DESIGN AND ACCESS STATEMENT

including evaluation of Significance and Heritage Statement

FOR

RECONSTRUCTION OF PARTIALLY COLLAPSED WALL OF GRADE II LISTED PONDTAIL BRIDGE

AT

BOWOOD ESTATE, BOWOOD, CALNE, WILTSHIRE, SN11 0LZ

3923-D&A

04.04.2023. – ISSUED PRELIMINARY FOR CLIENT'S COMMENT

13.07.2023. - ISSUED FOR LISTED BUILDING CONSENT PURPOSES

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INTRODUCTION

Mark Lovell Design Engineers have been appointed by the Bowood Estate to prepare the required documents and obtain all necessary approvals for the repair of the Grade II Listed Pondtail Bridge situated on the Bowood Estate drive, east of Pond Tail Lodge and listed under Historic England Entry No: 1253398. The bridge is situated within a Grade I Listed Park and Garden, listed under Historic England Entry No: 1000336.

The vehicular and pedestrian Pondtail Bridge has suffered sudden catastrophic collapse to large section of downstream wall, in the night between the 11th & 12th January 2023.

There was and still is a real danger of further collapse of the remaining part of the northern side wall and MLDE have urgently sought advice from the Local Authority's Conservation Officer. This application has been prepared following benefit of her advice.

SIGNIFICANCE OF THE STRUCTURE, BACKGROUND and EXISTING SITUATION

Pondtail bridge is a Significant Grade II Listed Structure situated in a very Significant Grade I Listed Park and Garden of Bowood Estate.

Bowood Estate of approximately 1550ha is situated between the villages of Studley and Derry Hill on it's north boundary, road A342 (between Devizes and Chippenham) on the western boundary, A4 road on the north-east boundary and agricultural land on all other boundaries. The site falls gently from SW to NE.

Whetham Brook flows through the site and feeds Bowood Lake at eastern part of the site. Wash Way, although not passing through the site, enters Bowood Lake c750m NW of the site. Bowood Lake is the focal element of extensive formal gardens, park and woodland. The Lake was created as a feature between 1763 and 1765 by Lancelot Brown who was appointed in 1762 by second Earl of Shelburne, later first Marquess of Lansdowne, to provide a landscape design to complement Bowood House including the creation of the Lake.

The Pondtail Bridge is situated over a narrow part of Bowood Lake, on the position of Whetham Brook's entry into the Lake. The Grade II Listed Bridge is C18 structure, single arch with walls and vault made of ironstone rubble and cornice and balustrade in Bathstone ashlar. Cornice and balustrade are splaying out at each end. South side of the bridge arch is raised creating a weir which acts as outflow to main body of Bowood Lake on the lower, north side. The Pondtail Bridge is of reasonable Significance as a stone structure itself however, the bridge is more Significant as a landmark in the overall setting of Bowood Lake. Thus in terms of it's structure the ironstone rubble walls and barrel arch and Bathstone ashlar balustrade and cornice are the Significant elements of the bridge.

In more practical terms, the bridge is part of Pillars Drive, the east approach to the site starting at Pillars Lodge which is the primary vehicular and pedestrian access for the event traffic into Bowood Park. It is also a primary and vital access route through the Estate for Bowood's land-based teams (forestry, grounds, farms, etc). Thus in terms of operational relevance within Bowood Estate the Pondtail Bridge is a very important structure.

The bridge has suffered sudden catastrophic collapse in which large section of the downstream part of the bridge side wall has been lost. The collapsed parts of the structure are currently in the Bowood Lake and a process of obtaining a Consent for Works in Ordinary Watercourse is currently taking place. Once the Consent has been obtained it is intended to promptly and carefully take down and recover the downstream stonework elements, rebuild the core of the bridge, in the manner possible without a need for taking down entire bridge and reconstruct collapsed stone elements.

PROPOSED DESIGN and SCHEDULE OF WORKS

When considering options for repair of the bridge one needs to realise that when the bridge was originally built the walls were raised simultaneously on all sides and the earth bed retained within them was compacted and consolidated stage by stage as the stone structure rose. The sudden catastrophic collapse has not only caused loss of a great deal of stone retaining structure, but has also destabilised the entire earth bed within the bridge.

If one wished to reinstate the bridge and the earth bed within on like for like basis, one would need to take down virtually completely both sides of bridge and start again. Alternatively, one can recognise the Significance of the rubble ironstone walls, barrel arch, balustrade and the cornice and reconstruct the bridge in manner that those elements remain as undisturbed as possible, whilst the earth bed within is replaced with more stable, bonding material which restores the stability of the bridge and enhances its load capacity to support the vehicular traffic above whilst allowing minimal disruption of Significant elements. This approach has been taken by MLDE.

It is proposed to carry out following works in order stated below:

- The remaining stone balustrade and cornice on the North Elevation of the bridge and balustrade and cornice on the west side of the South Elevation are to be carefully marked and recorded, in order that elements can be reassembled, once they have been removed.

- Specialist Contractor to install a temporary dam upstream and downstream along with flow diversion pipe, all in accordance with approved Land Drainage Consent. Pumping measures to be in place to ensure clearing of the water from working zone. Pump system to have silt filtration measures in place.

- Temporary ramp to be carefully installed in inert MOT Type 1 a compacted stone from Contactor's Compound on the north-east bank down to downstream works area.

- Measures to intercept surface water at each approach to the bridge to be implemented and water diverted away from works.

- Ineffective tie bars to be removed and stored. They will not need to be reinstated for structural reasons and more. They are later addition in an attempt to stabilise the bridge.

- Established ivy coverage on both sides of the bridge to be carefully checked by a competent person for presence of nesting birds. If nesting birds are not found, the ivy to be carefully removed. If nesting birds are found the project ecologist should be invited to visit the site and advise of further course of action.

- Engineer to identify which parts of the north side of the bridge requires to be dismantled further in order that repaired bridge face can be reinstated on original line.
  During inspection Engineer to take samples of mortar for analysis in order to determine constituents and proportions of the mortar.

  Any stone to be removed from the bridge face to be carefully stockpilled on stillages in compound to allow inspection and correct reuse. All stone removed to be carefully stored, covered and protected from weather.

- Arched area to be lined with 2000 gauge polythene as a debonding layer on all sides. Specialist, expanding inert foam, such as Brtifoam or Geobear) to be used to provide temporary support to arch under part of vault which is not damaged.

- Collapsed stone to be retrieved from the water course, cleaned and stored for re-use.

- East side of the bridge to be consolidated with lime grout to provide stability. Core drilled holes to be carried out sequentially to nom. 2M depth. To be gravity filled with a free-flowing lime grout (1 Natural Hydrolic Lime (3.5) : 4 Sieved stone dust (1.2mm max aggregate size). Cores to be carried out in controlled and progressive manner, allowing first for setting of lime grout prior to moving to next core.

- Existing concrete footing that is currently suspended to be carefully removed. Layer of C20 mass concrete blinding to be applied to the existing collapsed bridge fill to provide temporary stabilization. Air bags to be inserted to provide temporary support to the precarious concrete, to allow controlled demolition. Concrete to be carefully broken up into sections and carefully removed.

- Loose collapsed fill to be carefully excavated from west side of north face of the bridge in stages until the angle of repose of 30° is reached, re-profiling of the fill in adjacent areas will be required in process to maintain stability. Engineer to inspect exposed face of upstream side of bridge in order that stability can be assessed. If 30° proves to lack stability, it may be necessary to excavate to shallower angle.

- C20 mass concrete, nom.75mm thk to be provided to excavated slope, to provide weather protection.

  Hit and miss section 750mm long to be excavated locally behind existing intact low level stone face, robust external grade, heavy duty building board to be provided and used as a lost shutter and C30 mass concrete to be installed as first stage concrete footing.

- Excavated and capped slope to be further consolidated with lime grout. Core drilled holes to be carried out sequentially to nom. 2m depth and gravity filled with a free-flowing lime grout (1 Natural Hydrolic Lime (3.5) : 4 Sieved stone dust (1.2mm max aggregate size). Cores to be carried out in controlled and progressive manner, allowing for first set of lime grout prior to moving to next core.

- Top section of the east side of the north face to be carefully excavated back to notionally 1.1m below existing road level, so that top section of bridge surface can be reinstated over entire bridge as a consistent surface.

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- Terraced, excavated face to be shuttered and filled in nominal 600mm lifts with C10 lean mix concrete.

- 300mm dia, ducts to be cast into top layer of concrete fill, filled with sand, as sockets to future timber post bollards. Placed at nom.3.5m centres on the centre line of grass verge to each side of the bridge. Ducts to extend to just above ground level.

- Recorded and removed stone balustrade and cornice to be reinstated in as recorded position, in an appropriate lime mortar mix confirmed by testing of the sample taken by the Engineer. Any lost elements of the balustrade or cornice damaged beyond salvaging (as confirmed by the Engineer) to be replaced on like for like basis with the Bathstone elements from Hartham Park quarry bed.

- The lean mix fill in lower parts of the bridge to be capped with profiled C30 mass concrete capping minimum 100mm thk. Concrete to be profiled to create subsurface drainage channels.

- Bridge capping to be sealed with a robust bitumen based paint-on membrane. Local bonded lapping membrane on fillet to be provided at junction with up-stand wall.

- Top parts of the bridge deck to be filled from compacted layers of MOT Type 1 graded inert limestone hardcore laid in maximum 150mm compacted layers.

- 50X200 Heartwood redwood edge boards to be pegged into fill to provide robust edging for new road surface.

- 100mm of 28mm dense bitumen macadam road base to be applied over the compacted hardcore, between the edging boards, followed by 50mm of 20mm dense bitumen macadam basecourse, followed by 25mm of dense mastic asphalt.

- Grass verges to north and south side of the road to be reinstated.

- The contractor is to insert a centring for arch on the collapsed side of the bridge which has no foam support to provide an appropriate formwork to allow the collapsed part of the bridge arch to be reinstated on like for like basis.

- Engineer to inspect the remaining barrel vault on the north side and instruct the Contractor how to clean off, repoint, consolidate and reinstate missing elements with an appropriate mortar mix on like for like basis. Salvaged stone to be reused and any shortfall to be provided on like for like basis. Any replacement stone and mortar to be advised by the Engineer and approved by Conservation Officer.

  Barrel Vault to be reinstated to the line of the bridge face as required, with salvaged collapsed elements on like for like basis. Any shortfall of the stone to be provided on like for like basis. Any replacement stone and mortar to be advised by the Engineer and approved by Conservation Officer.

- Collapsed downstream face of the bridge to be reinstated to the line of the bridge. Sound salvaged stone to be reused. Any replacement stone and mortar to be advised by the Engineer and approved by Conservation Officer. Contractor is to produce a sample panel indicative of the stone and mortar to be used and get it approved by Conservation

Officer prior to sourcing any materials.

Vertical stainless steel tracks to be robustly resin anchored to concrete face behind at 600mm horizontal c/c.

Stone to be build up in approximately 450mm lifts and tied using compatible stainless steel cramps to the track system. Stone to be built up in an approved lime putty mortar.

Lifts to be grouted to fill void between stone and concrete with 1:4 lime grout as used in other parts of the project.

- Previously dismantled balustrades and cornices to be reinstated in previously recorded positions. Missing elements to be replaced, stone to be sourced from Hartham Park. Mortar to match original for colour and texture. Mix to be informed by analysis of original samples. Conservation Officer to approve sample of material for replacement elements and mortar sample.

- Collapsed, west side of the north face of bridge balustrade and cornice to be reinstated from salvaged elements to the line of the bridge as per MLDE drawings. All sound salvaged elements to be reinstated and used as templates to form replacement elements.

  Missing elements to be replaced, to be from Hartham Park. Mortar to match original for colour and texture. Mix to be informed by analysis of original samples. Conservation Officer to approve sample of material for replacement elements and the mortar sample.

- Once reinstated rubble stone walls and barrel arch have cured specialist contractor to remove centring to collapsed part of the arch and foam support for the remaining part of the arch.

- Engineer to inspect the remaining barrel vault, once the foam support has been removed and instruct the Contractor which parts need to be cleaned off, repointed and consolidated with an appropriate mortar mix on like for like basis. Any badly damaged elements to be replaced on like for like basis.

- Temporary access ramp to the watercourse to be carefully removed and the bank made good.

- Watercourse temporary bypass pipes and dams to be carefully removed and watercourse restored.

- Following removal of Contractor's compound all of the stockpiled topsoil to be reinstated over the compound site to original levels, dressed and seeded to re-establish landscaping.

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HERITAGE STATEMENT AND CONCLUSION

Significant Grade II Listed Bridge structure in a very Significant Grade I Listed Park and Garden of Bowood Estate has suffered a sudden catastrophic collapse of large section of the downstream part of the bridge side wall. The collapse has also removed part and destabilised remaining earth core to the bridge. The loss of the load capacity of the earth core is equally large issue as the bridge is primary vehicular and pedestrian access for the event traffic into Bowood Park.

The collapsed parts of the bridge are currently laying in the Bowood Lake adjacent to the bridge. Some smaller stones might have been washed further downstream.

The works here proposed would reintroduce the stability in the core of the bridge and reconstruct the Significant collapsed parts on like for like basis, reusing as many of original stones as it is possible to recover from the Lake. Any shortfall in stone will be replaced with rubble ironstone for the wall and barrel vault and Bathstone ashlar from Hartham Park bed for the balustrade and cornice. The bridge and it's setting would be restored to appear as they were before the collapse.

It is considered that the proposed stabilisation and reconstruction of collapsed elements would preserve and enhance the Grade II Listed structure and it's Grade I Listed setting in line with the guidance set in NPPF. It is hoped that the proposals will gain Local Planning Authority's approval.

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APPENDIX

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