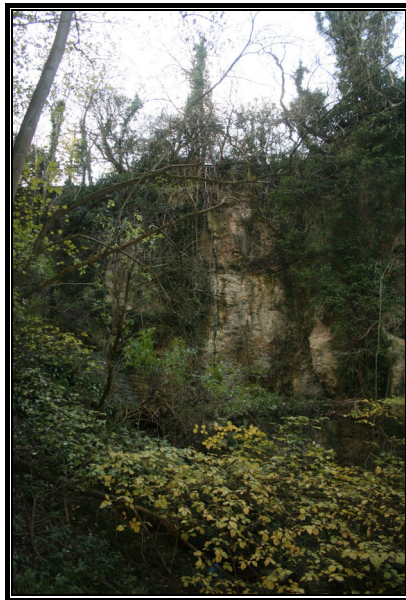

BURTON LEONARD LIME QUARRY, NORTH YORKSHIRE.

REPORT ON AN ARCHAEOLOGICAL LANDSCAPE SURVEY.
OSA REPORT No: OSA10LS01

December 2010



OSA

ON SITE ARCHÆOLOGY LTD

25A Milton Street • York • North Yorkshire • YO10 3EP
telephone • 01904 411673 • fax • 01904 414522 • mobile • 07767 385766

e-mail • onsitearchaeology@gmail.com

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Report Summary.

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SITE NAME: Burton Leonard Lime Quarry

COUNTY: North Yorkshire

NATIONAL GRID REFERENCE: SE 323 630

ON BEHALF OF: Yorkshire Wildlife Trust
1 St George's Place
Tadcaster Road
York
YO24 1GN

TEXT: Dave Pinnock

GRAPHICS: Dave Pinnock

FIELDWORK: Nick Pearson
Dave Pinnock

TIMING: Fieldwork
November 2010
Post excavation & report preparation
November 2010

ENQUIRIES TO: Nick Pearson
On Site Archaeology
25A Milton Street
York
YO10 3EP

tel (01904) 411673

fax (01904) 414522

mobile (07767) 385766

e-mail onsitearchaeology@gmail.com

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1.0 Abstract.

An archaeological landscape survey was carried out by On-Site Archaeology Ltd. on behalf of the Yorkshire Wildlife Trust at the site of the Burton Leonard Lime Quarry. The site consists of historic limestone quarries and associated lime kilns. It is presently managed as a nature reserve by the Yorkshire Wildlife Trust. It is designated a Site of Special Scientific Interest and is home to nationally important grassland plants, including many rare species.

The survey of the site revealed the remains of six lime kilns of various sizes and various states of repair, ranging from well-preserved intact masonry structures to near-destroyed earthwork remains. Also found were the remains of three buildings almost certainly originally associated with the quarry and lime burning business. An area of the northern part of the site was found to have been used as an historic landfill, potentially masking archaeological remains.

This report presents a gazetteer of remains with full descriptions, a map of the site showing accurate location of the main quarried faces and other features and a series of management recommendations.

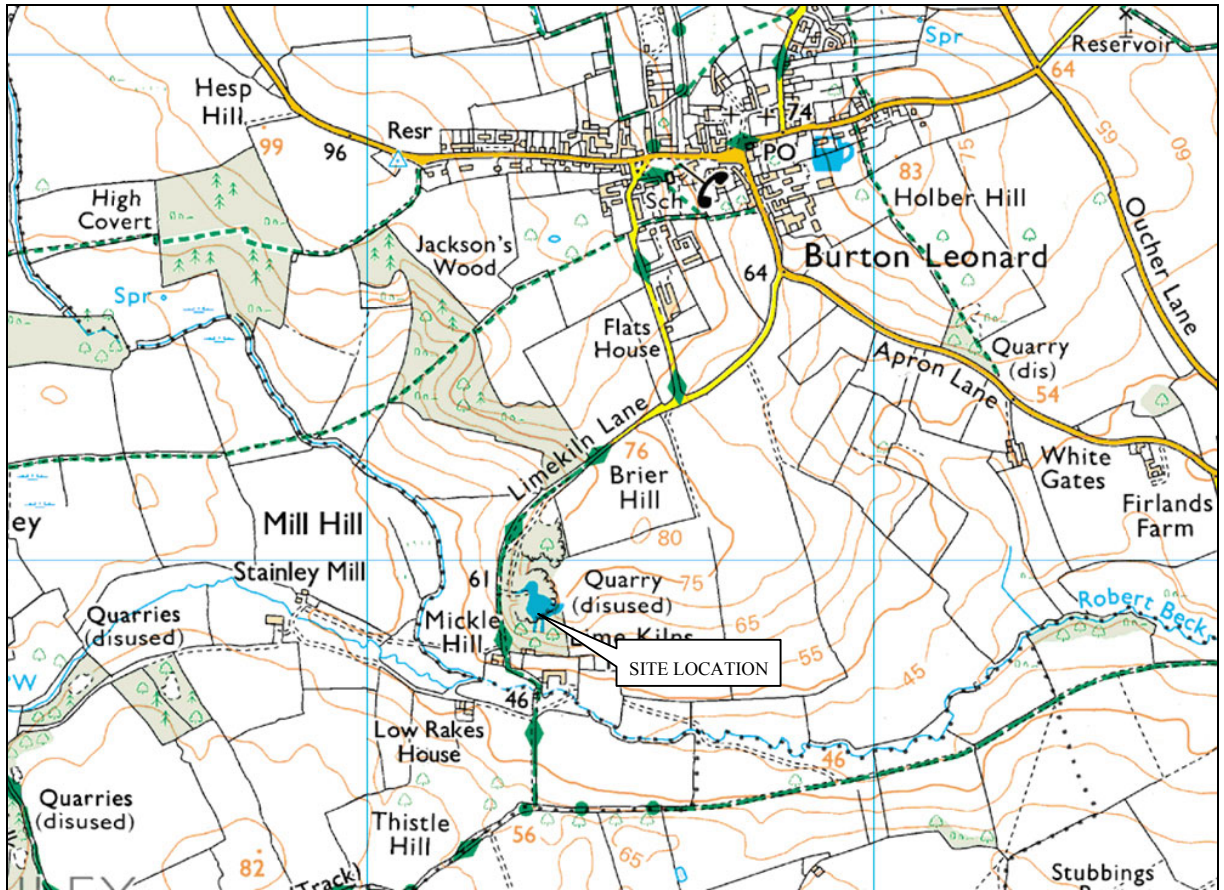


Figure 1. Site Location (NGR SE 323 630)

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2.0 Site Location, Geology, Topography and Land Use.

The quarry is situated in Harrogate District and lies 0.75km to the south of the village of Burton Leonard on Limekiln Lane. The site is known as Burton Leonard Lime Quarry (also sometimes called Mickle Hill Quarry). It is managed as a nature reserve by the Yorkshire Wildlife Trust. The area of the nature reserve is 3.33ha and it is enclosed by hedged and fenced boundaries (Figure 2).

The geology of the site is Cadeby Formation dolostone (British Geological Survey <http://maps.bgs.ac.uk>), otherwise known as dolomite or magnesian limestone. The quarries themselves comprise two west-facing horseshoe-shaped quarry faces (Plate 1). The northern of the two quarries has been used for the dumping of rubbish and is filled to a large extent by landfill material.

The SSSI is an important habitat and is home to several important species. The text of the SSSI citation is included in Appendix 1.

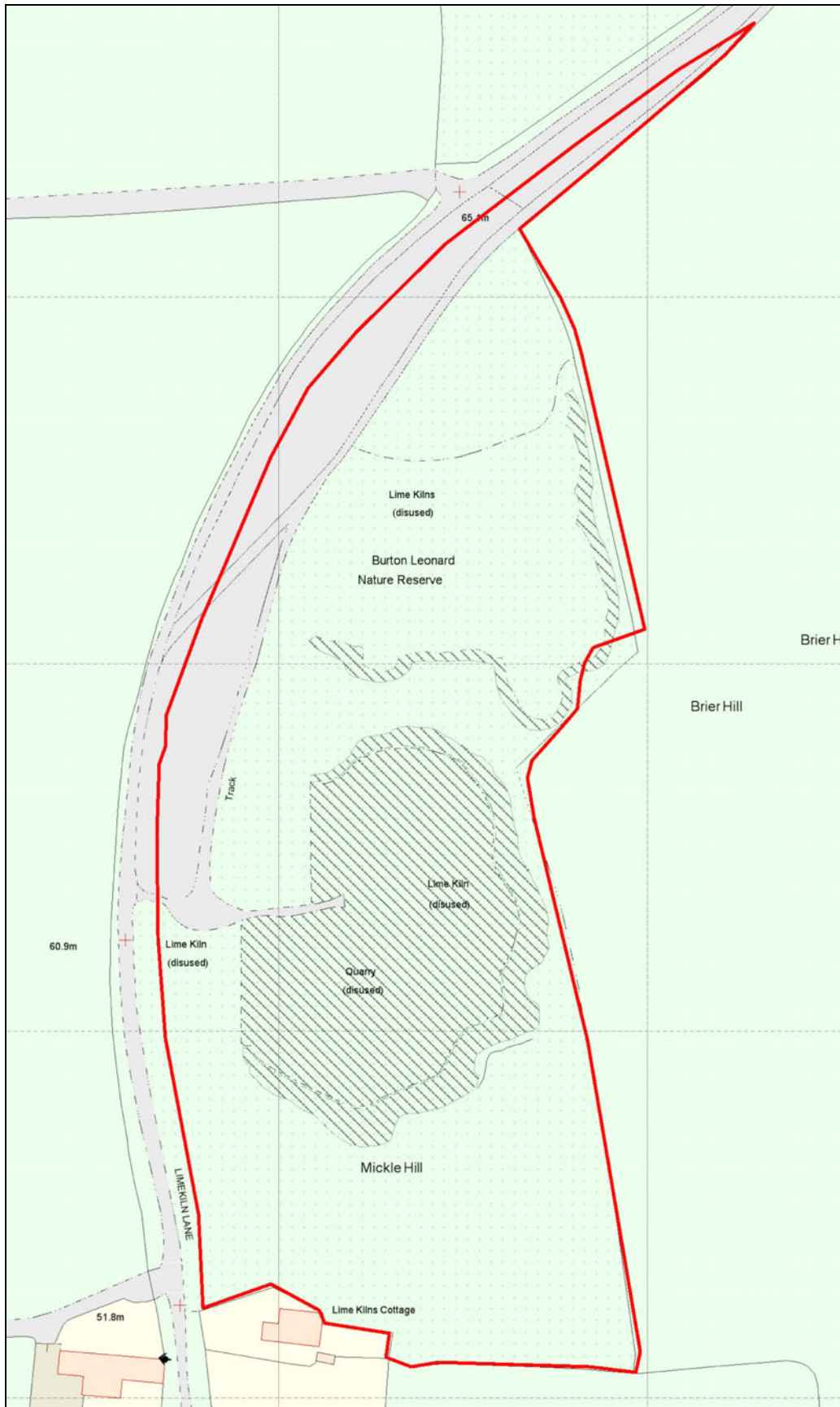


Figure 2. Site plan showing the nature reserve boundary (in red)

3.0 Archaeological Background.

Lime kilns were an important facet in the history of the area, as they were in any limestone or chalk rich area in the UK. A survey of the nearby Yorkshire Dales National Park identified 1220 kilns from aerial photographs and map analysis, mostly eighteenth century and later field kilns (Horne and MacLeod 2004). The purpose of lime kilns was to produce quicklime (otherwise known simply as ‘lime’) from limestone or other calcium carbonate rocks. Limestone has to be heated to around 900°C to produce calcium oxide or quicklime and in lime kilns this was usually achieved by burning the limestone mixed with wood, coal or charcoal for up to five days.

The resulting quicklime had a series of uses of which the most important was as a fertilizer to ‘sweeten’ acidic ground, to break up clay soils to finer tilths and to provide vital minerals required by growing crops. This was particularly used in areas of reclaimed moorland where the underlying acidity of the peat soils needed to be ameliorated. Quicklime was also mixed with water to produce slaked lime, the main ingredient in lime mortar as well as lime render, plaster and limewash. There were other minor industrial uses for lime such as tanning and as a flux in lead smelting.

The earliest kilns were called pye or sow kilns and comprised little more than clamps, bonfires containing alternate layers of limestone and fuel. Sometimes a certain amount of stonework superstructure was built. Their remains are difficult to identify with any certainty as they were destroyed at the end of the burn to retrieve the lime (Leach 1995, White 2002).

Small kilns with a masonry superstructure were called flare kilns or field kilns and were the most common type of kilns in rural contexts (Crossley 1990, White 2006). They typically comprised a ‘bowl’ in which thumb-sized fragments of limestone were loaded in alternate layers with either wood or coal from above via a ‘charging ramp’ or charging platform’. A fire was set below the charge via the ‘draw hole’ or ‘eye’, an aperture into the bottom of the bowl that was accessed by the ‘draw arch’, an arched tunnel leading to the draw hole. The charge was constantly tended for between two and five days until the fuel in the bowl was fully burnt. The resulting limestone fragments were then raked and shovelled out through the draw hole. The material was then riddled to remove the ash and detritus of combustion. In the Yorkshire Dales where the most wide-ranging survey work has taken place, there is considerable variation in the shape and size of field kilns.

Larger versions of field kilns were constructed that could be burnt on a more continuous basis (sometimes called ‘draw kilns’) with material raked out of the draw hole while further charge was added at the top of the bowl. In other cases, multiple kilns were built together to economise heat production. However, true continuous burning was only achieved in industrial scale Hoffman kilns – ring-shaped kilns of much larger scale.

This lime quarry appears to have been in use for the period 1838 to 1941 (information provided by the Yorkshire Wildlife Trust). The northern quarry has been used for landfill. The track leading to it from Limekiln Lane is tarmaced and was probably the route used by

tipping lorries (Plate 2). The exact dates of the landfill period are unknown but the nature of the remains suggests it may have extended into the 1980s (Plate 3).

4.0 Methodology.

After an initial walkover survey to establish the nature of and identify the remains, the quarry, buildings and kilns were surveyed using a Leica GPS900 Survey Instrument.

The results are presented here in the form of a descriptive catalogue that includes written descriptions of the remains with selected dimensions as well as observations on their condition and recommendations for future management.

The written description lists the visible components of the feature, describes the location and general condition of the feature, and describes the component parts with selective measurements. It then offers management recommendations for each feature.

The description then includes a table summarising the stability of the feature, the active damage factors that need to be considered and then makes management recommendations. The keywords employed are shown in Figure 3).

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Good Moderate Bad Destroyed
Stability	Stable Slow deterioration Rapid deterioration
Actively damaged by:	Burrowing animals Neglect Sheep/Other stock People (erosion) Vegetation Water action No factors apply Info not available
Management recommendations	Free text

Figure 3. Management factors and keywords.

The management recommendations are based on the following list (Figure 4). Clearly there may be some conflict between the needs of the site as a nature reserve and the management recommendations outlined here. Conflicting aspects will be discussed in Chapter 7.

Management recommendation	Explanation/full recommendation
Control scrub & bracken	Wherever possible consider the reintroduction of grazing, otherwise control scrub and vegetation through manual clearance or burning.
Control access to avoid visitor erosion	Identify access to earthworks that causes least damage. Identify visitor access that causes least damage. Avoid driving vehicles over known features during wet conditions
Control burrowing animals	Rabbits, badgers, moles and foxes, etc. can cause considerable damage to earthworks. Their control should follow appropriate MAFF or DANI guidelines, but not any activity that involves digging or disturbance to the soil.
Remove trees or shrubs but leave stumps <i>in situ</i>	Grind down stumps on archaeological features rather than grubbing them out.
Consolidate relict structures	Make ruins and structures safe and prevent further decay. Wherever possible use original materials and techniques (such as lime mortar). Should be done in conjunction with a structural engineer or similarly qualified professional.
Control access to hazardous remains/areas	Wherever possible use techniques and materials that are unobtrusive and in sympathy with the original materials and techniques.

Figure 4. Table showing explanations of management recommendations.

5.0 Catalogue of Results.

The identified remains comprised six kilns and the remains of three buildings. A catalogue of the remains is presented below and their position is shown on Figure 5.

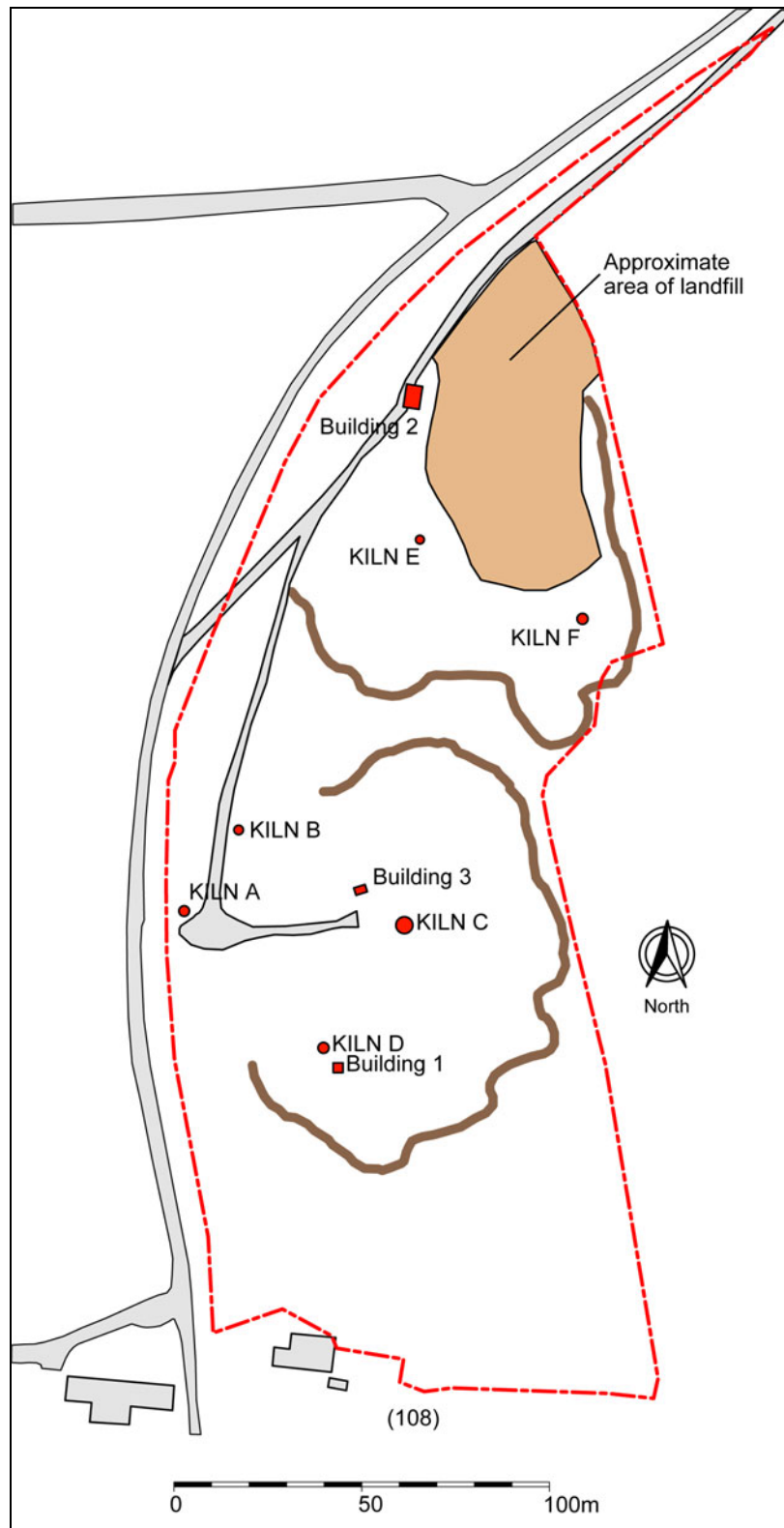


Figure 5. Plan showing location of kilns and other features (to scale)

5.1 Lime kilns.

5.1.1 Kiln A

This was positioned on the western edge of the quarry site close to Limekiln Lane. It was of moderate preservation and was heavily overgrown (Plates 4 and 5). The kiln comprised an oval bowl with the collapsed remains of a single draw arch facing to the west. The charging platform was a sizeable flat raised area with ramp access to the quarry floor. The remains of revetting walls were present adjacent to the collapsed draw arch. The kiln was built before 1854 as it is shown on the 1854 OS map.

BOWL: The bowl was of oval plan and mostly filled in. It measured 2.4m x 2.8m, the E-W being the longest axis. Up to 90cm height of masonry was visible. The bowl was made of a mixture of brick, limestone rubble and mortar. It was lined with a single course of mortared brick that was heavily vitrified over much of the visible surface.

DRAW ARCH: The superstructure of the draw arch was collapsed with only a small amount of mortared rubblestone masonry present on the northern side of the original arch location. It was possible to estimate that the draw arch would have originally projected from the front face of the kiln by at least 1m.

REVETTING WALL: A dry rubblestone revetment wall flanked the kiln on the north. Any equivalent on the south side of the kiln was missing.

CHARGING PLATFORM: The charging platform was a sizeable flat raised area with ramp access to the quarry floor.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Moderate
Stability	Slow deterioration
Actively damaged by:	Vegetation: trees are growing from the bowl and the collapsed remains of the draw arch; Scrub is growing in the revetting wall. Visitor erosion: The charging platform at the top of the bowl is crossed by visitor tracks. However, this is a less significant part of the monument and at present there appears to be no significant damage.
Management recommendations	Control scrub & bracken Remove trees or shrubs but leave stumps <i>in situ</i>

5.1.2 Kiln B

Kiln B was positioned on the west side of the site, close to Kiln A (Plates 6 and 7). In contrast to Kiln A however, Kiln B was poorly preserved with no substantial visible masonry. It was identified on the basis of the shape of the earthwork remains, which comprised the bowl (with a small amount of exposed masonry/rubble at the top) and the collapsed remains

of a single draw arch facing east. The charging ramp led up from the quarry floor to the east. Piles of crushed limestone were present on the charging ramp. The kiln was built before 1854 as it is shown on the 1854 OS map.

BOWL: The earthwork of the bowl indicated an oval bowl measuring 2.5m x 2.2m, with the longest axis orientated north-south. The exposed rubble at the top of the bowl structure did not include any brick lining but comprised limestone rubble and mortar. The maximum surviving height of the bowl is 1.75m.

DRAW ARCH: The draw arch survives only as two earthworks indicating the position of the side walls. They appear to show a 2m x 2m area of draw arch. The draw arch opens onto the existing path through the site. The path is likely therefore to follow the line of an original working track within the quarry.

CHARGING PLATFORM: The charging platform/ramp led gradually up to the top of the kiln from the floor of the quarry to the east. Interestingly the platform, though heavily overgrown, appeared to be occupied by a sizeable pile (up to 1.5m high and 8m in diameter) of ready crushed limestone in chunks of between 1” and 2” cubed in size.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Bad
Stability	Slow deterioration
Actively damaged by:	Vegetation: scrub and trees are growing from the bowl and the collapsed remains of the draw arch. These are likely to be damaging the buried remains of the structure
Management recommendations	None

5.1.3 Kiln C

This kiln was situated in the central area of the site close to the quarry face at the southern quarry. Kiln C was very well preserved and was much larger than the other kilns in the quarry (Plates 8, 9, 10 and 11). It comprised a bowl, a draw arch and flanking revetting walls that may have supported a lightweight roof. The charging platform was large and was linked to the quarry floor with a ramp. The kiln was almost certainly built after 1854 as it is not shown on the 1854 OS map. In fact the southern quarry was much less extensively worked in 1854 and the position of this kiln would have been very close to the quarry face.

BOWL: The bowl was almost fully in-filled. No visible masonry was present and only a shallow depression (less than 50cm deep) remained. It was possible to measure the diameter of the bowl as 4.5m. The rear of the bowl was within the large mound forming the charging platform.

FAÇADE: The front of the kiln, facing to the south, was faced with mortared and roughly coursed rubble limestone. The façade stood at 4m high and the surviving masonry was 4.5m wide – the same as the diameter of the bowl behind it. A wide crack was observed in the eastern side of the façade running from top to bottom and up to 80mm wide.

DRAW ARCH: In the lower part of the façade was the draw arch structure comprising three recessed arches leading to the draw hole. The first arch was 2.8m wide and 1.93m high (although the floor is covered by an unknown depth of rubble and soil) and led into a working area with an arched roof that was 2.9m deep. The first arch was constructed of well-shaped limestone voussoirs with a slightly larger but otherwise not elaborate keystone. The well-made barrel arched roof of the working area ended at the second arch. A large structural crack up to 70mm wide ran across the arched roof 1.35m from the outer arch.

The second arch was made in a similar fashion to the outer arch except that the voussoirs were of bull-nose brick with limestone springers. This arch was 2.17m wide, 1.3m high (with the same caveat regarding the floor level as the outer arch) and created a recess 0.33m deep to the inner arch and façade.

The inner façade and arch were built of mortared brick, presumably forming the lower part of the lining of the bowl. The arch was 1m wide and 0.55m high. This façade and arch formed the draw hole or eye of the kiln.

REVETTING WALLS: On either side of the draw arch were revetting walls running away from the kiln façade at an angle. These were of unmortared rubble and were clearly built later than the main façade as they overlay the façade's masonry. They were up to 1.9m high and extended beyond the façade by up to 4m. It is possible that these supported a roof to aid the raking out of the lime although there is no structural evidence visible; only their unique forward projection suggests the possibility.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Good
Stability	Fast deterioration
Actively damaged by:	Vegetation: scrub and trees are growing from the area of the revetting walls. These are likely to be damaging the buried remains of the structure. Ivy is growing over the front façade and is likely to damage the structure. Neglect: serious-looking structural cracks are present in the masonry.
Management recommendations	Control scrub & bracken Remove trees or shrubs but leave stumps <i>in situ</i> Consolidate relict structures

5.1.4 Kiln D

Located just to the south of Kiln C, Kiln D comprised the earthwork remains of a bowl and draw arch (Plate 12). A charging ramp could also be seen. The kiln was very poorly preserved and there is a degree of uncertainty about the identification. The kiln was definitely built after 1854 as it is beyond the quarry face shown on the 1854 OS map.

BOWL: The bowl is an earthwork up to 1m high with no visible masonry. It is oval in plan and measures 2.6m north-south and 2.9m east-west. The south side of the bowl is particularly poorly preserved.

DRAW ARCH: The draw arch structure is completely collapsed and is represented by an earthwork up to 0.4m high with no visible masonry. It measures approximately 2m square and lies on the east side of the bowl.

CHARGING RAMP: To the west of the bowl is the charging ramp, which leads steeply down to the quarry floor.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Bad
Stability	Stable
Actively damaged by:	Vegetation: trees are growing from the area of the bowl. Although these are likely to be damaging any buried deposits, the general poor preservation of the feature doesn't really justify their removal.
Management recommendations	None.

5.1.5 Kiln E

Kiln E was situated near to the northern quarry face. It was well-preserved and comprised a charging platform, bowl, revetting walls and draw arch (Plates 13, 14, 15 and 16). The 2.1m deep bowl was unfenced and hazardous. The kiln was almost certainly built after 1854 as it is not shown on the 1854 OS map.

BOWL: The bowl was 2.1m deep and slightly oval in plan measuring 2.3m east-west and 1.95m north-south. Enough backfill was present in the base that the draw hole was not visible. The bowl was faced with brick although this was heavily calcined.

DRAW ARCH: The outer arch was made of crudely-shaped voussoirs. It was 2.65m wide but the area of the draw arch had been backfilled so that the roof of the draw arch was only 0.9m high. The draw arch structure was barrel arched and extended back 2.17m. The arch of the inner draw hole was just visible above the back fill and was made of brick.

REVETTING WALLS: The revetting walls were just visible above the backfill and were of unmortared limestone rubble. They extended either side of the draw arch by about 1m.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Good
Stability	Slow deterioration
Actively damaged by:	Vegetation: trees are growing from the bowl. These are likely to be damaging the structure. Hazard: The open bowl is a hazard.
Management recommendations	Control access to hazardous remains/areas Remove trees or shrubs but leave stumps <i>in situ</i>

5.1.6 Kiln F

Kiln F was located in the north quarry close to the rock face (Plates 17 and 18). It had been damaged; probably by the landfill operation in the north quarry and only the earthwork remains of the bowl were present. The kiln had originally had a draw arch facing to the west but this was no longer present. The kiln was built before 1854 as it is shown on the 1854 OS map.

BOWL: The bowl was heavily overgrown with only a small area of masonry visible in its northwest. It was slightly oval and measured 2.9m north-south and 2.5m east-west. The visible masonry was the remains of a heavily calcined brick lining. The bowl remains were up to 0.95m deep.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Moderate
Stability	Slow deterioration
Actively damaged by:	Vegetation: trees are growing from the bowl. These are likely to be damaging the buried remains of the structure.
Management recommendations	Remove trees or shrubs but leave stumps <i>in situ</i>

5.2 *Buildings.*

Three buildings were observed, universally in bad condition. They are described below. None of the buildings are shown on the Ordnance Survey map of 1854.

5.2.1 *Building 1*

This was located close to Kiln D and may have been a lime shed, for storing the lime after burning. The building survived only as earthworks up to 0.6m high and 0.5m wide demarcating two sides of the structure (Plate 19). It is possible that the other walls of the shed were of wood. The shed would have measured 2.6m square internally. In 1854, the site of this building, like Kiln D, was beyond the quarry.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Destroyed
Stability	Stable
Actively damaged by:	Vegetation: trees and other vegetation are growing from the remains. These are likely to be damaging the buried remains of the structure. Animal burrows: found extensively in and around the building.
Management recommendations	None

5.2.2 *Building 2*

This was located in the northern part of the site but away from the quarried face or the two northern kilns. The building survived only as earthworks up to 0.5m high and a brick foundation course, only visible because it had been eroded by the path (Plate 20). The foundation comprised bricks laid in a header bond and mortared. The building was originally approximately 6.2m north-south and 4.3m east-west.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Destroyed
Stability	Stable
Actively damaged by:	Vegetation: trees and other vegetation are growing from the remains. These are likely to be damaging the buried remains of the structure. People (erosion)
Management recommendations	None

5.2.3 Building 3

This was located in the southern part of the site close to the charging platform of Kiln C and was better preserved than the other buildings. It was built of mortared limestone rubble standing as high as 1m in places (Plates 21 and 22). The building measured 3.15m east-west and 2.05m north-south. There was a doorway in the eastern elevation that was 0.9m wide. In the northwest corner there was ruinous evidence for a brickwork structure that may have been a stove or fireplace. As with the nearby Kiln C, this building was not shown on the 1854 Ordnance Survey map.

MANAGEMENT FACTORS	KEYWORD OPTIONS
Condition	Bad
Stability	Slow deterioration
Actively damaged by:	Vegetation: trees and other vegetation are growing from the remains. These are likely to be damaging the buried remains of the structure.
Management recommendations	Control scrub & bracken Remove trees or shrubs but leave stumps <i>in situ</i>

6.0 Discussion of the Archaeological Remains.

A total of six lime kilns were found during the course of the survey along with the remains of three buildings. The kilns were of varying states of preservation and included two kilns in very good condition, two in moderate condition and two in bad condition.

The northern part of the site has been badly affected by landfill activity. Two kilns shown on an undated modern map supplied by Yorkshire Wildlife Trust are noted in a position that would be covered by the present day landfill material (Figure 6). Although the front of the landfill appears to be shown on that map (by a dashed line), it is some distance short of its present position. The 1854 Ordnance Survey map shows a single kiln below the present day landfill (Figure 7). The 1854 Ordnance Survey map also shows a further kiln close to building 2. No trace of this was found during the survey. It is possible that it was completely dismantled or that it is hidden by later changes to the area associated with the landfill. The northeast-southwest track leading from Limekiln Lane lies over its position and it is likely that the track was constructed, or at least enhanced by the addition of tarmac, as a tipping route for landfill material. It is also possible, though less likely, that the position of the kiln was mis-surveyed by the Ordnance Survey, and that this in fact represents Kiln E, which is actually located 25-30m to the southeast.

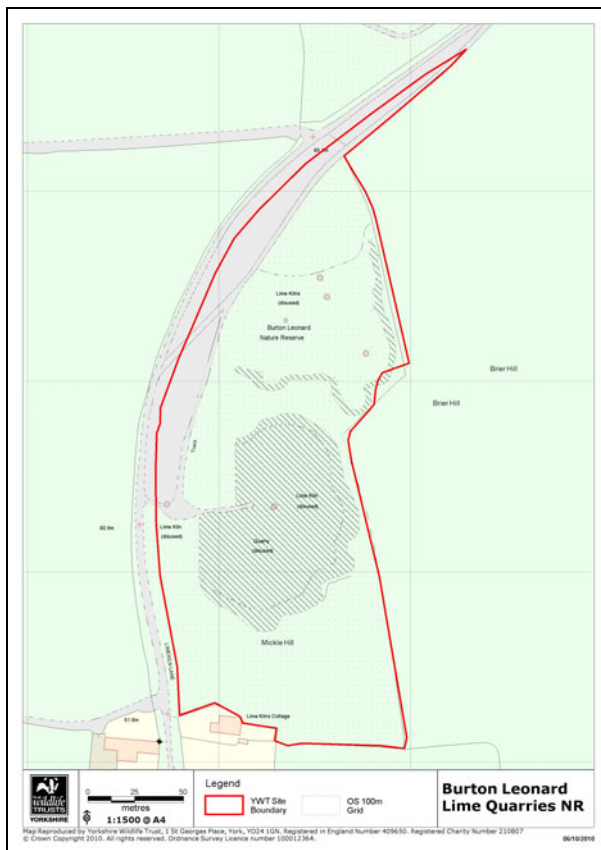


Figure 6. Undated modern Ordnance Survey map showing various kilns

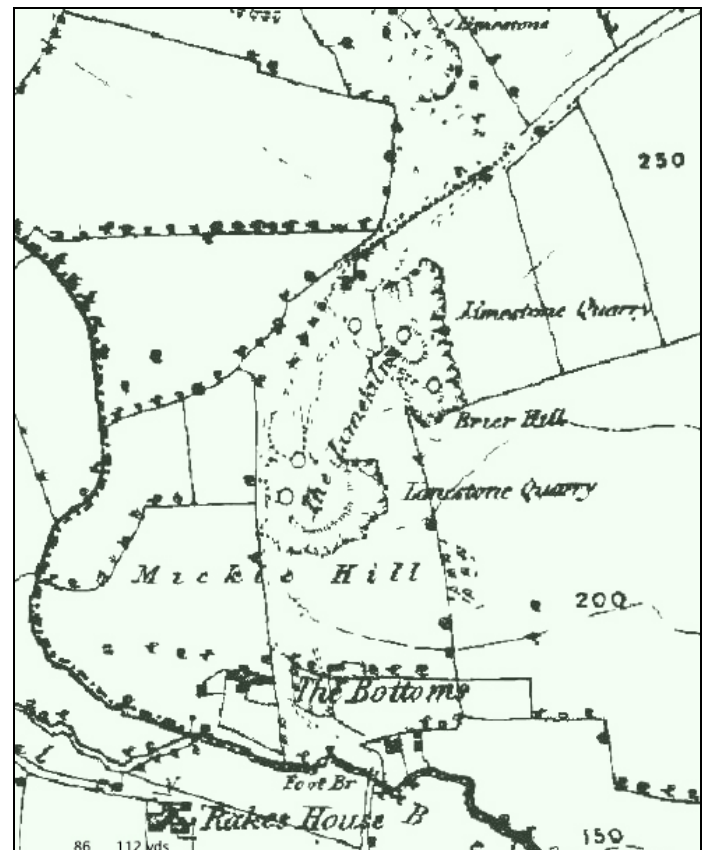


Figure 7. 1854 Ordnance Survey map showing kilns and quarry faces

It is clear from map evidence that the kilns were not built at the same time. Kilns A, B and F were shown on the Ordnance Survey map of 1854 (along with two further kilns that are today hidden by landfill activity). Kilns C, D and E were built after 1854. Curiously this does not fully correlate with the condition/degree of preservation of the kilns. The two best -preserved kilns, C and E, are late examples as would be expected. However, kiln D, another late example, was in poor condition. Of the pre-1854 kilns, one was in bad condition and two were moderate.

Of course, the picture may be complicated by the continuing use of early kilns while the later kilns were in use. It would be likely for small-scale industrial production to proceed in this way using multiple kilns, as this would allow the charging of one kiln to take place while tending the fire in another.

There is remarkably little variation in the kiln types. With the exception of Kiln C, all the kilns, both early and late, were of similar size as measured by bowl diameter. The degree of preservation prevents comparison of their superstructure except in the case of C and E, which, despite their size disparity, were of broadly similar construction. Kiln C was however distinguished by its forward-projecting revetting walls, a later addition to the structure that may have supported a lightweight roof. In all cases where masonry was visible (kilns A, C, E and F) the bowls were lined with brick – again, spanning all phases of the quarry.

7.0 Discussion of the Management Recommendations.

7.1 *General*

The management recommendations made for the kilns and other features on the site are an attempt to balance the requirements for safeguarding the future of the archaeological features with the function of the site as a nature reserve. It is for this reason that intrusive measures such as the control of vegetation and the removal of trees have been prioritised for the better preserved structures and not for the poorly preserved features, even though damage may be occurring to buried archaeological remains. Management recommendations have been matched to the value of the features.

An additional requirement in the management of some features is a concern for public safety. It is a ‘difficult balancing act’ to deal with such a concern while also attempting to maintain a site’s character (White 2006, 113). In this instance, the ‘wild’ aspect of the location is an essential element in the quarry’s character and consequently the recommendations for controlling access have been kept minimal.

It would aid visitor interest to provide a little history and background, in order to place the site in context. This might take the form of a display board, but, again, in keeping with the wild nature of the quarry the siting of the board should be relatively discreet and unobtrusive, probably at the boundary of the site rather than within.

7.2 *Individual structures*

The structure of Kiln A is heavily overgrown and it is likely that the masonry is being actively damaged by the roots of the various trees and shrubs that are growing out of the bowl remains in particular. As this kiln is moderately well-preserved, the control of scrub and bracken and the removal of the trees growing out of the bowl are likely to be advantageous to the future preservation of the feature. It is not considered that the path running over the charging platform will result in erosion to any significant remains.

Kiln B is in poor condition, surviving only as earthworks. Even though vegetation is likely to damage any buried elements of the feature, such damage is likely to be limited in comparison with the kiln's already poor state. The value of the feature does not justify intrusive measures.

Kiln C, by contrast, is one of the best-preserved kilns in the quarry. It is under threat from tree and ivy growth and intrusive management measures to remove/control the vegetation are justified by the value of the feature. Of particular concern are structural cracks visible in the front façade and the roof of the draw arch. It is recommended that the structure be assessed by a suitably qualified person and steps taken to stabilize the masonry and prevent access to the draw arch if it is deemed necessary on safety grounds.

Kiln D is badly preserved and, as with kiln B, no intrusive management is required.

The well-preserved structure of Kiln E has trees growing from its bowl that are likely to damage the kiln's structure. Given the high value of this feature it is recommended that the trees be removed. Although the lower part of the kiln, i.e. the draw arch area, has been backfilled, it is not recommended that this be removed. Although detrimental to the appearance and understanding of the kiln it is probably beneficial to its structural stability. The only other consideration with this kiln is the deep bowl, which at the moment is a hazard to visitors. Even though the kiln is not on a right of way, it is easily accessible from the main route through the quarry and the 2.1m deep bowl is dangerous, especially if the trees growing from it are removed. Simply filling the bowl or capping in with a concrete lid would be detrimental to the character of the kiln; either a fence or a grille would be better options.

Kiln F has been damaged by landfill activities but is still worth preserving. Therefore it is recommended to remove the trees growing out of it.

Buildings 1 and 2 are very poorly preserved and do not merit any management measures. Building 3 is better preserved and its ruins would benefit from the control and removal of vegetation and trees. This would also increase the visibility of the ruin.

8.0 Bibliography.

Crossley, D 1990 *Post-Medieval Archaeology in Britain*. Leicester University Press.

Horne, P and MacLeod, D 2004 *The RCHME's Yorkshire Dales Mapping Project*. In White, R and Wilson, P (Eds.) *Archaeology and Historic Landscapes of the Yorkshire Dales*. Yorkshire Archaeology Society Occasional Paper No. 2.

Leach, J 1995 *Burning Lime in Derbyshire Pye Kilns*. *Industrial Archaeology Review*, XVII: s, Spring 1995.

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9.0 Appendix 1 ~ SSSI Citation.

County: North Yorkshire

Site Name: Burton Leonard Lime Quarry

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act, 1981.

Local Planning Authority: Harrogate Borough Council

National Grid Reference: SE 323630 **Ordnance Survey Sheet 1:50,000:** 99 **1:10,000:** SE

36 SW Area: 3.33 (ha) 8.23 (ac)

First Notified: 1958 *

Date of Revision: 1983

Description:

Burton Leonard Lime Quarry is a disused Magnesian Limestone quarry, which supports a rich calcareous flora including several rare and local species. There are open grassland and scrub communities, the latter developing into woodland. Woody species include ash *Fraxinus excelsior*, hawthorn *Crataegus monogyna* and hazel *Corylus avellana*.

The grassland comprises species characteristic of Magnesian Limestone including yellow oat *Trisetum flavescens*, the spring sedges *Carex caryophylla* and *C. ericetorum*, thyme *Thymus praecox*, rockrose *Helianthemum nummularium*, burnet saxifrage *Pimpinella saxifraga*, twayblade *Listera ovata* and milkwort *Polygala vulgaris*. Notable species include buckthorn *Rhamnus catharticus*, burnet rose *Rosa pimpinellifolia*, squinancy wort *Asperula cynanchica*, pyramidal orchid *Anacamptis pyramidalis*, heath grass *Danthonia decumbens* and yellow-wort *Blackstonia perfoliata*.

The site supports both primary and secondary grasslands, the former on the slopes of Mickle Hill, the latter established after the working out of the quarry. It is an important refugium for the Magnesian Limestone flora in North Yorkshire.

Other Information:

- 1 During the 1983 revision the boundary has been reduced.
- 2 The site is managed as a nature reserve by the Yorkshire Naturalists' Trust. *Under Section 23 of the National Parks and Access to the Countryside Act, 1949.

Source: http://www.english-nature.org.uk/citation/citation_photo/1002312.pdf

10.0 Appendix 2 ~ Lime Kiln Locations.

The following table presents the location of the identified lime kilns as surveyed. Numeric grid references are given with an accuracy of 1m for the centre points of the kiln pots.

Kiln	Grid reference (numeric)
A	432271,462937
B	432286,462959
C	432330,462933
D	432308,462900
E	132334,463036
F	432377,463015

11.0 Appendix 3 ~ The Plates.



Plate 1. The northern quarry face



Plate 2. The tarmac track leading to the landfill. Limekiln Lane on left



Plate 3. Landfill close to Kiln F



Plate 4. Kiln A. Retvetting wall on left, bowl in centre



Plate 5. Kiln A. The bowl.



Plate 6. Kiln B. The earthworks as seen from the track. Draw arch remains at front, bowl remains at rear



Plate 7. The remains of the bowl of Kiln B



Plate 8. General view of the facade of Kiln C



Plate 9. Detail of the draw arch and draw hole



Plate 10. The infilled bowl of Kiln C



Plate 11. The crack in the facade of Kiln C



Plate 12. The earthwork remains of Kiln D. Draw arch in foreground, bowl in centre ground



Plate 13. The approach to Kiln E showing its charging platform and bowl



Plate 14. the deep bowl of Kiln E (2m scale)



Plate 15. The draw arch of Kiln E. Lower part of kiln is backfilled



Plate 16. The draw arch and draw hole of Kiln E



Plate 17. Kiln F heavily overgrown



Plate 18. Kiln F



Plate 19. The earthwork remains of Building 1 (two 2m scales and one 1m)



Plate 20. The remains of Building 2 as exposed in the eroded path



Plate 21. The ruins of Building 3



Plate 22. Another view of Building 3