Cornerstone Technical Report

Our ref:	DS0721–SE57JZ/JB	**Author:**	Andrew Dallen
Name	Mr. Khawaja	**Client**	Mr. Khawaja
Address	8 Addington Square London SE5 7JZ	**Contact**	Christopher Read
		Initial visit	4th August 2021
		Return visit	10th August 2021

Scope

Following instruction from Mr. Khawaja, attend the above property to report on moisture conditions and were possible identify sources of loss moisture affecting the structure.

Report

1.0 Property:
The property is a large Grade II listed semi-detached dwelling dating from the early 1800's and, a review of London Street maps suggest it possibly pre-dates 1820. Original areas are of solid wall construction part rendered and decorated to the exterior with a mix of timber suspended floors and ground supported floor slabs noted through the ground floor. There is a range of single storey rooms added to the rear of the property and are of reasonable modern cavity wall construction

1.1 Period of construction – Concrete floor slabs:
In 1965 it became a matter of regulation that ground supported concrete floor slabs should have a DPM (Damp Proof Membrane) in their construction to prevent ground moisture from migrating to the surface of the slab. Prior to this date it was the floor finish which acted as the DPM for example, thermoplastic tiles set on bitumen or wood block flooring set on bitumen etc.

1.2 Period of construction – Wall structures
In and around 1875, a public health act and aligned local by-laws, made it a matter of regulation DPC's (Damp Proof Courses) should be incorporated in wall structures affected by ground moisture to prevent the migration of ground moisture into the upper wall structures through capillary action. Prior to this date walls tended to be constructed with lime-based materials. Lime has a high permeability factor which allow it to vent structural moisture freely which will in turn tend to limit the vertical climb of ground related moisture in affected walls structures.

3.0 Conclusion:
A detailed moisture survey has been carried out through the property to allow an understanding as to the moisture condition of the structure and where possible, identify likely routes of water ingress. In all cases every effort has been taken to ensure reported readings are representative of the surveyed areas.

3.1 Limitations:

- loft areas have not been accessed other than a general review of the rear section of the main roof from the access hatch.
- The review of floor joists has only been carried out in areas where the floorboards have been lifted.

21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

3.2 Observations and relevant information:

3.2.1 Top floor front room high level water ingress:
Readings through survey locations 6,7,8 & 9 strongly suggest periodic water ingress through the parapet and associated upper wall structures and, corresponding ceiling readings tend to suggest the ingress is limited to the wall structure and not the roof. A similar detail was noted at survey location 11 to the flank wall and in this area, significant cracking was noted to the exterior render to the upper wall. Loss water able to migrate behind external render systems will, over time, migrate to the interior due the fact the external render and associated decoration greatly reduces, if not prevents the wall venting moisture back to the exterior.

3.2.2 Rear elevation rainwater ingress:
Significant water ingress is occurring in the area of the shoe passing through the parapet wall to the external hopper from the valley gutter behind the parapet. Water ingress in this area may well be a mix of issues affecting the copings, gutter, and shoe detail etc. This area of ingress is significant affecting all the floors down through the structure, saturating the brick elements and driving fungal decay in associated timbers including the stairs etc.

3.2.3 Rear room top floor:
Regarding the rear room adjoining the stairwell, it was noted the exterior wall is dry lined and drilled invasive readings recorded from the masonry indicated elevated moisture readings at survey locations 13 & 14. It is recommended this area is further investigated involving the removal of the dry lining. Issues with upper wall and parapet and or external pointing etc. may well also be allowing rainwater penetration.

3.2.4 First floor flank wall to bathroom:
The moisture survey indicated significantly high moisture in regard to the mortar to the exterior with moderately dry readings to the bricks. A review of the exterior highlighted a significant issue with the pointing to this area of exterior wall which is also influenced by the prevailing weather. Significant rainwater penetration of the exterior wall is indicated and a sample of the affected mortar has been sent for gravimetric analysis.
This will allow a clear understanding of free capillary moisture and/or hygroscopic moisture affecting the mortar with results to follow. Significant rainwater ingress through issues with the window units was also affecting this area.

Gravimetric Analysis – 21st August 2021:

Total moisture content	Hygroscopic moisture	Free capillary moisture
1.9 %	2.4 %	Nil

The gravimetric analysis would tend to suggest the mortar was dry at the time of the survey with Hygroscopic salts in the said mortar driving the elevated readings. However, it is the opinion of the author it would be prudent to remediate the exterior wall structure.

3.2.5 Ground floor flank wall entrance:
The exterior wall is saturated generally floor to ceiling and is certainly the case towards the front of the property at survey location 45. Issues with the weather-proofing of the parapet, integrity of the valley gutter etc. may well be allowing the water ingress. This area of the structure has been subject to movement and is also is likely to be a contributory factor.

3.2.6 Previous damp remediation works:
Regarding many of the original wall structures through the ground floor, it was noted the lower wall finishes have been removed and replaced with modern boarding up to the dado rail. As mentioned, the property possibly dates from or before 1820, prior to DPC's being a requirement. The noted boarding is most likely part of remediation carried out in regard to ground moisture affecting the structure and, in a number of areas where boarding was not noted, significant moisture levels to the lower wall was recorded for example survey locations 62 & 64. In the case of the adjoining area survey location 67, elevated resistance readings were recorded in relation to the remediation boarding noted to the lower wall.

3.2.7 Curved exterior walls to rear:
As indicated in the moisture survey, elevated readings were noted at high and low level either side of the patio doors etc. The nature of the wall structure and associated waterproofing to the parapet, is likely to be allowing rainwater penetration to be an issue in regard to the wall structure. In addition, observations noted the roof timber in the area of survey location 93 was saturated as is the floor structure below with significant timber decay noted. This would suggest rainwater ingress through the roof is also an issue in this area.

3.2.8 Older single structures to the rear:
In regard to the single storey slate pitched room areas, significant cracking and deterioration was noted to the render and associated decoration. This, and possible issue with the integrity of the roof structure is allowing rainwater ingress to affect the structure.

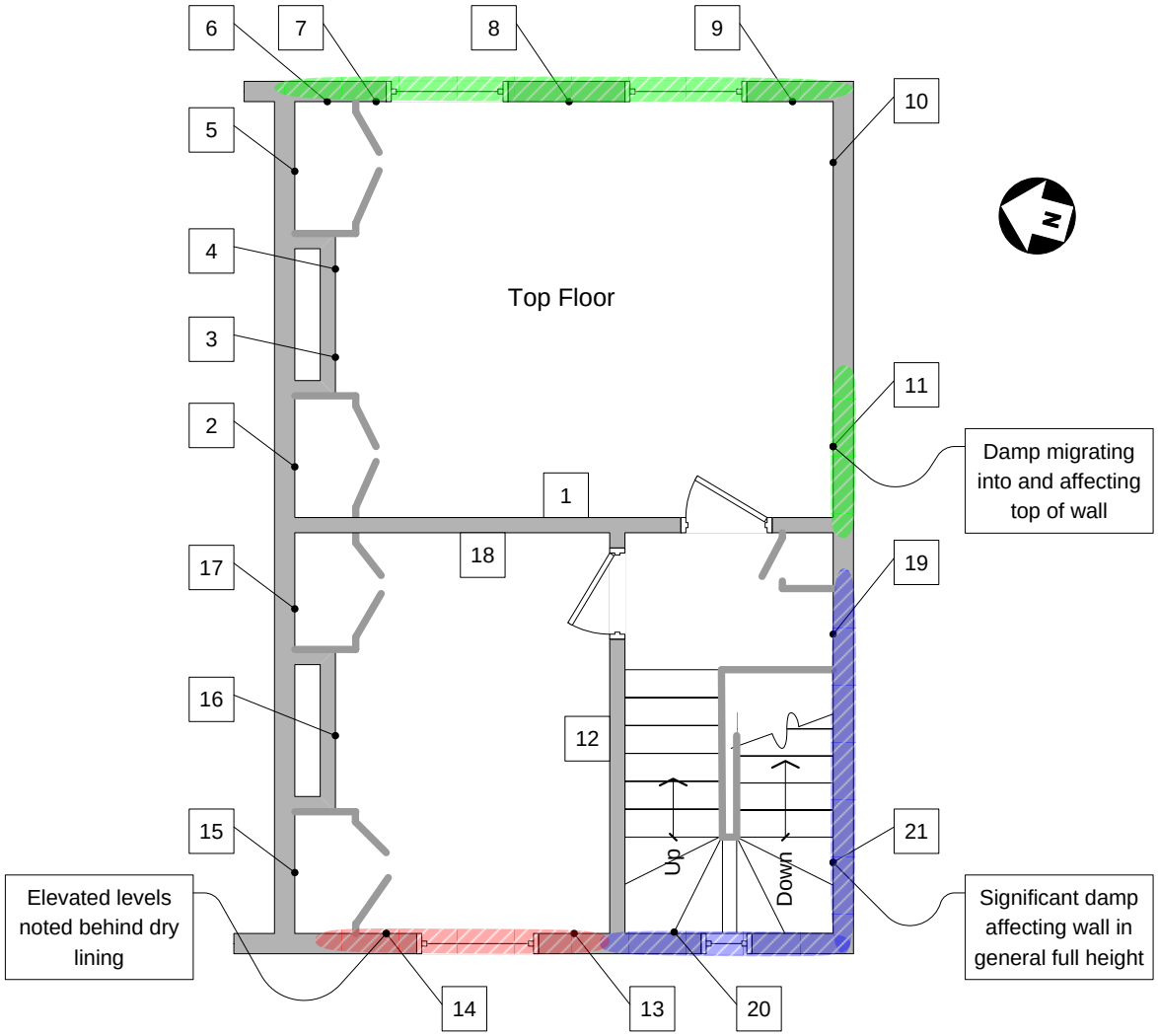
21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

3.2.8 Modern flat roof room to the rear:
In a number of areas, the flat roof has failed allowing long term rain ingress to affect the structure. In general wall and floor structure through these areas were saturated.

3.2.9 Ground supported concrete slabs:
In a number of areas concrete floor slabs were noted and, due to ongoing rainwater ingress, in general these were saturated. With regard to possible restorative drying, their period and nature of construction would have to be understood to allow drying requirements to be determined.

21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

4.0 Moisture survey – Top floor:



4.0.1 Structural wall and ceiling readings – Top floor:

Loc	Skirt. %mc	Base of wall		Height REL =250	REL(PS) up wall and ceiling			Comments
		% WME	REL(PS)		Middle	Top	Ceiling	
1	13.9 %	13.8 %	86		81	101	114	
2		10.3 %	107		114		104	
3	8.2 %	8.7 %	136		131	142	116	
4	9.0 %	11.2 %	129		127	145	116	
5		12.2 %	114		112		156	
6		10.8 %	116		116	480	107	350mm Down
7	10.2 %	< 6.0 %	120		118	566	116	640mm Down
8	13.2 %	8.4 %	133		136	999	116	670mm Down
9	9.8 %	9.6 %	136		121	999	250	740 mm Down
10	14.8 %	12.3 %	136		155	143	153	
11	11.5 %	12.3 %	156		135	999	112	830mm Down
12	12.2 %	< 6.0 %	101		110	104	121	

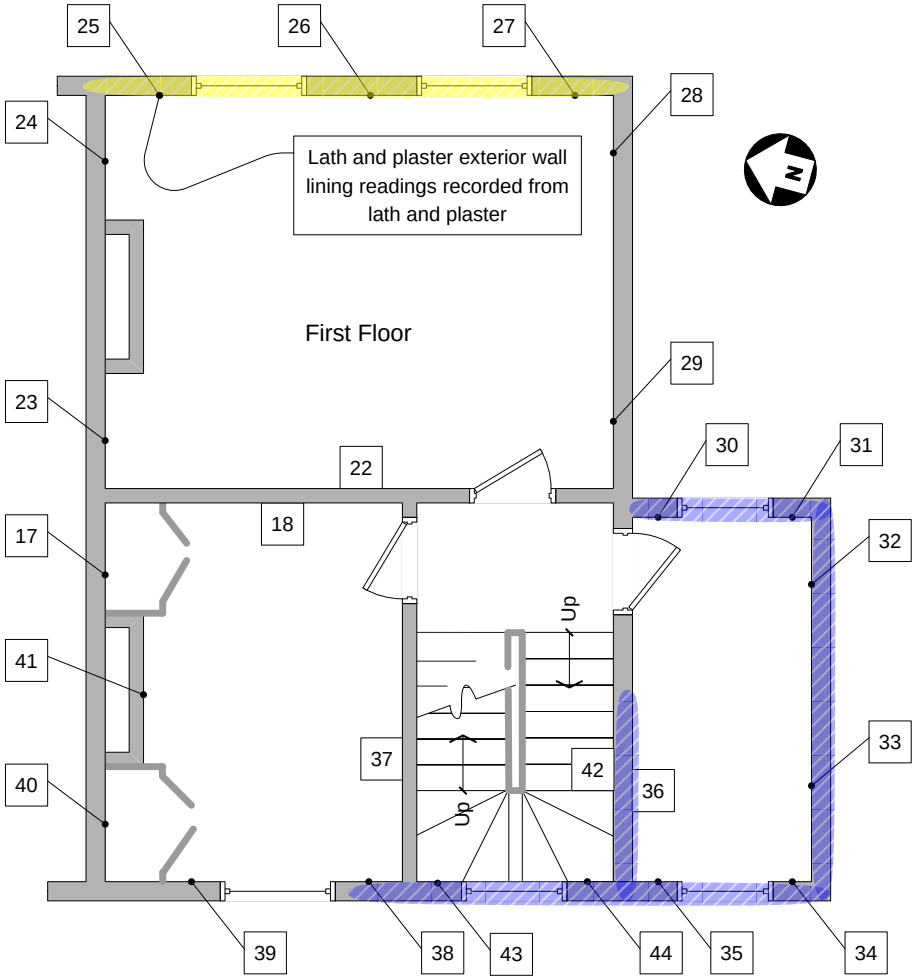
21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

Loc	Skirt. %mc	Base of wall		Height REL = 250	REL(PS) up wall and ceiling			Comments
		%WME	REL(PS)		Middle	Top	Ceiling	
13		17.5 %	145		155	140	117	Drilled Base 30.9 %
14	8.9 %	14.1 %	112		132	118	127	Drilled Mid. 31.8 %
15		10.2 %	138		139		122	
16	9.7 %	9.9 %	136		139	149	110	
17			144		132		129	
18			130		126	116		
19	< 6.0 %	22.7 %	999		499	141	112	Drilled Base 19.9 %
20		25.5 %	999		999	999		Drilled Base 28.5 %
21		42.1 %	999		999	999		

4.0.2 Structural readings floors joists – Top floor:

Loc	%mc	Comments
8	17.7 %	Dry readings in general noted in exposed floor joists
19	19.2 %	

4.1 Moisture survey – First floor:



21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

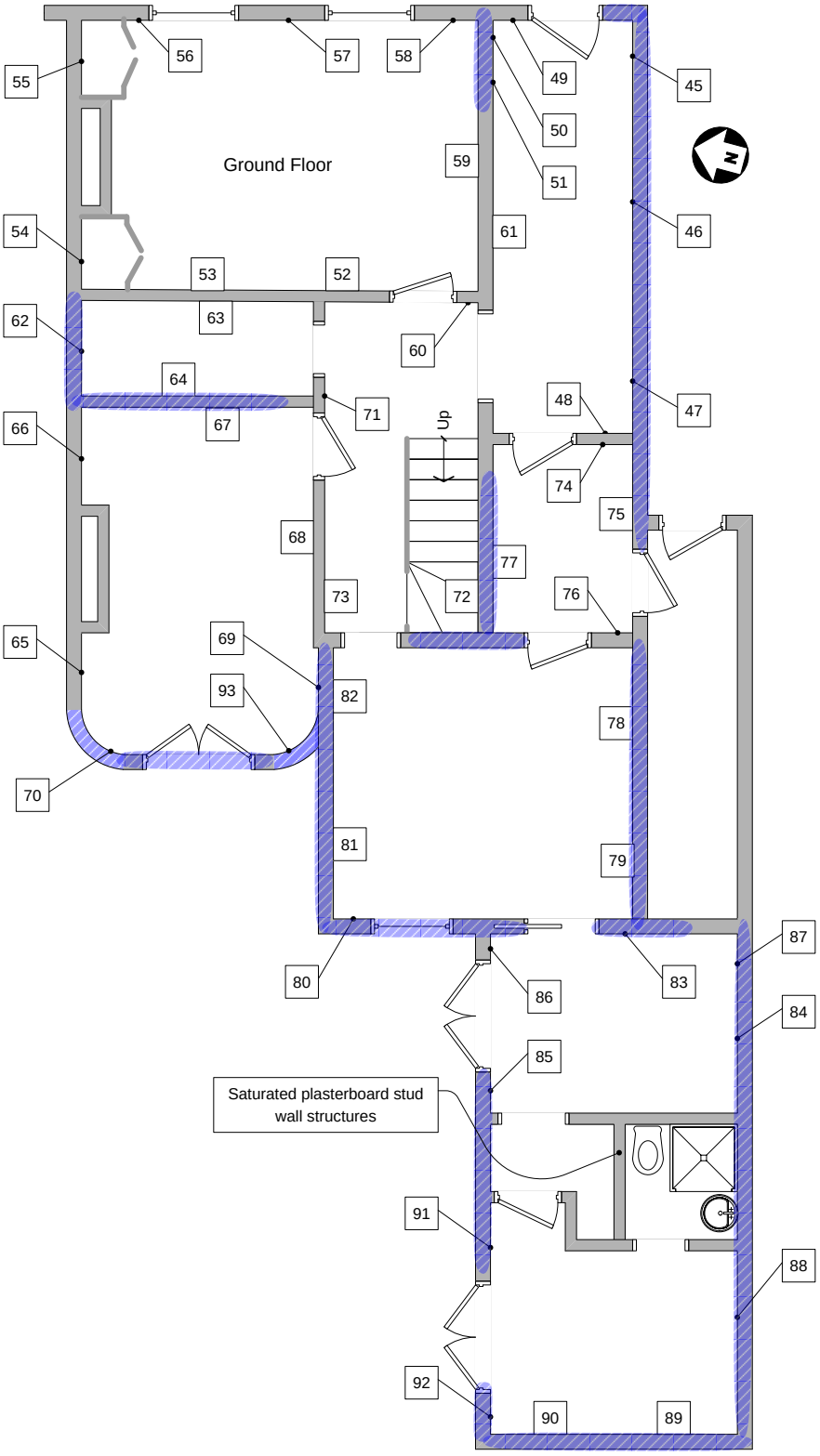
4.1.1 Structural wall and ceiling readings – First floor:

Loc	Skirt. %mc	Base of wall		Height REL =250	REL(PS) up wall and ceiling			Comments
		% WME	REL(PS)		Middle	Top	Ceiling	
22	< 6.0 %	< 6.0 %	132		142			
23	< 6.0 %	14.7 %	146		138			
24	10.1 %	11.0 %	146		138	136	131	
25	8.0 %	7.9 %	131		129	131	134	
26	< 6.0 %	13.9 %	131		129	124	124	
27	< 6.0 %	8.9 %	129		134	134	129	
28	< 6.0 %	11.7 %	135		136	139		
29	8.6 %	11.9 %	141		138	127	121	Drilled Mid. 8.7 %
30		30.2 %	143		132	121	122	Middle 25.4 %WME
31		76.7 %	430		166	166	131	Middle 24.9 %WME
32		74.8 %	166		220	177		Sporadic readings Mortar 42.9 %
33		26.2 %	129		210	135		
34		93.0 %	177		999	135	127	
35		24.3 %	127		555	230	122	
36		44.3 %	147		999	999		
37	< 6.0 %	< 6.0 %	131		127	136	112	
38	< 6.0 %	14.6 %	133		212	168	121	Drilled Mid. 41.3 %
39	8.7 %	9.9 %	131		132	136	122	
40	< 6.0 %	11.6 %	141		145			
41	9.6 %	10.5 %	141		138			
42		65.4 %	999		999	999		
43			999		999	567		Wall timber 27.2 %
44			999		999	999		

4.1.2 Structural readings floors joists:

Loc	%mc	Comments
29	16.9 %	
33	25.2 %	Joist nearest to rear wall to property Rest of joists 17 – 19 %
38	19.9 %	

4.2 Moisture survey – Ground floor:



21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

4.2.1 Structural wall and ceiling readings – Ground floor:

Loc	Skirt. %mc	Base of wall		Height REL =250	REL(PS) up wall and ceiling			Comments
		% WME	REL(PS)		Middle	Top	Ceiling	
45		99.9 %	999		999	999		Wall timber 47.2 %
46			999		999	999		
47		41.6 %	999	1500mm	166	172		
48		14.0 %	167		131	138		
49	8.7 %	11.5 %	187		158	166		
50	17.2 %	61.2 %	999		136	134		
51	15.1 %	43.2 %	999		132	136		
52	14.3 %	18.7 %	182		151	145		Middle 10.6 %WME
53	8.1 %	23.4 %	172		141	142		
54	8.1 %	15.4 %	145		131	136		
55	15.2 %	15.5 %	149		138	145		
56	12.5 %	16.4 %	136		146	129		
57	14.4 %	12.8 %	134		149	132		
58	8.1 %	14.1 %	136		158	138		
59	10.7 %	14.0 %	129		143	136		
60	12.6 %	15.8 %	139		129	137		
61	18.7 %	18.1 %	126		141	139		
62		95.6 %	999	1700mm	390	132		
63		15.2 %	155		128	101		
64		88.8 %	999	860mm	210	229		Wall timber 15.2 %
65	14.6 %	15.8 %	135		145	148		Middle 12.6 %WME
66		14.4 %	127		142	143		
67		22.3 %	164		141	143		Boarding to base
68	18.2 %	16.1 %	144		143	133		Middle 9.9 %WME
69			151		999	999		Middle 99.9 %WME
70	30.7 %	29.9 %	287		134	999		Middle 55.6 %WME
71	25.6 %	13.5 %	136		154	142		
72			999		999	999		Middle 55.3 %WME
73	11.2 %	13.4 %	143		146	152		
74		14.2 %	167		151	153		
75		32.7 %	999	500mm	165	229		
76	18.6 %	14.0 %	197		169	999		Top 71.2 %WME
77		99.9 %	999	2200mm	999	197		
78	41.7 %	99.9 %	999		360	258		
79	42.0 %	99.9 %	999		999	999		
80			999		999	124		Middle 85.2 %WME
81		99.9 %	999		999	325		Middle 99.9 %WME
82	18.0 %	18.7 %	250		202	466		Top 53.9 %WME
83		96.5 %	999		999	999		Middle 86.5 %WME
84			Kitchen base units		258	999		
85		42.6 %	999		287	584		
86			999		999	999		Middle 62.1 %WME
87			999	1000mm	229	221		

21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

Loc	Skirt. %mc	Base of wall		Height REL = 250	REL(PS) up wall and ceiling			Comments
		%WME	REL(PS)		Middle	Top	Ceiling	
88	41.8 %	55.4 %	999	1500mm	208			
89	35.6 %	23.0 %	999		431	999	999	
90	39.6 %	22.6 %	999		287	999		
91			999		338	999		
92	52.8 %	92.9 %	999		431	999		
93			999			485		

4.2.2 Structural readings floors joists:

Loc	%mc	Comments
45	82.1 %	
53	26.2 %	
57	21.4 %	
58	24.8 %	
62	25.7 %	
70	27.1 %	
93	99.9 %	Saturated timber joists significant decay

7.0 Survey Equipment:

Non-destructive moisture readings using:

Protimeter Surveymaster on search mode using radio frequency survey method with readings given numerically from 0 to 999 REL. Survey depth is approximately 5 to 15 mm depending on material characteristics. **Please note** the readings are subjective and open for interpretation, therefore they **should not** be used indicate actual moisture content.

Tramex MRH using electrical impedance survey method on non-wood materials the readings are given numerically from 0 to 99. **Please note** the readings are subjective and open for interpretation, therefore they **should not** be used indicate actual moisture content. Readings taken from wood are given as a %mc the unit can be calibrated to wood species the readings indicated can be taken as an indication of wood moisture content. Survey depth up to 30 mm depending on material characteristics.

Tramex CMEX11 (Concrete encounter meter) using electrical impedance survey method the meter is calibrated to indicate % moisture content by weight in concrete floor slabs and anhydrite screeds.

Invasive moisture readings have been taken using a Protimeter Surveymaster reading direct % moisture in wood and % wood moisture equivalent (%WME) in other materials.

Air moisture readings have been obtained using a Tramex MRH and a Protimeter Hygromaster measuring temperature in °C, % relative humidity and specific moisture content in g/Kg

Note: all readings taken with electronic metering are a guide and should be viewed with all the available information to gauge the true condition. However, for the purposes of this report the following readings can be taken as an indication that the material checked could be said to be dry back to a satisfactory level.

Non-destructive Protimeter Surveymaster	200 REL(PS) or below in masonry **guide only**
Non-destructive Tramex MRH Masonry scale	40 REL(TM) or below in masonry **guide only**
Tramex CMEX11 Concrete	3.0 %mc Tramex or below concrete **guide only**
Invasive moisture readings	Plaster and Masonry WME 16% or below **guide only**

21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk

Invasive wood readings	Below 15%
Normal indoor wood moisture content	10% – 12%
Air moisture readings in concrete	Below 11 g/Kg Dry Air (75 %ERH at 20 °C)

Reference for Readings Table:

Non-destructive Protimeter Surveymaster		REL (PS)
Non-destructive Tramex MRH		REL (TM)
Non-destructive Tramex CMEX	Concrete	%mc Tramex
Invasive moisture readings:	Concrete:	% WME
	Wood:	% mc
Air moisture readings in concrete:		g/kg (DA)

Guide to moisture survey:

	High Moisture Levels
	Moderate Moisture Levels
	Low Moisture Levels

21A Picton House, Hussar Court, Westside View, Waterlooville, Hampshire PO7 7SQ
Tel: 0344 846 0955 E: enquiries@cornerstone-ltd.co.uk W: www.cornerstone-ltd.co.uk