

Charles Church Limited

Conservation Repair Methodology Statement

Grade II Listed Ice House at Land off Waterdell Lane, St Ippolyts,
Hertfordshire

794-PLN-HER-02331

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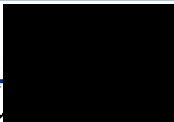
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Executive Summary

This Methodology Statement has been prepared by Tetra Tech Consulting on behalf of Charles Church Limited following the granting of full planning permission for the residential development of land between no.53 and no.81 and land rear of nos.7-53, Waterdell Lane, St Ippolyts, Hertfordshire (the 'Site'), under application ref. 20/02412/FP, by North Hertfordshire District Council.

The Site contains one built heritage asset, a double Ice House structure that is listed at Grade II (NHLE ref. 1102540). Condition 13 of the planning permission granted under application ref. 20/02412/FP relates to this designated built heritage asset. Condition 13 states that: *In accordance with paragraph 2.22 of the Conservation Management Plan dated 07/07/2022, the following materials: (i) Bricks (ii) Mortars (iii) Fencing (iv) Step slabs to be used for the repairs of both Ice House structures together with an associated method statement, shall be submitted to and approved in writing by the Local Planning Authority prior to the commencement of the repairs. Thereafter, the works shall be implemented in accordance with the approved materials/method statement(s) and prior to the completion of the 52nd (last) residential unit. Reason: To ensure that special regard is paid to the special character of this grade II listed building under Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 and to satisfy the 'Immediate Term' aims of the submitted Conservation Management Plan.*

This Method Statement sets out the proposed scope of Ice House repairs and associated works, and the proposed materials and methodologies for these works.

This document should be read in conjunction with the supporting documentation and approved drawings submitted with application ref. 20/02412/FP.

This Conservation Repair Method Statement is not a Risk Assessment Management Statement (RAMS), nor does this document make any health and safety specifications. All responsibility for health and safety matters lie with those parties carrying out work on the Site, the Site's Principal Contractor and the Site's Management Company. All persons working on Site should complete a RAMS document specific to their role and have this approved by the Site's Principal Contractor and the Site's Management Company.

This Method Statement remains a 'live' document and may be subject to revision on an as needed basis.

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1.0 Introduction

1.1 Introduction

- 1.1.1 The Site contains one designated built heritage asset, a double Ice House, listed at Grade II (NHLE ref. 1102540).
- 1.1.2 The application for the development of the Site was supported by a comprehensive Built Heritage Statement (RPS, December 2021), undertaken in accordance with relevant local and national policy and guidance, to assess the potential impacts of the proposals on the significance of the Ice House and other relevant built heritage assets. The submitted Built Heritage Statement concluded that the proposed development would enhance the significance of the Ice House by securing its future and raising public appreciation of it. The proposals incorporate measures to repair and maintain the Ice House, securing its long-term future as a 'placemaking' element of the proposed development.
- 1.1.3 Subsequently, an Ice House Management Plan was produced (RPS, ref. JCH00626, July 2022) and approved by the local planning authority. The Ice House Management Plan was informed by a full structural condition survey of the Grade II Ice House, carried out in 2022 (Conisbee, ref. 210859/S Wilkinson). The condition report is appended to this method statement as Appendix A.
- 1.1.4 This method statement document sets out the scope of key works to be carried out to the Grade II Ice House within the Site and sets out the methodologies for their completion. This method statement remains a 'live' document and will be updated as required during discussions with the Local Planning Authority and their built heritage advisors.

2.0 Scope of Works and Methodologies

- 2.1.1 This section of the Conservation Repair Method Statement sets out the works to be carried out and their methodology.
- 2.1.2 **This Conservation Repair Methodology should be read in conjunction with the appended Structural Condition Report (Appendix A).**
- 2.1.3 The provisions of this document are specific to the safeguarding and enhancement of the significance of the Grade II Ice House within the Site as a Heritage Asset. This document does not function in isolation and should be read in conjunction to all works documentation produced by the parties instructed to carry out the physical works.

A plan of the Ice House is given as **Figure 1** and is referred to throughout this document.

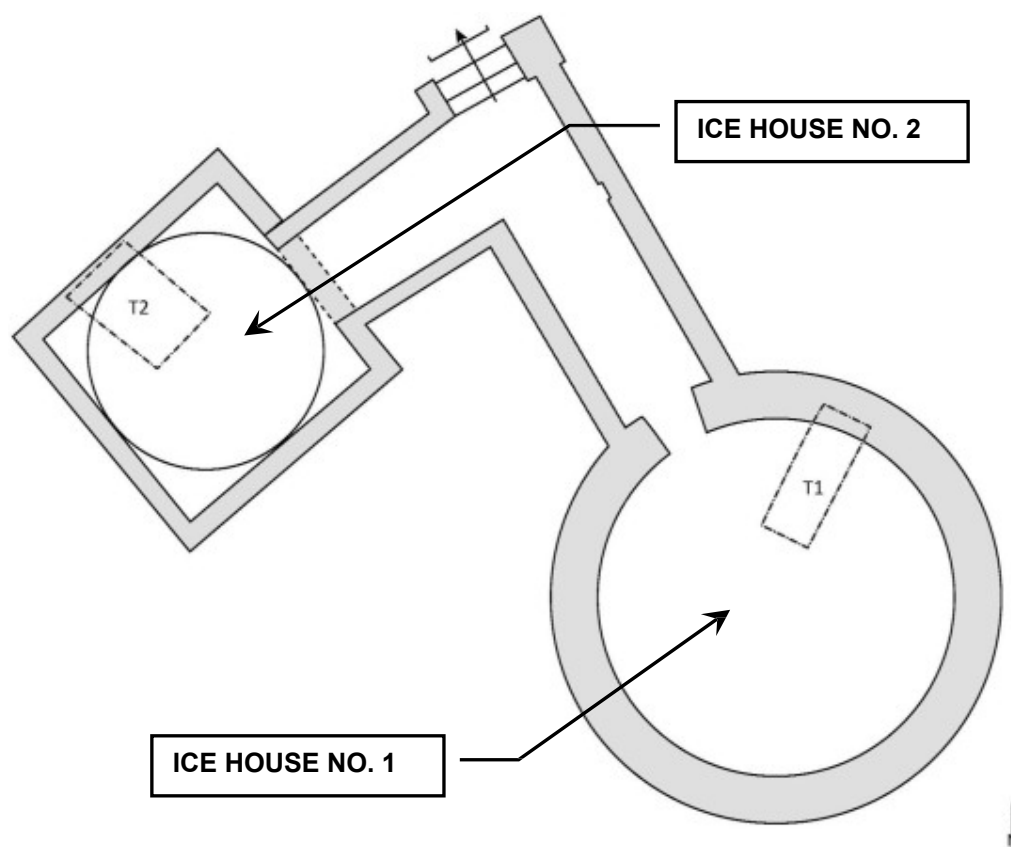


Figure1: Plan of Grade II Ice House: extract from report by AOC Archaeology (ref. 33887, Dec 2018).

2.2 Works Access

- 2.2.1 For the duration of works to the Ice House, the structure and its immediate surrounds will be secured by heras fencing. Only persons directly working on the structure or the ground around it will access this secured space.
- 2.2.2 No persons will be permitted to access the interior of the Ice House unless strictly necessary to their instructed role and in accordance with a Risk Assessment Management Statement (RAMS) that has been approved by the Site's principal contractor during the construction phase of the proposed development, or by the Site Management Company, in the operational phase of the proposed development.
- 2.2.3 Where it is necessary to access the chambers of the Ice House for inspection or repair, it is anticipated that this will be achieved by abseiling. All such access will be performed only by a suitably qualified person and in accordance with a RAMS produced by them and approved the party with responsibility for health and safety on the Site at the time of that access being made.
- 2.2.4 RPS and Tetra Tech offer no guidance on any Health and Safety matters/methods. It is the responsibility of those carrying out works on Site and the parties with responsibility for Health and Safety matters to ensure all works and access to the Ice House accord with the provisions/requirements of the Health and Safety Executive (HSE).

2.3 Brickwork and Repointing

Scope of Works

- 2.3.1 The following works will be required relating to the Ice House structure's brickwork:
- Repoint approximately 3m² of brickwork to the roof soffit of No.2 chamber;
 - Reinstate approximately 0.5m² of brickwork to the end wall of No.2;
 - Carefully take down and rebuild the arched roof to the entrance of No.2;
 - Repair the edge brickwork to the entrance arch of No.1; and
 - Carry out minor brickwork repairs and repointing to the passageway walls.

Methodology

- 2.3.2 These works will be completed during the construction phase of the proposed development, prior to occupation of the last of the 52 consented units.

- 2.3.3 Prior to the undertaking of any internal repair to the Ice House chambers, the refuse/debris dumped in their bases is to be removed by hand. This is to ensure any areas of brickwork presently obscured from view are inspected for the need for repair.
- 2.3.4 Physical works to the Ice House will be completed by a contractor with demonstrable experience of working on listed buildings.
- 2.3.5 Where mortar must be removed, this will be carried out by hand tools only.
- 2.3.6 Bricks removed from the Ice House will be inspected and where found to be structurally sound, will be retained for re-use. Retained bricks will be cleaned by hand using a non-abrasive and non-chemical method (brush off only) and stored off the ground on a timber palate that is covered by a suitable waterproof material.
- 2.3.7 Where there is an insufficient number of retained bricks to carry out repair in a given area, repairs may be completed with additional newly supplied bricks. Newly supplied bricks will be chosen to closely match the existing. Plates 1-4 give examples of suitable bricks that are readily available.
- 2.3.8 Where new bricks are incorporated to the Ice House they will be randomly mixed with retained, re-instated bricks.
- 2.3.9 Uniform areas of new brickwork are permissible only where no mix with salvaged/retained bricks is possible. This is to ensure no part of the Ice House appears to be 'rebuilt'.
- 2.3.10 It will be noted that the pattern/bond of brickwork differs across the Ice House. Bricks will be laid in a bond most closely matching the surrounds of that repair.
- 2.3.11 All bedding and re-pointing will be completed using only a NHL 3.5 hydraulic lime mortar, mixed to match surrounding historic mortar as closely as possible.
- The pointing finish will have a simple 'flush/recessed' pointing finish.
 - Joint: The mortar is to be left to achieve an initial cure. This may take several hours depending on the temperature and relative humidity. Once the mortar has firmed up, the edge of a trowel can be used to break the projecting mortar of the face of the joint to expose the mortar beneath. A churn brush is to be used to beat this back, which will compact its face and reveal the aggregate in the joint. Areas of repair must remain protected against the sun, wind and rain until the mortar has hardened. This may require damp hessian, plastic sheeting and shade from the sun.

- Standard builder's sand is not to be used as this is 'round sand'. Rough, sharp aggregate sand is to be used to ensure strength in binding of mortar. Grading in particles is also essential.
- Quality, sampling and testing: To BS EN 13139.

2.3.12 In terms of finish, no abrasive or chemical cleaning will be undertaken. Brickwork repairs and areas of re-pointing will be brushed off on completion with a stiff natural fibre brush.



Plate 1: Brick Sample - Chatsworth Multi



Plate 2: Brick Sample - Southdown Mult.

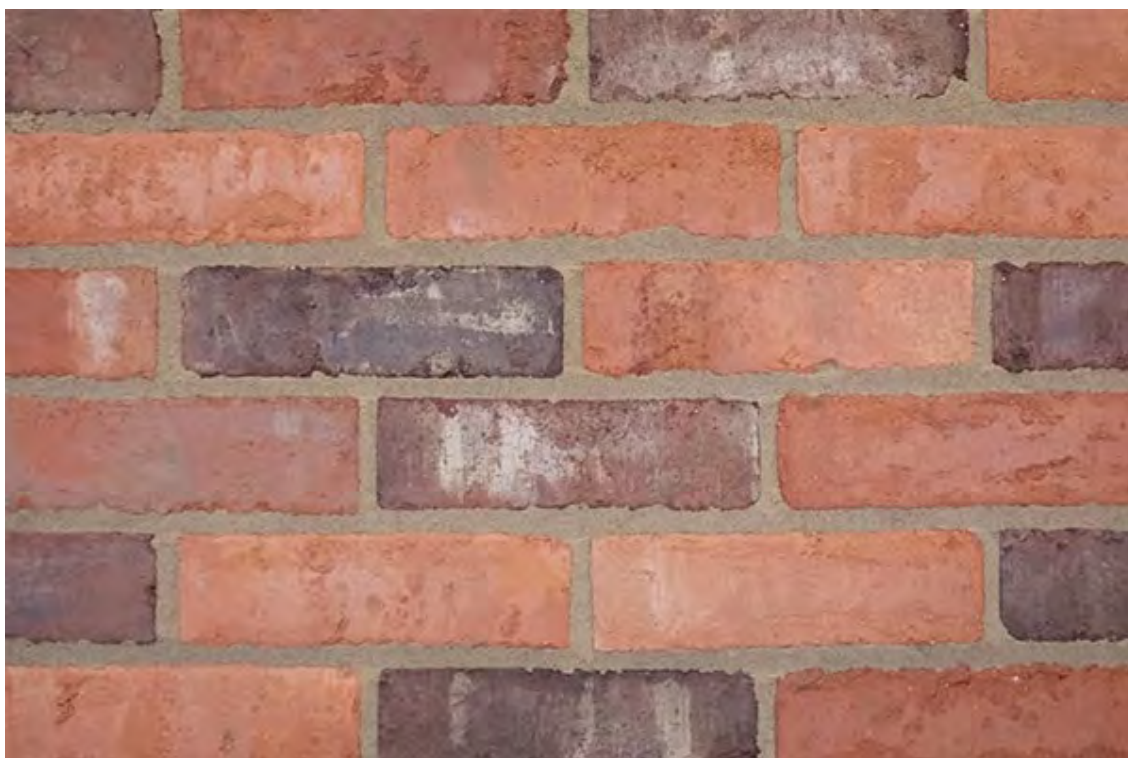


Plate 3: Brick Sample -Ember Blend



Plate 4: Brick Sample – Russet White

2.4 Above Ground Earth Works

Scope of Works

- 2.4.1 The following above ground earth works are required:
- Consolidate/regrade the mound material over the entranceways of the Ice House; and
 - Remove trees and shrubs growing directly on the mound of the Ice House (to be confirmed with Arboriculturalist).

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- 2.4.2 All movement of earth on or around the Ice House, including both the consolidation/regrading works specified above and the movement of earth that may be required to reveal areas of repair, is to be carried out using hand tools only.
- 2.4.3 Earth removed from the Ice House is to be stored nearby for re-instatement. Spoil removed from the Ice House is not to be mixed with spoil taken from elsewhere on the Site or outside. Modern refuse and natural debris are to be removed from the spoil and discarded.
- 2.4.4 Where additional earth is required to complete consolidation/regrading, a high-quality natural topsoil is to be used.
- 2.4.5 On completion of re-grading, areas of earthworks are to be turfed over to secure them.
- 2.4.6 Trees and shrubs are to be removed with care, using hand tools only. Voids caused by removal of trees/shrubs are to be infilled with high quality natural topsoil and turfed over.
- 2.4.7 Removal of trees is to be carried out with sign-off by an arboriculturalist.

2.5 Access Repair and Access Safeguarding

Scope of Works

- 2.5.1 The following works are required to the exterior spaces of the Ice House:
- Reinstatement of access steps to the Ice House;
 - Installation of suitable access restrictions, including edge protection and/or gates over the openings; and
 - Erection of permanent fencing around the Ice House.

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Reinstatement of Access Steps

- 2.5.2 Access steps are to be re-instated/cut in the existing/former position through the addition of new earth if required. Works are to be carried out by hand tools only.
- 2.5.3 Once re-graded/cut, the steps down to the Ice House access are to be capped with natural stone flags, appropriately secured.

Installation of Gates

- 2.5.4 The opening to the Ice House passage is to be secured with a steel, padlocked security gate to prevent all public/unauthorised access.
- 2.5.5 The gate is to be installed in accordance with manufacturers guidelines.

Erection of Fencing

- 2.5.6 Timber fencing is to be erected around the Ice House to deter public access.
- 2.5.7 The fencing is to be installed outside of the plan-extent of the Ice House to avoid damage to the structure.

Appendices

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1.0 INTRODUCTION

- 1.1 Conisbee were appointed by Mr Ollie Begley on behalf of Countryside Properties to undertake a visual structural inspection of the interior of an ice house together with relevant external areas. The purpose of the inspection was to confirm the current condition of the structure and make recommendations for any remedial works required to maintain their stability and durability, as well as to make them safe for potential public access in the future.
- 1.2 Our inspection was undertaken by Simon Wilkinson on 6th April 2022. We were assisted by rope access contractors, Access All Areas, who provided safe access for inspection of the interiors of the chambers. Prior to our inspection, an ecologist, Samantha Rigg of James Blake Associates, visited to confirm that no bats were currently in residence within the structure.
- 1.3 The inspection was visual and hands-on where feasible. No opening-up works, intrusive investigations or testing were undertaken, however a small sample of brickwork bedding mortar was extracted for future testing to confirm composition. Access within the chambers was obtained at all levels, however hands-on access to all surfaces is not viable without installation of a fixed platform. The structures are however small enough to allow adequate viewing of such less accessible areas.
- 1.4 A selection of photographs taken during our inspection are included within this report for illustrative purposes. Other photographs are available on request.
- 1.5 Whilst our investigation work has been taken far enough to satisfy the requirements of the brief, it has, of necessity, not been exhaustive. The findings cannot therefore be warranted to apply to areas of the structure not inspected or investigated or structural elements that were concealed at the time of inspection.
- 1.6 This report is intended for the use of our client, Countryside Properties, and no liability can be accepted for use by any third party.

2.0 STRUCTURE TYPE, CONSTRUCTION & CONTEXT

- 2.1 The Ice House comprises two subterranean chambers with shared access via a connecting passageway (now partially collapsed). It is Grade II listed. Review of the listing information and archive reporting by archaeological consultants AOC (ref. 33887, Dec 2018) confirms a construction date of around 1816.
- 2.2 The chambers and access passageway are of brickwork construction. The larger chamber to the south-east of the access point will be referred to as Ice House No.1 and the smaller chamber to the south-west as Ice House No. 2 – see Figure 1 below.

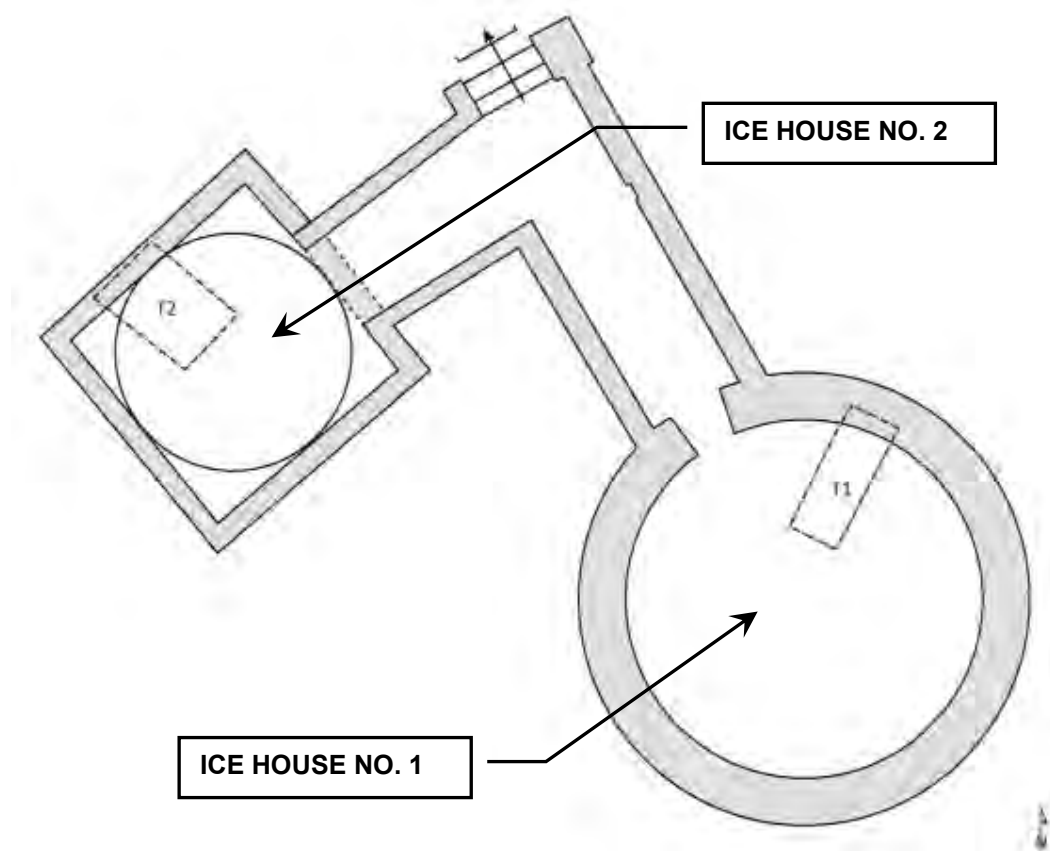


Figure 1: Plan extract from report by AOC Archaeology (ref. 33887, Dec 2018).

- 2.3 The structure is located at the south-east corner of an arable field adjacent to the junction of Half Hankerchief Lane and London Road. It is covered by an earthen mound rising approximately 2 metres above the prevailing ground level. A number of saplings and shrubs are growing on the mound with several fully mature trees in fairly close proximity, notably a large oak at the east side.



Photograph 1: General view of the ice house mound and access location at the northern side.

3.0 OBSERVATIONS

3.1 Access passage

- 3.1.1 The access area to the chambers is now partially collapsed. There is no rubble currently present and it may be amongst other debris at the base of the chambers. Based on the remaining structure it seems that the passageway was originally entered via steps down from external ground level. The side walls of the steps remain, however the treads are now missing (Photograph 2).



Photograph 2: Remains of step access down into the passageway

- 3.1.2 The main passageway height into No. 1 is around 1.6 metres and the access to No. 2 is around 1.3 metres, so there must either have been some kind of transitional roofed structure above ground level, or alternatively the steps may have terminated at a small lower-level open area with a doorway to the passage beyond.



Photograph 3: General view of the access passageways

- 3.1.3 The remnant part of the passageway to No.1 comprises brickwork side walls laid in English bond with a half-brick thick barrel vault roof structure (Photograph 4). The bond pattern is not wholly consistent, however the brickwork is of overall reasonable quality.



Photograph 4: Access passage to No. 1

- 3.1.4 The remaining brickwork is in relatively good condition. The arched profile remains acceptable with no evidence of flattening. A small amount of slippage has occurred at the left-hand springing point (Photograph 5), likely due to erosion of mortar or effects of the adjacent collapse. Some localised spalling has occurred to individual bricks together with moderate erosion of pointing.



Photograph 5: Slight displacement of brickwork at the arch springing point (arrowed)

- 3.1.5 The access passage to No. 2 is structurally separate and the brickwork is laid in Flemish bond. The roof height is lower and the arch appears to have been originally constructed at a fairly shallow angle. It was described in 2018 as being 'remarkably flat' and comparison of current site observations and archive photographs indicates that further movement may have occurred. Some efflorescence is present at the soffit suggesting that water periodically percolates through the brickwork.



Photograph 6: Flattened arch at the entrance passage to No.2

3.2 Ice House No. 1

- 3.2.1 This larger structure comprises a tapering brickwork shaft with a maximum width of around 3.4 metres. A layer of debris is present at the base which prevents definitive confirmation of the overall depth/height, however it is in excess of 5 metres from the apex of the roof dome to the debris level. The walls return inwards to form a shallow dome. The inner part of the dome has render finish at the soffit (Photographs 7 & 8).



Photograph 7: General view of the chamber showing inward taper at lower level with the dome brickwork returning inwards.



Photograph 8: General view of the dome

- 3.2.2 The brickwork is not laid in a consistent bond pattern, however it was noted that in the lower part below the springing point for the dome, the brickwork incorporates headers at regular intervals however the dome (where visible) is laid in stretcher bond only at the inner leaf.
- 3.2.3 Where the wall is visible in section at the entrance it appears that the dome may be formed from two separate leaves of brickwork laid in stretcher bond (Photograph 9).



Photograph 9: Partial section view through the dome brickwork showing separate inner leaf

- 3.2.4 At the entrance there is some remnant embedded ironwork and the remains of a low wall (presumably installed to reduce fall risk). The archaeological report speculates that this ironwork relates to some kind of structural strapping to reinforce the brickwork however it seems to be more consistent with framing for a door or a hatch (now missing). Minor localised cracking in the brickwork due to expansive corrosion of the iron has occurred.
- 3.2.5 The brickwork of the chamber is in overall good condition with no evidence of extensive water ingress or penetration by woody or fibrous roots.

- 3.2.6 There is no general evidence of structural movement or cracking to the brickwork and the pointing remains in generally good condition.
- 3.2.7 A considerable quantity of debris and rubbish has accumulated at the base of the chamber (Photograph 10) and needs to be cleared. Much of this material seems to have been deliberately discarded.



Photograph 10: Ice House No.1 – debris and rubbish within the chamber

3.3 Ice House No. 2

- 3.3.1 The smaller ice house is also of brickwork construction and comprises a tapering shaft which narrows towards the base. The roof structure arrangement is different and comprises a single barrel vault which is approximately square on plan. Infill walls are used to close the ends of the vault. Infill brickwork is also used at the corners to account for the different plan forms of the shaft and roof (Photograph 11).



Photograph 11: Chamber interior showing part of the barrel vault roof, infill wall and corners.

- 3.3.2 The shaft is around 2.4 metres diameter at its widest and also has an overall measurable height of around 5 metres. Debris is also present at the base here, preventing confirmation of total height.
- 3.3.3 Both the shaft and the roof are laid in stretcher bond but it was not possible to confirm the overall thickness of either element by visual inspection. A patch of brickwork is missing from the wall opposite the entrance which shows another leaf of brickwork behind with a small gap between the two.
- 3.3.4 The brickwork is of somewhat reduced quality when compared with No.1. with inconsistent joint widths, particularly in the roof construction. Some mortar loss has occurred at the arch soffit in particular but there is no sign of significant movement or cracking.
- 3.3.5 Water ingress has occurred at various locations (as evidenced by staining), mainly at the corners and junctions between the roof, wall and infill elements. This is wrongly identified as root growth in a previous report by CTP Consulting Engineers, but seems instead to be a soluble (organic matter?) deposit of some kind (Photograph 12). There was no evidence of penetration through the brickwork by either woody or fibrous roots.



Photograph 12: Staining due to water ingress (typical example).

- 3.3.6 A large quantity of waste has also been deposited in at the base of this chamber (Photograph 13) with comparison of photographs from 2018 indicating that further material has been added since that time.



Photograph 13: Ice House No. 2 – waste at the base of the chamber

3.4 External Areas

- 3.4.1 There are now no surface structures around the access point and the partial collapse of the access passage has left an unprotected edge with a considerable drop. This is currently partially protected by Heras fencing. The exposed edge of the made ground is moderately consolidated by vegetation but is still somewhat friable and vulnerable to further erosion.
- 3.4.2 The saplings and shrubs on the mound seem to be self-seeded and although well established, are not yet mature and have potential to increase in size.
- 3.4.3 The mature oak tree does not appear to have impacted the structure in any way.

4.0 DISCUSSION

- 4.1.1 The Ice House remains in reasonable condition overall. Both chambers are free from structurally significant cracking and as far as can be reasonably ascertained, significant structural movement or distortion. There is no sign of flattening of the arches or development of hinges at the springing points or soffits.
- 4.1.2 The lowest parts of both chambers are currently not visible due to an accumulation of debris and further inspection will be required once this has been cleared. Based on the good condition of the upper parts, it would be reasonable to assume that there has not been any significant movement at base level. The possibility of the presence of a drain at the bases of each chamber has been previously discussed. Whilst this is of historical interest and significance, it is not a matter of structural concern as the ice houses are now disused and, in spite of some water penetration from above, appear to be dry.
- 4.1.3 There is some evidence in both No.1 and No. 2 that a form of cavity wall construction has been used, with two separate leaves of brickwork separated by a small gap. There do not seem to be any iron ties between the two as corrosion and cracking and spalling of the brickwork would reasonably be expected to have occurred by this point. The reason for this construction is not entirely clear but may be an attempt to slightly reduce heat gain and slow down melting of ice stored within.
- 4.1.4 Concern has been previously expressed over root damage to the structure. There was no visible evidence of root penetration at the inner face of the wall during our inspection. It is possible that some root penetration to outer leaf of brickwork (in contact with the earth) has occurred but the trial pit investigations undertaken in 2018 suggest this is not currently generalised. Excavation in two locations did not find root activity at the lower levels of the mound cover adjacent to the brickwork. It is possible that further root growth may occur as the trees mature so it is recommended that the trees and shrubs on the mound are removed under the guidance of a qualified arboriculturist.
- 4.1.5 Information provided by the British Geological Survey indicates that the prevailing bedrock geology in the locality is of the Zig Zag chalk formation overlain with superficial deposits of sand and gravel. These non-cohesive bearing strata are not considered to be shrinkable and are not typically associated with structural movement resulting from vegetation related moisture abstraction. This concurs with site observations that the mature trees in close proximity to the Ice House have not adversely affected the structure and, subject to confirmation by the arboriculturist, there does not seem to be any structural reason for removal or substantial reductions in their size.

- 4.1.6 No works are considered to be required to the currently visible structure of No. 1. Slow corrosion of the embedded ironwork around the entrance is ongoing, but does not require remedial action at the current time.
- 4.1.7 No. 2 is in slightly poorer condition and some limited works are required. Repointing in lime mortar is required to parts of the roof soffit brickwork. The missing patch of brickwork at the end wall should be reinstated. The water ingress causing staining to the brickwork will be hard to halt without undesirable extensive and highly intrusive works externally. It does not appear to have resulted in any structural degradation and we do not therefore recommend that any action is taken at the current time.
- 4.1.8 The condition of the access passageway area is more concerning, particularly if there is an intention to provide even supervised public access. The exposed edge of the brickwork arch at No.1 needs to be repaired and stabilised. The slope above also needs to be stabilised or perhaps slightly regraded to prevent erosion or localised slippage.
- 4.1.9 The brick arch of the passage leading to No.2 has flattened excessively and is now close to failure. It cannot be reasonably repaired in-situ and needs to be rebuilt. This is relatively straightforward as it is separate from the roof of the chamber. It may be feasible to clean and reuse the existing bricks or potentially bricks found in the base of the chambers. The new brickwork will need to be laid in hydraulic lime mortar.
- 4.1.10 Reinstatement of steps will be needed to provide safe access for viewing and maintenance together with consolidation of loose brickwork at the wall tops. Localised repointing is also needed to the brickwork in this area.
- 4.1.11 Depending on future access requirements and risk assessments, either a wider area will need to be fenced off with suitable signage or more localised edge protection and steel gates to prevent access and fall risk will be required. Gates to the passageways may be fixed into the brickwork side walls subject to discussion with the Conservation Officer and any required consents.

5.0 RECOMMENDATIONS

5.1 The following works and actions are recommended:

- Repoint approximately 3m² of brickwork to the roof soffit of No.2
- Reinstate approximately 0.5m² of brickwork to the end wall of No.2
- Carefully take down and rebuild the arched roof to the entrance of No.2
- Repair the edge brickwork to the entrance arch of No.1
- Consolidate/regrade the mound material over the entranceways
- Reinstate access steps to the passageway
- Carry out minor brickwork repairs and repointing to the passageway walls
- Remove trees and shrubs growing directly on the mound (tbc with arboriculturalist)
- Provide suitable access restrictions including edge protection and/or gates over the openings.

5.2 Some of the above recommended works will require listed building consent and should not be undertaken unless this is obtained.

5.3 All brickwork repairs should use bricks salvaged from site or matching new bricks and utilise NHL 3.5 hydraulic lime mortar for bedding and pointing. A sample has been obtained for testing if required for consent purposes.