# ULSTER ARCHAEOLOGICAL SOCIETY

**Survey Report: No. 18**

## Survey of Lime Kiln at Murlough Bay
## County Antrim
## UAS/09/03

**In association with**

THE NATIONAL TRUST

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# CONTENTS

## LIST OF FIGURES

## 1. Summary

### 1.1 Location

A site survey was undertaken at a feature known as the Lime Kiln at Murlough Bay in County Antrim. The monument is in the townland of Torglass and the parish of Culfeightrin. This is in an area of outstanding natural beauty, with spectacular views of the islands of Rathlin, Islay, Ailsa Craig and the Mull of Kintyre. In 1842 the novelist William Thackeray described the scene: 'As one travels up the mountains at night, the kilns may be seen lighted up in the lonely places, and flaring red in the darkness'. The survey was the second in a series of planned surveys undertaken by members of the Ulster Archaeological Society during 2009.

Figure 1: View of the Lime Kiln looking south

### 1.2 Aims

In order to enhance the archaeological record of this site, the aims of this survey were to produce accurate plan drawings of the monument and carry out a photographic survey. This information was compiled into a report and copies submitted to the Northern Ireland Environment Agency, to the National Trust and to the archives of the Ulster Archaeological Society.

Figure 2: East-facing elevation of the Lime Kiln, Murlough Bay

## 2. Introduction

### 2.1 Background

The survey of the Lime Kiln was undertaken on Saturday 16th May 2009. It was carried out by members of the Ulster Archaeological Society, in response to a decision taken by the committee of the society to extend an opportunity to members to participate in practical surveys of archaeological monuments that had not previously been recorded. This followed a bequest to the society from the late Dr Ann Hamlin, from which the items of survey equipment were purchased. During discussions with Malachy Conway, Survey Archaeologist of the National Trust in Northern Ireland, it was noted that many archaeological sites on National Trust property had not been subject to a detailed archaeological survey. It was therefore agreed that members of the society would commence a programme to survey these sites and the Lime Kiln was subsequently chosen to be the eighteenth of these.

### 2.2 Previous archaeological surveys

As far as it is known, there has been no previous archaeological survey at this site.

2.3 Cartographic Evidence

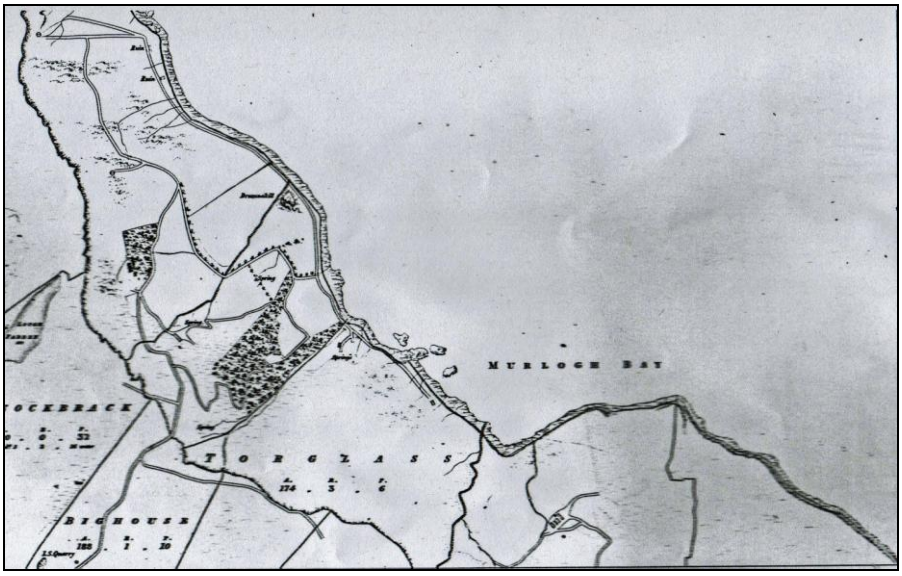


Figure 3: OS County Series Antrim Sheet 5 (part of) 1834

As indicated, there is no presence of the Lime Kiln on the 1834 Ordnance Survey, but it is present by the 1855 Ordnance Survey, suggesting that this particular lime kiln was built between the years 1834 and 1855.

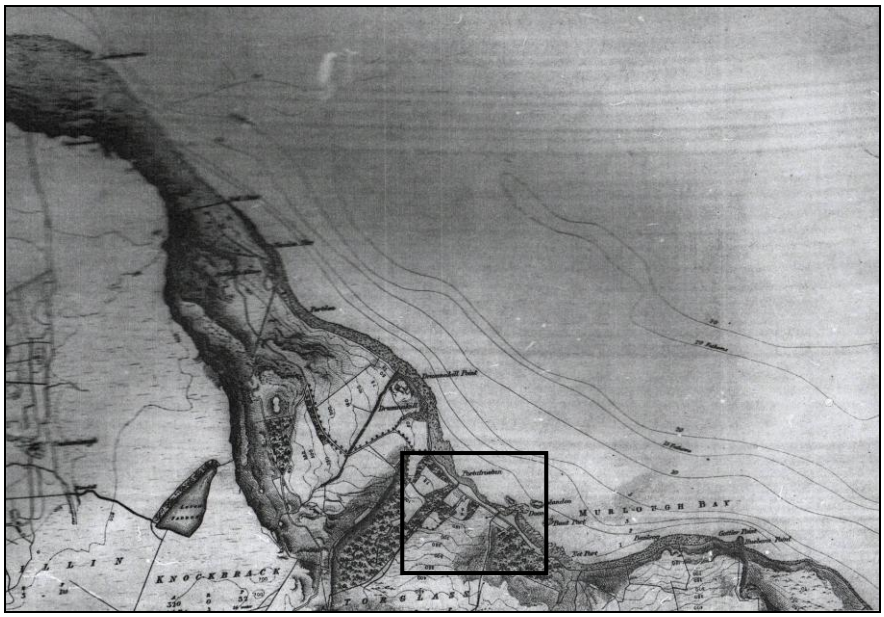


Figure 4: OS County Series Antrim Sheet 5 (part of) 1855

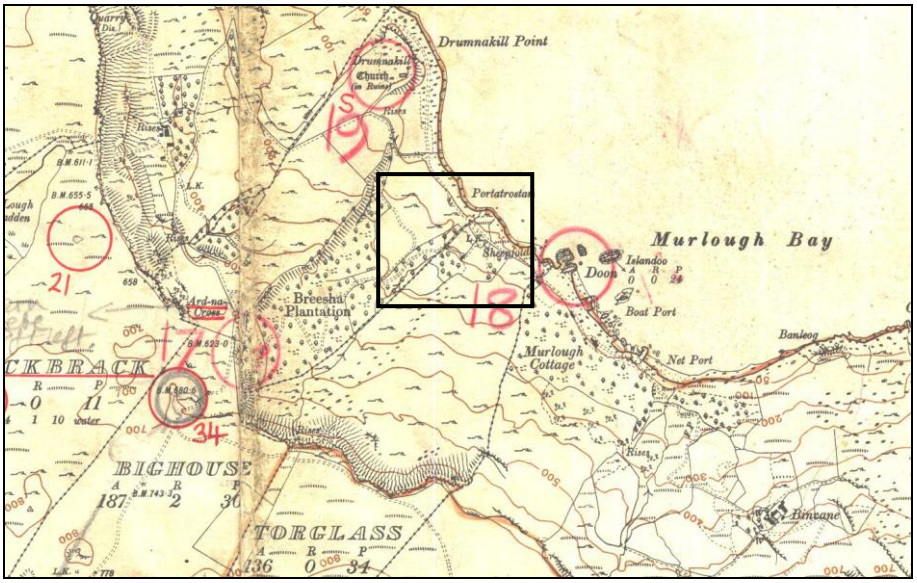


Figure 5: OS County Series Antrim Sheet 5 (part of) 1935

In the vicinity of the Lime Kiln at Murlough Bay, there are two other lime kilns. One is 1km to the west-south-west and is found in the adjacent townland of Bighouse. The other is 0.6km to the east-north-east and is in the townland of Knockbrack.

Figure 6: Lime Kiln in the townland of Bighouse

2.4 Archiving

Copies of this report have been deposited with the Northern Ireland Environment Agency, the National Trust and the Ulster Archaeological Society. All site records have been archived by the National Trust at Rowallane, Saintfield, County Down.

2.5 Credits and Acknowledgements

The survey was led by Harry Welsh and other members of the survey team included Michael Catney, William Dunlop, Ian Gillespie, Lee Gordon, Yvonne Griffiths, Anne MacDermott, Pat O'Neill, Ken Pullin, George Rutherford, and June Welsh. The Ulster Archaeological Society is particularly grateful to Malachy Conway, Survey Archaeologist of the National Trust, who worked closely with the survey team in choosing the site and facilitating access.

I would also like to thank Anthony Kirby of the Northern Ireland Environment Agency for providing details of Ordnance Survey maps.

## 3. 2009 UAS Survey

3.1 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.

3.2 Production of plan drawings

Plan drawings and elevations were completed, using data obtained from the field survey. Measurements were obtained by using the society's *Leica Sprinter 100* electronic measuring device. Sketch plans at 1:20 scale 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.

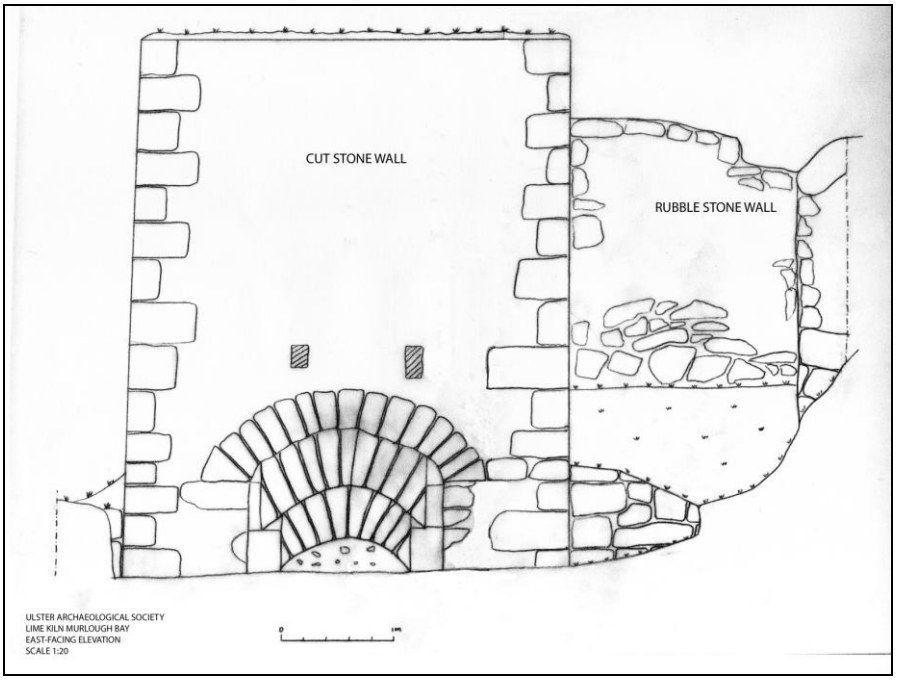


Figure 7: East-facing elevation of the Lime Kiln, Murlough Bay

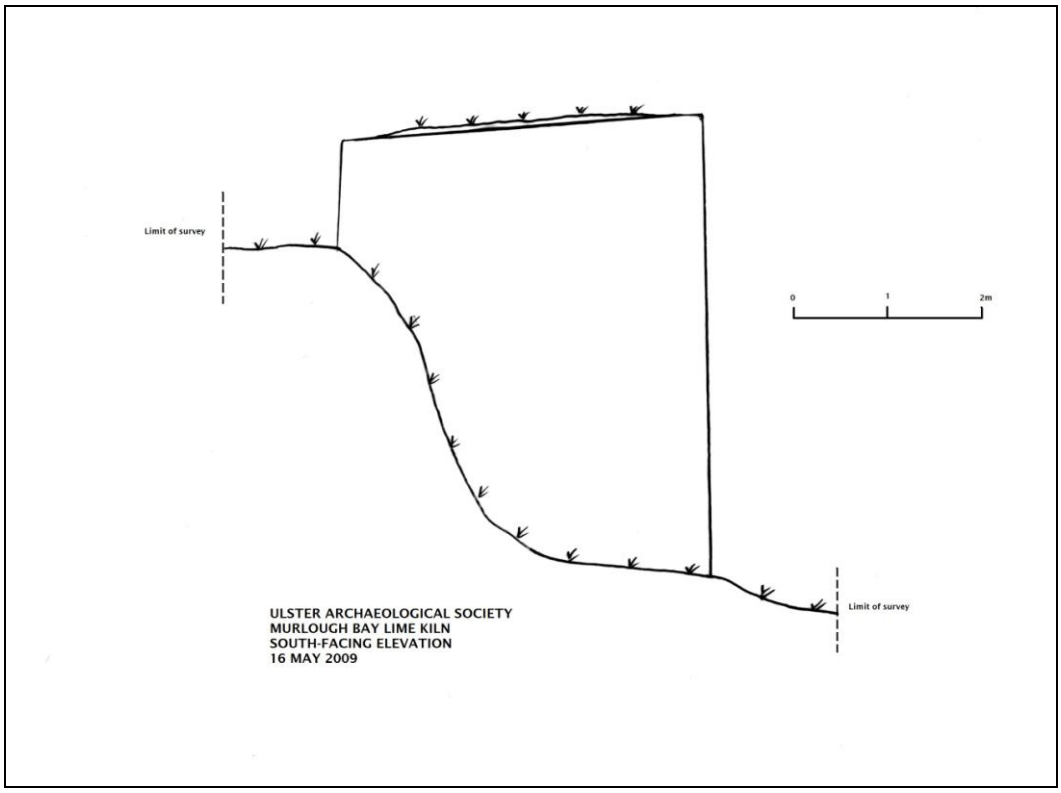


Figure 8: South-facing elevation of the Lime Kiln, Murlough Bay

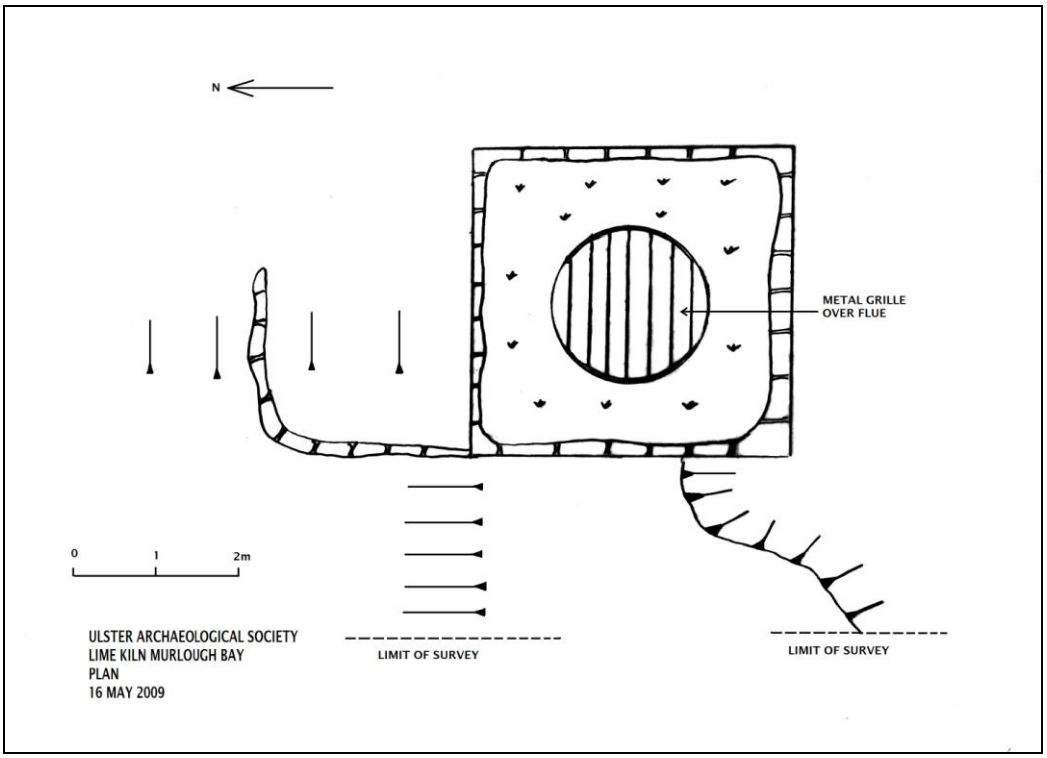


Figure 9: Plan of the Lime Kiln, Murlough Bay

3.3 Photographic archive

A photographic record of the site was taken by using a *Nikon Coolpix S1* 5.1 megapixel digital camera and a photographic record sheet was employed, corresponding to photographs taken during the site survey on 16 May 2009. The archive has been compiled in jpeg format and saved to compact disc.

Figure 10: South-facing elevation of the Lime Kiln

Figure 11: UAS survey team members at work at the Lime Kiln, Murlough Bay

## 4. Discussion

Introduction

According to Colin Rynne, the lime kiln, in which limestone was calcined for a wide variety of uses, is Ireland's most numerous (as many as a quarter of a million!) and widely distributed industrial monument. It is intriguing that lime continues to be important into the twenty-first century, so much so that the Building Limes Forum Ireland (BLFI) was formally established in 2005 and is affiliated to the international Building Limes Forum, which was established in 1992 to encourage expertise and understanding in the use of building limes. The publication *Lime Works* by Patrick McAfee has just been produced by the BLFI and is designed to encourage the use of lime for the repair of old buildings and also for new buildings.

### Coal Mining

Many small lime kilns survive in the vicinity of Ballycastle and Murlough Bay, where coal was readily available. Coal had been mined at Ballycastle since the 1600s. During the 1800s and 1900s, many basalt and limestone quarries were opened up. Numerous lime kilns were also erected for the conversion of limestone into agricultural fertilizer and also mortar. The economic importance of coal should not be underestimated, fuelling as it did Britain's eighteenth-century industrial revolution. Within the Glens of Antrim, coal seams were found immediately east of Ballycastle and also at Murlough Bay. At its zenith in the 1750s, more than a hundred miners worked at Ballycastle to produce 5,000-8,000 tons of coal annually, but by the mid-1800s most mines had been worked out. At Murlough Bay, mining took place sporadically from the late 1700s to the 1940s, but never on the same scale as Ballycastle. Dispatch was difficult, due to land slippage and the exposed shoreline. The remains of the houses of the mine workers are a visible reminder.

## Local Geology

Some 100 million years ago, much of County Antrim was overlain with white limestone. Commonly known as 'chalk', it was subsequently covered by basalt and is now only exposed west of Ballycastle, at Murlough Bay, Knocklayd and along the coastal scarp between Waterfoot and Larne. Calcium carbonate is the main constituent of limestone. When burnt in a kiln, the calcium carbonate decomposes and on releasing carbon dioxide, is converted into calcium oxide, which is lime or quick-lime, as it is commonly known. When exposed to water, the calcium carbonate (lime) is converted into calcium hydroxide (slake lime). This is the active ingredient responsible for the many uses of lime in agriculture, building and other related uses.

Chalk reduced the acidity of the peaty soils in the area. The fertility of soil is further enhanced when slake lime promotes the breakdown of soil organic matter and also releases the limited quantity of nutrients found in the top soil. The benefits to agriculture can last many years, but there is a danger of over-liming, which exhausts the soil nutrients. This fact is borne out by the old Irish expression, 'Lime enriches the father but impoverishes the son'.

## Historical Background

The majority of farm lime kilns surviving today are monuments to the eighteenth and early nineteenth century agriculture. However, the production of lime by burning limestone is a very ancient technology. The Egyptians, the Greeks and the Romans all used lime-based mortars. In Ireland the burning of limestone for the specific purpose of application to the soil, was commonly practised between the twelfth and seventeenth centuries.

The small-scale farm lime kilns gave way to the industrial manufacture of lime by quarries with a convenient supply of limestone and fuel and also access to transportation. One of the recently-invented Hoffman Kilns, designed for the manufacture of lime and bricks, was established at Castle Espie, County Down. (*The Irish Builder*, June 1st 1867, 134) This kiln, whose chimney measured 53m in height, had twenty-four compartments, each capable of containing one hundred tons of limestone and with the capacity to manufacture 600 tons of lime each week.

## Lime Kiln Design

Lime kilns were specially designed furnaces, which could reach temperatures of up to 1000° C. Draw kilns burnt limestone in a continuous process, where the kiln was loaded from the top and the furnace or fire-box was at the bottom.

It had four main parts:

1. Furnace shaft: This consisted of a cylindrical shaft, in which the entire burning operation took place. It was usually built of sandstone.

2. Masonry casing: Lime kilns were often built into a bank of rising ground and secured on the other sides by a stone-built structure, often rectangular in shape. The space between the furnace shaft and the outer structure was filled in with stones, clay, sand and other non-combustible materials. This ensured support, insulation and also provided room for expansion within the kiln.

3. Draw-hole or stoke-hole: This was located at the front, providing draught and access to the fire and was also where the lime was withdrawn from the kiln. It was usually designed to accommodate one or two men and sometimes a cart. Some, like the one at Murlough Bay, had an arch built in stone or brick and was flared inwards.

Figure 12: Draw-hole at the Lime Kiln, Murlough Bay

Figure 13: Example of burnt lime, *www.buildinglimesforumireland.com*

4. Kiln head: This was the flat top of the kiln above the furnace shaft, where the final breaking of the limestone and the loading into the kiln took place. Cast-iron covers served as dampers and were also used to moderate the draught. As this area was often enveloped in smoke, a wall was built around the edge of the kiln head to protect both humans and animals.

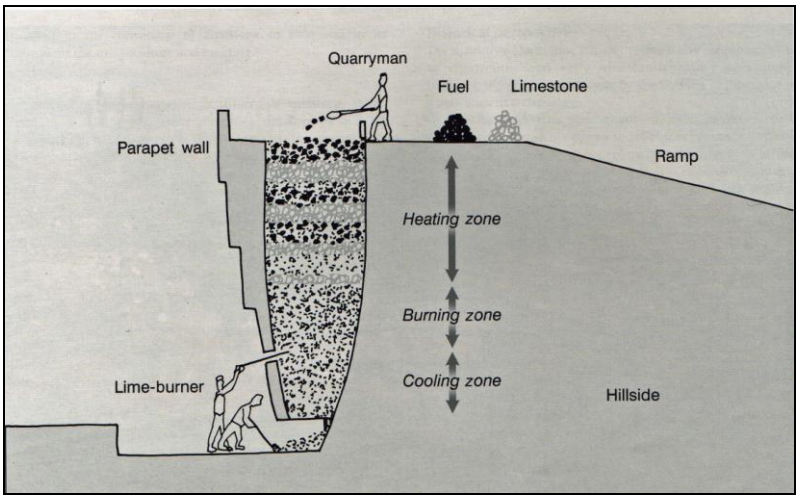


Figure 14: Diagram of a working kiln (after Ursula Mattenberger, *Archaeology Ireland*, Volume 19, No. 2, Issue No. 72, 19)

**Keeping the Kiln Running**

Alternating layers of limestone and fuel were stacked on top of the grate, which was fixed over the fire-box. As the fuel burned to decompose the limestone, lime dropped through the draw-hole. Additional layers of both limestone and fuel were added at the top and this process continued for weeks or even months. The draw kiln produced large amounts of lime and proved to be fuel-efficient too. However, the quality of the lime produced depended upon the knowledge and skill of the lime-burner, in maintaining the necessary temperature in the kiln and also in determining the speed and duration of the burning process.

**The Lime Kiln at Murlough Bay**

The site consists of an almost square in plan, vertical lime kiln, which was constructed of stone blocks, probably sandstone, in a lime mortar. The regular stones measure 38cm-40 cm in length. The lime kiln is 4.65m tall and 4.1m wide at its base, tapering to 3.84m at its top. The flue is 1.9m in diameter and was placed centrally within the square design. It is lined with rounded basaltic boulders, approximately 25cm in all dimensions and is constructed with a lime mortar.

At the draw-hole there is a triple arch and directly above the archway, there are two quite large vents cut into the outer casing. The larger vent measures approximately 30cm by 17cm and the second vent measures 20cm by 17cm approximately.

Figure 15: Larger vent at the Lime Kiln, Murlough Bay

The top of the flue is sealed with a removable iron grille. The top of the lime kiln is reached by a steep path from the roadway from the North and also by a winding path to the West, towards the ruins of a cottage behind the lime kiln. This cottage may well have once been occupied by the lime-burner and his family. This path is revetted on the eastern side.

Figure 16: Iron grille at the top of the Lime Kiln flue, Murlough Bay

One unusual feature of this particular lime kiln is the stone lean-to built at one side. This may have been used to store fuel or indeed the limestone itself and may also have offered shelter from the elements, when needed.

Figure 17: Stone lean-to at the Lime Kiln, Murlough Bay

About 6m to the south is a small stream, aligned east/west. It discharges into the sea. Along the paths are scattered numerous small fragments of limestone, some evidently burnt. There is a significant amount of limestone/chalk in the immediate area and the southern end of the Ballycastle coal seam is also nearby.

**Conclusions and Recommendations for further work**

At present the lime kiln is quite a robust structure and seems to be in good repair. Vegetation may appear to protect some parts of the lime kiln, but could cause problems in the future, if left to grow out of control. The flue contains a variety of litter, which may indicate a risk of vandalism to the monument. Although attractive ruins of lime kilns, like the one at Murlough Bay, still exist throughout the countryside, it is a sad reality that the overwhelming majority of those recorded in the 1840s have been destroyed. It should be our aim to prevent the further destruction of lime kilns, but at the moment sites dated after AD 1700 are not normally included in the SMR and as a result, do not receive the necessary legal protection. This must be a cause for concern. This Lime Kiln should be considered for some form of statutory protection.

A small-scale excavation could help determine the actual purpose of the lean-to and provide valuable information about the lime kiln itself.

Murlough Bay is obviously a haven for walkers, naturalists, artists and photographers throughout the year, so perhaps we should consider erecting an information board to tell the story of the Lime Kiln and its related industries. This would be of particular interest to tourists, but perhaps local people would wish to be reminded of their heritage too.

**Other examples of Lime Kilns in Ireland**

Figure 18: A double lime kiln at Ballintoy, County Antrim

Figure 19: Lime kiln at Hook Peninsula, County Wexford

Figure 20: Lime kiln in the grounds of Tintern Abbey, County Wexford

**Bibliography**

Books and Articles

Hammond, F. 1991. *Antrim Coast and Glens, Industrial Heritage.* HMSO.

O'Sullivan, M. and Downey, L. 2005. 'Know your monuments: Lime Kilns', *Archaeology Ireland*, Volume 19, No. 2, Issue No. 72, 18-22.

Rynne, C. 2006. *Industrial Ireland 1750-1930. An Archaeology*. Collins Press.

## PHOTOGRAPHIC RECORD FORM

**Site:** Lime Kiln, Murlough Bay, County Antrim
**Date:** 16 May 2009

| Film no. | B/W Print | Colour print | Colour slide | Digital image (m.pixels) |
|---|---|---|---|---|
| | | | | 5.1 |

**Make and model of camera…*Nikon Coolpix SI* & others**

| Frame no | From | Details |
|---|---|---|
| DSCN 3799 | S | Coastal path approach to the Lime Kiln |
| DSCN 3800 | NE | UAS Survey Team members at East-facing elevation |
| DSCN 3805 | SE | Lime Kiln in Bighouse townland |
| RIMG 0026 | E | Draw-hole at the Lime Kiln, Murlough Bay |
| RIMG 0027 | SE | View of draw-hole and vents |
| RIMG 0028 | E | Stone lean-to at the Lime Kiln |
| RIMG 0030 | W | Iron grille at top of Lime Kiln flue |
| RIMG 0032 | S | View of Lime Kiln built into hillside |
| RIMG 0039 | E | Larger vent on East-facing elevation of Lime Kiln |
| RIMG 0040 | E | East-facing elevation of Lime Kiln |
| DSCN 5792 | N | Double lime kiln at Ballintoy, County Antrim |
| DSCN 5254 | NW | Lime kiln at Hook Peninsula, County Wexford |
| RIMG 0009 | SE | Lime kiln in the grounds of Tintern Abbey, County Wexford |