# Survey Report: No. 1
# Survey of Limekiln at Dunanney, Carnmoney
# County Antrim.

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Cover illustration: Front of limekiln, looking west  Fig 1

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## 1. Summary

The Dunanney limekiln on Carnmoney Hill which was surveyed is one of a number of small scale limekilns found not only on Carnmoney Hill, but throughout the Belfast Hills.
This limekiln was worked by a John Thompson who in the period around 1861 rented it from Thomas Verner who held the overall rights to quarry Carnmoney Hill. John Thomspon lived in the farm building just up the hill from the kiln and was entitled to raise and burn limestone for his own farm free of charge. It appears that John Thompson was actually using the limekiln for commercial purposes and so was charged £20p/a in rates to do so.
It is recommended that this limekiln is conserved as a good example of small scale industrial heritage in the Belfast Hills, with an associated information panel installed to enhance the understanding of the general public on its purpose.

## 2. Credits and acknowledgements

The survey was initiated by Lizzy Pinkerton, other members of the Belfast Hills Partnership Archaeology survey team members were Geoff Wright, Grace Wright, Gemma McCoubrey, Janeen Tully, Karen Foreman and Lesley Crawford. The Belfast Hills Partnership is particularly grateful to the Ulster Archaeological Society Survey Group lead by Harry Welsh who was accompanied by Janna McDonald and Michael Catney for providing their expertise in the field of Archaeological Surveying and their assistance on the day. Much of the historic research found in this report was uncovered by Karen and Michael.

## 3. Introduction

### 3.1 Objective

Despite the wealth of history in the Belfast Hills there is a lack of records accurately outlining historic features or gathering together relevant historic information. The aims of this survey were to produce accurate plan drawings of the limekiln and carry out a photographic survey to discover the size and nature of the kiln. This would then be compiled into a report along with any related historic records in order to enhance the archaeological record of this site. This report will be made available on the Belfast Hills Partnership (BHP) website.
This report will also help further BHP's plans to ensure the preservation of the kiln, while using it to explain the importance of such kilns in the history of the Belfast Hills and the formation of the landscape as we see it today. It will assist BHP in producing educational tools such as an information panel on site to inform walkers, visitors and local residents about the kiln.
This survey is the first archaeological survey to be undertaken by the BHP. It is hoped that this will be the beginning of a process of archaeological survey of key sites within the Belfast Hills area that will provide the much lacking historic survey records. On this basis further conservation and education work will be carried out.

### 3.2 Location

A site survey was undertaken at the Dunanney Limekiln at Carnmoney just off the O'Neill Road, Newtownabbey, Co Antrim (Irish Grid ref J3359682199 and Polar Co-ordinates 54°40'11.71"N5°55'44.26"W). The kiln is in within Carnmoney Hill woodland, this site is

part of the Belfast Hills which is owned by Newtownabbey Borough Council and managed by the Woodland Trust.

The lime kiln lies on the south/south east face of Carnmoney Hill, located on a lane which leads uphill from the left hand side of a minor cul de sac road with the name 'Dunanney', close to its junction with O'Neill Road B513. The main public access to Carnmoney Hill is situated on nearby Knockenagh Avenue, where there is side-of-road parking. The lime kiln is within Dunanney townland, which takes its name from the ancient fortification that was located on the Hill (see Appendix).

Historic maps show a number of kilns across Carnmoney hill, but to date only the Dunanney kiln and the Altnacreeve Kiln have been found. The Dunanney kiln was selected as the focus of this survey.


Fig 2: Location of the Dunanney and Altnacreeve Kilns- *Google Maps*$^{TM}$ (satellite view)

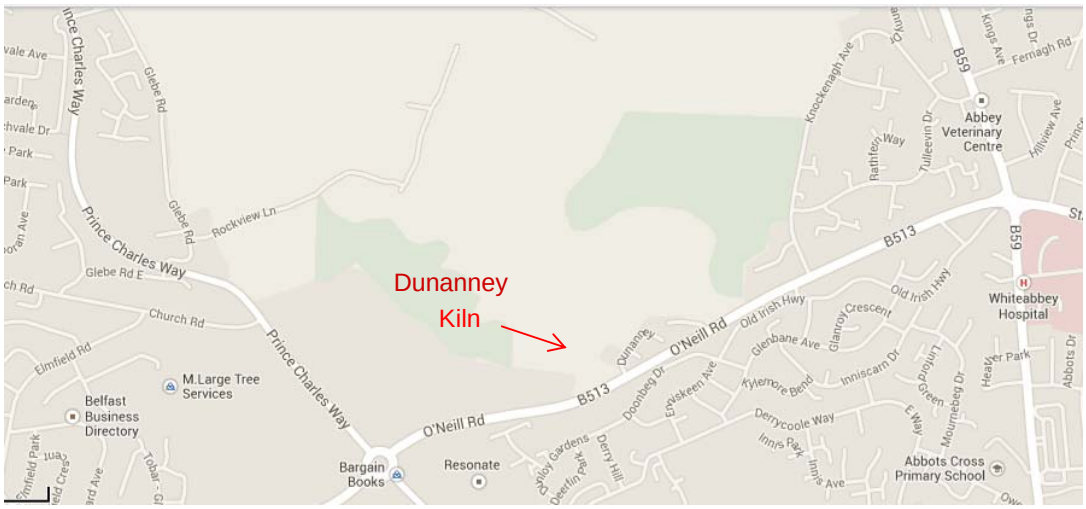



Fig 3: Location of the Dunanney Lime Kiln- *Google Maps*$^{TM}$ (map view)

## 3.3 Background

The survey of the Limekiln was undertaken on 17 August 2013. It was carried out by members of the Belfast Hills Partnership Archaeology Survey Team and the Ulster Archaeological Society under the supervision of Harry Welsh from Queens University Belfast's Centre for Archaeological Fieldwork (CAF).

The Belfast Hills Partnership Archaeology Survey Team were members of the public who had expressed an interest in learning more about local archaeology, and helping to survey sites throughout the hills that had not been previously surveyed.

Historic maps indicate the Belfast Hills once had numerous limekilns dotted around its lower slopes. Today only a few are still visible, and a number of these are unstable due to age and vegetation levels on the structures. It is therefore important to record this Industrial Heritage while we still can.

## 3.4 Previous archaeological surveys

Although recorded in the NIEA Industrial Heritage Record (IHR = 1026500000) as far as it is known, there has been no previous archaeological survey at this site.

## 3.5 Cartographic Evidence

Below are shown a series of maps showing the limekiln from 1833 until present day. They illustrate how developed the area has become, with moden housing densely built up to the edge of the hill.

The first Edition OS map (fig 4) and the Griffiths Valuation map (fig 5) seems to indicate that two kilns were once located on the site of the Dunanney Kiln (marked site 1), while the present day map along with investigations on the ground show only one kiln. It may be possible that origionally two small kilns were present, and these were later knocked down and the stones used to build one relatively large kiln possibly moving from a 'flared' to a 'draw' kiln (see section 5.2 for more information on types of kilns).

Other changes that should be noted are that in fig 4 site 2 shows two further limekilns, while fig 5 (approx 30 years later) shows just one kiln symbol. It can also be seen that in site 3 of the same map a kiln appears to have been built sometime during the inter survey years 1833 and 1857. It is possible that one of the site 2 kilns was dismantled and the material used to build the Site 3 kiln which can be seen is much closer to the Quarry. Of the two additional kilns (marked in green on fig 4) the more southern kiln has also disappeared from the Griffith valuation map (fig 5).

All the maps show that further up the lane that the Dunanney limekiln is located on is a complex of buildings with some quarry workings close to these buildings. From the maps it would appear that all the kilns were located at the end of a lanes downhill from quarries, presumably for ease of processing the extracted limestone.

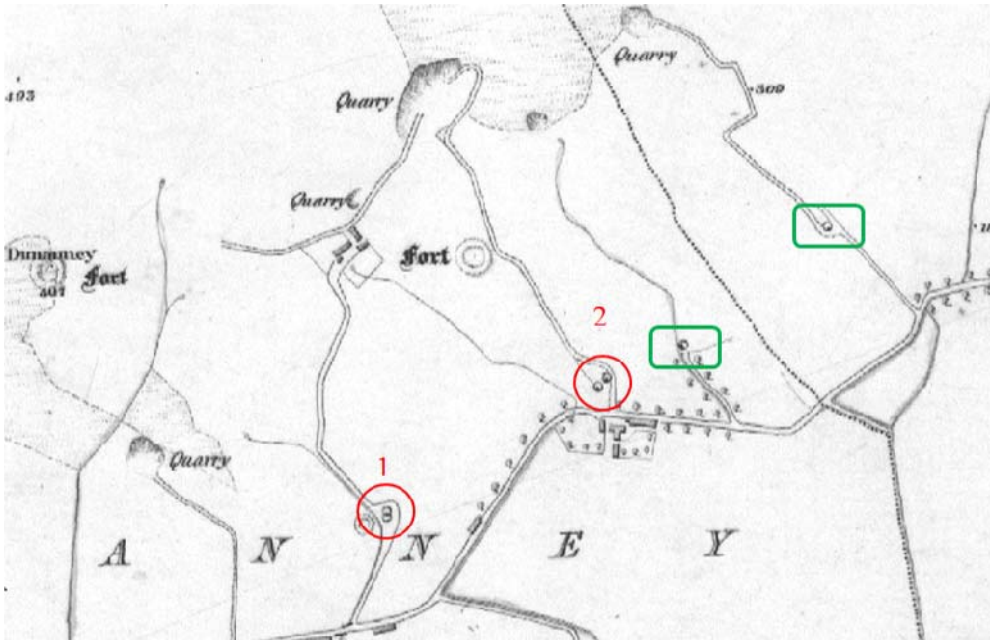



Fig 4 Limekilns, Dunanney Td, Co. Antrim, OS 1st Edition map
6" County Series (part of) OS-6-1-57-1(1833)

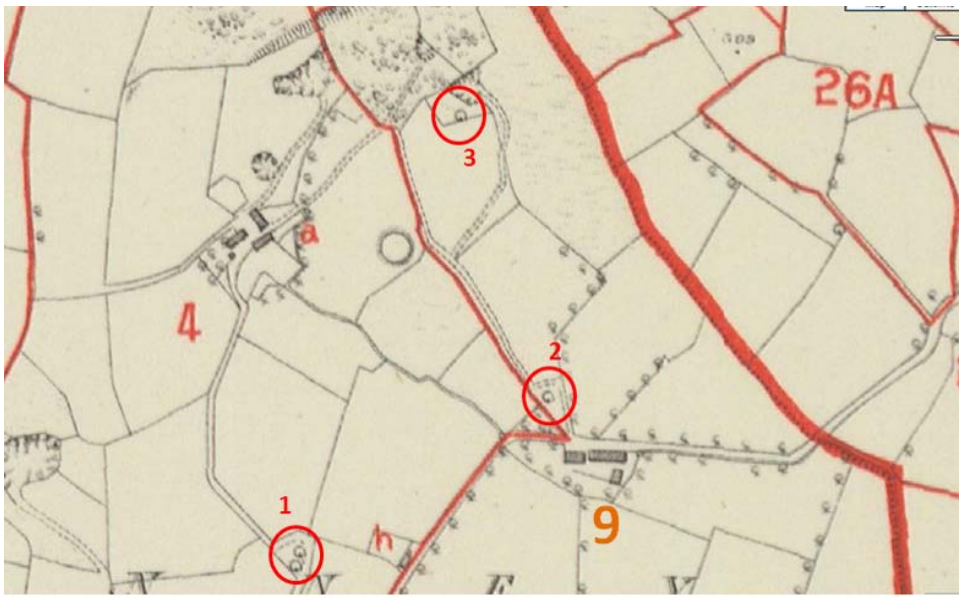



Fig 5 Griffith Valuation Map (extract) – Dunanney, 1861
*(askaboutireland.ie/griffith – Place Name valuation*)


Fig.6. Latest map - Dunanney Td - *OSNI, Historical Map Store*

3.6 Archiving

Copies of this report have been deposited with the Northern Ireland Environment Agency, and are available to download from the Belfast Hills Partnership website. All site records have been archived by the Belfast Hills Partnership, Hannahstown Hill, Belfast.

## 4. Limekiln Survey

4.1 Methodology

It was decided that the survey would take the form of the production of plan drawings and elevations, accompanied by a photographic survey. This report was compiled using the information obtained from these sources, in addition to background documentary material.

*Fig 7 Survey Team members in action in access laneway to Dunanney Kiln, 17 August 2013*

4.2 Production of plan drawings

Plan drawings and elevations were completed, using data obtained from the field survey. Sketch plans at 1:20 scale for the limekiln and 1:100 scale for the road were completed on site by recording these measurements on drafting film secured to a plane table and backing up the data on a field notebook for subsequent reference. Field plans were later transferred to a computer-based format for printing.

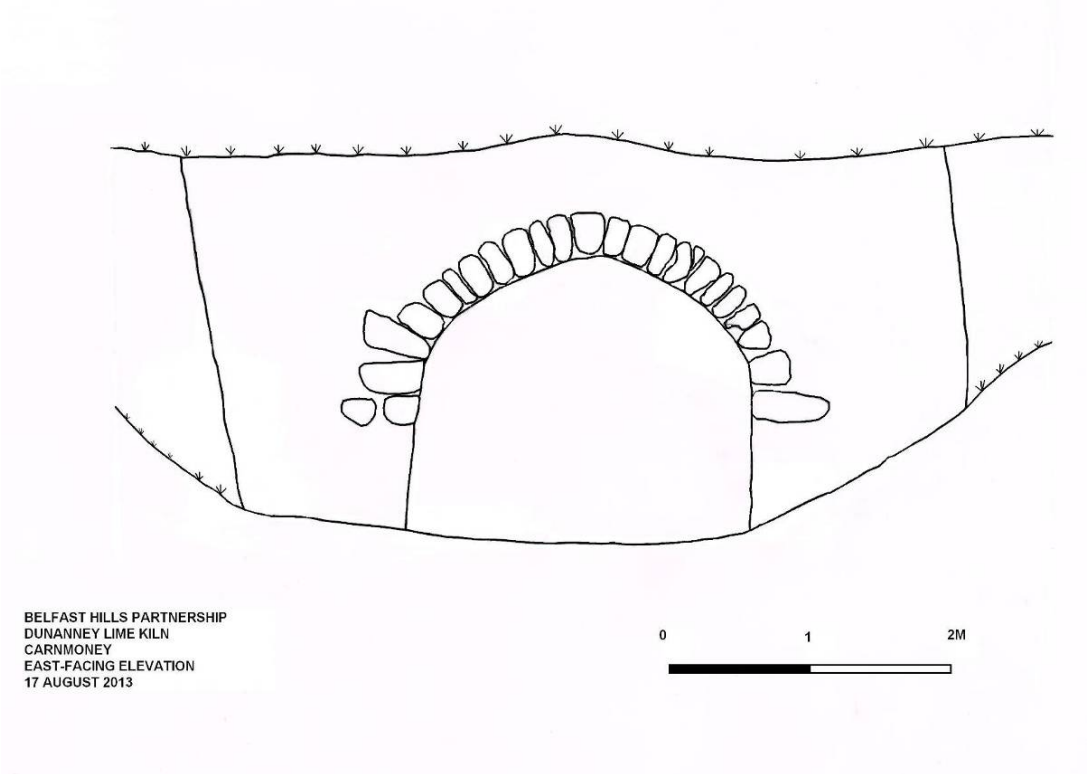



Figure 8: East Facing Elevation

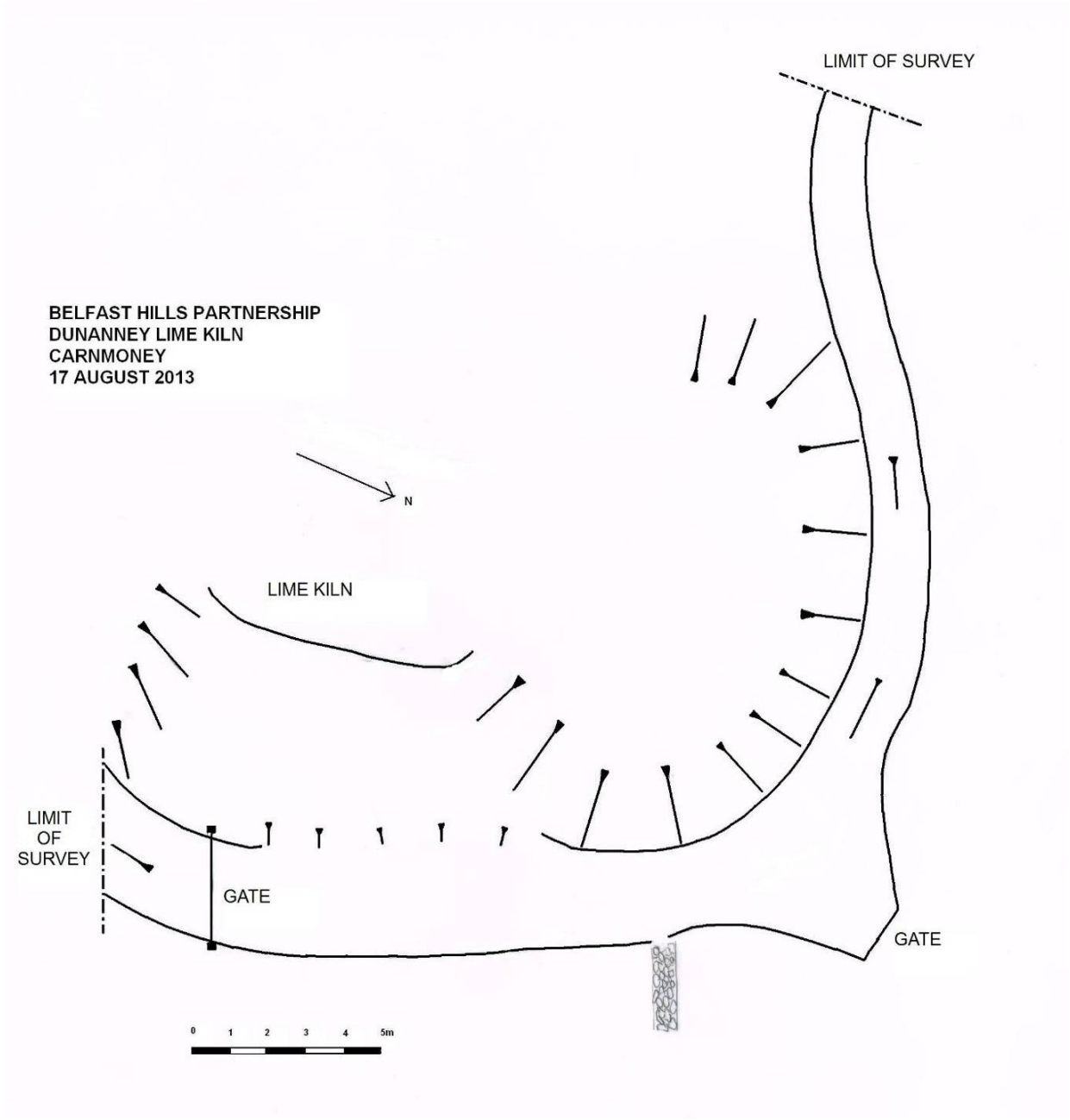



Figure 9: Overview sketch plan

4.3 Photographic archive

A photographic record of the site was taken by using a Panasonic Lumix Dmc-FT4 digital camera and a photographic record sheet was employed, corresponding to photographs taken during the site survey on the date of the survey. The archive has been compiled in jpeg format and saved to compact disc. Photographs are included in the discussion and the appendix.

## 5. Discussion

### 5.1 The science behind lime and its uses

A lime kiln is used to produce quicklime through the calcination of limestone (calcium carbonate). Lime kilns were introduced to Britain by the Romans and could have been used in Ireland from mediaeval times through to the eighteenth and nineteenth centuries, for the production of quicklime for agricultural purposes. The ability to produce lime locally was of great importance for agriculture on an estate. In areas with acid soil, the fertility and productivity of farmland could be improved by the addition of lime. It was also used to improve grassland for cattle grazing. The lime helped to neutralize acids present in the soil and bound to clay particles (English Heritage, 2011). Records for the Cloughvally and Tyrogarvan lime kilns show that 'lime tokens' were issued to tenants, to encourage the use of lime to improve land quality (Shirley, 2007).

If a farmer did not have a limestone outcrop on his property, he would have either purchased rock from a local quarry and burned it on his own land, or purchased quicklime from a neighbour's kiln. Kilns producing lime for just one farm or a few neighbours would probably only have been used seasonally and this type of kiln has been described as 'intermittent', 'periodic' or 'lazy'. Kilns were also erected just to produce the mortar required for a specific building project (English Heritage, 2011). Lime had numerous other uses: in the tanning industry, in the bleaching process (Ragauskas, 2014), as a white-wash for walls as well as mortar; and was used in remedies to treat for example burns and gangrene. Mortar for building was in particular demand at the time that Belfast was rapidly expanding.

### 5.2 How a limekiln worked

There are common features to be found in any kiln designed to burn limestone. A stone structure similar to a broad chimney provides the combustion chamber, with a hearth at the base. This structure is usually found located against an existing area of rising ground, or in the case of larger kilns it will be built against a vertical rock face. This higher ground beside or behind the kiln provides an access ramp to more easily raise the quarried limestone to the loading point at the top of the kiln.

Layers of limestone together with a burning agent, either wood, coal or coke, were built up in the kiln by loading through the roof hole. The layers were built up and prevented from touching the floor of the kiln by the grate bars placed across the base (in place of bars, early kilns had a vault of stone blocks, resting on an internal ledge). Air would be drawn through the 'eye' or 'stoke hole' at the bottom of the kiln. Supporting the limestone charge so that it was not in direct contact with the fuel also produced good quality lime that was not mixed with ash.

There was a simple way to use the kiln process: 'flare' kilns involved a bottom layer of fuel, the kiln above filled with only limestone. The more complex method, using the same basic structure as a 'perpetual' or 'draw' kiln, involved filling the chamber with multiple layers of fuel and limestone. A flare kiln would be alight for several days and, after cooling, the entire kiln would be emptied. With a draw kiln, lime would be extracted from the bottom of the

kiln and further layers of limestone and fuel added to the top. It is likely that the latter type would be used where the quicklime was to be produced on a larger scale.

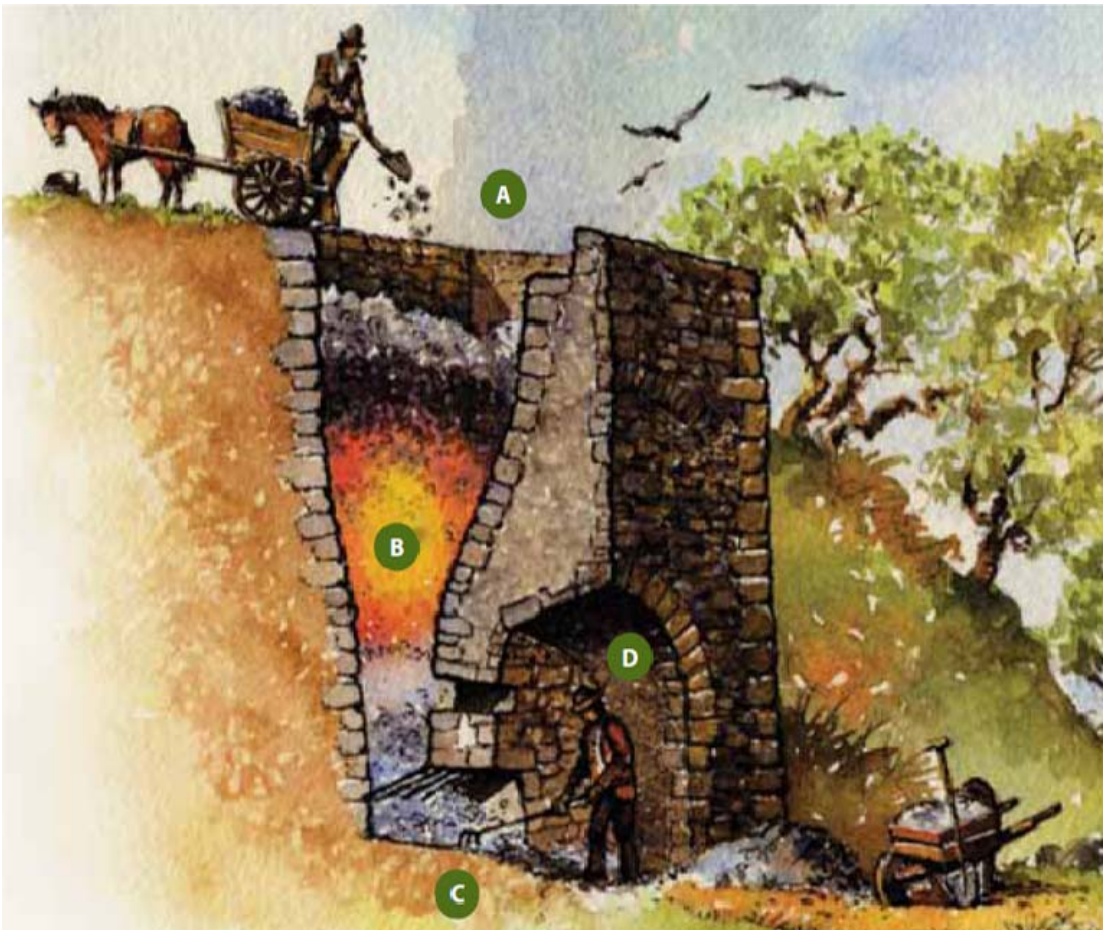
The limestone for the kiln had to be broken into the correct sized lumps before loading. Smaller stones were not used as they would have choked the mix in the kiln, preventing the upward flow of air which in turn kept the temperature high enough. Once loaded, the kiln was lit via kindling at the bottom and the fire gradually spread upwards through the charge. Fine ash would drop and could be removed and discarded with the 'riddling'. When burnt through, the charge in a flare kiln was left to cool, then possibly riddled from above or from below, and the quicklime could then be raked out through the opening at the base of the kiln.

It has been suggested that a 'flare' lime kiln could take a day to load, three days to fire and allow the charge to be burned adequately, two days to cool and a further day to unload. Therefore a kiln in regular use would have a one week turnaround. This process was time-consuming.

There would be differences in temperature in different parts of the kiln and so not all the limestone loaded into the kiln would produce good quality quicklime. A mixture of under burned, well burned and 'dead-burned' lime was normally produced. A wood-burning limestone kiln involved more work but the lime burned at a lower temperature, which resulted in a higher proportion of good quality quicklime produced from the lime stone.

Lime burning generated unpleasant fumes and acrid smoke. Quicklime was a volatile product capable of producing great heat if it came into contact with water, so it was necessary to protect the newly raked lime from rain. For this reason, lime kilns often featured shelters of timber or (at larger Victorian kilns) of corrugated iron, placed over the raking hole. Drainage ditches may also lie nearby, to maintain a dry environment around the kiln. The lime had to be cooled and kept at a consistency suitable for spreading (or 'slaking') on fields or mixing for mortar.

Info from English Heritage, 2011 and Wikipedia




**A:** THE CHARGE HOLE
A large hole at the top of the kiln where alternative layers of coal and limestone pieces were tipped

**B:** THE PROCESS
A coal fire was lit at the base of the charge hole which ignited the fuel in the whole kiln. This burnt slowly for days with temperatures reaching over 900°C producing quicklime

**C:** THE DRAW-HOLE
The powdery quicklime dropped through a grate into the draw-hole where it was raked out and bagged

**D:** THE KILN EYE
The arched opening, known as the kiln eye, allowed air to feed the fire while preventing rain from getting the quicklime wet

Fig 10 Illustration by Philip Armstrong of limekiln in operation

See a limekiln in action at the below link:
http://www.youtube.com/playlist?list=PLD3DC99A655C9618F

5.3 Site specific discussion

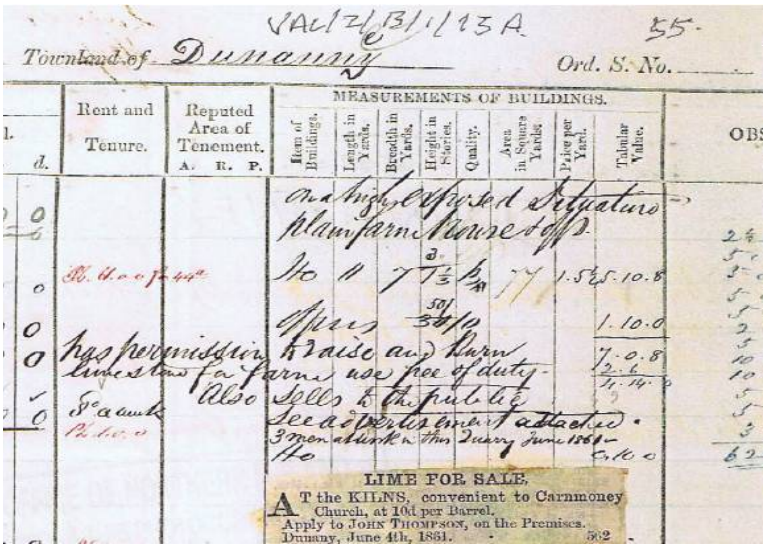
The limekiln is located along a laneway known as Dunanney Lane which leads to a farmyard complex and quarry. The kiln is made from basalt, but contains nodules of flint and other stones, presumably whatever stone was locally available.

Fig 11 View of limekiln during survey, looking west

Thomas Verner held the overall rights to quarrying Carnmoney Hill (Griffiths Valuation ref). Griffith's Valuation also indicates that John Thompson had availed of Verner's Quarrying Rights and was renting from him the limestone quarry and kilns (£20p/a rates) and Blackstone quarry (£10p/a rates). John Thompson also rented tenement 4 which included a house (£5p/a rates), offices and land (£43p/a rates) from a John Thomson (without a 'p'). It should be noted that most of the farmland, houses and gardens in Dunanney townlands are leased from John Thomson. It is thought that £1 in the late 1800's would be equivalent to about £55-60 now i.e. £20p/a for the quarry and kilns would be approx £1100 to £1200p/a.

Verner can be seen to have been operating a kiln in his own name in the neighbouring townland of Cloughfern for which he was Rated for Taxation at £30pa. Verner leased the Cloghfern plot, Tenement 14b, from the Marquess of Donegall.

As highlighted in the Cartographic Evidence section the number and location of limekilns on Carnmoney Hill appears to have varied over time. This may be connected to rental rates due for use of the kilns. In the Griffith Valuation (fig 12) it states that 3 men were connected with the Limestone Quarry in June 1861 and that John Thompson had permission to "*raise and burn limestone for farm use free of duty"*. However it appears that he was actually using the limekiln for commercial purposes as it was noted that he *"also sells to the public"*. The last point was reinforced by mention of an advertisement to that effect.



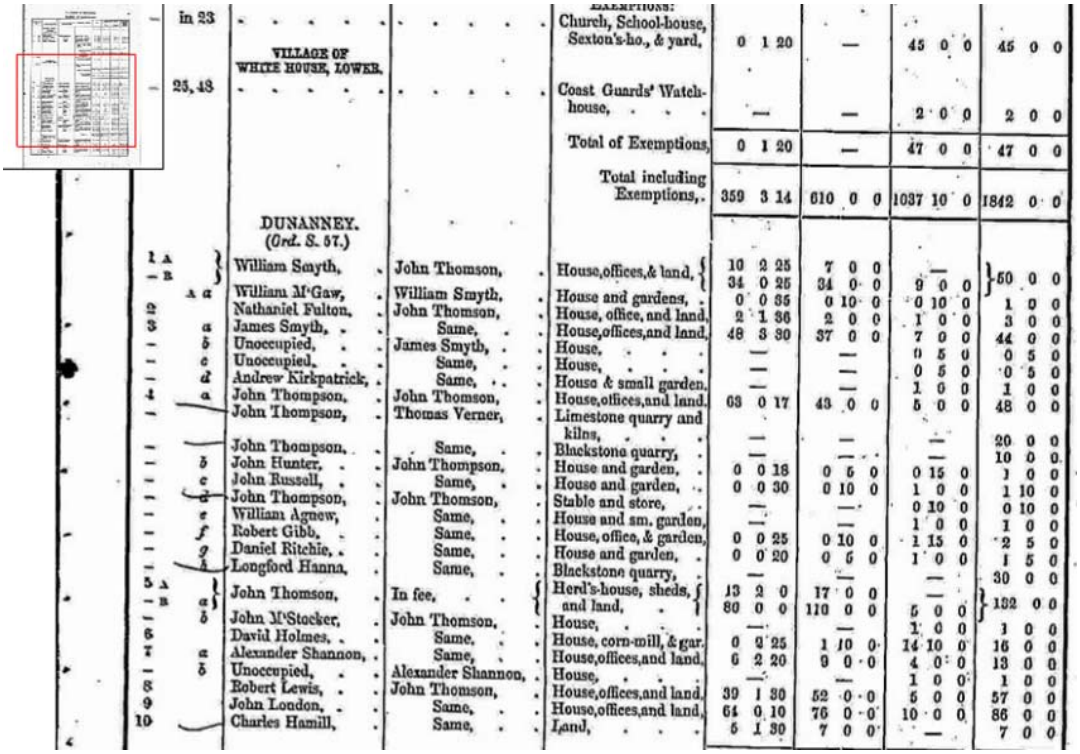
Townland of Dunanny Ord. S. No.

MEASUREMENTS OF BUILDINGS.

LIME FOR SALE.

AT the KILNS, convenient to Carnmoney Church, at 10d per Barrel.
Apply to JOHN THOMPSON, on the Premises.
Dunany, June 4th, 1861.

Fig 12 Griffith Valuation extract



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| in 23 | | | | Church, School-house, Sexton's-ho., & yard, | 0 1 20 | — | 45 0 0 | 45 0 0 |
| 25, 43 | VILLAGE OF WHITE HOUSE, LOWER. | | | Coast Guards' Watch-house, | — | — | 2 0 0 | 2 0 0 |
| | | | | Total of Exemptions, | 0 1 20 | — | 47 0 0 | 47 0 0 |
| | | | | Total including Exemptions, | 359 3 14 | 610 0 0 | 1037 10 0 | 1842 0 0 |
| | DUNANNEY. (Ord. S. 37.) | | | | | | | |
| 1 A | William Smyth, | John Thomson, | | House,offices,& land, | 10 2 25 | 7 0 0 | — | 50 0 0 |
| 1 B | | | | | 34 0 25 | 34 0 0 | 9 0 0 | |
| A a | William M'Gaw, | William Smyth, | | House and gardens, | 0 0 35 | 0 10 0 | 0 10 0 | 1 0 0 |
| 2 | Nathaniel Fulton, | John Thomson, | | House, office, and land, | 2 1 36 | 2 0 0 | 1 0 0 | 3 0 0 |
| 3 a | James Smyth, | Same, | | House,offices,and land, | 48 3 30 | 37 0 0 | 7 0 0 | 44 0 0 |
| b | Unoccupied, | James Smyth, | | House, | — | — | 0 5 0 | 0 5 0 |
| c | Unoccupied, | Same, | | House, | — | — | 0 5 0 | 0 5 0 |
| d | Andrew Kirkpatrick, | Same, | | House & small garden, | — | — | 1 0 0 | 1 0 0 |
| 4 a | John Thompson, | John Thomson, | | House,offices,and land, | 63 0 17 | 43 0 0 | 5 0 0 | 48 0 0 |
| | John Thompson, | Thomas Verner, | | Limestone quarry and kilns, | — | — | — | 20 0 0 |
| | John Thompson, | Same, | | Blackstone quarry, | — | — | — | 10 0 0 |
| b | John Hunter, | John Thompson, | | House and garden, | 0 0 18 | 0 5 0 | 0 15 0 | 1 0 0 |
| c | John Russell, | Same, | | House and garden, | 0 0 30 | 0 10 0 | 1 0 0 | 1 10 0 |
| d | John Thompson, | John Thomson, | | Stable and store, | — | — | 0 10 0 | 0 10 0 |
| e | William Agnew, | Same, | | House and sm. garden, | — | — | 1 0 0 | 1 0 0 |
| f | Robert Gibb, | Same, | | House, office, & garden, | 0 0 25 | 0 10 0 | 1 15 0 | 2 5 0 |
| g | Daniel Ritchie, | Same, | | House and garden, | 0 0 20 | 0 5 0 | 1 0 0 | 1 5 0 |
| h | Longford Hanna, | Same, | | Blackstone quarry, | — | — | — | 30 0 0 |
| 5 A | John Thomson, | In fee, | | Herd's-house, sheds, | 13 2 0 | 17 0 0 | — | 132 0 0 |
| a B | | | | and land, | 80 0 0 | 110 0 0 | 5 0 0 | |
| b | John M'Stocker, | John Thomson, | | House, | — | — | 1 0 0 | 1 0 0 |
| 6 | David Holmes, | Same, | | House, corn-mill, & gar. | 0 2 25 | 1 10 0 | 14 10 0 | 16 0 0 |
| 7 a | Alexander Shannon, | Same, | | House,offices,and land, | 6 2 20 | 9 0 0 | 4 0 0 | 13 0 0 |
| b | Unoccupied, | Alexander Shannon, | | House, | — | — | 1 0 0 | 1 0 0 |
| 8 | Robert Lewis, | John Thomson, | | House,offices,and land, | 39 1 30 | 52 0 0 | 5 0 0 | 57 0 0 |
| 9 | John London, | Same, | | House,offices,and land, | 64 0 10 | 76 0 0 | 10 0 0 | 86 0 0 |
| 10 | Charles Hamill, | Same, | | Land, | 5 1 30 | 7 0 0 | — | 7 0 0 |

Fig 13. Griffith Valuation – original table 1861

It seems likely that limestone was extracted from the small quarry behind the farmyard, drawn by horse and cart down the lane to the limekiln. It should be noted that the typography of the landscape is significant to the location of the limekiln. The kiln is built into the side of hill, this would have enable a horse and cart to have drawn limestone and coal to the top of the kiln, to ensure ease of filling. Likewise the laneway continues round by the base of the kiln, again allowing ease of transporting the product away when the kiln was emptied.

Fig 14 View of upper laneway towards farmyard, looking north-west

A ditch was observed at the top of the limekiln (near a more modern soakaway), it is probably a fair assumption that this was to ensure that water did not flow straight down the lane or from off the hill above and into the change hole as keeping the lime dry was essential to the process.


Fig 15 View of top of limekiln in foreground with access laneway, looking west

A rather unique attribute of the limekiln is the presence of two purpose built recesses/alcoves. These are not typically found in kilns so it is difficult to know what their purpose was. It may have been possible that they took advantage of the heat produced in the kiln enabling bread to

be cooked. It should be noted that the Altnacreeve kiln also had these alcoves, potentially indicating being constructed by the same individual or at least to the same plan.

Fig 16 Detail of northern recess/alcove in arch, looking north

Fig 17 Detail of southern recess/alcove in arch, looking south

From the historical fiscal records it is evident the Dunnaney Limekilns financial fortunes fluctuated. To date no records pertaining usage of the lime from this kiln have been discovered, without such supporting evidence it not possible to link the type of demand for lime to the profitability of the kiln

## 6. Conclusions and Recommendations for further work

On the basis of this study an information panel has been designed and will be located beside the limekiln so that visitors to the site can learn more about the history of the kiln.
There are future plans to re-point the limekiln, to stabilise the structure, so keeping it intact to have as an example of this type of industrial heritage.
Future excavation of the associated farm yard complex could help highlight the importance of the hills rich heritage, encouraging local people to visit and protect the site for future generations.

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**Appendix A**

## PHOTOGRAPHIC RECORD FORM

**Site:** Dunanney Limekiln **J33668219**

**Date:** 17th August 2013

**Make and model of camera = Panasonic Lumix Dmc-FT4 digital camera**

| Frame no | From | Details |
|---|---|---|
| P1000628 | E | View of limekiln before commencing survey, looking west |
| P1000620 | E | View of limekiln during survey, looking west |
| P1000617 | E | View of limekiln arch, looking west |
| P1000587 | E | Detail of draw-hole, looking west |
| P1000588 | SE | Detail of northern recess in arch, looking north |
| P1000589 | NE | Detail of southern recess in arch, looking south |
| P1000590 | | Socket from which stone fallen out in arch |
| RIMG0076 | S | View of access laneway, looking north-west |
| RIMG0081 | E | View of top of limekiln in foreground with access laneway, looking west |
| RIMG0082 | SE | View of upper laneway towards farmyard, looking north-west |

Fig 18View of limekiln before commencing survey, looking west

Fig 19View of limekiln arch, looking west

Fig 20 Detail of draw-hole, looking west

Fig 21 Socket from which stone fallen out in arch

## Appendix B

### Geology of Carnmoney Hill

The Belfast hills lie on the edge of the Antrim basalt plateau; their geology features predominantly basalt with limestone outcrops. The hill top at Carnmoney has a volcanic cap yet the slopes are mainly of limestone and flint, joining mudstones at the coastal belt below (Woodland Trust, 2014).

The limestone was quarried and used locally and at the beginning of the nineteenth century there was also a growing export trade to Belfast and beyond. Many quarries are recorded in the Griffiths valuation map (fig 22) both on Carnmoney Hill and in the surrounding area. Today easily visible in the landscape, there is a disused limestone quarry still visible on the eastern slope of Squires Hill and within Cave Hill Country Park. The Cave Hill limestone quarry had associated with it a horse drawn gravity railway which transported the quarried limestone to the docks, this is the route of the modern Limestone Road (Belfast Hills Heritage Guide, 2014).

Dunanney limekiln is within tenement 4 on the Primary Valuation, known as Griffith's Valuation, 1861. The Griffiths valuation map is shown with possible quarry sites around Carnmoney Hill marked in blue (fig 22). Quarries may have produced limestone or basalt (also known as blackstone or whinstone).

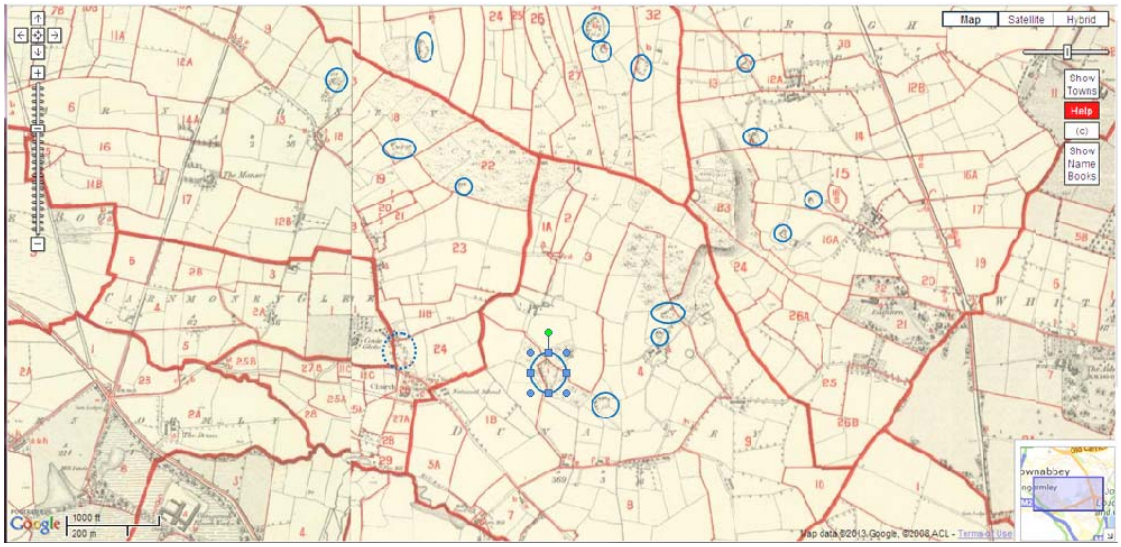


Fig 22 Possible quarry sites around Carnmoney Hill marked in blue on Griffiths valuation map

**Appendix C**

**Townland name – notes on origin and spelling**

There is a Dunanny townland (*note different spelling, no 'e'*) in the barony of Farney, County Monaghan. In some older documents such as Ulster directories, the county Antrim location is sometimes also spelt 'Dunanny' rather than 'Dunanney', especially where relating to the farm name. There is also Dunany (*note third spelling variation*) a civil parish in County Louth.

Dunanney retains a name based on the Irish. The townland is supposedly named for the rath near the summit of Carnmoney Hill. Dunanney has been interpreted as meaning 'Aine's Fort'. Other translations of this name have been suggested over the years, including 'the fort of the golden chain or collar', 'The Fort of the Assemblies' (which has been variously interpreted as an arbitration meeting or as a fair) and 'The Fort of the Watery Place'. The parish name Carnmoney refers to Cairn Monadh, 'cairn of the boggy place'.

Dunanny rath near the summit of Carnmoney Hill was refered to as the fort of the watery place (O'Laverty, 1884). Interestingly O'Laverty states "the bottom of the ditch is formed by the rock, as is also the summit of the fort, which, with its parapet, forms a sort of basin, from which the rain water that lodges in it cannot escape, so that it is generally from one to three feet under water." The name Fort of the Watery Place may have been applied in later centuries, when the rath was no longer occupied – or it may provide a reason for its abandonment?

Yet another suggestion for the origin of the placename of Dunanney appears in the Annual Reports of the Belfast Naturalists' Field Club, 1873-80: 'Straidnahanna, and Hannahstown, and perhaps Dunanney, all near each other, are significant of the locality occupied by the ancestors of the Hannahs (not the Scotch family of that name), still living in the county.'