CADARN
CONSULTING ENGINEERS

STRUCTURAL CONDITION SURVEY
ROSE HILL LODGE,
WREXHAM



Date
June 2020

Prepared for:
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Rose Hill Lodge,
Erbistock,
Wrexham,
LL13 0DR

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REVISION	DATE	DESCRIPTION	BY	CHECKED	REVIEWED
P01	22.06.2020	First Issue			
P02	14.07.2020	Amend to IR comments			
P03	27.08.2020	Amend Para 6.3 in conclusion	[redacted]	[redacted] Gwyn Llewelyn Jones MEng CEng MICE I am approving this document 2020.08.27 16:35:57+01'00'	[redacted] Ifan Rowlands I am approving this document 2020.08.27 16:37:13+01'00'

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1. PREFACE

1.1. Property Address - Rose Hill Lodge
Erbistock
Wrexham
LL13 0DR

1.2. Date - 22nd May 2020

1.3. Nature of Investigation - Structural condition of purchased property

1.4. This report has been produced to record the structural condition of the 2-bedroom semi-detached property known as Rose Hill Lodge, Wrexham. This report will detail any structural and non-structural defects along with their root cause(s), and will identify specific remedial measures required to address those defects.

1.5. The inspection was undertaken by Eifion Rowlands, Senior Engineering Technician at Cadarn Consulting Engineers Ltd (hereby referred to as "Cadarn"), with the findings and recommendations reviewed by Gwyn Llewelyn Jones, Engineering Manager and Ifan Rowlands, Principal Engineer and Director of Cadarn. Copies of their individual qualifications and experience are available upon request.

1.6. Cadarn were employed to represent the owner of the aforementioned property in undertaking this structural investigation. A copy of Cadarn's professional indemnity cover to undertake structural investigation and design is also enclosed within (Appendix A).

2. INTRODUCTION

2.1. As per the request of the owner of the property, a structural inspection of Rose Hill Lodge, Wrexham was undertaken on 22nd May 2020.

2.2. The purpose of the inspection was to determine the structural condition of the property by identifying any defects that should be addressed to ensure the continued structural stability and adequacy of the property. The inspection, which was of a non-intrusive nature, was limited to readily accessible areas only and no additional uncovering was undertaken.

3. PROPERTY BACKGROUND & HISTORY

3.1. A search of the historical mapping for the area local to the property has been undertaken and has indicated that the original construction of the property pre-dates the earliest historical mapping made available, which dates 1879. The configuration of the property has remained relatively unchanged from its original layout in 1879 with exception to the extension to the rear of the property in 2011. Reference is made to Figure 1 below.



Figure 1 - Historical Mapping of Local Area 1879

4. STRUCTURAL CONFIGURATION OF PROPERTY

4.1. The property is of two-storey, traditional construction comprising a duo-pitched slate roof supported upon a series of load-bearing stone masonry walls.

4.2. The walls of the property are painted externally and the property benefits from timber windows and doors throughout. All windows and doors are fixed to the surrounding masonry.

4.3. The foundations of the historic element of the property were exposed along the rear elevation and are confirmed to be, as expected from the information provided, concrete underpinned foundations. The foundations for the later extension was also exposed along the rear elevation and confirmed to be approximately 450mm projection from external wall face and 150mm thick concrete strip foundations founded approximately 150mm below the existing ground level within the natural strata.

4.4. The natural strata directly beneath the foundations consist of a light brown, very loose, silty soil matrix with small to medium, sub angular cobbles throughout. Prior to the site investigation the client penetrated the strata beneath the foundation with a 50mm diameter steel bar, resulting in the easy penetration to an approximate depth of 1.2m, therefore confirming the loose, uncompacted nature of the underlying strata. Groundwater was not encountered within the trail holes during the exposure of the foundations. Reference is made to Figure 2 below.



Figure 2 - Ground Conditions

4.5. Although unconfirmed, the ground floor and basement level are expected to consist of ground bearing slab, with the kitchen extension and first floor assumed to consist of suspended timber construction.

4.6. The rainwater goods for the later kitchen extension is situated along the gable wall above ground and within close proximity to the concrete strip foundations below ground. Reference is made to Figure 3 below. Due to the sewer network consisting of thermoplastic pipework the risk of surface water seepage through construction joints is considered negligible due to the standard manufacturing lengths of pipework being 3m, making the need for construction joints across the gable negligible and general condition of surrounding strata.



Figure 3 - Surface water drainage

HISTORICAL STRUCTURAL AMENDMENTS

4.7. The historic element of the property pre-dates the earliest historical mapping available, however the recent construction works undertaken on site, underpinning of the existing foundations and construction of two storey extension to the rear of the property have been recorded through the Local Authorities Building Control department and Planning department dating 2010 and 2011 respectively.

4.8. The property benefited from the underpinning of the existing foundations in 2010, following the approval of the proposed works by the Local Authority through the planning process in March 2009. Reference is made to Appendix C for the approved documents. The previous action of underpinning is considered likely to have been undertaken due to poor ground conditions attributing to the settlement of the existing foundations.

4.9. An originally designed two storey extension was proposed to the rear of the property in 2011. Refer to Appendix C for planning supporting documents. This extension consists of traditional construction methods comprising cavity brickwork external walls, duo pitch natural slate roof and traditional timber cut roof structure. The masonry walls are painted white to match the existing property. During the construction of the extension the foundations were constructed at a significantly lower depth than originally intended, approximately 1.5m, due to poor ground conditions as discussed within **paragraph 4.4** above, thus creating a basement room below the kitchen.

5. FINDINGS & DISCUSSION

5.1. The findings from the structural inspection of the property, and any points of discussion required to support these findings, are discussed below. The main defects are categorised as follows.

- Settlement of the floor slab of the extension;
- Gaps / cracking at the interaction of the extension and the original structure.

5.1.1. Settlement of the Extension Floor Slab

5.1.1.1. The ground-bearing floor slab of the extension has endured movement of approx. 15 to 20mm in the form of downward settlement in relation to the external blockwork of the extension. From discussions with the Owner it is apparent that the foundations of the original structure were underpinned approximately 12 months prior to the construction of the extension, which indicates ground bearing slab would be founded on unsuitable material at a higher level, which has led to the settlement under the weight of the structure over time. It is likely that the design of the foundations of the extension has accounted for potential subsidence or excessive settlement and are therefore likely to have been constructed to similar depths to those of the original structure post-underpinning. This has likely limited, although not entirely prevented, the settlement of its foundations.

5.1.1.2. However the ground floor slab of the extension, which is a structure independent from the external walls, appears to have settled under its own weight, thus suggesting that the shallow strata has upon which it bears has unsuitable bearing resistance characteristics.



Figure 4 - Slab movement

Visual inspection of exposed ground near to the building's footprint confirmed the ground to be of silty nature, which is susceptible to washout in periods of heavy rainfall and may therefore have contributed to any settlement issues.



Figure 5 - Exposed Concrete Foundations

5.1.2. Gaps / Cracking at the Extension-to-Original Structure Interaction

5.1.2.1. Significant gaps / cracking is evident along the interaction between the original structure and the extension of approximately 30mm and indicative of foundation settlement. Settlement of a new build tends to occur in the early years of its construction; this, combined with underpinning of the original structure, has led to differential settlement across the two structures. However, this issue is exaggerated by the fact that there appears to be no structural ties between the extension and the original structure; rather the extension has been constructed to abut the original structure only. The original structure therefore provides no resistance to counteract the extension's movement and the lack of restraint has allowed the extension to rotate from verticality.



Figure 6 - Vertical gaps / cracking at extension interaction with historic structure

6. CONCLUSION & RECOMMENDATIONS

6.1. Based upon the findings detailed in section 6, Cadarn consider the property in general to be performing adequately from a structural perspective, however the later extension addition to the property contains some significant structural issues. Significant movement has been recorded within the extension however this does not pose an immediate risk to life. To address this, it is recommended that the following remedial measures are undertaken:

- The floor slab and foundations of the extension should be underpinned to prevent further settlement. The foundations may be underpinned by mass concrete pour, whilst resin injection techniques are available to underpin the floor slab and, in some cases, may raise the level of the floor to the original level. It is recommended to undertake intrusive ground investigation to determine the bearing characteristics of the ground strata, as well as the nature of the extension's foundations and the floor slab (if this information is not readily available). The services of a specialist contractor should be procured for the purpose of undertaking these works.
- Remedial wall ties should be installed at regular intervals along the interaction between the extension and the original structure providing an effective movement plane between both buildings. The gap / cracking between both structures should then be filled with resin or grout until a continuous surface (both internally and externally) between both structures is formed. Similarly, the services of a specialist contractor should be procured for the purpose of undertaking these works.

6.2. It is noted that the existing foundation arrangement of the kitchen extension approved by the local Building Control during its construction does not conform to the minimum requirements within the Approved Document A of the Building Regulations 2010. The movement noted within the structure is considered as a direct result of the inadequate foundations.

6.3. Due to the significance of the defects identified, the effectiveness of these repairs, along with the structural condition of the remainder of the property, should be regularly monitored on a continuous basis by the home owner to record any

additional cracking or movement following a period of 6months post completion of the remedial measures.

6.4. Alternatively, it may be considered more economical to remove the defective kitchen extension in its entirety and reconstruct with a suitably designed structure to accommodate the ground conditions present on site.

APPENDICES

APPENDIX A: PROFESSIONAL INDEMNITY

VERIFICATION OF INSURANCE

Hammond Professional Indemnity Consultants Limited

Somerset House
37 Temple Street
Birmingham
B2 5DP

Cover is confirmed subject to the terms and conditions issued prior to inception of cover. This document is furnished to you as a matter of information only. The issuance of this document does not make the person or organisation to whom it is issued an additional insured, nor does it modify in any manner the contract of insurance between the insured and the underwriters. Any change or extension to such contract can only be affected by specific endorsement attached thereto.

Registered in England No. 4799667

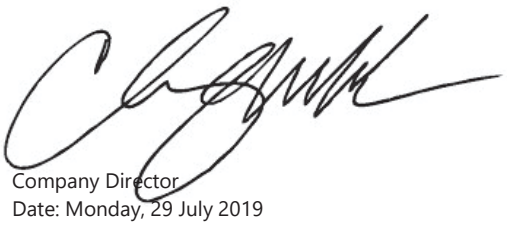
AUTHORISED AND REGULATED BY THE FINANCIAL CONDUCT AUTHORITY

Policy Holder:	Cadarn Consulting Engineers Ltd and/or Cadarn Consulting Engineers
Insurer:	OMNYY LLP *Everest Syndicate 2786 19.0477%* *Neon Syndicate 2468 23.8095%* *Probitas Syndicate 1492 23.8095%* *Antares Syndicate 1274 33.3333%*
Policy Reference:	19*YPIP027324
Professional Indemnity:	£5,000,000 Any one claim
Excess:	£5,000 Each and Every Claim
Cover Period:	31/07/2019 to 30/07/2020 (inclusive)

VERIFICATION

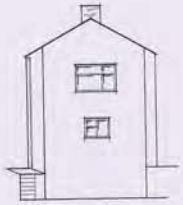
The policy is subject to the insuring agreements, exceptions, exclusions, limitations, conditions and declarations contained therein. The above is accurate at the date of signature. Should the aforementioned contract of insurance be cancelled, avoided, assigned or changed during the above policy in such manner as to affect this document, no obligation to inform the holder of the document is accepted by the undersigned or by the insurers.

Signed By:

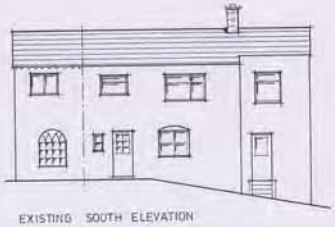


Company Director
Date: Monday, 29 July 2019
On behalf of: Hammond Professional Indemnity Consultants Ltd
Please visit us on www.hammondpi.com

APPENDIX B: PLANNING SUPPORTING DOCUMENTS



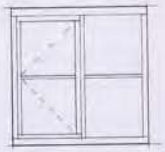
EXISTING EAST ELEVATION



EXISTING SOUTH ELEVATION

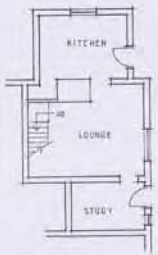


EXISTING FIRST FLOOR PLAN

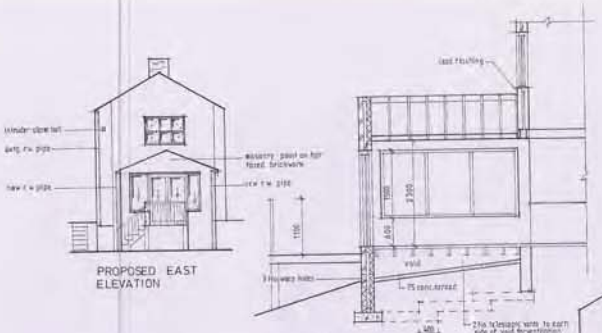


REPLACEMENT WINDOW DETAILS

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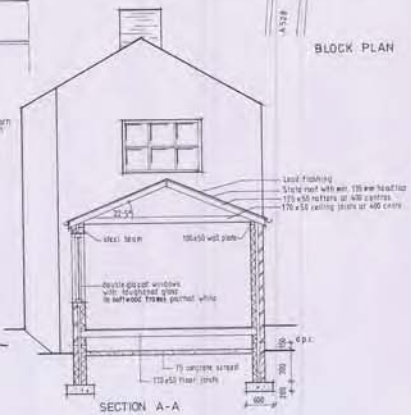


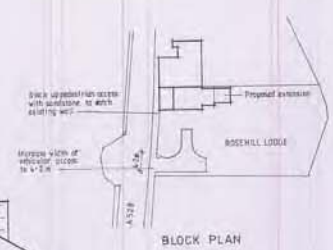
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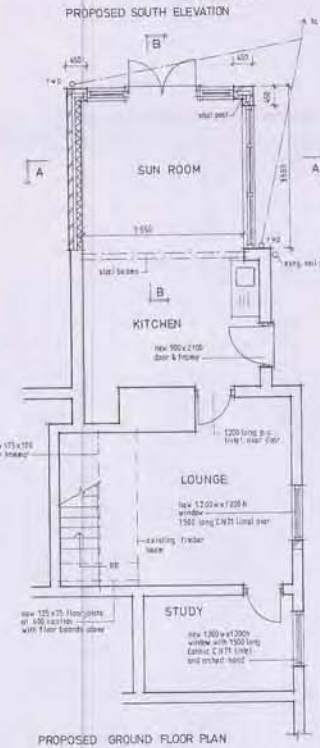


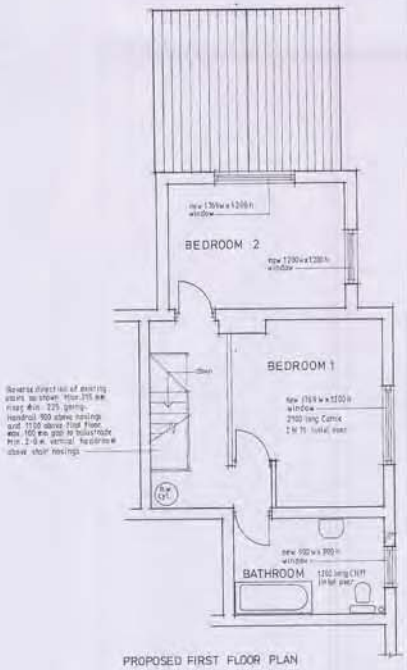
PROPOSED SOUTH ELEVATION











Notes.

Roof Construction: Blue/grey new or reclaimed slates to match existing roof with min. headlap of 135mm on 38 x 25 tanalised battens on 38 x 25 counter battens to provide air gap on Kingspan Nilvent or Tyvek breathable membrane on 125 x 50 rafters at 400mm centres at 22.5° pitch. Bottom of rafters tied to 100 x 50 wall plate with proprietary steel fixings. Wall plates tied to blockwork with 1000 x 90 x 3mm galv. m.s. straps at 2m centres or drilled to steel ring beam. 175 x 50 ceiling joists at 400mm centres supported on wall plate. 12.5mm plasterboard & skim ceiling. 150mm fibreglass insulation laid between ceiling joists and 200mm fibreglass insulation laid over ceiling joists. Insulation to link with wall insulation to avoid cold bridging. Lead flashings to abutments of walls as necessary. Lead treated with patination oil to avoid future roof staining.

Wall Construction: White masonry paint on fair faced brick to external leaf, 75mm cavity filled with Crown Dritherm insulation, 100mm lightweight insulating block, max. 0.15 W/m.K thermal conductivity and min. 3.5N strength to inner leaf, returned to horizontal and vertical d.p.c. at openings. Staifix 200mm HRT4 stainless steel cavity wall ties at 900 centres horizontally and 450 centres vertically. Walls tied to existing with masonry restraints. Install steel ring beam in accordance with Structural Engineer's details, supported onto brick walls and onto steel corner post. All new blockwork, lintels and steel beam to be plastered internally or lined with 12.5mm plasterboard & skim.

Doors and Windows: New external door and frame to new Sun Room to be hardwood and fitted with toughened safety glass. Trickle vents to frames (8000 sq.mm per frame) and not to exceed U value of 2.2 W/m²K. New windows in Sun Room to be softwood frames, painted white and fitted with double glazed units with k glass. Trickle vents to frames (8000 mm² per frame) and not to exceed U value of 1.8 W/sq.mK. Toughened glass to all windows within 800mm of floor. New windows in existing house to be softwood frames, painted Dapple Blue, with single glazing to detail. Bedroom windows to have openable area of min. 0.33 m² (450mm min. width) for escape.

Foundations: 200mm thick concrete foundations to external walls. Bottom of trench excavations to be approved by L. A. Building Control Surveyor.

Ground Floor Construction: 18mm chipboard floor deck on 170 x 50 joists at 400mm centres. Polypropylene netting to be draped over and stapled to sides of joists and Crown Loft Roll 200mm thick fitted tightly between joists, supported on netting. New floor to be level with existing Kitchen floor.

Drainage and Plumbing: Supply and fix half round black pvc gutters and down pipe to match existing as shown, taken to new gulley and 100mm pvc pipes surrounded in pea gravel to new soakaway, 5m from building and in porous ground.

Electrical: Supply and fix extract fan or cooker hood in Kitchen to give 60l /sec. extract, with 15 minutes overrun. Supply and fix lighting and power points to new extension to meet client's needs. Height of light switches to be max. 1200mm above floor level and socket outlets min. 450mm above floor levels. Provide mains operated smoke alarm to Lounge and Landing; both interconnected. All electrical work to be carried out by Part P approved Electrician.

P / 2010 / 0483

PROPOSED SUN ROOM EXTENSION AND NEW WINDOWS TO ROSEHILL LODGE, ERBISTOCK, WREXHAM LL13 0DB

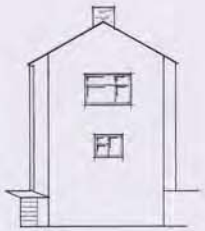
EXISTING AND PROPOSED PLANS AND ELEVATIONS: SECTIONS: BLOCK PLAN: LOCATION PLAN.

SCALES	DATE	DRAWING No
1 : 50; 1 : 100; 1 : 500; 1 : 1250	June 2010	WBS/01/02 A

David B. Davies MRICS
Chartered Building Surveyor
2, Maes Glas, Court Road,
Wrexham LL13 7SN
Tel: 01978 359882
Mob: 0798 678 3057

RICS

RECEIVED
4 JUN 2010
PLANNING DEPARTMENT



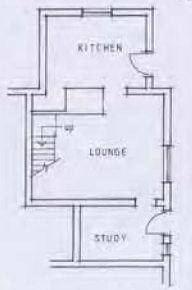
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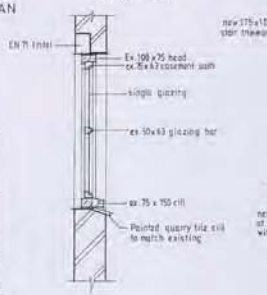
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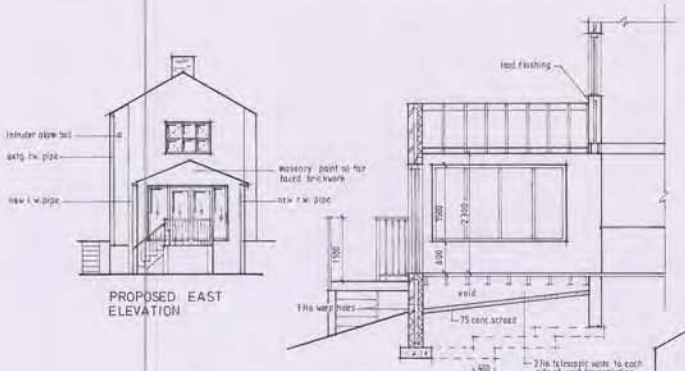


EXISTING GROUND FLOOR PLAN



REPLACEMENT WINDOW DETAILS
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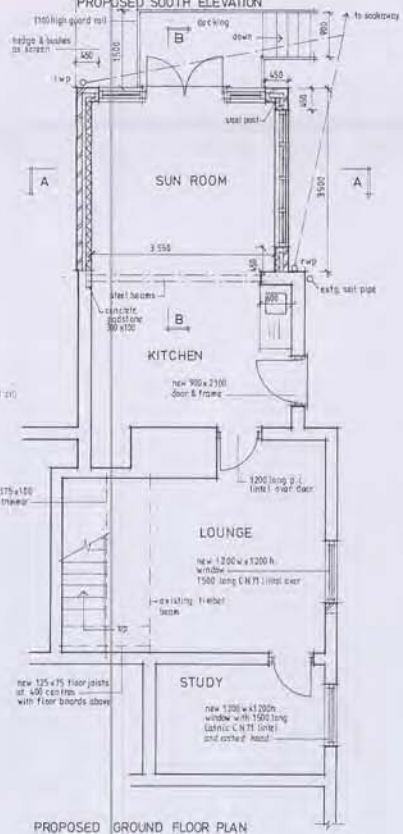


PROPOSED EAST ELEVATION

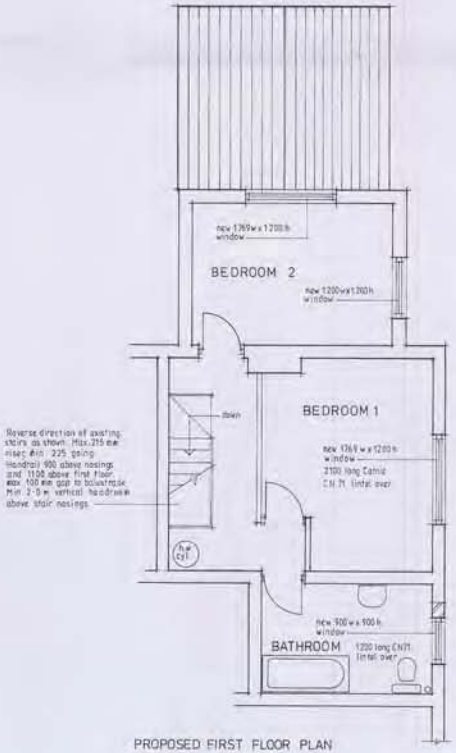
SECTION B-B



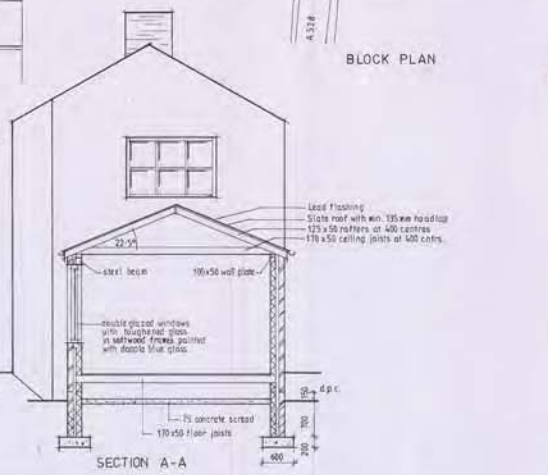
PROPOSED SOUTH ELEVATION



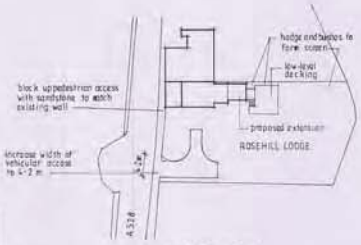
PROPOSED GROUND FLOOR PLAN



PROPOSED FIRST FLOOR PLAN



SECTION A-A



BLOCK PLAN



LOCATION PLAN

WREXHAM COUNTY BOROUGH COUNCIL
2 JUL 2010
AMENDED PLANNING DEPARTMENT

WREXHAM COUNTY BOROUGH COUNCIL
16 AUG 2010
APPROVED PLANNING DEPARTMENT

Notes.

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PROPOSED SUN ROOM EXTENSION AND NEW WINDOWS TO ROSEHILL LODGE, ERBISTOCK, WREXHAM LL13 0DR

EXISTING AND PROPOSED PLANS AND ELEVATIONS; SECTIONS; BLOCK PLAN; LOCATION PLAN.

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David B. Davies MRICS
Chartered Building Surveyor
2, Moss Glas, Court Road,
Wrexham LL13 7SN
Tel: 01978 359882
Mob: 0798 678 3057

RICS

P / 2010 / 0430

Grade II
Date Listed 13/02/1995

Community **Erbistock**
Locality **Erbistock**

Grid Ref
Record No **15173**

Post Code

Name **ROSE LODGE (ALSO KNOWN AS THE OLD POST OFFICE), WREXHAM ROAD, A528, OVERTON BRIDGE**
Entry Name/No **ROSE LODGE (ALSO KNOWN AS THE OLD POST OFFICE), WREXHAM ROAD, A528, OVERTON BRIDGE / 426**
Street No, Name

Location

History

Exterior

Situated on the E side of the A528, 150m N of Overton Bridge.

History: Estate dwelling of late C18/early C19 with possibly earlier origins. Evident on 1840 Tithe Map. Part of the Rose Hill Estate.

Exterior: 2-storey, whitewashed brick with pedimented gables and slate roof. Main elevation facing road: Dentilled brick cornice ground floor openings altered, 2 doors in their original positions 2 later windows, inset red cast-iron GR letter box dating from the conversion to a post office. First floor contains 2 cast-iron C19 Gothick tracery windows. Right hand return elevation: much altered with later windows with evidence of blocked earlier openings similar to pointed arched windows on front elevation, rear C20 extension. Left hand return elevation: single- storey lean-to additions, 2 brick stacks one with diagonal chimney pots which may relate to an earlier building phase.

Interior not accessible at time of survey (October 1994).

Listed as a good example of late C18/early C19 estate architecture which externally retains much of its original character and for its historical associations with the Rose Hill Estate.

Reference: Erbistock Tithe Map 1845.e

Interior

Listed

Reference

WREXHAM COUNTY BOROUGH COUNCIL
18 MAY 2010
PLANNING DEPARTMENT



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WREXHAM COUNTY
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30 MAR 2009

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