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Wentworth Castle

Plaster Ceiling Survey

02/08/2024

Rev 0.2: Initial Draft

Version Control Table

Version Number	Purpose/Change	Author	Date
0.0	Initial draft – for internal approval	Bethanie Zucker	27/03/2024
0.1 0.2	Initial draft following internal review and alterations (Note, several versions may be generated at this stage).	B Zucker E Hirst	19/07/2024 22/07/2024
1.0	Consultation draft – to client	E Hirst, K Langton, H McDonnell- Woods	08/08/2024
1.1	Client comments		
2.0	Final Report		
2.1	Any further revisions noted here		

Document Summary

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Name and address of client	Northern College for Adults, Wentworth Castle, Barnsley S75 3ET
Name and address of Architect	Storah Architecture Ltd. 46 Halifax Road, Todmorden OL14 5QG
Site Assessment by:	Elizabeth Hirst, Tim Pretty, Bethanie Zucker 25th – 26th March 2024. Tim Pretty 13th May 2024. Keith Langton 27th June 2024. K Langton, Harry McDonnell-Woods 06/08/2024
Author of report:	Bethanie Zucker, E Hirst, H McDonnell-Woods

Executive Summary

This survey assesses the plaster ceilings in fifteen rooms at Wentworth Castle which exhibited varying degrees of observed damage over four survey inspections of the ceilings. The ceilings were all inspected visually from ground level and tactile inspection conducted by push test were employed where reach was accessible. Multiple ceilings were inspected from their upper side where access and visibility were possible. The first survey resulted in the main body of information found below while subsequent visits offered more visibility to the upper side of select rooms where access was later made available and where damage was suspected.

Observation of the upper sides of the Blue Room, Queen Anne 3, and Principal's Office ceilings all provided evidence of previous interventive schemes, in some instances reflecting numerous interventive schemes over multiple periods of time evidenced by the variety and type of materials used. In accordance with the structural engineer and architect present on site, fixing methods were designed for areas of loose timber found in the upper side of the Blue Room ceiling, which can be inserted while the upper side of the ceiling is currently accessible, to aid in the support of the inserted structural elements which were found. Observation of the Upper Side of the Queen Anne Suite 3 ceiling revealed the ceiling to be unstable and in danger of collapse or loss and requires urgent interventive stabilization methods which are discussed in detail in the findings and fixing methods presented below.

Recommendations and causes for further action and next steps:

Room/Ceiling	Further action Needed
Blue Room, North End Room	Appears stable from underside. Upper side should be observed if access is possible.
Blue Room	Stable. Minor action required to secure loose timber fixings. Preventative securing methods could be employed while access to upper side of ceiling is open to avoid potential future movement.
Queen Anne Suite 1	Appears stable from underside. Upper side should be observed if access is possible.
Queen Anne Suite 2	Appears stable from underside. Upper side should be observed if access is possible.
Queen Anne Suite 3	Unstable and requires urgent consolidation and securing intervention with scaffolding. Room to be closed.
Dining Hall	Out of scope of report but limited inspection suggests it is reasonably stable although further inspection must be desirable.
Italian Staircase	Requires further inspection from the upper side with safe access arrangements.
Long Gallery, North End Room	Upper side should be further inspected
Long Gallery	Upper side should be further inspected
Long Gallery, South End Room	Upper side should be further inspected
Michael Barratt Brown Seminar Room MH/F/15	Upper side should be observed if access is possible.
I.T.C. Teaching Room 1 MH/F/10	Upper side should be observed if access is possible.

I.T.C. Teaching Room 2 MH/F/09	Upper side should be observed if access is possible.
I.T.C. Teaching Room 3 MH/F/07	Some movement was found in the ceiling. Upper side should be observed if access is possible.
Vice Principal R&AS MH/F/06	Upper side should be observed if access is possible.
Principal's Office MH/F/01	Possibly requires stabilization due to lack of adequate nibs.

Contents

1. Introduction

An in-depth survey was undertaken of fifteen plaster ceilings in Wentworth Castle to quantify if any remedial action or repairs were required in areas where concern was addressed. The scope of works at this stage were based on the following brief:

On 25th March 2024 floorboards will be lifted to allow an inspect of the blue room from the upperside where ideally the floorboards would be lifted in an area corresponding to any defect below.

In addition, access into the roof space above the Long Gallery. I understand the fixing restraints are to be certified so trained surveyors can access with harness, including training for working in confined spaces and with detailed RAMS in place. The survey may be hampered by debris and insulation that may require further cleaning out at a later date TBA.

The other rooms will be mapped from ground level and with binoculars for defects (failing coatings, cracks, deformation, etc.). In addition, the condition of the coatings/painted decoration will be considered. This will provide a datum point for conditions at present and allow any future changes to be better understood. It will also highlight where opening up above may be desirable or where borescope investigation from the underside may be needed in the second phase of survey work. We may also need to consider if this complies with the requirements of a listed building.

Tower scaffold to all areas is not planned at this stage although we have allowed for a tower to be provided by us for use in specific areas of concern and include this in our time allocation. We will liaise at the onset regarding the need for any furniture removal.

I will also visit during this first assessment. In addition, it would be very useful if you have any records of previous interventions/repair in the building's records and ideally a copy of these would be useful.

The finding will be collated in a written, photographic, and diagrammatic report together with further recommendations (Hard copy and E-Format).

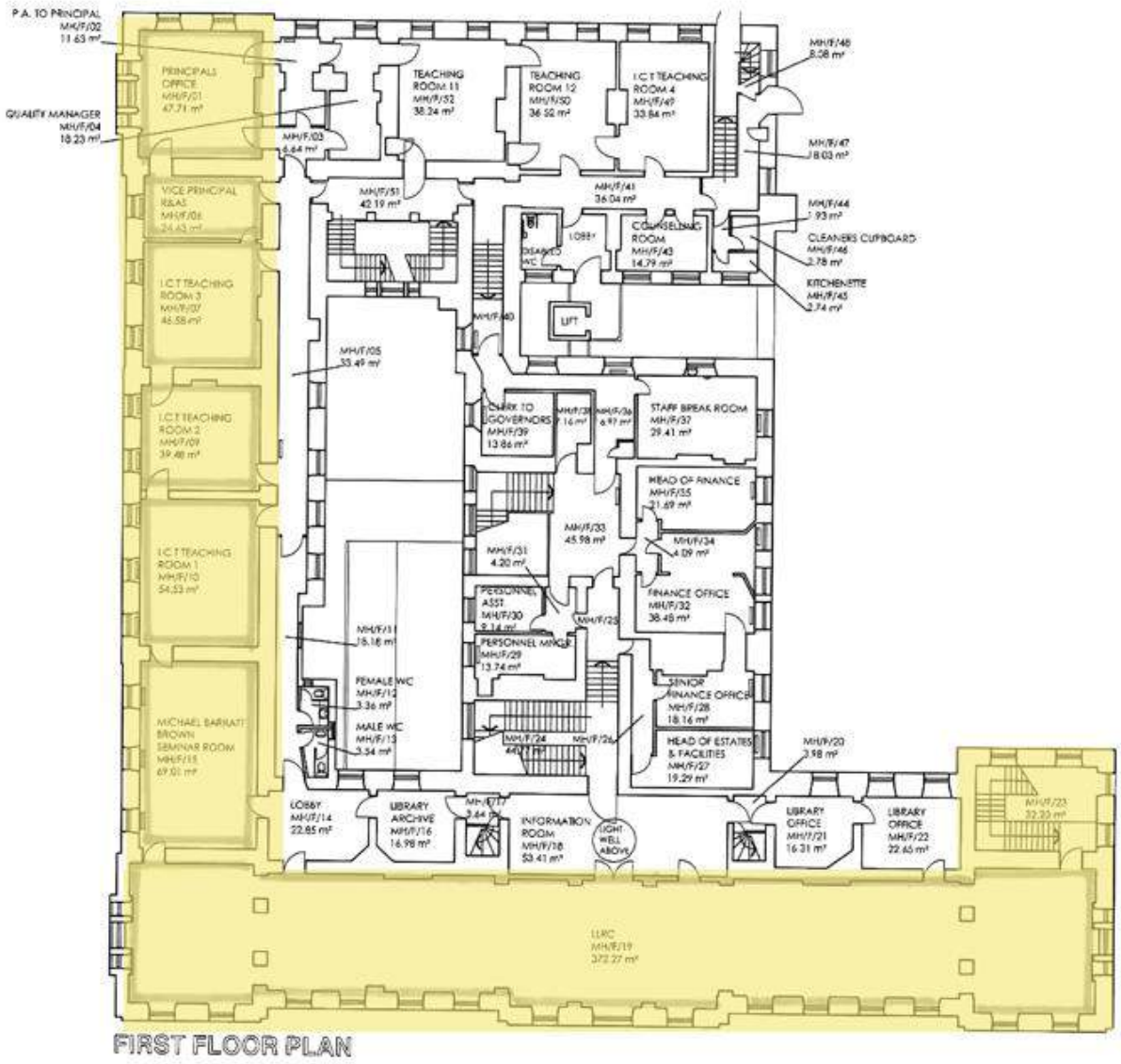
The first survey was undertaken by Elizabeth Hirst, Tim Pretty, and Bethanie Zucker of Hirst Conservation taking place over the 25th – 26th of March 2024. A follow up Survey of the upper side of the Blue Room ceiling, Upper side of Queen Anne Suite 3, and Upper side of Dining Hall was conducted by Tim Pretty on 13th May 2024. A follow up visit by Keith Langton to assess the upper side of the Queen Anne Suite 3 was conducted on 27th June 2024. Further inspection from the roof space over the Long Gallery was undertaken on the 6th August 2024 by Keith Langton assisted by Harry McDonnell-Woods, however access was limited, further inspection will be necessary once access is available.

The survey in each room was conducted by visual inspection from ground level. In select rooms, where reach was accessible, a tactile push survey was conducted. Additionally, the upper side of the ceiling was inspected in multiple rooms where access was granted and inspected in areas where floorboards were lifted. Instances where inspection expanded beyond visual observation are noted in detail in the findings below.

This report presents the findings of the plaster ceiling survey detailed by each room inspected, beginning with ground level rooms followed by the first-floor level rooms. The Long Gallery has been divided into three separate sections to give optimal detail due to its long expanse. Detailed digital

mapping of the defects found on each ceiling follow the discussion of each room. Recommendations for each room follow the discussion of the findings with detailed images of recorded damage. Consolidation methods and fixing options suggested for any recommended repairs can be found in Section 3: Fixing Methods.

Ground level floor plan showing the location of the rooms surveyed: Blue Room North End room, Blue Room, Queen Anne Suite 1, Queen Anne Suite 2, Queen Anne Suite 3.



FIRST FLOOR PLAN

First level floor plan showing the location of the rooms surveyed: Italian Staircase, Long Gallery North End Room, Long Gallery, Long Gallery South End Room, Michael Barratt Brown Seminar Room, I.C.T Teaching Room 1, I.C.T Teaching Room 2, I.C.T Teaching Room 3, Vice Principal R&AS, Principal's Office.

2. Results of Survey

2.1. Blue Room, North End Room

Methods Employed for Survey: visual inspection, tactile push test.

6.7 x 7.7 x 5.7 Height

Figure 1. Location of Blue Room, North End Room

Figure 2. Blue Room, North End Room Ceiling

- The Blue Room, North End Room was found to be in good and stable condition.
- Multiple hairline fractures were noted throughout the ceiling and through the decorative details and cornice (Figure 3).
- There were multiple fractures noted at the junction between the ceiling and mouldings.
- The ceiling was found to be solid and stable from push testing.

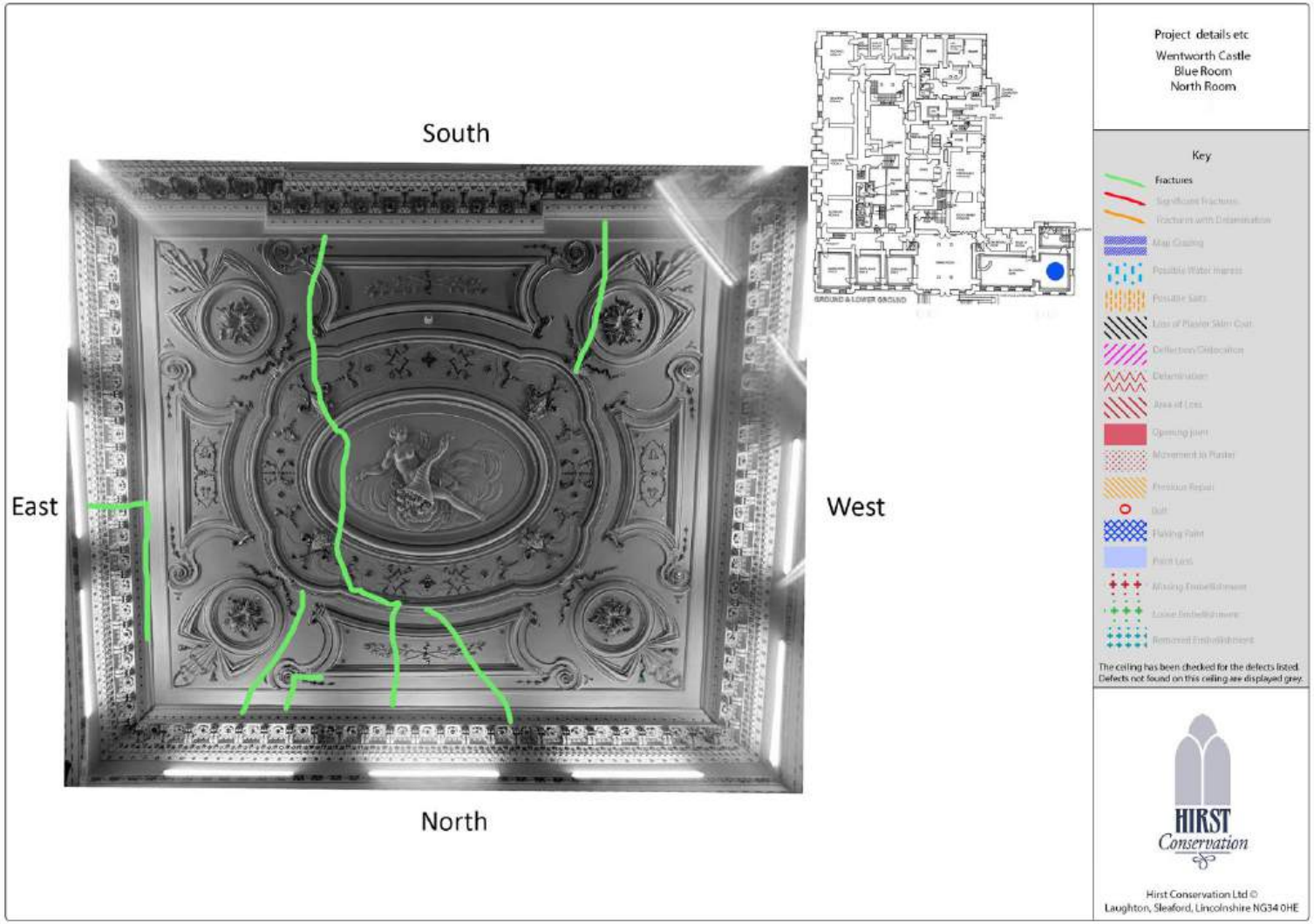
2.1.1. Blue Room, North End Room Recommendations

- The ceiling expanse was found to be in stable condition from observation and tactile testing of the underside.
- If possible, observation of the upper side of the ceiling is recommended to ensure stability of the ceiling and its composing elements.

2.1.2. Blue Room, North End Room Images

Figure 3. Image of hairline fracture running through the decorative plaster ceiling.

2.1.3. Blue Room, North End Room Defect Diagram



2.2. Blue Room

Methods Employed for Survey: visual inspection, tactile push test, in-depth inspection of multiple sections of the upper side of ceiling. 6.3 x 12 x 5.6 Height.

Figure 4. Location of Blue Room.

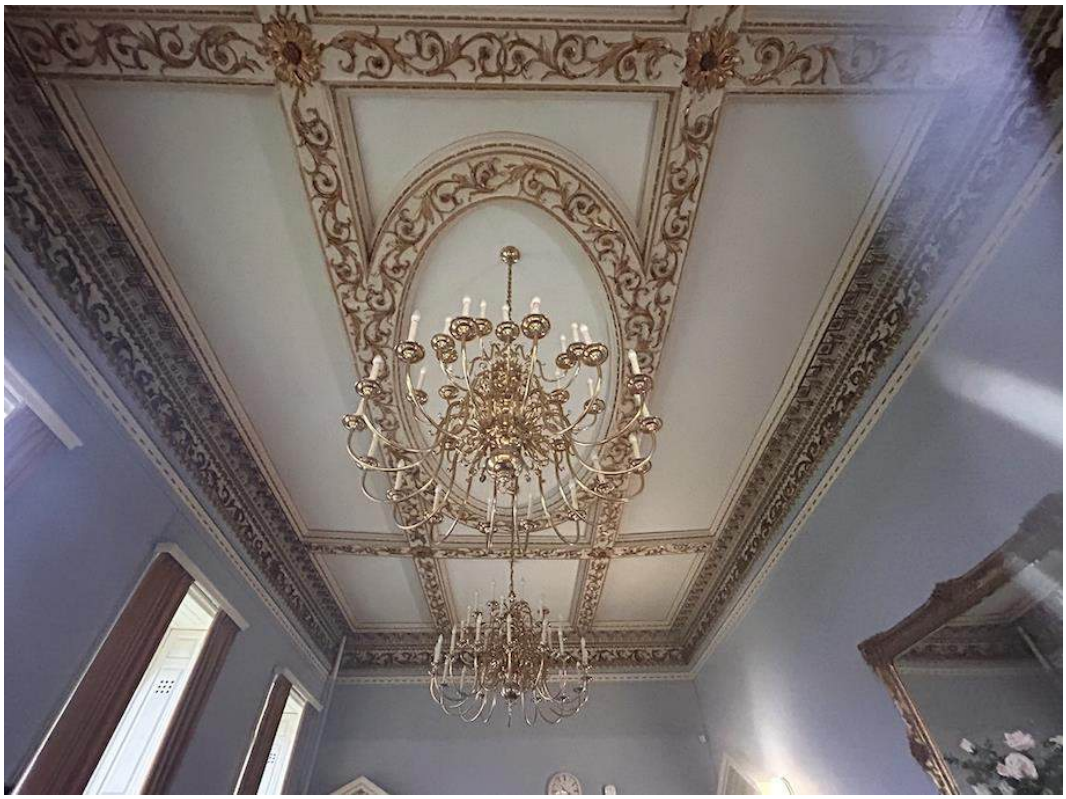


Figure 5. Blue Room Decorative Plaster Ceiling.

2.2.1. Underside of Blue Room Ceiling

- The full ceiling exhibited evidence of displacement, observed as bowing from East to West along the full expanse of the ceiling (Figure 6).
- Bowing and displacement were noted on the West facing wall's cornice from North to South (Figure 7).
- Multiple hairline fractures were noted throughout the plaster, decorative elements, and cornice (Figure 8).
- Hairline fractures were noted on multiple enrichments; however, these may have been deliberate cuts created for the historic stabilization work on the upper ceiling (Figure 9).
- Multiple hairline fractures were noted along the enriched decorative beams in equally spaced sequences. These also appeared to be deliberate cuts which could have been from the previous stabilization work to the upper side of the ceiling. Evidence supporting the insertion of deliberate cuts is aided by the visible presence of multiple bolts found between each fractured section. (Figure 11). These were found mirrored on both the East and West ends of the central decorative oval (Figure 12). These bolts match to the stabilization bolts viewed from the upper ceiling (Figure 13).
- Multiple minor areas of loss and minor cracking and flaking were noted throughout the ceiling (Figure 14).

2.2.2. Underside of Blue Room Ceiling Images

Figure 6. Ceiling bowing from East to West, visible on the beam.

Figure 7. Bowing noted on West wall cornice.

Figure 8. Hairline fractures noted throughout the ceiling.

Figure 9. Fracture which could be a deliberate cut noted on multiple enrichments.

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Figure 10. Equally spaced fractures which could be deliberate cuts from upper ceiling stabilization work.

Figure 11. Bolts visible give evidence on the underside ceiling of the stabilization methods which occurred on the upper side of the ceiling.

Figure 12. Equally spaced fractured mirrored on East and West sides of the central decorative oval.

Figure 13. Bolts visible from the upper side of the ceiling matching the location of the bolts visible on the underside of the ceiling.

Figure 14. Minor delamination of skim coat and loss visible surrounding the enrichment.

2.2.3. Upper Side of Blue Room Ceiling

- The upper side of the ceiling was assessed visually from expanses of lifted floorboards (Figure 15).
- The inspection revealed multiple materials added historically to structurally stabilize the Blue Room ceiling. These materials include steel beams, plasterboard, bolts, and bat straps.
- Pugging was noted only around the perimeter of the upper ceiling corresponding with the cornice below. It is possible that the pugging only extended 750 – 800 mm from the wall (Figure 16).
- Nibs and Laths were overall found to be in good condition (Figure 17).
- It appears that there were two major phases of renovation historically to the Blue Room ceiling. This is evidenced by red coloured inserted steel beams running East to West (Figure 17) and grey coated steel beams of a later manufacture found inserted running North to South (Figure 18). The later grey coated beams have bat straps attached which are fixed to the plaster ceiling below. Earlier steels were also found affixed in a support system for the remaining original timber beams (Figure 19).
- It is possible that these interventions resulted from the collapse or partial collapse of the blue room ceiling and the subsequent repair resulted in the bowing and displacement visually observed from the underside of the ceiling.
- The wooden beams and joists are original to the ceiling and it appears that the later steel beams were inserted to give additional structural support to the failing timber beams (Figures 20 & 21). Steel beams were also found where timber beams were missing (Figure 22). These inserted steels could have possibly replaced a rotten or failing original timber beam. The earliest inserted steel beams were found running above the timber beams (Figure 23).
- It is possible that the underside ceiling appears to be bowing due to the stabilization methods employed above which could have suspended the sagging of the plaster ceiling and held it in place. The plaster ceiling below could therefore be stopped from any further displacement yet was stabilized at the level of displacement found when the interventions occurred, resulting in the current visible condition of the ceiling.
- The fractures and bolts which were visible from the underside of the ceiling give evidence that sections of plasterwork were removed to allow the fitting of the main steels, which run East to West. The plaster was then refixed and screwed in place using bolts. The deflection in the ceiling also therefore corresponds with the placement of the replaced beams above (Figure 22) and could have been caused by the loss and rotting of the original structural elements.
- The floor structure is separate from the plaster ceiling below. The only connection between the plaster ceiling and the upper room's floor structure are bat straps and the later intervention bolts. New timbers were found to be attached to the steel beams with bat straps attached to the joists. (Figure 18). Therefore, the floor is free floating above the ceiling structure and it appears that the steel beams are taking the majority of the weight of the floor, therefore bearing no weight on the plaster ceiling below. The previous stabilization works to the upper side of the ceiling may have arrested the plaster ceiling from dropping any further but did not return the plaster ceiling from its slightly bowed and deflected state.
- The apparent cracks seen on the plaster ceiling below could be at the junction between the laths and plaster and plasterboard all present in the upper side of the ceiling.

A second survey of the upper side of the Blue Room ceiling was conducted by Tim Pretty on 13th May, 2024. The findings are as follows:

- A number of splits/shakes were seen within the main beam to the west side. Replacement floor joists are evident in some areas with additional support blocks fitted under the ends of original retained joists.
- It is clear that there has been deflection of the main beams as many of the floor joists have been chocked and raised above the top of the beams presumably to level the floor. In addition, steel strengthening plates and bolts could be seen at the north end of the western main beam. It was not possible to view the eastern beam as floorboards remained in place.
- Frass and worm holes were seen in isolated areas and Mark Barrett and Richard Storah were notified of this.
- In the areas that could be seen plaster nibs/keys were clearly evident and found to be intact and robust when subjected to tactile examination. The laths appear to be in good condition and only isolated ones were springing. The laths appear to be well fixed to the joists and no opening up below the joists was seen. There is a slight build-up of general detritus comprising wood shavings, sawdust, and small off cuts of timber on the upper side presumably as a result of previous remedial works.
- Pugging was not found to be present except on the perimeter of the upper side of the ceiling.

2.2.4. Blue Room Recommendations

- The Blue Room plaster ceiling appears to be sound and stable due to the previous interventive stabilizing works which took place to the upper floor.
- From the information gathered to date, no areas observed were found to be of immediate concern regarding stability. However, please note that not all areas of the ceiling could be assessed as only a limited number of floorboards had been lifted.
- While the opportunity of access is available with the upper room cleared and floorboards lifted, any desired extra support could be added as a preventative conservation method. Extra support could be provided by adding additional strapping between the plaster ceiling and floor structure above. Additional added support could aid in preventing future movement of the plaster ceiling.
- Extra support to the two timber joists which were found to be loose during the survey was recommended on site and a plan was devised with the architect for design and placement of the added support (Figure 24).
- It is recommended that the close consultation with the structural engineer is conducted to inform the best course of action for any additional stabilization requirements or plans.

2.2.5. Upper Side of Blue room Ceiling Images

Figure 15. Access to upper side of the ceiling was provided by expanses of the floorboards being lifted.

Figure 16. Pugging extending only partially over the edges of the ceiling.

Figure 17. Close up of nibs and laths.

Figure 17. Red coloured steel beams running East to West give evidence of the first major intervention to the ceiling's structural stability.

Figure 18. Later steel beam gives evidence of a second phase of intervention and stabilization. Bat straps are attached, connecting the plaster ceiling to the structural repairs above.

Figure 19. Earlier steels shown supporting timber beam with grey coated beams inserted parallel to the timber beams.

Figure 20. Timber beam supported by steels on either side.

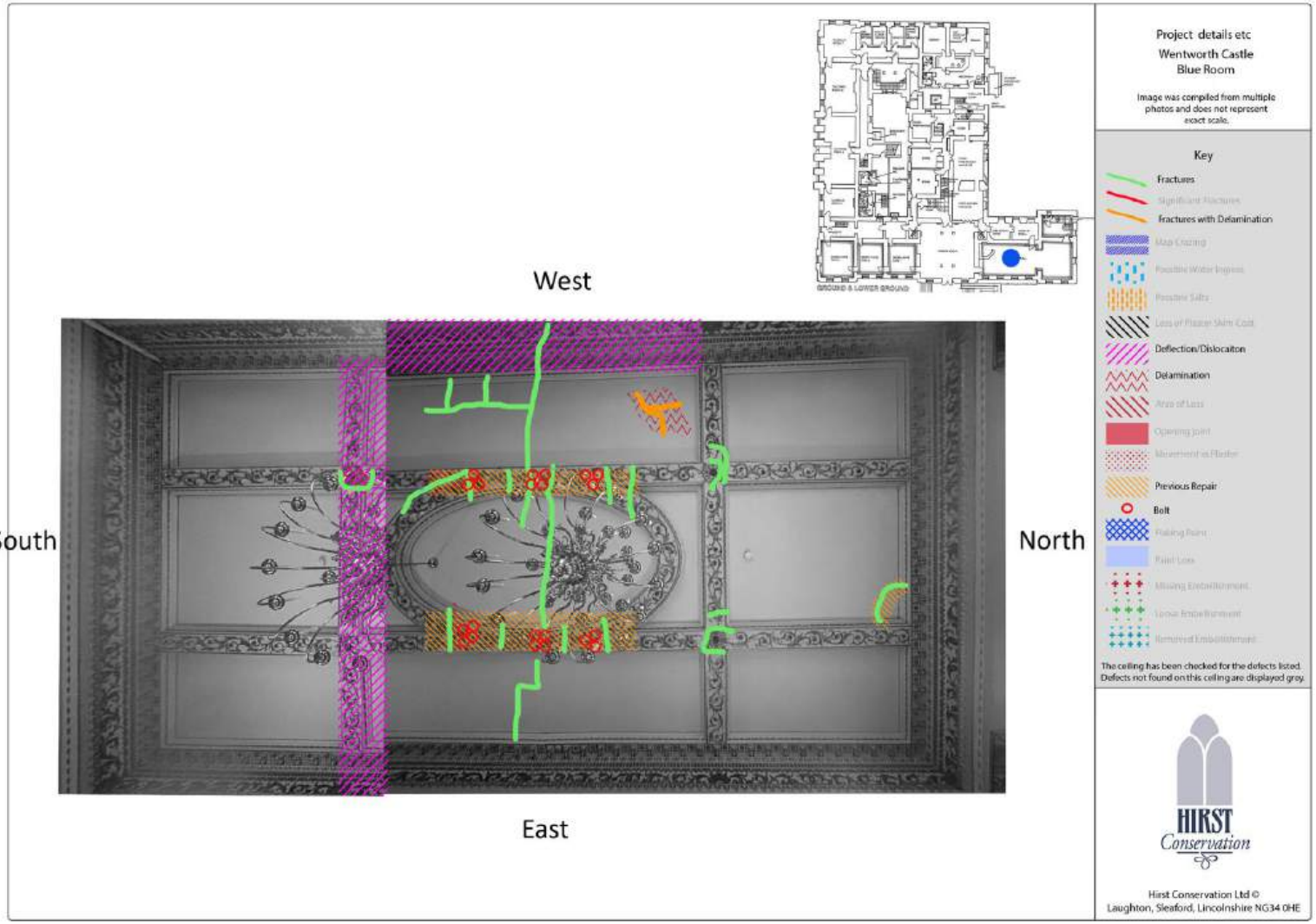
Figure 21. Timber beams being aided by later added support system.

Figure 22. Steel beams found where timber beam would have originally been.

Figure 23. Two red steel beams inserted East to West above timber beams.

Figure 24. Loose timber elements affixed with bolts requiring extra stabilization agreed upon with architect.

2.2.6. Blue Room Defect Diagram



2.3. Queen Anne Suite 1

Methods Employed for Survey: visual inspection, tactile push test. 5.5 x 6.3 x 5.7 Height.

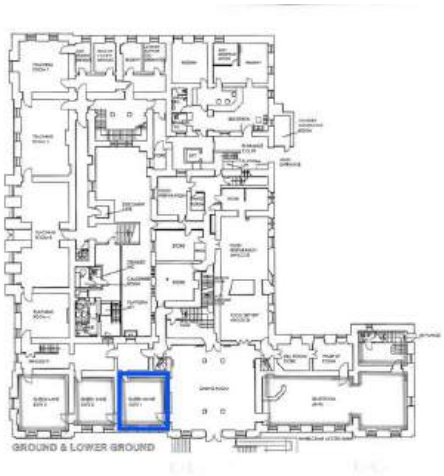


Figure 25. Location of Queen Anne Suite 1

Figure 26. Queen Anne Room 1 Plaster Ceiling.

- Multiple very fine hairline fractures were visible throughout the expanse of the ceiling.
- Several fractures continued into the cornice. Fractures were visible on the cornice (Figure 28).
- Minor deflection was visible above the South wall cornice (Figure 29).
- Minor deflection was visible over the North wall corbels.
- Evidence of a previous patch repair was visible on the South wall cornice (Figure 30).
- Tactile push test revealed the ceiling to be sound and stable (Figure 31).

2.3.1. Queen Anne Room 1 Recommendations

- It is recommended that the upper side of the ceiling is inspected to fully understand the stability of the ceiling and its composing elements.

2.3.2. Queen Anne Suite 1 Images

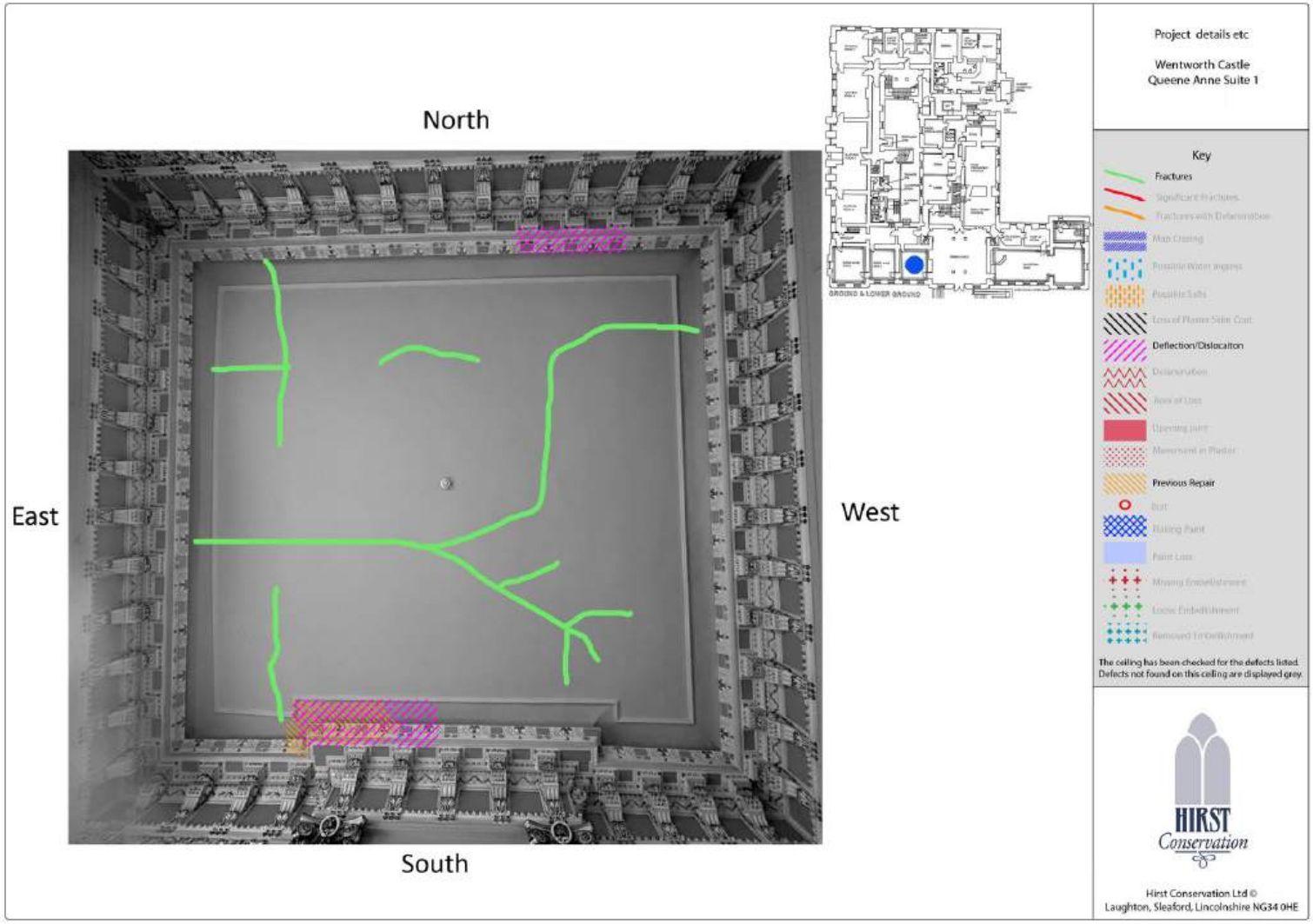
Figure 27. Fracture visible on the cornice.

Figure 28. Minor deflection and evidence of a previous repair over the South wall cornice.

Figure 29. Previous patch repair visible.

Figure 30. Push test revealed the plaster ceiling to be stable.

2.3.3. Queen Anne Suite 1 Defect Diagram



2.4. Queen Anne Suite 2

Methods Employed for Survey: visual inspection, tactile push test, inspection of select areas of the upper side of the ceiling. 5.5 x 6.3 x 5.7 Height.

Figure 31. Queen Anne Suite 2 Location.

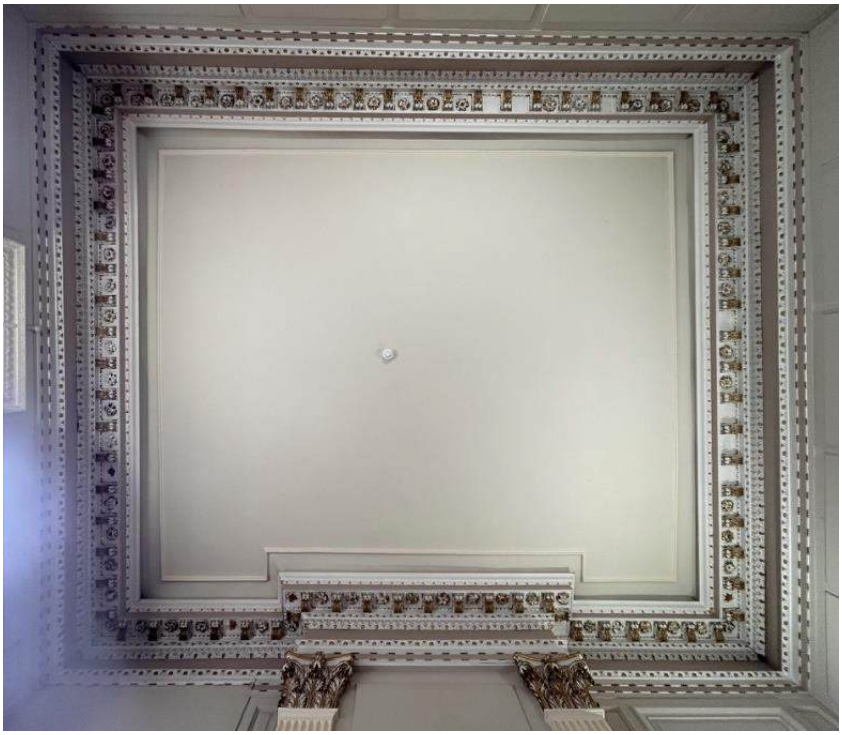


Figure 32. Queen Anne Suite 2 Plaster Ceiling.

- Multiple Hairline fractures were visible throughout the ceiling and cornice. Cracks were noted in the cornice (Figure 34).
- The mitres were found to be opening in the corners (Figure 35).
- What appeared to be possible water ingress was visible near the cornice on the North wall (Figure 36).
- There were multiple missing enrichments throughout the expanse of the cornice (Figure 37).
- The cornice and enrichments appeared to be made of timber from visual appraisal at a distance.
- Tactile testing revealed the plaster ceiling to be solid and stable.

2.4.1. Queen Anne Suite 2 Recommendations

- It is recommended that the upper side of the ceiling is inspected to fully understand the stability of the ceiling and its composing elements.

2.4.2. Queen Anne Suite 2 Images

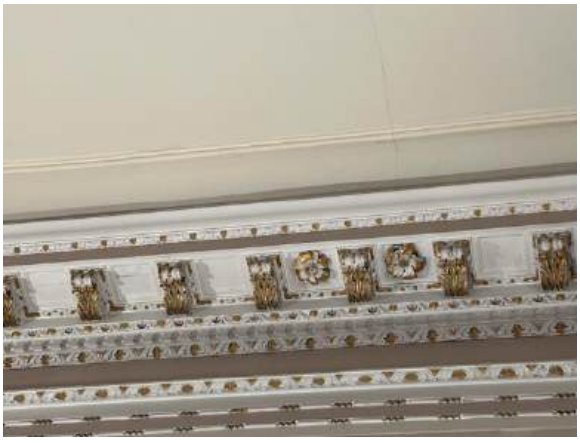


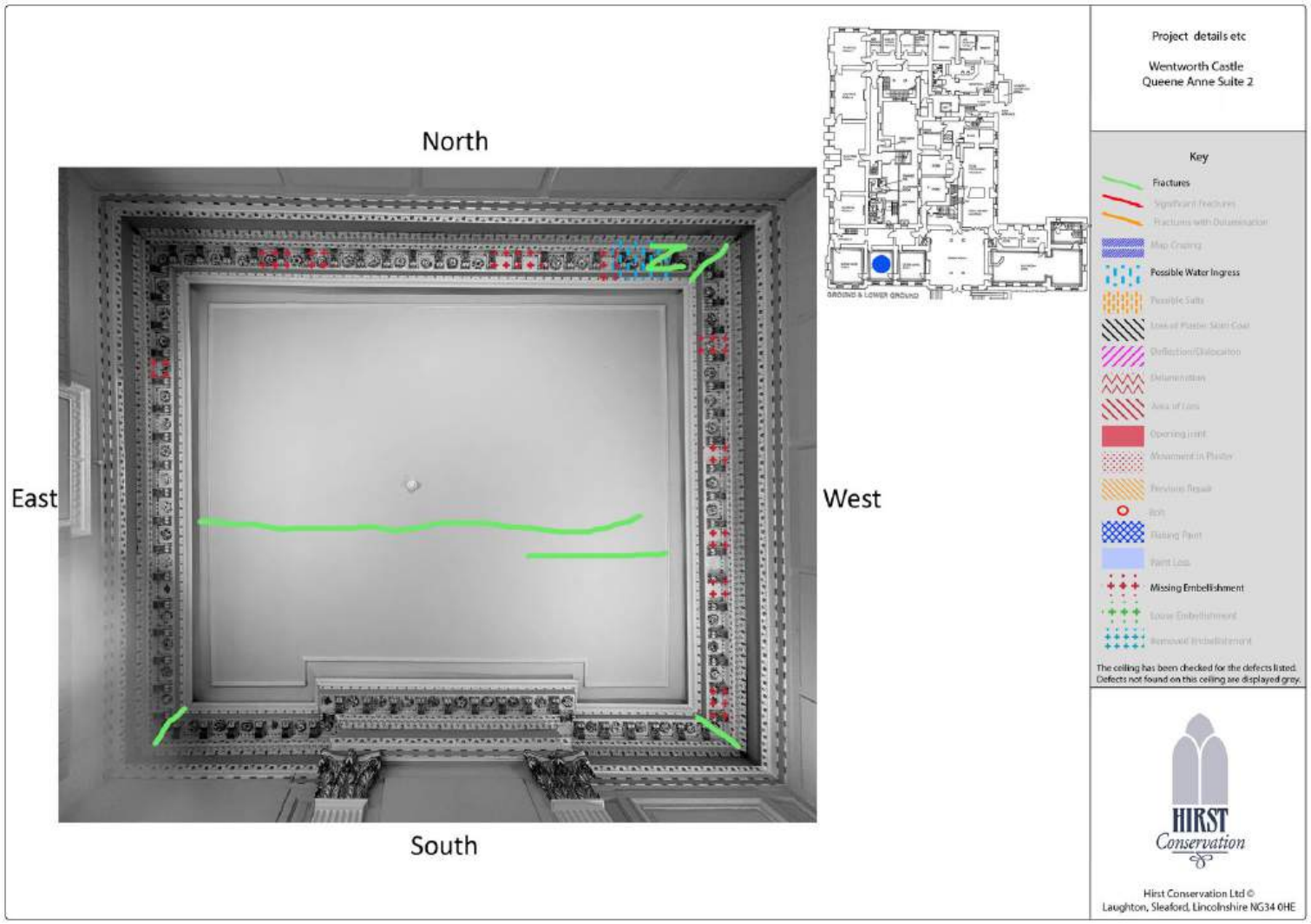
Figure 33. Hairline fractures running through the plaster ceiling.

Figure 34. Cracks visible in the mitres.

Figure 35. Possible water ingress visible on the cornice.

Figure 36. Missing embellishments throughout the cornice.

2.4.3. Queen Anne Suite 2 Defect Diagram



2.5. Queen Anne Suite 3

Methods Employed for Survey: visual inspection, tactile push test. 5.4 x 6.3 x 5.7 Height.

Figure 37. Queen Anne Suite 3 Location.

Figure 38. Queen Anne Suite 3 Ceiling.

2.5.1. Underside of the Ceiling Queen Anne Suite 3

- The ceiling had multiple hairline fractures and cracks visible throughout the expanse of the ceiling, cornice, and decorative elements (Figure 39).
- An area of splitting was observed on the East wall cornice (Figure 40). Splitting was also found in multiple areas on the South wall cornice and between the ceiling and cornice at the corner of the South and East walls (Figure 41).
- What appears to be water ingress was visible on the East wall (Figure 41). Additionally, some paint loss was noted in the area of localized damage on the East wall. Possible water ingress was also visible on the South wall cornice (Figure 42).
- There were multiple embellishments missing from the cornice (Figure 42).
- One loose embellishment was removed during the survey as it was found to be a hazard to visitors to the room (Figure 44 & 45). A second embellishment on the West wall was found to be loose but not deemed dangerous or urgent to remove.
- The cornice and embellishments appear to be made from timber. Removal of the loose embellishment confirmed the materials was made of timber (Figure 45).
- Push testing revealed the plaster ceiling to be solid and stable.

2.5.2. Upper Side of Queen Anne Suite 3

The Upper Side of the Queen Anne Suite 3 was observed on the second site survey conducted by Tim Pretty on 13th May, 2024. The findings are as follows:

- The beam and joist construction is of the same design as above the Blue Room.
- Splits and shakes were again seen within the main beams along with steel plates and strengthening angle plates clearly having been added at some point in the past. A number of the original floor joists have pulled away from the main beams and appear to have minimal bearing on timber chocks which are assumed to have been added at a later date. A number of replacement floor joists were also noted indicating that extensive remedial works have been undertaken in the past.
- The condition of the lath and plaster is considered to be very poor especially when compared to the other areas observed within the Long Gallery. Laths are fixed very closely to each other and there are minimal plaster nibs/keys evident. Where they are present many were found to be fractured when subjected to tactile examination. There is clear evidence of woodworm activity and decay of the laths which were reduced to dust when physically examined. In addition, a significant amount of springing laths were found.
- Given the fracturing observed from the underside and the extant condition of the upper side it is our opinion that there is a significant risk of the ceiling plaster failing with a potential risk of collapse. Mark Barrett and Richard Storah were made aware of our findings and were advised to close the Queen Anne 3 room directly below.

The Upper Side of the Queen Anne Suite 3 was additionally surveyed by Keith Langton on 27th June, 2024. The findings are as follows:

- There are various stress related movement cracks across the ceiling, not following the line of the lath/joists etc.
- There is no pugging present.

- There are signs of previous interventive works such as metal joist hangers which are found to be too rigid. Additionally, multiple steel plates were found inserted in the oak beams where they have split over time. None of these methods have assisted in supporting the plasterwork.
- There are signs of wood worm, heavily decayed and loose/springing lath, and loose joists.
- Tight laths with no keys were found to be present.
- Where the reverse of the ceiling is exposed, the limited haired lime grinning through the lath, that have mostly been originally installed too close to each other, shows 'very little or no key/nibs' at all. It seems that when the void was potentially cleaned out some time back, all the key/nibs were scrapped-off and removed along with the pugging layer etc resulting in a ceiling which is unstable and requires stabilization.

Tight lath and minimal key, previous interventions visible.

Insect presence visible.

2.5.3. Queen Anne Suite 3 Recommendations

- The ceiling was found to be unstable and requires interventive stabilization methods employed as soon as possible.
- It is recommended that temporary propping is installed to support the ceiling plaster using suitable acrow props, planks, and plywood sheeting. All points of contact with the ceiling plaster should be cushioned with medium density plastazote foam padding. Once propped the remaining floorboards will need to be lifted to allow securing works to be undertaken from above.
- It is assumed that the entire area is likely to require securing as the defects described above were observed throughout all accessible areas where boards had been lifted and this equates to approximately 50 sq m.
- It is recommended that the reverse receives the Crystacal plaster pad system, inserted into the lath, on suspended on wires. Then, depending on the ceiling joist positions, SS screws and washers inserted into the lime face at approx. 350-400mm centres.

Proposals

Protection

Correx boarding to floor taped together, use temporary plastic sheeting (TPS) to walls attaching to timber cornice by staple gun and/or adhesive tape. Floor protection is necessary to prevent dripping of consolidate staining the floors and walls. Correx to the floor should be placed down prior to scaffolding installation to prevent damage to the floor and the room should be empty to prevent accidental damage to furniture/ pictures.

Ceiling temporary support

Due to the height of the ceiling, the installation of standard Acrow supports from the floor is not recommended. It will be necessary to install birdcage scaffolding of sufficient strength to allow the ceiling to be propped off the deck level once formed. Scaffold jacks from a birdcage fixed scaffolding to the face of the ceiling using lamb's wool insulation or a breathable foam packers should prevent pressure damage to the plaster while it is supported.

Other forms of ceiling support such as battens to the underside tie wired to joist above will not work with the ornamentation to the underside but more importantly it needs to be supported prior to any further removal of floorboards to the upper side.

Cleaning the upper side

After all remaining floorboards have been lifted by others the revealed area will be fully recorded and photographed.

The area to be cleared of any debris and vacuumed out to the full reverse following which further photographic images will be taken.

Structural works

Joiners, under the guidance of the Structural Engineer, to re brace any loose joists or to further support the structure (by others).

Further works including suspension

This can only be fully qualified following removal of the floorboards. We have assumed all areas to the upper side require suspension although this may reduce in quantity once the upper side has been fully appraised.

Removal of lath to the reverse in areas to 300mm x 100mm at 300-400mm centres. Approx. 220 no above the Queen Anne Suite by gently trimming the timber using a multi/feign cutting tool.

Consolidate any friable plaster if required with aqueous colloidal silica.

Brush-apply the plaster/AC300, Quadaxle pads with SS high-rib suspended on 'tagged' twisted wires.

On completion of the pads, remove all Acrow support to the room below.

Any further securing if required would be done from either towers or the birdcage using stainless steel screws and washers approx. The requirement for this work will be informed by the access and suspension works undertaken from above. It maybe that screw and washers can be limited to the span of plaster directly under the main beams.

Plaster repairs using lime /plaster of Paris or other approved to any cracks or defects.

2.5.4. Queen Anne Suite 3 Images

Figure 39. Hairline cracks visible throughout the ceiling and cornice.

Figure 40. Splitting and ingress visible on the East wall cornice.

Figure 41. Splitting and ingress observed on the South wall cornice and ceiling.

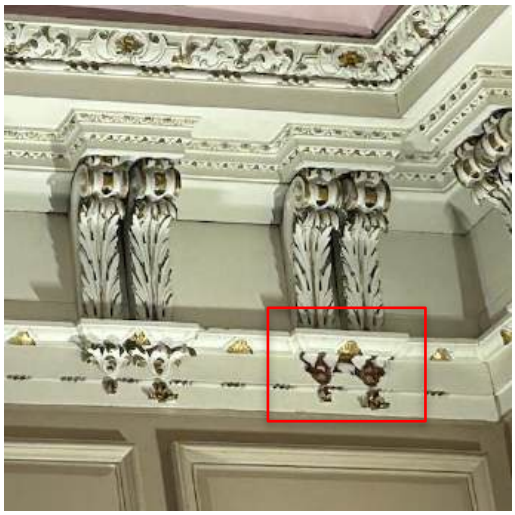
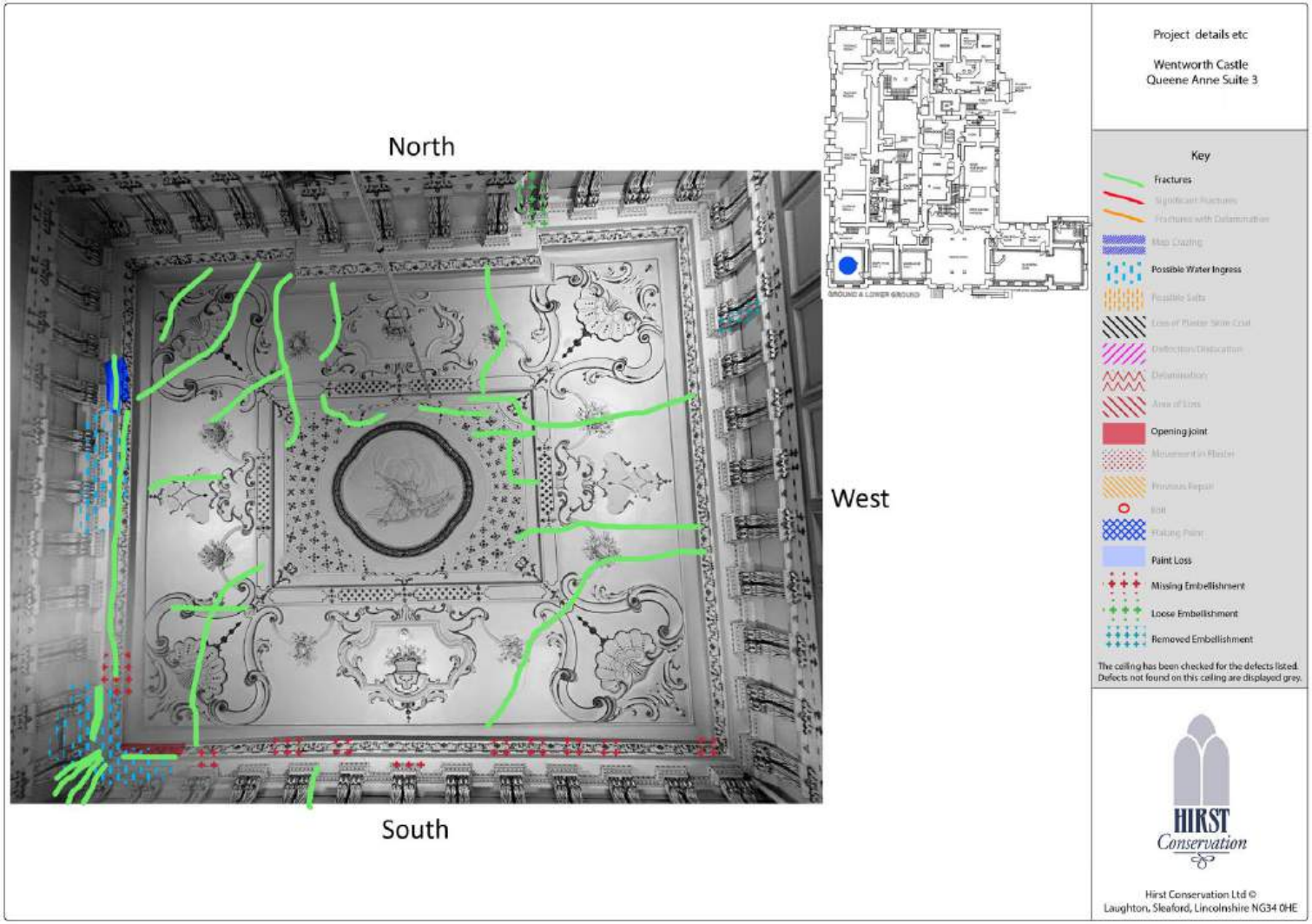


Figure 42. Multiple embellishments missing throughout the cornice.

Figure 43. A loose embellishment was removed above the West wall during the survey due to being a hazard to visitors to the room.

Figure 44. Removed loose embellishment revealing the cornice to be made of timber.

2.5.5. Queen Anne Suite 3 Defects Diagram



2.6. Dining Hall

Although not included in the original scope of works, a limited number of floorboards had been lifted in this area and Hirst Conservation were asked to give their opinion on the plaster that could be seen. The underside of the ceiling was visually inspected by Tim Pretty and Richard Storah from ground level. The ceiling below comprises coffers with down stand beams. There are canvas paintings set within the coffers mounted on stretcher frames which appear to be nailed/mechanically fixed into the ceiling structure. Whilst some of the paintings appear to fit tightly within the coffers some of them the frame edges could be seen and they appear out of alignment with the plaster margins. It is not known if this has always been the case or if any movement/pulling away from the plaster has occurred. It is recommended that the canvas paintings are checked for stability.

- The down stand beams appeared sound with only isolated hairline fractures and no significant deflection or distortion was seen. Observation from the upper side revealed extensive strengthening works have been undertaken in the past but the date of these works is not known.
- Generally, plaster nibs/keys were seen throughout accessible areas and laths appeared sound and stable with good spacing and well bonded to the plaster.

2.7. Italian Staircase

Methods Employed for Survey: visual inspection.

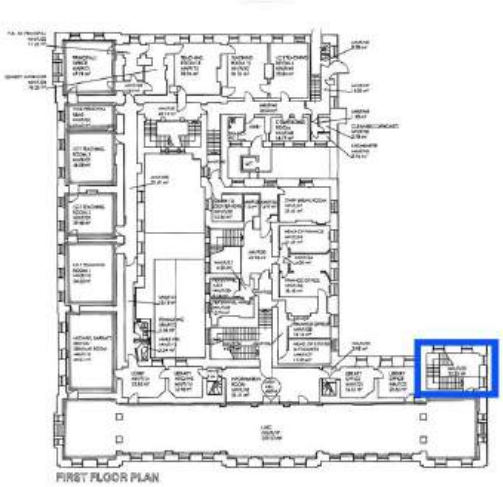


Figure 45. Italian Staircase Location

Figure 46. Italian Staircase Plaster Ceiling

- The ceiling has multiple hairline cracks present throughout (Figure 47)
- There are some areas of loss present throughout the ceiling. An area of loss can be seen on the central rose, where there is a loss of paint and possible loss of plasterwork (Figure 48). Additionally on the central border (Figure 49). Closer inspection is needed to fully understand the type and level of damage.
- Five support straps attached with bolts were visible on the ceiling. (Figure 50).

2.7.1. Italian Staircase Recommendations

- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if there is any ingress which could be causing the areas of loss and damage.

2.7.2. Italian Staircase Images

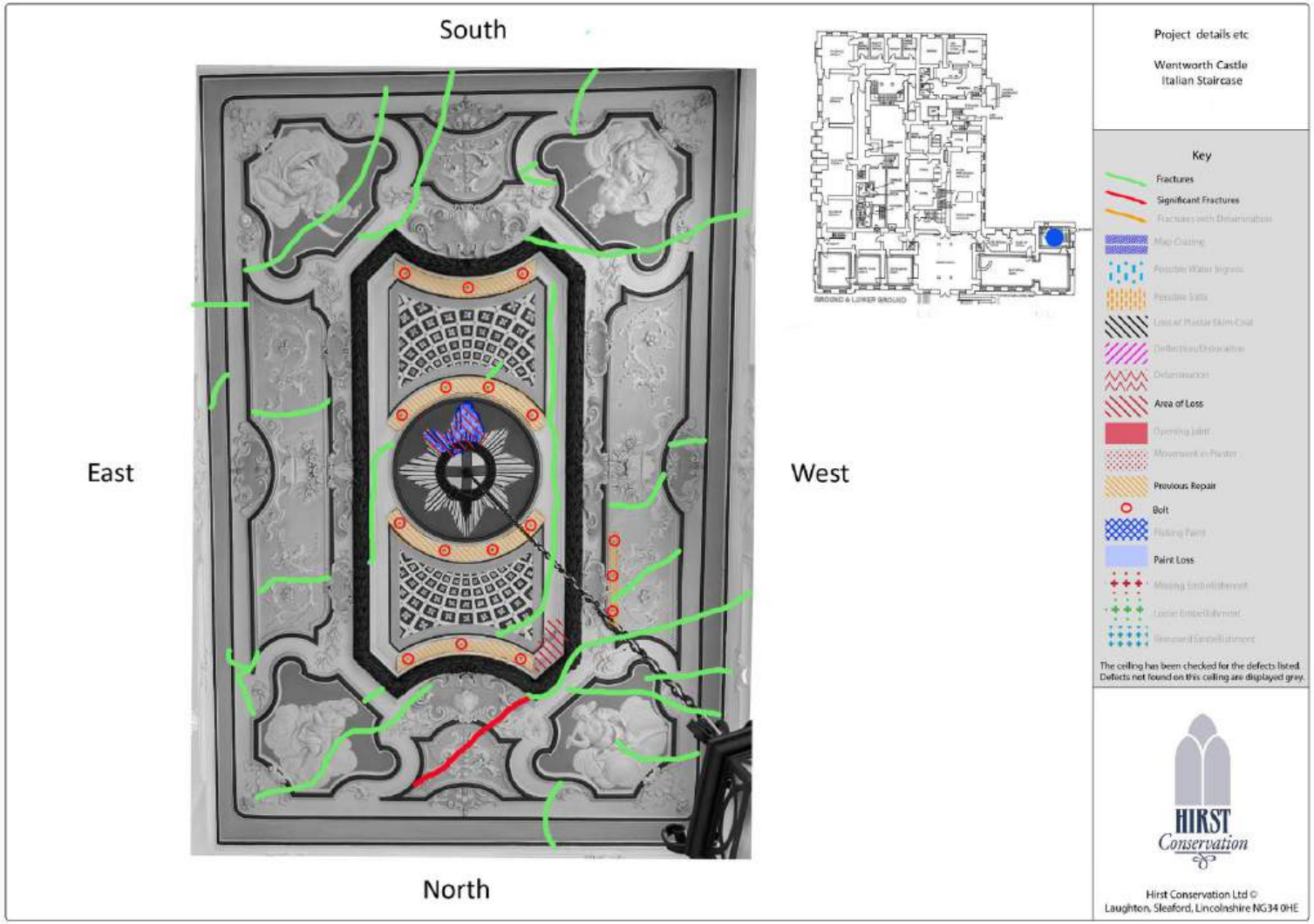
Figure 47. Hairline fractures visible throughout the ceiling.

Figure 48. Area of loss in central rose.

Figure 49. Area of loss on central border.

Figure 50. Support straps attached with bolts.

2.7.3. Italian Staircase Defect Diagrams



2.8. Long Gallery North End Room

Methods Employed for Survey: visual inspection.

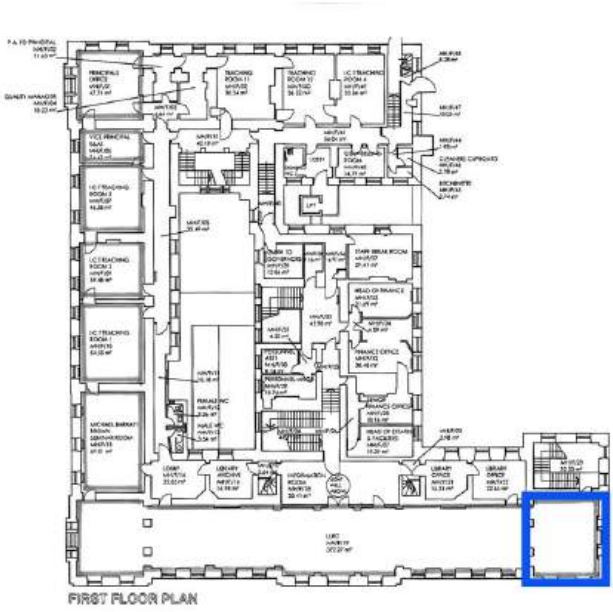


Figure 51. Long Gallery North End Room Location

Figure 52. Long Gallery North End Room Plaster Ceiling.

- Multiple hairline fractures were found throughout the expanse of the ceiling (Figure 53). Two repeating hairline fractures were found mirrored on the North and South coves (Figure 53).
- Markings which could potentially be water ingress marks or salts were observed on the North wall cornice (Figure 55).
- Fractures resulting in flaking paint were noted and some small areas of loss of the skim coat of plaster and delamination of the plaster skin were observed (Figure 55).
- Minor deflection was noted between the two South columns.

2.8.1. Long Gallery, North End Room Recommendations

- A closer in-depth tactile survey is recommended to confirm the ceilings stability and damage level.
- If possible, it would be beneficial to further access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if the ingress is ongoing and requires intervention or is stable, inspection of the roof and lead flashing and tiles may further inform on this.

2.8.2. Long Gallery, North End Room Images

Figure 53. Hairline fractures noted throughout the ceiling.

Figure 54. Shape of hairline fractures on North and South wall coves.

Figure 55. Fractures with delamination and potential water ingress or salts visible.

2.8.3. Long Gallery, North End Room Defects Diagram

2.9. Long Gallery

Methods Employed for Survey: visual inspection.

Due to its length, the Long Gallery has been divided into three sections to aid in understanding and mapping of the defects. It has been divided into a North section, Central section, and South section. Due to the ceiling height and limitation of inspection from ground level, observation of the defects was limited.

Measurements of Long Gallery

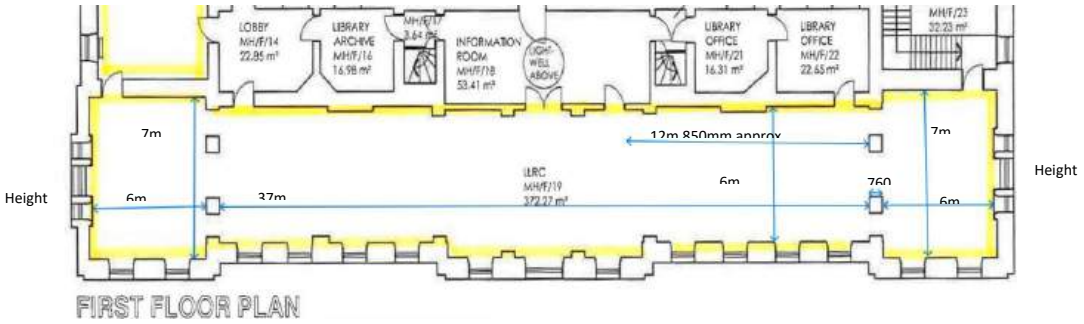


Figure 56. Measurements of the Long Gallery.

2.9.1. Long Gallery North Section

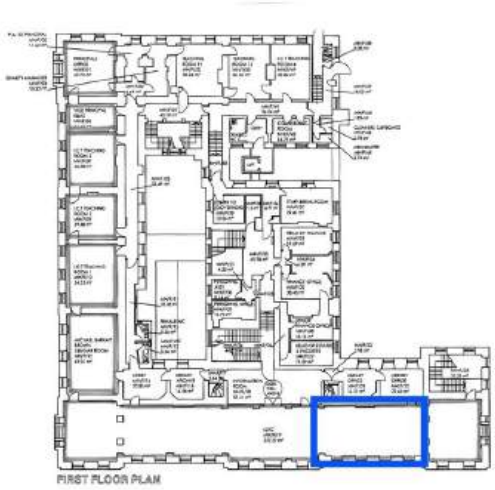


Figure 57. Location of Long Gallery, North End Section.

Figure 58. Long Gallery, North End Section.

- A large expanse of the ceiling appears to be covered in boarding. The edges of the cove appear to be original with the majority of the expanse of the upper ceiling being covered in plywood, used as propping after historic failure of the ceiling in this area.
- There are multiple hairline fractures noted throughout. Fractures were noted on the mitred edges of the ceiling.
- Fractured were observed in multiple enrichments.
- Potential water ingress or marks of historic water ingress were visible in multiple areas of the ceiling. With damage to the dental blocks and enrichments.

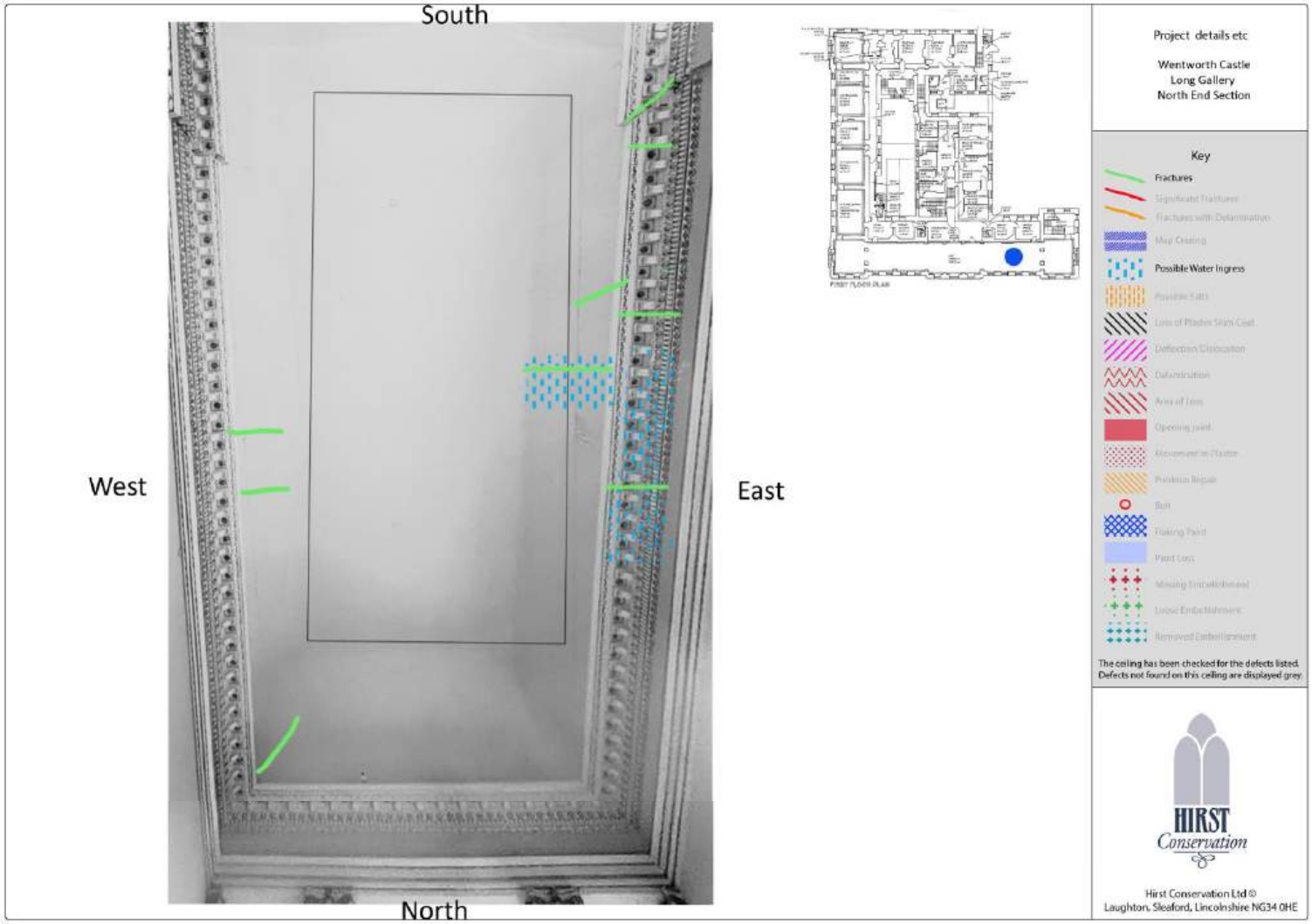
2.8.1.1 Long Gallery North Section Recommendations

- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- Additionally, it would be beneficial to understand why the plasterboard was added and what defects were found previously in the ceiling and to understand if any different or additional fixing methods may be required.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.

2.8.1.2 Long Gallery North Section Images

Figure 59. Plasterboard meeting seams visible on large expanse of the ceiling.

2.8.1.3 Long Gallery North Section Defects Diagram



2.9.2. Long Gallery Central Section

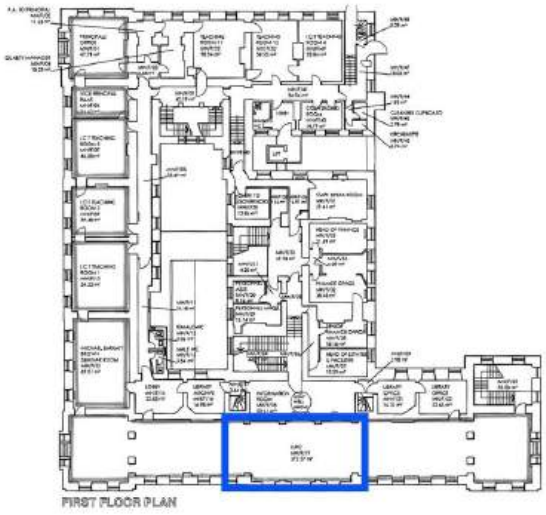


Figure 60. Long Gallery Central Section Location.

Figure 61. Long Gallery Central Section.

- Multiple hairline fractures were noted running East to West along the expanse of the ceiling (Figure 62).
- A small section of map crazing was noted on the East wall cove.
- Evidence of water ingress was noted to the north side, and appears to follow down to the pilaster, causing flaking of the paint. In this area the modillion blocks have split.

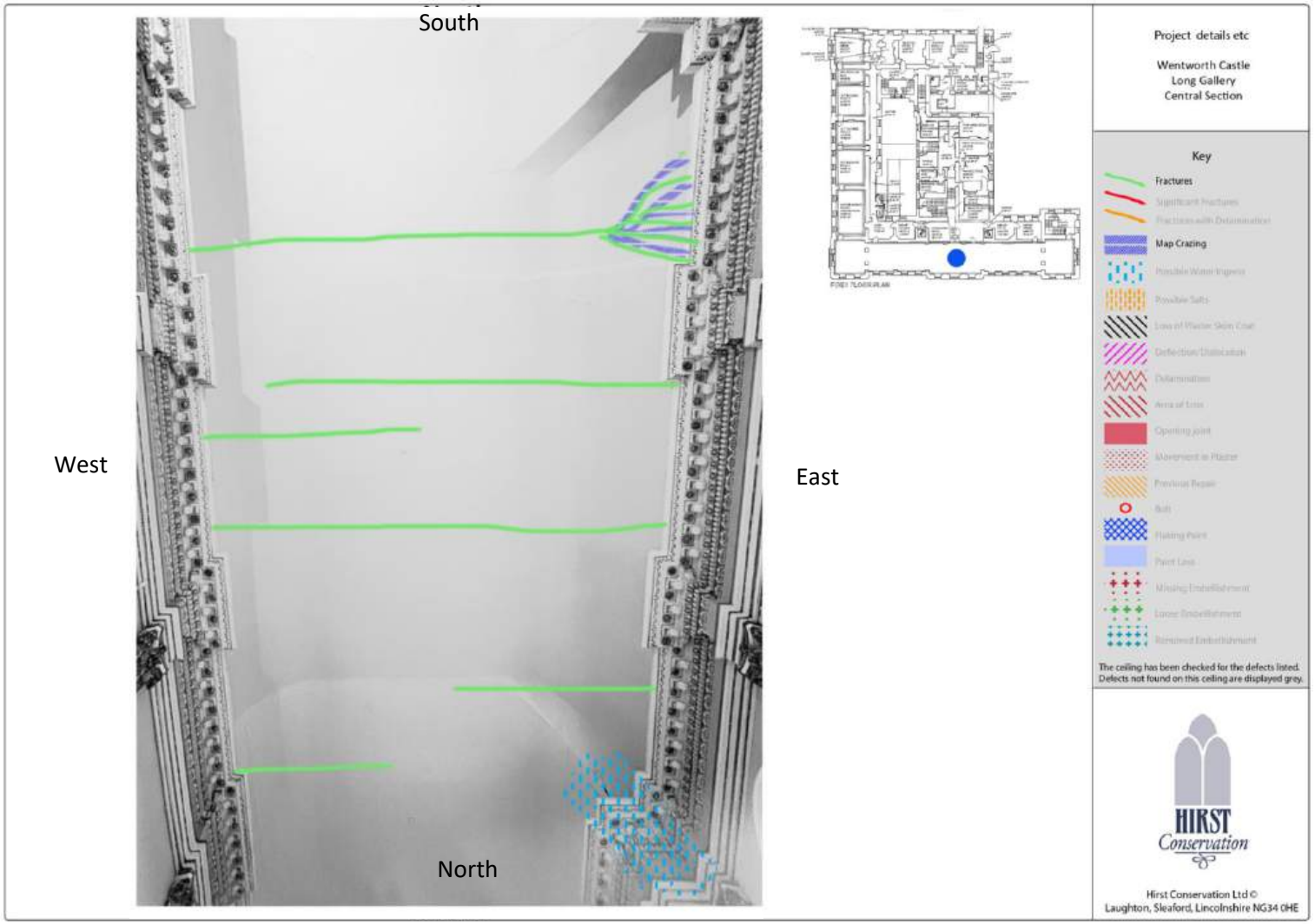
2.8.1.4 Long Gallery Central Section Recommendations

- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.

2.8.1.5 Long Gallery Central Section Images

Figure 62. Fracture visible on the ceiling.

2.8.1.6 Long Gallery Central Section Defects Diagram



2.9.3. Long Gallery South Section

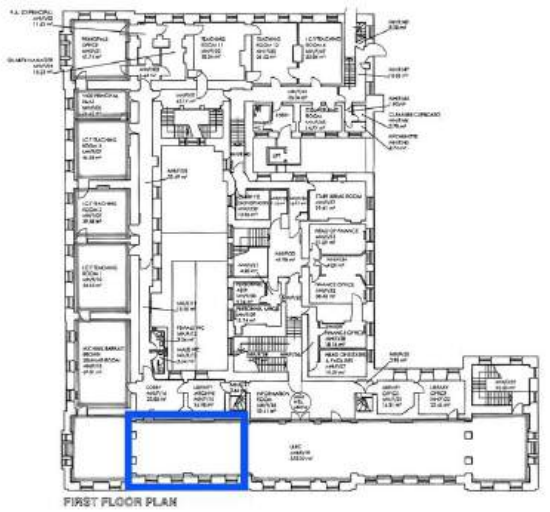


Figure 63. Location of Long Gallery South Section.

Figure 64. Long Gallery South Section Ceiling.

- Hairline fractures were found running along the full expanse of this section of ceiling (Figure 65). Some fractures were found running through the cornice.
- Fractures with delamination and areas of loss were observed on the East wall cove.
- Potential water ingress or marks of historic water ingress were visible on the West and East wall coves (Figure 66).

2.8.1.7 Long Gallery South Section Recommendations

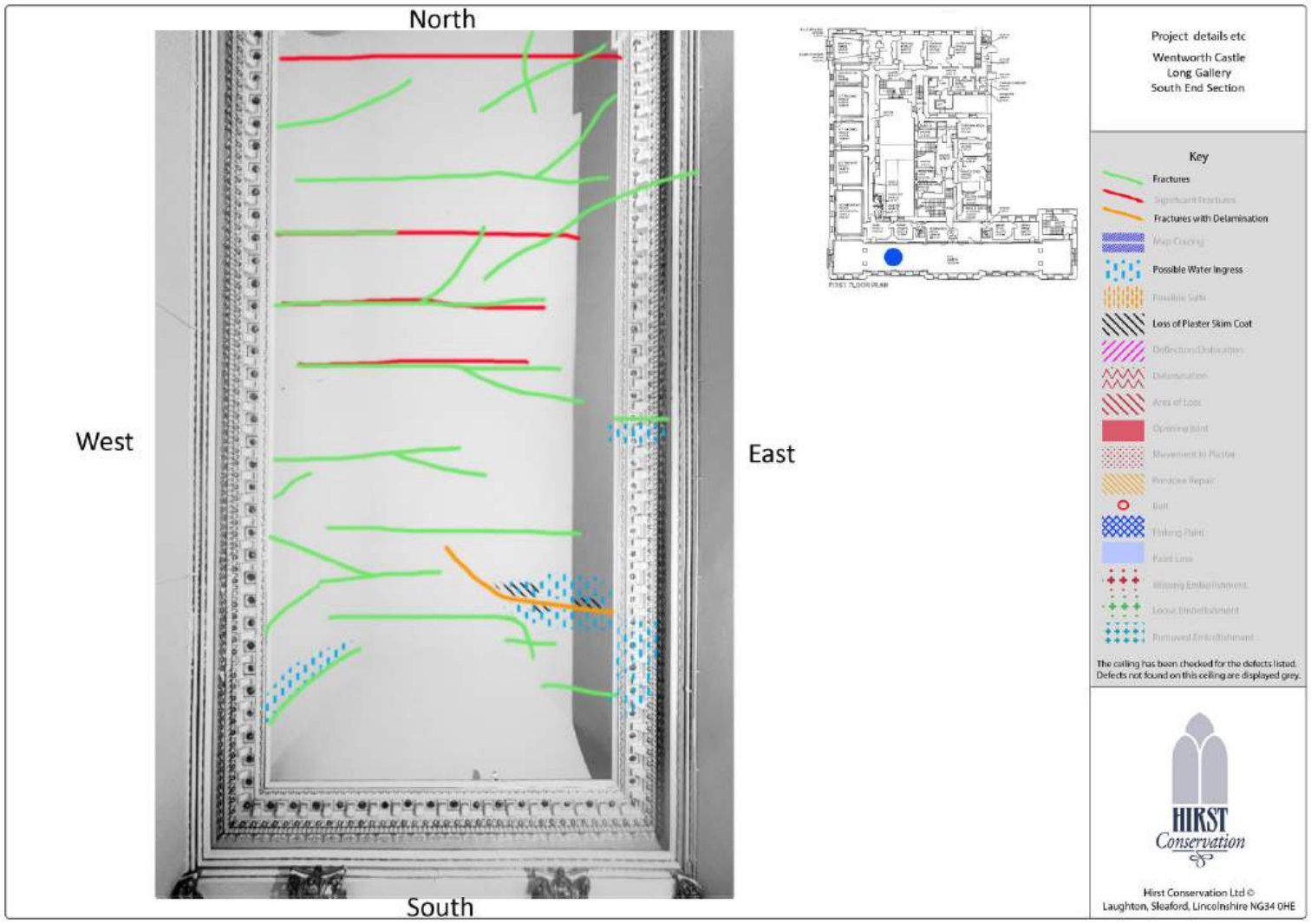
- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.

2.8.1.8 Long Gallery South Section Images

Figure 65. Multiple fractures running through ceiling.

Figure 66. Fracture resulting in loss and possible ingress.

2.8.1.9 Long Gallery South Section Defects Diagram



2.10. Long Gallery South End Room

Methods Employed for Survey: visual inspection.

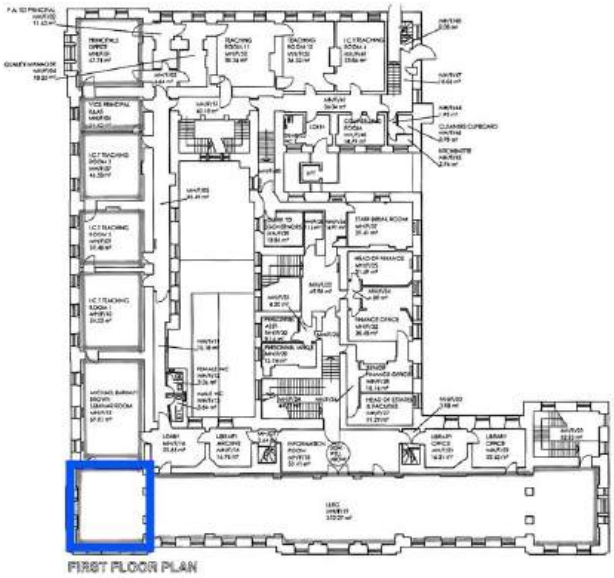


Figure 67. Location of Long Gallery South Room.

Figure 68. Long Gallery South End Room Plaster Ceiling.

- Multiple hairline fractures were found throughout the expanse of the ceiling (Figure 69). Some fractures were found running through the cornice.
- Fractures were found in the mitres.
- Fractures with areas of loss and delamination of the skim coat of the plaster were observed (Figure 70).
- Possible water ingress or staining was observed (Figure 70).

2.10.1. Long Gallery, South End Room Recommendations

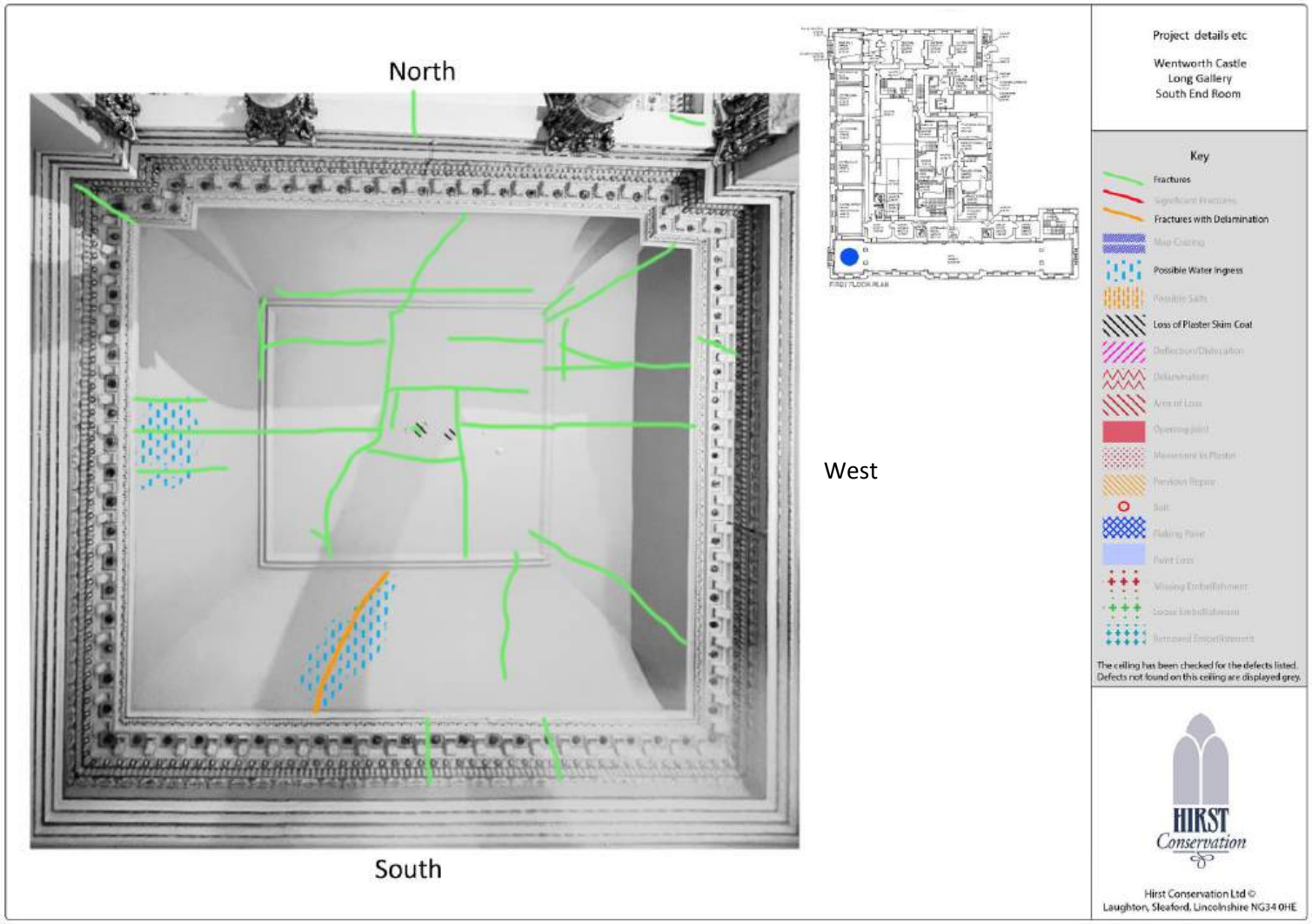
- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.

2.10.2. Long Gallery, South End Room Images

Figure 69. Fractures seen throughout ceiling expanse.

Figure 70. Fracture with loss and delamination and possible water ingress.

2.10.3. Long Gallery, South End Room Defects Diagram



A second visual inspection of the ceiling from the underside was conducted during the 6th August visit, this highlighted areas of concern of the ceiling to the centre south of the long gallery ceiling.

2.11. Long Gallery, Roof Space Inspection

Methods Employed for Survey: visual inspection, limited to length of harness and where safe to access. Due to the location of the harness point and length of the lanyard, minimal areas of ceiling were able to be inspected 06 August 2024 (See Fig. 71). Further access to the topside of the ceiling will be required for further inspection. Recommendations for this access are discussed at the end of this section.

*Figure 71. Keith Langton inspecting the topside of the ceiling, note location of hoist and boarded floor, limiting access for inspection. Shown at *4 in the diagram below.*

Observations

The diagram below (Fig. 72) shows the approximate location of the inspection points of the ceiling.

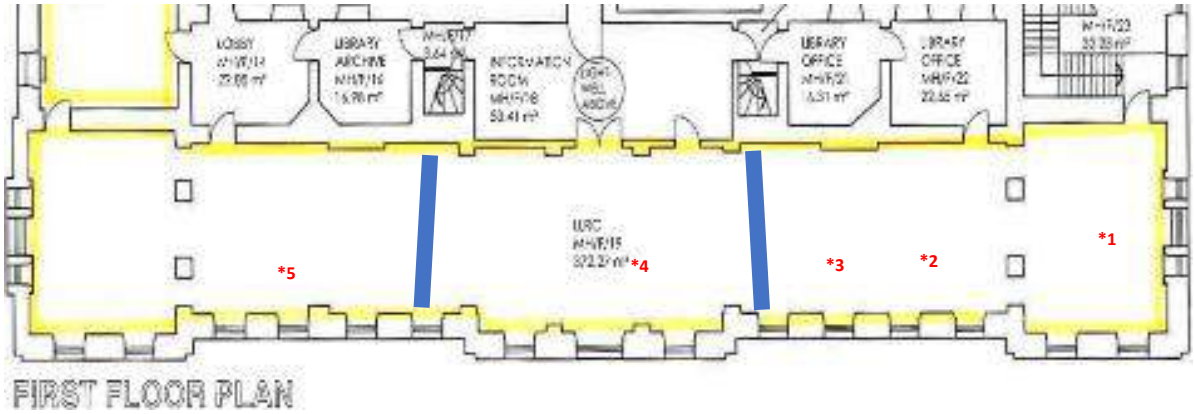


Figure 72. Measurements and approximate locations of inspection to the topside of the ceiling, numbered 1-5 and the location of the rain troughs to the North and south end of the Long Gallery.

2.11.1. North End

Due to limited access, only 3 areas of the North end of the ceiling were inspected (Fig. 72). Where inspected, the original lime plaster ceiling appears to be present with screws drilled directly through the boards into the plaster, suggesting that the fixing of these boards was undertaken without knowing the location of the supporting beams.

As a section of the ceiling of the Long Gallery was known to have collapsed historically, there will be loss of the lath and lime plaster, however the extent will not be known until further boards are lifted to allow inspection. Current evidence suggests areas of original ceiling survive underneath the boarding. It was noted throughout the ceiling, the lath are spaced very close together (See Fig.73).

This has impacted the formation of the nibs which act as a supportive key to hold the plaster to the ceiling. The historic failure of the ceiling was likely caused by the water ingress, softening and adding weight to the plaster, and the lack of supportive nibs caused by incorrect spacing of the lath promoted the failure.

*Figure 73. Location *1 lath to the Nouth end of the Long Gallery, showing the spacing is too close together.*

*Figure 74. Screws through the lime plaster where the boards have been fixed to the ceiling. Note the lime plaster is still present in this area. Note the debris on the topside of the ceiling, located at *4 of the diagram.*

By looking at the approximate location of the ductwork on the floorplan, the ceiling directly below the North End rainwater trough, particularly the cornice to the East wall, has significant evidence of water ingress, it is not known if this is recent. However this evidence suggests that water may be leaking around the seal of the trough to the ceiling and wall below, causing the deterioration noted during inspection. However, the shape of the ceiling above this area may promote the flow of any water towards this area. Inspection of the roof and ductwork will inform further.

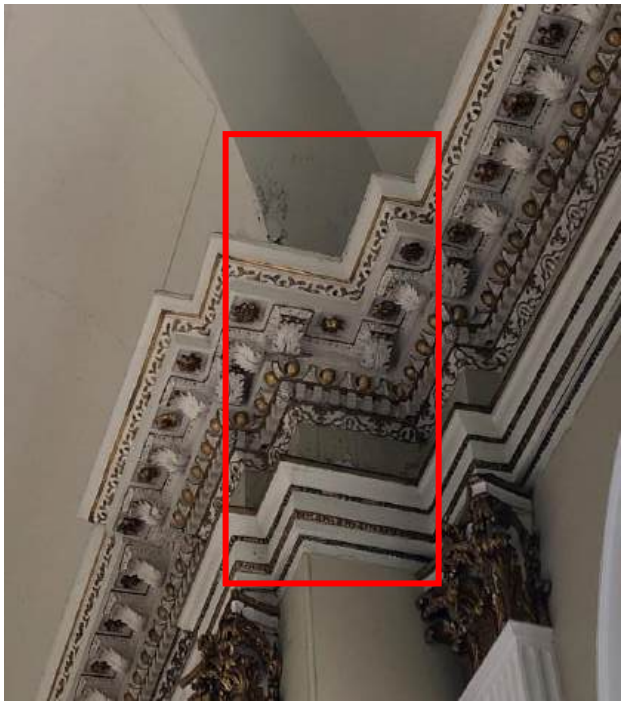


Figure 75. Evidence of historic water ingress, the rain trough may be above this area to the North side of the Long Gallery.

Figure 76. Flaking paint to the base of the column a result of water ingress causing the wood to swell and paint to delaminated.

2.11.2. Long Gallery Centre

South of the centre of the long gallery ceiling has evidence of parallel cracks running along the curve of the ceiling, four (section 2.8.1.9) of these expansive cracks were noted as concerning during the 06 August inspection undertaken by Keith Langton as the direction of cracks would usually follow the direction of the lath, however the fractures and cracks to this ceiling appear to go the opposite direction and follow the shape of the ceiling. This area may be directly under the south end rainwater trough where the nibs where the lath were found to be incorrectly spaced. The improper spacing of the lath impacts the formation of the structural nibs. The presence of buckets and water staining in this area to the plywood suggests that there are ongoing leaks in the roof, inspection of the roof from above may give an indication of possible entry routes for water ingress (See Fig.79,80).

The area of cornice and plaster mouldings underneath on the East wall has suffered from significant deterioration from water ingress (See Fig. 78). Moisture readings may be effective in evaluating how much moisture is present in the wall/ ceiling to see if levels are high.

*Figure 77. Location *5 showing the lath are spaced close together with minimal nibs present.*

Figure 78. Deterioration of the cornice, Egg and Dart and Dental Blocks.

Figure 80. Location of the South End rainwater trough. Note the buckets placed along the chimney suggesting lead flashing leak and strategically placed buckets in the walkway.

Figure 79. Water staining of the plywood surrounding buckets suggesting leaks in the area of the bucket.

2.11.3. South End Small Ceiling

The single ceiling to the south end of the Long Gallery could not be inspected during the 06 August 2024 survey due to is being covered with sheeting and not known if the floor is stable.

Figure 81. South End ceiling where plastic sheeting is present covering the walkway.

2.11.4. Long Gallery roof space recommendations

- Removal of alternating boards to allow complete inspection and access to the back of the ceiling for cleaning and consolidation works. Recommendation for another company to undertake removal of these plywood boards and lifting of some of the floorboards currently nailed down for further access.
- Adding a second harness anchor point to the other side of the fire doors, the current harness is central to the ceiling void, however it is off centre of the long gallery ceiling below, moving the anchor point closer to the centre of the ceiling will enable access for further inspection.
- Inspection of the roof tiles and lead flashings would be beneficial to investigate any current sources of water ingress.
- Adding additional moisture sensors to the rainwater drains to further monitor for future blockages.

2.12. Michael Barratt Brown Seminar Room MH/F/15

Methods Employed for Survey: visual inspection, tactile push test.

Figure 82. Location of Michael Barratt Brown Seminar Room.

Figure 83. Michael Barratt Brown Seminar Room.

- Multiple hairline fractures were found running West to East along the ceiling expanse (Fig.84).).
- Plasterboard was present in the ceiling and there is fracturing along the joint lines between plasterboards.
- There was potential water ingress visible (Fig.85).
- Push testing revealed the plaster ceiling to be solid and stable.

2.12.1. Michael Barratt Brown Seminar Room MH/F/15 Recommendations

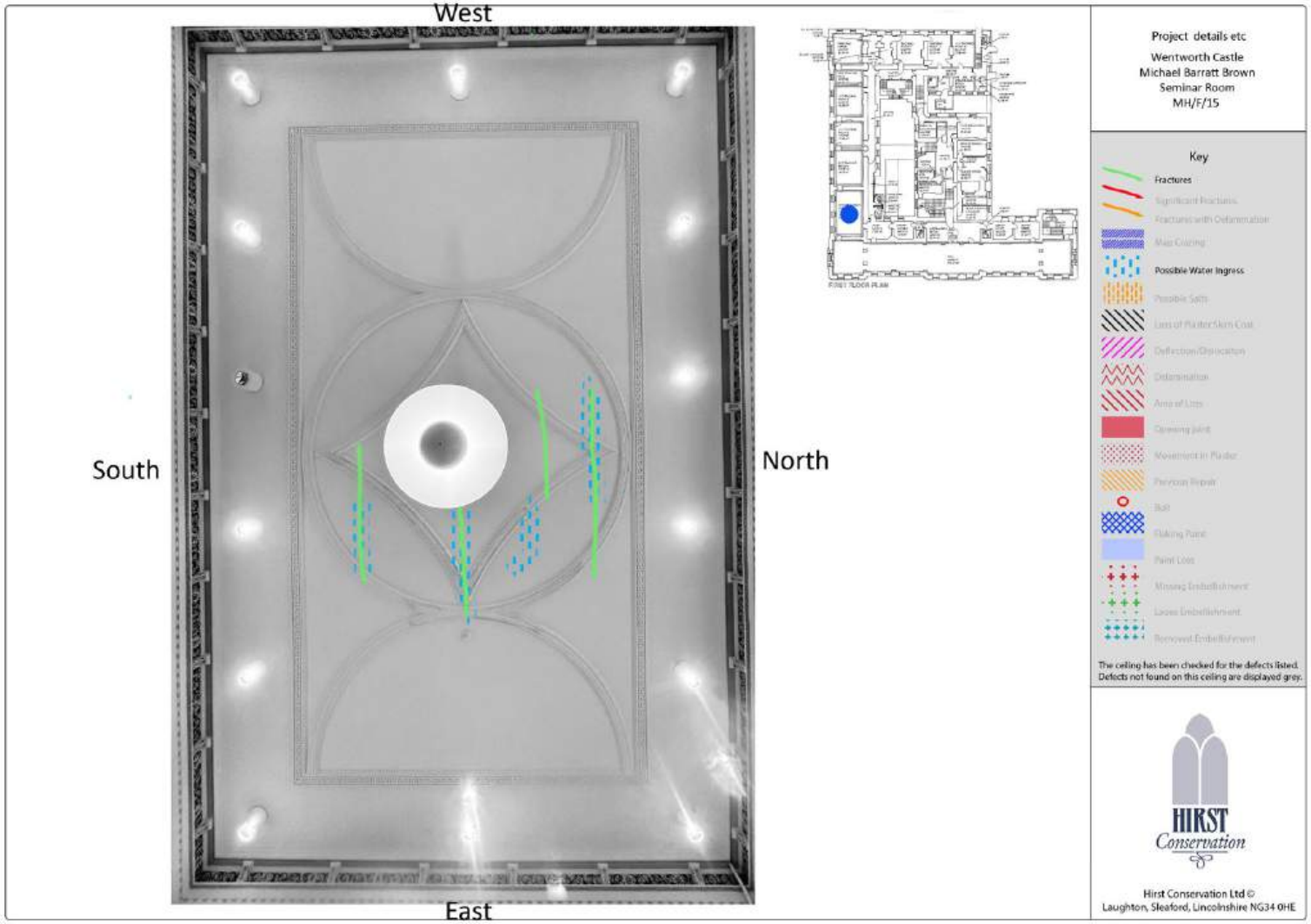
- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.

2.12.2. Michael Barratt Brown Seminar Room MH/F/15 Images

Figure 84. Hairline fracture on centre rose of ceiling.

Figure 85. Possible water ingress marks near fractures.

2.12.3. Michael Barratt Brown Seminar Room MH/F/15 Defects Diagram



2.13. I.T.C Teaching Room 1 MH/F/10

Methods Employed for Survey: visual inspection, tactile push test.

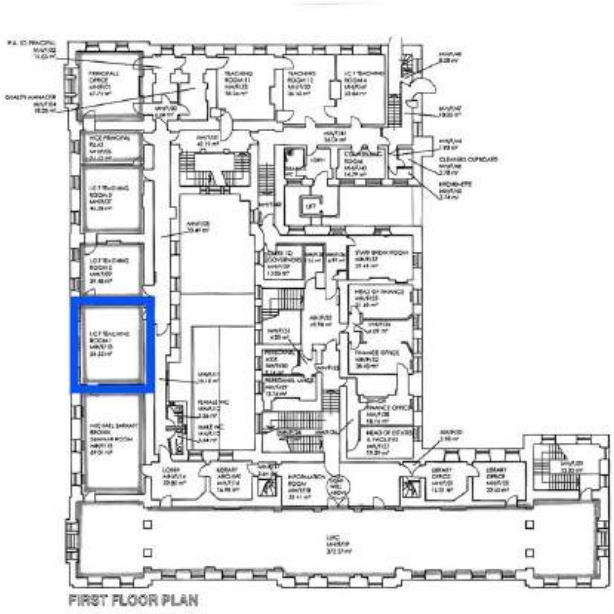


Figure 86. Location of I.T.C. Teaching Room 1.

Figure 87. I.C.T. Teaching Room 1 Plaster Ceiling.

- Hairline fractures were observed throughout the ceiling and through multiple painted panels (Fig.88).
- Map crazing was found in multiple panels (Fig.89).
- Possible water ingress was observed on a painted panel. The water ingress appears to have caused damage to the painted work (Figure 90).
- There were variations in the paintwork noted throughout the ceiling. Areas of loss to the painted detail were noted, specifically in areas where fractures and possible ingress were most severe. Additionally, fading and flaking and variations in colour were observed throughout the painted panels.
- Paint loss and fading was noted on the detailed plaster border (Fig.91).
- There was the potential of two different materials used in the ceiling, plasterboard was suspected to be used in the border.
- Tactile testing found the ceiling to be stable and secure.

2.13.1. I.T.C. Teaching Room 1 MH/F/10 Recommendations

- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.

2.13.2. I.T.C. Teaching Room 1 MH/F/10 Images

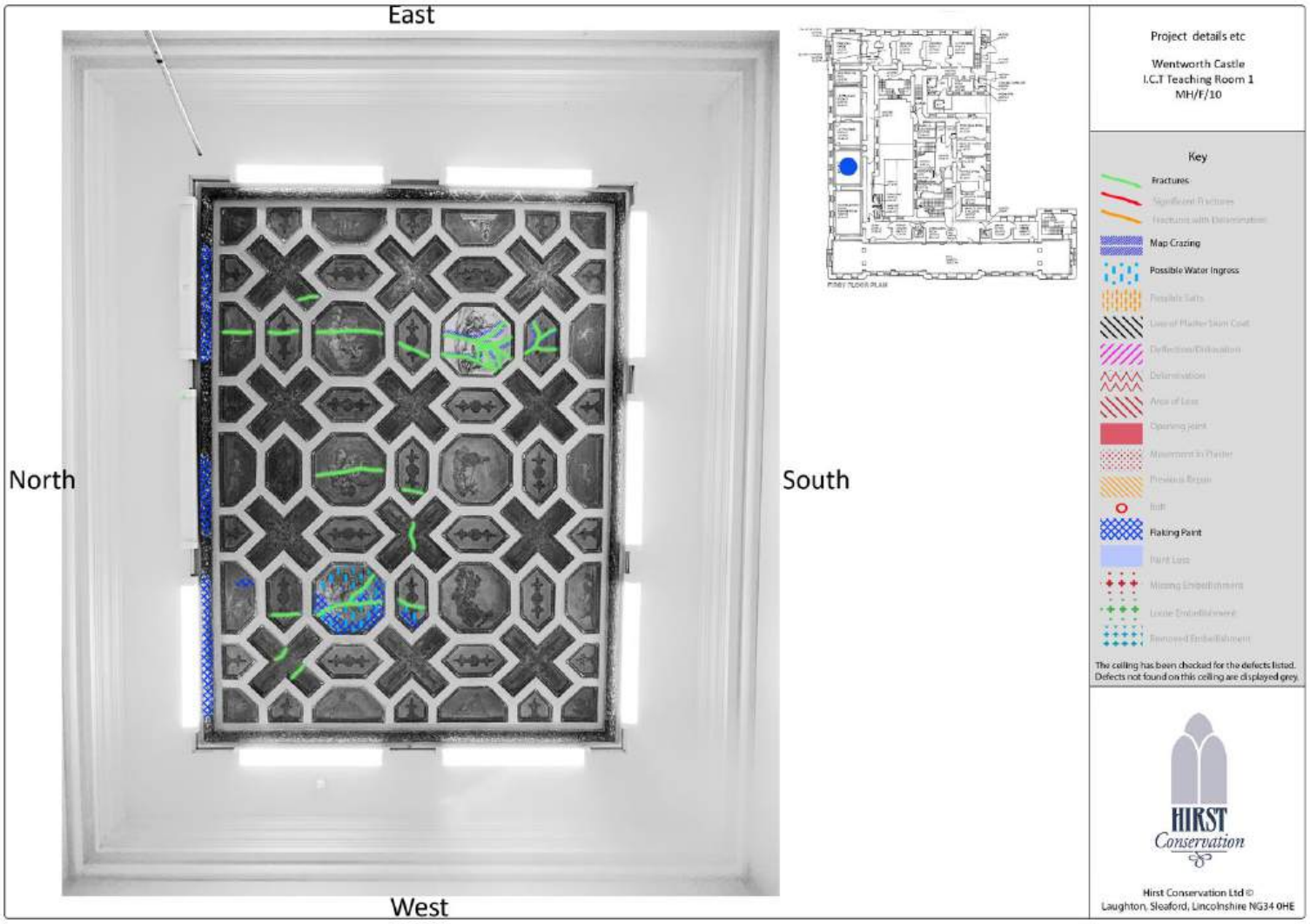
Figure 88. Hairline fractures found throughout the ceiling.

Figure 89. Map crazing found on a painted panel.

Figure 90. Possible water ingress resulting in paint loss and discolouration.

Figure 91. Fading noted on the painted decorative plaster border. Hairline fractures visible throughout.

2.13.3. I.T.C. Teaching Room 1 MH/F/10 Defects Diagram



2.14. I.C.T Teaching Room 2 MH/F/09

Methods Employed for Survey: visual inspection, tactile push test.

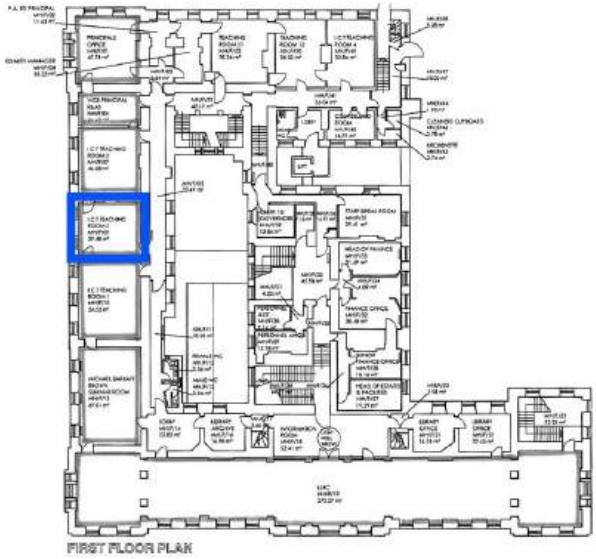


Figure 92. I.C.T. Teaching Room 2 Location.

Figure 93. I.C.T Teaching Room 2 Ceiling.

- Multiple fractures observed throughout the ceiling expanse with a significant fracture running though the central panel from East to West. Multiple hairline fractures form out of the larger significant crack (Fig.94).
- Possible water ingress was observed resulting in discolouration of the painted detail (Fig.95)
- Areas of paint loss, flaking, and fading were noted throughout the painted ceiling panel (Fig.96).
- The perimeter ceiling could be composed of a different material form the inner painted ceiling, however, this requires further assessment.

2.14.1. I.T.C. Teaching Room 2 MH/F/09 Recommendations

- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.

2.14.2. I.T.C. Teaching Room 2 MH/F/09 Images

Figure 94. Multiple fractures run from the central significant fracture.

Figure 95. Possible water ingress observed around fracture.

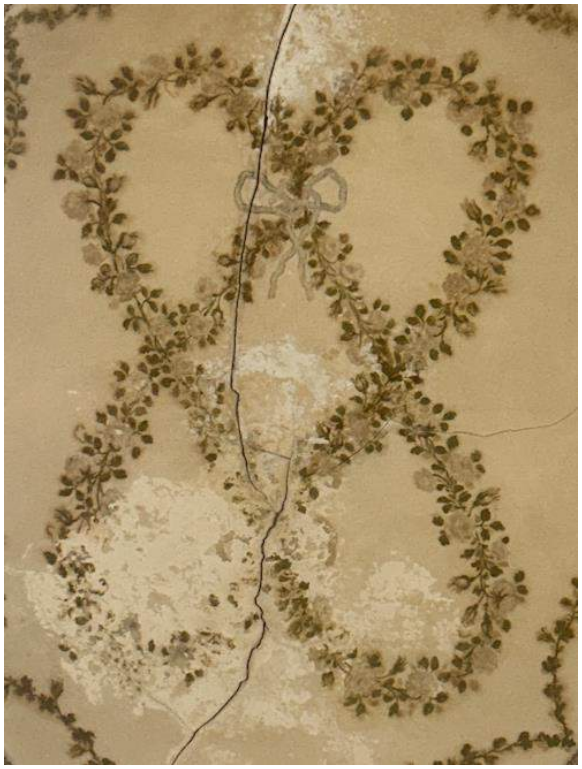
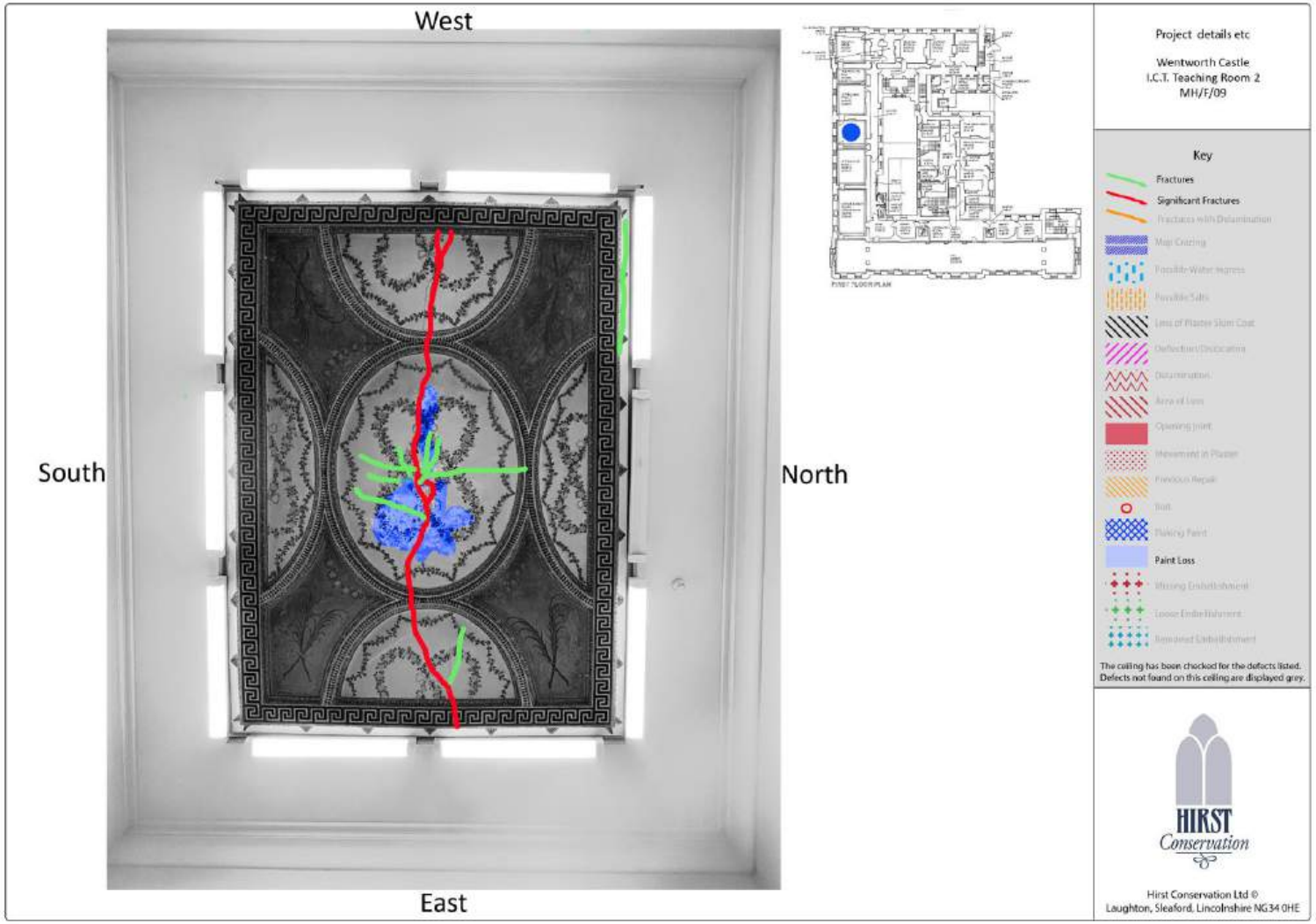


Figure 96. Paint loss, flaking, and fading seen throughout the painted ceiling expanse.

2.14.3. I.T.C. Teaching Room 2 MH/F/09 Defects Diagram



2.15. I.C.T Teaching Room 3 MH/F/07

Methods Employed for Survey: visual inspection, tactile push test.

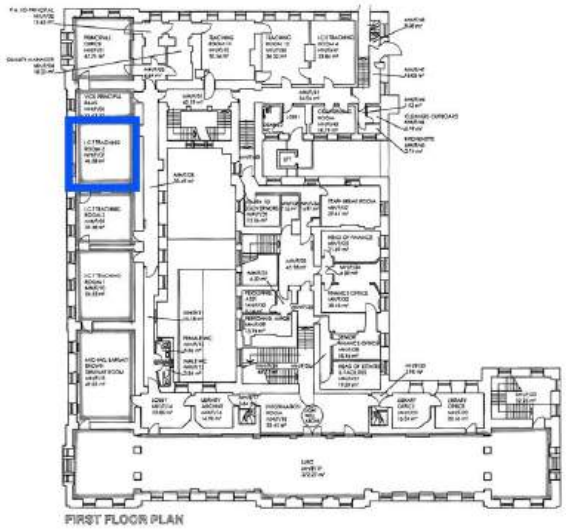


Figure 97. I.C.T. Teaching Room 3 Location.

Figure 98. I.C.T. Teaching Room 3 Ceiling.

- Multiple fractures were observed throughout the ceiling expanse (Fig.99). Fractures were found on the mitred corners and along the cornice (Fig.100 and Fig.101).
- Deflection was noted along multiple fracture lines.
- Possible water ingress and staining was observed (Fig.102).
- Tactile push test revealed some movement was present in the ceiling.
- Previous repairs were found in the form of some localized areas which had been previously filled.

2.15.1. I.T.C. Teaching Room 3 MH/F/07 Recommendations

- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system. Additionally, this would aid in pinpointing the possible cause of movement in the ceiling and inform the best course of action for stabilization, if required.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.

2.15.2. I.T.C. Teaching Room 3 MH/F/07 Images

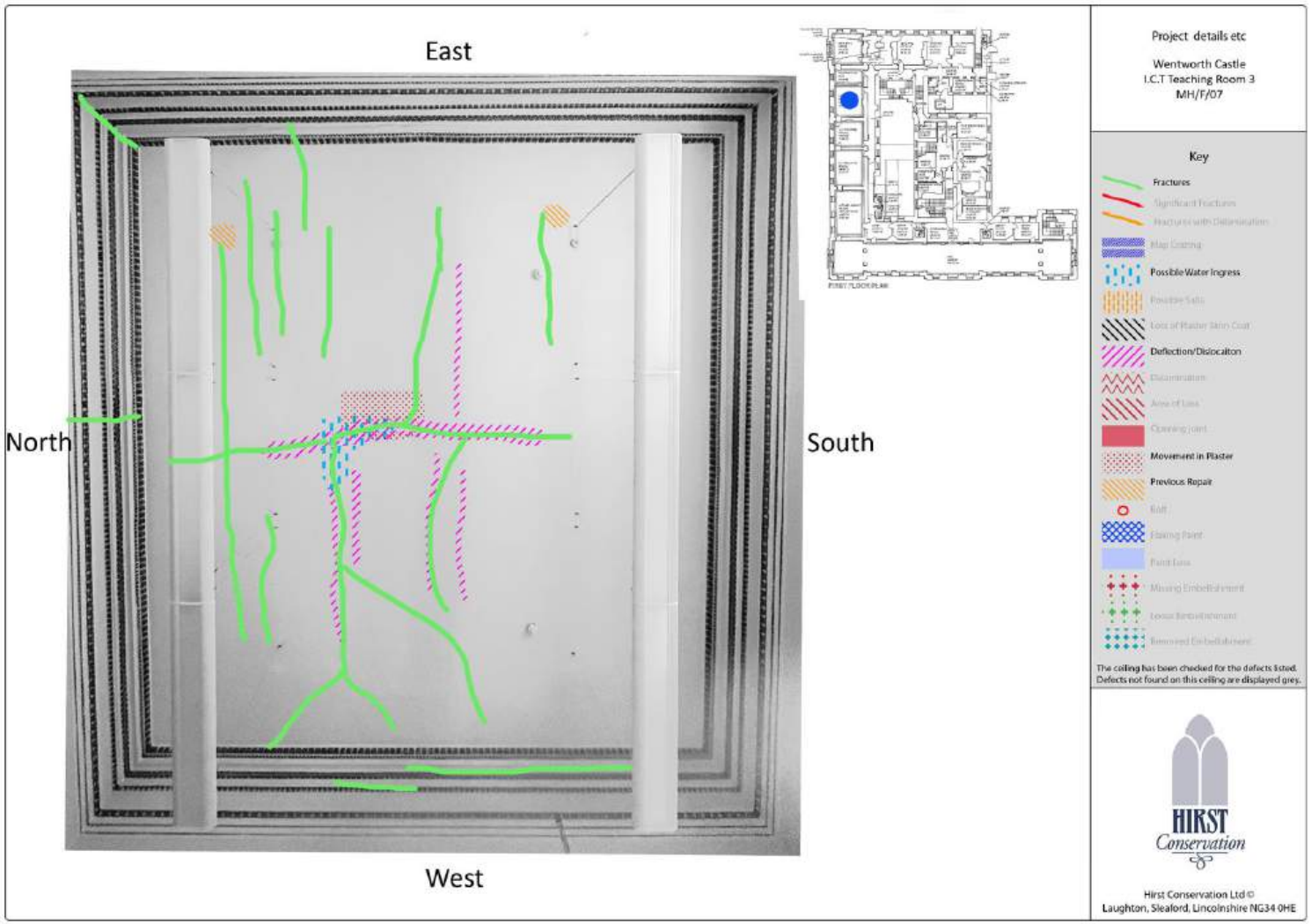
Figure 99. Fractures found running along the ceiling expanse.

Figure 100. Fractures found along the cornice.

Figure 101. Fracture running along cornice.

Figure 102. Possible water ingress visible surrounding fractures.

2.15.3. I.T.C. Teaching Room 3 MH/F/07 Defects Diagram



2.16. Vice Principal R&AS MH/F/06

Methods Employed for Survey: visual inspection.

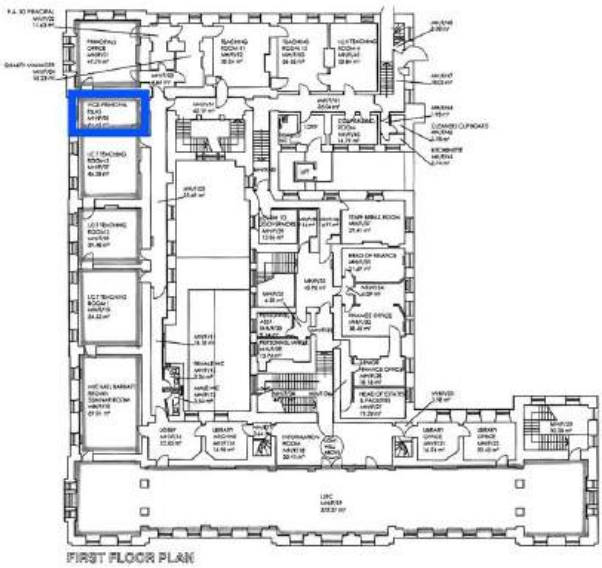


Figure 103. Vice Principal's Office Location.

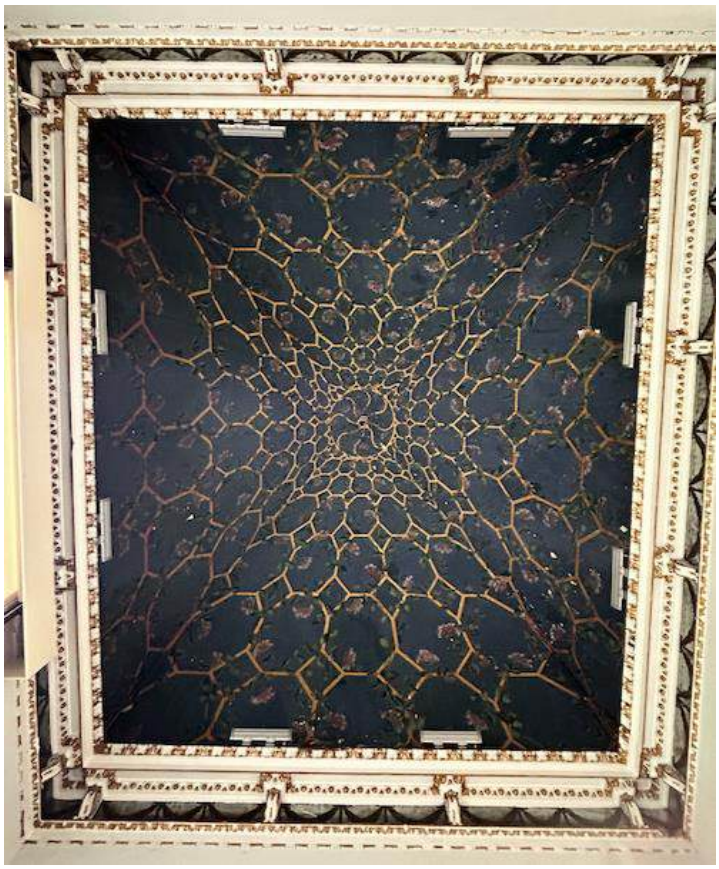


Figure 104. Vice Principal's Office Decorative Ceiling.

- There are multiple fractures noted throughout the ceiling including some significant fractures (Fig.105). The wider and more significant fractures were often found on the edges of the ceiling coves. Fractures were noted down the mitred corners. Some fractures extend into the cornice. Cracks were also found to extend into the mirrored frieze, causing cracks, breaks, and glass in the painted mirrors (Fig.106).
- Multiple of the painted mirrors of the frieze were cracked or missing (Fig.107).
- Possible water ingress and staining was observed.
- Multiple enrichments were noted to be missing.
- There is a significant loss of the painted detail throughout. Flaking and areas of loss were observed throughout (Fig.108)). Additionally, portions of the paintwork were noted to be discoloured (Fig.109 & 110).
- Previous fills were observed reflecting previous intervention.

2.16.1. Vice Principal R&AS MH/F/06 Recommendations

- A closer in-depth tactile survey is recommended to fully understand the level of damage and stability of the structure of the ceiling.
- If possible, it would be beneficial to access the upper side of the ceiling to fully understand the condition of the ceiling structure and support system.
- It is important to understand if the ingress is ongoing and requires intervention or is stable.
- For aesthetic considerations the hairline fractures can be filled and painted. Areas of loss and flaking can be consolidated and retouched.

2.16.2. Vice Principal R&AS MH/F/06 Images

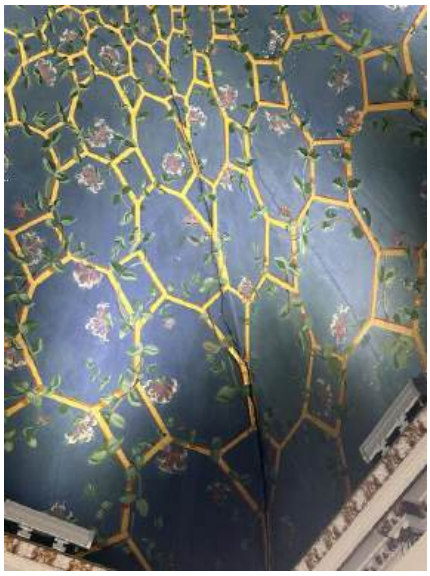


Figure 105. Significant crack running down mitre of cove.

Figure 106. Crack running through cornice and causing a break in the mirrored frieze panel.

Figure 107. Loss of mirrored frieze panel.

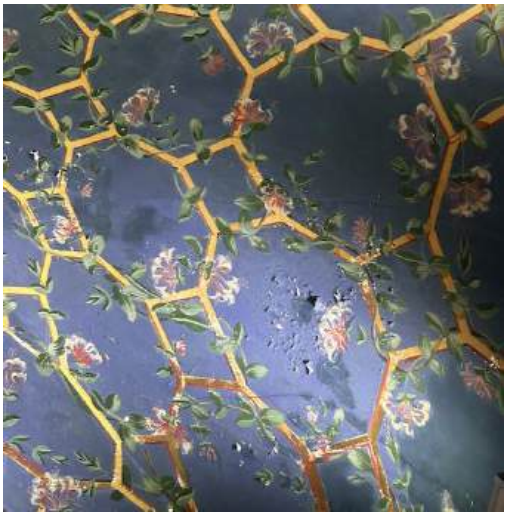
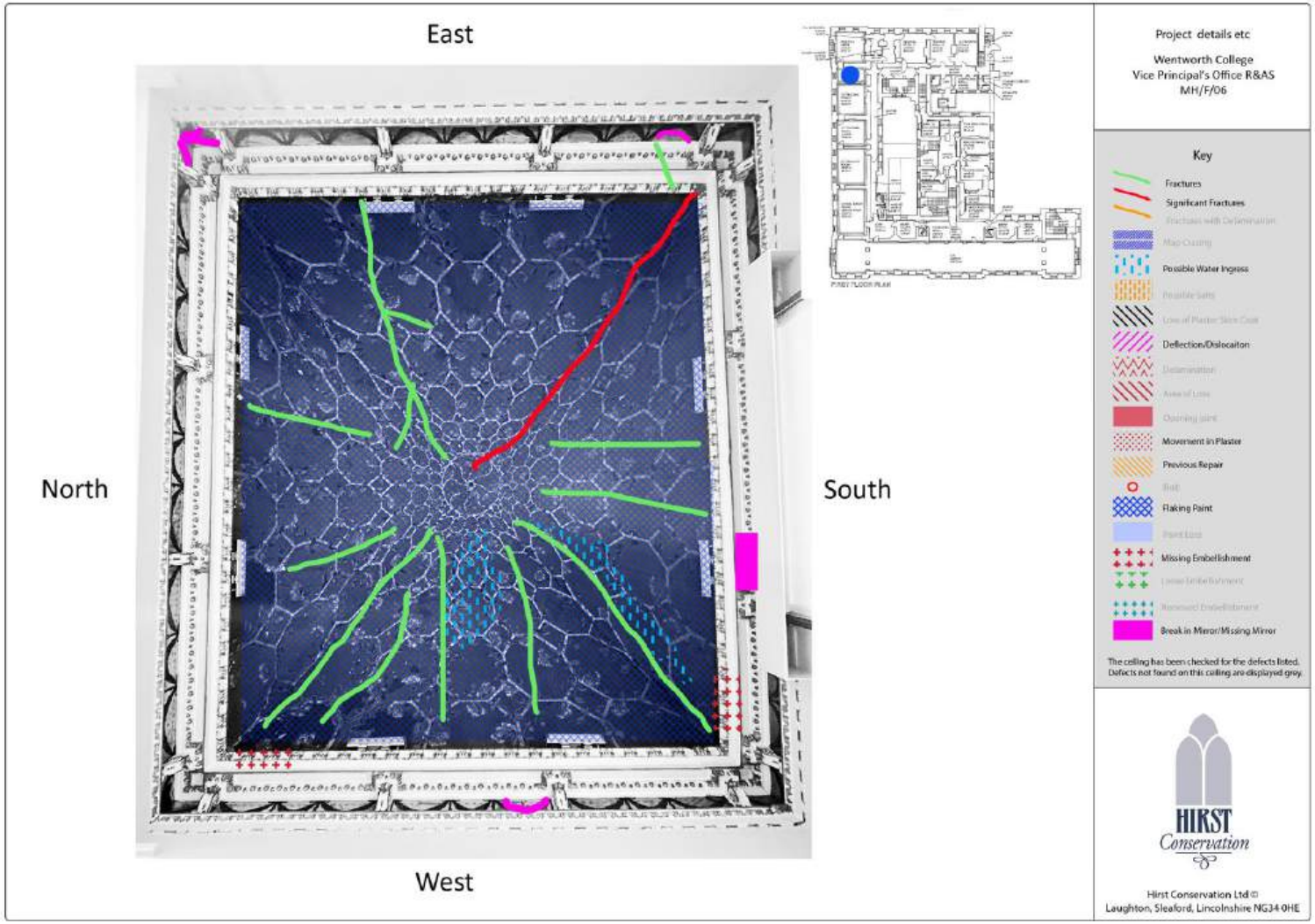


Figure 108. Significant paint flaking and loss throughout ceiling.

Figure 109. Discolouration noted in the paintwork.

Figure 110. Loss, flaking, and discolouration visible.

2.16.3. Vice Principal R&AS MH/F/06 Defects Diagram



2.17. Principal's Office MH/F/01

Methods Employed for Survey: visual inspection and tactile inspection or underside and upper side of ceiling.

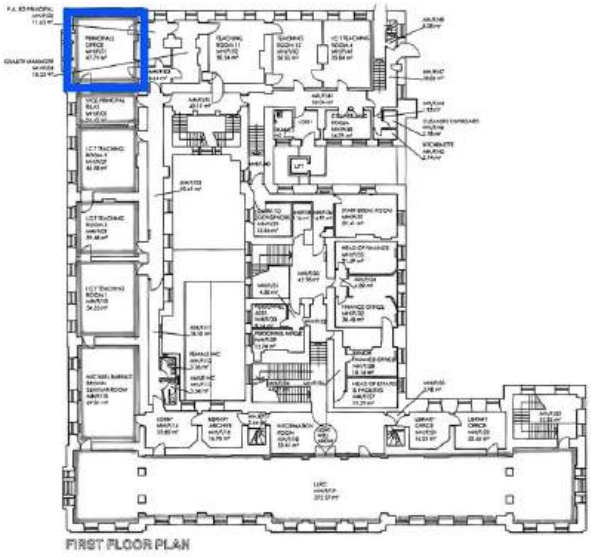


Figure 111. Principal's Office location.

Figure 112. Principal's Office Ceiling.

2.17.1. Principal's Office MH/F/01 Under Side of Ceiling

- Multiple hairline fractures were observed throughout the ceiling (Figure 113 & 114). Fractures were found extending into the cornice (Figures 115 & 116).
- Possible water ingress or staining was observed.
- Paint loss was observed along many of the fracture lines. Paint loss, flaking, and fading was found throughout the ceiling. Areas of discolouration and possible overpainting were noted (Figure 117).

2.17.2. Principal's Office MH/F/01 Upper Side of Ceiling (Figure 118).

- Nibs were found to be present but were found to be in poor condition (Fig.118).
- Nibs were found to be intermittent with some missing (Fig.119).
- Laths were found to be tightly spaced but were not found to be springing.
- Timber boards were found resting directly on top of the plaster laths and nibs adjacent to the main beans, their purpose and reason for placement is unknown.

2.17.3. Principal's Office MH/F/01 Recommendations

- Consolidation methods can be employed to ensure the stability of the ceiling due to the lack of solid nibs and laths.
- The boards found in the underside of the ceiling should be removed if found to have no securing purpose.

2.17.4. Principal’s Office MH/F/01 Images

Figure 113. fractures found along the ceiling expanse.

Figure 114. Fractures found along the ceiling expanse.

Figure 115. Fractures running through cornice.

Figure 116. Fractures running through cornice.

Figure 117. Paint loss and flaking visible.

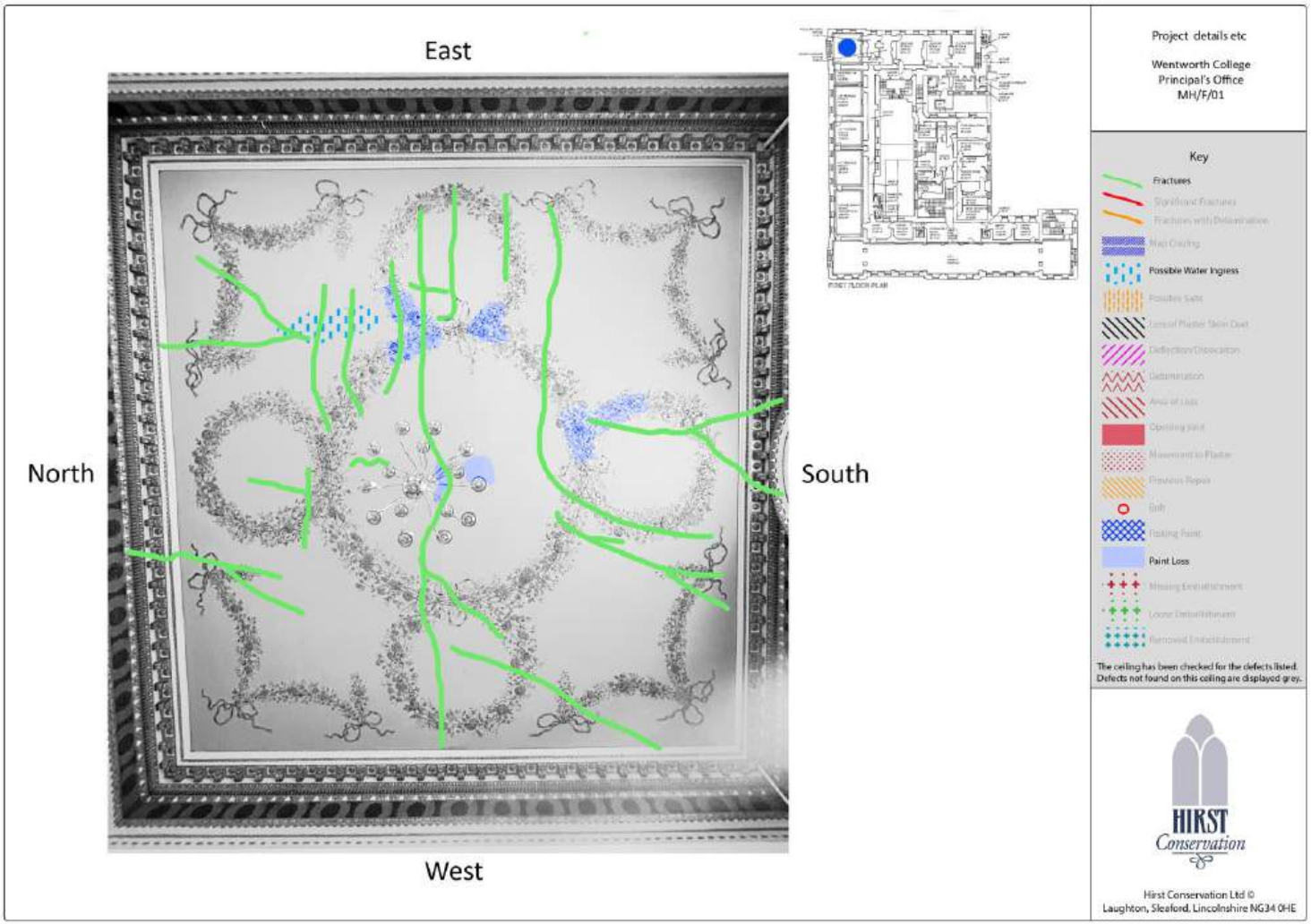
Figure 118. View into the upper side of the Principal's Office ceiling.

Figure 119. View of laths and nibs, many nibs are missing.

Figure 120. View of laths and nibs, laths are tight and nibs are sparce.

Figure 121. Timber board seen resting on plaster laths and nibs.

2.17.5. Principal's Office MH/F/01 Defects Diagram



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