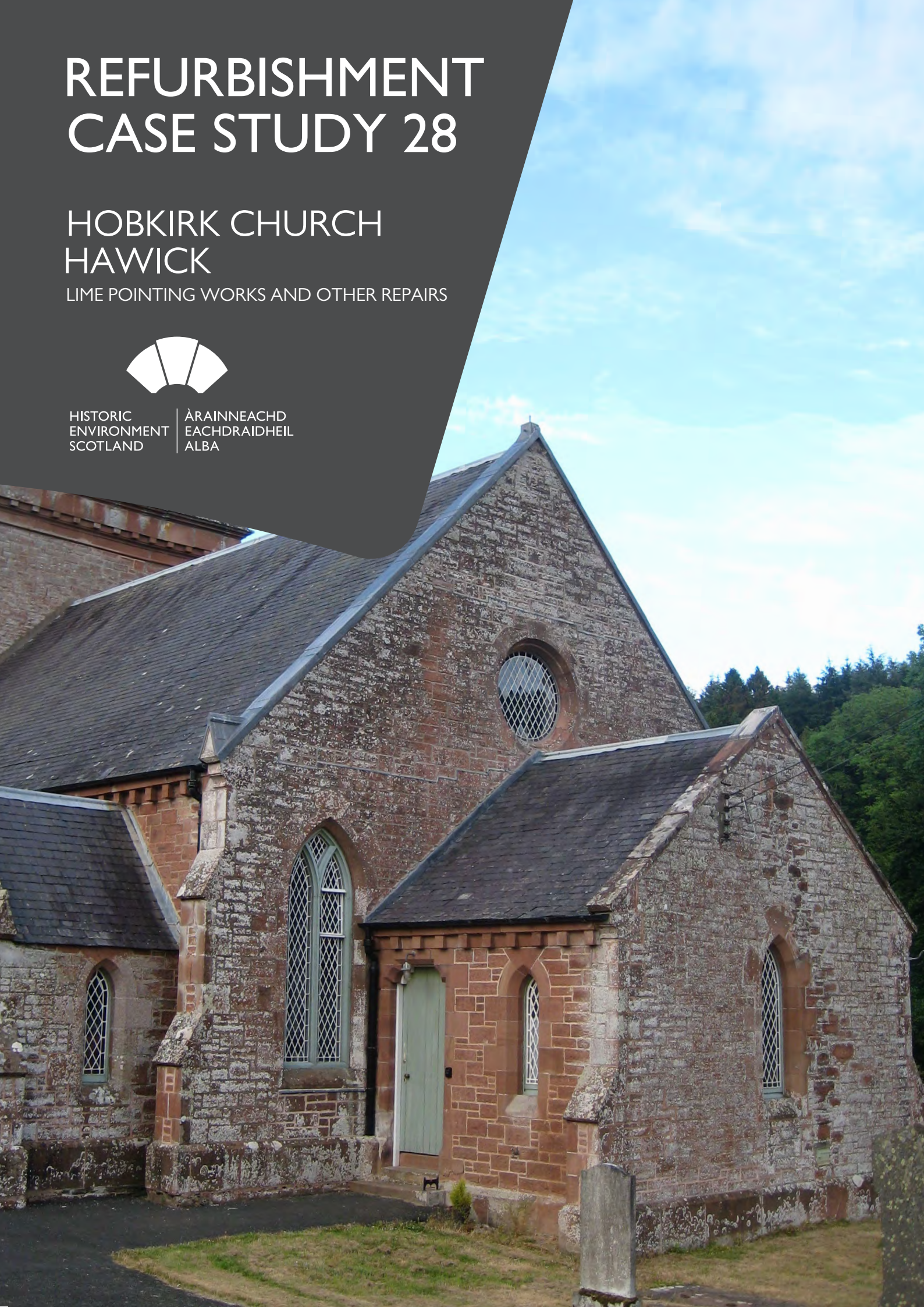
REFURBISHMENT CASE STUDY 28

HOBKIRK CHURCH HAWICK

LIME POINTING WORKS AND OTHER REPAIRS

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA



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HOBKIRK CHURCH, HAWICK

LIME POINTING WORKS AND OTHER REPAIRS

ROGER CURTIS

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1. INTRODUCTION

This Refurbishment Case Study describes lime pointing and other small scale repair works carried out on Hobkirk Church in the Scottish Borders. It describes the mixing and use of a lime mortar made from local sand and quicklime, and the lessons learnt during the works. The re-pointing was done over two years, in two week-long sessions in the summers of 2013 and 2014. After a reasonable interval the condition of the work was reviewed and the opportunity taken to record and describe the process.

The work was carried out as part of the Society for the Protection of Ancient Buildings (SPAB) Scotland's Summer Working Party, with a mixed group of skilled and semi-skilled volunteers and Historic Environment Scotland (HES) staff. The experience levels varied considerably, from masons and stone conservators, to lay people wanting to learn about building conservation and repair. Therefore, the fact that all were able to learn and contribute is a significant outcome and demonstrates that conservation can be a community activity. This case study is one of a series of small pilots sponsored by HES where similar work was carried out, largely by those new to traditional lime mortars.

2. THE SITE

2.1 History

Hobkirk Church is a red sandstone building dating from 1863 (Figure 1). It was designed by Scottish architect David Rhind and replaced a post-Reformation building formerly some 100 metres to the north. It is Category C Listed. While the external envelope of the church has not changed significantly since its construction, internally there has been a series of alterations, including re-alignment of the direction of worship.

2.2 Condition

The condition of the external fabric was generally good, although failure of cement pointing on the vestry and nave gables had started to cause water ingress. The coursed rubble is a hard red sandstone, known geologically as 'Devonian Old Red Sandstone'. The stone dressings are of a similar hue, but softer in texture and showing signs of decay where there is persistent wetting and drying. Some areas of the walls had been repaired before, and it is believed that the last repair was re-pointing work to the gable of the nave and vestry in the late 1960s. This used a strong Portland cement mix which was pointed over the original lime-rich mortar. The new cement mortar was cracked in many places and had begun to come away from the

wall. In addition to failures in the pointing, open joints at the skew copes on the nave gable were letting in water. This high level work was addressed by the church at a later phase with re-pointing and new leadwork in 2016.

Figure 1. Hobkirk Church viewed from the southwest.

3. ORGANISATION AND DESIGN OF THE WORKS

3.1 The need for masonry repairs

The congregation were aware of the poor condition of some areas of masonry, and the possibility of the church hosting a volunteer working group in association with HES and the SPAB was discussed. This would not address all the masonry issues on the gables, but it would allow straightforward work to be carried out at a low level, as well as trialling and assessing potentially suitable lime mortars. This information could then be used in the specification of higher level works by contractors at a future date. The SPAB developed arrangements with the congregation for accommodation/welfare and catering to support the volunteers, and two working parties were arranged for August 2013 and August 2014.

3.2 Re-pointing and traditional mortar

On inspection of the site, it was decided that the volunteers could address areas of masonry at ground level and areas that could be accessed with an aluminium tower system scaffold. The replacement mortar was based on a conventional ratio of 1 part quicklime to 3 parts sand. Quicklime has many benefits as the main constituent of a mortar: technically it is a close match to what was generally used historically, and it is also vapour open and capillary active. This allows a full moisture exchange (absorption and desorption of water in both liquid and vapour form). Modern lime mortars tend to incorporate a significant hydraulic lime component to address concerns over durability. One of the objectives of this pilot study was to establish the durability of a quicklime based mortar with only a modest hydraulic component.

The original 19th-century pointing style on the church was slightly recessed, with the mortar joint smoothed or 'struck'. As this was only visible on some sheltered areas, and new pointing would adjoin areas with more recent pointing, it was agreed that the pointing in adjacent areas would be finished to match the latter. The extent of re-pointing had to be carefully considered. Removal of all the cement on the vestry gable and other areas might be desirable, but as work had to be completed within the allocated time, there was a limit to what could be achieved. Therefore, only areas where mortar was cracked, failing or causing damage to the sandstone were targeted.

3.3 Consent

The Conservation Officer for Scottish Borders Council was consulted and advised that as the re-pointing was being done on a like-for-like basis, using a lime based mortar similar to the existing, Listed Building Consent (LBC) was not required. Re-pointing with other materials (such as cement) would be considered an alteration and would not have been supported.

4. SITE SET-UP

4.1 Equipment

HES supported the project by providing equipment, materials and site management. Equipment included a forced action mixer, Personal Protective Equipment (PPE), pointing keys, mash hammers, trowels and other miscellaneous site tools. The SPAB approached a local contractor, John Laidlaw and Sons of Jedburgh, who agreed to support the project with a sizeable contribution of plant and equipment. This included an access platform, wheelbarrows, mortar bath, shovels, HERAS fencing and aggregate. A site pound was set up on the south side of the vestry to

prevent public access to the mixing area and to allow storage (Figure 2). As the mixer was electric, power was taken from a 240 volt socket in the vestry, which was converted with a transformer to the 110 volts required for the mixer. This is common practice in site conditions as the lower voltage reduces the rise of electric shock. The quicklime was delivered in sealed waterproof tubs and stored with the hydraulic lime in the coal cellar beneath the vestry which was kept locked and known to be dry. These site arrangements were used for both work sessions.

Figure 2. The site pound at Hobkirk.

4.2 Mortar Trials

As part of the site set up, in the days before the working party was assembled, mortar and pointing trials were carried out to judge the mortar batching arrangements and its initial performance on the wall.

4.3 Support from the congregation

The volunteers could not have done the work without strong support from the minister and congregation of Hobkirk during both work sessions. Accommodation and welfare facilities were arranged locally, the vestry was used for meals, and the church WC was also made available. Lunches were kindly provided for the core working days and permission given for camping in the field next to the church.

5. INSTRUCTION AND TRAINING

5.1 Health and safety

The working party was first briefed on the plan for the week and given an induction to the site, including a health and safety briefing. This included an explanation of the health and safety aspects of working with lime mortars, specifically quicklime. Quicklime is a hazardous material and must be handled with care, but if used with appropriate techniques and PPE, the risks can be minimised. Kibbled (granulated) quicklime was selected rather than the powdered form, as the risk from dust is reduced.

5.2 Mortar mixing demonstration

The batching of the mortar was described and demonstrated (Figure 3) before an initial batch was made up in the mixer. This ensured that everyone had a common understanding of the components of the mix, how it was mixed, and the basic application and aftercare of the mortar.

Figure 3. Demonstration of lime mortar mixing given to the volunteers prior to works commencing.

6. THE MASONRY WORK

6.1 Rubble pointing mortar preparation

For the first session in August 2013 the rubble pointing mix followed a 1:3 ratio of lime to sharp sand. The sand was sourced locally. The lime was 3/4 part quicklime and 1/4 of a part hydraulic lime (NHL 2). The mix was batched in a 20 litre forced action mixer (Figure 4). This type of mixer is sometimes preferred for limework as the lower water content in lime mortars (compared to cement mixing) does not allow free enough mixing in a bell type mixer. The sharp sand was supplied in a ton bag from the local builders' merchant and the quicklime from a specialist lime supplier.

The mixing sequence when using quicklime is important to ensure that the correct temperatures are maintained. On a more practical level, this can help to avoid mixer jams and mix saturation. The full measure of the sharp sand is added to the mixer first, followed by the kibbled quicklime; the action of the mixer combines the sand and the lime and a partial slake takes place from the water in the sand, breaking down the quicklime. The mix at this stage resembles a warm dry powder. Water is then added progressively to produce a soft porridge-like consistency. The quicklime slakes quickly from then on, with heat and water vapour generated. It is important to keep the mix fluid or plastic, but not too wet. The limeworker must judge the amount of water needed to produce the right consistency, depending on how dry the sand is. For this mix, per batch, it was around 1.5 buckets of water.

The first mix used at Hobkirk Church worked well and took an initial set within a day. Once cured it gave a good, firm mortar with no cracking, however, it did have a pinkish hue from the building sand. This blended in well with the adjacent masonry but was clearly different from the 19th-century mortar, which was much whiter in hue. Consequently, for the 2014 work the mix was changed, using only the sharp 'concrete' sand and kibbled quicklime. This was batched and used in the same way as the first mix; it cured similarly, but due to the higher quicklime content it gave a brighter white mortar. This new mortar was felt to be a better match. It was observed that the initial set of this second mixture was similar to that of the first mix, despite the absence of a hydraulic lime gauging.

Figure 4. Addition of water during the batching of the pointing mortar.

6.2 Rubble pointing

The works at Hobkirk concentrated initially on re-pointing the coursed rubble and the fine ashlar joints of the sandstone dressings. For the 2013 work the volunteers began on the vestry gable, removing cement pointing from the late 1960s. This was done with hand tools, working along a joint, without attempting removal where mortar was found to still be strongly adhered. The joints were washed with a hose, which cleared any fines or debris, and also pre-wetted to prevent the mortar drying out from behind (Figure 5). Because the red sandstone rubble at Hobkirk is quite impermeable, only a modest amount of water was needed. The mortar was applied to the joints with a pointing key and was set just proud of the masonry surface so as to give a flush surface once scraped back (Figure 6).

Figure 5. Cleaning the raked out joints prior to re-pointing.

Figure 6. A volunteer re-pointing the vestry wall.

6.3 Mortar curing

A few hours after the pointing, the joints were pressed back to close any cracks. Depending on the weather conditions, some wetting down of the wall was required. Afternoon sun on a recently pointed wall may cause the mortar to dry out too rapidly and inhibit curing. To prevent this, damp hessian was used to cover the repaired area for around 48 hours, and kept damp by lightly spraying with a hose (Figure 7). After two days the hessian was removed and the pointing continued to cure. By the end of the week the early work had set firm.

Figure 7. Finished pointing protected behind hessian. This needed wetting down for the first 24 hours while the initial set took place.

In the 2014 session more overcast and damp conditions permitted a more relaxed routine with the hessian. The mortar in the second session cured a creamy grey colour (Figure 8) and showed no signs of shrinkage or cracking.

Figure 8. The finished rubble joints from the 2014 working party.

6.4 Ashlar re-pointing work

Although much of the stonework was in reasonable condition, in places the lime-rich pointing in the joints between the formal ashlar stones had been washed out, leaving an open joint. This was allowing water penetration into the stone below and behind, and frost and salt action were causing decay. Using fine tools and modified hacksaw blades, these joints were carefully raked out and prepared for re-pointing. The pointing mix for ashlar work differs considerably from that used in rubble pointing. As the width of the joint is so narrow, the mortar must have a very fine aggregate and be very pliable.

Opinions vary as to what constitutes the best ashlar pointing mix, but generally it is a lime putty with fine silica sand, mixed at 1:1. Chalk dust or whiting is sometimes used instead of the sand if a high degree of plasticity or 'squeeze' is needed, although normally only when bedding stones during initial construction. There is no quick method of ashlar pointing – it is a slow, careful process. Pre-wetting of the joint is needed, and wiping down the adjacent areas of stone to remove excess lime must be done promptly once the work is finished, to avoid staining the stone (Figure 9). Some contractors use masking tape adjacent to the joint to keep the stone clean.

Figure 9. New ashlar pointing work on the narrow joints of the vestry gable quoins.

7. OTHER WORKS

7.1 Repairs to grave markers

During the project the opportunity was taken to address other areas of damage in the church and its vicinity. Of increasing concern to the community was the condition of some of the headstones, grave markers and other memorials. A specialist HES stone conservator worked with another conservator from the SPAB and together they were able to refasten various broken stone fragments (Figure 10). Due to time constraints, repairs to only a few stones were completed, but it showed what was possible with the right expertise and equipment (Figure 11).

Figure 10. This decorative stone finial was carefully repaired by a stone conservator.

Figure 11. The finial after its repair.

8. EDUCATION AND OUTREACH

8.1 Explaining the works to the public

The Hawick Archaeological Society brought visitors and an open day was publicised as part of Borders Heritage Week. A presentation was given to the congregation on the masonry and the limeworks by the SPAB team, and further plans for the care of the church were outlined. This presentation emphasised the use of correct materials as well as the importance of maintenance. Using traditional materials for the repair of older buildings not only ensures that the repairs look right, but also that they will function correctly and last much longer than work done with an inappropriate alternative, even if this might be cheaper in the short term.

8.2 Interpreting the site history

Hobkirk is an early ecclesiastical site with a long history, but due to several rebuilds and other works only fragments of the early church remain. Since the 1930s, there have been efforts by those in the parish to gather 'stones' that may or may not have come from the pre-Reformation church on historic record. As part of this, four Norman era capitols and a pillar were built into a new font arrangement in 1937 (Figure 12). Other stones were laid by the porch and on the tarmac by the west wall of the nave to be viewed by the public. To examine these pieces in detail, and to assess their authenticity, Professor Richard Fawcett of the University of St Andrews visited the site. He was able to determine that one was a Victorian quoin from a villa or other such building, but confirmed that all others were indeed of medieval origin. During a presentation to volunteers and the public he was able to explain their likely position in the medieval church, as well as the liturgical purpose of a dish-shaped stone object. Examples were shown of similar stones in situ on complete buildings in other parts of lowland Scotland.

One stone at Hobkirk, of considerable size and weight, is carved to resemble a grotesque of some kind and is likely to have been the voussoir of an arch, possibly the chancel arch (Figure 13). It came to light in 1947 when a row of cottages adjacent to the church was demolished. It is likely that the masonry of these cottages incorporated fragments of the early church, which in turn might have been uncovered when the post-Reformation church was demolished in the 1860s. Other carved stones appear to depict a 'green man' and further decorative features.

Figure 12. Some of the Romanesque capitols and a pillar, probably from the medieval church on the site, incorporated into a modern font arrangement in 1937.

Figure 13. A carved grotesque believed to have been part of the original medieval church at Hobkirk.

9. CONCLUSION

The two annual working parties achieved a considerable amount during the relatively short time available. The necessary re-pointing of a locally important 19th-century church was achieved using a traditional lime mortar, as well as successful temporary and permanent repairs to some memorials. The projects showed that with proper management a combination of skilled and unskilled individuals can deliver repairs of good quality. While all areas of the church could not be accessed, much was achieved that will be long lasting, and these areas did not need to be revisited during the main phase of repairs to gables and masonry that was subsequently carried out. The opportunity to observe how the limework fared over two winters has demonstrated that the hot-mixed mortar used is durable and lasting well in a relatively exposed location (Figure 14).

Figure 14. Hobkirk Church in 2018, demonstrating that the lime pointing work undertaken in 2013 and 2014 has held up well. Subsequent high level repairs and adaptions have also been carried out to help the building cope with increased rainfall due to a changing climate.

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