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STRUCTURAL REPORT

of

RADNOR ARMS HOTEL, NEW RADNOR

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6946/RVW/R2

22 March 2023

Ben Asson
The Radnor Arms Hotel Ltd CBS
Brookside Farm
Park Road
New Radnor
Powys
LD8 2SU

NEW RADNOR : RADNOR ARMS

1.00 AUTHORITY AND BRIEF

- 1.01 We were commissioned to prepare a Structural Report of the Radnor Arms Hotel at New Radnor.

2.00 INSPECTION

- 2.01 An inspection of the building was made on 23 February 2023.
- 2.02 Sketch plans of the property were made available to assist with the inspection.

3.00 GENERAL DESCRIPTION

- 3.01 For orientation purposes the front of the building facing the road is considered as the east elevation.
- 3.02 The ground floor area is approximately 15 metres wide, north to south, and 20 metres long. There is a first floor above the south half approximately 9 metres wide by the length of the building.
- 3.03 The building dates from the 18th C. The northern single storey restaurant area was originally of two storey construction which burned down in 1976. The adjoining property to the south is Listed which means that the south party wall of the building is also Listed.
- 3.04 The two storey building has a slate clad pitched roof whilst the single storey area has a felted flat roof.

4.00 OBSERVATIONS (the numbers in brackets refer to the record photographs in Appendix B)

4.1 East Elevation – External (1)

4.1.1 The two-storey building is constructed from random stonework faced with brickwork externally and houses a central door with small semi-circular bay windows either side. There are two further windows at first floor. The single storey section has a felted flat roof with large windows built off random stone plinth.

4.1.2 The wall to the two-storey building is of painted brickwork with no signs of any structural cracking. There has been some previous movement, and possible re-building, above the south bay window (2).

There is a slight projection of the roof over the bay window which can hold water. It is likely that water previously penetrated through defective flashings resulting in rot to the lintels. This would account for the possible rebuild. There are no signs of further distress which would suggest that any repairs are successful. It would, however, be prudent to check the flashings above the bay.

4.1.3 There is bulging of the brick wall starting at the north side of the north windows extending to the north side of the door. There is slight cracking running diagonally between the south sides of the bay and first floor windows.

In order to offer stability to the bulging masonry it is suggested that consolidation anchors be included to tie the outer skin of brickwork back to the main core of the wall and also possibly anchor internally to the first floor. Details can be provided when drawings are made available.

4.1.4 The single storey section has a 900 mm high coursed random stone plinth with glazing over (3). There are vertical cracks within the outer face of the stone plinth aligning with the window mullions (4 & 5).

For comments relating to the cracking refer to clause 4.2.2

4.2 North Elevation – External

4.2.1 The north elevation of the two storey building forms a gable with a flat roofed extension to the west (6). The gable section is rendered and houses one first floor window. There is general crazed cracking of the render particularly around the window (7). The vertical alignment of the gable section appears to be relatively true.

The cracking of the render is most likely due to loss of adhesion of the render causing hollowing to occur. It is likely that the existing render will need to be replaced with new.

4.2.2 The north elevation to the single storey area comprises stonework plinth with glazing and flat roof over. There is vertical cracking within the stone plinth below the window mullion. Some trial pits have been opened-up alongside the wall indicating that the existing strip footings are based about 400 mm below existing ground level to the underside of the concrete.

It is understood that the flat roof section of the building was originally of two-storey height with a pitched roof matching the south side of the building but burnt down in the 1970's and replaced with the single storey Restaurant. The structure is of roof joists spanning onto steel beams supported by steel columns. Whilst these columns have not been exposed it is most likely that the lower section of steel, within the stone plinth, has corroded and possibly laminated due to water penetration. Rust expands and can displace any surrounding brittle material such as masonry, which would account for the vertical cracking evident externally to both the north and south faces. The steel columns will need to be exposed and the repairs or replacement will be dependent upon the extent of rust found. The depth of the footings to the north wall do not comply with current or past Building Regulation requirements and should be a minimum of 750 mm below ground as opposed to the 400 mm. Any re-building to the single storey building will require either underpinning or more likely replacement foundations.

- 4.2.3 The west half of the single storey building is constructed of masonry which is 300 mm thick and probably of cavity construction. The north wall houses a door and three windows and is rendered externally (8). There is a horizontal crack located mid height running between the windows (9) and extends from the west window to the north-west corner. The roof timbers have suffered water penetration resulting in rot (10)

The cracking suggests either inadequate wall ties offering restraint to the outer skin of the cavity wall or, more likely, corrosion of the wall ties causing expansion and crackling along the bed joint. It is recommended that a section of the outer skin be removed to view the existing wall tie condition. If the ties have corroded, then remedial wall ties will need to be installed.

- 4.2.4 The north wall to the west end of the building has patio doors serving the roof and one first floor window together with a ground floor door and window (11) The upper floor level appears to have been extended westward with a vertical crack within the render located about 4 metres from the north-west corner. Within the extended section there is general crazed cracking within the render. In front of this is a short section of flat roof.

Whilst the cracking to the render is not structural it does suggest a breakdown of the render.

4.3 West Elevation – External

- 4.3.1 The return west wall of the Kitchen Store has horizontal cracking within the rendered finish at 450 mm vertical centres (12).

The horizontal cracking every fourth course of brickwork would suggest corroded wall ties and if this proves to be the case then remedial wall ties are recommended.

- 4.3.2 The west elevation of the single storey building was partially blocked with a timber outbuilding but appears to have been rendered with no signs of any significant defects from the area that could be viewed.
- 4.3.3 The west face of the two-storey flat roof section has two windows to its north half and has a rendered finish (13). There are slight cracks emanating from the heads of the windows up to roof which can be expected due to temperature movement. There is also a vertical hairline crack below the north side of the south window.

These cracks are not of structural significance and due to thermal movement.

- 4.3.4 The two-storey west wall houses one small ground floor window (14). There are two steel beams embedded within the wall at the south-west corner. The steel beams have rusted and there is a diagonal crack within the render emanating from the beams. There is also horizontal cracking within the render running full width of the wall.

The cracking near the beams is caused by expansion of the rusting steel. The horizontal cracks are more likely due to rusting wall ties causing cracking along the bed joints.

- 4.3.5 At the south-west corner of the random stone wall (15), there is vertical cracking of the stonework which has previously been re-pointed. (16)

As the cracking has re-opened this suggests that there is ongoing movement. It is recommended that horizontal cintec anchors are installed to stitch the cracked stonework. Details can be provided following the provision of survey drawings of the building.

4.4 South Elevation – External

- 4.4.1 The two steel beams presumably are providing support for the upper south wall near the south-west corner (17). The web of the steel universal beam has corroded through.

Further erosion of the steel will result in failure of the beams and movement or possible collapse of the south wall near the corner. The general masonry construction below the beam is of poor quality. It is recommended that the steel beam is withdrawn. Either the south wall above, to the en-suite, is needed and propped to remove the steelwork or demolished, which is considered the preferred option.

- 4.4.2 The east end of the south wall to the Lounge and Lounge Bar is of coursed random stonework and is Listed Grade II as part of the adjoining property. There is no evidence of movement or cracking to the stonework and appears sound (18). The first floor windows have concrete lintels which suggests some previous rebuilding or alteration at high level.

- 4.4.3 The south wall to the west half of the building houses two large ground and first floor windows. The wall has a stipple render finish. The construction of the wall is not known but it is considered likely to be of cavity masonry construction. There is a noticeable vertical crack between the rendered masonry and stonework (19)

There is general vertical and horizontal hairline cracking within the rendered finish but none of structural concern. The vertical cracks are most likely due to thermal movement. The horizontal cracks may be caused by rusting of wall ties which should be checked by localised opening-up for inspection. There may also be localised de-bonding of the render.

4.5 **Internal – Ground Floor** (for room references see drawing 6946/01 in Appendix A)

4.5.1 **Lounge**

4.5.1.1 Within the Lounge the first floor joists span east to west with false joists below spanning north south. The east wall is clad with timber whilst the north wall is of exposed random stonework housing a fireplace and previous window openings.

4.5.1.2 The first floor joists throughout the Lounge appear relatively new and they are supported on a 203 x 133 steel beam which runs through just east of the west wall of the Lounge.

4.5.2 **Lounge Bar**

4.5.2.1 The Lounge bar has joists spanning east to west taking support off a beam over the bar which is boxed in. There is, however, no sign of support at the end of the bar so it cannot be loadbearing. The joists must therefore take support off the stone wall between the Lounge bar and Back Bar.

4.5.3 **Back Bar**

4.5.3.1 The Back Bar houses a fireplace within the west. The floor over has 45 x 125 joists at 450 centres spanning approximately 1.4 metres onto substantial timber cross beams running north to south with these beams in the order of 200 mm square. The end west beam is of steelwork but its size could not be established.

4.5.3.2 There are no signs of any structural cracking evident to the walls within the Back Bar. There are vertical timber posts buried within the south wall (20) suggesting that this originally may have been a timber framed wall.

4.5.3.3 Within the north-west Back Bar the roof joists span east to west and there is considerable water penetration evident (21).

During the inspection water was dripping from the roof into buckets and on to the floor. This water ingress will have impacted on the roof timbers and studwork within this area. Whilst the joists appear sound at present the water penetration must be stopped as soon as possible to prevent major deterioration of the timbers.

4.5.4 **Restaurant**

4.5.4.1 The roof joists over span east to west and are supported by steel beams (22). There has been considerable water penetration through the roof which has impacted on timbers (23). The steelwork has surface rusting but is intact.

As note previously the water penetration should be prevented to allow the timbers to dry out. All defective and rotted timbers will need to be replaced. As noted in clause 4.2.2 the lower section of the steel columns may have suffered rust and dependent upon their condition.

4.5.5 Kitchen

4.5.5.1 The joists span east to west and have suffered with water penetration through the ceiling (24).

4.6 Internal – First Floor (for room references see drawing 6946/02 in Appendix A)

4.6.1 North East Room

4.6.1.1 The roof over is of trussed rafters spanning east to west.

4.6.1.2 There is an outward bow of the east wall with a gap between the floorboards and wall (25). The south wall is of solid masonry. There is no cracking

It is recommended that the east wall is strapped to the floor joists and anchored into the wall to offer a degree of restraint.

4.6.1.3 There is a Bathroom to the west of the north-east room separated by a stud partition.

4.6.2 Managers Room

4.6.2.1 There is a slight outward bow of the east wall but no cracking to the walls.

4.6.2.2 The south wall above the ceiling line is of blockwork up to the roof line.

4.6.3 Bedroom 2

4.6.3.1 The roof joists span north to south within this room with some damp staining through the ceiling.

4.6.3.2 There is a window within the south wall with a noticeable bow within the west side of the window (26) together with noticeable cracking of the masonry at cill level (27). The east wall is of solid construction whilst the west wall is of studwork.

The cause of the movement evident is not clear and will require the removal of finishes to establish the wall construction and whether the defects extend into the masonry. There are similar defects to the opposite side of the pier dividing the windows to this room and Bedroom 3. It is assumed that the south wall is of masonry cavity construction. Assuming the stud wall between Bedrooms 2 and 3 offers little or no lateral restraint against wind forces the wall panel is 5.5 metres long x 2.4 metres high with two large window openings and may require additional restraint against wind. Another possibility is buried metal within the wall having rusted such as wall ties or straps or even steel first floor beams or lintels. Further examination is necessary following the removal of finishes.

4.6.4 Bedroom 3

4.6.4.1 The south wall has a window located 140 mm from the east wall. There is a horizontal crack at the cill to the east side of the window (28) together with a horizontal crack at mid height (29). There is a significant horizontal crack to the west side of the window emanating at cill (30) and running to the solid west wall (31). There is also a hairline crack in the west side of the window

opening. There is no similar movement evident externally to the pier dividing the windows (32).

There is an indication that the west side of the wall at the cill is lifting which may suggest some buried metalwork within the wall. There is also an indication of a slight crack near the ceiling of the west wall suggesting that there may be outward movement of the south wall. As there is no similar movement at cill level externally suggests that the defects are confined to the inner skin of the cavity wall.

4.6.4.2 The roof joists span north to south within this room.

4.6.5. **Bedroom 1**

4.6.5.1 The roof joists span north to south. Apart from some localised damp staining through the ceiling there was no significant cracking within the walls.

4.6.5.2 The north wall is 450mm thick.

4.6.6 **Bathroom**

4.6.6.1 The roof joists span north to south with some damp staining evident.

4.6.6.2 There is a horizontal crack in the north wall located 450mm below the underside of the roof joists and extends about 1.2 metres from the north-east corner.

4.6.7 **Bedroom 5**

4.6.7.1 The roof joists span north to south with the north, south and east walls of stud, whilst the west wall is of solid construction about 300mm thickness.

4.6.7.2 There is a 203 x 133 steel beam supporting the roof joists.

4.6.8 **Lounge**

4.6.8.1 The roof joists span east to west and take support off a 203 x 133 steel beam running north to south and located 650 mm from the west stud wall.

4.6.8.2 There is a large window within the south wall of this room but no cracking around the windows, however, the wall dry lined, which would tend to hide any defects.

4.6.9 **Bedroom 4**

4.6.9.1 The roof joists span east to west and take support off a steel beam spanning between the two outer north and south walls.

4.6.9.2 There is a large window within the south wall.

4.6.9.3 The en-suite serving this Bedroom appears to be an extension with vertical cracking at its junction within the south wall (33). The floor within the en-suite falls towards the west wall.

The parting of the extension indicated by the vertical crack suggests that there is some instability and movement of the walls surrounding this room. The south wall sits on the corroded steel beams described in clause 4.4.1 and may have started to compress due to the erosion of the webs. There are also vertical cracks externally following the line of the extension. It may prove easier to remove the extension housing the en-suite than repair and strengthen the cause of the movement if not within the proposals.

5.0 SUMMARY

- 5.1 The external fabric of the two-storey main building is generally sound together with the roof and first floor construction. There is a suspicion of corroded wall ties to the more recent cavity walls which would necessitate the inclusion of remedial wall ties. Some localised areas will require opening-up for inspection of the ties. There is movement and cracking above the first floor of the south cavity wall and the cause is unclear and will require removal of finishes and exposure to determine the cause. The crack pattern suggests expansion of metals but this needs to be proved.
- 5.2 The felt finish to the flat roofs has failed in numerous locations and allowing significant water ingress which will result in rot of the timbers. The water penetration must be stopped as soon as possible as significant structural damage to the timbers could occur. It is likely that all of the roof boarding will require replacing. There are far better waterproof membranes available in lieu of felt. Greater falls of the covering should also be included to negate standing water. If the hotel rooms are retained then areas of the flat roof will be fire exits.

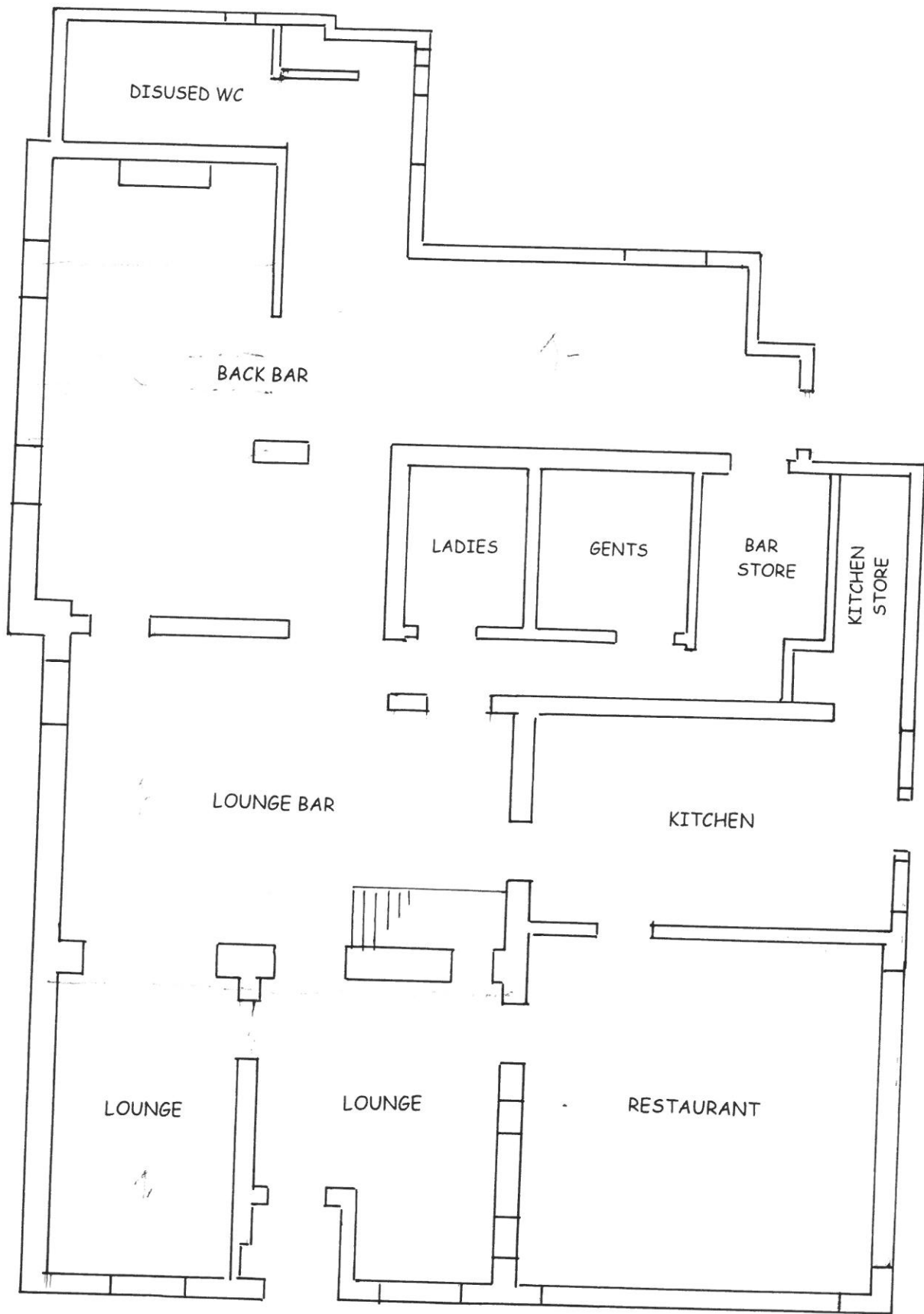


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R V Williams C.Eng., FStructE

APPENDIX A

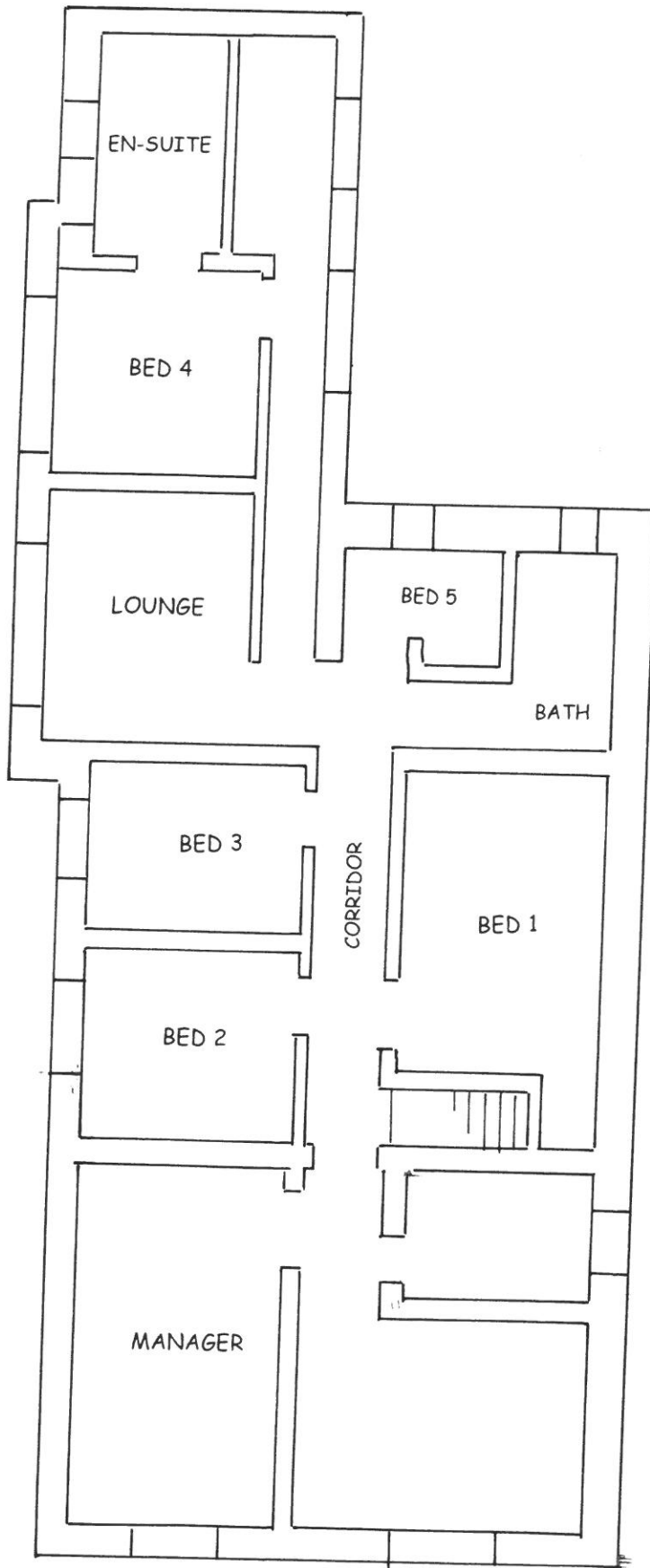
Drawing 6946/01 : Ground Floor Plan

Drawing 6946/02 : First Floor Plan



GROUND FLOOR PLAN

R V WILLIAMS ASSOCIATES Ashby House, Middleton Street Llandrindod Wells, Powys LD1 5ET Tel: 01597 825788 Fax: 01597 824388	Project.	NEW RADNOR : RADNOR ARMS HOTEL			
	Title.	GROUND FLOOR PLAN			
Date.	March'23	Scale.	1:100 approx	Drawing no.	6946/01



FIRST FLOOR PLAN

R V WILLIAMS ASSOCIATES Ashby House, Middleton Street Llandrindod Wells, Powys LD1 5ET Tel: 01597 825788 Fax: 01597 824388	Project.	NEW RADNOR : RADNOR ARMS HOTEL			
	Title.	FIRST FLOOR PLAN			
Date.	March'23	Scale.	1:100 approx	Drawing no.	6946/02