

High Level Masonry Project
Tactile safety inspection of high-level fabric

REPORT
HOLYROOD ABBEY
PIC223



October 2022



HISTORIC
ENVIRONMENT
SCOTLAND

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CONTROL SHEET

Document Control

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Authors:	

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Version Control

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V0001	20/10/2022	Draft	[REDACTED]	First draft
V0002	15/11/2022	Approved	[REDACTED]	Final draft
V0400	16/11/2022	Approved	[REDACTED]	Reviewed&Approved

Template version: PICxxx-T1C-HLF-REP-YYYYMMDD-X-V0400-Report

High-Level Tactile Inspection: Report - Introduction



PIC ID # ↓	PIC223	Site name	Holyrood Abbey		
Inspection start	30/05/2022	Inspection end	18/10/2022	Submission	16/11/2022
Lead inspector	[REDACTED]				
Other inspectors	[REDACTED]				

Introduction:

The HLM Inspection Team assessed 10 out of 11 High Level Inspection zones. Access was achieved from a range of MEWPs and ladders. The internal East end of the abbey was not inspected as being scaffolded during the inspection of the interior.

HLF Inspection Risk Matrix:

HES-T1C-HLF-RAS-X-X-V0300-RiskMatrix

Consequence \ Probability		1	2	3	4	5
		No injury	Minor injury	Moderate injury	Major injury	Fatal or life-altering injury
5	Fabric fall almost certain	5	10	15	20	25
4	Fabric fall highly likely	4	8	12	16	20
3	Fabric fall likely	3	6	9	12	15
2	Fabric fall unlikely	2	4	6	8	10
1	Fabric fall highly unlikely	1	2	3	4	5

RISK RATING	RISK SCORE RANGE
High	15 - 25
Medium	10 - 14
Low	1 - 9

Re-inspection frequency: (in years)

[REDACTED]



		Annual Visitor Numbers				
		up to 5 k	5-20 k	20 - 100 k	100k - 2m	over 2 m
Identified Risk Rating	Low	5 years	5 years	5 years	4 years	4 years
	Medium	3 years	3 years	2.5 years	2 years	2 years
	High	1 year	1 year	1 year	1 year	0.5 year

Link to 3D model:

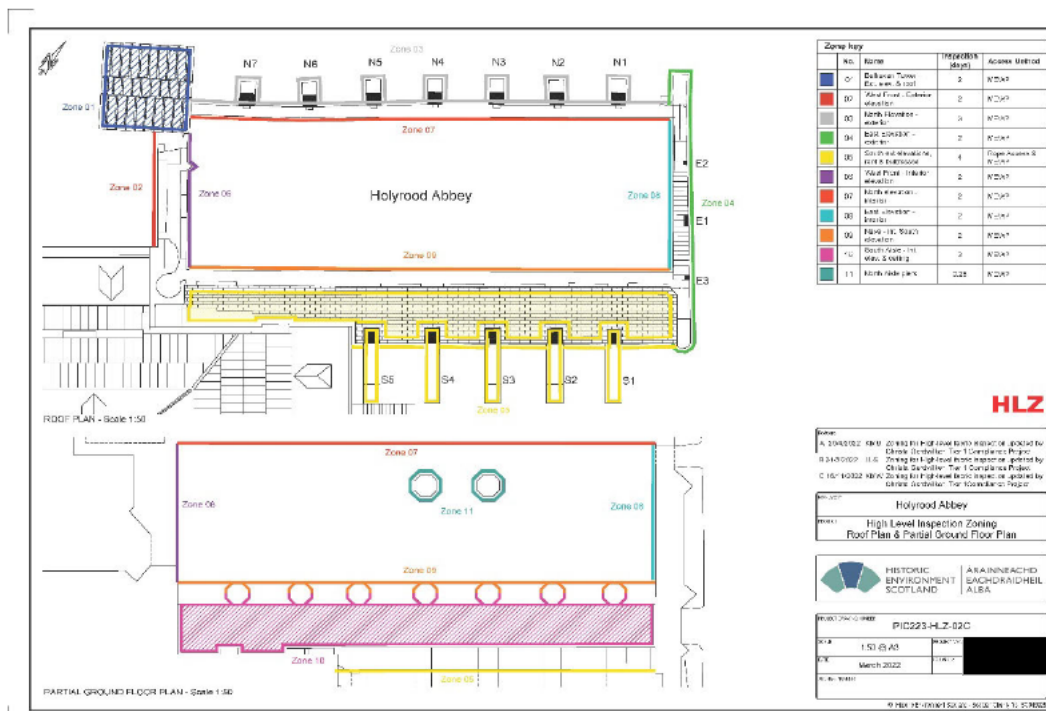
[Holyrood Abbey 3D Model](#)

HL Zones:

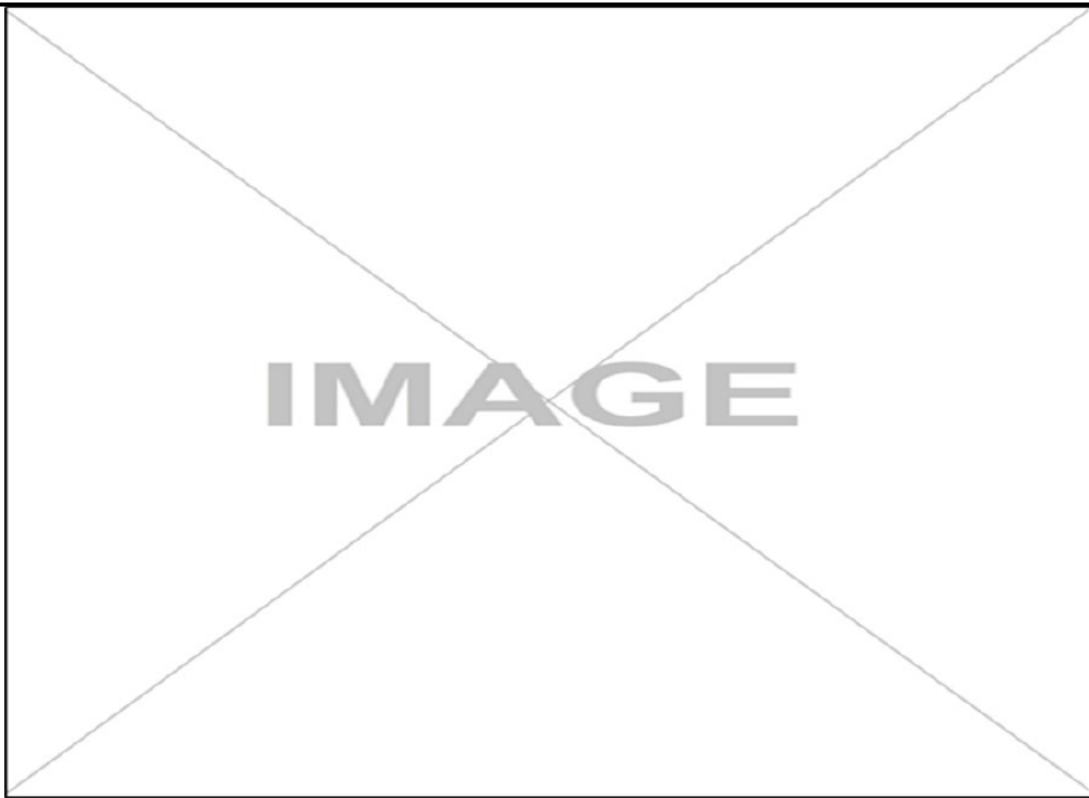
Zone:	Colour:	Zone Name:
1		Belhaven Tower - exterior elevations and roof
2		West Front - exterior elevation
3		North Elevation - exterior
4		East Elevation - exterior
5		South exterior elevations, roof & buttresses
6		West Front - interior elevation
7		North elevation - interior
8		East elevation - interior
9		Nave - interior South elevation
10		South aisle - Interior elevations and ceiling
11		North aisle piers



Click on link below image to open drawing in PDF viewer:



[PIC223-HLZ-02C](#)



High-Level Tactile Inspection: Report - Summary dashboard



PIC ID#	PIC223	Site name	Holyrood Abbey	
Submission	16/11/2022	Number of zones	11	
Select zone of which data should be displayed ↓	All zones	Number of observations	147	

Identified Risk



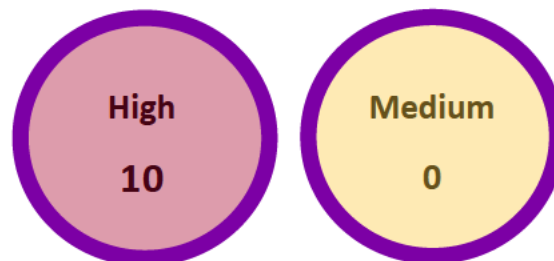
Residual Risk

After Inspection Action



Residual Risk

Mitigated with applied Access Restriction in place



Inspection Action:

Class V Report = Fabric detached during tactile inspection	Access Restriction = Risk of fabric falling and causing harm			Monitor Observation / Plan Repairs = No immediate action
	Full site, notifiable	Partial site, notifiable	Partial site, not notifiable	
23	0	0	10	114

Inspection types:	Tactile	144	Visual	3
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Key comments:

KEY FINDINGS

The originally blond sandstone predominantly used in the construction of the now ruined and roofless abbey is prone to suffering surface delamination and scaling. Previous consolidation repairs to the North elevation in particular are now failing. Exposed carved details is at particular risk of larger fabric falls. Access restrictions



have been put in place for most of the exterior North elevation while preventive mitigating action was taken in relation to high risk defects on the external South and East elevations. The large arched openings of the East and West elevations are, by their overhanging nature and exposure, particularly vulnerable to decay. Much of the West elevation has been conserved in recent years. The abbey has been extensively cement pointed which has led to accelerated erosion of arises. The joints on the difficult to access external nave of the South nave clearstorey are hungry.

PREDOMINANT RISKS:-

- Predominantly structural defects (cracks) were observed on Belhaven Tower which are largely if not completely known by the engineers and estates team.
- The ceremonial West entrance has been partially netted following conservation of carved ornament. Some of these repairs have failed and have been prevented from falling by the netting. The netting is therefore effective but needs to be regularly checked to remain so.
- In general, surface scaling and delaminations resulting in bossing, opening of bedding laminae and partial or full detachment were found to result in the main risk of fabric fall. In most cases, this would be in small/thin sections. Projecting elements, overhanging hood mouldings and face-bedded columns and tracery are at particular risk of larger delaminations and fabric detachment.
- Surface scaling and delamination of face bedded stones particular affect the North elevation buttresses, their finials, armorial panels and the North doorway ornament. As a result, an access restriction for this area has been put in place.
- A number of loose stone scales and a couple of detached roof tile fragments were removed from the South and East elevations in particular as they became detached during the inspection or were deemed too unsafe to leave in situ. A separate Class V report for material removed during the first inspection phase (of the exterior) has been issued.
- One dangerous stone fragment was removed from the interior South nave clear storey and retained in accordance with updated procedures in compliance with the revised Section 17 regulations. No further high risk OBS were identified in the inspected areas of the more sheltered abbey interior.

High-Level Tactile Inspection: Report - Access Scope



PIC ID #	PIC223	Site name	Holyrood Abbey
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Access methods: Select all methods used to conduction inspection ↓

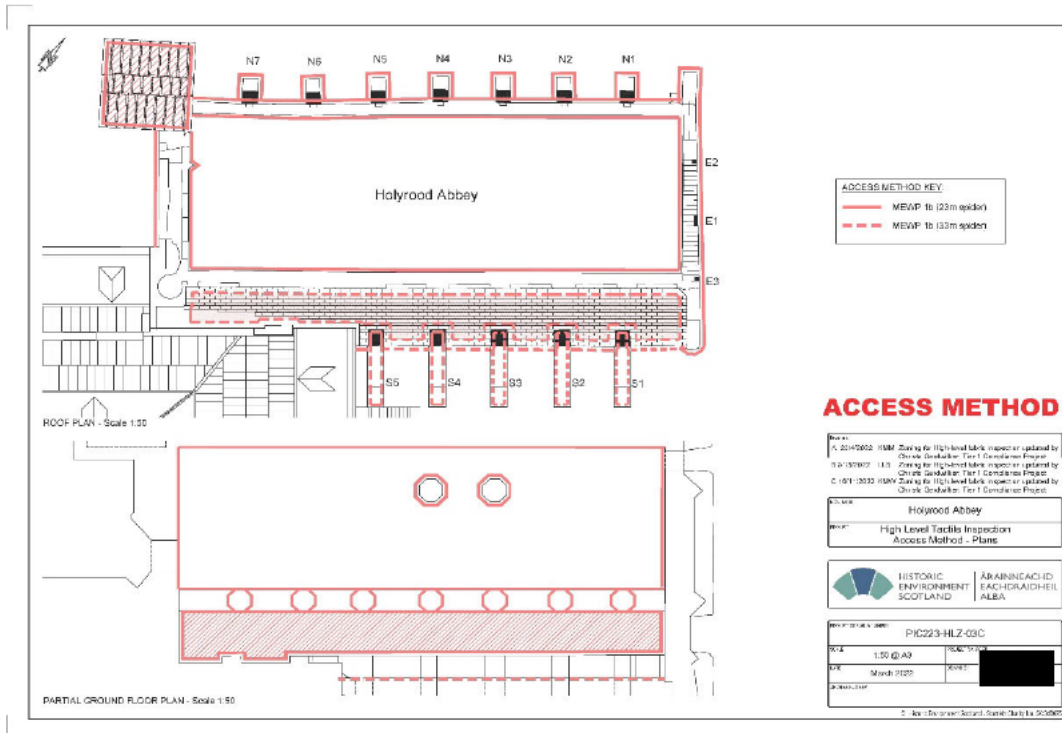
MEWP	Yes	Design Scaffold		Alloy Tower Scaffold	
Rope Access		Steeplejack		Ladder	Yes
Ground	Yes	Binoculars / Photo		UAV	
	Yes				
	Yes				

Inspection info:

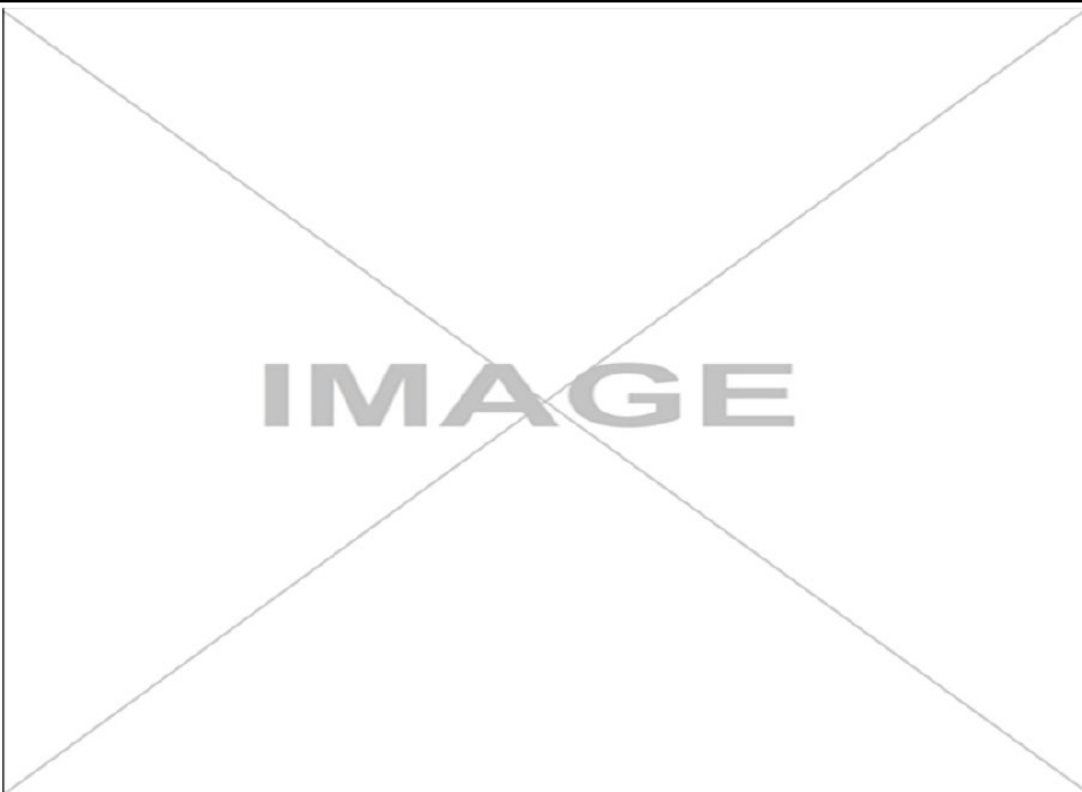
	A tactile inspection was carried out on all inspected zones with the exception of the Belhaven tower and South aisle roofs where only visual inspections could be carried out. The area between the palace North elevation and the abbey South aisle could also only be visually inspected. All reasonable effort is taken to note all defects which may result in a fabric fall and, where necessary, mitigate their risk. Nonetheless, there is always a chance that some defects may be missed due to the viewing angle, light as well as human nature.
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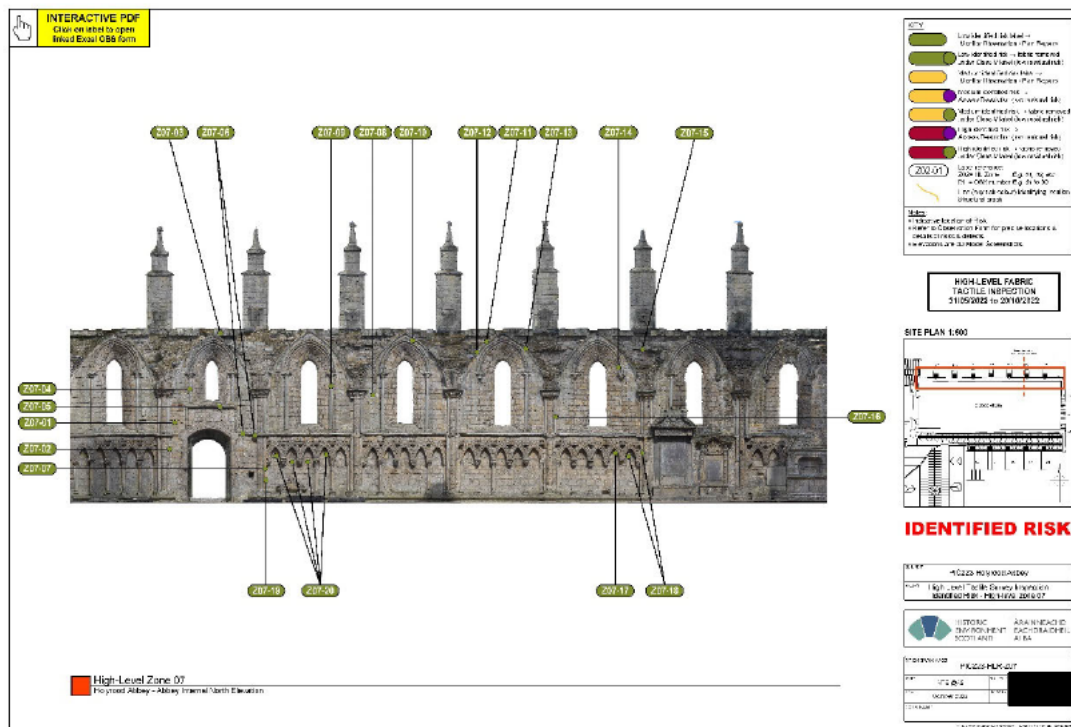
Areas not inspected:	The East end of the abbey interior could not be inspected as it was being scaffolded during the interior phase of the HLM Inspection. This includes all of zone 8 and the East end (two most easterly bays) of zones 7 and 9.
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Click on link below image to open drawing in PDF viewer:

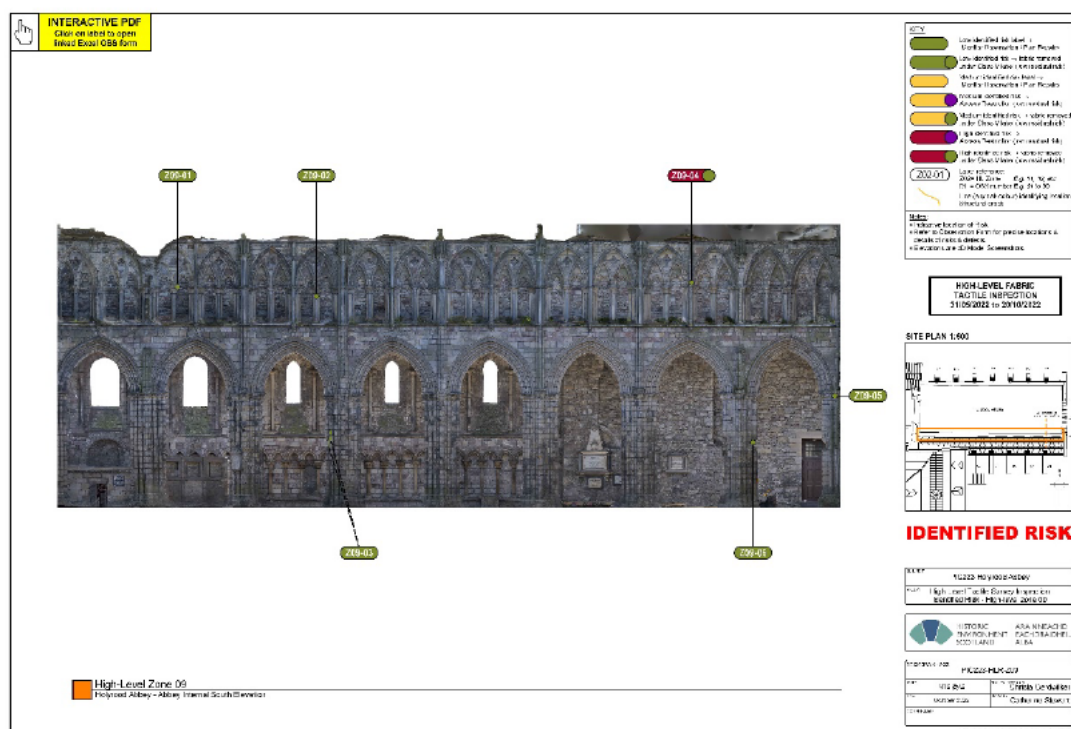


[PIC223-HLZ-03C](#)





[PIC223-HLR-Z07](#)



[PIC223-HLR-Z09](#)

Click on link below image to open Interactive PDF in PDF viewer. In PDF viewer, the drawing is an interactive PDF, click on the labels to open the relevant OBS form for further information.



INTERACTIVE PDF
Click on text to open
Hazard Excess OBS form

High-Level Zone 10
Holyrood Abbey - Abbey South Nave - Internal South Elevation

High-Level Zone 11
Holyrood Abbey - Abbey North Aisle Pass

KEY	Low level to use - 1
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	Low level to use - 100

LEGEND

High-Level Fabric
Tactile Inspection
Z10-002 to Z10-012

SITE PLAN 1:600

IDENTIFIED RISK

KEY

1:222 Holyrood Abbey

High-Level Tactile Inspection
Z10-002 to Z10-012

LEGEND

High-Level Fabric
Tactile Inspection
Z10-002 to Z10-012

INTERACTIVE PDF

PIC223-HLR-Z10-11

DATE: 10/10/2023

USER: [REDACTED]

STATUS: [REDACTED]

ISSUE: [REDACTED]

1:222 Holyrood Abbey

[PIC223-HLR-Z10 11](#)

Click on link below image to open Interactive PDF in PDF viewer. In PDF viewer, the drawing is an interactive PDF, click on the labels to open the relevant OBS form for further information.

202210-Holyrood Abbey-ConditionReport

Section 6



Click on link below image to open drawing in PDF viewer:

RESTRICTION KEY:
 Barrier
 Access Restriction

Notes:
 • Access Restrictions in place to all High Risk areas, unless labels is removed under Class V.
 • Inductive location of fish.
 • Refer to Observation Form and Report for precise locations & details of risks.
 • Other dates to be determined by the Report.

HIGH-LEVEL FABRIC TACTILE INSPECTION
 31/05/2022 to 28/10/2022

ACCESS RESTRICTIONS

PIC223 - Holyrood Abbey
 High Level Fabric Tactile Inspection
 Residual Access Restrictions

HISTORIC ENVIRONMENT SCOTLAND | ARABINICACHID, EACHDRAIGHTEL ALBA

PIC223-HLR-RAR-01

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 October 2022

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