



The Morton Partnership
Structural Engineers

Registered in England No. 2727193

Old Timber Yard House, 55 The Timber Yard
Drysdale Street, London N1 6ND
Tel: 020 7324 7270 Fax: 020 7729 1196
Email: london@themortonpartnership.co.uk
www.themortonpartnership.co.uk



**SPECIFICATION AND SCHEDULE
OF MINIMUM WORKS
FOR
STABLES
TO BRADGATE HOUSE
GROBY
LEICESTERSHIRE**



Client: Hinkley and Bosworth Borough Council
Hinckley Hub
Rugby Road
Leicestershire LE10 0FR

Grant Aid: Historic England
The Foundry
82 Granville Street
Birmingham B1 2LH



Historic England

Lead Consultant: Place Services
Essex County Council
County Hall
Chelmsford
Essex CM1 1QH



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Rev	Comments	Name	Date
0	Draft issue for comments	EJM	12/11/23
1	Updated following comments from Historic England	EJM	13/01/24
2	Final issue	EJM	05/02/24

1.0 BACKGROUND AND REPAIR PHILOSOPHY

1.1 Background

- 1.1.1 Bradgate Stables and Kennels to Bradgate House, Bradgate Hill, Groby were added to Historic England's Heritage at Risk Register in 1998. The 2023 published summary on the register, advised the condition as 'very bad'.
- 1.1.2 Due to the condition the Hinkley and Bosworth Borough Council exercised its statutory powers and served an Urgent Works Notice in May 2023. Urgent Works are defined as the urgent works necessary for the proper preservation of the listed building. This has led to the owner voluntarily commencing works with the Notice held in abeyance by the Council. These works, to date, have been to the west wing of the stable range.
- 1.1.3 The Morton Partnership is currently, and separately, engaged by the Council as their Lead Adviser in connection with Statutory Action. TMP have prepared Schedules of Urgent Work (which cover work to the four ranges) to support the Council in serving Urgent Works Notices upon the building owner.
- 1.1.4 The current voluntary work to the West Range was inspected by TMP in September 2023. The owner's further proposals are currently unclear.
- 1.1.5 In this context, the schedule which follows includes work to the North, East and South ranges. This schedule will need to be reviewed as further work is undertaken in accordance with the Notice served.

1.2 Repair Philosophy

- 1.2.1 The intention of the works is to retain the maximum amount of historic fabric, whilst ensuring structural stability to allow free access to the building ranges. Where structural stability is currently provided by scaffold, the intention will be to replace this function with steelwork.
- 1.2.2 There are bonding timbers built into both external and 'internal' walls. To external walls, which are generally 13 ½" wide the decay of the bonding timbers to the internal face does not cause instability, whereas to the 9" wide 'internal' walls decay means 50% of the wall width is unsupported, and in some cases there are bonding timber to both faces. The intention is to removed decayed bonding timbers to the 'internal walls' and replace these sequentially in brickwork, of a slightly different dimension/color to distinguish this from original bricks.
- 1.2.3 Where brickwork is decayed the intention is only to replace that which reduces structural integrity. These bricks will be to match existing in size, color and texture including both reds and gaults.

2.0 PREAMBLE AND DESCRIPTION

- 2.1 The following Schedule of Minimum Works has been commissioned by Place Services on behalf of Hinckley and Bosworth Borough Council related to an options appraisal to look at the future use of the site. The **Minimum Works** are considered to be those to consolidate the existing structure, which along with further regular maintenance will allow the site to be entered. This is the Curated Ruin option considered on the main report.
- 2.2 The scope and nature of minimum works shall be to carry out those works for structural stability and to reduce ongoing decay to the fabric. The work scheduled (see section 4.0) is considered to be the minimum consistent with achieving this objective.
- 2.3 The building is Grade II* Listed of Special Architectural or Historical Importance and those undertaking work should pay due respect to the fabric of the existing building. No finishes, structural members or non-structural members or fabric should be taken down or removed other than those specified within this document, or as subsequently agreed with the Local Authority.

- 2.4 The list description, taken from the online Historic England's National Heritage List for England is repeated below:

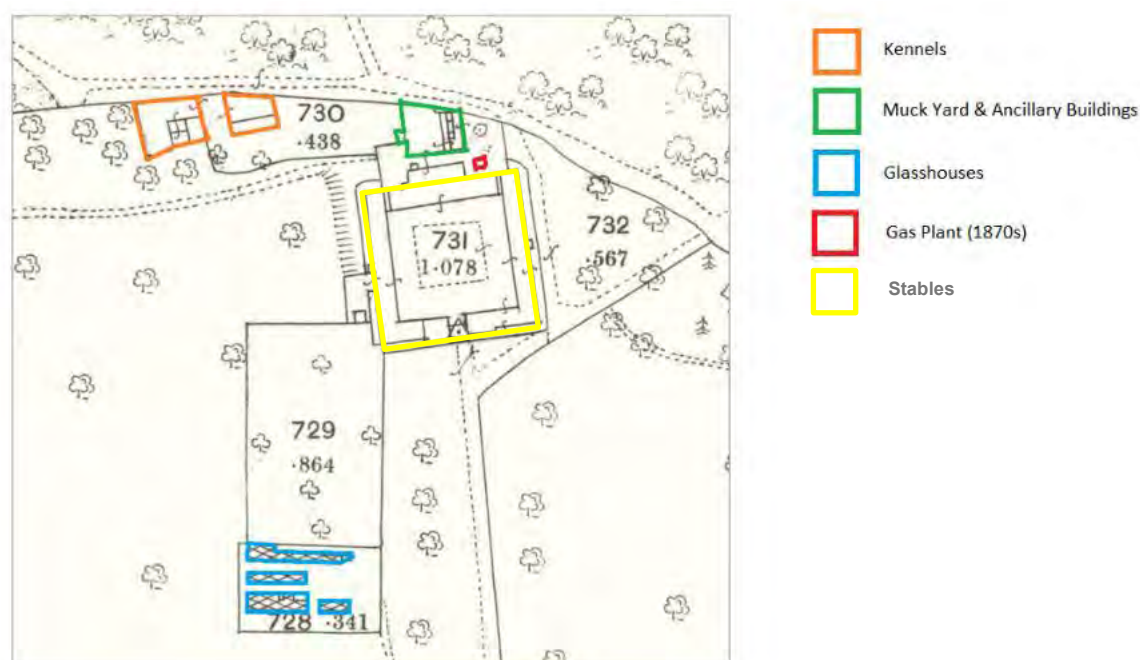
*GROBY BRADGATE HILL SK 50 NW (North east side) 4/18 Stables and Kennels to 29.11.88
Bradgate House Grade II**

Former stables and kennels now a ruin. 1856 by M.J. Dain of 'Dain and Parsons' for George-Harry Grey. 7th Earl of Stamford, Master of the Quorn Hunt 1856 – 63. In the Jacobean style. Red brick with white brick decorative banding, ashlar dressings, plain tile roofs, clustered brick gable and ridge stacks. Quadrangular plan. The main south front is of 5 bays with a central projecting, square entrance tower, 2 storeys plus attics. Round headed archway, with moulded ashlar imposts and arch with keystone decorated by a fox's head. Either side are single Roman Doric columns supporting an entablature, above is a large panel containing the arms of the Earl of Stamford, flanked by tapering columns supporting an entablature and above a Dutch gable containing a circular window. The square dome was originally capped by a square cupola. The entrance tower is clasped by lower flanking semicircular towers with small round headed openings to the 2 stages and half domed roofs. To either side are two storey single bay projecting pavilions with brick bands and coped Dutch gables, To each floor is a single 3 light stone mullioned opening decorated with strapwork. In the gables a circular opening in a lozenge surround. Either side are blank recessed wings terminated by single storey pavilions, each with a single 3 light mullioned opening with strapwork surrounds and above a circular window in a Dutch gable. The inner courtyard facades. The southern facade has a central 5 bay 2 storey block including the gate tower, with a central round headed arch and above a 4 light traceried window and above again a circular window in a Dutch gable. Either side are single 2 light mullioned windows flanked by 3 light mullioned windows, with above two 2 light mullioned windows and above again a small and a large Dutch gable both with circular windows. Beyond are single storey stable wings with irregular segmental headed doorways and round headed windows. The east and west fronts are identical, with central 2 storey blocks, each with a central segmental headed archway and above 3 round headed windows with above again a Dutch gable containing a circular window. Either side are single round headed windows, single large segmental headed doorways, then further round headed windows, above are single segmental headed loft doors with small Dutch gables over. Either side single storey wings have 2 segmental headed doors, the outer ones larger. The north front has a central 7 bay section with 5 segmental headed carriage arches flanked by a single circular window. Above a central circular window is flanked by single loft doors, circular windows and small windows with strapwork surrounds. This section is surmounted by a row of 5 small Dutch gables each with a circular window flanked by square towers with parapets topped by ashlar strapwork gables.

Either side are single storey wings with irregular segmental headed doors and round headed windows. These stables and kennels were built to accompany Bradgate House built as a hunting lodge for the Earl of Stamford when he was Master of the Quorn Hunt. Bradgate House has since been demolished.

Listing NGR: SK5070209288

- 2.5 For the purpose of this document the elevation facing towards the drive is considered to be south facing and with directional notations taken in relation to this convention. This is consistent with the plans included in appendix B. Rooms are numbered for reference.
- 2.6 The buildings form a quadrangle in plan and based around a courtyard. For the purpose of this report the buildings are sub-divided into the following elements with a plan provided overleaf:
- Tower and south range;
 - East range;
 - West range;
 - North range;
 - Pump House;
 - Kennels.



Plan showing buildings (courtesy Place Services)

- 2.7 In general terms the building is constructed of load bearing masonry walls, predominantly of brickwork with ashlar dressings. The roofs, where remaining, are of cut timber, although in an advanced state of decay.
- 2.8 As part of the assessment for the preparation of the schedule of Urgent Work, to support the Council's statutory action, a cherry picker was provided to allow a high level assessment of the remaining roofs etc. Photographs are included in appendix A albeit are from 2022. The structure was reinspected, without the benefit of high level access in later September 2023, except to the west range, where scaffold had been erected. It was noted that a north range door head had collapsed in late 2022; and the poorly supported brickwork to the former carriage house (North Range) was a concern.
- 2.9 Dr David Carrington of Skillington Workshop Limited has attended site previously to review and prepare a report on the Armorial Panel. This is included in appendix C.
- 2.10 This specification and schedule should be read in conjunction with the following drawings prepared by The Morton Partnership Ltd. It should be noted that these are not based on measured survey drawings for the buildings and thus should be considered as diagrammatic.
- 22383/01 rev - Diagrammatic Plan Existing;
 - 22383/02 rev - Diagrammatic Plan Existing – Walls where bonding timbers to be checked;
 - 22383/03 rev - Diagrammatic Plan Showing Walls where Temporary Support Req^d.
- 2.11 It should be noted that the building is in a poor condition. At the commencement of any work the building should be carefully assessed and unsafe areas carefully delineated with hazard tape to avoid access into these areas.
- 2.12 As part of minimum works a number of stability frames are proposed to provide restraint to the now free-standing walls of the ruins and which will allow temporary scaffold to be removed. These are to be in stainless steel for long term durability. The details provided are provisional and will need to be reviewed and verified with detailed design once the urgent works being undertaken by the owners are completed and the ruins re-assessed.
- 2.13 This document should be read in conjunction with the Architect's schedules and information.

3.0 SPECIFICATION

A11 SCHEDULE OF SCAFFOLDING

- 80 SERVICES: The Contractor should carry out an inspection and check the location of all drains and underground services, tanks, wells etc. and the scaffold should be placed to avoid these. The Contractor's attention is drawn to possible tanks or wells in the north courtyard area, but they may exist elsewhere. The scaffold will need to be designed to avoid loading these elements, as well as service and manhole covers etc. and which should not be obscured by the scaffold.
- 120 DESCRIPTION OF THE WORKS: See schedule of Works.
- 130 APPROVAL: the design of a scaffold to a historic structure needs special care and consideration, particularly on the method of attachment. The Employer and their appointed Consultant's approval MUST be sought BEFORE any work starts on site.
- 140 LOADINGS TO EXISTING STRUCTURES: Loads from all temporary structures can be transmitted to the existing masonry by butts only, but only in positions where the existing fabric is in reasonable condition and able to support such lateral loads. No fixings are permitted into the fabric. All proposals for horizontal restraint from uplift and lateral forces are to be agreed with the Employer and their appointed Consultant's. However do refer to the schedule of works for variations to this.
- 150 SITE INVESTIGATION REPORT: A report is not available. However, the contractor should assume a minimum ground bearing pressure of 75kN/m² on grass/earth and 100kN/m² where there is hard-standings. The scaffold at ground level should be spread to achieve less than this bearing pressure.
- 160 PROGRAMME: The Contractor must submit full details of the scaffolding programme for erection of the scaffold and subsequent maintenance regime. List main stages of activities with anticipated start and finish dates for each stage. This must be in accordance with this specification.
- 170 DRAWINGS, ETC SUBMITTED FOR APPROVAL: Accept responsibility for the accuracy of all drawings and documents submitted for the Employer and their appointed Consultant's approval. Approval or acceptance by the Employer and their appointed Consultant's in no way diminishes the Contractor's responsibility for any errors or omissions contained in such drawings or documents nor for their other contractual and legal obligations. Where changes are required to drawings previously submitted arrange for the changes to be made and submit revised drawings for approval with changes clearly identified and "bubbled". The Contractor is to bear all costs for drawings and revisions.
- 180 TAKING DIMENSIONS FROM DRAWINGS: When taking dimensions from drawings, at any stage of the work, including before work is commenced:
- Do not scale drawings;
 - Check their compatibility with each other with the site and work completed to date;
 - Inform the Structural Engineer of any discrepancy and seek their instructions
- 190 SPECIFICATION REFERENCES ON DRAWINGS: Where specification references are given on drawings to define the clause (or clauses) applicable to that part of the construction drawn, they must not be taken as excluding any other relevant information contained in other clauses of this Specification.
- 200 SITE MEETINGS AND MANAGEMENT: Hold such regular site meetings as are necessary for the proper management and co-ordination of the scaffold Contract. Proper management of the erection is vital. The Contractor should include with the method statement an indication of the management re-sources to be utilised for this element of works. A meeting is required every two weeks with the Employer and their appointed Consultant's for the duration of the erection period,
- 210 INDUCTION AND TOOL BOX TALK: Due to the status of the building an induction will be given by the main contractor to all site workers. The Scaffold Contractor should allow for arrangement and attendance. This will include information related to the history and importance of the building, particular areas of concern. The Contractor will provide a resume of the induction and tool box talks to the Employer in written form confirming the headings of each element to be included.

220 METHOD STATEMENT: The Contractor will be required to produce a detailed method statement for the erection of the scaffold.

230 ATTENDANCE: The Main Contractor to be in attendance during erection of scaffold at all times, and at time of deliveries to site, including all out of hours deliveries.

B10 SCAFFOLDING

Materials

100 TO BE READ: With general conditions and preliminaries and other Contract Documents.

110 GENERALLY: Where the Contractor is required by the specification to provide details of subcontractors and suppliers these must be supplied with the tender. Where method statements, drawings, calculations, samples or approvals are required, a minimum of one week should be allowed. These periods should be indicated on the Contractor's programme.

Materials

115 FITNESS FOR PURPOSE: Due to the duration that the scaffold will be erected all materials will be chosen to be fit for purpose and to last for the period.

120 METAL SCAFFOLDING: To BS EN 39:2001 Loose steel tube and coupler scaffold. All scaffolding and couplings to be hot dip galvanised to BS 729.

130 TIMBER SCAFFOLD BOARDS: To BS 2482:2009, 38 x 225 softwood with metal end caps. Supply stable boards of moisture content to suit situation. Discard twisted or damaged boards.

140 LADDERS: To BS 1129:1990 and BS 2037:1990. All ladders to be in good repair. Replace any timber ladders that warp or break.

150 SHEETING: Side Sheeting to be Monarflex air flow flame retardant flexible sheeting, or similar approved. The sheeting may be required to be temporary lifted for access, ventilation etc. Sheeting is required down to eaves level to avoid lateral wind driven rain access.

160 NETTING: Nylon woven green debris netting, with neoprene rubber anchor straps.

170 ROOFING SHEETS: To CP 143 or alternative approved proprietary system as agreed with the Employer or their Consultant's in writing during the tender period.

180 PLYWOOD SHEETING: Exterior quality WBP 19mm thick to BS 6566.

190 ANCHOR SOCKETS AND FIXINGS: Anchor sockets will not be permitted to the building unless indicated in this specification or on the attached drawings in isolated positions. No fixings will be acceptable into the original brickwork.

195 BUTTS: Will be permitted providing suitably protected with plywood and polystyrene pads. Single butts must be able to be removed to allow repairs to fabric below. Individual butts are to be capable of removal for local masonry repairs below.

198 TIES: Ties into the masonry will not be permitted.

200 WARNING TAPES AND STRIPS: Fluorescent and/or stripped plastic tape and self-adhesive strips.

210 KENTLEDGE: Where required the scaffold will be held down with kentledge. The Contractor should provide details for the proposed kentledge for approval. The following will not be acceptable: scaffold tubes and ground anchors. Where water butts are proposed the contractor will be required to ensure these do not split through freeze action of accidental damage – a method statement will be required as to how this risk will be mitigated.

Design

- 310 SCAFFOLD DRAWINGS BY CONTRACTOR: Where the Contractor is required to prepare proposals, submit full details in duplicate to the Employer and their appointed Consultant's based on the parameters set out in this specification including drawings in an agreed format and in AutoCAD. The proposals are to be of an extent and detail commensurate with the complexity of the Contract and with the degree to which they are critical. Indicate levels of working platforms in relation to the existing structure, and include loadings to the surrounding ground and structure including kentledge. The Contractor must submit drawings and calculations prior to erection for comment or approval by the Employer and their appointed Consultant's.

Indicate with tender the name of the scaffolding designer, who is required to inspect the design and then on completion the scaffold to verify to the Structural Engineer that the scaffolding has been erected in accordance with their proposals. The Scaffold Designer to have a minimum level of Professional Indemnity Insurance of £500,000 each and every claim. Renewal certificates to be forwarded to the Structural Engineer for the duration of the Contract.

- 320 CERTIFICATION: Allow for independent Consulting Engineer (not the scaffolding designer) to fully check both calculations and drawings and provide written confirmation of approval of design and calculations. Independent Engineer to confirm scaffold has been erected to agreed designs on completion of erection, and also following any significant modifications or alterations. The Engineer will be required to demonstrate Professional Indemnity Insurance to a level of £500,000 each and every claim. Renewal certificates should be forwarded to the Employer and their Consultants for the duration of the Contract. The Independent Engineer will not be a direct employee of the scaffolding sub-contractor or the scaffolding design company if separate to the scaffolding sub-contractor.

330 CONTRACTOR DESIGN:

- The Scaffolding Contractor will be responsible for providing a documented design with calculations for the erection, use and dismantling of scaffold structures and for the integration of these activities within the overall work programme. The Scaffolding Contractors must submit details of the following, when requested to do so:
- Design including highlighting all positions of ties into the fabric which must comply with that allowed in this specification and/or shown on the Benchmark drawings
- full set of drawings
- calculations
- number and location of working levels
- loading bays
- manufacturer's details for specialist equipment such as ladder beams and cluster props, roofing sheets, side sheeting etc.
- risk assessments;
- programme;
- method statements covering erection, use and dismantling.

340 SCAFFOLDING CONTRACTOR:

- The scaffolding contractor must be members of the National Association of Scaffolding Contractors (NASC).
- Contractors would have to demonstrate:
 - A sound Health and Safety Policy
 - Adequate Employers and Public Liability Insurance
 - Scaffolding operatives should be registered under the Construction Industry Training Board (CITB)
 - Scaffolders' Record Scheme to Identify the level of competence
 - All operatives are fully trained, registered and competent in activities undertaken
 - All work is adequately supervised by competent trained Supervisors.
 - Materials conform to the specified standards and are regularly checked and maintained
 - Work is carried out in accordance with relevant codes of practice

- 350 ACCESS AND WORKING SCAFFOLDING: Access and working scaffolding should be designed, constructed and used in accordance with BS EN12811-1:2003 Temporary works equipment scaffold. Performance requirements and general design and TG20:21 Technical Guidance on the use of BS EN12811-1, associated supplements and all statutory regulations. Scaffold structures will normally fall into one of two categories:

- Standard scaffolds.
- Special scaffolds.

360 STANDARD SCAFFOLDS

- **This category includes putlog and independent tied scaffolds. Putlog scaffolds will not be permitted.**
- Un-sheeted independent scaffolds, where no loading rating is specified, may be constructed up to a height of 50m without calculations providing they are constructed in accordance with BS EN 12811: 2003 and that they do not carry greater loads nor have greater bay lengths than those given in the table below.

Table 1. Load classes for access and working scaffolds made from tube and fittings					
Duty	Use of Platform	Load on Platform kN/m ²	Max No of Platforms	Max numbers of boards	Max Bay Length (m) and max spacings of board transoms
Inspection and very light duty	Inspection, painting, stone cleaning, light cleaning and access	0.75	1 full (0.75) and one 50% (0.375)	3 boards	2.7m 1200mm
Light Duty	Plastering, painting, stone cleaning, glazing and pointing.	1.50	1 full (1.50) and one 50% (0.75)	4 boards	2.4m 1200mm
General Purpose	General building work including brickwork, window and mullion fixing, rendering, and plastering.	2.00 (inside boards 0.75)	1 full (2.00) and one 50% (1.00)	5 boards or 4 boards + 1 inside	2.1m 1200mm
Heavy Duty	Masonry work, concrete blockwork, and very heavy cladding	3.00 (inside boards 0.75)	1 full (3.00) and one 50% (1.5)	6 to 7 boards	1.8 900mm
TG20:21 Table 1 Note: This table should be read in conjunction with the remainder of TG20:21 including notes and supplements					

370 SPECIAL SCAFFOLDS

- These will include all access and working scaffolds other than those identified under standard scaffold limitations. All special scaffolds should be designed by a competent person.
- These will generally cover:
 - Cantilever scaffolds
 - Protection fans
 - Cantilever loadings bays
 - Truss out scaffolds
 - Freestanding towers
 - Power line crossings
 - Guys and struts
 - Access birdcages
 - Hoist towers
 - Ladder towers
 - Stair towers
 - Slung scaffolds
 - Pedestrian bridges and walkways
 - Temporary ramps and elevated roadways
 - Masts
 - Lighting towers Transmission towers
 - Lifting gantries
 - Temporary buildings
 - Temporary roofs
 - Spectator terraces and seating stands

- Temporary storage on site
 - Sheeted scaffolds including open mesh sheeting
 - Scaffolds deriving lateral support from buttressing
 - Scaffolds including a standard bearing on a bridging beam or bracing
- 380 WIND LOADING: To be in accordance with BS EN 1991-1.4.
- 385 SNOW LOADS: To be in accordance with BS EN 199101.3.
- 390 PLATFORM LOADS: Shall be appropriate to the designation of the scaffold but not less than 2.5kN/m^2 . **Only one single level may be fully loaded at any one time.** The scaffolding contractor should allow for the worst condition. This relates to possible future works.
- 420 LOADING ON EXISTING STRUCTURES: The scaffolding may only take bearing off the existing structures, as described in this specification.
- 430 SUPPORT STRUCTURE OF SCAFFOLD: The support structure of the scaffold should be concentrated as necessary to leave the area adjacent to the structure as free as possible for use by other parties wishing access to the building.
- 440 SHEETING ENVELOPE: (see clauses B11 150) The sides are to be enclosed in Monarflex air flow sheeting, or similar approved but only to the extent to prevent wind driven rain being blown on to the roofs and into the parapet gutters.
- 460 PLATFORMS: The scaffold will have minimal boarding out as required for erection. Where required ensure hand rails and toe boards are included. Ensure that boards are fully supported and lie flush, to prevent traps, particularly at ladder holes. Allow boards immediately adjacent to wall/window to lift out. For future use, and as part of the design, the designation of the scaffold should have one lift at not less than 2.5kN/m^2 and one at 1.0kN/m^2 .
- 470 LADDERS: Provide ladder access for full height of scaffold both to the south and north elevations and include suitable locally boarded areas for this access. Agree with the Employer and their Consultant's such positions.
- 480 LIGHTNING PROTECTION: Bond scaffold to suitable lightning conductor terminal(s). The existing lightning protection system can be utilised if appropriate. The Contractor to confirm details of their proposal with the tender. If new terminals are required to be driven into the ground or in pits, positions to be agreed with the Employer or their Consultants to comply with the requirements of BS 6651. In either case test connection(s) and continuity through scaffold on completion of the contract.
- 490 CLEARANCES: Clear access is to be provided to all doorways at all times.
- 510 CONTROL OF WORK ON SITE:
- Adequate supervision must be provided by the Contractor at all times during erection and dismantling of scaffolding and temporary structures.
 - Designers of special scaffolds should, under the terms of contract, be required to attend site on the first day of erection to liaise, and brief the Scaffolding Supervisor on the requirements of the design.
 - Designers should be required to emphasise that any variations to the design will not be permitted, without the designer's written authority. Any agreed variations must be clearly documented, checked by a competent person with details passed to the Structural Engineer. The Contractor will be responsible for all costs associated with design changes, re-drawing and revised calculations etc.;
 - On completion the Designer should certify (on F91 part 1 section A) to the Employer that the scaffold has been erected fully in accordance with the design and any approved variations. Copies of the certification should be passed to the Employer and Principal Designer.
 - All scaffolds and structures should be inspected at least every seven days (and after weather conditions likely to have affected their strength or stability) by a competent person.

- Records of such inspections together with necessary action must be made in register F91 and signed by the person making the inspection.
 - No alterations must be made at any time without written authority from the Designer and with the Employer and their Consultants informed.
 - At all times during erection, dismantling or alteration to scaffold structures, access to the working areas needs to be clearly defined by suitable barriers and notices. Notices stating "incomplete scaffold" should be secured as necessary in an appropriate place.
 - All work on external scaffolding to be halted during thunderstorms or high winds.
- 520 PROTECTION:
- Tubes bearing on masonry should be provided with suitable timber bearers and protective material.
 - All scaffold tube ends which are near or likely to come into contact with the fabric of the building during erection, dismantling or as a consequence of lateral movement should be provided with plastic end caps.
 - All scaffolding and temporary structures must be adequately earthed against lightning strikes, or bonded into the existing installation and is to be carried out by an approved lightning conductor specialist.
- 530 PUBLIC ACCESS:
- During erection, modification or dismantling, care must be taken to exclude the public and staff from a clearly defined area around the work.
 - Authorised access thoroughfares must have effective protection in the form of fans, netting, sheeting, brick guards, etc., to protect persons from falling objects.
 - Ladders must not be left unattended when accessible to the public.
 - Ladders at ground floor level and other risk areas should be removed and securely locked away at the end of each working day.
- 540 MOBILE SCAFFOLD TOWERS:
- Mobile scaffold towers should be designed and used in accordance with HSE Guidance Note GS42.
 - If a static tower is to be free standing (that is not tied to a building), the maximum height to base ratio, is 4:1 for use inside a building and 3:5:1 for use outside buildings.
 - If a mobile tower is to be free standing, the maximum height to base ratio, is 3:5:1 for use inside a building and 3:0:1 for use outside the building.
 - The minimum base dimensions can be increased, and stability improved, by the use of outriggers or stabilisers.
 - The recommended maximum height for a free standing tower is 9.6m when mobile and 12m when static.
- 550 PROVIDE, MAINTAIN AND ADAPT: All platforms, ladders, hoists, scaffolding, sheeting, hoarding, temporary roofs and protection as necessary for the proper execution of the works including that required for sub-contractors. Inspect regularly in accordance with the regulations and maintain records of these inspections on site. Co-ordinate the design and erection of scaffolding with general and sub-contractors programme and working requirements.
- 560 TAKE CARE: To prevent damage to the existing structure and its fittings. Any damage caused to the building is to be made good to the approval of the Employer at the Contractor's expense. Grade II* Listed Buildings are of national historical and cultural importance and the historic fabric is vulnerable to damage and much of it irreplaceable. All personnel should be made aware of this and treat the building with great care.
- 570 PERMISSIBLE BEARING PRESSURE: Ensure that the permissible bearing pressure of the ground or of the building below the structure is not exceeded. Set standards on scaffold boards to spread the load, taking care not to block access to drains, rainwater channels, outlets etc. Where founded on soil, set out on appropriate spreaders as sole plates. Provide protection to any underlying stone, leadwork, asphalt etc. with 50mm polystyrene and 19mm plywood as base for scaffold supports. Note the position of the below ground culvert to the south side and design to bridge this element as necessary.

- 580 SCAFFOLD TUBE ENDS: All to be covered with plastic caps where within 75mm of the building. All ends to be kept a minimum of 100mm back from any glazing. Where butting is permitted provide detail of padding to butt to avoid damage to fabric. Assume minimum of 50mm polystyrene and 19mm plywood. Wrap any vulnerable carvings or fittings with bubble wrap and cover glass or decorations in rigid sheeting where adjacent to scaffolding.
- 590 FIRE ESCAPE: Do not obstruct means of escape routes from the site or adjoining buildings unless alternative routes are provided, signed and agreed in writing with the Employer.
- 600 UNAUTHORISED ACCESS: Take all reasonable precautions to ensure that unauthorised persons cannot gain access to scaffolds. Remove and lock up all ladders from the bottom lift of scaffolding and secure all gates each night.

C30 SHORING

- 110 GENERALLY: Before starting work:
- Examine all available information.
 - Visually survey the structure, site and surrounding area.
 - Submit method statements to the CA covering any relevant matters raised in this document.
 - Ensure that all statutory notices have been given and licenses obtained.
- 120 COMMENCEMENT CONDITION SURVEY:
- Before starting work, survey the existing state of structure to be kept in place to locate and record the magnitude and extent of all cracks, or other major structural defects. Mark up on plans with photographs cross referenced.
 - Agree the commencement condition survey record with the CA.
- 125 GENERAL:
- All items of pulling down, cutting openings and any other demolition items, alterations, etc., to the existing works shall include shoring, strutting and propping to support the superincumbent and adjacent work likely to be injured or affected by the operations and construction of the new Works and also for maintaining, easing and adjusting, striking and removing same when no longer required and making good all work disturbed.
 - Provide any necessary temporary concrete foundation bases etc., required for the shoring etc., and break up same and clear away when no longer required and make good.
 - Particular care must be exercised to ensure that every part of the structure requiring needling, shoring, etc., is carefully and sufficiently supported before demolition, pulling down and alterations and construction and re-erection commences.
- 220 ERECTING SUPPORT SYSTEMS:
- Locate positions of existing and new services which may be affected by support systems. Provide any necessary temporary diversions.
 - Prevent excessive loadings from foundations of support systems being imposed onto foundations of structure to be kept in place.
 - Erect support systems and connect to structure to be kept in place taking all necessary precautions to prevent damage, and taking due account of movement of structure which may occur before, during and after demolition.
 - Promptly repair any damage caused to adjoining property by erection or connection of support systems. Make good to ensure safety, stability, weather protection and security.
 - Report to the CA any damage caused to retained facades by erection or connection of support systems. Agree methods of repair with the CA.
 - Check support systems at agreed stages during erection for compliance with design proposals.
- 320 MAINTAINING SUPPORTED STRUCTURE:
- Regularly inspect and monitor supported structure to ensure stability. Report any significant movement or deterioration of the fabric of supported structure to the CA.
 - Agree any necessary remedial work with the CA.
 - Adequately protect supported structure from damage by site operations and from staining due to corrosion of support systems.

410 DISMANTLING SUPPORT SYSTEMS: When all permanent connections between supported structure and new construction have been made inform the CA and obtain any required permission to disconnect and dismantle support systems.

430 MAKING GOOD: Repair any connection holes made in the structure kept in place.

440 COMPLETION: Clear away all support systems and leave the site and any working areas beyond the site boundary in a tidy condition on completion.

C41 REPAIRING/ RENOVATING/ CONSERVING MASONRY

GENERALLY/ PREPARATION

110 SCOPE OF WORK

- Repairs as identified in schedule of works to various elements.

120 REVIEWING SCOPE OF THE WORK

- Inspection: Arrange before starting work. Confirm type and extent of work required.
- Records of masonry to be removed: Before starting work, use measurements and photographs as appropriate to record bonding patterns, joint widths, special features, etc.

WORKMANSHIP GENERALLY

150 POWER TOOLS FOR REMOVAL OF MORTAR

- Usage: Not permitted unless approved by CA.

155 PUTLOG SCAFFOLDING

- Usage: Not permitted.

165 STRUCTURAL STABILITY

- General: Maintain stability of masonry. Report defects, including signs of movement that are exposed or become apparent during the removal of masonry/brick units.

170 DISTURBANCE TO RETAINED MASONRY

- Retained masonry/bricks in the vicinity of repair works: Disturb as little as possible.
- Retained loose masonry units and those vulnerable to movement during repair works: Prop or wedge so as to be firmly and correctly positioned.

180 OPERATIVES

- General: Skilled and experienced with the materials and procedures required.
- Evidence of training and previous experience: Provide on request.

185 ADVERSE WEATHER

- Frozen materials: Do not use. Do not lay masonry units on frozen surfaces.
- Air temperature: Do not bed masonry units or repoint:
- In hydraulic lime:sand mortars when at or below 5°C and falling or unless it is at least 3°C and rising.
- In non-hydraulic lime:sand mortars in cold weather without approval.
- Temperature of the work: Maintain above freezing until mortar has fully set.
- Rain and snow: Protect masonry/bricks by covering during precipitation and at all times when work is not proceeding.
- Hot conditions and drying winds: Prevent masonry from drying out too rapidly.
- New mortar damaged by frost: Rake out and replace.

190 TENDING:

- Tending is the key to successful mortar work.
- Tending should occur over of a period of around 10 days.
- Where appropriate push back mortar within joint where this has moved laterally.
- It is imperative to control the rate of drying out and adjust it to the ambient environment to ensure consistency.

- Tend by protecting the mortar with damp hessian and polythene in warm drying conditions and damp hessian and bubble wrap in winter or cold periods.
 - Check repairs at regular intervals and spray with clear limewater to keep damp.
 - Take care not to allow run off as lime mortar causes stains which are invisible until they dry out.
- 200 CLEANLINESS: keep face work clean during construction and until practical completion. Ensure that no mortar encroaches on face when laying. Turn back scaffold boards at night and during heavy rain. Rubbing to remove marks or stains will not be permitted.

MATERIALS/ PRODUCTION/ ACCESSORIES

281 FIXINGS

- Type: Submit proposals.
- Material: Stainless steel.
- Size, strength and number: As necessary to resist loads likely to occur during the life of the building, and to prevent lateral displacement or pulling apart of the construction.

285 BED JOINT REINFORCEMENT TO INSITU MASONRY

- Manufacturer: Helifix or similar approved.
- Product reference: HeliBar, to suit joint width.
- Material: Austentic Stainless steel.
- Width: As indicated in scheduled of work or agreed on site but no less than 450mm either side of the structural defect, i.e. minimum 900mm.
- Laying: As per manufacturer's instructions.
- Laps: 225mm laps at joints and full laps at angles.
- Position: 40mm from back from face of masonry and re-point as 810, 8410, 850 and 860.

WORKMANSHIP

330 PREPARATION

- Defective material: Carefully remove to the extent agreed. Do not disturb, damage or mark adjacent retained masonry.
- Existing metal fixings, frame members, etc: Report when exposed.
- Redundant metal fixings: Remove completely.
- Recesses: Thoroughly clean to remove loose material and leave joint surfaces in a suitable condition to receive replacement units. Protect from adverse weather.

360 CRACK ANCHORS

- Drill at positions agreed with Contract Administrator, but to avoid all windows, doors and other features, and to length specified.
- Provide temporary restraint locally as necessary to area around drilling to retain core insitu.
- Clean out hole thoroughly and flush through with water and allow to dry.
- Insert crack anchor (threaded rod) and set in resin.

405 BONDED DOWELS/PINS. WIRE AND FIXINGS

- Dowels: Stainless steel grade 18/8 Austentic.
- Adhesive: to be Exchem Resifix 3S (base pin grout) or similar approved.
- Holes for dowels: Suitably sized and accurately aligned in masonry background and in rear of replacement/ insert stone; clean and dry.
- Other requirements: Do not use adhesive to bond stones at joints unless instructed.

410 CORRODED METAL FIXINGS

- Removal: Cut out carefully, causing the least possible disturbance to surrounding masonry. Remove associated rust debris.
- Replacement: Compatible fixings as clause 281.

REPAIRS

- 490 REPAIR TYPE 2 – DEEP POINTING
- Allow to rake out area and for depth up to 75mm;
 - Allow to DEEP RE-point with pointing mortar.

CRACK REPAIRS/ TIES/ REINFORCEMENT

- 610 MORTAR REPAIR OF CRACKS As directed on site
- Mortar: Lime mortar as section Z21.
 - Preparation: Clean out cracks to remove loose debris, dust and dirt. Dampen joints to control suction as necessary.
 - Applying mortar: Press well into joints so that they are fully filled. Ensure that no mortar encroaches upon exposed faces. Finish flush.
 - Other requirements: None.
- 650 CRACK ANCHORS:
- Existing construction:
 - Wall type/ thickness: Existing walls
 - Preparation:
 - Before commencing insertion of each tie, ensure that there are no service pipes, electrical cables or other obstructions in its path.
 - Tie system:
 - Manufacturer: Helifix or Spiroties or similar approved. Product reference: Helibar or Spiroties
 - Tie installation: Insert ties accurately and securely to cracks as indicated in schedule of works.
 - Bonded type fixings: Thoroughly grouted.
 - Making good: As agreed with CA.
- 690 MAKING GOOD OF INJECTION/ INSERTION HOLES
- Preparation: Clean out holes thoroughly.
 - Repair mortar: To match existing masonry units/ joints in colour and texture. Fully fill holes and finish neatly and flush.
 - Give notice: Before starting and obtain approval of appearance of first few holes before completing the remainder.

POINTING/ REPOINTING

- 810 PREPARATION FOR REPOINTING
- Removing mortar:
 - Work from the top of structure downwards.
 - Remove carefully and without damaging adjacent masonry, arrises or widening joints.
 - Recess for repointing: Form a neat recess of depth not less than 30mm or twice joint thickness whichever is the greater.
 - When mortar beyond this depth is loose and friable and/ or cavities are found seek instructions.
 - Dust and loose debris. Remove. Dampen joints to control suction as necessary.
- 820 POINTING
- Preparation of joints: as clause 810.
 - Mortar: As section Z21.
 - Joints profile/ finish: To match existing.
- 840 POINTING WITH TOOLS/ IRONS
- General: Press mortar well into joints using pointing tools/ irons that fit into the joints, so that they are fully filled.
 - Face of masonry: Keep clear of mortar. Use suitable temporary adhesive tape on each side of joints where necessary. Finish joints neatly.

F10 BRICKWORK**Materials**

290 BRICKS: For face repairs new bricks are required to match existing in color, size and texture. Three sample bricks to be provided for approval by Contract Administrator for both the red and gault bricks. One to be retained on site for future inspection and one passed to the CA for retention. For filling of voids such as bonding timber and previous main beam pockets the bricks are to be a slightly different size and color to allow this constructional information to be differentiated and understood in the future.

295 BRICK BOND AND LINE: Brickwork to be re-built in bond to match existing. Line of any re-built brickwork to be 'floated' to bond into the existing so that the plane of the wall looks visually reasonable.

Workmanship (to be in accordance with manufacturers/supplier's recommendations).

350 MORTAR: See Z21.

360 ADVERSE WEATHER

- Frozen materials: Do not use. Do not lay brick units on frozen surfaces.
- Air temperature: Do not bed brick units or repoint:
- In hydraulic lime:sand mortars when at or below 5°C and falling or unless it is at least 3°C and rising.
- In non-hydraulic lime:sand mortars in cold weather without approval.
- Temperature of the work: Maintain above freezing until mortar has fully set.
- Rain and snow: Protect masonry/bricks by covering during precipitation and at all times when work is not proceeding.
- Hot conditions and drying winds: Prevent masonry from drying out too rapidly.
- New mortar damaged by frost: Rake out and replace.

400 CLEANLINESS: keep face work clean during construction and until practical completion. Ensure that no mortar encroaches on face when laying. Turn back scaffold boards at night and during heavy rain. Rubbing to remove marks or stains will not be permitted.

410 JOINTING:

- Where specified finish joints neatly as work proceeds.
- Unless otherwise specified all joints are to be struck off flush.

420 TENDING:

- Tending is the key to successful mortar work.
- Tending should occur over of a period of around 10 days.
- Where appropriate push back mortar within joint where this has moved laterally.
- It is imperative to control the rate of drying out and adjust it to the ambient environment to ensure consistency.
- Tend by protecting the mortar with damp hessian and polythene in warm drying conditions and damp hessian and bubble wrap in winter or cold periods.
- Check repairs at regular intervals and spray with clear limewater to keep damp.
- Take care not to allow run off as lime mortar causes stains which are invisible until they dry out.

460 RELEASING BRICK/WORK:

- Provide temporary support as necessary.
- Release bricks by cutting out jointing material, easing / levering bricks from their backing.
- Prevent damage to bricks being removed and surrounding work.
- Use manual tools only.
- Lay dust by sprinkling with water.
- Inspect voids with Contract Administrator or notify any signs of structural movements in walls.

- 470 PREPARING BEDS/BACKINGS/VOIDS:
- Thoroughly clear out void using hand tools and brushes.
 - Temporary support surrounding work as necessary.
- 480 LAYING/BONDING:
- Ensure the bond, is replicated.
 - Clean out and flush out or moisten with clean water voids to remove dust and reduce suction.
 - Dampen bricks and tamp in place on a full and even bed of mortar.
 - Pack remaining joints with mortar using a rammer and pointing key.
- 490 RE-POINTING:
- Where specified carefully rake out existing joints by hand to form a square recess of 25mm depth.
 - Remove dust, lightly wet and neatly point in specified mortar.
 - Unless otherwise specified all joints are to be struck off flush.
 - Finish joints as work proceeds.
- 550 REPAIR TYPE A – REPLACING STRETCHER BRICK:
- Remove damaged brick as 460.
 - Prepare beds, backing and voids as 470.
 - Insert new stretcher as 480.
 - Point around brick as 490.
- 560 REPAIR TYPE B – REPLACING HEADER BRICK:
- Remove damaged brick as 460, but only to maximum of 4 ½" depth.
 - Prepare beds, backing and voids as 470.
 - Insert new snapped as 480.
 - Point around brick as 490.

Z21 LIME MORTARS

- 200 SHARP AND SOFT SANDS: shall be a mix of clean washed very sharp pit sand free from loam and other impurities and soft sand. Colour should be correct for mortar colour matching with existing, to be matched to approved sample. Use well graded sands (10mm maximum down to 75 microns), note the existing has aggregate particles up to 10mm. To BS 1200 unless specified otherwise. Sand for facework mortar to be from one source different loads to be mixed if necessary to ensure consistency of colour and texture.
- 235 QUICK LIME: to be powdered Calbux quicklime from Tarmac or Singleton Birch or lump lime from an approved source. The choice to be agreed prior to order and use.
- 240 NATURAL HYDRAULIC LIME to be mixed in accordance with manufacturer's instructions. With hydraulic limes performance is variable because it gradually carbonates. Obtain fresh and do not store. Unless otherwise specified, to be obtained from:
Setra Marketing Ltd, 16 Cavendish Drive, Glaygate, Esher, Surrey, TK10 02E, (tel: 01372 465779).
Reference: St Astier natural hydraulic lime.
- 325 WATER:
- To be clean and uncontaminated.
 - Obtain approval for other than mains supply.
 - Test to BS3148 if instructed.
- 330 READY PREPARED LIME PUTTY
- Type: Slaked directly from CL 90 quicklime to BS EN 459-1, using an excess of water.
 - Maturation: In pits/ containers that allow excess water to drain away.
 - Density of matured lime putty: 1.3-1.4 kg/litre.
 - Maturation period before use (minimum): 30 days minimum.
- 335 READY PREPARED LIME PUTTY
- Manufacturer: Contractor's choice to approval.
 - Product reference: Contractor's choice to approval.
 - Maturation period before use (minimum): 30 days minimum.

- 345 ADMIXTURES FOR MORTARS: Not permitted.
- 350 STORAGE OF MORTAR MATERIALS
- Sands and aggregates: Keep different types/ grades in separate stockpiles on hard, clean, free-draining bases.
 - Ready prepared non-hydraulic lime putty: Prevent drying out and protect from frost.
 - Non-hydraulic lime:sand mortar: Store on clean bases or in clean containers that allow free drainage. Prevent drying out or wetting and protect from frost.
 - Bagged hydrated hydraulic lime: Store off the ground in dry conditions.
- 360 MAKING LIME MORTARS GENERALLY
- Batching: By volume. Use clean and accurate gauge boxes or buckets.
 - Equipment: Use roller-pan mixer for all earth mortar mixing. Do not use cement/concrete barrel mixer.
 - Water quantity: Soak overnight and mix over-wet. Add quicklime in powder form to allow workable mix.
 - Mixing: Mix materials thoroughly to uniform consistency, free from lumps.
 - Contamination: Prevent intermixing with other materials, including cement.
- 410 MORTAR PREPARATION – FOR DEEP PACKING MORTAR, STRUCTURAL MORTAR OR WEATHERING MORTAR ETC:
- Measure materials by volume using clean gauge boxes. Proportion of mixes are for dry sand; allow for bulking if sand is damp. Where a range is given (e.g. 5-6) use the higher value for well-graded sand and the lower value for coarse or uniformly graded sand.
 - The mix should be made up as dry as possible, with the minimum of water, to avoid shrinkage and the unsightly smearing of mortar on to the brickwork.
 - Mix ingredients thoroughly to a consistency suitable for the work and free from lumps.
 - NHL mortars should be used fresh and only within the day of preparation.
 - Keep plant and banker boards clean at all times.
 - Do not use ready mixed retarded mixes without the permission of the Conservation Consultant.
 - Do not use hydraulic hydrated lime powder which exceeds its shelf life (approximately one month).
 - Carry out a site trial test initial setting period prior to carrying out the work.
- 500 MORTAR FOR REPAIRS
- Refer to Schedule of Works

4.0 SCHEDULE OF MINIMUM WORK – CURATED RUIN OPTION

Diagrammatic plans is included in appendix B with room referencing for clarity.

4.1 General

- 4.1.1 Check for services in the vicinity of the works including water, electricity, gas etc. prior to works commencing and ensure that the works will not interfere with these in any way, i.e. scaffold should not be based out over any service traps, gullies, covers etc.
- 4.1.1 It should be noted that the existing gate to the courtyard, will need to be carefully removed and set aside at the commencement of the works. This will need to be re-instated at completion of the works. As public access will be required this will need to be suitable design.
- 4.1.2 Whilst the works set out are specific it should be accepted that further works of a similar nature will become obvious during the course of the works where vegetation is removed and or close level and high level access are available.
- 4.1.3 Allow to provide security gates to two north entrances into courtyard.
- 4.1.4 Provide further gate or new door to cellar and new balustrading around stairwell areas.
- 4.1.5 Provide new gates and two stairs to main tower to prevent public access.
- 4.1.6 Allow to sort all building material around site. Some of these may be suitable for use in repairs such as half round clay drainage channels for flat wall heads, bricks (if matching) etc.
- 4.1.7 Allow to clear courtyard areas of all built up debris, earth, vegetation etc. (see also 4.3). Include for making good surfacing where disrupted.
- 4.1.8 Allow to clear all rooms of debris etc. Include for making good surfacing where disrupted.
- 4.1.9 To remaining slate panels to stables allow to provide 4 Nr. stainless steel cleats each to provide additional support and prevent these falling. Cleats to have resin fixings back into wall masonry. Provisionally allow for 12 No.
- 4.1.10 To windows refer to Architect's information.

4.2 Protected Species

- 4.2.1 Prior to commencement of main works any works required by the Protected Species Surveyor should be undertaken. This advice is provided separately.

4.3 Vegetation and Sapling and Tree Removal etc.

- 4.3.1 Some of the bramble scrub etc. has been removed as part of recent works by the owner, Heidelberg Materials. Carry out any further clearance required under Ecologist supervision, from directly inside and outside of the whole of the stable complex including the Pump House and Kennel(s). This clearance to be for a 10m from the outside face of the building to provide sufficient space for scaffold (if required) and access for works and for the complete interior of the courtyard and all rooms. Work progressively and check for any concealed manholes (which may be open) or other features. If no scaffold is required then the extent of scrub clearance can be reduced to provide suitable access.
- 4.3.2 To any located manholes (see photograph 59) of other features which may cause a hazard, allow to provide new cast iron purpose made cover. Provisionally assume 8 Nr.
- 4.3.3 Access buildings and carefully cut down any remaining saplings, trees, bushes etc. This to follow completion of works identified 3.3.1. Note if any vegetation is rooted into masonry or fabric, it should be cut back to 60-70mm from the face to the face of the wall, but leaving the root portion embedded and to decay over time and treated (these may be plugged). All exposed stems in this situation to be killed using approved brush applied biocide following suitable training and where appropriate PPE. Provide details of biocides proposed all in accordance with Control of Pesticides Regulations.

- 4.3.4 Where possible remove juvenile ivy by hand ensuring no damage to the structure, and if damage commence then cease removal. Kill all climbing plants (i.e. ivy) noted throughout the structure using approved biocides prior to carefully removing them. Note all embedded sections are not to be removed but allowed to die over time. Provide details of biocides proposed all in accordance with Control of Pesticides Regulations. Include all access via scaffold, MEWP's etc. Under no circumstances should ivy stems be simply cut with the assumption that the growth will die.

4.4 Scaffold

- 4.4.1 There is existing scaffold on site which has clearly been in situ for many years. It appears that the scaffold erected was to provide stability to high level sections of walls which were vulnerable to collapse due to lack of stability. However, the scaffold seems to have been poorly designed or built with the main issues noted as overleaf:
- a) Tie tubes to tops of gables only with no bracing to lower levels of the walls and with single couplers used, rather than the required load-bearing double couplers;
 - b) Transom tubes not butted to walls or fitted with double couplers;
 - c) Lack of ledger and raker bracing to stabilise the scaffold and transfer loads;
 - d) Lack of sway bracing;
 - e) Base plates bearing directly onto ground with no bearer.
- 4.4.2 The main risks will occur when there are strong wind conditions. It is recommended that works are only carried out when wind speeds are less than 25mph. Mitigation works may include:
- a) Replacement of single couplers with double couplers;
 - b) Tie the scaffold into walls or use window openings and lip hooks over gables;
 - c) Spreader boards to be fitted vertically between the ties to provide additional vertical support and fixed to prevent slippage;
 - d) Scaffold to butt walls with protective butts. Butts to be formed of 200mm x 200mm ply boards with carpet underlay;
 - e) Include ledger and raker bracing to all scaffold;
 - f) Include sway bracing to all scaffold;
 - g) Provide concrete paving slabs below standards where currently only steel pads;
 - h) Remove redundant scaffold where original masonry has collapsed.
- 4.4.3 It should be noted that some areas of wall have clearly collapsed since the scaffold was erected, now leaving the scaffold rising up but not supporting anything. The Contractor should allow for a detailed inspection of the existing scaffold to familiarise themselves and their scaffolding contractor with the existing scaffold.
- 4.4.4 The Contractor is to provide a method statement to set out how the main issues highlighted above in 4.4.1 will be rectified in terms of sequence and methodology. This could include dismantling and erection of new scaffold if considered more economic. A plan (drawing 22383/03) is included with walls shaded that need to be provided with support but subject to re-assessment on completion of urgent works. The tower (Room 21) scaffold also needs to be included in the works.
- 4.4.5 In addition or as part of, allow to provide all access scaffolding, platforms and means of vertical access, ladders, mobile towers, where appropriate for the execution of the works unless specifically included in individual items. The scaffold is not permitted to take any fixings into the structure to any visible elevations.
- 4.4.6 It should be noted that the above relates to the any temporary support that the scaffold is currently providing to the stable structure, its adaption and use for works, if appropriate, or replacement of the scaffold to carry out the proposed works.

4.5 Minimum Works – Curated Ruin Option

NOTE: where any loose materials are removed from the structure, for instance stone or brickwork from wall heads allow to record with photographs prior to implementation and mark out plan to cross reference.

- 4.5.1 Bonding timbers are noted in various positions around the building. Originally, these were used to spread load during construction as mortar cures, to provide bearing for floor joists and roof members, or for fixing secondary elements to. Previous works, presumably to help protect these, included using Flash-band over the timbers. In some 9" cross walls there are bonding timbers 'back to back' in the dividing walls. Where bonding timbers are decayed to 9" wide walls, or where there are bonding timbers to both sides of 13 ½" walls, these will have the potential to reduce stability to the walls.
- 4.5.2 Provide access to bonding timbers to **all 9" and 13/ 1/2" cross walls**, remove Flash-band where this exists, and check by hand drilling if the timbers are decayed. Record positions on drawings and by photograph including identifying lengths of decayed timbers. A diagrammatic plan is included in appendix B numbered 22383/02 to provide assistance but should be checked on site.
- 4.5.3 To all remaining walls mark up on survey plans positions of bonding timbers. Review and agree if any areas require timber removal with Contract Administrator.
- 4.5.4 Subject to the results of the above, where timbers are identified as decayed, carefully remove in a piecemeal manner in short lengths and infill with solid brick in a lime based mortar (assume 100mm wide x 75mm deep). Brick to match existing in porosity or size, or be slightly undersized, but to be different colour to clearly distinguish this from the existing to make it 'readable' in the future. This is to include any temporary works considered necessary to undertake the works. Allow for the following including all access:

	ITEM	LOCATION	APPROX TOTAL LENGTH [m]	LENGTH TO BE REPLACED [m]
GROUND FLOOR	A	North Range - one wall face	12	12
	B	North Range - cross wall to both faces at same position	14	14
	E	East Range - one wall face	6	6
	F	East Range - cross wall to both faces at same position	30	30
	G	South Range & Tower - one wall face	-	-
	H	South Range & Tower - cross wall	63	63
		Total	161	161
FIRST FLOOR				
	I	North Range - one wall face	10	10
	J	North Range - cross wall to both faces	-	-
	K	West Range - one wall face	12	12
	L	West Range - cross wall to both faces	30	30
	M	East Range - one wall face	12	12
	N	East Range - cross wall to both faces	-	-
	O	South Range & Tower - one wall face	-	-
	P	South Range & Tower - cross wall to both faces	20	20
		TOTAL	84	84

Note: Where wall heads are suggested as mortar flanchied this is to sloped areas only. To flat wall heads then half round clay coverings (glazed pipes cut in half) to match those in place already or reduce to suit wall width if necessary. These are available from the Civils Store or WT Knowles & Sons Ltd. All to be set in 1:3 hydraulic lime (NHL3) to sand mortar.

- 4.5.5 To chimney rising up from Rooms 4, 4a, b and c (see photographs 25 and 54). Urgent Work has been very recently undertaken by the owner. Temporary scaffold remains in place to provide lateral restraint.

- 4.5.6 To remove the remaining temporary scaffold it will be necessary to provide additional stability. Two outline options are provided below as well as other repairs to the walls:
- a) Allow to drop down 8 Nr. 16mm stainless steel reinforcement bars set in a Lytag lightweight structural concrete for full height or stack to stabilize. [Provide cost but not to be carried forward to collection £.....]
 - b) Allow to install 2 Nr. 300 x 100 stainless steel PFC's to south side of stack and fixed into brickwork at 350mm staggered vertical centres set in resin.
 - c) To wall head to Room 4b allow to remove vegetation and allow to cap walls with half round drainage channels.
- 4.5.7 To the chimney rising up from Rooms 15, 15a, b and c provide for high level access. Allow to re-bed loose bricks at head.
- 4.5.8 Re-point all of head brickwork to chimney to aid stability (see photograph 18).
- 4.5.9 To provide permanent stability it will be necessary to provide additional structure. Two outline options are provided below:
- a) Allow to drop down 8 Nr. 16mm stainless steel reinforcement bars set in a Lytag lightweight structural concrete for full height or stack to stabilize. [Provide cost but not to be carried forward to collection £.....]
 - b) Allow to install 2 Nr. 300 x 100 stainless steel PFC's to south side of stack and fixed into brickwork at 350mm staggered vertical centres set in resin.
- 4.5.10 To Room 3 where hole in rear wall (see photograph 26) allow to brick infill hole. Brick to match existing in porosity or size, or be slightly undersized, but to be different colour to clearly distinguish this from the existing to make it 'readable' in the future.
- 4.5.11 To Room 4 at ground level there is a projecting section of brickwork forming a niche (see photograph 29) which is loose. Re-point/consolidate brickwork in 1:3 lime (NHL2) to sand mortar include flaunching to head.
- 4.5.12 To Room 5 where hole in rear wall (see photograph 30) allow to brick infill hole. Brick to match existing in porosity or size, or be slightly undersized, but to be different colour to clearly distinguish this from the existing to make it 'readable' in the future.
- 4.5.13 To Room 7 to north gable, once ivy is removed, mortar flaunch head in 1:3 lime (NHL5) to sand (see photograph 31).
- 4.5.14 To central high level gable of west wing allow for new horizontal stainless steel channel to rear face of gable and fixed in with 12mm s/s bolts set in resin at 350mm staggered centres. Allow for 2 Nr. stainless steel Diagonals to drop down to cross walls to north and south sides of Rooms 4 and 4a and fixed into masonry with 12mm s/s bolts set on resin at 350mm staggered centres.
- 4.5.15 Allow provisionally to Room 3 to install 2 Nr. horizontal stainless steel beams with end plates and 12mm s/s fixings set in resin set into the east and west walls. Allow to span diagonal stainless steel off these beams at the west end and rising up to the high level section of east wall with end plate fixed to the wall to provide stability.
- 4.5.16 Allow provisionally to Room 5 to install 2 Nr. horizontal stainless steel beams with end plates and 12mm s/s fixings set in resin set into the east and west walls. Allow to span diagonal stainless steel off these beams at the west end and rising up to the high level section of east wall with end plate fixed to the wall to provide stability.
- 4.5.17 Allow provisionally to Room 7 to install 1 Nr. horizontal steel beam with end plates and 12mm s/s fixings set in resin set into the east and west walls. Allow to span a diagonal stainless steel off the beam and rising up the north gable with end plate fixed to the wall to provide stability.

- 4.5.18 To Room 8 to tower, once ivy is removed allow to cap walls with half round drainage channels. Extend this to full perimeter of tower head where bricks and or stone pointing degraded.
- 4.5.19 To external west facing wall of Room 9a the wall is in poor condition (see photograph 32).
- a) Once ivy removed allow to deep (up to 75mm deep) re-point 8.0m² of brickwork.
 - b) Allow to replace 30 Nr. Stretcher bricks to match existing.
 - c) Allow to replace 20 Nr. Header bricks to match existing.
- 4.5.20 To the east side of Room 9 where there is loose and unsupported brickwork (see photograph 22) allow to provide new stainless steel column rising off new mass concrete pad foundations to support the overhanging brickwork with head plate fixed with resin fixings. Include for removal of any hand loose bricks.
- 4.5.21 To the west side of Room 9 where there is loose and unsupported brickwork allow to provide new stainless steel column rising off new mass concrete pad foundations to support the overhanging brickwork with head plate fixed with resin fixings. Include for removal of any hand loose bricks.
- 4.5.22 To Room 10 to tower, once ivy is removed allow to cap walls with half round drainage channels. Extend this to full perimeter of tower head where bricks and or stone pointing degraded (see photograph 33).
- 4.5.23 To water tank in Room 10 tower, allow to temporary support from below on a precautionary basis, and then remove all rubbish and debris from inside tank. Allow to carefully break out the tank and remove from site including base and two iron rails/beams below and pipework. Allow to repoint brick and ledge to consolidate.
- 4.5.24 To Room 10a to chimney to west side (see photograph 34), appears in poor condition. Provide access and allow for taking down and re-building to match existing.
- 4.5.25 To Room 11 to north gable, once ivy is removed, mortar flaunch head in 1:3 lime (NHL5) to sand (see photographs 35 and 36).
- 4.5.26 Allow provisionally to Room 11 to install 1 Nr. horizontal stainless steel beam with end plates and 12mm s/s fixings set in resin set into the east and west walls. Allow to span a diagonal stainless steel off the beam and rising up the north gable with end plate fixed to the wall to provide stability.
- 4.5.27 Allow provisionally to Room 14 to install 2 Nr. horizontal stainless steel beams with end plates and 12mm s/s fixings set in resin set into the east and west walls. Allow to span diagonal stainless steel off these beams at the west end and rising up to the high level section of east wall with end plate fixed to the wall to provide stability.
- 4.5.28 To Room 15b to tower, remove vegetation and any loose brickwork and allow to cap walls with half round drainage channels. Extend this to full perimeter of tower head (see photograph 37).
- 4.5.29 Allow provisionally to Room 16 to install 1 Nr. stainless steel beam spanning horizontally between east wall and south wall with end plates and 12mm s/s fixings set in resin set into the walls. Allow to span diagonal stainless steels off this beam rising up to the east and south elevations at high level end plate fixed to the walls to provide stability.
- 4.5.30 Allow provisionally to Room 18 to install 1 Nr. horizontal steel beam with end plates and 12mm s/s fixings set in resin set into the east and west walls. Allow to span a diagonal stainless steel off the beam and rising up the south gable with end plate fixed to the wall to provide stability.
- 4.5.31 To Room 18 to south gable, once ivy is removed, mortar flaunch head in 1:3 lime (NHL5) to sand and consolidate brickwork where loose (see photograph 38).
- 4.5.32 To Room 20, allow provisionally to install 2 Nr. stainless steel beams spanning north to south at high level to provide lateral stability. Include for diagonal steels to be fixed to underside of the new beams and fix the bottom of the diagonals with face plates with 12mm stainless steel fixings set in resin into the walls to both ends.

- 4.5.33 To Room 20, south elevation, where head of lost gable is exposed (see photograph 28) provide access, consolidate loose bricks, and allow to cap walls with half round drainage channels. (see photographs 39 and 40).
- 4.5.34 To west face of Room 20c, there are cracks above the openings (see photograph 41). Reinforce cracks with helibar every 6th course. Re-point upper and lower crack in 1:3 lime (NHL2) to sand mortar to allow monitoring.
- 4.5.35 To head of the west wall of Room 20c, provide access gable over to re-point and flaunch wall head (see photograph 53) including consolidating all loose masonry.
- 4.5.36 To 2 Nr. chimneys rising up to east wall of Room 20 a and 20b respectively provide high level access and for re-pointing all of head stonework/brickwork (see photograph 42).
- 4.5.37 Provide concrete paving slabs to cap the flues cut to size and set up on slates shims to ensure ventilation gap below and fixed with stainless steel pins set in resin. Point between slabs. To be confirmed with high level access.
- 4.5.38 To Room 21 – Tower – the timber roof structure is partly supported on 2 steel beams spanning north south inserted, we assume, as part of historic assumed 1990's emergency works. The timber structure is decaying and this will increase with time (see photographs 3, 43 to 48).
- a) Provide suitable access (either scaffold or MEWP but note requirements of other works) and sequentially record and remove timbers etc.
 - b) Consolidate loose bricks and stone in lime mortar and allow to cap walls with half round drainage channels where practical or flaunch head in 1:3 lime (NHL5) to sand to all elevations (see photograph 49).
- 4.5.39 To Room 22, allow provisionally to install 2 Nr. stainless steel beams spanning north to south at high level to provide lateral stability. Include for diagonal steels to be fixed to underside of the new beams and fix the bottom of the diagonals with face plates with 12mm stainless steel fixings set in resin into the walls to both ends.
- 4.5.40 To 1 Nr. chimney rising up and wall to west wall of Room 22a and 22b provide high level access and for re-pointing all of head stonework/brickwork (see photograph 51).
- 4.5.41 Provide concrete paving slabs to cap the flues cut to size and set up on slates shims to ensure ventilation gap below and fixed with stainless steel pins set in resin. Point between slabs. To be confirmed by Contract Administrator.
- 4.5.42 To east face of Room 22e, there are cracks above the openings (see photograph 52). Allow to install helibar reinforcement every sixth course. Re-point cracks to allow for monitoring.
- 4.5.43 Allow provisionally to replace 250 Nr. face stretcher bricks at multiple positions agreed on site.
- 4.5.44 Allow provisionally to replace 100 Nr. face header bricks at multiple positions agreed on site.

4.6 The Armorial Panel

- 4.6.1 Reference should be made to the report prepared by Skillingtons and included as appendix C. Note this includes some budget costs, which if used should be checked at the time of tender.
- 4.6.2 Provide suitable access and protection for the works.
- 4.6.3 Carry out the following works, all to be undertaken by an ICON Accredited Conservator with relevant experience in the care / conservation of alabaster sculpture.

- Cleaning both alabaster and limestone, methods subject to trials;
- Analysis of historic finishes to copper alloy components and evidence of original core material. Conservation treatment guided by that;
- Fills to alabaster to prevent water ingress, using a palette of coloured lime mortars;
- Pointing generally isn't much of an issue because the joints are incredibly tight, but any open joints (including around the edge at the interface with the brickwork) should be filled with suitable lime mortars;
- Consideration of finishing the alabaster with a microcrystalline wax coating;
- Conservation of friable limestone and making good small losses using lime-based techniques;
- Potentially restoring remaining losses (such as unicorn tails) by piecing in using stone;
- Potentially lime shelter-coating the limestone.

4.6.4 Provide report from ICON Accredited Conservator on works carried out above to record any variation from condition previously reported as well as conservation and protection work undertaken and provision of a photographic record on completion.

4.7 Pump House

4.7.1 The Pump House is in relatively poor condition with leaning walls to the south side particularly (see photographs 55 to 58). Provide a method statement for the approach to these works related to condition.

4.7.2 Carefully remove all vegetation and ivy leaving any embedded roots or growth in the wall insitu. Kill with approved biocide.

4.7.3 Subject to further inspection following completion of this work allow to:

- a) Take down all loose brickwork, stacking and storing on pallet with the building. This to include the south wall by a height of 1.0m.
- b) Re-build and use helibar to reinforce the brickwork. Flash head of walls with a 1:3 lime (NHL5) to sand mortar.

4.8 Completion

4.8.1 On completion of works, clear site. Ensure all fencing, barriers, gates etc. and returned to the condition at commencement.

4.8.2 Provide detailed photographic schedule of works completed including cross referenced to site plan for location.

4.8.3 Record on drawing the eventual works undertaken to include any variations agreed.

APPENDIX A

**Photographs
(from February 2022)**



Photograph 1: South range - south facing elevation



Photograph 2: South range tower - south facing elevation



Photograph 3: South range tower - remaining timber roof, as seen from the cherry picker



Photograph 4: West range - east facing elevation at an angle, as seen from the cherry picker



Photograph 5: North range - south facing elevation, as seen from the cherry picker



Photograph 6: East range - west facing elevation at an angle, as seen from the cherry picker



Photograph 7: Loose bricks at timber roof base level - south range tower



Photograph 8: Eroded bricks at upper stage of tower - south range south elevation (south range)



Photograph 9: Vegetation overgrowth throughout the stables and kennels, as seen from cherry picker



Photograph 10: Deteriorated coping stone noted to the east end of the south elevation



Photograph 11: Missing coping stone to the east end of the south elevation (south range)



Photograph 12: Collapsed stone dressings to the south elevation of the south range



Photograph 13: Climbing plants overgrowth to the south range



Photograph 14: Coping tiles from previous works to mitigate water ingress into the masonry fabric (west range - east elevation)



Photograph 15: Embedded timber plates rotten away (north range)



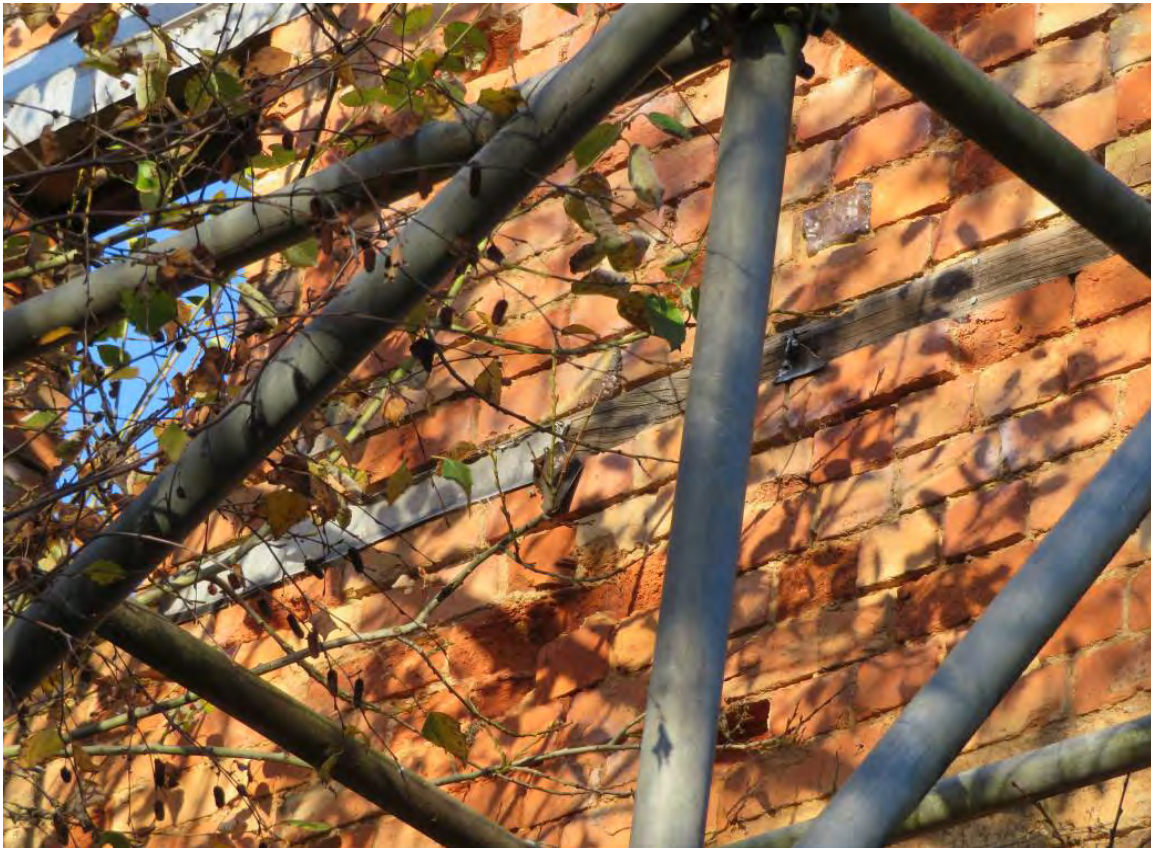
Photograph 16: Former water tank as seen from the cherry picker
(north range - area '10')



Photograph 17: Damaged and loose coping stone at high level (north range - area '10')



Photograph 18: Stepped chimney stack to be inspected from close-level, and to be provided with temporary support, as appropriate (east range)



Photograph 19: High level bonding timbers between areas '2' and '3' (refer to TMP diagrammatic plan) with flashing over to protect



Photograph 20: Surviving slate backing for stables



Photograph 21: Bonding timber acting also as a wall plate providing support to joists. Vulnerable area for the 9 inch cross wall in question.



Photograph 22: Loose bricks and lack of adequate support to the south wall of area '9' (north range)



Photograph 23: Stone steps to tower stair (south range)



Photograph 24: Brickwork behind niche found to be loose in area '4'
(refer to TMP diagrammatic plan)



Photograph 25: Head of chimney Room 4, 4a, 4b and 4c



Photograph 26: Room 3 west wall hole



Photograph 27: Lost head to pediment to east side of Room 3



Photograph 28: South gable of Building 20



Photograph 29: Brickwork to niche to Room 4



Photograph 30: Hole in rear wall of Room 5



Photograph 31: North gable of Room 7



Photograph 32: West wall of Room 9a



Photograph 33: Eroded mortar joints to tower head to Room 10



Photograph 34: Bulged chimney to west elevation to Room 10a



Photograph 35: North gable to Room 11



Photograph 36: Wall head to north gable of Room 11



Photograph 37: Tower to Room 15b



Photograph 38: South gable to Room 18



Photograph 39: South gable to Room 20



Photograph 40:Head of south gable to Room 20



Photograph 41: Cracks over openings towards Room 20c



Photograph 42: Chimney to east side of Rooms 20a and 20b



Photograph 43: Tower roof structure



Photograph 44: Tower roof structure



Photograph 45: Tower roof structure



Photograph 46: Tower roof structure



Photograph 47: Tower roof structure



Photograph 48: Loose timbers, leadwork etc.



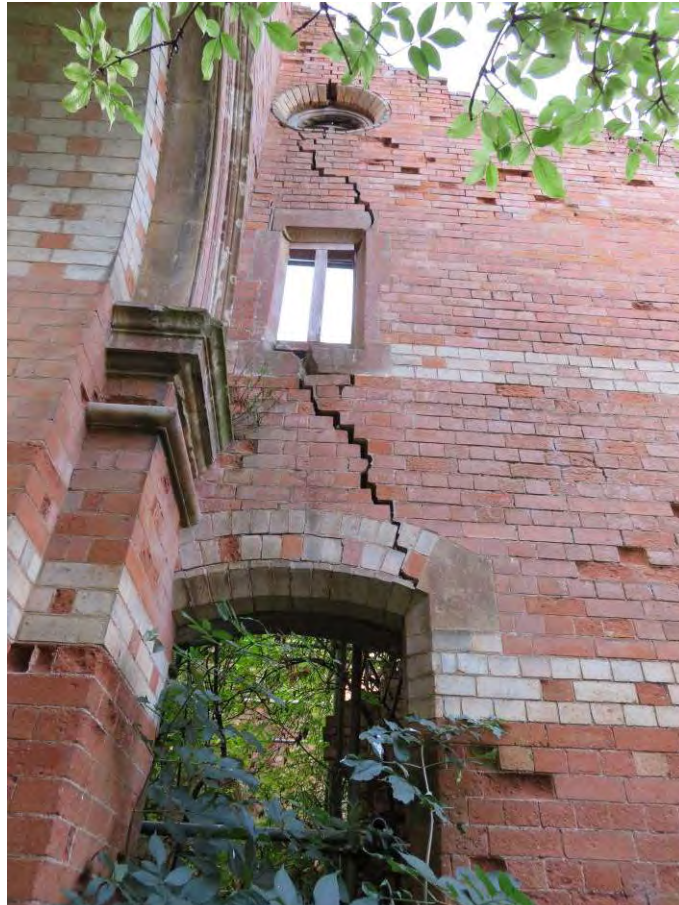
Photograph 49: Head of opening to tower to south side



Photograph 50: Brickwork to head of tower Room 21



Photograph 51: Chimney and wall head to west of Room 22



Photograph 52: Cracks over openings towards Room 22e



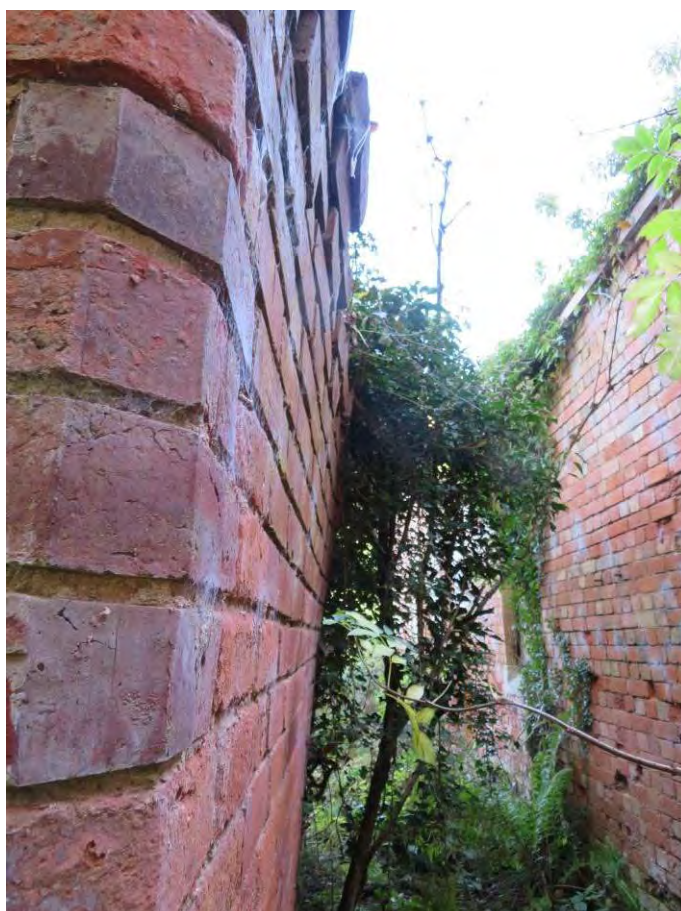
Photograph 53: Head of gable to Room 20 to west side



Photograph 54: Chimney to Room 4 with missing bricks



Photograph 55: Kennels



Photograph 56: Leaning south wall of kennels



Photograph 57: Kennels



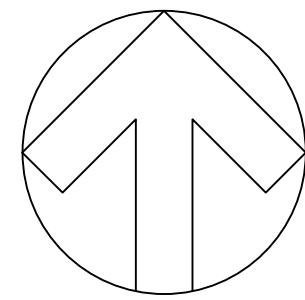
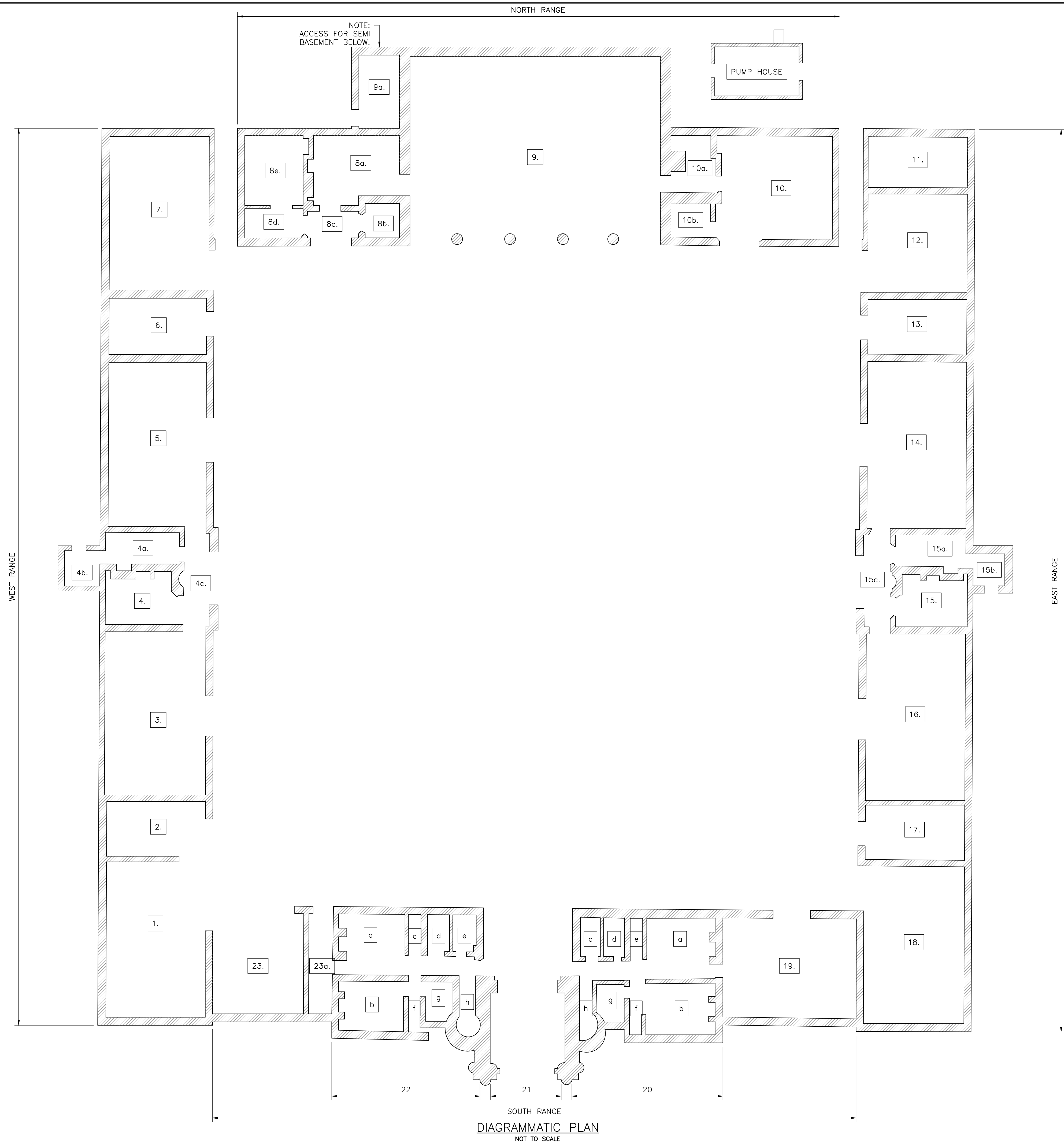
Photograph 58: Kennels brickwork on poor condition



Photograph 59: Manhole

APPENDIX B

Diagrammatic Plans etc.



- NOTES:-
1. ALL DIMENSIONS TO BE CHECKED ON SITE AND NO MEASUREMENTS TO BE SCALED OFF THIS DRAWING.
 2. IN CASE OF ANY DISCREPANCY THE ENGINEERS ARE TO BE NOTIFIED IMMEDIATELY.
 3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECT'S AND SERVICE ENGINEER'S DRAWINGS AND SPECIFICATIONS.

REPORT



OLD TIMBER YARD HOUSE
55 THE TIMBER YARD
DRYSDALE STREET, LONDON N1 6ND
TELEPHONE: 0207 324 7270
EMAIL: london@themortonpartnership.co.uk

BRUNEL HOUSE
NORWICH ROAD
HALESWORTH, SUFFOLK, IP19 8HX
TELEPHONE: 01986 875651
EMAIL: halesworth@themortonpartnership.co.uk

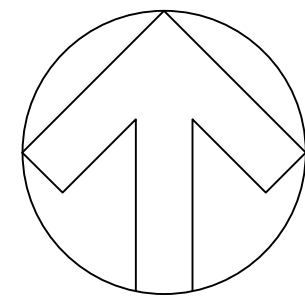
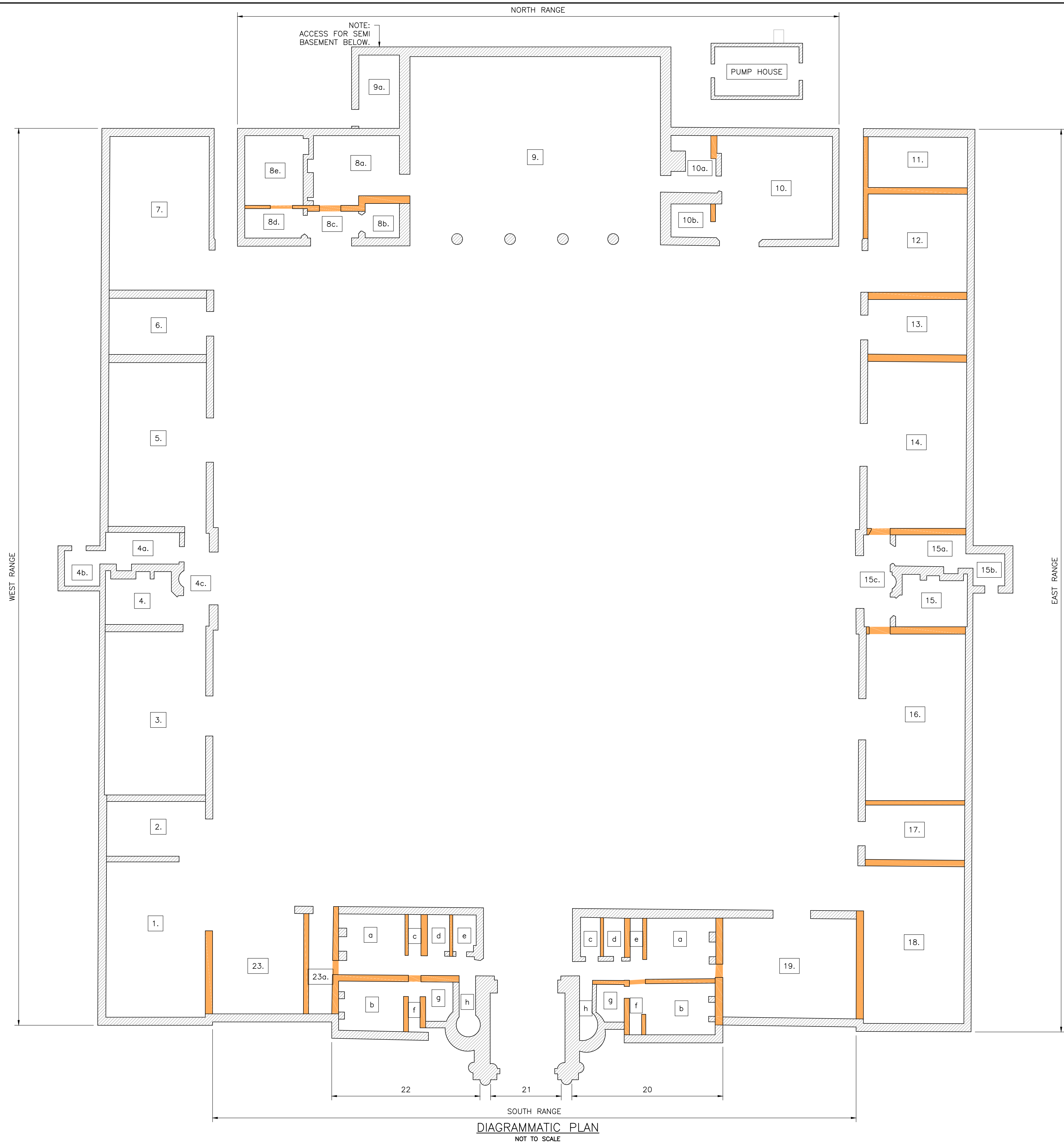
8 CHURCH STREET
COGGESHALL ESSEX CO6 1TU
TELEPHONE: 01376 563883
EMAIL: coggeshall@themortonpartnership.co.uk

PROJECT:
BRADGATE STABLES
GROBY
LEICESTERSHIRE



TITLE:
'OPTIONS APPRAISAL'
DIAGRAMMATIC PLAN
EXISTING

SCALE: NTS (A1) DRAWN BY: MM
DATE: NOVEMBER 2023 CHECKED BY: EJM
DRG No. **22383/01 (REV -)**



- NOTES:-
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REPORT

REPORT ISSUE	EJM	02.11.23
AMENDMENT	CHK	DATE



- ☐ OLD TIMBER YARD HOUSE
55 THE TIMBER YARD
DRYSDALE STREET, LONDON N1 6ND
TELEPHONE: 0207 324 7270
EMAIL: london@themortonpartnership.co.uk
- ☒ BRUNEL HOUSE
NORWICH ROAD
HALESWORTH, SUFFOLK, IP19 8HX
TELEPHONE: 01986 875651
EMAIL: halesworth@themortonpartnership.co.uk
- ☐ 8 CHURCH STREET
COGGESHALL ESSEX CO6 1TU
TELEPHONE: 01376 563883
EMAIL: coggeshall@themortonpartnership.co.uk

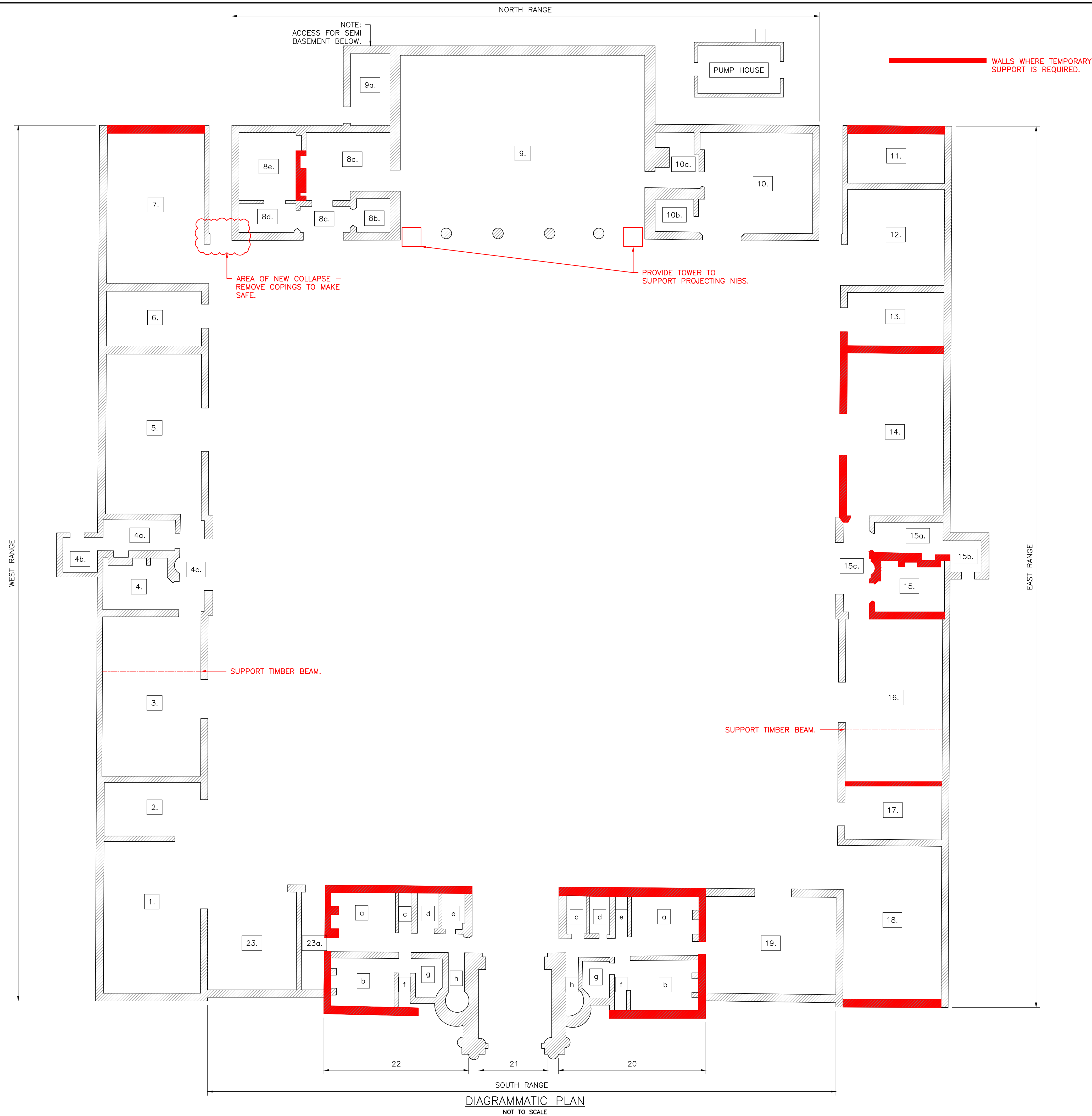
PROJECT:
BRADGATE STABLES
GROBY
LEICESTERSHIRE



TITLE:
'OPTIONS APPRAISAL'
DIAGRAMMATIC PLAN
WALLS WHERE BONDING
TIMBERS TO BE CHECKED

SCALE: NTS (A1) DRAWN BY: MM
DATE: NOVEMBER 2023 CHECKED BY: EJM

DRG No. **22383/02 (REV -)**



NOTES:-

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REPORT

REPORT ISSUE	EJM	02.11.23
AMENDMENT	CHK	DATE

The Morton Partnership
Structural Engineers

☐ OLD TIMBER YARD HOUSE
55 THE TIMBER YARD
DRYSDALE STREET, LONDON N1 6ND
TELEPHONE: 0207 324 7270
EMAIL: london@themortonpartnership.co.uk

☒ BRUNEL HOUSE
NORWICH ROAD
HALESWORTH, SUFFOLK, IP19 8HX
TELEPHONE: 01986 875651
EMAIL: halesworth@themortonpartnership.co.uk

☐ 8 CHURCH STREET
COGGESHALL ESSEX CO6 1TU
TELEPHONE: 01376 563883
EMAIL: coggeshall@themortonpartnership.co.uk

PROJECT:

BRADGATE STABLES
GROBY
LEICESTERSHIRE

TITLE:

'OPTIONS APPRAISAL'
DIAGRAMMATIC PLAN
SHOWING WALLS WHERE
TEMPORARY SUPPORT REQ'D

SCALE: NTS (A1) DRAWN BY: CJS
DATE: NOVEMBER 2023 CHECKED BY: EJM

DRG No. **22383/03 (REV -)**

APPENDIX C

Skillington Report on the Armorial Panel

Stables and Kennels to Bradgate House, Bradgate House, Leicester: Report on the Armorial Panel



Plate 1: General view

February 2022

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Works required as emergency measures	page 19
A longer term strategy	page 17
Estimates	page 22

Introduction

This survey has been commissioned by Ed Morton of The Morton Partnership under an Urgent Works Notice for the Local authority. A site survey was made by Dr David Carrington ACR on the 11th of January 2022 from a cherry picker (provided by The Morton Partnership). Dr Carrington is the sole author of this report and will be referred to in the first person in the text.

The survey brief is for the armorial panel, looking at its present condition, and to advise measures required to minimise the risk of further deterioration in the immediate future (12 months). Longer term conservation requirements are also considered in outline.

The building structure itself is being considered separately by The Morton Partnership and is beyond the scope of this report, although facets which impact directly on the armorial panel are noted.

In the report, when referring to the 'left' or 'right' of a feature I mean the viewer's left or right. Where reference is to the object's left or right – generally in the case of a figure, the term 'proper left' or 'proper right' is used. The terms 'sinister' and 'dexter' are reserved for heraldry.

All photographs are by David Carrington unless stated otherwise.

Estimates for the urgent works are provided at the end of the report.

Bradgate House Stables



Bradgate House was demolished in 1926 but its elaborate stable block still survives, albeit in a ruinous and dilapidated condition. The Stables were built, like the house, on a lavish scale (the bill is thought to have run to £30,000) for the Seventh Earl of Stamford when he was made Master of Quorn Hunt in 1856.

The Stables are listed Grade II* (list number 1361383). The architect was M.J. Dain of Parsons and Dain, a Leicester firm of architects active from the 1840s to about 1870 – although they were Dain and Smith it seems from the later 1850s.¹

¹ [Leicester-Greyfriars-21-St-Martins-History.pdf \(greyfriarsheritage.org.uk\)](https://www.greyfriarsheritage.org.uk/leicester-greyfriars-21-st-martins-history.pdf), accessed 8/2/2022.

Other examples of the use of alabaster externally and its conservation

It is widely accepted that, due to the fact that it is relatively soluble in water, alabaster is not suitable for use externally. Apart from the use here at Bradgate I know of only two other examples in England. One is at St. Mary's church, Tutbury, Staffordshire where it is used in one of the inner orders of the Romanesque west doorway. This dates to about 1160-70 and is widely considered to be the earliest example of alabaster carving in the country², with the earliest use for funeral monuments coming some 160 years or more later, in the 1330s³. Tutbury is documented as an early site of alabaster quarrying⁴, and it is thought that the alabaster use here was very much an experimental 'one-off' exploitation of a locally sourced stone.

The second example is at Elvaston Castle, Derbyshire, where it was used to clad the walls flanking the Golden Gates on the south avenue. Although the gates date to the 18th century they were moved in the mid-19th century, and that is I believe the date of the alabaster cladding. The builder is not known, but the client was the 4th Earl of Harrington who was remodelling the grounds from 1830-60⁵.

One further example is worth a mention. St George's Garrison Chapel, Woolwich has extensive alabaster cladding on the inside of the Chancel, which was left exposed to the elements after the church was left as a roofless ruin as a result of second world war bomb damage.

All three of these examples have undergone conservation work in recent years. The alabaster at Tutbury was conserved by Hirst Conservation in 2018, the works comprising:

Work included further consolidation with nano-line soles⁶, securing of detached alabaster fragments using a spot fixing method with acrylic resin as well as grouting and fine mortar repairs utilising a dispersed lime binder suspended in ethanol and suitable aggregates. The great variation of colours within each individual stone presented a significant challenge and although the intention was not to disguise the areas of repair, our aim was, by using a variety of coloured repair mortars, to achieve a visual balance between areas of repair and the original stone surface. Coloured shelter coats were implemented in areas of shallow loss and micro-fractures and several degraded stones where the original carved surface had been completely lost. This is in order to protect the vulnerable surface and to act as a sacrificial layer.⁷

² Noted as such in, for example, Gardner, A. (1940) *Alabaster tombs of the pre-Reformation period in England*, Cambridge: Cambridge University Press, page 3.

³ Badham, S. (2016) 'The rise to popularity of alabaster for memorialisation in England', *Church Monuments* volume 31 pages 11-67.

⁴ It is documented that in 1374 the alabaster for John of Gaunt's monument in Old St Paul's Cathedral came from here, for example.

⁵ Hartwell, C., Pevsner, N., & Williamson, E. (2016) *The buildings of England: Derbyshire* (revised edition), London: Yale, page 391. See also [GOLDEN GATES AND ATTACHED WALLS AT ELVASTON CASTLE, Elvaston - 1096397 | Historic England](#); noting that the listed building description mistakes the alabaster for marble.

⁶ Copied verbatim. Line is presumably a spelling mistake but I don't know what the soles are. Nano lime would appear to be a curious choice of consolidant for alabaster, although it does sound as though success was achieved here.

⁷ [Tutbury, Priory Church of St Mary, Alabaster Archivolt – Hirst Conservation \(hirst-conservation.com\)](#) accessed 6/2/22.

The alabaster at Elvaston was I believe conserved recently as part of a major building contract but I have no details.

Skillington Workshop carried out the conservation work at Woolwich, where we used acrylic resins as consolidants and plaster of Paris for fills. These are materials not normally used for external repairs, but there is a fabric roof protecting the old interior from direct rainfall and giving some buffering from the elements. I was lead conservator and project manager for the works and argued strongly for protective wax coatings to be applied to the alabaster since condensation and subsequent dissolution of calcium sulphate was identified as an issue, but concerns over maintenance implications and the aging of waxes in an external environment meant that this didn't happen.

The Armorial panel at Bradgate Stables - description



Plate 3

As can be seen from Plate 3, above, the arms, which are of the 7th Earl of Stamford, comprise the shield with the arms to the dexter side of quarterly, 1st and 4th Barry of six argent and azure, 2nd and 3rd three boars' heads sable. To the sinister side is a quarter with a lion's head set against a Barry – I'm not sure of the arms here. The supporters are two unicorns, the helm above with elaborate mantling and the earl's coronet, and below the family motto *À ma puissance*. There are two heraldic crests set above; on the dexter side a wyvern; to the sinister the unicorn passant against the sun in splendour, of the Greys.

These are all of limestone. The source would need confirming by a Geologist but I suspect it is a Bath stone. It is the same stone used for the dressings of the general building features, used there in conjunction with red brick. The background to the arms is, as previously noted, of alabaster ashlar – which can be seen to be at least 90mm thick where and edge is exposed adjacent to the sinister unicorn's proper left hind leg. The ashlar can be seen to be

rebated behind the adjacent brick returns, indicating construction in parallel to the main tower.

There are ten courses of alabaster ashlar, the majority being 305mm high but the top course ('course 1') is 220mm and course 8 is 295mm high. Lengths are random. In the top course there are seven stones with a typical length of 500mm.

Overall dimensions, excluding any rebate, are a height of 2980mm and a width of 2680mm.

There are no positive metal detector readings around the alabaster and I suspect it is just relying on the tight joints and the depth of the blocks to hold it in place. There are numerous (presumably) original small piecing-in indents suggesting that the quality of the alabaster wasn't that good to start with.

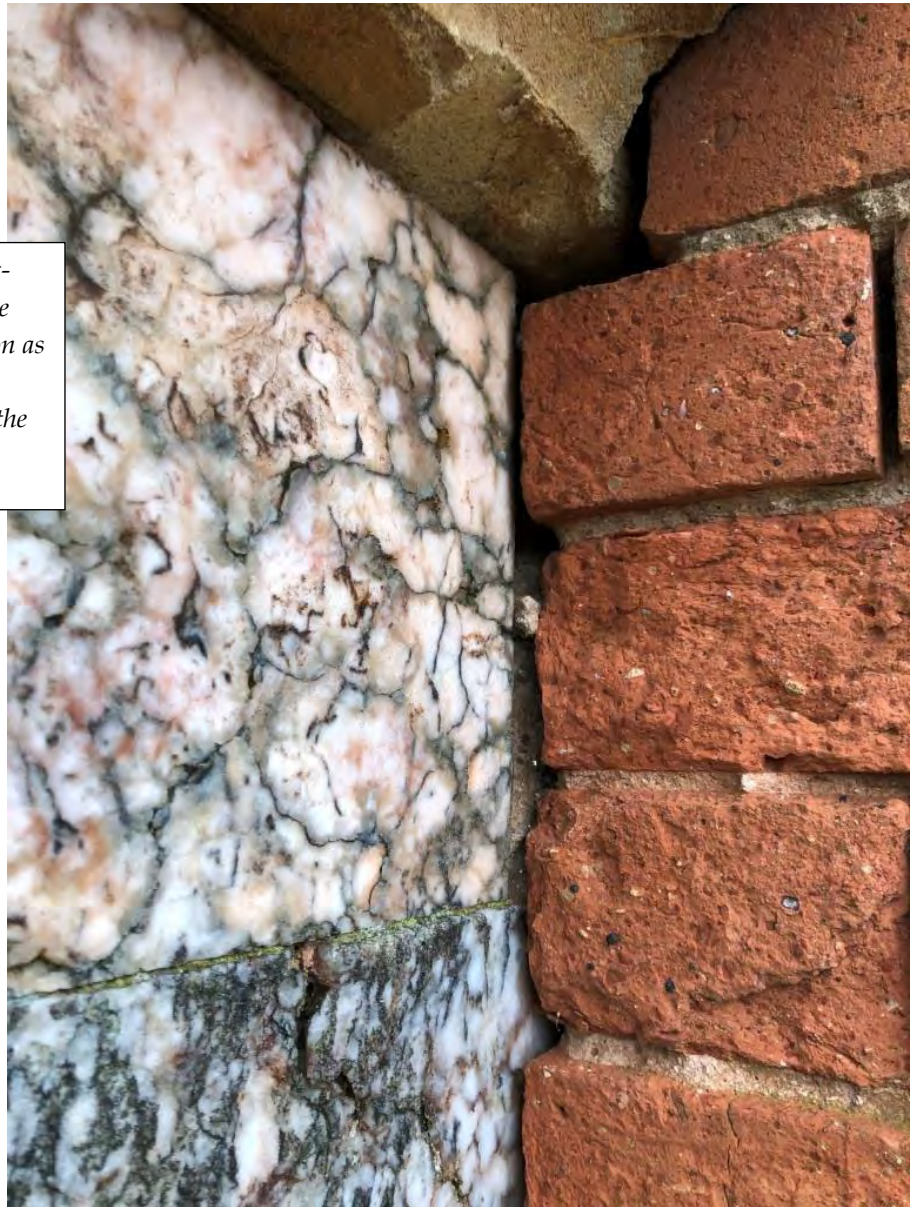
Also of note are the copper alloy wyvern tongue and unicorn horns, neatly made from flat sheet spirally twisted to form the shape. Was there originally a solid core?

No traces of painted colour or gilding were seen.



Plate 4: The upper left-hand corner showing the alabaster rebated behind the brick and the brick and stone interlocking.

Plate 5: The upper right-hand corner showing the interlocking construction as well as the contrast in colours and textures of the materials.



Condition report

Observations in detail about the condition are most easily explained by annotated photographs.

The unicorn and sun crest

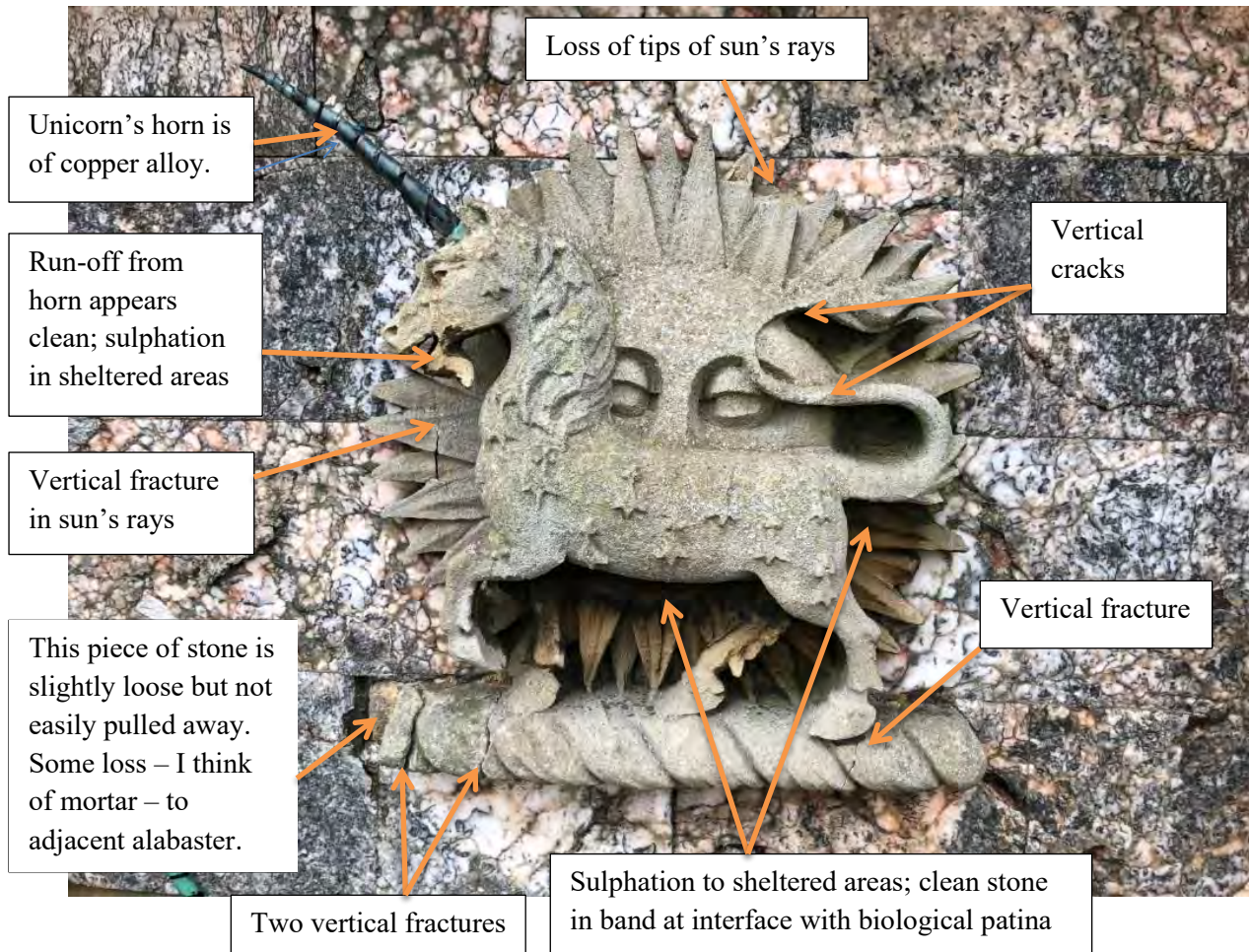


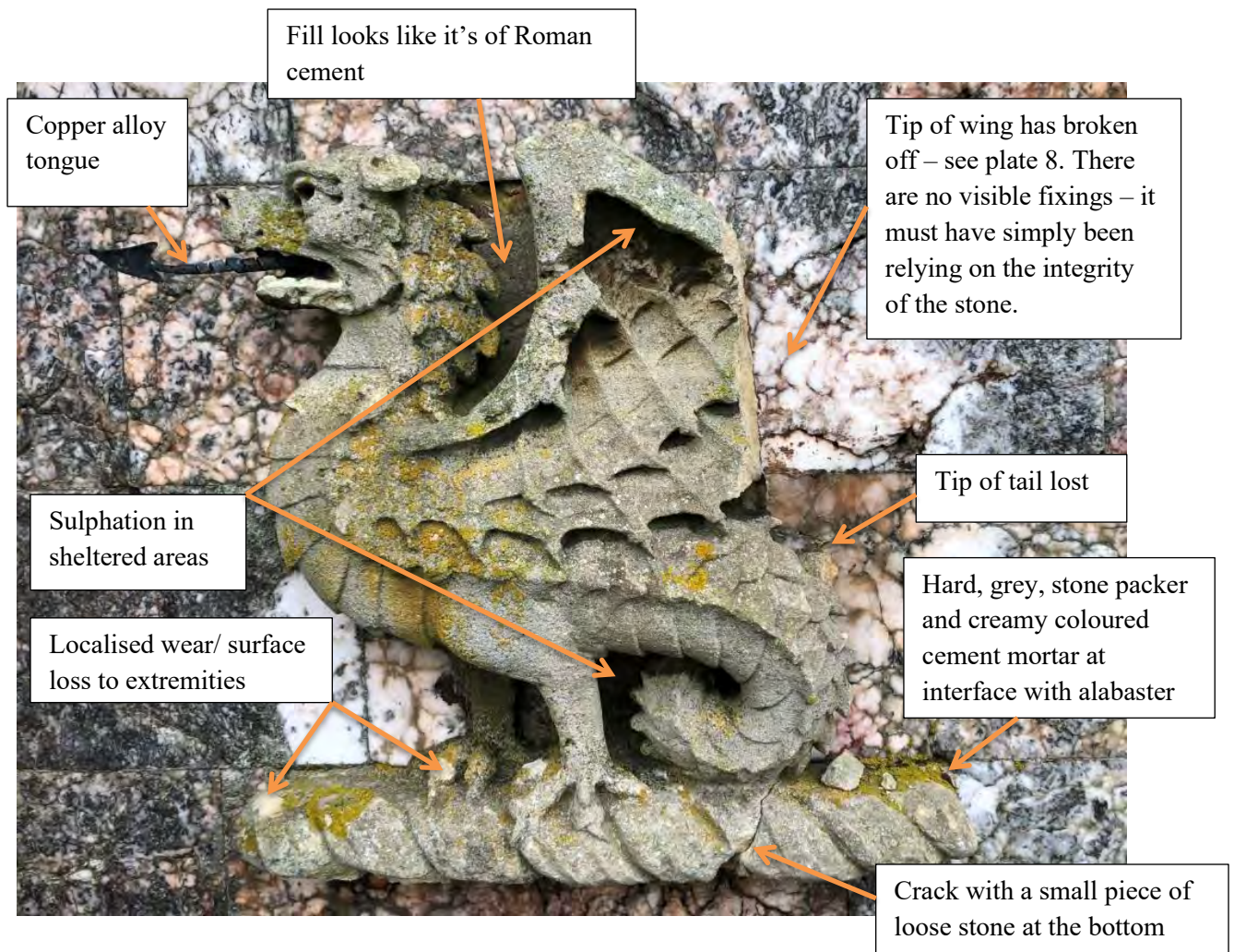
Plate 6: Annotated photo of the unicorn and sun crest.

This feature, looking as if it's made from a single piece of limestone, must have the back of the stone corbelled in the wall behind the alabaster. It is circa 670mm high and 700mm wide.

The weathering pattern is as seen elsewhere on the limestone. Upper areas of stone have developed a relatively benign and stable patina of algae and lichen. Run off from the horn has left a cleaner area (copper has biocidal qualities). Sheltered areas have developed a black 'sulphation' crust – formed of the combination of relatively water-soluble calcium sulphate (formed from the alteration of the calcium carbonate of the limestone in reaction with sulphurous pollutants in the atmosphere) re-depositing in sheltered areas and combining with carbon pollutants. Note that this is the normal pattern, but of course the alabaster forms a ready pool of calcium sulphate which may also be contributing. There is then typically a band of 'clean' stone between the sulphation and the biological patina. Fissures

typically form along weak beds (is this stone laid off bed?) and in exposed and vulnerable areas – here being the tips of the sun’s rays.

The Wyvern crest



The overall size of the exposed stone is 710mm high and 720mm wide.

Plate 7 (above): Annotated photo of the wyvern.



Plate 8: The broken wyvern's wing, found in two pieces in the grass. It was placed on the side of the stonework (the adjacent column base upper ledge) for safe keeping. It is in total circa 250 x 200 x 110mm in size and has residual mortar on the back – presumably original bedding – that looks like Roman cement.

The coronet and helm



Plate 9: The upper surface of the coronet. There is a particularly heavy build-up of lichen here.



Plate 10: Detail from plate 9 showing the tip of the coronet which has become completely detached. This was left in place for safe-keeping.

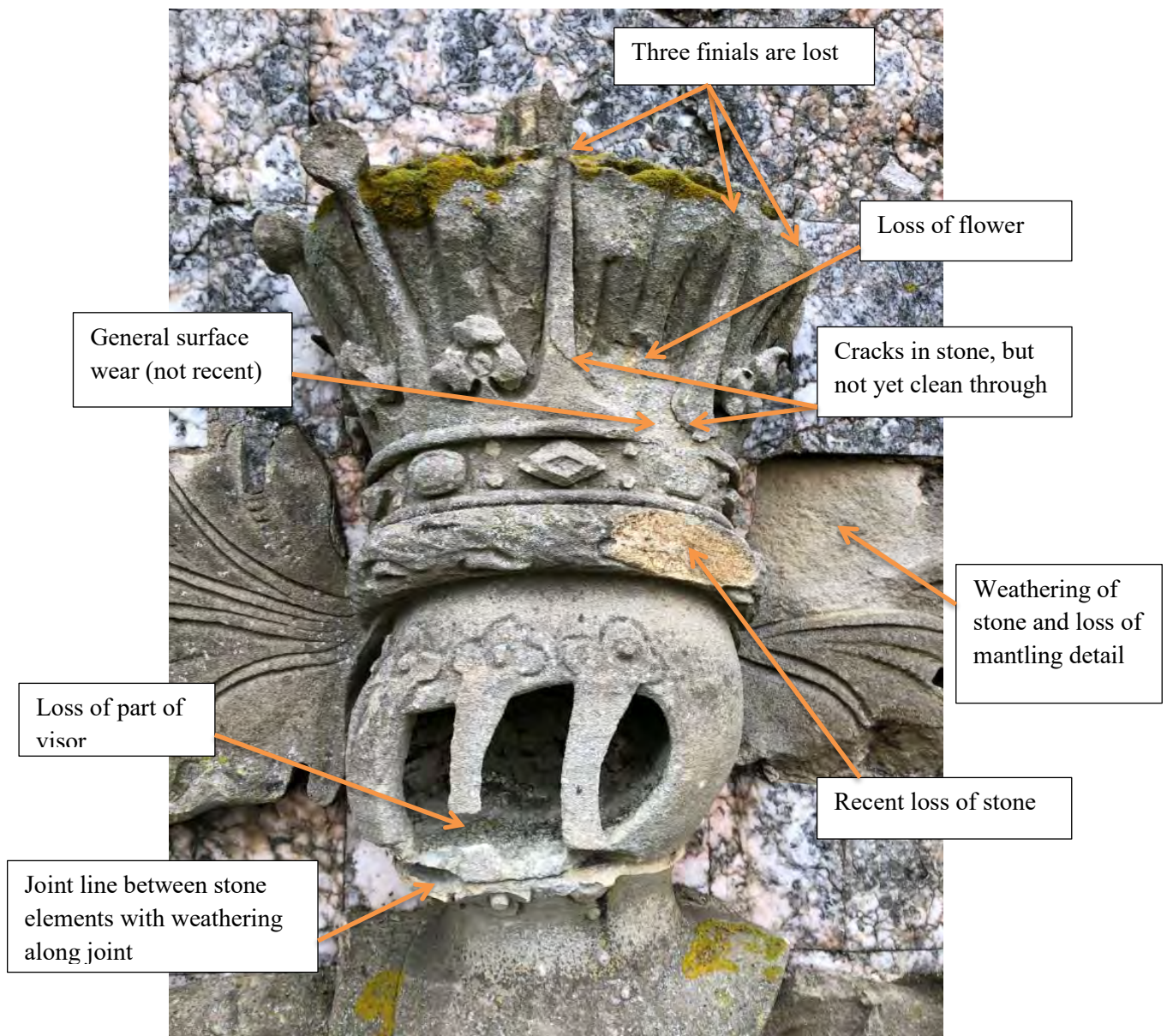


Plate 11: Annotated photograph of the helm.

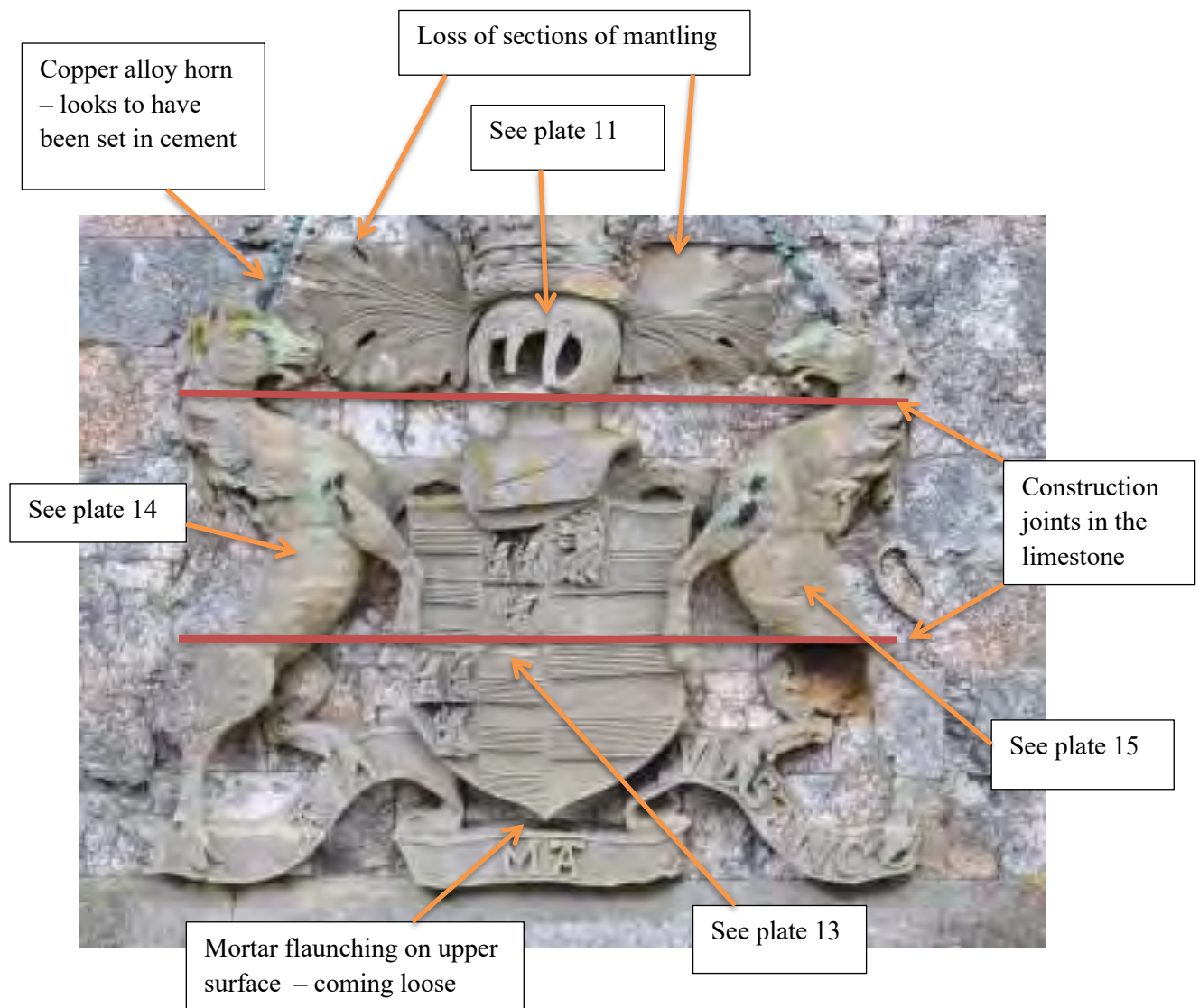


Plate 12 (above): Overview of the main arms.



Plate 13: Detail showing breakdown and recent loss of stone adjacent to the construction joint in the centre of the shield.

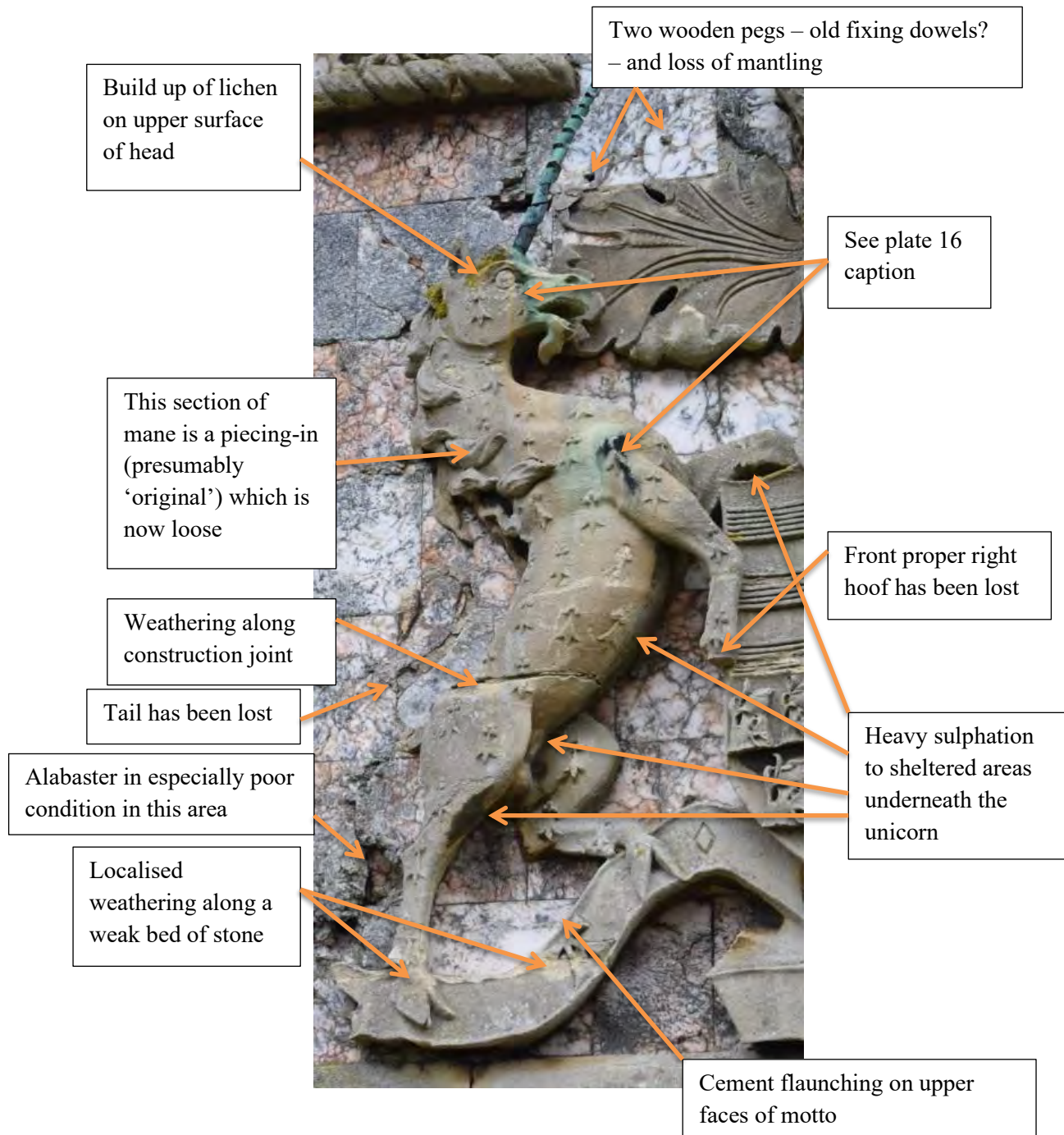


Plate 14: Annotated photograph of the dexter unicorn.

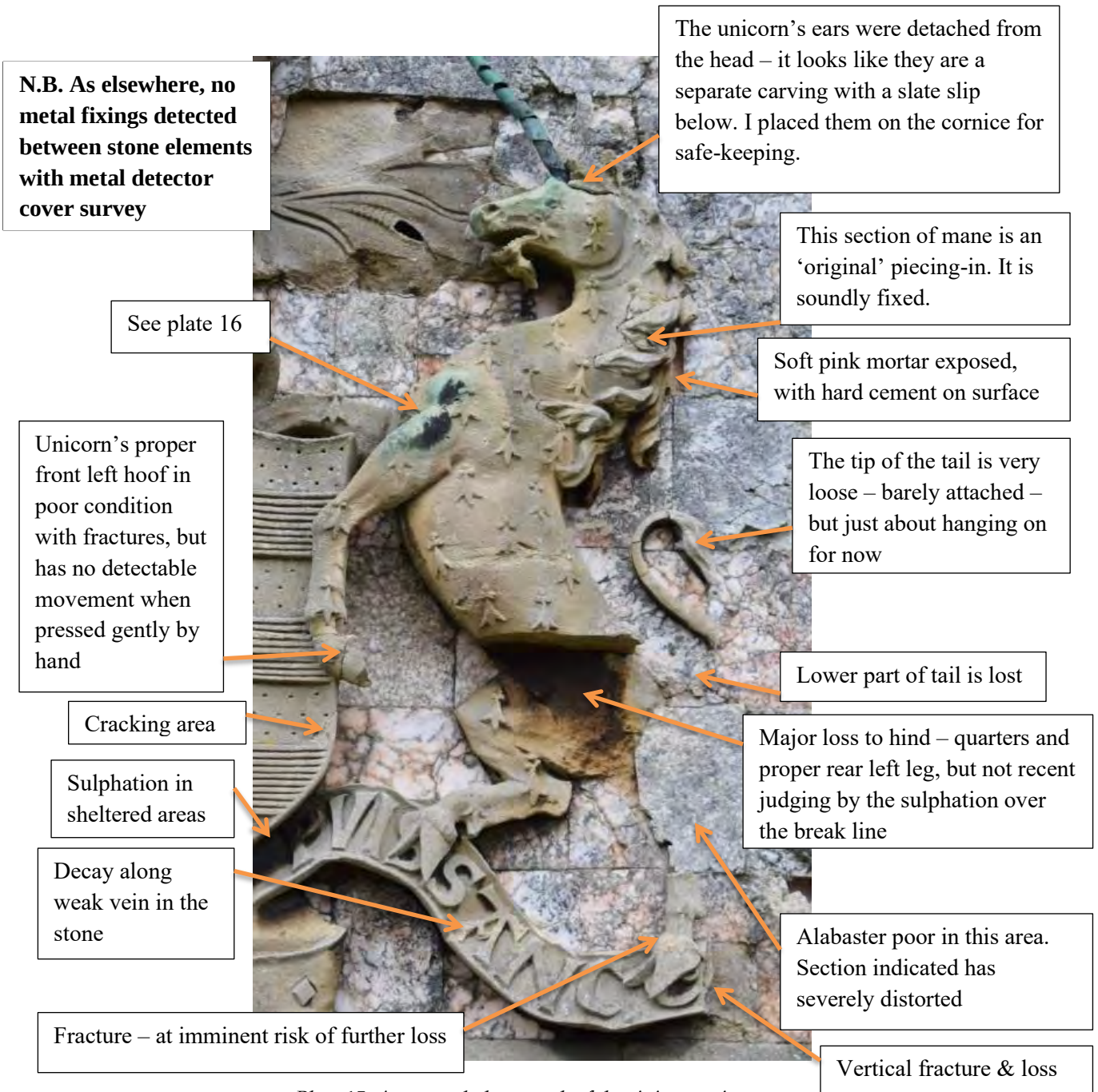


Plate 15: Annotated photograph of the sinister unicorn.



Plate 16: – detail of the sinister unicorn's proper left front leg shoulder showing a curious pattern of staining associated with the copper run-off from the horn. This is also reflected on the dexter unicorn.

The alabaster generally

The alabaster generally has weathered extensively with some areas of extensive loss, lots of darkening of the surface due to biological growth taking hold, and some areas of quite severe surface distortion. However, when subjected to a finger-tip test nothing was found that was so loose it was in imminent danger of falling. The deterioration seems to be more of a gradual process here.

Joints are very tight and what pointing there is seems to be for the most part intact.

Causes of deterioration

Decorative stone features such as this rely to a large degree on the architectural surrounds to provide some protection from the weather. Wind, rain, snow, freeze-thaw cycles, biological growth from algae to woody plants, airborne pollutants, and even warming in the sun can all contribute to deterioration of stone carvings, including in this instance copper alloy embellishments. Builders and designers were on the whole wise to this, and the panel is rebated in the façade for good reason, with the pilasters giving some additional protection to the sides and the projecting masonry above being especially important in its function as a sort of hood.

The good condition of the surrounding masonry is dependent on the functioning of features above to dispose of rainwater from the core – in this case that would be the projecting cornice, the parapets and gables above and their copings, and gutters and downpipes from the roof. All of these have failed to varying degrees – as will be covered by The Morton Partnership’s report – but the issues are perfectly exemplified in plate 17 below. A structural crack has led to open joints in key features with the deterioration of bricks and stone below being abundantly clear. In fact, although the alabaster immediately below at first looks okay, there is a concentration of failure of decorative limestone features below these areas of building defect.



Plate 17: Cracking in the masonry above the panel leading to openings for water penetration.

As has been previously discussed, alabaster is usually considered as inappropriate for exterior use due to its high degree of solubility in water. This, therefore, is arguably a poor choice of building material to start with. It must however have given a stunning effect when new and polished, has actually stood up pretty well on the whole over a period of some 165 years, and the very rarity of its use in this context might be argued as a strong case for efforts to preserve it.

Although the alabaster may not have been a wise choice, it is used in thick units so structurally has a fair amount of resilience. The builders appear to have been wise enough not to use iron cramps between masonry units, and the limestone carved features look (as far as I can judge) to be corbelled back into the wall behind the alabaster.

The main facets of failure to the limestone appear to be surface blistering and disaggregation leading to weathering back; cracks and fissures eventually leading to sections breaking off; and surface soiling (including sulphation).

The blistering and disaggregation looks to be concentrated around areas which look like weaker beds in the original stone, and in some cases – particularly on the upper part of the motto – to especially vulnerable exposed edges of detail. The mechanism is likely to be a combination of dissolution of weaker, possible clay-rich, beds in the natural stone and the recrystallisation (and expansion) of soluble salts – especially calcium sulphate – in the stone matrix, in conjunction with natural weathering agents. Note that the exposure of the alabaster to excessive water penetration may be contributory to this, as well as contributory to the areas of sulphation build-up.

The cracks appear to be concentrated around more exposed features and are likely to have been caused by a combination of freeze-thaw action in existing fine fissures and by thermal stresses, with wind ultimately causing the weakened pieces to fall off.

The surface soiling is a natural process, the sulphation being caused by pollutants (see page 9 for a detailed explanation). Soiling patterns can be symptomatic of weathering agents and at times help with diagnosis of problems, but can also be visually intrusive and aesthetically unpleasant. Some lichens can contribute chemically to stone deterioration (I saw no evidence of this here) and thicker lichen and moss growth can cause issues by retaining water at the surface. Woody plant roots can cause structural disruption. Sulphation can be harmful by creating a pool of sulphates ready for re-dissolving. In this instance, to be frank, where there is so much alabaster surrounding the stone this is probably an irrelevance.

Much of these causes are simply part of natural processes affecting ornate stonework in the outdoor environment. In normal circumstances regular and good maintenance of the building generally helps to reduce the impact of the outdoor environment; and periodic inspections and light-touch remedial works serve to ‘nip in the bud’ most facets of decay. Neither of these have occurred here for many years and that is a major cause of the poor condition of the armorial panel today.

The copper alloy horns and tongue appear okay at present, but may have lost an original ‘core’ and have surface corrosion. It is not known what their originally intended appearance was. They might even have been gilt.

Works required as emergency measures

These are the minimum works necessary to stabilise the Armorial Panel for 12 months.

The alabaster

There are many aspects of the armorial panel which are at risk of further loss in the short-term. Despite the unsuitability of alabaster for external use – and the fact that the surface generally has lost its polish, is affected by biological staining, and has numerous areas of pitting, loss and distortion, this seems generally to be a slow and progressive process. The thickness of the panels gives them some protection, and none of the ashlar was found to be at great risk of failure. Works required to the alabaster are therefore medium term and beyond an emergency repair that would be necessary as a holding action for the next 12 months.

The limestone carvings

The limestone carving is a different matter. I am concerned that small pieces which are already detached, including the Wyvern's wing, the sinister unicorn bearer's ears, and the finial to the coronet will be further damaged or lost altogether if action is not taken.

I therefore advise that these pieces are re-fixed in place using a combination of lime bedding mortar (based in a lime putty (or 'hot lime') binder with suitable sands/aggregates) and 316 grade stainless steel pins set in Hilti HY polyester resin. The pins are to be set in hidden surfaces, the size, location and number to be determined by the conservators on site.

I've identified other areas which are very vulnerable and already loose but not easily removed for safe-keeping. These could easily become detached over the next 12 months. At greatest risk are:

- The rays of the 'sun in splendour' and the base of the unicorn and sun crest (see plate 6)
- The base of the Wyvern Crest (see plate 7)
- A section of mane on the dexter unicorn bearer (see plate 14)
- The tip of the tail to the sinister unicorn bearer (see plate 15)
- The proper left rear leg of the sinister unicorn bearer (see plate 15)
- The right vertical edge of the shield (see plate 15)

Where stone has started weathering back and there is fresh surface exposed it will deteriorate further over 12 months. Recommended remedial action is to make lime mortar repairs that will both provide a protective 'cap' and help to shed water. These should be closely matched to the stone colour and texture as far as is practical, and may either be based in a lime putty (or 'hot lime') binder or an NHL2 lime depending on the time of year being carried out and the access available. Such areas include:

- Parts of the helm (see plate 11)
- Adjacent to the construction joint in the centre of the shield (see plate 13)

- As above, on the dexter unicorn bearer, and to the motto (see plate 14)
- Bits of the motto below the sinister unicorn bearer (see plate 15)

A temporary screen and/or facing up?

The possibility of some kind of temporary screen, or cage effectively, around the panel was discussed during the preparation of this report – the idea being that any more pieces that fall off would be caught and retained behind the screen. I have a number of concerns about this. Given the size of the panel – approximately 3m high and 2.6m wide – it would need a pretty substantial frame, and to make its removal (eg for emergency repairs) quite difficult other than from a fixed tube and fitting scaffold unless a modular system was designed – meaning a more involved frame. The mesh would have to be quite fine if the smaller pieces at risk of falling were to be kept in place – and I don't think there are any particularly large pieces at imminent risk of falling off. A finer mesh (eg. 20mm) might then start to impact upon the microclimate and could even end up trapping snow in place for longer than if it wasn't there. I don't believe that a screen is necessary as part of the 12 months measures as long as the emergency re-fixing, stabilisation and mortar repairs I have described are carried out, in conjunction with measures to reduce water penetration from above.

It has also been suggested that some kind of facing up might be a short-term solution. In some situations this might be applicable, although the adhesive to be used is not straightforward. Paraloid (B72) or a similar acrylic resin had been suggested, but these don't work well in damp environments and can have a relatively low glass transition temperature such that they could become tacky on a hot summer's day – this is why these materials are not used outside of a strictly controlled museum environment in India, for example. Conservation grade PVA is a better adhesive in this context, but there are issues with creating an impermeable skin and trapping moisture behind, which could in itself be detrimental. Given that the alabaster ashlar, although in poor condition, is less of a concern over the next 12 months than the limestone carvings advise that this isn't an appropriate treatment here and that we stick with the emergency re-fixing, stabilisation and mortar repairs previously described, combined with weathering protection above.

Preventing water penetration from above

This is important, and basically means retaining the functionality of the masonry forming the top part of the 'frame'. This could be done by tackling the cornice above and by tackling the wall head. This is really part of the wider building stabilisation works and I haven't given the detail too much thought but I should think that – as a temporary measure – some kind of heavy duty sheet (synthetic rubber mat or even heavy gauge plastic) could be set in the joint above the cornice and weighed down with sandbags. The open joint in the brickwork will need filling to stop water getting in, which could be done by plugging (eg with wire mesh or packing tiles and slate slips into the joints into then pointing up with hydraulic lime mortar. This won't address all avenues of water penetration (eg from behind) and will fail if there is further opening up, but should suffice for 12 months or so.

A longer term strategy

In the longer term the surrounding building fabric needs repairing properly to prevent water ingress, and there may be merit in introducing a lead cover to the cornice above, with a drip on the front lip.

To the Armorial Panel itself I suggest a programme involving:

- Tube and fitting scaffold access, sheeted in with a temporary roof.
- Cleaning both alabaster and limestone, methods subject to trials.
- Analysis of historic finishes to copper allow components and evidence of original core material. Conservation treatment guided by that.
- Fills to alabaster to prevent water ingress, using a palette of coloured lime mortars.
- Pointing generally isn't much of an issue because the joints are incredibly tight, but any open joints (including around the edge at the interface with the brickwork) should be filled with suitable lime mortars.
- Consideration of finishing the alabaster with a microcrystalline wax coating.
- Conservation of friable limestone and making good small losses using lime-based techniques.
- Potentially restoring remaining losses (such as unicorn tails) by piecing in using stone.
- Potentially lime shelter-coating the limestone.
- Providing a treatment record.

In addition a schedule of periodic inspections (possibly every 3 or 5 years) should be instituted, with the anticipation that every 10-15 years some minor remedial works may be required.

Estimates

For the emergency works:

For the emergency re-fixing, stabilisation and mortar repairs as described on pages 19-20, carried out over three days working from a cherry picker: £1,350.00

Provision of a cherry picker and operator for 3 days, based on previously quoted price from Turner Hire plus 10% OHP: £2,780.00

For the temporary works to the masonry above, as described on page 20, over 2 days: £980.00

Provision of a cherry picker and operator for 2 days, based on previously quoted price from Turner Hire plus 10% OHP: £1,850.00

Giving a total of **£6,960.00 plus VAT**.

Provision of portaloos or mobile welfare unit not allowed for here.

All prices are subject to VAT and are given exclusive of any main contractor mark-up or discount.

All prices remain valid for 12 months and are strictly subject to payment within 30 days of monthly valuations.

For the longer term works:

Budget figures only:

Tube and fitting scaffold access: £7,500.00

Cleaning, repairs, mortarwork, wax to alabaster,
works to copper alloy, and treatment record: £14,000.00

Restoration of lost parts, in stone: £3,000.00

Preliminaries including welfare, fencing etc: £1,500.00

Giving a total budget cost of £26,000.00 plus VAT, excluding works to the wider building fabric and excluding a future maintenance regime.

Dr David Carrington ACR FSA
Skillington Workshop Ltd

9th February 2022