

16 ARCHAEOLOGY, ARCHITECTURAL & CULTURAL HERITAGE

16.1 INTRODUCTION

Margaret Gowen and Co. Ltd undertook an archaeological, architectural and cultural heritage assessment of the proposed onshore pipeline. In addition, an assessment of underwater archaeology was undertaken by Archaeological Diving Company Ltd (ADCO).

Sections 16.1 to 16.5 provide details on the archaeological, architectural and cultural heritage assessment while Section 16.6 addresses the underwater archaeological assessment. Section 16.7 discusses the residual impacts. Reports on both assessments are contained within Appendix N (Archaeological, Architectural and Cultural Heritage) and Appendix O (Underwater Archaeology).

The following sections describe the methodology used in the assessment and the existing environment from an archaeological, architectural and cultural heritage perspective. It also examines the potential impacts of the proposed development and recommends mitigation measures to ameliorate these impacts on features of archaeological potential, architectural heritage or cultural heritage.

16.2 METHODOLOGY

The methodology used involved a desktop assessment, field inspection, an examination of aerial photography, test excavation and consultation, as described in Sections 16.2.1 to 16.2.3, to identify features of interest within 50m of either side of the centreline of the proposed route, i.e. a 100m assessment corridor.

A review of the construction layout plan was also undertaken to identify associated temporary works and the potential to impact on features of archaeological, architectural and cultural heritage potential.

16.2.1 Field Inspection

A field inspection was undertaken by archaeologists in August 2007, January 2008, June 2008, July 2008, January 2009 and February 2010 to assess present topography and land use. It also sought to identify potential low-visibility archaeological features and upstanding features of architectural or cultural heritage interest. Although the width of the proposed temporary working area is 40m, the assessment was generally carried out over a 100m corridor and beyond in areas of proposed ancillary works, e.g. LVI and site compounds.

16.2.2 Desk-top Assessment

A desk study of the proposed route was undertaken which examined the following sources:

- RMP files (Record of Monuments and Places);
- Topographical files (recorded stray finds, held in the National Museum of Ireland);
- Mayo County Council (consulted for schedules of buildings and items of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest that are listed for protection in the study area);
- Documentary sources (additional published and unpublished documentary and literary references consulted are listed in Appendix N); and
- Cartographic sources (various editions of Ordnance Survey mapping) and historic mapping (William Bald's map 'Maritime County of Mayo').

The methodology utilised for this desktop assessment included:

- An examination of aerial photographs (2004, 2006 and 2008); and
- A review of previous cultural heritage reports.
- Consultation with various parties. Those consulted included:
 - Department of Environment, Heritage and Local Government (DoEHLG): National Monuments Section, Underwater Archaeology Unit;
 - Noel Dunne, author of 'Pre-bog Archaeology: The Glenamoy-Barnatra Peninsula Co. Mayo'. Unpublished MA, 1985, UCD;
 - Dr. Graeme Warren, lecturer in the School of Archaeology, UCD and director of an archaeological field survey and excavation project based in Béal Deirg (Belderrig), Co. Mayo;
 - Greta Byrne, Manager of Céide Fields Visitor Centre, Co. Mayo;
 - Local landowners;
 - Dr. Seamus Caulfield, formerly of the School of Archaeology at UCD, the renowned and now retired expert on the prehistoric landscape at Céide; and
 - Dr. Niall Brady, underwater Archaeologist, Director of ADCO Ltd. and Rex Bangerter, underwater archaeologist conducting the underwater archaeological survey for the project.

16.2.3 Test Excavation

Following desk based research and a detailed field inspection; the National Monuments Section of the DoEHLG requested that a potential archaeological site, a mound (ID A3) be investigated through test excavation. The proposed development works at Na hEachú (Aghoos) had been deliberately located to avoid this feature. However, the use of test-excavation was applied to provide greater certainty and definition of the suggested archaeological potential of this site.

16.2.4 Assessment Criteria

Impacts on archaeological, architectural and cultural heritage are generally categorised as being a direct impact, an indirect impact or as having no predicted impact as described in Table 16.1.

Table 16.1: Type of Impact

Category of Impact	Description
Direct	Occurs when an item of archaeological, architectural or cultural heritage is removed in part, or totally, due to the proposed works. A direct impact can also occur when the pipeline is crossing an environment or area considered to be of archaeological potential.
Indirect	May be caused due to the close proximity of the proposed development to an archaeological, architectural or cultural heritage feature. Mitigation strategies and knowledge of detail design can often ameliorate any adverse indirect impact.
No predicted	Occurs when the proposed route option does not adversely or positively affect an archaeological, architectural or cultural site.

The impacts of the proposed route on the archaeological, architectural or cultural heritage are first assessed in terms of their quality i.e. positive, negative and neutral as described in Table 16.2.

Table 16.2: Impact Quality

Quality	Description
Negative	A change that will detract from or permanently remove an archaeological, architectural or cultural heritage monument, structure or feature from the landscape.
Neutral	A change that does not affect the archaeological, architectural or cultural heritage environment.
Positive	A change that improves or enhances the setting of an archaeological, architectural or cultural monument, site or feature.

A significance rating for these impacts is then given i.e. slight, moderate, significant or profound as described in Table 16.3.

Table 16.3: Impact Significance

Significance	Description
Profound	Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeological, architectural or cultural site is completely and irreversibly destroyed by a proposed development.
Significant	An impact, which, by its magnitude, duration or intensity alters an important aspect of the environment. An impact like this would be where the part of a site/structure would be permanently impacted upon leading to a loss of character, integrity and data about the archaeological, architectural or cultural feature/site
Potentially Significant	An impact on a potential feature or area of archaeological, architectural or cultural heritage potential that could be significant without mitigation measures taking place. This impact relates to items of archaeological potential, possible sub-surface remains, recorded archaeology, possible archaeological sites and areas of archaeological potential as well as features of architectural heritage merit and sites of cultural heritage interest.
Moderate	A moderate impact arises where a change to the site is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological, architectural or cultural heritage feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.
Slight	An impact which causes changes in the character of the environment which are not significant or profound and do not directly impact or affect an archaeological, architectural or cultural heritage feature or monument.
Imperceptible	Impact capable of measurement but without noticeable consequences.

16.3 RECEIVING ENVIRONMENT

The following section describes the existing environment along the route of the proposed onshore pipeline from an archaeological, architectural and cultural heritage perspective.

16.3.1 Archaeological Heritage

The following is a description of the areas of archaeological potential within the 100m assessment corridor (see Figures 16.1 and 16.2). Further information is included in an inventory format listed below.

16.3.1.1 Greenfield

The proposed route passes through a greenfield environment at the landfall at Gleann an Ghad (Glengad) until it reaches Sruwaddacon Bay. Considerable reorganisation of western Ireland's field pattern occurred in the nineteenth and early twentieth centuries. New farms were arranged in parallel strips or 'ladder farms', running down the slopes with the farmsteads arranged in lines along new roads (Aalen & Whelan 1997). The fields comprise unimproved, self-improved and improved pastoral mixed sized fields. As such it is important to note that, even if the landscape does not retain surface traces of archaeological remains, it does not mean that it is devoid of archaeological value.

To date archaeological test-excavation at the landfall site has revealed no features or finds. In June 2002, archaeological monitoring of topsoil-stripping was carried out in the Gleann an Ghad (Glengad) area. Soil was stripped from an area of 0.25ha along the route of an access road and approximately from an area 500 – 600m sq along the pipeline route itself across the Gleann an Ghad (Glengad) headland. Nothing of any archaeological significance was noted during any of the topsoil stripping. Monitoring of inshore dredging operations in Broadhaven Bay was also undertaken. Geotechnical test trenches excavated in the intertidal zone were also monitored. Nothing of an archaeological nature was observed or recovered during the monitoring programmes.

Further to this in May and June 2005, monitoring of the excavation of three geo-technical test pits located within the pipeline wayleave on the eastern shore of Gleann an Ghad (Glengad) Headland (Plate 2). All three pits were excavated to a depth of 3m using a tracked mechanical excavator. The pits were excavated through natural sand with some gravel and occasional shell fragments noted in the upper levels to a depth of 0.35m. In order for the tracked excavator to reach the location of the three pits, two 5m long sections of field boundaries were removed. The field boundaries consisted of banks of mixed sand and peat. Nothing of any archaeological significance was noted (Delaney, 2005).

Also at Gleann an Ghad (Glengad) a roughly linear 15m long bank was test excavated in order to assess its archaeological potential (Excavation Licence Number 05E0411). This feature is located in a naturally marshy field which has been partially drained. A field drain is situated at the southern edge of the field and is oriented east-west. The neighbouring field to the north has been completely drained and is improved pasture land. The linear bank is 15m long and runs from north-north-west to south-south-east. It has a maximum height of 0.5m and is 2.75m wide. The ground to the south-west of the linear mound is noticeably flat and even. Stones were noted protruding through the grass which covers the linear bank.

A tracked excavator fitted with a toothless grading bucket was employed to excavate two sections across the linear feature. The bank was composed of irregular loosely packed limestone rocks mixed throughout with sandy clay. The underlying natural was light brown/yellow sandy clay. The feature was thought to be the result of field clearance and modern drain excavations along the western field boundary. It was not archaeologically significant (Delaney, 2005).

An enclosure site (MA004-015, ID A1, and Plate 16.1) is recorded in Gleann an Ghad (Glengad). It is located c. 10m to the east of the permanent access route to the LVI.

Enclosures can date to a variety of periods. Often identified from early OS maps or through aerial photography, they are referred to as 'enclosures' in the Archaeological Survey of Ireland (ASI) unless a more precise classification can be established. The site at Gleann an Ghad (Glengad) is depicted on the first edition Ordnance Survey (1838-39) as a circular feature, resembling a ringfort. It now presents as a mounded area and is approximately 16.5m in diameter at its base and 2.2m in height (ASI, 1995). The site is encircled by traces of an in filled fosse¹. From the east, south and west, portions of the mound have been removed as a consequence of the construction of a modern field boundaries and the fosse has been incorporated into the field boundary. The north-eastern half of the site has been largely quarried away, probably for use in the modern field boundaries described above. It is known locally as a 'kileen' (*cillíní*), which are also called 'caldraghs' (*ceallúrach*), or a children's burial ground.

Archaeological monitoring took place in this area during the construction of the access route for the landfall works in Gleann an Ghad (Glengad). During this time no archaeological features or finds were revealed (Frazer, 2002).

¹ A surrounding ditch

16.3.1.2 Coastal/Estuarine/Riverine

Coastal, estuarine and riverine environments, especially in the west of Ireland, have been shown through research and fieldwork to have significant archaeological potential. Archaeological evidence has shown that these areas have acted as focal points for both settlement and ritual activity through all periods of human settlement. The Mesolithic period (c.8,000-4,000 BC), which records human activity in Ireland after the end of the last ice age, does not appear to be represented among the known archaeological records for the immediate area. Mesolithic people did not build permanent stone monuments, and the sites dated to the Mesolithic are usually connected with habitation or food production activity. However, the hunting and fishing economy of this period means that many Mesolithic sites are coastal and estuarine, and there is significant possibility that work in coastal, estuarine and riverine areas, such as Sruwaddacon Bay, may reveal Mesolithic material.

There is a prehistoric settlement site (MA004-007) at the mouth of the estuary of Sruwaddacon Bay (Curraun Boy). While this site is over 900m from the proposed route it provides a good example of the type of coastal settlement which may be found in the surrounding area providing that environmental and physical conditions are suitable. Sand hills are also noted to the east of the landfall site, these are limited in extent and it is unknown whether the environmental conditions existing at this location would have attracted settlement. To date, no archaeological features or sites have been identified at Gleann an Ghad (Glengad) by archaeological monitoring or investigation.

Particular areas of potential archaeology relating to coastal, estuarine, and riverine environments within the assessment corridor are detailed in the underwater archaeology section 16.6 and include:

- The landfall at Geann an Ghad (Glengad);
- The tunnel from Aghoos to Glengad;
- The coastal region of Na hEachú (Aghoos) townland to the southeast of Sruwaddacon Bay; and
- The crossing of the Leenamore River.

16.3.1.3 Blanket Bog

The Céide Fields are a pre-bog field system in north Mayo located approximately 23km northeast of the proposed route. The Céide site encloses an area 12km² and consists of two large conjoined coaxial prehistoric field systems preserved intact under a mantle of deep blanket bog in excess of 4m deep in places. Within these field systems, there is evidence for settlement in the form of enclosures, hut sites and megalithic tombs. Research has revealed that they are amongst the oldest known preserved field systems in the world at over five and a half millennia old (Neolithic). Blanket bog has the ability to mask these types of field systems and the Céide Fields, Rathlacken, Béal Deirg (Belderg) and Glenamoy – Barnatra peninsula were only detected by using a method known as probing.

The presence of these pre-bog field systems in the northern part of the country and on the western seaboard is much more extensive than originally thought, with systems being revealed in Co. Donegal, in the northern part of the Inishowen peninsula, the Iveragh peninsula in Co. Kerry, and in the vicinity of Clifden in Co. Galway.

Pre-bog field systems of this nature also occur west in the Glenamoy-Barnatra peninsula. These field systems were detected and recorded by Dunne (1985) at Gleann an Ghad (Glengad) (MA004-021 and MA011-023), Graghil (MA011-024), Gortbrack North (MA011-025), Gort Meille (Gortmellia) (MA011-026), Cnoc Na Lobhar (Knocknalower) (MA011-027), Fálach (Faulagh) and Muingerroon South (MA011-028) (Dunne 1985).

The nearest recorded field system (MA004-021) is 1.8km from the proposed pipeline route. Dunne suggests that megalithic tombs reflect areas where field boundaries once existed, as is the case on Glenamoy –Barnatra Peninsula. An analysis of the overall survey results of his study revealed that the pre-bog field systems have a very high correlation, spatially, with the other prehistoric monument types within the peninsula (Dunne 1985, 57).

To date, no archaeological deposits, finds or features have been revealed as a result of an archaeological field inspection, engineering investigations or probing in the Na hEachú (Aghoos) area where blanket and eroding bogland extends from the shore of Sruwaddacon Bay to the townland boundary of Béal an Ghoile Theas (Bellagelly South) (Ch 88.650-89.260). A peat probe survey has established that the depths of bog vary from 3.6m to 0.2m.

Archaeological test excavation of a mound (ID A3) (approximately 11m in diameter and 1m high) identified during field inspection at na hEachú (Aghoos) took place in April 2010). Excavation confirmed that the mound was formed as a result of natural processes (displaced peat covering a pine stump) and is not archaeological in nature with no archaeological material revealed.

Evidence for prehistoric forest cover in the low lying townland of na hEachú (Aghoos) is demonstrated by the remains of tree stumps, predominantly of pine, preserved either in the lower layers of the bog or under it. These remains of scrubby pine were studied by Prof. M. Downes (Maynooth) and he achieved a C14 determination of 2,348BC from one pine stump (Dunne 1985). Two further pine samples were dated from this townland, one was taken from 0.65m above the mineral soil and dated to 4,340 ± 60BP, the other from 0.75m above the mineral soil, dated to 3,950± 60BP (Caulfield, O'Donnell & Mitchell 1998). Because these pines grew on peat and were preserved by it, the C14 dates of the pines are central to providing a date for the initiation of blanket bog. These dates place the growth of the pine trees in the Late Neolithic-Early Bronze Age Period placing the growth of bog to the Neolithic period and earlier. It follows that the initiation of the bog, given the depth of cover, must have been relatively early in this area, possibly earlier than Neolithic settlement; leaving this area devoid of archaeology dating to this period. The results of the test excavation would confirm this theory.

At Béal an Áha Buí (Bellanaboy), which is located to the south of the proposed onshore pipeline, an exposed section of blanket bog along the river bank was examined in the 1970's. Two superimposed layers of pine stumps, one at the based of the peat, the other 0.2m higher, were radiocarbon dated to 7,110±75BP (Håkansson 1974), and 4340±65BP, respectively suggesting that the rate of growth was extremely slow and that the bog was already there throughout the Neolithic period. Around 4,000 years ago, a great expansion of pine on bog surfaces took place in western and central Ireland. Pine also flourished on raised bogs in the midlands between 4,000 and 3,500 years ago.

16.3.1.4 Inventory of Sites and Areas of Archaeological Potential Within and Adjacent to the 100m Assessment Corridor

The following inventory is categorised on the basis of:

- Recorded archaeological monuments; and
- Specific features of archaeological potential.

The inventory considers features and areas of archaeological potential within and adjacent to the 100m assessment corridor, i.e. 50m on either side of the proposed pipeline and areas immediately adjacent. It also considers associated works (and one permanent access road), as described in Chapter 5.

The inventory (Table 16.4 and 16.5) should be read in conjunction with Figure 16.1 and 16.2. Further details are provided in Appendix N.

Table 16.4: Inventory of RMP Sites.

Unique ID	ID A1
Legal Status	Recorded Monument
Ref No.	RMP MA004-015 (see Plate 1 in Appendix N)
Townland	Gleann an Ghad (Glengad)
Site type	Enclosure site
NGR	GPS coordinate 816800, 338390
Description	Circular earthen mound (diam. at base 16.5m; max. H 2.2m) encircled by traces of an infilled fosse. From E-S-W, portions of the mound have been removed as a consequence of the construction of a modern field boundaries and the fosse has been incorporated into the field boundary. The NE half of the site has been largely quarried away, probably for use in the modern field boundaries described here.
Sources	RMP Archive and historic mapping
Approximate distance from access road to LVI	10m to east.
Approximate distance from the proposed pipeline route	235m to the southwest.

Table 16.5: Inventory of Specific Features of Archaeological Potential

Unique ID	ID A2
Legal Status	None, specific site of archaeological potential
Townland	Na hEachú (Aghoos)
Site type	Large Mound
NGR	GPS coordinate 857779.44, 335252.11
Description	This site was identified during a field inspection and is located in an area of uneven, eroding bogland south of and immediately adjacent to Sruwaddacon Bay. The site appears as a circular mound. It is c. 12m north-south and c. 13m east-west. There is also a flat projection (c. 11m long north-south) attached to the north of the mound. The site is positioned at a strategic point overlooking Sruwaddacon Bay where it narrows forming the Muingnabo and Glenamoy Rivers. It is also located beside the inlet for the Leenamoy Stream. While the location is unsheltered, this mound and ID A3 are both visible in the landscape and can be viewed from the roadside at Na hEachú (Aghoos). While this feature occupies a prominent position in the landscape, given the test excavation findings of the other mound (ID A3) and the dating evidence of the pine stumps it is considered likely to be natural in origin.
Sources	Field inspection
Approximate distance from the proposed pipeline route	106m to the north
Approximate distance from working area	The working area is located approximately 31m northwest and 51m southwest of the mound

Unique ID	ID A3
Legal Status	None,
Townland	Na hEachú (Aghoos)
Site type	Mound – not archaeological
NGR	GPS coordinate 85712.91, 335233.37
Description	Located in an area of uneven and eroding bogland south of and adjacent to Sruwaddacon Bay. This site was identified during a field inspection of the area. The site appears as a circular mound c. 11m in diameter (Plate 27 in Appendix N). A rectangular feature abuts the mound to the northeast which measures c. 3.5m long and c. 2m wide. This site was archaeologically test excavated and was found to be formed by natural processes. It is not an archaeological monument or feature.
Sources	Field inspection
Approximate distance from the proposed pipeline route	21m from the edge of the mound to the pipeline.
Approximate distance from working area	3m from the edge of the mound to the fence line of the working area.

Unique ID	ID A4
Legal Status	None, specific site of archaeological potential
Townland	Béal an Ghoille Theas (Bellagelly South)
Site type	Commemorative mass site and stone wall/enclosure
NGR	GPS coordinate 85876, 334964
Description	<p>This site is situated in close proximity to a small stream called <i>Leenamore</i>, which forms the townland boundary between Béal and Ghoile Theas (Bellagelly South) and na hEachú (Aghoos). It is located on low ground, cut into a west facing slope. It is naturally protected from the elements and has good views out to Sruwaddacon Bay. William Bald's map (surveyed 1809-1817 and published 1830) shows a chapel in much the same location as this site. The site consists of stone foundations in a rectangular form (c. 11m north-south x c. 5m east-west). There are two possible entrances on the western side. The stone foundations of the site are overgrown by earthen banks and the stone that is exposed is very worn. Locals say the site was used as a church in penal times and that it was never roofed (<i>pers comm.</i> local landowners). There is still a local tradition of practicing mass at this location every Easter Sunday. Noone states that 'by the mid 1820's the chapel at Leenamore had fallen' (1991, 142). He also states that the sacrament of confirmation was celebrated there in the 1820's (1991, 142). The 1st edition six-inch Ordnance Survey mapping depicts two structures roughly in this location each enclosed by a ditch or wall.</p> <p>Approximately 1.5m from the southwest corner of the foundations (ID A4) is the southern extent of a curving stone wall/enclosing feature. This feature (c. 0.5 - 0.7m high) follows the bend of the <i>Leenamore</i> stream from the south-eastern extent of ID A4. Further along this feature, to the north, the stone wall bends away from the river. Noone says this feature protected the 'chapel' (ID A4) in times of floods.</p>
Sources	Field inspection, local knowledge, Noone 1991, 141-142, cartographic (Bald 1809-1817, 1 st edition O.S map 1838)
Approximate distance from the proposed pipeline route	82m to the south
Approximate distance from working area	52m

Unique ID	ID A5
Legal Status	None, specific site of archaeological potential
Townland	Béal an Ghoille Theas (Bellagelly South)
Site type	Mound
NGR	GPS coordinate 86128.41, 334921.64
Description	<p>This feature presents as a roughly oblong, linear anomaly which is located within bogland parallel to the forestry plantation. The feature is approximately 11m east-west and while the northern extent is clearly defined the southern extent blends into the rising level of the bog. Therefore, the feature while visible when approaching from the northwest appears as a natural ridge when viewed from the south. Telegraph poles have also been placed parallel to the forestry boundary and it is possible that this feature was created as a result of the disturbance caused by the various development activities. The northern extent of the feature is defined by a drop in the bog as the field becomes steeper towards Sruwaddacon Bay. There are good views to the north and northwest over Sruwaddacon Bay. While noted, it is considered likely that this feature is part of a natural ridge and not archaeological in nature.</p>
Sources	Field inspection
Approximate distance from the proposed pipeline route	This feature is located 13m to the north of the proposed pipeline.

16.3.2 Architectural and Cultural Heritage

16.3.2.1 Architectural Heritage

The Mayo County Development Plan (2008-2014) was consulted to identify the presence of any protected structures or features of architectural heritage merit in close proximity to the proposed scheme. No upstanding historic structures, items of architectural heritage significance or their surrounds, curtilage or attendant grounds will be affected by the construction of the proposed pipeline or associated works.

16.3.2.2 Cultural Heritage Features including Field Systems and Townlands

A commemorative mass site (ID A4), which is a site of cultural heritage interest, is located immediately east of the Leenamore stream. This stream forms the townland boundary between Béal an Ghoile Theas (Bellagelly South) and na hEachú (Aghoos). The site is located on low ground, cut into a west-facing slope. It is naturally sheltered and protected from the elements (Plate 4 & 5). The location also affords good views to Sruwaddacon Bay. William Bald's map (surveyed 1809-1817 and published 1830) shows a chapel in much the same location as this site along the Leenamore stream, which is referred to on the map as '*Muingnanoone*', the stream of the lamb. The site consists of stone foundations in a rectangular form (c. 11m north-south c. 5m east-west). There are two possible entrances on the western side. The stone foundations of the site are overgrown by earthen banks and the stone that is exposed is much worn. Locals say the site was used as a church in penal times and that it was never roofed (*pers comm.* local landowners). There is still a local tradition of practising mass at this location every Easter Sunday. Noone, states that 'by the mid 1820's the chapel at Leenamore had fallen' (1991, 142). He also records that according to a local of the na hEachú (Aghoos) area; Mass was celebrated at Leenamore during penal times at a place known as '*Pollan an Aifrinn*' which possibly is a reference to the topography of the valley (the mass hollow). The first edition six-inch Ordnance Survey mapping depicts two structures roughly in this location each enclosed by a ditch or wall.

Approximately 1.5m from the southwest corner of the foundations (ID A4) is the southern extent of a curving stone wall/enclosing feature (Plate 5). This feature, c. 0.5 - 0.7m high, follows the bend of the *Leenamore* stream from the south-eastern extent of the church site. Further along this feature, to the north, the stone wall bends away from the river. Noone says this feature protected the 'chapel' (ID A4) in times of floods.

The fields traversed by the proposed route could be described as stripped fields. This type of field pattern was created in the nineteenth and early twentieth centuries by the Congested Districts Board, a government body established to improve conditions in disadvantaged areas. The fields comprise unimproved, self-improved and improved pastoral mixed size fields. The maintenance and replacement of field boundaries is important as it leads to the restoration of a traditional landscape.

Townlands are a unique feature in the Irish landscape, and their origins are undoubtedly of great antiquity, most certainly pre-Norman. They existed well before the establishment of parishes or counties. Townlands can take the form of natural boundaries such as Sruwaddacon Bay, rivers, or route ways, as well as artificially constructed earthen banks and ditch divisions. They are predominantly formed by well-built boundaries that demarcate the townland and are usually distinguishable from standard field division boundaries. There are 62,000 townlands in Ireland, grouped into civil parishes, then counties and finally provinces. The proposed route passes through three townlands, Gleann an Ghad (Glengad), na hEachú (Aghoos) and Béal and Ghoile Theas (Bellagelly South)

Townland names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on the history, the archaeological monuments and folklore of an area. A place name may refer to a long forgotten site, and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830s and 1840s, when the entire country was mapped for the first time. Most of the townland names in the study area have Irish origins (which is unsurprising given that this is a Gaeltacht area), and have been anglicised through time. A description of each of the townland names along the proposed route is provided in Appendix N.

16.4 POTENTIAL IMPACTS

16.4.1 Recorded Archaeological Sites, Sites of Archaeological Potential and Areas of Archaeological Potential

The proposed pipeline route avoids all recorded archaeological monuments. A recorded enclosure (RPM MA004-015) (ID A1) is located adjacent to an existing access road in Gleann an Ghad (Glengad) that is scheduled to be upgraded as part of the proposed project (plate 16.1). However, all previous work conducted in this area was archaeologically monitored and did not reveal any finds or features of an archaeological nature. The enclosure is located 10m from the nearest (eastern) edge of the existing road. The monument has been fenced off for protection and any further work in the area will take place on the opposite side of the road to the enclosure and will be monitored by a licensed archaeologist. This is to ensure that no impact occurs to the recorded monument.

One specific site of archaeological potential (ID A5) has been identified within the working area (see Table 16.4 above). As such, this site is considered to be indirectly impacted by the proposed development. This site has been described as a mound. Archaeological work carried out in bogland environments has proven that features noted on the surface of the bog do not necessarily equate with a buried archaeological site. Mounds may simply reflect a rise in mineral soil, a rock or tree stump which lies beneath the peat. This was the case at na hEachú (Aghoos), where a mound (ID A3) was identified during field inspection of the working area in Na hEachú (Aghoos) townland. The DoEHLG required this mound to be subjected to test excavation the findings demonstrated that the mound represented displaced peat surrounding a substantial buried tree stump. As the feature was proven to be natural in origin and not archaeological in nature, there will be no impact on ID A3.

In Béal an Ghoile (Bellagelly), an oblong irregular mounded area (ID A5) was identified approximately 13m north-east of the proposed pipeline route within the working area. The location of this feature has been noted and while it is likely to be part of a natural ridge, it can be avoided.

Areas of archaeological potential, identified as greenfield/coastal Gleann an Ghad (Glengad) and blanket bog Na hEachú (Aghoos) and Béal an Ghoile Theas (Bellagelly South) (see Figures 16.1 and 16.2) will also be impacted by the extended construction working area. In these areas there is a possibility that previously undiscovered features or sites of archaeological and cultural heritage could be revealed. This will be mitigated by the archaeological monitoring of all earthmoving work. Estuarine and riverine areas of archaeological potential are dealt with in the underwater archaeological assessment in Section 16.6.

Table 16.6 summarises the types of potential impacts on identified sites and areas of archaeological potential, which are described in more detail in Appendix N.



Plate 16.1: Enclosure site ID A1 facing northwest

Table 16.6: Summary potential impact assessment on archaeological, architectural and cultural heritage.

Ref. No	Townland	Site Type	Type of development causing impact	Type of Potential Impact	Distance (approximate)	Impact Level
ID A1	Gleann an Ghad (Glengad)	Enclosure site MA004-015	Access road to the LVI	Indirect impact	10m from access road to LVI	No predicted impact
ID A2	Na hEachú (Aghoos)	Mound	None	No predicted impact	Located outside the working area and 106m from the proposed pipeline route	No impact
ID A3	Na hEachú (Aghoos)	Mound - non archaeological	Working area	No predicted impact	Located immediately outside the working area and 21m from the proposed pipeline route	No impact –
ID A4	Béal an Ghoille Theas (Bellagelly South)	Commemorative mass site and stone wall/enclosure	Fencing associated with project	No predicted impact on the feature but indirect, short term impact on the setting of the site	Located 52m to the south of the working area and 82m south of the proposed pipeline route	Indirect, short term impact on the setting of the site
ID A5	Béal an Ghoille Theas (Bellagelly South)	Mound	Proposed route	Indirect impact	Within temporary working area & 13m from pipeline	This site is likely to be part of a larger natural ridge and can be avoided. No impact

16.4.2 Plantation Forests

Approximately 2.1km of the proposed route travels through forested areas. A proposed compound (SC4) is situated within an area cleared of forest. Much of these forested areas have gone through the entire forestry cycle of thinning, felling and harvesting. This type of concentrated disturbance considerably reduces the possibility of archaeology surviving intact below the surface of the bog and marginal land. Monitoring the removal of peat from the Terminal site did not produce any archaeological features or finds, given the dating evidence obtained at Bellanaboy Bridge (Håkansson 1974) (Appendix N), and from the results of archaeological monitoring it appears that the bog and pine stumps predate the Neolithic period resulting in no archaeological activity through out the area.

16.4.3 Groundwater

As part of the proposed development, measures will be taken to deal with the seepage of groundwater in areas such as low-lying floodplain areas adjacent to rivers / streams or blanket bog. As trenches for the pipeline may act as conduits for groundwater flow when backfilled, they can sometimes promote

the drainage of bog areas. This can reduce the consolidation of the peat and dry out the layers, affecting archaeological sites and features of organic content that prefer waterlogged conditions (See Chapter 15). Peat plugs will be used within the stone road to maintain the hydrology of the area and prevent the stone road acting as a preferential drainage channel within the bog. A similar approach will be used to maintain hydrology in the tunnelling compound at Na hEachú (Aghoos).

16.4.4 Architectural and Cultural Heritage

There are no protected structures or structures of architectural heritage merit located along any part of the proposed pipeline route or within any area proposed for ancillary development. Therefore, there is no anticipated impact to features of architectural heritage merit.

The commemorative mass site (ID A4) has been avoided by the proposed pipeline development. However, during the construction period fencing will be erected around the working area which will have an indirect, short term impact on the setting of this site.

In Gleann an Ghad (Glengad) the proposed route traverses fields that are organised as stripped field systems. The boundaries of these field systems will be directly impacted. However, this impact will be localised to the extent of the proposed temporary working area (where it will be necessary to remove field boundaries). All boundaries will be reinstated following completion of the construction works therefore, the predicted impact will be temporary in nature.

16.4.5 ‘Do Nothing’ Scenario

In the event of such a scenario, in general any previously unrecorded subsurface archaeological features not yet discovered would remain intact and undisturbed. In the event of a ‘do nothing’ scenario, features of a cultural heritage nature would remain intact and undisturbed.

16.4.6 ‘Worst Case’ Scenario

In the ‘worst case’ scenario the proposed pipeline development could disturb previously unrecorded features of archaeological merit or that archaeological material could be destroyed, without preservation by record taking place. Similarly, in the ‘worst case’ scenario, the proposed development could disturb and potentially remove previously unrecorded features of cultural heritage merit without the appropriate recording taking place.

16.5 MITIGATION

All recorded archaeological features (ID A1), sites of archaeological potential (ID A2 and A5) and of cultural heritage interest (ID A4) have been avoided by the proposed scheme. The following mitigation measures have been prepared and agreed with the National Monuments Section of the DoEHLG.

16.5.1 Archaeological Heritage- Construction Stage

16.3.1.5 Monitoring

An archaeological program of inspection will enhance and build upon the historic information gathered to date and provide a further understanding and appreciation of the historic landscape and its evolution along the proposed route. Having discussed the proposed pipeline development and the matter of archaeological mitigation with the National Monuments Section of the DoEHLG, it is recommended by that authority that archaeological monitoring by a licensed archaeologist be undertaken during the earthmoving works of the construction stage. This will ensure that any potential archaeological feature or discovery of an isolated stray find is identified, recorded and fully resolved under licence to the statutory authorities.

16.3.1.6 Mitigation Assessment Table

Table 16.7 outlines the mitigation measures specific to each site/area of archaeological potential identified in Section 16.3

Table 16.7: Archaeological Mitigation Strategy

ID Number	Type of site	Location relation in to proposed development (approximate)	Mitigation strategy
ID A1	RMP (MA 004-015) - Enclosure	Access road to LVI	This recorded archaeological site will be avoided. ID A1 has been fenced off previously and this protective measure will be subject to review by the licensed archaeologist on site and the DoEHLG to ensure that no inadvertent damage occurs to the monument. Archaeological monitoring will take place throughout the preconstruction stage.
ID A2	Mound – potential archaeological site	Located 106m from the pipeline	This feature is located outside the working area associated with pipeline and will be avoided
ID A3	Naturally occurring mound	21m north of the proposed pipeline	Archaeological test excavation has demonstrated that this site is not archaeological in nature and therefore requires no further mitigation.
ID A4	Commemorative mass site and stone wall enclosure	82m from the proposed pipeline and 52m to the south of the working area	This site and area will be avoided. Appropriate signage in relation to the historic nature and cultural heritage significance of the site is suggested for fencing in proximity to this feature.
ID A5	Mound-potential archaeological feature	13m north of the proposed pipeline	This anomaly is part of a long natural ridge and given the early initiation of bog formation and disturbance in the area and the results of test excavation in the neighbouring townland of na hEachú (Aghoos), considered to be of limited archaeological potential. Archaeological monitoring will take place throughout the pre-construction stage. The feature will be avoided during the construction process.
All works			Archaeological monitoring will be undertaken. Environmental analysis of organic archaeological remains will occur where it is considered necessary.

16.5.2 Architectural & Cultural Heritage

No structure or building will be removed as a result of the development of this project and no protected structure or structure of an architectural heritage merit will be subject to a direct impact. Therefore, no mitigation measures are necessary.

It is not anticipated that any proposed maintenance works to the already existing road network will impact on features of a cultural or architectural heritage merit. If improvement measures are deemed necessary they will be subject to review by the appropriate statutory authority. As a result, it is anticipated that there will be no direct impact by the proposed development on any items of architectural heritage merit (for example bridges, stone boundary walls, gateways) which are at a remove from the route of the onshore pipeline and the proposed works at Gleann an Ghad (Glengad), na hEachú (Aghoos) and Béal and Ghoile Theas (Bellagely South).

It is recommended that fencing surrounding the compounds and working area at Gleann an Ghad (Glengad) and na hEachú (Aghoos) display information in relation to archaeology and the cultural heritage of the area. This is particularly relevant to the pedestrian access route at the commemorative mass site (ID A4), where signage could be developed to reflect the historic nature of the area and provide a more aesthetically pleasing backdrop to the setting of the site during the construction period.

Where necessary, field boundaries will be appropriately reinstated during the post construction stage of the proposed development. All townland boundaries along the proposed route are formed by watercourses. An underwater archaeological survey of these watercourses was undertaken and results of this survey are outlined in Section 16.6.

16.6 UNDERWATER ARCHAEOLOGY ASSESSMENT

The pipeline route traverses two watercourse areas of archaeological interest. These include:

- Sruwaddacon Bay from Na hEachú (Aghoos) to Dún Ceartáin/Gleann an Ghad (Dooncarton/Glengad); and
- Estuarine crossing known locally as the Leenamore River.

These crossings were considered in the underwater archaeological assessment. The detailed report containing this assessment is included in Appendix O.

It is proposed to construct the pipeline beneath Sruwaddacon Bay using a tunnelling technique known as segment lined tunnelling. This method is designed to minimise surface disturbance during construction. However, if a problem is encountered during the works an intervention pit may be required to overcome the problem (see Chapter 5).

It is proposed to cross the Leenamore River using an open-cut method.

16.6.1 Methodology – Underwater Archaeology

The methodology for the underwater archaeological assessment involved a desktop assessment, archaeological interpretation of acquired marine geophysical data and geotechnical site investigations conducted in the lower and upper areas of Sruwaddacon Bay and a field inspection.

16.6.1.1 Desktop Assessment

A desktop assessment of cartographic and archival information was conducted in advance of the on-site assessment. This included examination of:

- Ordnance Survey mapping for the area since the First Edition six-inch series in 1839;
- Topographical files in the National Museum of Ireland; and
- RMP files (Record of Monuments and Places) in the Department of the Environment, Heritage and Local Government, with specific attention to the Inventory of Historic Shipwrecks.

The legislation, standards and guidelines that were considered and consulted for the purposes of this evaluation are outlined in Appendix O.

16.6.1.2 Archaeological Interpretation of Geophysical/ Geotechnical Data

Review and interpretation was undertaken of the marine geophysical and geotechnical data previously acquired for Sruwaddacon Bay.

16.6.1.3 Field Inspection

The following field surveys were conducted:

- The inter-tidal survey was undertaken in September 2007 and April 2010 under licences granted by the DoEHLG; and
- The underwater assessment and diver-truthing of the side-scan sonar anomalies was carried out in October 2007 under licences granted by the DoEHLG.

The survey included both the underwater and the inter-tidal survey areas. Detailed descriptions were made of topography, bottom composition, and a photographic record of the existing environment was made. Further details of the field surveys can be found in Appendix O.

16.6.1.4 Assessment Criteria

The assessment criteria used in the underwater archaeological assessment are those outlined in Section 16.2.2.1.

16.6.2 Existing Environment

16.6.2.1 Cartographic Information

The earliest detailed accurate map of Sruwaddacon Bay, which is appropriate to this assessment, is provided in the Ordnance Survey First Edition six-inch map series dated to 1839. The maps show the estuarine nature of the Bay with large tidal mudflats and sandbars. In contrast with present-day Bay topography, the river channels appear to be somewhat wider, and there was a second channel running along the southern shore of the Bay below a large mudflat expanse. Today that southern channel has almost disappeared and waters flowing from the Gleann na Muaidhe (Glenamoy) and Moing na Bó (Muingabo) rivers are directed northwards along the only main channel through the Bay at low water.

Since 1839, the Bay has changed, both in terms of the infilling of the southern channel, and the more extensive development of the ferry crossing point at the north end of the Bay. Little else has changed and the tongue-like sandbars remain similar to the way they were in the 1830s.

16.6.2.1.1 Shipwreck Sites

The Shipwreck Inventory in the DoEHLG's archive is a list of recorded instances of wrecking since 1750. This is not a record of where the wreckage lays, since the historic records generally only deal with the vessel before it sunk. More detailed information can be obtained from other sources, such as fishermen's records of snag points and diver records of sites located underwater. These are included in the Shipwreck Inventory wherever possible most entries lack this final level of data. Finally, while the Shipwreck Inventory provides a record of wrecking incidents since 1750, it does not claim to be a comprehensive record for earlier events, therefore the medieval and prehistoric periods are not represented in this archive.

Broadhaven Bay in general was also included when searching the Shipwreck Inventory for wrecks in Sruwaddacon Bay. The results suggest that recorded wreckings on this coastline are relatively few, however, this might have more to do with the under-populated landscape, as there would have been fewer people regularly observing shipping movements than on more densely populated stretches of coastline. If this was true for the more active coastline, the relative absence of settlements on Sruwaddacon Bay even up to 1839 might explain the lack of wreckings reported in the Bay.

16.6.2.2 Field Inspection

Geophysical Inspection

A series of geophysical anomalies were identified and those within the Bay were diver-truthed as part of the underwater/inter-tidal assessment and the foreshore and sandbank walk-over. None of the anomalies are deemed to retain archaeological significance.

Systematic visual inspection of the foreshore/inter-tidal and sub-tidal seabed areas surrounding the proposed pipeline route did not reveal any material or features of archaeological significance. While it is possible to conclude that the known archaeological potential of the area assessed is low, the possibility nevertheless remains that subsurface deposits retain archaeological material. The mobile nature of the estuarine silts and the palaeo-channel on the south side of the Bay in particular would be an ideal holding area for such material.

Geotechnical Investigation

The geotechnical logs and data report on a series of rotary and percussive boreholes taken within Sruwaddacon Bay identified a buried peat level in four locations (see Appendix O for summary data of borehole logs). The peat is located in a single thin band in each of the four boreholes but at various depths of between 5.8m and 10.7m below current seabed level. In one instance hazelnut shell fragments were identified. The hazelnut shells have been set aside for further analysis. No archaeological artefacts were identified in the samples recovered.

The most appropriate mitigation strategy will be to maintain a monitoring programme during tunnelling operations in this area, with special attention to the locations of the four boreholes.

16.6.3 Potential Impacts

The tunnelling operation requires the excavation of a starting pit at na hEachú (Aghoos) and a reception pit at Gleann an Ghad (Glengad). These works represent potentially significant impact on the existing environment, from an archaeological perspective. The main tunnelling work will be conducted at a minimum depth of 5.5m below surface and represent an imperceptible impact on the known archaeological environment.

In the unlikely event that an intervention pit in the Bay is required, this would represent a potentially significant impact on the existing environment, from an archaeological perspective. Surface intervention would require a shaft to be excavated from the seabed surface to the obstruction located at the TBM head. This intervention pit would require sheet piling prior to excavation of the seabed material. In addition, the use of an intervention pit may result in a secondary impact to the foreshore at na hEachú (Aghoos); with a shore access point required to mobilise and embark the excavation machinery. A temporary access point has been designated for this purpose. It is located across a section of foreshore, adjacent to the Aghoos tunnelling compound.

An open trench construction method will be used to construct the pipeline at a small inlet located at the south-eastern corner of Sruwaddacon Bay, called the Leenamore River inlet.

16.6.3.1 'Do Nothing' Scenario

In the event of a 'do nothing' scenario, foreshore/inter-tidal/underwater deposits, features, or structures of archaeological significance would remain intact and undisturbed by the proposed development.

16.6.3.2 'Worst Case' Scenario

In the event of a 'worst case' scenario, the proposed development would disturb previously unrecorded deposits, features, or structures of archaeological significance within the foreshore, inter-tidal, or underwater zone; resulting in the destruction of these deposits/features/structures without preservation by record taking place.

16.6.4 Mitigation Measures

16.6.4.1 Pre-construction Measures

No further underwater archaeological mitigation measures will be necessary in advance of construction works commencing.

16.6.4.2 Construction Phase Measures

It is recommended that archaeological monitoring licensed by the DoEHLG be conducted during all seabed and inter-tidal/foreshore disturbances associated with the construction of the proposed onshore pipeline.

An archaeologist experienced in maritime archaeology will be retained for the duration of the relevant works.

Monitoring of the tunnel arisings is recommended. A programme of monitoring is to be carried out for all tunnelling works. This programme will be reviewed once the works are underway.

In the event of archaeologically significant features or material being uncovered during the construction phase, any machine work should cease in the immediate area to allow the archaeologist to inspect any such material.

If the presence of archaeologically significant material is established, full archaeological recording of such material is recommended. If it is not possible for the construction works to avoid the material, full excavation is recommended.

16.7 RESIDUAL IMPACTS

There will be no residual impacts on archaeological, architectural or cultural heritage as it is anticipated that any issues associated with features and sites of archaeological, architectural or cultural significance will be resolved in the pre-construction or construction stage of the proposed pipeline development.