

4.4.2.3 Priority 3 Works

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
All Elevations	Brickwork pointing and red over pointing is coming away in places allowing potential moisture ingress.	Allow to rake out and re-point defective pointing and cover pointing throughout.	£20,034.00	1.1.4 – External Walls
All Elevations	Efflorescence and minor algae build up noted to all elevations.	Allow to carefully wash and brush away efflorescence staining.	£6,678.00	1.1.4 – External Walls
All Elevations	Copper lightning protection aged and approaching end of reasonable life.	Replace lightning protection to entire structure.	£8,162.00	1.1.13 – Lightning Protection
All windows	Isolated damage to stonework cills/ window surrounds.	Carry out isolated stonework repairs.	£2,671.00	1.1.4 – External Walls
Tropical and Temperate Room Elevations	Low level rising algae and efflorescence staining noted.	Allow to carefully wash and brush away algae and efflorescence staining.	£2,671.00	1.1.4 – External Walls

4.4.2.4 Priority 4 Works

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
Temperate Room South Elevation	Newly re-built brick pediment above main entrance in a fair condition. Minor efflorescence noted.	Allow to carefully wash and brush away efflorescence staining.	£668.00	1.1.4 – External Walls

4.5 INTERNAL AREAS

4.5.1 GENERAL DESCRIPTION AND CONDITION

Please note our comments below are in relation to the building fabric only and do not include a review of the fixtures and fittings within the Temperate, Tropical and Bird Room.

4.5.1.1 Floors

The floor covering type is consistent throughout the winter gardens with a grey/ blue textured block paving set on a solid concrete slab.

To the internal areas of the main building there is a combination of vinyl, carpet and tiled flooring. The flooring was generally noted to be in a fair condition throughout with wear and tear in places.

Generally, the tiled floor is in a fair condition albeit soiled throughout which is expected due to the properties use. A number of floor paving tiles primarily to the perimeter of the floor space has lifted making the flooring loose. It is recommended that any loose floor tiles are re-fitted.

To the central section of the Temperate Room sees a duct cover with retrofitted paving tile inlays. A number of tiles are cracked leaving a potential trip hazard; tiles beyond repair should be replaced to match existing.

4.5.1.2 Walls

The internal walls are fair faced red clay brickwork throughout. As with the external elevations the walls are defined by rusticated brick pilasters supporting entablature with brick mouldings. To each elevation structural semi-circular brick arches with a combination of false window reveals and arched Crittall style steel windows set in timber sub-frames can be seen.

The internal areas of the main building comprise painted plaster and feature panelled timber walls which appear to be veneer.

As with the externals, spalling of brickwork is common throughout the internal face of the walls. Evidence of repaired brickwork can be seen to the Tropical Room. It is recommended that all spalled brickwork is repaired where possible and replace any bricks beyond repair with a suitable match. It is also advised that loose red mortar is hacked off and replaced with a lime-based mortar.

Significant damage was noted to high level brickwork running along the horizontal entablature, specifically the brick cornice band. Damaged bricks should be carefully cut out and replaced with bricks to match existing.

Efflorescence and minor algae build up was noted to all elevations at high and low level. High level efflorescence and algae build up within the Temperate and Bird Room correlates with the external stepped lead valley gutters which are to be repaired. Following external repairs brickwork should be carefully brushed/ cleaned to remove staining. It is likely that constant moisture would have led to a breakdown in the pointing, where damaged; pointing should be raked out and replaced with a lime mortar.

Within the Temperate Room to the North elevation wall there is significant damage to two number brick piers at low level. It is assumed that damage is as a result of previous works. It is advised that damaged/ loose brickwork is cut away, following this re-build the brick pier.

A timber framed, glazed panel storm lobby with GRP roof has been added to the main point of entrance into the Temperate Room. Generally, the lobby is in a fair condition, although decorations would benefit from renewal. The GRP roof is aged with vegetation build up from the internal trees/ plants.

4.5.1.3 Frame and Structure

Internally the winter gardens dome roof is of riveted iron construction with round arches resting on decorative wrought iron Corinthian columns. Glazing frames are steel and rest on a timber purlins/ top plate that runs the perimeter of the Temperate, Tropical and Bird Room walls at eaves level.

From a visual inspection the ironwork appeared structurally sound. The decorative/ intumescent coating applied to the iron structure however has failed throughout with finishes flaking significantly and signs of corrosion apparent; particularly to the 'I' beams. It is recommended that the existing finish is removed, a corrosion inhibitor applied followed by re-application of an intumescent coating. The decorative finish to the Corinthian columns was generally fair, however would benefit from minor redecoration.

From a high-level inspection taken from the scaffold, it was noted that isolated lengths of the timber purlins/ top plates to the eaves perimeter of each room have experienced signs of rot. Fixing failures were also apparent where the steel window frame has been fixed to the plate. It is advised that lengths of the timber purlins/ top plate are renewed with surrounding, sound members treated to prevent further degradation.

Between lengths of rounded iron 'I' beams moulded; timber cornice details have been fitted. Rot is evident to isolated end sections of timber. It is advised that rotten timber is replaced, where rot is minor new timber details should be spliced in and decorated on completion. At high level plywood skirting has been fitted to the perimeter of the dome. Sections of timber skirting are missing and should be replaced; all existing timber should be redecorated.

4.5.1.4 Internal Doors

Four sets off arched bolection panelled timber double doors with glazed vision panels in keeping with the design of the bay windows connect the Temperate, Tropical and Bird Room.

The left hand double doorset from the Bird Room to the Temperate Room are damaged at low level to both leaf's with entire sections of panels blown out of place. It is advised that the doorset is replaced to match existing.

Internal doorsets elsewhere are in a fair condition although decorations are tired. It is recommended that doors are redecorated to match existing as well as an overhaul of existing ironmongery.

4.5.1.5 Internal Windows

The same single glazed steel casement units set in timber subframes used to the external elevations of the property are incorporated internally on the East and West elevations of the Temperate Room looking in to both the Tropical and Bird Room.

To the Western internal elevation of the Bird Room, the left-hand timber glazed unit is rotten to the horizontal timber glazing bar as a result of water ingress from the damaged rainwater goods. Due to the localised rot it is advised that timber repairs are carried out.

To the South internal elevation of the Temperate room window cills and sub-frames are rotten in isolated locations as a result of rising damp. Due to the localised rot it is advised that timber repairs are carried out.

Internal windows elsewhere are in a fair condition although decorations are tired. It is recommended that windows are redecorated to match existing.

4.5.1.6 Joinery & Metal Work

Decorations to internal metalwork and joinery are generally in a poor condition. It is advised that decorations to timber and metalwork are carried out to match existing.

4.5.1.7 Vermin Infestation

Evidence of pigeon guano was noted at the time of inspection. A budget allowance has been included within our cost estimates as detailed below for any additional follow up inspections/treatments that may be required.

4.5.2 RECCOMENDED REMEDIAL ACTION

4.5.2.1 Priority 1 Works

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
Tropical Room	Areas of pigeon guano noted at high and low level.	Allow for a professional clean/ removal of guano throughout.	£5,194.00	1.1.14 – Vermin Infestation
Temperate Room Floor	Isolated cracked/ lifted floor tiles throughout causing potential trip hazards.	Allow to replace damaged and cracked floor tiles.	£5,342.00	1.1.8 – Internal Floors

4.5.2.2 Priority 2 Works

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
Temperate Room, Bird Room & Tropical Room High Level Timber Purlins/ Top Plate	Isolated lengths of purlins/ top plates to eaves perimeter of each roof rotten/ displaced.	Allow to replace rotten lengths of timber with new and treat/ re-fix existing sound members.	£20,940.00	1.1.11 – Joinery and Metalwork
Temperate Room, Bird Room & Tropical Room High Level Moulded Cornice	Rot is noted to edges of moulded timber cornice details.	Timber repairs to be carried out to lengths of rotten timber, where possible splice in sections where rot is minor.	£8,459.00	1.1.11 – Joinery and Metalwork
Temperate Room, Bird Room & Tropical Room Metalwork & Joinery	Internal finishes to metalwork and joinery flaking/ tired throughout allow materials to corrode/ degrade.	Allow to remove existing finishes and redecorate throughout to match existing.	£18,698.00	1.1.12 – Internal Decorations
Temperate Room, Bird Room & Tropical Room Walls	Significant spalling to brickwork throughout.	Allow to carry out repairs and replacement of spalled/ damaged clay brickwork.	£32,028.00	1.1.9 – Internal Walls
Temperate Room, Bird Room & Tropical Room Walls	Brick cornice/ soldier course to the perimeter of each room damaged/ missing brickwork throughout.	Allow to carry out replacement of damaged/ missing brickwork detail.	£5,476.00	1.1.9 – Internal Walls

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
Temperate Room, Bird Room & Tropical Room Floor	Textured block paving lifted throughout.	Allow to re-lay loose or lifted tiles.	£6,678.00	1.1.8 – Internal Floors
Temperate Room, Bird Room & Tropical Room Iron Structure	Intumescent coating to iron structure flaking throughout increasing the risk of corrosion.	Allow to strip off coating, treat corrosion and redecorate to match existing.	£39,771.00	1.1.10 – Frame and Structure
Temperate Room Walls	Significant efflorescence and algae growth to internal walls at high- and low-level causing breakdown of brickwork.	Following RWG repairs allow carefully rubbing down / cleaning off brickwork and carrying out isolated re-pointing where required.	£12,985.00	1.1.9 – Internal Walls
Temperate Room North Elevation Wall	Damage to two internal brick piers where works have been carried out.	Allow to repair brick piers to match existing.	£2,671.00	1.1.9 – Internal Walls
Temperate Room RWGs	Signs of defective joints to internally routed RWGs causing moisture ingress/ algae build up.	Allow for isolated repairs to internal RWGs sealing defective joints.	£1,113.00	1.1.3 – Rainwater Goods
Temperate Room Windows	Timber window cills and sub-frames rotten in isolated locations.	Allow to carry out isolated timber repairs to windows throughout.	£1,692.00	1.1.6 – Windows
Bird Room Windows	Internal windows to the Western Elevation of the Bird Room are rotten to the timber glazing bar.	Allow to carry out repairs to the timber glazing bar and redecorate upon completion.	£890.00	1.1.6 - Windows

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
Bird Room Wall leading to Temperate Room	Significant efflorescence and algae growth to internal walls at high level causing breakdown of brickwork.	Following RWG repairs allow carefully rubbing down / cleaning off brickwork and carrying out isolated re-pointing where required.	£3,339.00	1.1.9 – Internal Walls
Bird Room Doorset	Double doorset leading into Temperate Room damaged at low level to both door leafs.	Allow to replace double doorset to match existing.	£3,710.00	1.1.7 - Doors

4.5.2.3 Priority 3 Works

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
Temperate Room, Bird Room & Tropical Room High Level Timber Skirt	Sections of timber skirting are missing at high level between structural iron, other existing timber is tired.	Replace missing timbers and redecorate existing.	£9,646.00	1.1.11 – Joinery and Metalwork
Temperate Room, Bird Room & Tropical Room Doorsets	Double timber doorsets leading to Tropical Room and Bird Room ironmongery appears tired.	Allow to overhaul ironmongery to allow doorsets to operate freely.	£2,374.00	1.1.7 - Doors
Temperate Room storm lobby	GRP roof covering to storm lobby aged albeit structural sound.	Allow for renewal of storm lobby roof covering to match existing.	£1,113.00	1.1.11 – Joinery and Metalwork

4.5.2.4 Priority 4 Works

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
Bird Room Metal Staircase to Mansion Block	Metal staircase decorations tired in places.	Allow to decorate staircase to match existing to prevent corrosion.	£519.00	1.1.11 – Joinery and Metalwork

4.6 SERVICES

4.6.1 GENERAL DESCRIPTION AND CONDITION

The mechanical and electrical services within Avery Hill Winter Gardens are minimal. Original steel hot water pipes are situated within the glasshouse. The pipes run to the underside of the windows as well as at high level to the entablature across the perimeter of the rooms in a coiled formation. The Bird Room has a more recent heating installation at low level to the perimeter of the room.

The Low Temperature Hot Water (LTHW) is supplied from a single gas fired boiler within the main plantroom beneath the tower of the mansion block. The boiler is served via a dedicated gas meter. The LTHW system is pressurised with a dedicated pressurisation unit and expansion vessel. There is an LTHW circulating pump installed in the Tropical Room to serve the heating system within the building.

The boiler was installed in 2000, CIBSE Guide M recommends a lifecycle period of 20 years for gas fired boilers. The boiler and ancillary equipment appear to have been correctly maintained but consideration should be given to replacing it as it is now beyond its recommended lifecycle and could become a risk item.

Only a small section of redundant heating pipework remains at low level to the Temperate Room, the pipework is heavily corroded. It is recommended that a new heating system is installed to the glasshouse in accordance with consultation with Historic England.

There is a dedicated Cold-Water Mains (CWM) serving the building from a meter and isolating valve adjacent to the main road, it enters the building at low level in the Tropical Room and serves various standpipes in each room. It appears that the system does not comply with the current water regulations as there is no back-feed protection to prevent contamination of the CWM. There is no Domestic Hot Water (DHW) provision.

The electrical installation to the gardens is also limited. The supply is currently fed from the boiler room distribution board to a dedicated 100A three phase electrical sub-distribution board located in the Tropical Room, a 32A three phase supply feeds back to the plant room to supply the boiler control panel and from there to the boiler plant and associated ancillary equipment. Should all the services be separated from the mansion block the new supply should be fed to a dedicated switch room.

There is no lighting serving to the internal areas of the property.

A CCTV system has been installed to the externals of the property.

This report refers to the condition of the existing services. The feasibility of separating the winter gardens from the mansion block has been considered. There is potential for a dedicated plant room to be built as part of the new extension and either a new gas main and gas fired boiler installed, or as the complete heating system requires replacement, an alternative low carbon system, such as ground source heat pump, considered.

4.6.2 RECOMMENDED REMEDIAL ACTION

4.6.2.1 Priority 2 Works

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
All Areas Mechanical Services	Original mechanical heating system unused to Temperate and Tropical Room. More recent heating system to Bird Room.	Consider replacing existing LTHW plant and pipework to Historic England's requirements. (CIBSE Guide M recommended lifecycle 15-20 years)	£318,000.00	1.2.1 – Mechanical Services
	No back-flow protection on CWM serving building	Install cold water boost set with suitable break tank (AA air gap) to provide WRAS Fluid Category 5 Backflow Protection		
All Areas Electrical Services	Electrical supply limited, existing distribution board located in Tropical Room.	Install new supplies and lighting to winter gardens.	£132,500.00	1.2.3 – Electrical Services
	Fire detection system	Install new aspirated fire alarm panel system and fire control panel	£21,200.00	
	Intruder alarm	Install intruder alarm system including door contacts and dualtech detectors	£5,300.00	
	CCTV	Install internal (4 No. Fixed) and external (6 No. Fixed) CCTV cameras, containment, cabling and recording equipment.	£15,900.00	
	Data and telephone	Install data cabinet with PoE switch for CCTV and	£6,360.00	

Location	Condition	Remedial Works Required	Cost (£)	Building & Fabric Category
		containment, network hardware for data outlets to POE cameras, WiFi Wireless Access Points (WAPs,) etc		

5.0 COST SUMMARY

The budget costs for all the works have been summarised in the below schedule, grouped according to their building and fabric category. Please note the caveats in Section 3 that apply.

Item	Details of Work	Total Cost	Priority			
			0-1 Years	2 Years	3-5 Years	N/A
1.1	Building & Fabric	£	1	2	3	4
1.1.1	Roof Repairs	£594,935.60	£594,935.60			
1.1.2	Roof Timber Details	£41,700.40	£41,700.40			
1.1.3	Rainwater Goods	£49,179.42	£40,936.00	£7,865.00	£378.42	
1.1.4	External Walls	£89,203.24	£30,422.00	£26,059.04	£32,054.40	£667.80
1.1.5	External Decorations	£40,646.76		£39,311.16	£1,335.60	
1.1.6	Windows	£110,498.64		£110,498.64		
1.1.7	Doors	£10,833.20		£8,458.80	£2,374.40	
1.1.8	Internal Floors	£12,020.40	£5,342.40	£6,678.00		
1.1.9	Internal Walls	£56,498.85		£56,498.85		
1.1.10	Frame and Structure	£39,771.20		£39,771.20		
1.1.11	Joinery and Metalwork	£40,677.50		£29,399.10	£10,759.00	£519.40
1.1.12	Internal Decorations	£18,698.40		£18,698.40		
1.1.13	Lightning Protection	£8,162.00		£8,162.00		
1.1.14	Vermin Infestation	£5,194.00	£5,194.00			
1.2	M&E Services	£	1	2	3	4
1.2.1	Mechanical Service	£318,000.00		£318,000.00		

Item	Details of Work	Total Cost	Priority			
1.2.2	Electrical Services	£181,260.00	£181,260.00			
1.3	Sub Total	£1,617,279.61	£718,530.40	£850,660.19	£46,901.82	£1,187.20
1.4	Project Costs					
1.4.1	Asbestos Removal @ 7.5%	£121,295.97				
1.4.2	Access/ Scaffolding @ 20%	£323,455.92				
1.4.3	Preliminaries/ OH&Ps @20%	£412,406.30				
1.4.4	Contingency @ 30%	£521,572.67				
1.4.5	Professional Fees @ 20%	£323,455.92				
1.5	Grand Total	£3,319,466.40				

6.0 CONCLUSION

Avery Hill Winter Gardens is generally in a state of disrepair. It has been classified as 'Heritage at Risk' by Historic England therefore several areas of concern need to be addressed to return the structure into a reasonable state of repair.

The main area of priority is to carry out significant repairs/ replacement works to the each of the three roofs. The glazed panels that clad the roof structure are cracking regularly which needs to be addressed to prevent a health and safety incident from occurring.

Since our original inspection the condition of the rainwater goods has worsened with seals having failed throughout.

Spalled masonry is common both externally and internally as well as a concentration of damaged brickwork to the horizontal entablature that spans the perimeter of the structure at high level. Brickwork should be replaced and repaired where possible to mitigate moisture ingress and maintain the structures integrity.

As highlighted within the report, it is recommended that a Structural Engineer is engaged to certify sufficient repairs to the brick dentil courses forming the arches on the Southern elevation of the Tropical Room.

Extensive timber replacement and repairs are required externally to the cupolas, scrollwork and entablature details on each roof. Internally timber cornice mouldings, purlins/ top plates and windows require replacement and refurbishment works.

The mechanical and electrical services within the Winter Gardens are dated. It is advised that the mechanical system throughout the winter garden is renewed, the existing boiler was noted to be nearing end of life and should therefore be replaced. The electrical installation should be renewed with new lighting also proposed subject to Historic England requirements.

We recommend that the works described within this report are undertaken to prolong the life span of the facility.

**APPENDIX A:
PHOTOGRAPHS**



Photo 1 – Rotting timber scrollwork to Temperate cupola roof.



Photo 2 – Lead flashing to roof looks tired and guttering requires cleaning.



Photo 3 – The Bird Room: Lead flashing on roof structure is loose and hanging off in areas. Rotting timber to cupola roof.

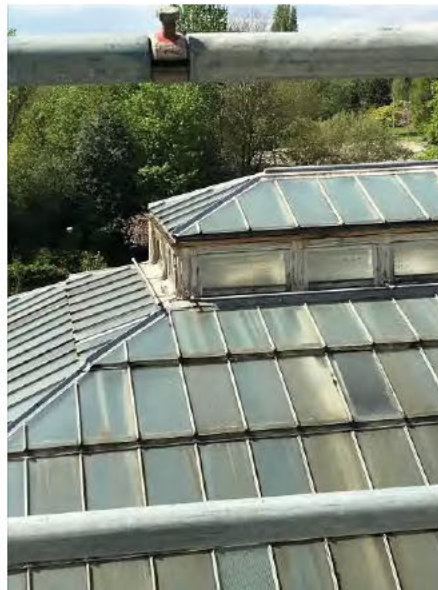


Photo 4 – The Tropical Room: Rotting timber to roof cupola. Damaged glazed panels throughout roofing structure.



Photo 5 – Roof structure valley gully showing signs of corrosion and in need of cleaning.



Photo 6 - Roof structure valley gully showing signs of corrosion and in need of cleaning.



Photo 7 – Fissure to lead capping above glazing bar.

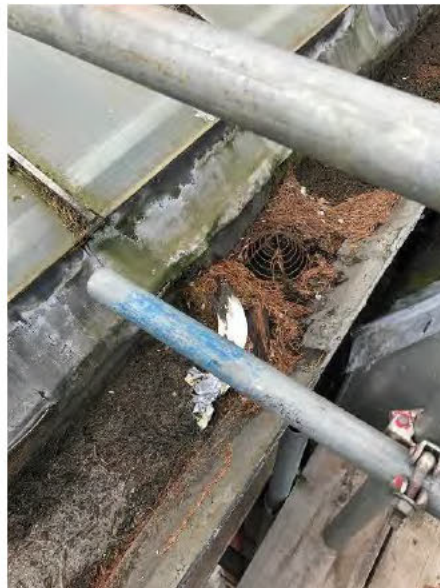


Photo 8 – Roof structure cast iron guttering outlet full of debris.

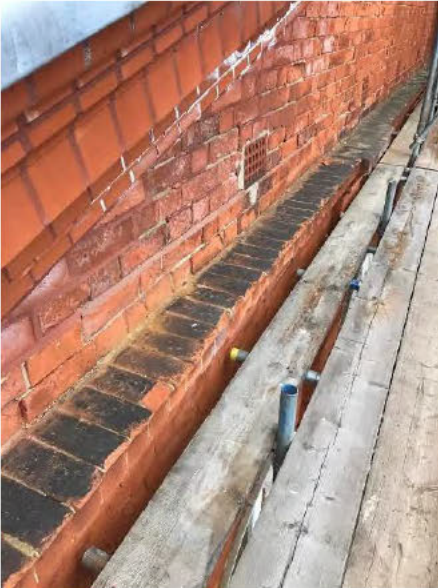


Photo 9 – Efflorescence staining and minor spalled brickwork to high level external wall.



Photo 10 – Efflorescence to high level external brickwork cornice.



Photo 11 – Algae growth to external walls at high level and underside of cast iron guttering.



Photo 12 – Minor spalling and efflorescence staining to external brickwork at low level.