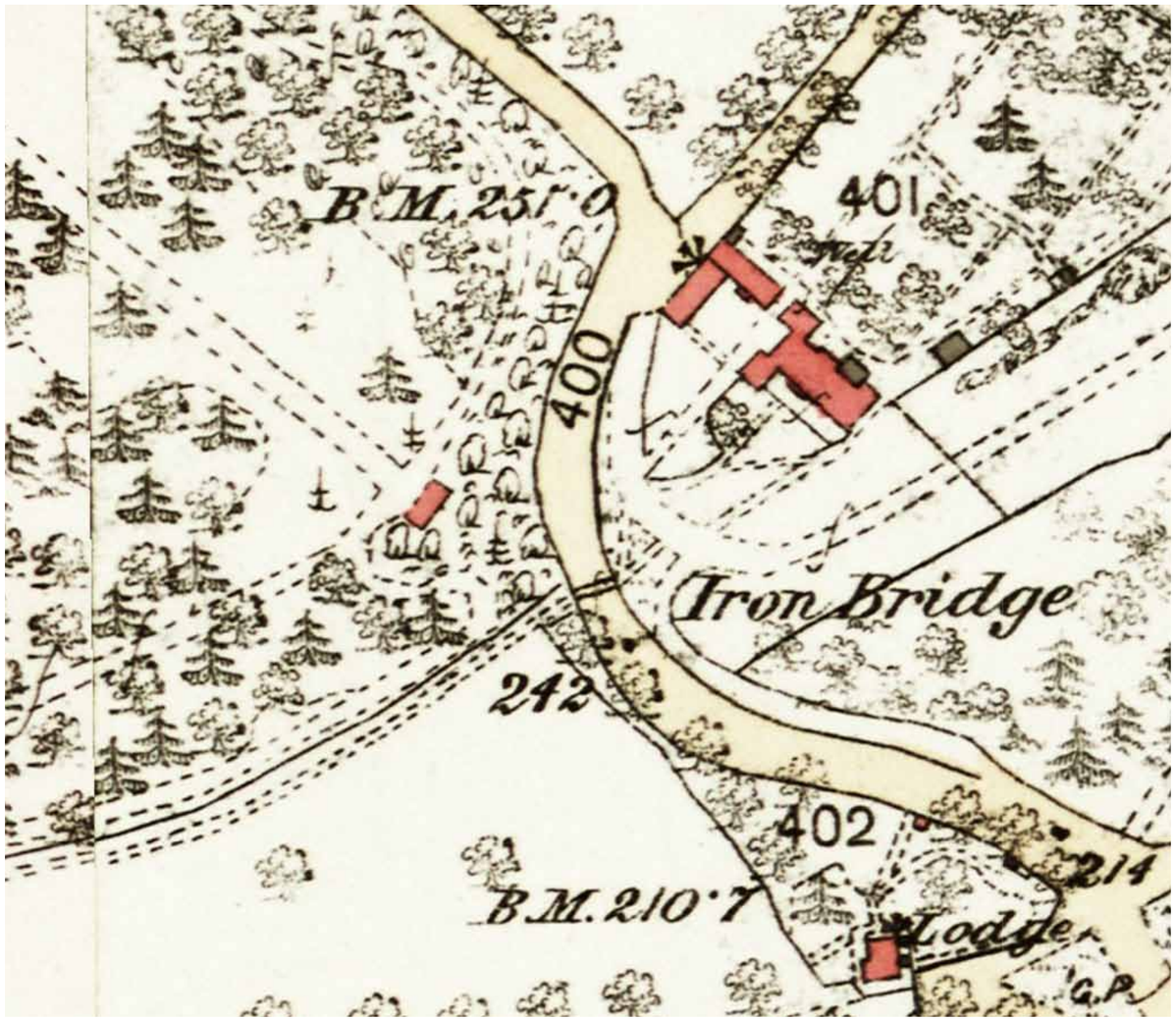
On Monday and Tuesday the 16th & 17th of April instant -The whole of the household furniture, plate, linen, china, glass, four-motion beer machine, brewing utensils, casks, horse and cart, etc of Mr Wm Hoare quitting his residence. N.B. The above Inn to be let with immediate possession and the furniture et cetera taken to at the valuation time preceding the date of sale.”

(Bristol Mercury, 7th April 1838)

Little change for almost a century. The estate remained a popular excursion for Bristolians, but had lost much of its international appeal and glamour. The Inn is known to have offered afternoon Teas for some time in the early C20th, and Fox hunts were regularly advertised to set off from there even though it had ceased operation as a pub decades previously. The suburbs of Bristol gradually edged closer to the boundaries of the park and the development of Avonmouth in the Late C19th and Early C20th brought greater traffic through the area.

In 1923 it was noted in the Western Daily Press that the bridge was in a “dangerous state”, though no description of its condition was included. There was ongoing dispute between Henbury Council and the City Council over who was responsible for the bridge and its repair. The City Council erroneously believed that it had been erected by Lord de Clifford and was therefore the responsibility of the owners of the Kings Weston Estate, though the parish council asserted correctly that it had been transferred into Bristol Council’s authority under the various Turnpike acts. No resolution to the matter found its way into the press, but Henbury Council resolved to refer the matter to the Ministry of Health if Bristol would take now ownership of the issue.

The last private owner of the house and estate, Philip Napier Miles, died in 1936 without an heir and his executors parcelled up the land and sold it on. Kingsweston Hill and the sliver of Shirehampton Park above Shirehampton Road was bought by the City Council to ensure they remained as open recreation space. The former Inn and Inn cottages were sold of somewhat later in the 1950s though, but this time, were already split into individual dwellings.



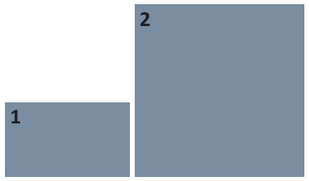


Fig.12

1 The Iron Bridge, Kings Weston, early 1900s postcard, BRO 43207/9/44/79

2 Early 1900s view of the footbridge

Later History

In 1971 the Iron Bridge was hit by a vehicle and badly damaged. Following the collision the bridge was repaired and the eastern side replaced by Bristol City Engineers department. This work included two recast spandrel panels for which moulds had to be made from scratch by the Port of Bristol Authority at Underfall Yard and remained stored there future use. The reconstruction also used modern materials and bolted or welded connections, but the west half of the bridge was retained in-situ and conserved in its original condition.

In 1979 WJ Sivewright of the Institution of Civil Engineers' Panel for Historical Engineering Works attempted to research the bridge, but, at the time, was unable to uncover much more than hearsay; however he did undertake a sketch survey of the structure which he provided a copy of to the City Council.

Kings Weston house itself, and the area immediately around it stretching as far as the viewing terrace was let for institutional uses from WWII until the 1990s. The primary school, Bristol technical College, nor Avon and Somerset Constabulary gave much attention to the historic park and structures in their care. The Echo and viewing terrace were virtually abandoned and the former narrowly escaped demolition in 1970 by the University of Bath who had evolved out of the former technical college. The viewing terrace became overgrown and the views entirely obscured until 2012 when the Kings Weston Action group uncovered the historic structure.

National protection of historic sites stemmed from the devastation wrought by the Second World War and a recognition of the loss of many historically and culturally important buildings. The Town and Country planning Act 1947 introduced Listing as a method of identifying important sites and providing protection for them. The majority of the buildings on the Kings Weston Estate received protection under the first review of the City's assets in 1959. Vanbrugh's Echo just to the north of the Bridge was Listed Grade I, Park Lodge on the road below it, and the Iron Bridge itself received Grade II protection in this year. The inclusion of the bridge at this date is an unusually early recognition of a relatively modest industrial structure. The Inn was added to the List as Grade II in 1977 under the erroneous description of "The Ship Inn".

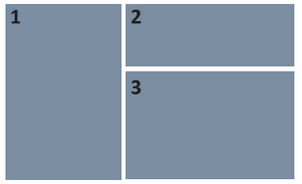


Fig.13

1 View across the bridge towards the Kings Weston Inn

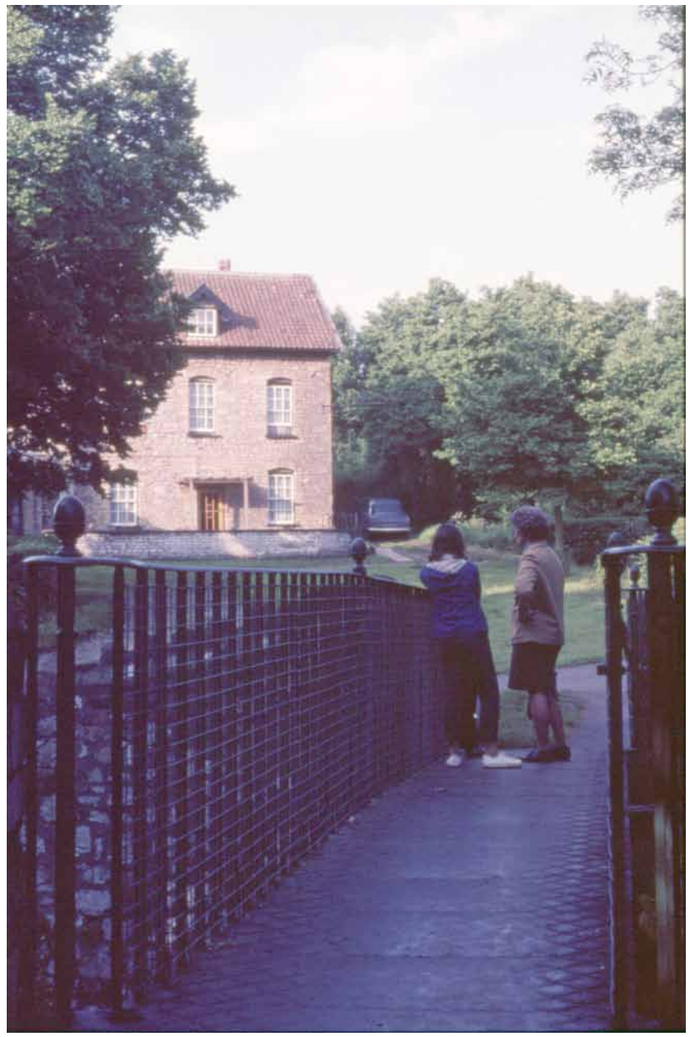
2 and 3 Recent community protest

Later History

Avon County Council recognised the special character of the area and designated the Kings Weston estate part of the Kingsweston and Trym Valley Conservation Area in 1981. Two years later the remaining parkland received national designation as a Grade II registered historic park or garden adding a further level of national protection to the landscape and assets within it. In 2015 the Kings Weston Action Group successfully campaigned to have the historic significance of the Georgian viewing terrace recognised as a nationally designate Grade II Listed structure.

Since 2011 Bristol City Council has been reviewing the condition and significance of the Kings Weston Estate. In collaboration with the Kings Weston Actin group the Local Authority undertook a Conservation Management Plan (CMP) to develop awareness of the historical importance of the estate and its features, and ensure there was a framework and policies in place to help protect them for future generations. The CMP was adopted in 2014 and remains a relevant planning consideration.

Following the bridge strike in November 2015 and the closure of the footpath there has been a great deal of public concern over the repair of the bridge and the reinstatement of popular walking routes across Kings Weston Hill. Residents concerns have also focussed on the perceived issue of pedestrian safety over the current temporary diversion route that crosses Kingsweston Road at a level close to the busy junction with Shirehampton Road. In January 2018 a campaign body the “save the green Iron Bridge” group organised a protest event to which more than 200 members of the public attended.



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Significance

Significance: The Iron Bridge

The Iron Bridge is the principle heritage asset assessed as part of this report. It is a nationally designated Grade II Listed structure and sits within both the Kingsweston & Trym Valley Conservation Area, and the Grade II Registered Historic landscape. The bridge crosses Kings Weston Road at a height of approximately 5m and connects public parkland on Kingsweston hill on the east, with Shirehampton Park on its west side. Kingsweston Inn which the bridge was partially intended to serve lies to the north east approximately 45m away. The western abutment of the bridge immediately adjoins the Grade II Listed Georgian viewing terrace that extends a further 160m westwards.

The cutting below the bridge was formed by the nationally important highways engineer john Louden McAdam in 1821. This was dug directly into the limestone bedrock of the hill and extends approximately 30m in length in a gentle curve from the junction of Shirehampton Road and Westbury lane in the south to Kingsweston Lane in the North. It maintains a consistent width of about 8.5m along its length. The present road, Kingsweston Road, B4057, consists of two lanes of traffic with a pedestrian pavement along its western edge.

The sheer walls of the cutting are now retained by rough-coursed limestone walls though there are significant portions that reveal the underlying natural rock face (fig 1,2,&3) . The masonry walls are formed of similar material to the bedrock and are likely to have reutilised excavated material at the time of construction. A parapet is formed along both sides of the cutting to protect pedestrians at the upper level from fall. Some portions of the retaining walls have been added to, or repaired and repointed, more recently and the overall height close to the bridge raised at some point in the Twentieth Century; Before that time the parapet was half the present height with a timber post and rail fence. The majority of the present cutting fabric dates from 1821. The present tarmacadam road and pavement surfaces are modern.

Both bridge abutments are of rough coursed limestone and project slightly forward from the rock face and walls. The abutments have canted reveals back into the natural line of the cutting which give added lateral stability and support to the bridge. At approximately 4.4m above the carriageway a freestone pennant stone springer corbel projects outwards from the vertical face; this is designed with a rebate across the width of its upper face to accommodate the cast iron spring plate to support the bridge spandrels (fig 3&4). It is significant that these spring plates have no mechanical fixings visible and are likely to rely only on gravity to maintain them, and subsequently the whole bridge, in position. Later repairs to the bridge have introduced a cement mortar joint between stone and cast iron which has since failed.

The section of abutment wall above, between the corbeled springer and the footpath level, is completed in the same pennant freestone with rough bolstered finish. The upper course of stone has been cut to accommodate the extended ends of the top chord of the spandrels.

The four cast iron spandrel sections that form the arch of the bridge are cast from two mirrored moulds. Each section is 4.4m in length and two opposing

Significance: The Iron Bridge


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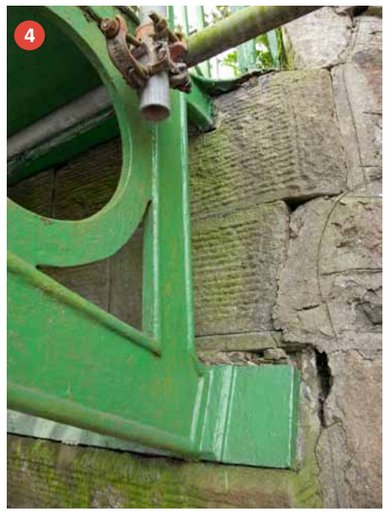
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Significance: The Iron Bridge

castings are brought together at the centre for form the completed segment arch form. That the arches were not cast as a single component is likely to have been determined by limitations in casting technology though the transport of larger components would also have been a consideration. For strength a pronounced flange is incorporated into the top and bottom of the arched section and the straight top chord with a ¾ inch thick web between. Flanges are also cast into the vertical stay on the abutment end of the casting. The open area between these three elements is filled with a pattern of graduated circles which add both strength and ornament to the finished element.

The thickness of the web and the use of flanges in this way is unusual when compared to similar bridges of the period. No doubt the innovation would have reduced both material and weight in the finished component. Further research into the use of flanges in cast iron structures may reveal earlier uses.

Each spandrel is constructed with a projecting tenon end at the termination of the arched bottom rib. This marries with mortices in the iron spring plate; again this is a connection that relies only on the strength of the interlock and gravity to keep it in place (fig. 5&6). The extended ends of the top chord sit directly into rebates in the stonework of the bridge abutments, though there is no anchor or other fixing to stop longitudinal movement; this connection only prevents torsional movement in the structure.

The spandrel elements incorporate a horizontal flange cast into the inside face of the top chord (fig7&8). This appears to have been part of a single casting rather than a welded section but incorporates a complex series of


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square and circular holes for locating balusters and fixings for the cast iron deck panels. Welding cast iron is difficult and usually limited only to repair work rather than fixing components together, so the complexity of the flange as part of a casting is unusual and would require a high degree of accuracy in forming moulds and casting.

Another difference in the Kings Weston bridge from similar structures is that the spandrels either side of the arch are not directly connected to each other at the centre-point. Rather than a standard fishplate connection there's another complex casting in the form of a cross-beam (fig 9&10). This element spans the width of the bridge, strengthened with a bottom web, connecting plates for the spandrels, and incorporates brackets at either end to support the balustrade. Each of the four spandrels is fixed to the inside face of the stretcher-beam by two bolts; The originals have square heads exposed to the outer face, and corresponding square nuts secured from behind.

The basic structure of the bridge is made of these seven cast iron elements – four spandrels and a stretcher-beam, bearing onto the bridge abutments with spring plate at either end; The rigidity is dependent on a weak connection at the centre point. It's appropriate at this juncture to speculate on the methodology of construction. Naturally the bridge abutments must have been in place before the bridge was begun, and the spring plates were then located on the stone corbel.

There are two approaches that may have been taken to erecting the bridge, either dropping the sections into place from above or raising them from below.


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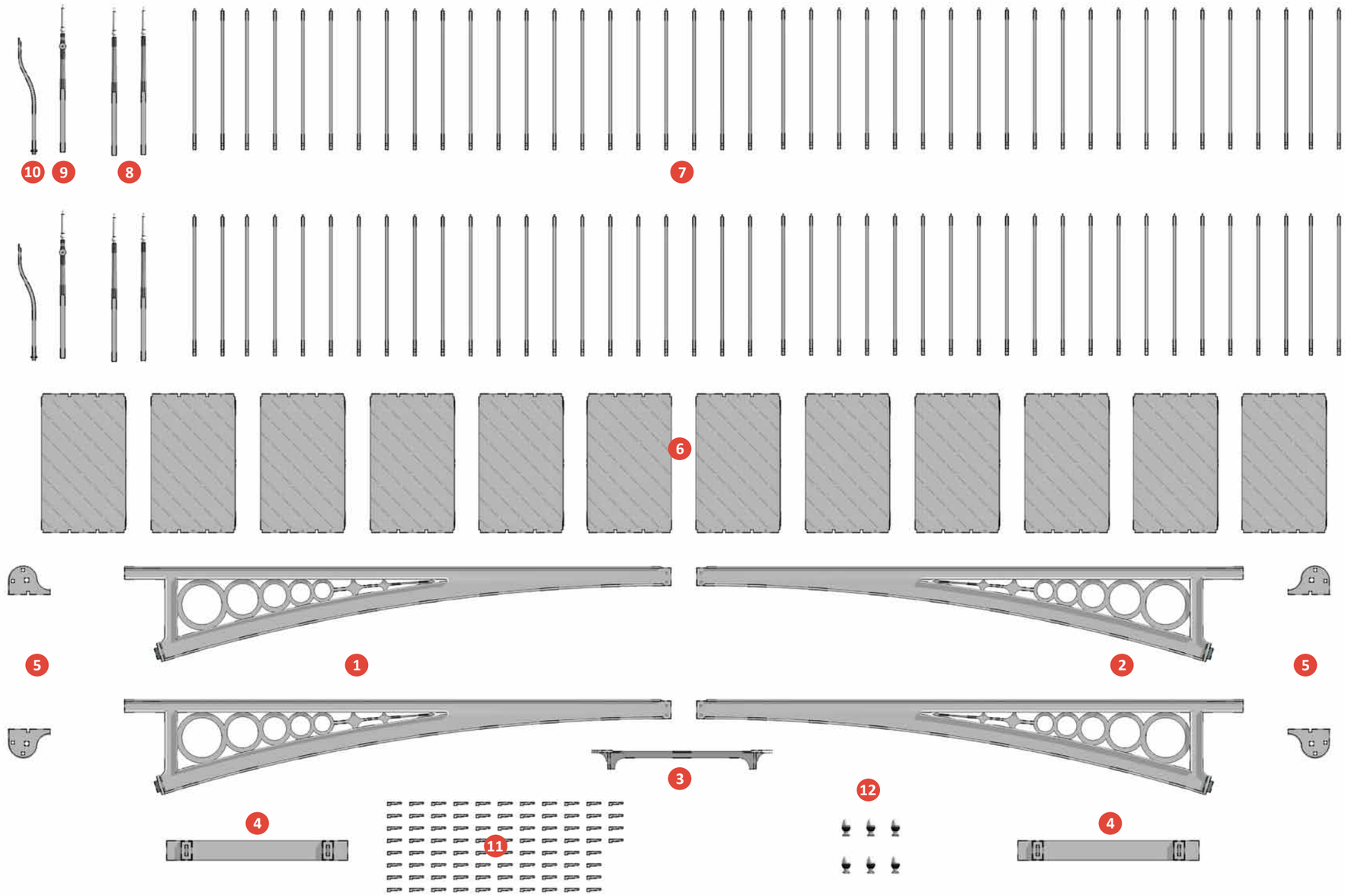
Significance: The Iron Bridge

KEY

1. Spandrels, left-hand , x2
2. Spandrels, right-hand, x2
3. Centre stretcher-beam
4. Spring plate x2
5. Balustrade termination plate, left-hand, x2, right-hand x2
6. Deck plates
7. Wrought iron stick balusters, x84
8. Wrought iron end newels, x4
9. Wrought iron centre newels, x2
10. Wrought iron centre newel strut, x2
11. Tapered wrought iron cotters x84
12. acorn finials x6



Significance: The Iron Bridge

That the bridge was hoisted into place from below is supported by the need for the spandrel sections to be slid under the central stretcher-beam to be fixed. Rather than a process used on other bridges, where each arch section was completed before being laterally connected to its neighbour, both spandrels would have been erected on one side only before the central member was attached, and then the spandrels on the opposite side could be raised into place individually (fig. 13) . This would have required the temporary support of the first side of the structure before the second pair of spandrels was fixed and the structure had a degree of rigidity.

The brittle cast iron would have remained sensitive to damage through lateral movement and the cast iron deck plates were a fundamental element in the bridge's rigidity. On their top surface the cast iron plates incorporate fixing holes offset from the side edges corresponding to one of the series in the spandrel flange, a raised tread on the top surface in a diamond pattern, and square notches along two edges and the corners (fig 11&12). The underside is plain but for curved flanges on the front and back edges; these both incorporate a hole for bolt fixing to the preceding and subsequent plates. The flange on the back end of the plate also accommodates a lip onto which the neighbouring plate overlaps (fig.14). Again the casting is far from straightforward and there is complexity involved in ensuring that the holes and flanges correspond with each other and other bridge components.

Once laid upon the horizontal flanges of the spandrel panels the deck plates form a ridged structure. Square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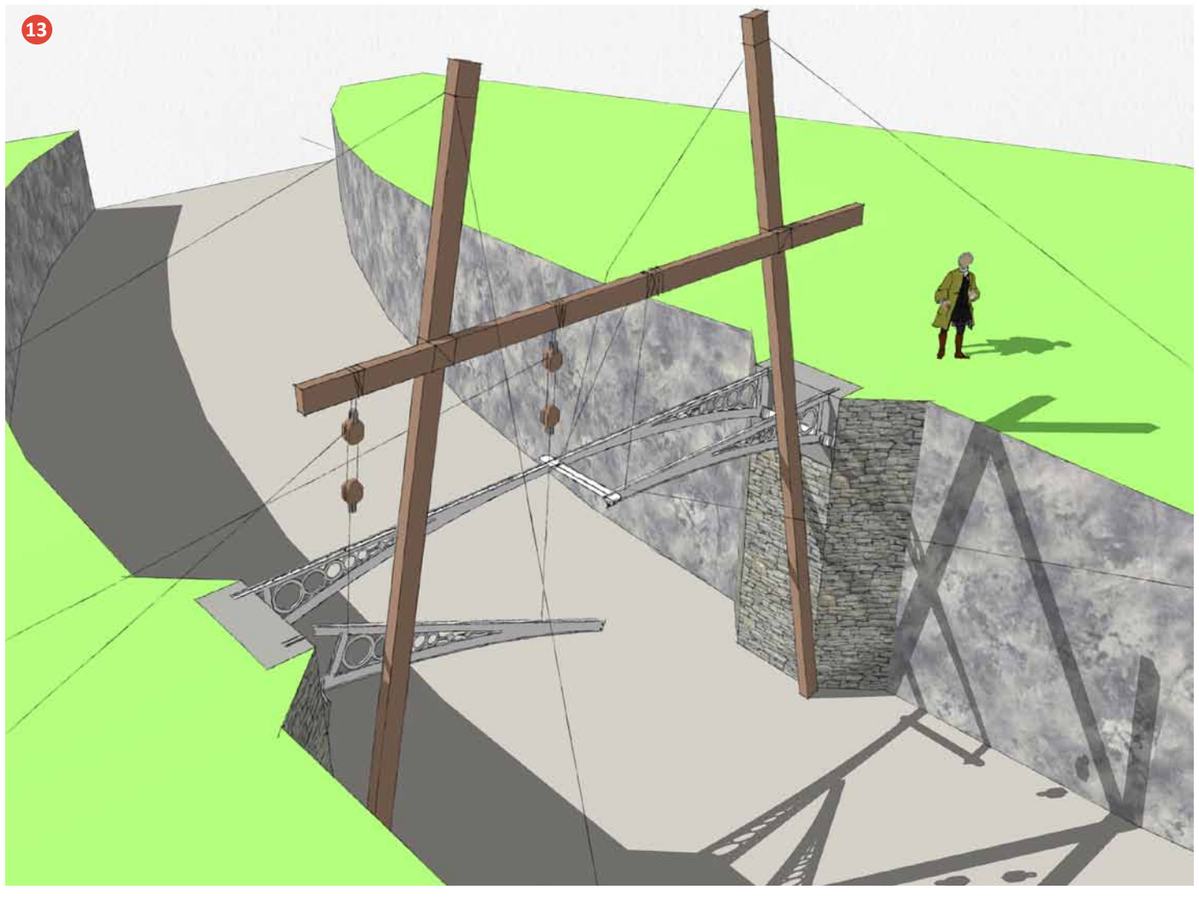
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Significance: The Iron Bridge

headed nuts and bolts fix each of the plates to its neighbour forming a long sheer panel preventing any lateral movement (fig.15). The plates are further fixed to the spandrel flanges by iron rivets or pins dropped through fixing holes in the deck surface and hammered flat from below (fig 16).

All principal elements of the bridge so far described are cast iron and are designed to work in compression. As discussed earlier, there is the potential that these were all fabricated in Staffordshire, or by a firm with knowledge and experience of bridge building and the properties of the material. They would also have needed to employ a designer or engineer who would have ensured that the complicated castings and design were suitably coordinated for the job. Although broadly similar to other contemporary bridges it's is likely to have been a bespoke order rather than a standardised product. The upper section of the bridge, incorporating its wrought iron elements, reverted to more traditional methods of fixing and construction and, although part of a unified design, could rely on more local skills and expertise to complete.

The stick balusters, all eighty-four of them, are hand wrought with dowel connections to the top, and a notch in the side towards the bottom. Each baluster could be dropped through the square holes in the deck plate and spandrel flange and fixed in a vertical position with a tapered cotters (wrought iron wedges) hammered in beneath (fig 16). It is not clear how the balusters do not fall straight through the holes and it may be that there are intricacies in the castings or baluster design that are obscured by the structure.


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More substantial balustrade support was provided at either end of the bridge and at its centre. Again these elements were wrought, not cast, iron. The central newel was fixed into a rebate in the central beam and a lateral support in another pre-designated hole in the cast element. The support was hammered from below to fix it in place and is likely to have needed softening in a forge or brazier before fixing in this manner.

The balustrade handrail is also wrought: a thin metal section hammered with a curved top surface and drilled with a series of holes corresponding with the rhythm of the balusters. The handrail was fitted over the balusters with the dowels projecting through the holes before they were hammered flat to fix it in place. The bridge was finished with elaborate curled terminations at either end of the balustrade, another feature that would have lent stability, and decorative cast acorn-shaped finials (fig. 17). The central finial acts to clamp the lapped joint between the two handrail sections.

Following the 1971 lorry strike the eastern end of the bridge was repaired with a simplified construction and modern techniques. The cast iron deck plates were switched for simple steel sheets. The stick balusters were reutilised, but bolted to the underside of the spandrels (fig. 19). The spandrel castings were bolted to the stretcher-beam with modern hexagonal nuts and there was the extensive use of welding (fig. 19). Finally the top surface of the footway was covered in a hard bitumen to act as a slip resistant surface where the steel sheet had none. At the same time the opportunity was taken to replace wire mesh that had been added for safety between the balusters. An attractive intermediate tracery was welded to the


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Significance: The Iron Bridge

existing balusters, effectively halving the gap between them; Although not original this modification has enhanced the decorative effect of the bridge (fig 20).

It is noticeable that the western section of the bridge was retained in-situ during these repairs. Whist the 2015 bridge strike impacted the 1971 fabric, and the western section was unharmed, a subsequent strike in early 2018 broke the original 1821 northern spandrel and cracked and dislodged the deck plates and pulled the spandrel foot out of the mortice in the spring plate (fig. 5&11).

The broken section of spandrel from the 2018 strike has been recovered and visually inspected. The exposed broken face exhibits a consistent grey crystalline structure, suggestive of a relatively low poring temperature with some graphite content (fig 23) . Further metallurgical analysis of the crystalline structure, elemental composition, and properties should be undertaken.

The bridge has always had a protective paint finish and assessment of the flaked sections suggests it has always been green of a variety of shades. Red oxide undercoats occur at regular intervals prior to later series of repainting layers. The lowest surface appears to have received a red oxide primer before a pale green-grey paint finish: the earliest traceable colour. Earlier repainting retained a muted palate of similar hues before the adoption of the parks green colour broadly similar to its current colour. In all seventeen separate painting events can be traced (fig. 22).

To help establish the significance of the Kings Weston bridge it is relevant to place it in a national historic


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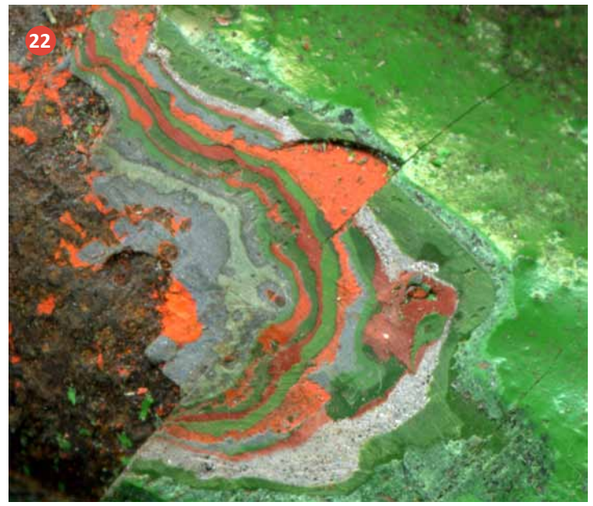
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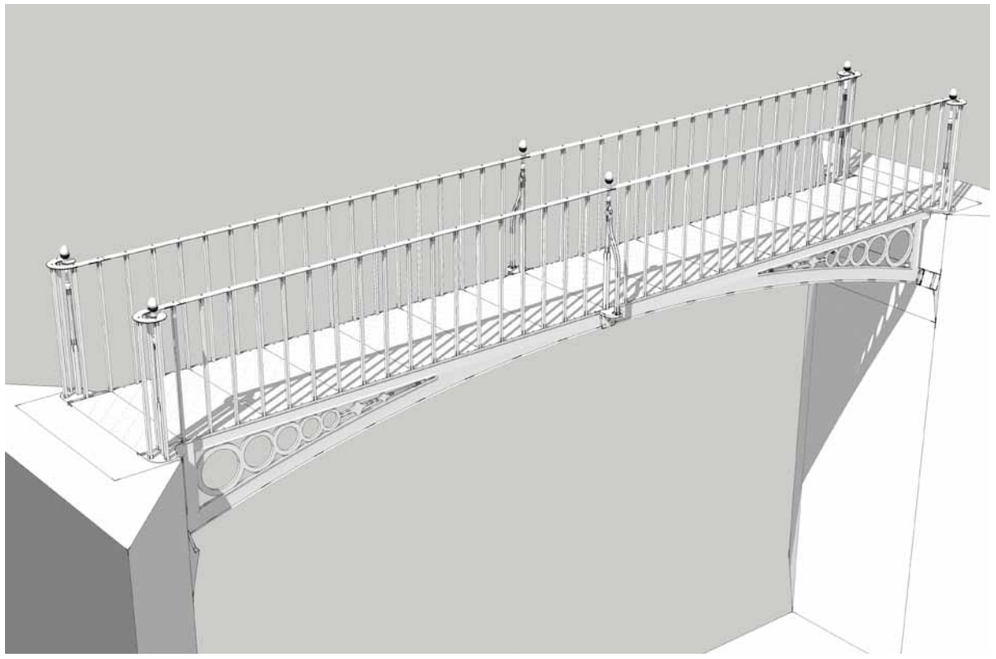
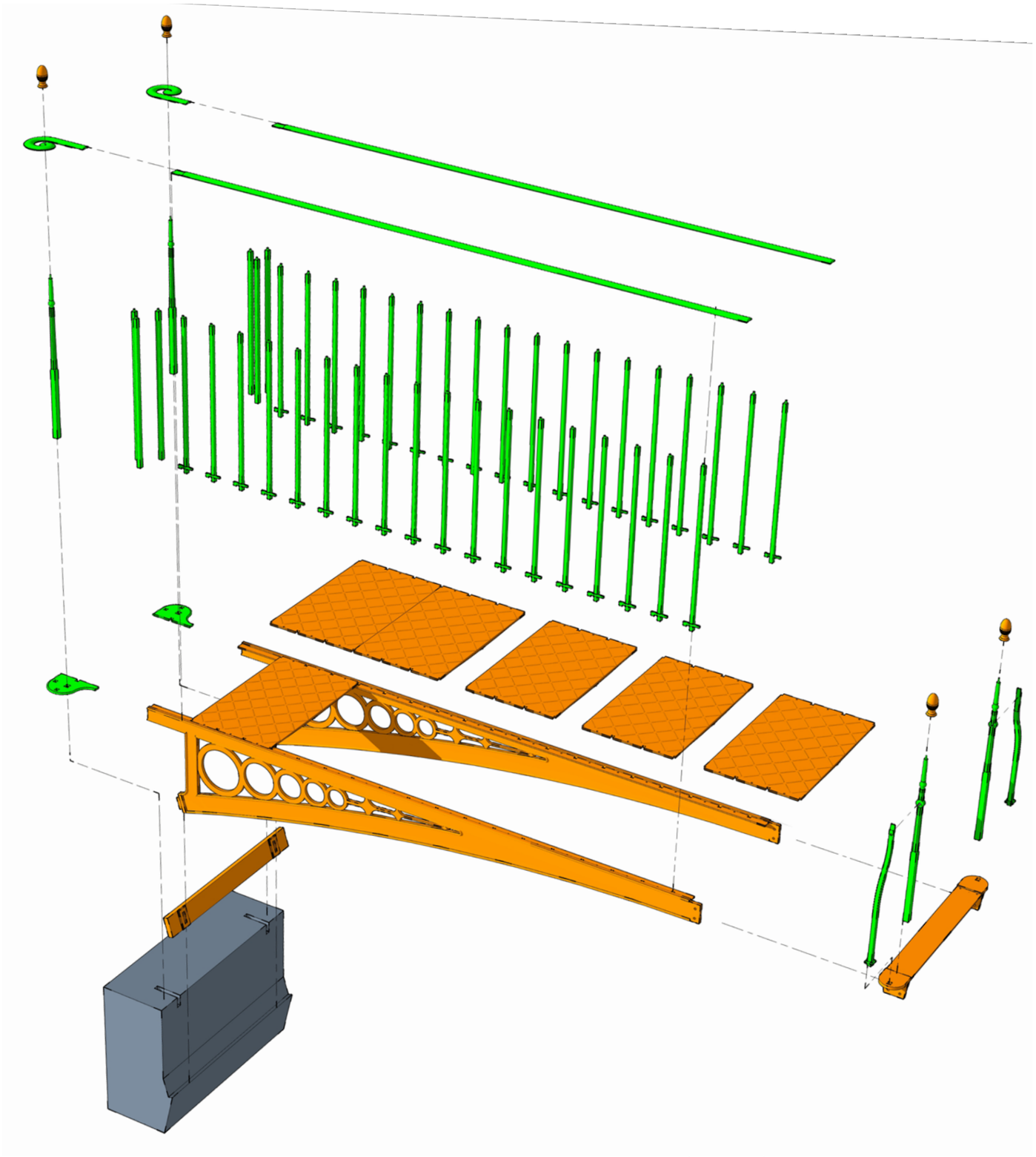
Significance: The Iron Bridge





Significance: The Iron Bridge

context and compare it with similar local examples. The bridge is one of an increasing number of cast iron structures that were becoming prevalent in the early C19th. It forms part of the second generation of iron bridges following the pioneering and eponymous Iron Bridge at Coalbrookdale, of 1789. Abraham Darby III designed a bridge based largely on traditional timber construction, but each component was individually cast with little standardisation or repetition. Later bridges developed a more refined structural system and design vocabulary for the new medium, but a significant feature of these structures was the incorporation of relieving circular rings. This became a motif used repeatedly on many smaller structures and was characteristic of the Coalbrookdale foundries.

By 1821 there had been a series of small canal overbridges and 'park' bridges erected across the country, but they were far from common. The closest extant examples to Kings Weston are found in Bath and are associated with the Kennet and Avon canal. Two bridges in particular bear closer attention; one is a simple footbridge like that at Kings Weston, and the other is a more substantial structure, but one known to be of Coalbrookdale manufacture; both bridges come from the second generation of iron bridges and are closely comparable in date and span to the Bristol example.

Firstly the Grade II Listed bridge by Stothert across the Kennet and Avon Canal near Widcombe. This is a small foot bridge of approximately six metres in length. Although undated it's design is typical of similar structures from around the same period as Kings Weston. Like it the outer arches are made from two mirrored castings. A projection is cast into the back of the top edge of these spandrels to directly carry the deck plates. The spandrels are thicker than those at Kings Weston, and without top and bottom flanges – the only projecting features being decorative rather than functional. Although the Bath example is no wider the engineers here have incorporated a third arch at the centre point of the bridge. There is minimal top chord to the spandrels and the arch rib is the principal structural element. There is no lateral beam or stays; the spandrels are connected at the crown by fishplates and lateral stability is given only by the cast iron deck plates bolted to the top edges.

The wrought iron railings are not fixed to the bridge arches, but are carried by an intermediate moulding that is bolted directly to the deck plates. This takes the form of an ornamental cornice on the outer face of the bridge, but it is visible as a hollow casting on the reverse. Brackets incorporated in to the back of this casting add stability to the railings, and they are further enforced at either end by buttressed returns.

The arches are all built directly into the masonry of the bridge abutment, as was usual at the time. Construction would have relied on forming each of the arches spanning the canal individually from two spandrels a piece before lateral stability is introduced by bolting down the thick, plain, deck plates; these exhibit none of the intricacies of bottom flanges, interlocking edges, end fixings, or integrated holes for stick balusters that the Kings Weston example does. The cornice moulding that carries the Canal bridge balustrade is no doubt a decorative feature, but there is redundancy in the need for additional components

to connect the railings to the bridge. At Kings Weston the structural simplicity is expressed and integrated hidden fixings and elaboration to the casting that enables this to be achieved.

The need for three arches to form the bridge appears cumbersome and heavy. Whether the manufacturers lacked confidence in the material, or experience in bridge construction is unclear. Whilst the decorative

Significance: The Iron Bridge

finish of the bridge is undoubted it appears over-engineered for such a small span and width.

Perhaps the model for the Washhouse Lock bridge was the grander structure over the same canal in nearby Sydney Gardens. This is dated 1800 and identified as being from the Coalbrookdale iron works. The span is closely comparable to that at Kings Weston, being approximately 8m, but with an overall width of about 3m. Erected twenty one years before it is naturally less technically sophisticated but the same techniques continued to be used through to th 1820s.

The canal is spanned by four arches with a gently arched profile ; again each arch is formed from two spandrels. The outer arches have two mirrored spandrel mouldings, and the central arches benefit from four identical castings. Like Washhouse Lock the arches are built directly into the masonry abutment and are connected at the crown of the arch by bolt-fixed brackets. The spandrels are a standard 2 inches thick with thinly applied beading that is mere ornament rather than a serious attempt at introducing flanges to provide rigidity.

Lateral stability if provided by horizontal stays threaded through some of the open circular hoops in the spandrel casting which can only have been introduced following the erection of all four arches. Like the other bath example the cast iron deck plates are plain slabs of metal with fixing holes that are bolted to long brackets cast into the arch spandrels.

The Sydney Gardens bridge required a deeper carriageway to be laid over the cast iron deck plates and here the use of the cornice moulding to carry the

Significance: The Iron Bridge

balusters enables the depth of the carriage drive to be incorporated. It is unclear how the individual balusters are fixed through this casting.

The Kings Weston bridge demonstrates a number of key developments in structural design form both the Bath examples; The addition of ribs to the top chord and arched rib is perhaps the most revolutionary of these. The designer has ensured that the weight of the bridge can be minimised whilst maintaining its structural integrity. The multiple arches have been dispensed with and the bridge is supported only on the two outer arches This innovation has also enabled the span across Kings Weston Road to be of surprisingly shallow arch profile and with minimal and slender structure. With the weight minimised the bridge vaults across the cutting in a single slender span of surprising delicacy.

The deck plates differ from those in previous structures too. Rather than the simple bolting of these onto the spandrels the castings are designed to add rigidity by recessing them into the spandrel mouldings. The bolting of each deck plate to its neighbour ensures that the whole deck surface acts as a single sheer element preventing the vulnerable central bolted connections from lateral movement and stresses; Traditional spreader bars or stays on which the earlier structures relied can therefore be dispensed with entirely.

Unusual too is the use of springer plates rather than the construction of spandrels into the bridge abutments. It is unclear why this design decision was taken but does minimise maintenance of the masonry abutments that might otherwise be susceptible to water ingress and deterioration. The majority of the bridge structure is therefore visible and inspect able with the exception of the tips of the top chord of the spandrels. The load from the arch ribs can be more directly passed into the abutment structure with the loads spread evenly by the spreader plate.

The attachment of the balustrade directly onto the arch spandrels is also peculiar. A great deal of forethought and complexity was required in ensuring all castings correctly corresponded. The fixings of the deck plates and the balustrades required additional holes to be cast in the back flange of each spandrel. The method of secret fixing behind the outer arch face ensures the cleanest of lines and most slender of profiles, but cannot have been achieved without careful calculation at point of manufactures.

Features of the Kings Weston bridge do appear in some later structures like the similar, but more cumbersome, footbridge over Borle Bridge, Highley, Shropshire. This Grade II Structure was built for a similar purpose to Bristol's but is slightly wider; This bridge adopts flanges on its arch rib and top chords, and there is a central spreader-beam separating the two ends; However in other respects the bridge is conservative and retrospective in its design with spandrels built into abutments and spreader beams giving the arch ribs lateral stability. This bridge is another product of the Coalbrookdale Company and was built in 1828. Why some of the innovations of the Kings Weston bridge were not carried through in the production of later structures can only be speculated upon.

Significance: The Iron Bridge

Although there is no known manufacturer for Kings Weston Iron Bridge there is the likelihood that it was commissioned from Coalbrookdale. That there was such a degree of innovation in its features implies that it could only have been from a firm well experienced in bridge engineering of this sort. The Stothert bridge in Bath at Washpool Lock suggests that, where local companies took on similar projects, they only imitated the designs of others. Whether McAdam was directly involved in the bridge design is entirely unknown, but there has been clear effort put into ensuring the most slender, elegant, structure adorned the Southwell Family's grounds.

As a Listed structure the Kings Weston Iron Bridge is doubtlessly of great technical interest Through its association with a nationally famous figure, John McAdam and the engineering achievements in cutting the turnpike road through its current course through the hill, the bridge has great historic value. Likewise its attribution to the Coalbrookdale foundries places the bridge high within a national context of early cast-iron structures. It is unfortunate that the 1971 repair works removed parts of the original structure from the east end, and this clearly impacts upon the significance of the structure. To maintain the significance of the Listed Building the original design, detailing, and materials will need to be protected.

The delicacy of the design and its setting in the historic landscape, with the adjacent inn grants aesthetic value on the asset. As one of the key designed elements of the Kings Weston Registered historic Landscape the bridge has extra interest. Communal value is bestowed though its public nature, its largely unbroken public use for almost two centuries, and the clear and palpable sense of frustration demonstrated by the local community through their efforts to have it saved.

Significance: The Inn and Viewing Terrace

The National Planning Policy framework (NPPF) places great emphasis on the setting of heritage assets as part of the decision-making process. The setting of the Iron Bridge is shared with two grade II listed buildings which may be impacted upon by any proposed alterations to the bridge or abutments. As such this report includes them within its assessment. The first of these to be considered is the former Kings Weston Inn.

The inn is attributed to the nationally important architect Sir John Vanbrugh, but, as discussed above, there have been substantial modifications to it. In the mid-Eighteenth century asymmetrical wings were added to either side of the central ale house structure, and in the mid Nineteenth Century the whole building was re-roofed. Internally there is a good degree of preservation of early Eighteenth Century details, but as far as we are concerned with the building here it is its setting that may be impacted upon by any proposed works to the bridge.

The front elevation is a pleasingly picturesque façade faced in local Penpole Stone and looks out across the Shirehampton Park section of the historic estate, towards Somerset; the use of the building as a belvedere was intentional from the beginning and although the central tower has been replaced the building is still a visible landmark when viewed up the slopes from the west.

Although the slight raising of the bridge parapets at some point in the Twentieth Century has slightly lessened the impact of the building towering over the slopes it remains a palpable characteristic when approaching from the west. The iron bridge itself

frames views to the inn frontage across the road cutting, with the gentle rise of Kingsweston Hill continuing the public parkland beyond. Although the later hedge planted around the building has created something of a visual barrier the raised position of the inn ensures that it remains an important landmark.

The setting of the bridge includes the lane accessing it and ascending from the south and north adjacent to the cutting parapet. This approximates the earlier course of the road across the hill hand is a historically significant set of features. These lanes open out at the bridge to a relatively flat area forming a prelude to the inn and climb up the hill beyond.

Significance: The Inn and Viewing Terrace

The settings of the inn and bridge are interwoven as part of the picturesque semi-rural character of this part of the historic estate. Views across the bridge to the inn, and from the inn looking across towards the Landscaped Parkland are visually and historically significant to both assets.

The Georgian Viewing Terrace is a Grade II Listed structure identified on the Local Authority's register of historic assets "at risk". Although the original platform of the structure is in reasonable condition the parapet wall above has suffered gradual deterioration and requires consolidation and repair. The views from the bridge are part of the structures special interest, indeed its reason for existing. A small set of steps at the east end, close to the bridge, are the historic entry into the formerly private grounds nearer to Kings Weston house. These access the promenade along the terrace and a serpentine path to the rear of the grade I Listed Echo.

The short section of the viewing terrace wall to the east of these steps is physically connected to the Iron Bridge parapet and the two Listed structures are conjoined. It is not clear how the terrace terminated in this direction before the formation of the road cutting. The 1772 estate plan shows that there was a fence along the edge of Kings Weston Road, separating it from the inn, but a gate was incorporated in the approximate location of the present bridge. The relationship is therefore historic.

The setting of the viewing terrace and bridge on the west side of the road is characterised by the broad panoramic views across the landscape in the foreground and towards Somerset beyond. The steep slope descending towards Shirehampton Road gives an added sense of elevation above the valley beyond and allows views out across the tree-studded parkland below. The bridge formed the boundary of the City of Bristol when it was extended in 1902. A boundary marker was placed at the point where the city boundary turned from running along the Viewing Terrace wall to heading in a south-easterly direction towards another marker at the foot of the slope. Although later this stone boundary marker contributes to the special interest of the estate and the setting of historic assets.

The public footpath that passes below the Georgian Viewing Terrace dates from at least the Eighteenth Century. This would have given views to the public who may not have been permitted on the other side of the wall into the private grounds beyond, but also gave easy access to the inn. The inn is a visible landmark beyond the bridge and these slopes are the only place where all three listed assets can be enjoyed within the same view. This pastoral setting is intrinsic to the setting of the Listed structures, and to the character of the nationally designated Grade II registered Historic Landscape.

Understanding Significance

Heritage Values and Significance

The conservation principle of 'Significance', the sum of the cultural and natural heritage values of a historic place, underpins modern conservation policy and practice. It provides a framework for understanding and comparing different values that have established in a given place through time.

Recent publications by Historic England and the Heritage Lottery Fund set out the current thinking on what is significant and how it is to be described. These documents promote four key categories of heritage value:

- The site as a source of evidence or knowledge (*evidential*)
- The site as a link to the past, the people who shaped it and a means of learning about it (*historic*)
- The site as a source of sensory or intellectual stimulation, designed or incidental (*aesthetic*)
- The site as an embodiment of social or spiritual values (*communal*)

For landscape sites such as Kings Weston a further category of *natural* value should also be considered to encompass ecological, geological and arboricultural values.

Within the five value categories the different levels of importance inevitably require judgements about their relative significance. The assets around the Iron Bridge exhibit a complex set of heritage values and levels of significance .

This study takes a broad approach to ranking the assets significance based on the heritage values, any formal designation status and survey information available at the time of assessment. The following significance ratings are used:

A+	Exceptional	(international)
A	Exceptional	(national - UK)
B	Considerable	(regional - West of England)
C	Some	(local - Bristol)
D	Little or no importance	
INT	Intrusive or damaging	

This approach supports future decision-making about the prioritisation and approach to management of historic assets. However, it is recognised that direct comparison across different heritage values can be problematic. For example part of the site may only be of limited historic interest but exceptional communal value to the local community.

Historic Values

English Heritage's 'Conservation Principles, Policies and Guidance' (2008) states that:

- *historic* value derives from the ways in which past people, events and aspects of life can be connected through a place to the present
- *historic* value tends to be *illustrative* or *associative*

Historic Associative Values

Kings Weston Inn, the Echo, and possibly the Georgian Viewing Terrace are all works by the nationally important architect Sir John Vanbrugh.

The road cutting and Iron Bridge were undertaken by eminent highways engineer John Loudon McAdam.

The bridge can be attributed to the nationally famous Coalbrokedale foundries.

The views from the inn and Georgian Viewing Terrace have been celebrated by numerous writers including the French diplomat Malesherebs.

All assets form part of the Grade II registered historic landscaped parkland around Kings Weston house and were owned by the nationally notable Southwell and Miles families.

Combined Value

The various associations of notable recorders, artists and owners are all part of the history of Kings Weston.

Aesthetic Values

English Heritage's 'Conservation Principles, Policies and Guidance' (2008) states that:

- *design* value relates to the aesthetic qualities generated by the conscious design of a building, structure or landscape as a whole
- *aesthetic* value derives from the ways in which people draw sensory and intellectual stimulation from a place
- some aesthetic values are not substantially the product of formal design, but develop more or less *fortuitously* over time, as the result of a succession of responses within a cultural framework

Aesthetic Value

The Registered Historic landscape is a verdant landscaped parkland artfully designed to mimic and improve on nature.

The designation of the area as a Conservation Area establishes it as one of special character.

The historic park, the Georgian Viewing Terrace, and Inn all take intentional advantage of the elevated panoramas across the Avon valley towards Somerset

The terrace, bridge and inn forms an appealing grouping of structures within a naturalised landscape setting

Design Value

The design value of the Inn, Iron Bridge, terrace, and other assets is recognised at a national level through their inclusion on the National Heritage List for England.

The Iron Bridge is designed to minimise its impact upon the parkland through an elegant and refined design.

The Inn retains architectural character developed over several generations

Evidential Values

English Heritage's 'Conservation Principles, Policies and Guidance' (2008) states that:

- evidential value derives from the potential of a place to yield evidence about past human activity
- physical remains of past human activity are the primary source of evidence and evolution of places, and of the people and cultures that made them
- age can be a strong indicator of relative evidential value
- evidential value derives from the physical remains or genetic lines that have been inherited from the past
- the ability to understand and interpret the evidence tends to be diminished in proportion to the extent of its removal and replacement

Evidential Value

The Kings Weston Inn is an important and early example of a purpose-designed building to serve visitors to a landscaped estate

The Iron Bridge exhibits significant technological developments in early iron bridge construction. The western part of the bridge retains the original materials and construction techniques from 1821

The Kings Weston road cutting is a tangible demonstration of the the power of the Bristol Turnpike Trust and the engineering works that they were able to undertake.

The Georgian Viewing Terrace expresses the wealth and ambition of the Southwell Family and their ability to remove a large portion of the hill from obstructing their views.

The city boundary post of 1902 identifies the exact location of Bristol's historic boundary before it was extended again.

Communal Values

English Heritage's 'Conservation Principles, Policies and Guidance' (2008) states that:

- *communal* value derives from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory
- *commemorative* and *symbolic* values reflect the meanings of a place for those who draw part of their identity from it, or have emotional links to it
- *social* value is associated with places that people perceive as a source of identity, distinctiveness, social interaction and coherence

Communal Value

The Iron Bridge was designed to ensure that public access would be ensured between Kings Weston Hill and Shirehampton Park and it continued to do so until 2015.

The Local community have demonstrated that they have great affection for the bridge and the Kings Weston estate as part of their local identity and distinctiveness

The footpaths routed over the bridge are a locally significant recreational resource

Natural Values

Natural Value

Shirehampton Park and the Home Park of Kings Weston estate have their natural value recognised at the local/city scale through its status as a Site of Nature Conservation Interest (SNCI). It should be noted that any proposals that would impact upon this will need to provide assessments of the ecological value.

The Registered historic landscape has nature value as part of a public park.

Significance

KEY

Heritage Assets:

a. The Iron Bridge **(Grade II Listed)**

b. **Kings Weston Inn (Grade II Listed)**

c. The Echo, (Grade I Listed)

d. Georgian Viewing Terrace (Grade II Listed)

e. Park Lodge (Grade II Listed)

NB. The whole area is covered by the Kingsweston and Trym Valley Conservation Area.

Other Features:

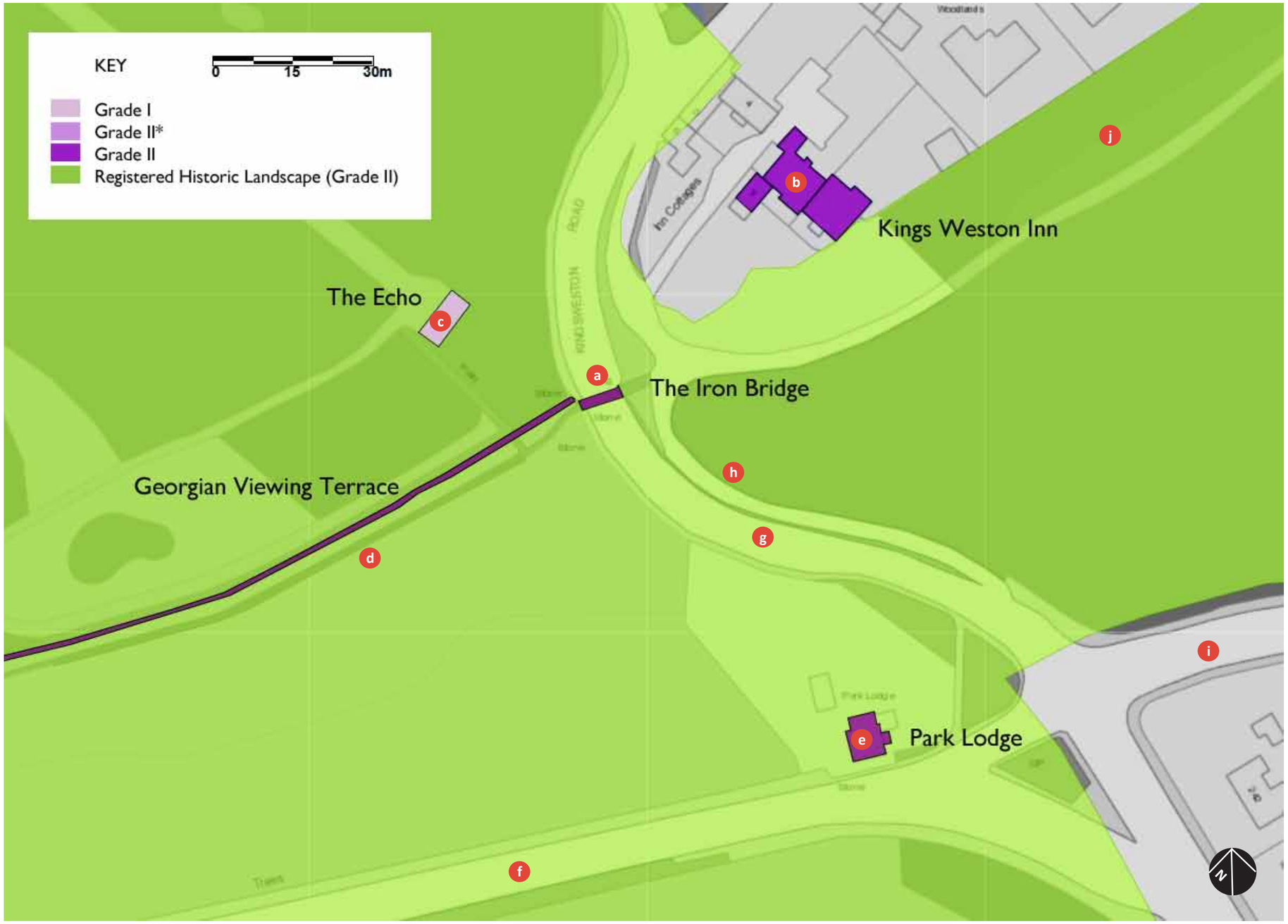
f. Shirehampton Road

g. Kings Weston Road

h. footpath to Kings Weston Inn

i. Westbury Lane

j. Kingsweston Hill.



National planning policy context

Any Planning or Listed building application must conform to national and local planning policies. The following is not a full list of all these, but summarise those most relevant to the assets and outline proposals. Any proposed works to the Grade II Listed Iron Bridge will require Listed Building consent unless they constitute like-for-like repairs. As the current condition of the bridge is so poor following the two recent lorry strikes the extent of repair work is likely to require a full Listed building application to be made. Any proposals that seek to raise, alter, or otherwise impact the supporting abutments and approaches will furthermore require a concurrent planning application to be made.

Although most Listed Building applications relating to Grade II Listed assets can be dealt with by the Local Authority, a Listed Building application for removal or substantial reconstruction will additionally need to be considered by Historic England. We strongly recommend that a pre-application enquiry is lodged with them prior to proposals are developed further.

The NPPF (para 189) requires applicants to undertake an appropriate archaeological desk-based assessment of, where necessary, a field evaluation prior to determination. It should be noted that this document does not provide a full archaeological assessment for those purposes. This report relates only to the above-ground heritage assets, specifically: The three Grade II Listed structures likely to be impacted upon by development, the Grade II Registered Historic Landscape, and the Kingsweston and Trym Valley Conservation Area. Specialist contractors should provide a more detailed assessment of the archaeological potential of the area if proposed impact upon it.

Paragraph 194 of the NPPF Requires “great weight” to be placed in the conservation of heritage assets:

> *“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).“*

As indicated in preceding sections the Grade II Listed structures are all of national significance as designated Listed buildings, however there are aspects of each asset that clearly contribute to an assets significance to a greater or lesser degree. The Registered Historic landscape is also a national designation.

> *“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. Substantial harm to or loss of…grade II listed buildings, or grade II registered parks or gardens, should be exceptional”*

The works to the Iron Bridge have the potential to pose substantial harm through its removal and strong justification must be made as to why any repairs cannot be undertaken on-site. Furthermore, if removal is justified then a clear programme of reinstatement, and demonstration that all funds are in place prior to works commencing are likely to be required to obtain consent. Where this is not demonstrated then it would be considered that substantial harm would be caused and paragraph 195. Would require the Local Authority to 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 a series of stringent requirements are met.

If works pose “less than substantial harm” under the definitions of the NPPF then paragraph 196 becomes the relevant clause. This states:

> *“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 the public benefits of the proposal”.*

The public benefits must be tangible and required to fall into one of three categories: economic, social, or environmental. The applicant should be clear over what these benefits will be, how they might offset the scale of harm, and describe what mitigation has been considered to minimise the harm.

Local planning policies

Bristol has two key Development Management policies relating to heritage assets – DM26 and DM31; these are designed to parallel and complement those of the NPPF. These policies are the implementation of Bristol Development Framework Core Strategy BCS22. This requires development proposals to:

"safeguard or enhance heritage assets and the character and setting of areas of acknowledged importance including:

- *Scheduled ancient monuments;*
- *Historic buildings both nationally and locally listed;*
- *Historic parks and gardens both nationally and locally listed;*
- *Conservation areas;*
- *Archaeological remains*

Three of these classifications relate to the assets in this document, with the potential for archaeological remains to be affected depending on the chosen course of action.

Development Management policy DM26 requires all new development to contribute positively to an areas character and identity, creating or reinforcing local distinctiveness. This general design policy is specifically relevant in the current case where proposals might impact upon the special character of the Conservation Area. This is further elaborated upon in the 2014 Conservation Management Plan for the Kings Weston Estate which should be read in conjunction with this document. DM26 states "Development will not be permitted where it would be harmful to local character and distinctiveness"

Heritage Assets have specific protection in Policy DM31, the introduction of which explains:

"Heritage assets, which can range from whole landscapes to individual items of street furniture, are a finite non-renewable resource that can often be irreparably damaged by insensitive development. Great weight is given to the conservation of designated heritage assets."

With specific reference for the Kings Weston assets the following policies apply:

- *Listed Buildings: Alterations, extensions or changes of use to listed buildings, or development in their vicinity, will be expected to have no adverse impact on those elements which contribute to their special architectural or historic interest, including their settings.*
- *Conservation Areas: Development within or which would affect the setting of a conservation area will be expected to preserve or, where appropriate, enhance those elements which contribute to their special character or appearance.*
- *Registered Historic Parks and Gardens: Development will be expected to have no adverse impact on the design, character, appearance or settings of registered historic parks and gardens and to safeguard those features which form an integral part of their character and appearance.*

It is important to note in the above that proposals are expected to have <u>no</u> adverse impact on a Registered Historic Landscape such as that at Kings Weston.

Impact assessment

Five options to deal with the repair and future management of the bridge of the Grade II Listed Iron Bridge have been proposed by consultants CH2M on behalf of Bristol City Council Highways Structures department. All options require the removal of the bride from its current location and therefore pose harm under the definitions of the National Planning Policy Framework. The cost of removing, restoring and reassembling the bridge at its existing location is estimated to cost £65k-£90k.

The Options are summarised as follows:

Option 1: Advanced Signage

Option 1 will be used in any situation where the bridge is installed at a level where there is less than standard headroom. It involves adding appropriate signage on both approaches and signs with available headroom fixed to the bridge, as well as advance direction signs (ADS) with diversion route for overweight vehicles, where appropriate. ADS with available headroom to be installed on the main approaches.

There was signage prior to the first bridge strike of November 2015, but it was obscured by vegetation. No ‘maximum headroom’ signs to diagram 532.2A or black and yellow markings were installed at the bridge during the first bridge strike. It is known that HGV drivers occasionally ignore height restriction signs, resulting in bridge strikes. Therefore, a solution where there is less headroom than the standard 5.49m leaves residual risk of bridge strikes.

The cost of installing the signage, including design is estimated to be £40k-55£k dependent of illumination requirements.

Option 2: Narrowing of Road and Traffic Signals

Option 2 involves narrowing the existing carriageway to one lane to direct traffic into the centre of the carriageway where there is a maximum headroom. The HGVs already take a significant width of the road on the narrow bend near the bridge (Tracking analysis in Appendix A) and currently there is not enough room for two lorries to pass safely.

The narrowing of the carriageway should be combined with installation of the new traffic signals and potentially new build outs for appropriate traffic guidance. This option allows headroom of 4.874m which is insufficient; hence this option would have to be combined with lowering of carriageway (Option 3) or lifting the bridge (Option 4) to achieve a standard headroom.

The installation of new traffic signals would part of this option. 3-way traffic signals would be required on King Weston Lane, King Weston Road southbound and northbound. Because the traffic signals need to be spaced far apart and is a one-way system, the signals would need longer phase times than a system at a junction. This, in combination with queuing at the signals would cause significant congestion and delays to motorists.

The cost of this option is estimated to cost £195k-£250k and will provide approximately 0.458m of headroom.

Option 3: Lowering of Carriageway

The headroom of the bridge can be increased by lowering the carriageway, reducing the risk of bridge strikes. The 2 main constraints to this option; increasing the height of the retaining wall, and excavation works in the road. Lowering the carriageway is likely to bring the highway below the toe level of the existing walls. It is likely that underpinning works would be required to ensure the stability of the walls. The extent of required underpinning works would be determined upon further ground investigation.

Excavating into the carriageway presents a challenge. The 5 carriageway core samples taken by Structural Soils Ltd. indicate that the carriageway is approximately 0.3m deep and is built directly on a stone face, making excavations expensive. The utilities in the carriageway require additional protection or lowering, which increases the cost of this option. The works would require the complete closure of the road for an extended period and providing appropriate diversion routes.

Lowering the road by 1.0m is estimated to cost £310k-£350k. Any diversions or protective measures to utilities have not been included in this estimate.

Impact assessment

Option 4: Elevate Bridge

The bridge can be raised to a level which eliminates the risk of the bridge being struck. The required headroom for an existing structure is 5.49m adjusted for the curve of the carriageway and the deflection on the bridge. Currently, the bridge has a headroom of 4.416m. Raising the bridge by approximately 1.074m will make the bridge meet current requirements and eliminate the risk of bridge strikes.

Reassembling the bridge at higher elevation necessitates the raising the abutment and landing levels. Lightweight backfill and/or light weight ramp structures displacing soil weight are 2 options for avoiding any further loading onto the wall.

“Ramps for pedestrians, cyclists and equestrians shall not be steeper than 1 in 20. Where compliance with this would create difficulties in keeping the access on the desired line, avoiding long diversions, minimising environmental impact, or making best use of available space, a relaxation in ramp steepness may be considered to 1 in 15. In cases of extreme difficulty the gradient may be increased up to 1 in 12. However, no ramp shall be steeper than 1 in 12. Where a ramp steeper than 1 in 20 is adopted then the reason for accepting this must be clearly documented and recorded, together with evidence of acceptance by the Overseeing Organisation.”

The bridge connects 2 footpaths through a green area, with the footpath being mostly used by children walking to school. The footpath to the west currently has a slope steeper than 1:20. Because this the bridge was being used primarily by people of good mobility it is suggested that a slope steeper than 1:20 should be permitted. While it is possible to ramp up to the bridge at a 1:20 slope, this will increase the scope of work in a significant way. A steeper permissible slope will therefore be assumed to be acceptable for this option.

Option 5: New bridge

There is a residual risk that it is not possible to construct suitable approach ramps for a new bridge without introducing additional load on the existing wall. A solution to this is to construction a new bridge in the place of the existing bridge and reassemble the existing bridge at another location.

The key advantage of a new construction would be that the bridge could be designed to not add any load onto the existing retaining wall. This could be done either by setting the abutments back or having the supports transfer the bridge loads directly into the rock cuttings behind the retaining walls. This would remove the need to increase the height of the existing retaining walls.

The price of this would be dependent on the aesthetic and maintenance requirements of the client as well as on the requirements related to the reassembly of the new bridge.

Options 1-4 would require the removal of the Listed bridge from its present location for a period of time, its restoration off-site, reinstatement and a range of proposals affecting lane width, signage, and traffic flow. The removal of the bridge would constitute harm under the definitions of the NPPF and Listed Building consent is only likely to be given if restoration can be undertaken within an approved timeframe, and with demonstration that full finance for the project is in place.

A methodology for dismantling, transportation, storage, restoration, and reinstatement will be required at planning stage to ensure that the significance of the asset will be protected during works. The applicant should discuss these requirements with a specialist restorer experienced in ironwork.

Other impacts may occur from the introduction of new signage, traffic signals, and other measures which would add visual clutter within the Conservation Area. Overall these could be designed and located to minimise impact, however these are likely to be proportionate to the location and have a low impact on the setting of the Listed structures, or Registered Historic Landscape.

Impact assessment (Option 4)

Impact	Decription	Level of harm
Physical impact to fabric of grade II listed footbridge	**The work to raise the bridge will require the dismantling of the bridge and the creation of a new supporting abuttment structure.**	The dismantling of the bridge will cause substantial harm to the asset. In accordance with paragraph 195 of the NPPF this level of harm can only be justified if it can be demonstrated that this is outweighed by substantial public benefits. In this instance the public benefits relate to the reduced risk of further vehicle collisions, improved and level public access to the structure.
Visual impact to setting of Grade II Terrace Wall and grade II footbridge Impact to character and setting of the Kings Weston and Trym Valley Conservation Area Impact to the character and setting of the Grade II Kings Weston House registered historic park and garden	**In addition to raising the bridge, new ramp structures are required on either side to facilitate continued access and use as a public right of way.**	The new ramps will introduce a significant new structure into an area of green space that was previously designed to optimise views from the terrace. Consequently this will potentially neither preserve or enhance the character of the conservation area and harm the setting of the assets. This level of harm can be minimised by the use of appropriate materials and through keeping the scale and massing of the new structure to a minimum. Opportunities for some restoration fo the terrace wall shoudl be included as a conservation gain to help balance the harm.
Impact to setting of Grade II listed Kings Weston Inn	**Raising the bridge and the construction of approach ramps will impact views to and the setting of the Grade II listed Kings Weston Inn group of assets**	It has been demonstrated that views to the Kings Weston Inn were part of the origianl design for this landscape. It has also been shown that the raised bridge and new structures will have a harmful impact to these views and the settign of these assets. The harm has been assessed as less than substantial, although the design of the new interventions should seek to minimise this impact particularly through the use of appropriate railing details.

Conclusion

The preferred option for reinstating the public right of way over Kings Weston Road via the listed iron footbridge retaining the pedestrian connection between Kings Weston and Blaise is option 4.

This option proposes the raising of the footbridge above the required headroom to avoid future damage from road vehicles.

This heritage impact assesssment has demonstrated that this proposal will cause significant harm to the assets and in the case of the bridge itself potentially substantial harm.

It is argued that the resulting public benefits from the reduced risk of future collisions and improved public access to the asset together with general improvements to the public rights of way provide significant public benefits to out weigh any harm.