

Repair Design and Access Statement

Alexandra and Ainsworth Tenants
Residents Association Hall,

For



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Job number:	9370
Status:	Version 1.0
Date:	January 2018

Issue number	Author	Date	Description of revision
Rev 1	JS	Jan 2018	First version

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1. Introduction

- 1.1 This statement provides supporting information on the proposed essential repair works to the roof above the Alexandra and Ainsworth TRA Hall a grade II* listed property within the designated Alexandra Road conservation area. The information contained in this report will review
- the current issues with the existing roof
 - the potential impact to the existing fabric and structure if left unrepaired
 - the nature of proposed repair works in the context of the overriding need to ensure the existing appearance is retained and the need for the repair to provide a lasting solution to negate future risk of damage to the historic character of the grade II* listed property and the designated Alexandra Road conservation area.
- 1.2 This document considers the current on-going issues of water ingress to the current TRA Hall and an initial assessment of the likely cause and most viable remedy noting the essential need to preserve the existing appearance of the building, it's surface material and general appearance whilst also providing enhanced performance to negate the risk of future water ingress adversely affecting this existing listed building and structure.
- 1.3 This statement is prepared as in accordance with the guidance contained within the National Planning Policy Framework and London Borough of Camden general planning requirements and guidance. It is also prepared with full regard to the Conservation area statement Alexandra Road published by London Borough of Camden Conservation & Urban Design Team dated December 2000.
- 1.4 Additionally, this statement has also been prepared with fully regard to the guidance for repairs to listed buildings and structures provided in the English Heritage publication, Conservation Principles, published in 2008.

2. The Site and Planning Policy Context

(i) Site Context

- 2.1 The site of the proposed repair works, consisting of the Alexandra and Ainsworth TRA Hall, is situated in the Grade II* listed Alexandra and Ainsworth Estate in the London Borough of Camden, Kilburn Ward. The listed Alexandra Road elements of the estate were designed by Neave Brown of Camden Architects department from 1968, and include 520 homes for 1660 people, a tenants' hall, underground parking, shop (now an artist's studio), community facilities and the walls steps and ramps of the park.



- 2.2 The site is part of Historic England List entry Number is 1130403 and is Grade II*. The location ref is TQ2683NW Rowley Way 798-1/71/1403 Community Centre and Boiler House to 18/08/93 Alexandra Road Estate. The Listing states;
- ‘... Community centre is attached to the east of Ainsworth Way and Rowley Way, and has the boiler house below, with its tall 3-shafted metal chimney. The community centre is on 1 level, and of an irregular, triangular plan; horizontal strip windows and roof terrace. To north and west are attached ramps and staircases, including East Bridge and West Bridge. To the west also attached to Ainsworth Way housing is the play area and public park; play areas of irregular shape at several levels, linked by ramps and steps and enclosed and contained by robust board marked concrete walls and planting boxes, often diagonally set, sometimes curved and some with inset seats.....’

The Heritage England plan is attached at appendix A.

- 2.3 The TRA Hall as is on 1 level and the roof is raised above from the other surrounding general estate areas and is accessed via flight of stairs secured with a lockable metal gate to the left of the main entrance to the TRA hall. The roof is flat and is of an inverted construction with the 450mm modular concrete paving flags covering insulation above insulation and the waterproof membrane below. There are substantial planters to the perimeter of the roof filled with soil and planted with hardy green flora. These appear to be irrigated via the water run off from the main roof being collected in recessed channels and sumps leading to a pump contained within and existing housing which appears to currently be non-functional. It appears that the soil within the planters is placed directly above the waterproofing membrane. Additionally, there is a staircase that rises to the rear from the TRA Hall below.

(ii) **Planning Policy Context**

- 2.4 Buildings which are listed or which lie within a conservation area are protected by law. Grade I buildings are of exceptional interest. Grade II* are particularly significant buildings of more than special interest. Grade II are buildings of special interest, which warrant every effort being made to preserve them. National planning policy The Government issued Planning Policy Statement 5 (PPS5) in March 2010 (DCLG 2010) integrates planning strategy on 'heritage assets', bringing together all aspects of the historic environment, below and above ground, including historic buildings and structures, landscapes, archaeological sites and wrecks. The significance of heritage assets needs to be considered in the planning process, whether designated or not, and the settings of assets taken into account. PPS5 requires using an integrated approach to establishing the overall significance of the heritage asset using evidential, historical, aesthetic and communal values, to ensure that planning decisions are based on the nature, extent and level of significance.
- 2.5 Camden has a duty under the Planning Listed Buildings Local planning policy including The London Plan, which sets out the Mayor's objectives for the protection and enhancement of London's historic environment, waterways and natural heritage to promote the conservation of listed buildings and structures. Camden Unitary Development Plan (UDP) was adopted in 2004 and sets out the council's intentions for land use and development from 2002 to 2017. Camden's UDP, together with the Mayor of London's adopted Consolidated London Plan and general Town and County Planning Act is the basis for dealing with planning applications.
- 2.6 The TRA Hall is part of the overall estate structure albeit located to one end of the estate and detached from the two main blocks of residential dwellings which run parallel to each other with a wide pedestrian walkway providing pedestrian access. The TRA Hall is located on top of the suspended pedestrianised walkway above the car parking area below that includes the communal plant area and associated general use areas including the concierge office.
- 2.7 The scale of the surrounding two blocks of residential blocks over shadows the TRA hall roof by two storey heights to the west with the narrow pedestrian walkway to the East proving access to lower ground car park area.
- 2.8 The building is mentioned in the statutory list of buildings of special architectural or historic interest albeit in the context of being in the style of the surrounding estate. The site is within a Conservation Area.

(iii) **Planning history**

- 2.9 The site and the buildings therein have been the subject of previous substantive 'upgrades including the water tanks to the roof and replacement of the major pedestrianised walkway. All of these works have been carried out in accordance with the intent of preserving the existing architectural nature of the buildings, estate and surrounding area. It also clear that extensive more minor repairs have been carried out to ensure that the existing buildings and structure are preserved to retain the original appearance.

3. Current Issues

- 3.1 The TRA Hall ceiling has suffered from water ingress from above for some time now. This has resulted in staining to the internal finishes and in some instances, water has been dripping from the electrical light fittings which have had to be disconnected to maintain minimum safety standards.
- 3.2 Over recent months inspections have been carried out to the main roof terrace above. It has been determined that the main concrete roof slab is covered by a concrete screed which in turn is covered by a waterproof membrane over which there is a thick layer of insulation and above this modular concrete paving slabs supported on plastic packers. A substantive part of the roof perimeter to the west is covered with planters in which hardy shrubs are growing with varying conditions of health. These planters are formed by part of the overall reinforced concrete structure and lined with a waterproof layer. Additionally, there is a small area of open channels to the North of the terrace which acts as a water sump and includes a small pump whereby it is intended this redirects the rain water channelled from the roof terrace and other surrounding areas to the pump and to the planters to supply the plants with sufficient irrigation. These channels are covered with and exposed grey waterproof covering. Photographs of the existing TRA hall and the roof terrace are attached
- 3.3 It clear that rainwater from either the main roof terrace, the planters or the channels is penetrating the waterproof roof membrane including upstands above. At the beginning of this year a more detailed investigation was carried by a specialist waterproofing manufacturer to verify the make-up of the main roof terrace. This confirmed that the existing make-up was as described above.
- 3.4 Additionally, there is relatively small pavement light panel adjacent to the access stairs rising from the main pedestrian access to the hall. There is staining near this internally that also suggests that this may be leaking. There is no sign of broken glass blocks and so it is likely the joint between this unit has lost its waterproofing integrity. Photographs of this are also attached at appendix B.
- 3.5 A further item noted was that the pump to the sump of the irrigation channels appeared not to be functioning which to some extent explains why the plants within the planters appeared to be generally in poor condition.

4. Potential impact to existing building and structure

- 5.4 Damage is already being caused to the internal finishes of the TRA hall and additional safety issues are now arising which adversely affect the use of the space by the community. This includes the water ingress into the electrical lighting fittings. It is not possible to determine the full extent of the water ingress into the main structural reinforced concrete slab above although it is likely this is greater than the water emanating from the surfaces below as it is likely the slab will be absorbing a significant amount of water prior to it manifesting itself on the finishes and fittings below.
- 5.5 Such saturation of the original reinforced concrete slab will most likely over time cause the steel reinforcement within to corrode and detrimentally affect the structural integrity of the slab. If the water ingress is unabated it is likely the internal surface damage will increase and that damage to the reinforced concrete slab will also increase. Ultimately this will reach the point where structural integrity will be compromised.
- 5.6 Should structural integrity of the main structure be compromised then the main roof structure to the TRA hall will have to be replaced along with extensive removal of the adjoining original exposed concrete finishes.
- 5.7 A further investigation was carried out at the beginning of this year with a specialist waterproofing manufacturer to further inform and confirm the nature and issues with the existing main roof terrace area. This report is attached at appendix C. It confirms that the main roof terrace is of the nature described above and it confirms that a suitable repair to the waterproof membrane is required.

5. Nature of the proposed repair

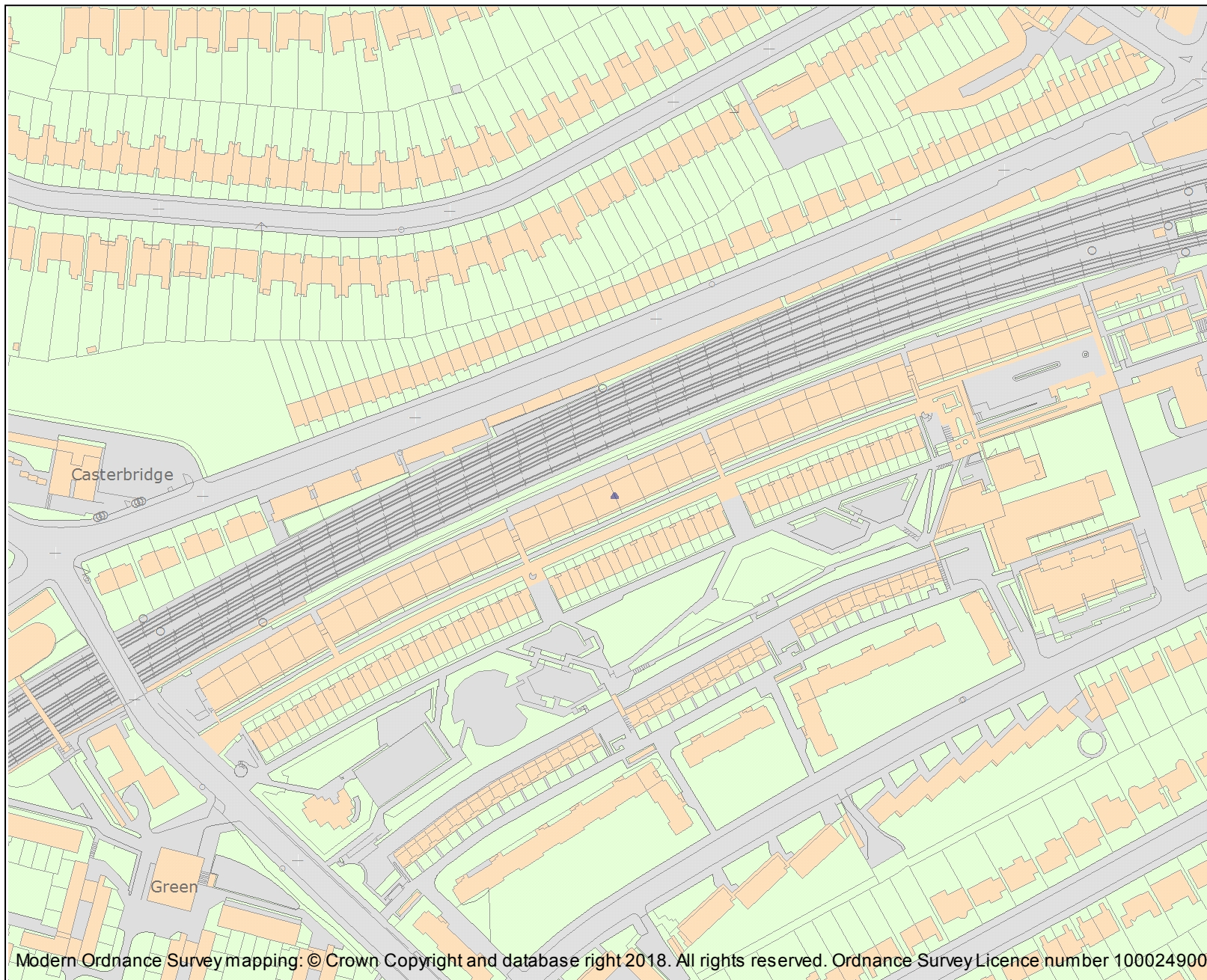
- 6.5 It is essential, as stated by Heritage England that ‘the conservation of heritage assets is based on appropriate routine management and maintenance. The significance of a place can quickly erode if long standing maintenance regimes are discontinued.’ ‘Periodic renewal, such as re-covering roofs, differs from maintenance in that it occurs on a longer cycle, is usually more serious in nature and often has greater visual impact than ordinary repair.’
- 6.6 In this instance because the roof waterproofing membrane is substantially covered to the main roof terrace and planters by concrete paving slabs and soil with plants respectively the visual impact will be minimal as it is proposed to carefully remove and then reinstate both after the waterproof membrane is replaced. It is further intended to use a visually similar modern waterproof membrane to the irrigation channels to further preserve the existing visual appearance albeit being new it will take a little time to reach the patina of the existing roof covering. Furthermore, the extent of this area is small compared to the other parts of the roof terrace and mainly sunken thus being largely obscured from view.
- 6.7 Heritage England states with Conservation Principles’ that periodic renewal ‘may involve the temporary loss of certain aspects of significance, e.g. The patina of age on old roof covering, but provided the replacement is physically and visually compatible it should be acceptable. By contrast, the consequence of not undertaking periodic renewal is normally more extensive loss of fabric.’ This is the situation in this instance as the existing waterproof covering has exceeded its expected life expectancy and so has become incapable of fulfilling its intended function through more limited intervention.
- 6.8 Additionally, the proposed roof waterproofing membrane are modern equivalents of the existing and so will provide a material that will have a greater life expectancy than the original and where it will be unseen under the soil and plants will be impregnated with copper to deter the plant roots from invading the original reinforced concrete structure thus providing greater protection to the existing heritage asset.
- 6.9 Furthermore, it has been determined that modern insulation of the same appearance as the existing can be provided under the concrete paving slabs to improve the thermal insulation to the TRA hall below to bring it in line with current building energy conservation recommendations.
- 6.10 The nature of the existing roof details will be retained such as height of existing upstands such that the appearance of the existing roof is retained. It is most intended to alter the existing rooflight structure or the seating to the roof terrace as it is considered far less likely that these structures are the main cause of water ingress. If after the works residual water ingress is noted adjacent to these, then further investigation will be carried out, and additional remedial works submitted for consideration.
- 6.11 Additionally, an allowance has been included to repair and service the existing irrigation pump such that it can function as originally intended which assist in promoting better condition of the surrounding planting

6. Conclusion

- 6.1 This Statement is submitted in support of the need to carry out these repairs to preserve the condition and appearance of the existing heritage asset. As such the works proposed represent a periodic renewal of the largely hidden waterproof membrane and represent a repair that is necessary to sustain the heritage asset.
- 6.2 Given the above the works proposed are wholly in accordance with the principles set out by Heritage England and wholly in accordance with Planning regulations and guidance. As they will not affect the character as a building of special architectural or historic interest, then listed building consent is not required. The proposed repairs will not affect the special interest in the building.

Appendix A

Heritage England Listing Plan



This is an A4 sized map and should be printed full size at A4 with no page scaling set.

Name: ALEXANDRA ROAD ESTATE INCLUDING WALLS, RAMPS AND STEPS
COMMUNITY CENTRE AND BOILER HOUSE TO ALEXANDRA ROAD ESTATE
NUMBERS 1-21 (INCLUDING A AND B TO EACH NUMBER)
NUMBERS 4-119 (INCLUDING A AND B TO EACH NUMBER ON SOUTH SIDE, AND A-K TO EACH NUMBER ON NORTH SIDE)

Heritage Category:	Listing
List Entry No :	1130403
Grade:	II*

County: Greater London Authority

District: Camden

Parish: Non Civil Parish

For all entries pre-dating 4 April 2011 maps and national grid references do not form part of the official record of a listed building. In such cases the map here and the national grid reference are generated from the list entry in the official record and added later to aid identification of the principal listed building or buildings.

For all list entries made on or after 4 April 2011 the map here and the national grid reference do form part of the official record. In such cases the map and the national grid reference are to aid identification of the principal listed building or buildings only and must be read in conjunction with other information in the record.

Any object or structure fixed to the principal building or buildings and any object or structure within the curtilage of the building, which, although not fixed to the building, forms part of the land and has done so since before 1st July, 1948 is by law to be treated as part of the listed building.

This map was delivered electronically and when printed may not be to scale and may be subject to distortions.

List Entry NGR:	TQ 26056 83913
Map Scale:	1:2500
Print Date:	28 May 2018

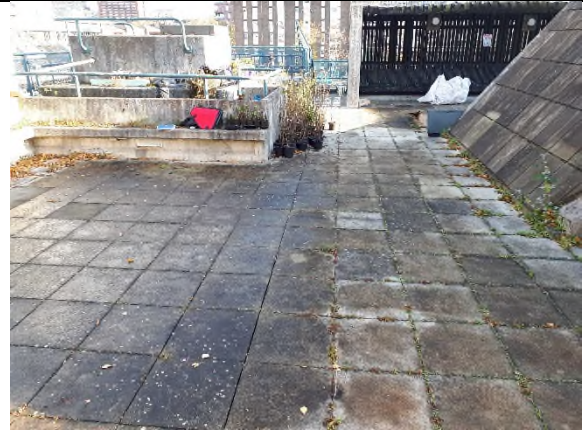
Appendix B

Photographs

	
<p>1. TRA Hall Elevation – Front viewed from walkway with roof above</p>	<p>2. TRA Hall Elevation – Front left showing main entrance to hall & step access to TRA roof terrace</p>
	
<p>3. TRA Hall Elevation – Left side showing guard rails to edge of roof terrace</p>	<p>4. TRA Hall Elevation – Right side showing guard rails to edge of roof terrace with planters formed as part of structure with shrubs planted</p>
	
<p>5. TRA Hall – Steps from main entrance level providing access to TRA Hall main roof terrace</p>	<p>6. TRA Hall – Top of access steps with main roof terrace beyond including pavement light</p>



7. TRA Hall – Roof terrace – Pavement light



8. TRA Hall – Roof terrace – Main area to front with access steps to rear



9. TRA Hall – Roof terrace – Main area showing built seating and irrigation sump and channels beyond around presumed water tank housing



10. TRA Hall – Roof terrace – Main roof area to front showing built in planters to left with seating to right



11. TRA Hall – Roof terrace – Main area showing continuation of in-built seating and planter to right side perimeter



12. TRA Hall – Roof terrace – Main area showing continuation of in-built seating and planter to right side rear perimeter



13. TRA Hall – Roof terrace – Area to rear around emergency exist stairs from TRA Hall below



14. TRA Hall – Roof terrace – Area to rear adjacent to emergency exist stairs from TRA Hall below



15. TRA Hall – Roof terrace – Area to rear around 'Skylight' to TRA Hall below



16. TRA Hall – Roof terrace – Area to rear left with arbour with built-in seating in background



17. TRA Hall – Roof terrace – Area to left side with arbour with built-in seating in background.



18. TRA Hall – Roof terrace – Area to left with pavement light adjacent to access steps hidden behind wall.



19. TRA Hall – Roof terrace – Area to centre ‘Skylight’ to TRA hall below and felt and timber covering in foreground.



20. TRA Hall – Roof terrace – Felt and timber covering by ‘Skylight’ detail



21. TRA Hall – Roof terrace – Area to centre to rear of ‘Skylight’. Invasive shrub growth.



22. TRA Hall – Roof terrace – Area to centre to right side of ‘Skylight’. Further invasive shrub growth.



23. TRA Hall – Roof terrace – Area to centre to rear of ‘Skylight’. Channel and upstand detail..



24. TRA Hall – Roof terrace – Recessed water channel and sump with irrigation pump (broken) housed in brickwork



25. TRA Hall – Roof terrace – Planters to front right perimeter – Ad hoc shrub growth



26. TRA Hall – Roof terrace – Recessed channel for rainwater discharge from roof linked to sump



27. TRA Hall – Roof terrace – Investigation to confirm existing roof terrace construction



28. TRA Hall -Roof terrace - Access hatches to side of sump and plastic pipework

Appendix C

Specialist roof waterproofing report

Report Document

Project 18171

Alexandra & Ainsworth Community Centre
Rowley Way
London
NW8 0SW

Client

John Rowan and Partners

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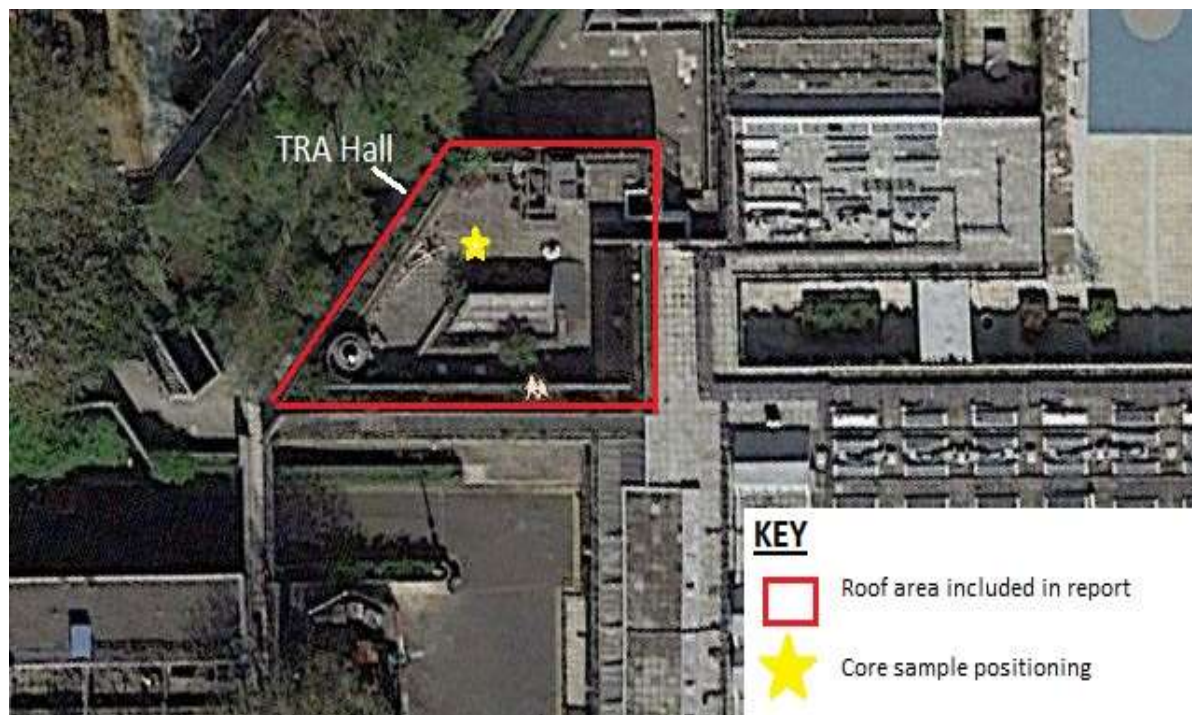


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Roof Survey Report & Recommendations

Roof area covered by this report: As highlighted below.



1.0 Outline Description

This report has been produced for John Rowan and Partners for the express use in the refurbishment of the designated roof areas of the property stated above. It is based on our site inspection of Rowley Way and should be read in conjunction with the enclosed photographs.

2.0 Scope of Report

This report is not a structural survey.

Any comments on roof structure or other building related issues in this report should not be taken to imply that its integrity has been assessed or deemed acceptable. A qualified party should verify any concerns relating to the integrity and/or capabilities of any part of the structure.

All the Langley Waterproofing Systems Ltd reports are written on the basis that the substrates, roof deck and structure are sound and durable. We cannot accept responsibility for the consequences of the latent defects in the roof deck and structure.

Listed Building Status: It is the responsibility of the building surveyor and/or client to ascertain the status of the building/s in question.

****Please Note: No U-calculations have been supplied based on the refurbishment of the waterproofing membrane only****

3.0 Roofs

Core Samples: These are taken for guidance purposes and indicate the construction only at the sample locations. Condition or levels of degradation affecting the coverings are only applicable at the time of inspection. Both construction and condition may vary throughout the roof area.

3.1 TRA Hall

Existing Construction

Deck – Reinforced concrete

Screed – 60mm

Waterproofing – Mastic Asphalt – 20mm

Inverted PUR insulation – 250mm

Mesh fibre

Pedestals (Adjustable) – 110mm

Surface finish – 50mm

Examples of Core sample



Roof Defects and Design Considerations

Main Area

The main area is an inverted roof, surface finished with paving slabs. Visually the waterproofing is showing signs of deterioration with water ingress reported internally.

Heavy vegetation and plant growth through the paving slabs is likely to be taking root within the waterproofing allowing water ingress.

Some paving slabs are cracking in areas and should be replaced.

There are garden flower beds around the perimeter of the roof with no root inhibiting membrane offering little protection from water ingress.

- **Upstands**

Waterproofing to rendered upstands should be detailed into a terminating bar upon refurbishment.

Low walls have been encapsulated with paving slabs which should be temporarily removed and replaced upon refurbishment.

- **Rooflights (Kerb Mounted)**

Pavement rooflights are level with the paving slab surface finish and are currently a weak detail allowing water to seep into the building below.

- **Rooflights (Structural)**

There is 1 No previously boarded over rooflight unit which should be removed to allow for sufficient waterproofing.

- **Plant**

There is a gully present to the outside edge perimeter with vegetation growth taking root within the waterproofing allowing water into the building fabric. Water is also ponding within this area due to poor falls.

Bee hives on the roof area should be temporarily removed to facilitate roofing works.

Access steps and safety handrails are present on the roof area.

Likely redundant pipe has been poorly covered allowing water ingress.

Photographic Record



Partial overview of roof area.

Photograph: 110729



As above.

Photograph: 110694



Vegetation growth likely to be penetrating waterproofing allowing water ingress.

Photograph: 110681



Photograph: 110685

As above.



Photograph: 110678

Asphalt gully area.

Note the liquid coating as an attempt to prevent further water ingress.



Photograph: 110695

As above, Langley liquid waterproofing system should be used.



Ponding water to above area due to poor falls.

Photograph: 110738



Pavement lights are a weak detail allowing water to seep in through the edges.

Photograph: 110746



Previously over boarded rooflight unit to be removed and made flush with the new waterproofing system.

Photograph: 110744



Photograph: 110677

As above, timber still exposed allowing water ingress.



Photograph: 110682

Asphalt gully area should have Langley liquid applied waterproofing system.



Photograph: 110689

As above.

Note the chute outlet draining into this area.



Photograph: 110686

Likely redundant pipe has been poorly covered allowing water ingress.



Photograph: 110692

Beehives should be temporarily removed to facilitate roofing works.



Photograph: 110702

Garden flower beds have no root inhibiting membrane providing no protection from root penetration.



As above.

Photograph: 110697



Overview of centrally located structure.

Photograph: 110703



Staircase access to roof area.

Photograph: 110704



Photograph: 110714

As above. Note the vegetation growth likely to be taking root in the waterproofing allowing water ingress.



Photograph: 110718

Cables fixed to rendered upstands

4.0 Summary

All areas of waterproofing are in poor condition with a long history of reported water ingress still taking place. It is clear that the roofs have reached the end of their useful life and are in urgent need of refurbishment.

5.0 Recommendations

All paving slabs and inverted insulation to be temporarily removed and stored safely for re-installation once waterproofing has been refurbished.

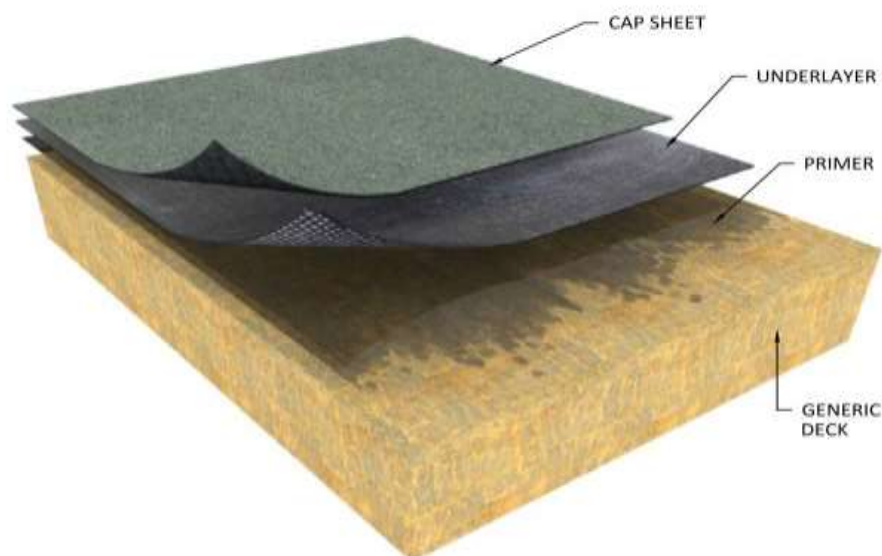
Existing asphalt waterproofing to be prepared for overlay of a New Langley, High-Performance 2 layer, overlay system to be installed

Pavement lights are to have supracoating RLV installed to the perimeter edges.

Gulley area to be waterproofing with a Langley, flame free liquid system.

All redundant penetrations to be removed and over boarded with 18mm WBP, exterior grade plywood

Garden flower beds to be stripped and re-lined with new waterproofing system incorporating Graviflex to prevent roof penetration.



Langley Waterproofing Systems Ltd Guarantee

All the specified systems come with Langley Waterproofing Systems Ltd, unique single premium, independent insurance-backed guarantee. The premium is pre-paid, in full, for the guarantee period stated in the specification and covers the following:

- ✓ **Materials**
- ✓ **Labour**
- ✓ **System Design**
- ✓ **Consequential Loss**

In addition:

- ✓ **The guarantee is transferable between building owners.**
- ✓ **Cover increases in line with an approved construction price index.**
- ✓ **Each project is covered for the full value of reinstatement of materials including installation.**
- ✓ **Insurance cover automatically reverts to the building owner should Langley and the roofing contractor fail to rectify defects for whatever reason.**

Langley Waterproofing Technical Support

The project/works will also be monitored by a Langley Technical Manager on a weekly basis, who will provide a written report on the progress and any issues arising. This monitoring service is provided to ensure full compliance with the specification and to approve the completed works for guarantee purposes and includes:

- **A detailed final inspection highlighting any snagging items.**
- **A joint 6 or 12 month defects inspection.**

Appendices

- **Glossary of Terms**
- **Bibliography**

GLOSSARY OF TERMS

A/C units	Air conditioning plant.
ACM	Asbestos Containing Material.
Attachment layer fixed/nailed)	An underlay used to isolate the new system from the substrate (usually mechanically.
Bunding	Internal waterproofing creating a 'tank' to contain potential leaks from water tanks.
BUR	Built-up felt roofing.
Cap sheet	Top layer of a built-up membrane system.
Cat ladder	Fixed (vertical) access ladder.
Cold roof	Roof structure designed with the insulation on the warm side (inside) of the roof deck.
Composite deck	A hybrid structural deck of rigid foam insulation with a factory bonded plywood top.
Cut-to-falls insulation	Insulation boards manufactured with a built-in fall.
Dew point (condensate).	Temperature at which moisture laden air releases the moisture as liquid water.
Free-draining edge	Roof perimeter that allows water to drain over, usually to an external gutter.
Free-standing	Not affixed to or through the structure.
Granule finish	Factory applied protective layer of fine granules to cap sheet.
Hard edge	A timber batten installed at exposed edges of insulation as a support to prevent damage to the insulation.
Hybrid deck	A structural deck that is also an insulant.
Inverted roof	A warm roof structure designed with the insulation placed over the waterproofing system.
LMR	Lift Motor Room.
Mushroom vent	Roof penetration used as a pressure release to the substrate.
OSB	Oriented Strand board.
Partial bonding layer	See venting layer.
Pour & Roll	Method of bonding of bituminous membranes using hot bitumen.
PIR	Rigid polyisocyanurate.
Protected membrane roof	See Inverted Roof.
PUR	Rigid polyurethane.
RWO	Rain water outlet.
Refurbidrain	A purpose made rainwater outlet designed to fit inside an existing outlet.
Sandwich construction	A warm roof configuration, where the insulation is sandwiched between a vapour control layer and the waterproofing.
Scupper	Low level over-flow outlet from a banded area such as a tank room etc.
Stramit	Trade name for a 'hybrid' supporting deck of compressed straw board.
SVP	Soil vent pipe.
SBS	Styrene-Butadiene-Styrene.
Tapered insulation	Insulation boards manufactured with a built-in fall.
Temperature gradient	The path of temperature change through a (roof) structure from inside to outside, plotted on a graph.
Timber deck	Either close boarding or tongue and grooved boards. (Not panelled material such as plywood, OSB board etc).
Torching	Method of bonding of bituminous membranes using propane gas torches.
Vapour barrier	See Vapour Control Layer. Bituminous membrane designed to prevent the passage of moisture laden air. Usually with an aluminium core.
Vapour check	See Vapour Control Layer. Bituminous membrane designed to restrict the passage of moisture laden air.
Vapour control layer	Underlay used below insulation to control the passage of moisture laden air.
Vapour barrier	See Vapour Control Layer. Bituminous membrane designed to prevent the passage of moisture laden air. Usually with an aluminium core.
Venting layer	Bituminous felt underlay with regular holes at predetermined centres to allow partial bonding of membranes on certain types of substrate.
Underlay	Interim layer of a multi-layer built-up membrane system.
Upside-down roof	See Inverted roof.
WBP	Water and Boil Proof (plywood).
Warm roof	Roof structure designed with the insulation on the cold side (outside) of the roof deck.
Wetted drip	Felt membrane edge detail.
Woodwool slab	Hybrid structural deck of cement coated wood shavings.

BIBLIOGRAPHY

The following British and European Standards and Codes of Practice are relevant to the installation of Langley roofing systems and products.

BS 6399 – 1: 1996	Loadings for Buildings. Code of Practice for dead and imposed loads.
BS 6399 – 2: 1997	Loadings for Buildings. Code of Practice for Wind Loads.
BS 8217 : 2005	Code of Practice for Built-up Felt Roofing.
BS EN 636 : 2003	Plywood, specifications.
BS 5268 – 2: 2002	Structural Use of Timber. Code of Practice for Permissible Stress Design, Materials and Workmanship.
BS EN 300 : 1997	Oriented Strand Boards (OSB). Definitions, Classifications and Specifications.
BS 747 : 2000	Reinforced bitumen sheets for roofing.
BS 6229 : 2003	Flat Roofs With Continuously Supported Roof Coverings – Code of Practice.
BS EN 12056 – 3: 2000	Gravity Drainage Systems Inside Buildings – Part 3 : Roof Drainage, layout and calculations.
BS EN 1253 – 1: 1999	Gullies for Buildings – Part 1 : Requirements.
BS 476 – 3 : 2004	Fire tests on building materials and structures. External fire exposure roof test.
BS 5250 : 2002	Code of Practice for the control of condensation in buildings.
BS 5950 – 6: 1995	Structural use of steelwork in buildings. Code of Practice for design of light gauge profiled steel sheeting.
BS EN ISO 6946 : 2007	Building components and building elements – Thermal resistance and thermal transmittance – Calculation method.
BR443:2002	Conventions for U-value calculations.
BS EN 13162: 2001	Thermal insulation products for buildings – Factory made mineral wool (MW) products – Specification.
BS EN 13163: 2001	Thermal insulation products for buildings – Factory made products of expanded polystyrene (EPS) - Specification.
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