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North Lodge to Heath House, Tean, Staffordshire

Part 2: Roofing slate

Building Stone Assessment:

The BGS Building Stone Assessment service combines geological expertise and building conservation expertise to provide authoritative advice to clients wishing to specify natural stone for repairing or building stone structures. Samples of stone supplied by clients are compared with samples from active quarries held in the BGS Collection of UK Building Stones to identify the closest-matching currently available stone(s). Using the closest-matching stone type in repairs to stone structures maximises the likelihood that the replacement stone will co-exist harmoniously with the 'original' stone and will weather sympathetically.

GeoReport ID: BGS_342180/59569/2

BGS sample number: ENQ20103

Client reference: Heath House – North Lodge

Date of report: 20/03/2025

Executive Summary

Site name: North Lodge, Heath House Estate, Tean, Staffordshire ¹.

Architectural/structural element(s) sampled: Roofing slate. The example slate supplied for analysis presumably dates to the construction of the North Lodge during the first half of the C19th (1830–1), but this is not certain and the building could have been reroofed at some stage.

Nature of planned repairs: Replacement of split or otherwise damaged slates that are not deemed suitable for reinstatement following stripping of the roof (as part of the general refurbishment of the North Lodge).

¹ See List Entry Number: 1037928 (<https://historicengland.org.uk/listing/the-list/list-entry/1037928>).

The sample(s) of roofing slate supplied to BGS comprise(s):

'North Lodge slate' (BGS sample number ENQ20103)

An incomplete roofing slate², originally of rectangular shape and with irregular bevelled edges. Lithologically, the slate comprises a dull greyish purple³ meta-mudstone with a perfect slaty cleavage; a segmented veinlet with a conspicuous 'bleached' (white cum pale greenish grey) envelope traverses the rock (see Figure A1-1).

There is little doubt that this is a '**Penrhyn-type**' Slate, originating from within the Cambrian ('Comley Series') **Llanberis Slates Formation**⁴ succession of NW Wales. Detailed provenancing of 'Penrhyn-type' slates based purely on their visual appearance is not always 100% reliable given inherent variation in the source rock mass (and the consequences this has for the individual slates fashioned from it), but the coloration of this particular roofing slate perhaps suggests a quarry source in the Nantlle area (see Figure A1-1). Determination of the true source of the 'Penrhyn-type' slates currently on the roof of the North Lodge (which may be revealed by documentary records held by the Heath House Estate) would be instructive with respect to establishing whether the slates date to the original construction or a later reroofing.

² With approximate maximum dimensions of 340 x 260 x 6 mm; the latter two dimensions correspond to the true width and true thickness of the slate.

³ Most similar to shades of 'reddish gray' (hue 10R and 2.5YR) on a Munsell[®] Soil Color Chart.

⁴ See relevant BGS Lexicon entry at: <https://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=LLBS>.

The closest-matching currently available roofing slate is:

There are two options in the circumstances. '**Penrhyn-type**' slates of various sizes and existing in a range of greyish and reddish purple colours are widely available from architectural salvage specialists, and it would be entirely possible to obtain replacements for use in the reroofing of the North Lodge via this channel. The use of reclaimed slates would benefit the quality of the visual match with the existing slates, especially if a significant proportion of these are to be repurposed.

The alternative option would be to reroof the North Lodge using a mixture of repurposed 'original' slates and new slates. **Penrhyn Slate** is still in production present day in its type area. Contact details for the relevant producer-supplier are as follows:

Welsh Slate (Breedon Trading Limited)

Penrhyn Slate Quarries, Bethesda, BANGOR, Gwynedd

Tel. 01248 600656

Email: enquiries@welshslate.com

Website: <https://www.welshslate.com/roofing/penrhyn-welsh-slate-roofing/>

We urge you to approach Welsh Slate and discuss your specific requirements, requesting samples of their most recent production for the purposes of conducting an on-site comparison exercise with the existing roofing slates collectively. Particular attention will need to be paid to colour (i.e. shade of reddish/greyish purple) and thickness/grade.

Other possible replacement roofing slates are:

N/A

Other remarks:

Prior to specification, representative samples of the replacement slate(s) being considered for reroofing purposes should always be obtained and examined alongside the existing slates.

The installation of natural stone roofing slates should only be undertaken by a skilled and experienced roofer/slater.

Do not hesitate to contact us for further advice if required.

Dr. Stephen F. Parry
British Geological Survey
Keyworth
Nottingham, UK.

20 March 2025

Appendix 1 – Image of supplied roofing slate

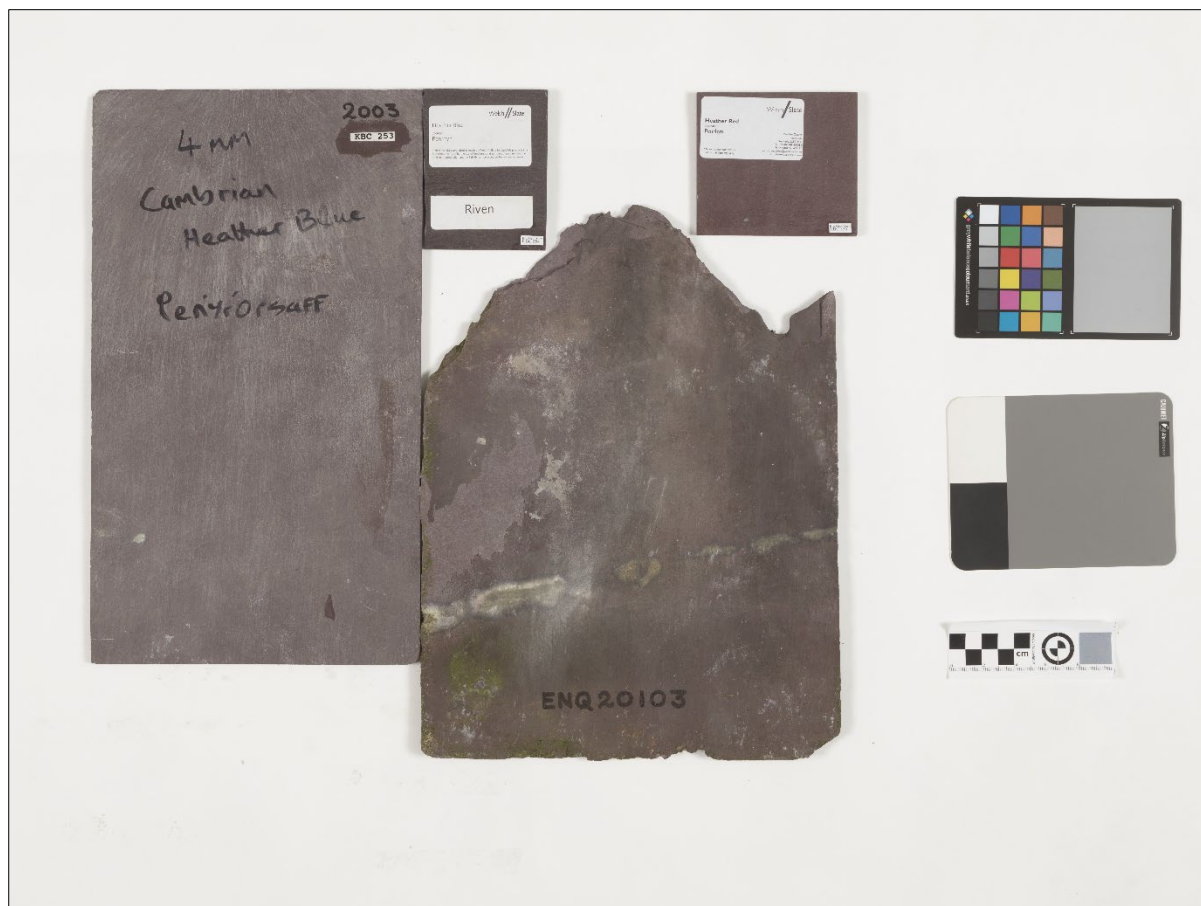


Figure A1-1. Image showing the underside of the supplied roofing slate from the North Lodge (designated ENQ20103) together with a new and unused 'Penrhyn-type' slate from the Pen-yr-Orsedd Quarries near Nantlle (BGS specimen KBC-253, labelled Pen'Yr'Orsaff) and samples of 'Heather Blue' and 'Heather Red' from Penrhyn Quarry near Bethesda (BGS specimens KBC-554 and KBC-555, respectively); colour swatches are included for comparison and the scale bar is in cm. Note the similarity in colour between the freshest, 'cleanest' part of ENQ20103 (towards its LHS) and the slate from the Pen-yr-Orsedd Quarries. There is a discernible difference in colour between ENQ20103 and both samples from Penrhyn Quarry.

Information about this Report

Introduction:

This report is designed for use by qualified professionals involved in building repair and/or conservation.

Limitations of the report:

- This report is based on an analysis of the sample or samples provided and cannot be assumed to be applicable to all materials in a building or structure unless an on-site assessment has been carried out by BGS or a suitably qualified professional.
- The mention of a specific stone type(s) should not be taken as an endorsement, or otherwise, of the quality of a particular product. Equally, recommendations made with respect to a replacement stone do not constitute a repair specification. All aspects of the building (location, detailing, other materials) must be considered in competent repair work.
- The report is based on petrographic analysis. This does not guarantee that a replacement stone is suitable for a particular purpose (e.g. carved detail), nor does it guarantee specific properties of a stone such as strength.
- The characteristics of stone from a quarry source can vary over time and from place to place within the quarry; there is therefore no guarantee that a sample of quarried stone held by BGS is representative of the stone being supplied by the quarry at any particular point in time. One or more samples of stone should be obtained from a quarry operator prior to stone specification, to confirm the appearance and character of the stone currently being supplied.
- Recommendations made with respect to a replacement stone are based on and limited to an interpretation of the records in the possession of BGS at the time the analysis is carried out.

BGS Building Stone Assessment

A BGS Building Stone Assessment is usually performed in three stages.

(i) The sample of 'original' stone (usually supplied by the client) is first subjected to a detailed petrographic examination (though only macroscopically in the present case), to establish the range and character of its intrinsic properties.

(ii) The range of properties is then compared with those of stone samples held in the BGS Petrological Collections, to constrain the source of the stone. Historical records and other forms of documentary evidence, if available, and the likelihood that the stone was sourced locally or 'imported', are also taken into account.

(iii) Finally, the closest-matching currently available stone(s) are identified. If the quarry from which the stone was sourced originally has been identified and is still open, it will usually provide the closest-matching stone.

If the quarry from which the stone was sourced originally has not been identified, or is closed, the closest-matching currently available stones are identified by comparing the properties of the 'original' stone with those of samples of currently available stones held in the BGS Collection of UK Building Stones.

Comparing stone properties to identify the source and/or the closest-matching stones is known as stone matching.

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