APPENDICES

Appendix 1

Statements of Significance

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

Property in Care (PIC) ID:	PIC076
Designations:	Listed Building (LB12310 Category A)
Taken into State care:	1999 (Leased)
Last reviewed:	2018

STATEMENT OF SIGNIFICANCE

IONA ABBEY

We continually revise our Statements of Significance, so they may vary in length, format and level of detail. While every effort is made to keep them up to date, they should not be considered a definitive or final assessment of our properties.

Any enquiries regarding this document should be sent to us at:
Historic Environment Scotland
Longmore House
Salisbury Place
Edinburgh
EH9 1SH
+44 (0) 131 668 8600
www.historicenvironment.scot

You can download this publication from our website at
www.historicenvironment.scot

HISTORIC ENVIRONMENT SCOTLAND
STATEMENT OF SIGNIFICANCE

IONA ABBEY

CONTENTS

1 Summary

1.1 Introduction

Iona Abbey is one of the oldest and most important religious centres in Western Europe. The abbey was a focal point for the spread of Christianity throughout Scotland, with a monastic community first founded here by St. Columba (Colum Cille) around 563, when Iona was part of the Kingdom of Dal Riata. The abbey is located on a small island in the Southern Hebrides, a short distance off the south-west tip of Mull.

The Property in Care (PIC) consists of the Benedictine Abbey, which was rebuilt in the 20th century from its medieval ruins, and the wider site around it, which contains the early Christian monastery associated with Columba. In addition, a very significant number of carved stones, principally High Crosses and West Highland Grave slabs, are collected within the site museum or remain outside in their original locations.

Contemporary with the Benedictine Abbey's foundation, an Augustinian Nunnery was founded on Iona. It is also in the care of HES and there are significant physical remains to be seen; it was not comprehensively rebuilt, as was the abbey, and so, while ruinous, gives a good idea of the original architecture of both early 13th century foundations. While it is of course an integral part of the islands medieval religious identity, the Nunnery is currently assessed in a separate Statement of Significance, along with St Ronan's Church and MacLean's Cross. These two Statements will be more fully integrated at a future date, but in the meantime they should be read together to obtain a fuller picture of HES-managed sites on Iona.

After the Reformation the abbey became increasingly ruinous and in time became an attraction for early tourists. Conservation of the site began in the late 19th century with the foundation of the Iona Cathedral Trust whose mission was to restore the abbey for worship. During the mid-20th century The Iona Community[1] (IC), an ecumenical group, spearheaded a major rebuilding project which saw the complete rebuilding and conversion of the cloisters for use as a residential ecumenical centre.

A large part of the island came into the ownership of the National Trust for Scotland in 1980. Their aim is to preserve of the peace and tranquillity of the island, enable access, and to work with the crofting and farming community to retain the traditional agricultural nature of the island.

[1] The Iona Community (IC) refers to the ecumenical group founded in Glasgow and Iona in 1938, as oppose to the local people of Iona.

The abbey, and the area of the earlier Columban monastery, came into the care of Historic Environment Scotland's predecessor body in 1999. HES has a lease of the abbey from the Iona Cathedral Trust and in turn lets the abbey to the IC. HES is responsible for upkeep, conservation, and visitor-facing matters. In 2013 the museum was upgraded and a major re-display undertaken; this was informed by the work of the Iona Research Group http://ionaresearchgroup.arts.gla.ac.uk/index.php/about/ who continue to make very significant contributions towards the understanding of the site.

1.2 Statement of significance

Iona and its abbey, inextricably linked to St Columba, are recognised by people around the world as a special, sacred place. It has a universally acknowledged spiritual presence, which together with the heritage of sanctity contribute to a numinous and sublime quality perceived by most visitors. This sets it apart from other properties in care. The following bullet points outline the most important aspects which contribute to Iona's cultural significance:

- Iona Abbey has had an important spiritual, cultural and political influence on Scotland (and sometimes further afield) for many centuries, from the time of Columba to the era of the Lords of the Isles.

- The legacy of St Columba can still be tangibly felt when visiting the site. The tiny shrine chapel (though extensively rebuilt) holds the greatest cultural significance of any of the buildings on Iona. It was created to contain Columba's relics which were the richest treasure of the monastery. It is probably the oldest church building in Scotland. Radiocarbon dating has confirmed that a structure atop Tòrr an Aba dates from Columba's time and thus is likely to be his writing hut.

- Iona contains the largest and most important collection of early sacred sculpture of any British monastery. This includes the spectacular high crosses such as St Martin's which has stood in its original position outside the monastery for 1250 years. The *Lapis Echodi* inscribed stone may be the oldest surviving memorial to a king in Britain. Eochaid Buide, king of Dal Riata died c 629.

- Iona was a major centre of literacy, the introduction of which revolutionised life in Scotland, especially in relation to governance. The Iona chronicles dating from 630-720 are amongst the oldest post-Roman chronicles in Europe and it is now widely accepted that the Book of Kells, the finest

Gospel book of the western European church, was produced on Iona around 800.

- Adomnán's *Life of Columba,* written on Iona c 690*,* is a prime evidential resource which provides unique insights into the reality of the monastery and the island during his own lifetime and places associated with Columba. Another Adomnán work, *De Locis Sanctis,* is an account of Christianity's sacred places, including Jerusalem. It provides a framework for understanding how the planning and development of Iona and its liturgical landscape was conceived as a reflection of the heavenly Jerusalem.

- The site exhibits the best preserved and most complex physical remains of an early monastery in Britain; it is therefore of immense research value. The vallum, the shrine chapel, Sràid nam Marbh, Torr an Aba and the high crosses represent extraordinary, in-situ evidence of the reality of the Columban monastery.

- The Benedictine Abbey is the largest and most elaborate ecclesiastical foundation in the West Highlands and Islands. Its design features express particularly the importance of pilgrimage in the planning of the site. Contemporary with the abbey, the Nunnery is one of only two Augustinian nunneries in Scotland and is one of the best-preserved medieval convents in Britain. Its presence evidences the importance of women's participation in religious life and especially pilgrimage. For further details see *HES Statement of Significance, Iona Nunnery, St Ronan's Church and MacLean's Cross.*

- Reilig Odhrain is of considerable importance as the burial place of the monastic communities, and of some kings. In later medieval times it was the popular burial place of the best men of the clans, their graves covered by more than 100 beautifully carved slabs. Today it retains significance as the last resting place of people of national and local importance such as the burial here of John Smith, leader of the Labour Party, in 1994.

- The patronage of the Gaelic-Norse lords and then the Lords of the Isles has led to the presence of a large and important collection of carved stones at the abbey, although it is difficult to know for certain which of the later graveslabs were produced here. The later medieval graveslabs can illuminate many aspects of life and society amongst the clergy and warrior elites of the West Highlands.

- Iona is also significant as a place of pilgrimage. Since the time of Columba's death people have come from afar and walked along Sràid nam Marbh, following in the footsteps of saints and hoping their prayers would be answered. Pilgrimage is a continuing tradition in the life of the island.

- The various phases of conservation and restoration at the abbey, particularly in the 19th and early 20th century, are testament to the continuing significance of Iona. In particular the circumstances around the creation of the Iona Cathedral Trust and the rebuilding work by Rev. George Macleod are of considerable social significance, particularly in regard to the development of so-called Celtic spirituality.

2 Assessment of values

2.1 Background

Iona Abbey is located on the north-east side of the small island of Iona in the Inner Hebrides, 1 mile west of Fionnphort on the south-west coast of Mull; the majority of visitors access the island by way of the Cal Mac ferry which plies across the Sound of Iona between Fionnphort and the landing at Iona village. The island is only 3 miles long and 1 mile east-west, with the highest hill (100m) at Dun I to the west of the abbey, and with Dun Bhuirg and its Iron Age hillfort overlooking the good natural harbours near Port Ban on the west side. Iona is a relatively modern name for the island, based on a misreading of its Latin name.

Iona may have had a reputation as a place of spiritual significance before Columba arrived there, and this may have been part of the attraction. The Greek historian Plutarch (c. 46–120) wrote of an expedition by the Roman fleet to the west coast of Scotland, during which they visited an island which was the retreat of holy men. This is likely to be the circumnavigation of Scotland which the Roman general Agricola ordered after the defeat of the Caledonian tribes at the battle of Mons Graupius in AD 84.

The abbey site can be characterised in four main phases:

<u>500s – 1100s The early Christian monastery</u>

Iona was powerfully associated with St Columba during his lifetime and posthumously as a saint with an international reputation. The key features comprise:

Vallum bank and ditch - the impressive upstanding remains of the west circuit of the early monastic enclosure, which has a long and multi-phase history going back at least 2000 years in places. At least two concentric enclosures existed which would have delineated different zones of sanctity within the monastery. Archaeological survey indicates the inner and outer vallum

developed during the 7th and 8th centuries. The full extent enclosed exceeds 20 hectares, one of the largest Christian sites in Scotland. It appears that at least part of the vallum pre-dates the Columban settlement: part of its west side has been radio carbon dated to 0AD indicating a pre-existing Iron Age site; other pre-historic and later enclosures/structures are indicated within the vallum.

Shrine Chapel – only the lowest courses of this tiny building survive from the original reliquary chapel probably constructed in the mid-700s and likely to be the earliest surviving fragment of a Scottish church. During the mid-1400s it was incorporated into the fabric of the cloister; the chapel was rebuilt to the present pattern in 1962. Its original function was probably to house the relics of St Columba, and as such was by far the most important structure at the abbey, harking back to the tomb of Christ in Jerusalem. Its west front contains a key surviving diagnostic feature, being projecting stone 'antae' located at both corners of the west façade. The building was exposed in 1874 during R Rowand Anderson's restoration programme, and found to contain a pair of above-ground stone cists. A new raised floor was built over these in the rebuilding of 1962.

Sràid nam Marbh*,* the 'Street of the Dead' processional way – only the south part of this is early medieval, the north part being a later medieval deviation bringing the road to the Benedictine bakehouse. It originally linked the landings close to the modern village, to the monastery, with many crosses marking its route. Only the 70m length through Reilig Odhrain towards St Martin's Cross is original, dating back to the 600s. It originally terminated at the forecourt in front of the early church and latterly the shrine chapel.

Tòrr an Aba – 'hill of the abbot' facing the likely west end of the early church, is traditionally associated with the elevated place where Columba had a writing hut and from where he could see what was going on in his monastery, as well as ships crossing the Sound. The hilltop was excavated in the 1960s, when evidence of a timber and wattle structure was found. Recent re-examination of excavated material and radio-carbon dating (540 – 650) has confirmed this structure dates to Columba's time and thus the traditional attribution of his writing hut to this location may well be correct.

Reilig Odhrain cemetery – the name alluding both to Odhran who was traditionally a cousin and contemporary of Columba, as well as the Reilig component which refers to a place of burial. This was the original burial ground for the early monastery which grew up outside the inner sanctum, separated from the abbey core by the inner vallum ditch. Most of the early cross marked stones and grave markers come from here, along with St Oran's cross which

probably stood beside the Street in the now-empty cross base still visible. The later chapel here was probably built on the site of an early Christian funerary chapel.

Several important traditions pertain to Reilig Odhrain. Dean Donald Munro writing in 1549 described seeing three tombs like small chapels in the Reilig Odhrain cemetery, possibly in a row north – S, each inscribed on the gable front - The Tombs of the Scottish Kings, The Tombs of the Irish Kings, and The Tombs of the Norwegian Kings. No trace of these survives, and indeed they were no longer visible when Pennant visited in 1772, by which time he could only see some indeterminate remains of a possible structure labelled 'the ridge of the kings', along with many West Highland slabs. It seems unlikely that Munro simply invented this description, although exactly what he saw remains a puzzle. There may have been a group of early Irish-style gabled tombs. Although some early medieval kings from home and abroad were buried here, along with numerous local kings (clan chiefs), the oft-repeated statement that many kings of Scots were buried here is considered to be a fiction, promoted by later medieval chroniclers and by the likes of William Shakespeare (Macbeth). It may be that the later Benedictines of Iona added the Latin inscriptions to a group of older tombs to 'sex-up' their offer. The popularity of Iona as a burial place for the great families declined following the forfeiture of the Macdonald Lords in 1493.

Pennant (1772) records the top of a box-like early Christian cross base (RCAHMS Argyll 4 no 99) as being in Reilig Odhrain just north-west of St Oran's chapel. This has an important folk tradition, attached to it, possibly lasting over 1000 years, for the practice of divination whereby visitors would turn 'noble globes of white marble' in a sunwise direction a prescribed number of rotations. This base was known as the *clach-bràth* in Gaelic, and was in situ until the 19th century. The socket in this base is 0.6m wide, which is wide enough to have supported St Oran's Cross.

High crosses and other features in the forecourt of the later church and in the site museum; and the substantial body of other crosses, cross slabs and grave markers in the site museum and in local Collections storage. Above all the early Christian period is represented by the (now rebuilt) shrine chapel at the west front – the single most important building, which from its creation around 750 became the central focus of the place. The well, the bullaun (prayer) stones, and the trough known as 'the cradle of the north wind' (losaid na gaoithe tuath), are all likely to have early Christian origins, specific to this location. The well is likely to pre-date the Columban monastery and may have been a predetermining feature in the choice of site of this monastery. It may have played a role in

baptism. The high crosses are key markers of the complex and sophisticated theological and liturgical activities at Iona.

1200 – 1600s – The Benedictine monastery

Somerled, in seeking to re-establish the power of Iona made an unsuccessful attempt to get the abbot of Derry, then Columba's successor, to take over the abbacy of Iona. Somerled's son Ranald, persisted in reinvigorating religious life on Iona with the foundation of a new Benedictine house, confirmed in a papal bull of 1203 placing the new monastery under the direct protection of the Pope. Derry and its allies took exception to this usurping of their spiritual power, and invaded the island in 1204 destroying construction work on the new church. But the Benedictines held their ground, building the new monastery in and around the high crosses, ancient vallum and historic buildings already imbued with centuries of sanctity. This probably involved little change of personnel, but rather the instructing of the existing brethren in the ways of the Benedictine rule.

The Benedictine monastery was endowed with lands and churches chiefly on Mull and neighbouring islands, but also stretching from North Uist in the North to Kintyre and Galloway in the South.

The first church that was built for the new order was narrower and about two-thirds the length of the later church, as revealed in the restoration works of P Macgregor Chalmers of the early 1900s. It had central transepts located to the west of the later transepts. The church went through two significant redesigns within the 13th century, and by 1250 the choir had been extended to accommodate an increased number of monks, and raised up over a timber-ceilinged crypt as a focus for the liturgy of the cult of St Columba. A greatly enlarged south transept was begun before the end of that century, although never finished, possibly intended to have been articulated with the crypt and occupying two storeys, similar to that planned for Glasgow Cathedral around the same time. The oldest surviving fabric is in the north side of the church. It was documented in the early 1400s that the buildings were in a poor state, and a major programme of repairs was led by Abbot Dominic (abb 1421-1465). The fine effigies of Dominic and of his successor Abbot John MacKinnon can be seen one each against the north and south walls of the choir. The entire south side was rebuilt in a wider form, the crypt done away with, and a large south choir aisle added. The Shrine Chapel was physically attached to the north-west corner of the west front at this time. The north transept contains a pair of shallow chapels set into the east wall, with a niche in between which contained an important almost life-sized statue, only the feet of which survive in situ. A modern imagining of this statue was commissioned for the niche by HES in 2015 and created by Tim Chalk.

The rebuilding of the abbey church in the mid-15th century shows strong Irish architectural influences, and one Irish master mason – Donald Ó Brolchán - signed his name on a crossing pier. All this was taking place in parallel with the flowering of the Iona and West Highland schools of monumental sculpture, and so there are many similarities between the two. There are numerous design features in the rebuilding which hark back to earlier period, including the round columns in the south choir arcade, but with much excellent quality work including that of the tracery. The influence of central and east Scotland, not only Irish architectural influence, can be seen in the use of spiralled tracery. The removal of the two level east end produced a lofty and impressive choir and presbytery space. The massive central tower, now with its caphouse restored, was also added at this time, one of the most impressive and visible features of the church.

A fascinating frieze of religious and genre scenes are carved into the richly decorated capitals of the south choir arcade. These include a Crucifixion and a Garden of Eden, warlike scenes with figures in dressed like the West Highland warriors, as well as scenes of everyday life, such as the cow-slaughter scene. The love of foliate decoration as well as cusped ogee arches, can be seen across the artistic output of Iona at this time, in the sedilia in the presbytery, in the canopied tomb in St Oran's, and also on the grave slabs.

The Benedictine cloister - the claustral ranges conform to a standard lay-out, excepting the fact that the cloister is located on the north rather than the usual preferred south side of the church. This may have been necessary due to the location of water courses required for the kitchen and latrine, absent to the south, plus the ground to the south may have been too boggy. It is also possible that there were important pre-existing buildings to the south which had to be avoided, now lost. These ranges survived pre-restoration reasonably well at least at ground floor level, documented in prints and early photos. The east range contained the chapter house with the monk's dormitory above. There was a night stair down into the north transept, while the latrines were located in a north extension of the dormitory, shared with the abbot's lodging to the north of the north range. The latter housed the refectory. As usual there was a covered walkway around all four sides, the pent roof supported on pairs of coupled octagonal columns.

There are two external buildings to the north-east of the monastery core, now known as the Michael Chapel and the Infirmary Museum. These are on a significantly different alignment, more true east-west, than the core which they may predate in their

origins. The remains of the monastic bakehouse are located west of the west range.

St Oran's Chapel – immediately to the south of the abbey is likely to be on the site of a much older mortuary chapel serving the early monastic community and their burial ground. With the rise of the MacSorley dynasty in the 12th century, and the creation of the first Lord of the Isles, John in 1336, the chapel was rebuilt as the dynastic sepulchre of the MacDonald Lords of the Isles and their chief followers.

The chapel is a plain building except for the late 12th century Irish influenced Romanesque west door with dressing of yellow Carsaig sandstone. Each of the 16 voussoirs of the second order of the stonework of the doorway possibly bears a human or animal head, now unrecognisable due to erosion. The interior features the most highly decorated tomb architecture on Iona, a pair of recessed wall tombs in the south wall. The surviving west tomb has an elaborate hood mould, the ornament similar to that on the MacKinnon cross shaft of 1489, now in the site museum. This grandiose tomb is likely to have been created for a Lord of the Isles, although it could have been appropriated by another family following the Macdonald forfeiture of the Lordship in 1493. The altar at the east end is modern but is built on a medieval footing, with the remains of a piscina east of the south window. It was roofless for 300 years until restored by Ian G Lindsay in 1957.

It is documented that a number of the Lords and family members were buried here. John, 1st Lord of the Isles was buried here in 1387, amid services over eight days and nights led by the abbot and the clergy. Key burials would have taken pride of place nearest the high altar, now represented by heavily worn grave slabs. One of these nearer the west door is of considerable importance, as it exhibits the rod of office of one of the lords. The West Highland slabs now displayed here upright against the walls have been gathered in from the burial ground.

<u>1600s – 1800s – Decline and abandonment</u>
During this period the Benedictine monastery was finally abandoned, entering a new life as a highly evocative ruin, a place of antiquarian curiosity and an inspiration for writers and artists. Greater interest was beginning to be taken in the West Highland grave slabs concentrated in Reilig Odhrain, and in 1858 the finest of these was gathered together in two rows and enclosed by iron railings. Any idea of their original disposition within the burial ground was lost at this time. In the late 1870s the Duke of Argyll was put under pressure to conserve fragile parts of the abbey buildings, the works led by the architect R Rowand Anderson.

Late 1900s to present – restoration and conservation

The degree of ruination of the abbey buildings is reasonably well documented in artists' images, and then photography, from the late 1700s onwards. The restoration work undertaken during the 19th and 20th centuries strongly evokes the feel of the medieval abbey and ancillary ranges and many original or early features have been incorporated into the new work.

The reconstructed external ranges – abbot's house, the so-called infirmary, and the Michael Chapel – give a good impression of the original scale of the Benedictine monastery, as not only being the church and cloister, and highlighting the fact to visitors that there were many satellite places of veneration on the island, not only the abbey.

In 1899 ownership of the abbey passed from the Duke of Argyll to the newly established Iona Cathedral Trust, which was committed to the restoration of the abbey for public worship. The various phases of conservation and restoration were aided by some leading Scottish conservation architects of the time, firstly Thomas Ross and John Honeyman, and then P MacGregor Chalmers. The partially restored church opened for worship in 1905, work on the nave was completed in 1910.

From the late 1930s, reconstruction of the cloister ranges was led by architect Ian Lindsay for the Reverend George MacLeod and the Iona Community. Reroofing and conservation of St Oran's chapel followed in 1957.

During the mid-20th century the abbey became an international centre of ecumenical faith, whilst also developing as a major tourism destination. In 1980 much of the island of Iona was given over to the care of the National Trust for Scotland. In 1999 Historic Environment Scotland's predecessor body, under a lease agreement, took over responsibility for conservation, maintenance and all visitor-facing operations at the abbey and in 2013 completed a major re-display of the very important carved stone collection.

2.1 Evidential values

Thanks to the survival of primary texts produced on Iona, along with an unparalleled survival of archaeological remains, carved stones and Gaelic place-names, the entire island is a rich resource for archaeologists and historians.

The HES sites on Iona offer a truly exceptional evidential resource in their combination of physical (both on and off-site), documentary

and intangible resources such as place-name evidence and oral tradition. Most importantly, this is true of the early Christian phases where the survival of primary texts and rare artefacts can be linked with archaeological results to enable a detailed picture of the philosophical, symbolic and design intentions which Columba and his successors had for the place, together with the actuality of the site they constructed and the more workaday aspects of everyday life on the island. This strand of significance is also linked to Iona's importance and influence as a leading religious site which, through its scriptorium, craft and sculpture workshops, was a hugely important cultural centre.

The medieval and post medieval operation of the abbey, and the later phases of restoration and re-presentation as a cultural heritage attraction are also evidenced from a wide variety of sources. Added to this, extensive research over two centuries of many aspects of the island's past enables a much better appraisal of its importance in wider contexts of Scotland, the British Isles and beyond. That said, there is potential for much more research over the whole site and its related artefacts and sources. For instance, the recent (2017) Glasgow University project which revisited excavations undertaken in 1956 - 1963 has applied modern techniques to recover very valuable evidence such as dating of timber from Torr an Aba to Columba's time.

Field evidence and surveys

The work of Sir Henry Dryden (1818−99) assisted by the architect William Galloway in recording the abbey in the 1870s has contributed a unique pre-restoration survey, containing much of archaeological importance. Another valuable early publication is John Drummond's 1881 record of the Sculptured Monuments.

In terms of excavation, archaeology has obscured much as well as contributing much. Sporadic, piecemeal campaigns of excavation took place though the 1950s into the 1970s, although these lacked a coherent research strategy, with no real synthesis of results. Between 1956 and 1963 Charles Thomas then of Edinburgh University excavated 98 small trenches, the most extensive investigations ever at the abbey, but the results were never published.

By contrast, Barber's 1979 excavations carried out in advance of the enlargement of the Reilig Odhrain cemetery, produced significant results regarding the nature of the early monastery. This included excavation of a terminal of the inner ditch of the vallum, its construction radiocarbon dated to around AD600, adjacent to the Sràid nam Marbh -Street of the Dead. A large 18m diameter roundhouse was found just inside the ditch (John Smith is now buried inside it), which may have been the communal *magna*

domus mentioned by Adomnán. A high number of important artefactual finds were recovered (see below).

Our understanding of the archaeology of the abbey has been significantly advanced by the recent (2016) study of the data from Thomas' excavations, carried out by Glasgow University. This has retrieved data on individual structures, as well as allowing a broad characterisation of the archaeological deposits across the site, which will inform future investigations. The study estimates 58% of the abbey site is undisturbed.

Recovered Artefacts
Evidence from recovered artefacts and ecofacts give a good impression of life on Iona and also demonstrate the craft skills and artistry which made the island a leading cultural centre. Some of the most important recovered collections include evidence of craft activity on a large scale including:

- Fine metalworking – bronze, silver, crucibles and moulds; debris widespread across the site in early deposits, many found in inner ditch terminal near Reilig Odhrain. Finished objects found include shrine fittings and personal ornaments. Recent re-evaluation by Glasgow University of investigations have brought new light to bear on a small cast bronze human head found by Thomas, which was probably made here in the 11th century as a component part of a large decorated reliquary. This allows us to understand that the Céli Dé brethren who occupied Iona immediately before the creation of the Benedictine house, were in the business of manufacturing major liturgical objects
- Glass working - studs with metal inlays, reticella rods for decoration of glassware, and beads; some architectural glass from early Christian buildings.
- Leather working – a purse and decorated shoes. Many well preserved from vallum ditch; shoes particularly valuable as the only closely dated group (c700) from early medieval Ireland and Scotland; they can be related to shoes illustrated in the book of Kells.
- Carpentry and Woodworking – turned bowls and architectural carpentry. The evidence for carpentry found in the vallum is the only such evidence to have survived from a monastic site at this period, some of which can be identified as elements of rectangular timber buildings. It is possible that some of the flat pieces of wood found here could represent shingles, such as those illustrated in the Temptation scene in the Book of Kells.
- Pottery – local and imported, African red slipware c 600, earthenware jar from west Gaul.

The archaeological and early documentary evidence together allows a picture of the economy of the early monastery to emerge – the entire island formed a precinct, with arable production centred on the Machair on the west side. A mill lade still exists which bisected the monastic enclosure to the north of the monastery. A number of millstones from horizontal water mills, used to process cereals, have been found, some re-used as the bases for high crosses. Although significant food production took place on Iona, the early monastery was not self-sufficient, and is likely to have received food rents from abbey lands on Mull and elsewhere. There is evidence of a mixed livestock economy on the island, predominant dairying (butter and cheese). Deer, cattle, pigs, sheep, seals and fish (inc deep sea) well represented on the menu.

2.3 Historical values

The historical value of Iona Abbey lies primarily in its strong connection to Columba and in its role as a key religious and cultural power centre in the British Isles. After the post-Reformation abandonment and gradual ruination of the Abbey, it retained a strong religious and emotional pull becoming a key “heritage” site for Scotland; reverence for its spiritual power growing stronger through the 19th and 20th centuries.

The quantity, quality and variety of evidence available (and the exceptional potential to learn more by further research) accounts for Iona’s exceptional ability to demonstrate these themes, coupled with the emotional strength of its ongoing spiritual role. The following paragraphs detail some of these themes, with more detail in a chronological appendix (forthcoming).

<u>Columba and the early foundation</u>

Columba is the first real historical figure in Scotland for whose life we have reliable documentation. He was a member of the kindred of the northern Ui-Neill and therefore of royal blood. He was a priest, poet, musician, scribe and scholar. Before arriving on Iona he had a successful career as a senior churchman in Ireland. He lived in a culture of the written word and there was a strong Gaelic political, cultural and linguistic commonality between Argyll and his home in the north of Ireland.

Columba was granted the island of Iona in 563 by his kinsman King Conall mac-Cognall of Dunadd, to establish what became one of the most important early medieval monasteries in western Europe. Christianity was only established in parts of Scotland at this time, unlike Ireland. His intention was to create the perfect monastic community. Iona would come to be the head of a monastic *familia* that spread across much of the mainland, with the abbot of Iona at its head.

Columba represented the pinnacle of Christian virtues – an example for others to imitate. He died aged around 75 on 9 June 597 in his church at Iona in the early hours of Whit Sunday, blessing the whole island. Buried in a simple grave, body wrapped in white linen, near his church on Iona. One of the most important surviving relics of St Columba is a Psalm book known as the Cathach, traditionally scribed by Columba himself. Depending on its provenance, this may be the earliest surviving Scottish or Irish book.

After Columba's death Iona became a place of pilgrimage with the relics as its focus. The core of the monastery grew around the grave of the founder. Iona became an internationally renowned centre of learning, where kings were sent for their education, including the Saxon King Aldfrith of Northumbria.

A major school and scriptorium existed at Iona, with access to an extensive library. Literacy was essential to monastic life and quickly became essential to secular government. The earliest census of households produced in Dal Riata was in the 700s, possibly with Iona monks seconded as clerks.

In 635, King Oswald of Northumbria, who had been exiled on Iona, gifted the tidal island of Lindisfarne, off the coast of north-east England, as the location for a monastery founded by Iona monk Aidan as a daughter house of Iona. This was a new dawn for Iona, with strengthened royal support in Dal Riata and in Northumbria.

<u>Iona under Adomnán</u>
Adomnán (c 627 - 704) was the ninth abbot of Iona, he was a kinsman of Columba, and like him a native of Donegal. He was influential in contemporary secular and ecclesiastical politics on both sides of the North Channel and wrote the Life of Columba, on which much of our information is based. Church dedications in Pictland in east Scotland and Hebrides show that Adomnán travelled widely for religious and diplomatic purposes; his other writings include Law of the Innocents (advocating protection of non-combatants in time of war); and *De Locis Sanctis* an account of the Holy Places in the life of Christ.

Adomnán describes the buildings of the monastery as including the church, huts of the monks, Columba's hut and his other hut for writing (Tòrr an Abba), scriptorium (and presumably library) guest houses, communal building (kitchen and refectory), some of these clustered around an open space. Outlying buildings included barns and sheds, and a smithy. He also describes that places associated with events in Columba's life were marked with crosses, including one with a millstone base. Coupled with the archaeological

evidence detailed above, Iona provides some of the best evidence anywhere for life in an early monastery in Britain.

Religion, Culture and politics

As introduced under Evidential values, the combination of surviving artefacts such as the magnificent sculptured Crosses and surviving contemporary manuscripts such as the Book of Kells, together with the recovered materials of many craft processes mean that Iona can tell a uniquely rich story of monastic life, industry and artistry. The Crosses and other artworks are discussed in the context of the physical and symbolic architecture of Iona in section 2.4. Less tangible aspects of the sites historical importance are its role in religious practice, politics and power brokering in early medieval Britain.

Iona's abbots wielded considerable political influence with important diplomatic roles. The monastery produced a major collection of Canon Law, used throughout Britain and Ireland as well as in France. Relics, of both Columba and Adomnán were taken on ritual journeys to consecrate churches or sanctify laws. In 753 relics of Columba were taken on circuit around Ireland during enactment of Law of Colum Cille (contents unknown) by Domnall, King of Tara. Relics taken to Ireland again in 757 and 778 for similar purpose. To allow this Columba's grave must have been opened and his remains placed within a reliquary chest possibly along with other associated relics. This gives an indicative date for the building of the first Shrine Chapel to house the exhumed relics.

In 807, in response to repeated Viking raids abbot Cellach and some Iona monks moved to found the new abbey at Kells, Co Meath in Ireland. A reduced community was left behind at Iona where Viking raids continued, perhaps prompting the burial of a hoard of 350 silver coins discovered in the vicinity of the later abbot's house. The primacy of the Columban federation was held by the abbot of Kells for next 350 years; it is not known when the Book of Kells left Iona.

In the 11th and 12th centuries a community of Céli Dé, ascetic Irish monks with a strongly eremitical tradition, was resident at the abbey. The chapel site of Cladh an Dìsert (burial ground of the hermitage) 400m north-east of the abbey may be associated with this phase of the monastery.

Pilgrimage

After Columba's death Iona became a prime Scottish site for pilgrimage. The assemblage of crosses, the layout and development of the site (see architectural values below) and the quantities of recovered artefacts contribute to Iona's particular

ability to demonstrate this theme. The ongoing and powerful tradition of pilgrimage underlines this aspect.

Later antiquarians and picturesque tourists

Into the 18th and 19th centuries the islanders made use of the ruins of the abbey as quarries and pasture, contributing to an air of neglect which eventually began to be reversed by a growing interest in antiquity and conservation though the 1800s. The islanders had a complex relationship with the site however, as they worshipped in the ruined church, until provided with their new parish church in 1828.

From 1874 to 1875, the 8th Duke of Argyll instructed the consolidation of the church, then in imminent danger of collapse. The project was led by architect R Rowand Anderson, and commissioned by the eminent historian and antiquary west F Skene acting on behalf of the Duke of Argyll. The ongoing story of the restoration of the Abbey and the presentation of its grounds demonstrates both antiquarian and religiously-motivated respect for the site and its history, see Contemporary values.

2.4 Architectural and artistic values

Architecture and site-planning

The architecture of Iona is important for its surviving medieval structures and their later rebuilding and restoration. Primarily though, the whole site is important for our understanding of the Early Christian conception of how the layout and design of the various elements of the site symbolised and represented spiritual and devotional themes and moments, set out in a deliberate and structured manner. Similarly, the carved crosses are understood on several levels as aids to devotion and prayer, conveying particular messages as well as highly sophisticated works of art.

The community's mission was to create nothing less than a new Jerusalem, as a precursor to the (as they believed) imminent Last Judgement, whereby they could prepare themselves for their new life in Heaven. The fact that the community saw themselves as a last bastion against the demons who threatened the world from the great unknown tracts of ocean to the west, made this even more pressing. Recent scholarship suggests that Adomnán's book *On the Holy Places* (690s) was no real attempt at a guidebook to the places associated with the Passion, but rather was a handbook through which they could create, inhabit and explore these places re-created in their own landscape. And this is the key to understanding the physical remains of the early Christian monastery. Understanding for example the Street of the Dead representing the Via Dolorosa in Jerusalem, Columba's shrine as

the Tomb of Christ, the church forecourt area as a Paradiso where you prepared yourself for the entry to heaven, and their church as the Temple/Heaven. This allows an imagining of processional activity with carefully structured movement through the ritual landscape, the chanting of psalms and prayers, and the devotional and exegetical role played by the complex iconographic programmes carved on the high crosses.

High Crosses and other carved stones

The most tangible surviving evidence of the rich cultural and political standing of Iona are its High Crosses. Apart from the challenge of winning and transporting the stone, these are some of the earliest and most ambitious carvings in Scotland. Added to this are the fine early medieval metalwork and illuminated manuscripts produced on Iona. Much of this was ground-breaking, experimental and innovative. Another important aspect of Iona's sculpture collection is the collection of West Highland grave slabs. These date from the 1300s to the 1500s.

The High Crosses, and specifically the ring-headed cross are particularly associated with Iona and with the practice of early Christianity. They are significant on many counts: for their role in technical innovation; for our growing understanding of their symbolic and functional roles within the liturgical landscape of the Abbey; for their individual "biographies"; and for their artistic achievement and iconographic content.

Technicalities of the design: The ring-headed cross has become the universally recognised symbol of the early church in Ireland and Pictland, and there is considerable debate concerning the origin of this, with Iona being a leading contender. St Oran's without a ring but with a unique component structure, is considered to be first of the Iona crosses, exhibiting an innovative and experimental design, with arms too heavy ultimately to be supported. A similar problem and collapse of St John's Cross was tackled early on by the addition of mortice and tenon jointed ring components, clearly borrowed from carpentry. This design was then developed into the familiar monolithic ring design, seen on St Martin's Cross and in the freestanding crosses of Ireland and Pictland. The replica of the St John Cross, cast in concrete in the 1970s is a considerable technical achievement in its own right.

Functional and symbolic understanding: The function of the high crosses was threefold: to commemorate individuals; to mark boundaries, or places and their associations; and as aids to prayer and ascetic meditation. Their placing within the symbolic and physical setting of the abbey was clearly important. By our current understanding, interplay with natural phenomena such as sunlight, and the casting of shadows onto other structures or locations, may

have been deliberately planned allowing the crosses to appear active and not static.

Recent research has demonstrated how the symbolism and multi-valent figurative sacred scenes on the high crosses were intended to be read with the movement of the sun, varying with the time of day and the liturgical seasons. The east facing sides of the crosses at Iona being seen by the monks as they left their church after morning worship. The west facing sides being observed during prayer and contemplation of the Passion and Life of Christ when facing east in the accepted direction of veneration.

Understanding the symbolic and physical placing of the Crosses within the evolving Iona landscape is something which deserves further research. However, it seems clear that important messages were conveyed by location and setting. For instance, with the high crosses the west face was the “front”, as Christians pray facing east in expectation of the risen Christ. The east and west faces cast various shadows when in sun, throughout the day. The monks would be aware of the gradual unfolding of the theological programme of each face, allowing them to respond to this through prayer and contemplation. Moreover, the shadow of St John’s Cross is almost burnt onto the west front of the shrine chapel late in the day, while on a summer’s evening the disc with the Virgin and Child at the centre of the St Martin’s cross head is brightly illuminated. In a more general sense, the shadow positions would have figured prominently in the daily lives of the monks, as a constant reminder of the canonical hours of worship.

Individual biographies: The sculpted stones in general and the high crosses in particular have a long and complex history. These histories began with the point of their original commissioning, design, creation and erection, but they have subsequent “lives” and “meanings” which developed and changed over a period of more than 1200 years. This is exemplified in the universal symbol of Iona, the St John’s Cross, the ring-headed cross, a concrete replica of which now stands in its original position facing Columba’s shrine chapel. The original cross was probably created around the mid 700s, and due to unfamiliarity of its carvers with the form the arms quickly collapsed, necessitating a redesign to incorporate the rings. This collapsed one or more times in antiquity, and only the shaft was standing when first recorded in 1699. It suffered a number of attempted reconstructions *in situ*, ending in collapse and damage to the original fragments. It was cast in concrete in 1990, and the original parts re-erected in an aesthetically pleasing reconstruction with modern glass components replacing missing parts, within the stone museum within the reconstructed Infirmary building. Impossible to move again, it forms the fixed point in the new (2013) museum, around which everything else was designed.

Within the body of early carved stones, there are pieces of what may be architectural stonework from a screen or altar rail in an early church, some pieces hitherto having been identified as posts for one or more box shrines (RCAHMS 104). There is also an ex-situ fragment of anta probably from the front of St Columba's shrine (RCAHMS 108). It is possible that more early architectural fragments await discovery and/or identification.

Artistic achievement: The artistry of the high crosses tends to be glossed over, with the focus instead being on interpretation of the symbols, patterns and biblical narrative scenes. Figurative scenes were carefully laid out with hierarchies and relationships, usually framed like pictures or icons. The carving is done in high relief, giving solidity and movement to the figures, and more so when freshly carved around 1250 years ago. Tremendous care was taken in the laying out and design of the non-figurative patterns which were executed with an extraordinary degree of symmetry and precision. The use of bosses and elaborate Celtic spiral work, also characterises the Iona school. It is believed that colour was extensively applied, presumably in a similar palette to that used in the Book of Kells, many surprisingly vivid colours being derived from local plants. The impact of these in colour would have been astonishing.

In general terms the narrative scenes on the more heavily illustrated St Martin's Cross were intended to provide Old Testaments parallels prefiguring the Life and Passion of Christ. The extensive use of 'snake-and-boss' decorative and symbolic patterning on the three surviving early high crosses – St Oran's, St John's, and St Martin's – may be symbolic of healing, rebirth and Resurrection, and is one example of multivalency in the symbolic schemes, whereby in Christianity the serpent is often associated with the Devil and clearly in this case the opposite is true. The Maria Angelorum, Virgin and Child scene which features prominently on St Oran's and St Martin's Cross, is a precocious example of Marian devotion in the western church, and is closely paralleled with the same scene in the Book of Kells. The latter might suggest the original colour scheme applied to this scene on the crosses.

In creating the decoration and scenes on the crosses the carvers were borrowing from Irish, Pictish and Anglo-Saxon art, as well as creating and contributing something entirely new and revolutionary to the art of the period in the Insular world.

Significance of the production and artistry of the West Highland grave slabs – for the MacDonalds and their supporters Finlaggan was the centre of lordly authority, while Iona was their

spiritual centre. As the most important place of burial, Iona Abbey still has the largest collection of West Highland Sculpture (WHS), dating from the twelfth to the sixteenth century. This consists of grave-slabs, effigies and commemorative crosses. About 100 slabs survive complete or in fragments. Most were created as grave covers laid flat in the main cemeteries of Reilig Odhrain and the Nunnery. Some covered above-ground stone coffins/sarcophagi, positioned in the open air or else inside churches. Not all were carved here, but some certainly were, as part of an ongoing tradition of specialist stone carving.

Some works can be identified as typologically early, perhaps dating from the 1200s into the 1300s. These include: slabs carved with crosses with 4-circle heads and long shafts; other grave slabs with long shafted crosses (eg 116 and 117); slabs with plant-scrolls the full width of the slab (inc 165, 166, 167 and 185); slabs with narrow panels of plant-scrolls and 13th century looking swords, plus an abbot effigy (200) which could be from the 1200s. Later slabs, especially of the 1400s into the 1500s, may be represented by those featuring ships and swords, without crosses. Some are not simply of one phase, occasionally inscriptions and/or new decoration added (eg 123 and 130) – at time of reuse, or other generations added to grave.

A small number of slabs were identified as the memorials to great ancestral heroes, specifically Ranald (191) and Angus Og d1318 (Aonghas Óg MacDomhnaill 150), and these may have been attributed, adapted or newly created, some time after the event. Although some are undoubtedly memorials to ‘the best me of all the Iles’ – chiefs of the MacDonalds, MacLeods, MacLeans, Macallisters, and MacKinnons - some may be memorials to rich mercenaries, maybe landless and unmarried younger sons, who had the cash to invest in this form of immortality. To be buried close together here reinforced their bonds of loyalty and kinship – in life and in death. There are only 5 surviving warrior effigies, one MacKinnon, and the rest MacLeans of Mull. These were the most expensive so belong to the upper echelons. Earlier military effigies depict warriors holding upright spears, presumably shortened to fit neatly on the slabs. About half of the slabs feature a sword, which seems to have replaced the earlier long-shafted crosses which had foliate decoration and interlace – continuing a much older decorative tradition.

In 1859 the 8th Duke of Argyll arranged for many of the best stones to be enclosed in two sets of protective railings, known as the ‘ridge of the kings’ and ‘the ridge of the chiefs’.

The restoration of the church should be seen in the context of an early 20th century aesthetic, with bare stone walls and relatively

little ornamentation, and this is of course contrary to the aesthetic of the medieval church in its Benedictine heyday, the decoration and detailing of which was intended to assault the senses as a reflection of the glory of God. There are some thoughtful details in the restoration works in the church of MacGregor Chalmers, for example where he found medieval burials under the floor of the nave, these are marked with simple crosses and groups of white quartz pebbles the only objects found with the deceased.

Numerous individuals and groups are commemorated in the church, in recognition of donations to fund various components of the work, for example the Highlanders of Nova Scotia who paid for the large south window of the nave. The modern timber work in the church is of high quality, such as the screen of 1956 and the adjacent minister's seat in the cross at the north transept. The modern stained glass in the church is of high quality, for example the Columba window in the north transept designed by William Wilson in 1965.

A few of the original paired shafts from the cloister arcade have been reconstructed on the west side, a process begun during the Ministry of Works conservation programme in 1921. New columns for the arcade openings were carved from 1959 on, decorated with flowers, birds, and plants. The grassy cloister garth is now dominated by a large bronze sculpture by Jacob Lipchitz entitled 'The Descent of the Spirit' installed in 1959.

Alexander and Euphemia Ritchie re-invented Celtic inspired silversmith and craft work, often based on designs inspired by Iona sculpture and the Book of Kells. Alexander was appointed the official custodian of the abbey in 1900. Their designs are highly sought after, and this silversmithing tradition is alive on Iona today.

The permanent exhibition *Iona Through Time* featuring the redisplay of the early and later medieval carved stone collections, completed in 2013, allows the artistry and sophisticated thinking behind these objects to be appreciated for the first time in centuries. This is located in the Infirmary, where the collection has been displayed since the 1960s, and which had the reconstructed St John's Cross from 1990 still at its core. Indeed this cross literally acted as a fixed point around which the new exhibition was designed. Clever use of space, coupled with jewel-like lighting, allows visitors to engage with and gain an appreciation of the creation and purpose of this sculpture. The stars are the early medieval high crosses, with St Oran's and St Matthew's crosses re-erected with high quality mounting technology, standing alongside St John's in an echo of how these originally stood outside the Columban monastery. Almost of equal importance are the selection of later medieval West Highland graveslabs and

crosses, featuring the effigies of Maclean and Mackinnon chiefs in full armour.

Because of its natural beauty and its importance as a religious and historical site, Iona attracted many famous visitors as a key stop on the highland itinerary of early tourists; e.g. Boswell and Johnson; Waler Scott, Worsdworth, Keats and Mendelsson. Queen Victoria arrived on Iona on 19th August 1847 aboard the Royal Yacht. Prince Albert landed while the Queen sketched the abbey from the boat.

2.5 Landscape and aesthetic values

In venturing to Iona, almost all visitors have made an arduous journey, and few are disappointed in what they find. Intuitive, imaginative values, the numinous quality of the landscape.

The sublime is further defined as having the quality of such greatness, magnitude or intensity, whether physical, metaphysical, moral, aesthetic or spiritual, that our ability to perceive or comprehend it is temporarily overwhelmed. This is a common experience when viewing the abbey within its wider landscape setting.

The view east across the Sound from the front of the abbey is of great significance. This was where the monks expected to see the risen Christ appear on the last day. The view is spectacular, and entirely natural and unchanged since Columban times, with progressive bands of green field, shoreline, water, the blood red Mull granite, with a band of higher dark hills behind, then the sky.

Although largely rebuilt and restored, the abbey sits comfortably within the landscape backed by a strip and water then a strip of land on Mull, accurate reconstruction in terms of massing and simplicity of form, use of the same grey and pink stones throughout have created a pleasing uniformity.

The abbey and misinterpreted perceptions of Columba’s faith provided the focus for the Celtic Christian Revival which took place between 1870 and 1900, which featured romantic evocations of Iona and its spiritual power. This movement coupled with the nascent conservation movement provides the context and indeed the necessary precursor to the restoration of the abbey. This created a new myth of Columba as romantic Gael, mystical rebel and national cultural icon, which persists to this day. This was to deny the historical reality of the Roman orthodoxy of the early church. This was place concurrent with a more general idealisation of the Highlands and islands and their inhabitants.

Visitors approach the site from the village passing the evocative ruins of the Nunnery, then the medieval parish church of St Ronan's, before arriving at MacLeans's Cross[2], passing the attractive gardens of the hotels, all the while drawn irrevocably to St Oran's with the mass of the abbey behind. This creates a strong impression of a pilgrimage journey, consciously or otherwise, following a prescribed ancient route with numerous satellites along the way. In so doing they are replicating and participating in centuries old ritual action. St Oran's stands within the ancient burial ground, conveying a powerful sense of antiquity. It sits low and natural within the burial ground; some visitors are automatically drawn inside, before reaching the ultimate goal of the abbey church, and usually respond with awe and reverence appropriate to the gloom of this sacred space.

Reilig Odhrain continued to be popular for burial in post-Reformation times, with a weight of Gaelic tradition for the deceased being transported to Iona for burial, landing at Martyr's Bay, before being carried along Sràid nam Marbh to their final rest. The old cemetery contains many important and poignant memorials, for example mass graves of shipwrecks, monuments to unknown sailors washed up during WWI, the attractive memorial to Alexander and Euphemia Ritchie the Celtic silversmiths, as well as memorials to some of the four young men of the island drowned in the Sound at Christmas 1998. Burials occasionally still take place here, as well as in the modern cemetery extension where Labour leader John Smith was buried in 1994. His grave is a place of pilgrimage, often with stones and flowers laid on top.

From the later 1700s the abbey became a popular subject for topographic artists making prints of scenes of the windswept ruins, inspired by visits by writers such as Walter Scott. Many of these contain valuable evidence of the contemporary appearance of the site and its surroundings. These featured in themed books, such as Daniell's *Voyage around Great Britain* vol 3 produced in 1818, helping drive a growing interest in the picturesque qualities of the Highlands and Islands. Also became the inspiration for painters, including the notable David Roberts who painted the ruined chapterhouse in 1829. Highest quality of antiquarian recording by Billings for the *Baronial and Ecclesiastical Antiquities* 1845-52. The culmination of early antiquarian interest came with Drummond's exceptional recording of the carved stones in *Sculpted Monuments of Iona* 1881. Queen Victoria rendered a sketch of the abbey from here boat in 1847, around which time steamers had started to make day trips to Iona from Oban.

[2] The Nunnery, St Ronan's Chapel and MacLean's Cross are all in the care of HES, for more details see *HES Statement of Significance: Iona Nunnery, St Ronan's Church and Maclean's Cross*

Iona has provided tremendous inspiration for artists, acting as a muse to creativity. The abbey was the subject of numerous prints and watercolours from the 1700s on, with draughtsmen accompanying the antiquarian visitors. Numerous artists have sketched and painted the abbey including Scottish seascape artist William McTaggart, with Scottish Colourists F.C.B. Cadell (1883-1937) making almost annual painting visits starting in 1912, along with S.J. Peploe (1871-1935) and others. Iona continues to inspire leading contemporary artists such as Sean Scully.

2.6 Natural heritage values

The abbey sits on a mid-level raised beach, in an area of mixed maritime grassland/wet maritime grassland, and semi-improved calcareous grassland. A boundary line in the underlying geology runs approximately N-S through the site, with sandstone underlying to the east and gneiss to the west of this line. The hard-packed ground on this boundary line was purposely selected as the solid and reasonably well-drained base for Sràid nam Marbh, as revealed in the 1979 excavations of the inner vallum area.

A number of the plants found here may have had historical uses. Many have well documented medicinal uses and are not naturally found here, suggesting deliberate introduction or else seed dispersal due to introduced livestock or feed.

2.7 Contemporary/use values

Social and community Values

There are two permanent communities on Iona, the island community of about 120 permanent residents, together with the Iona Community (IC) resident in the abbey and at the Macleod Centre nearby, who maintain a small staff all year round, welcoming 100 guests every week from Easter – October. The IC is a world-wide dispersed ecumenical Christian organisation which was founded in 1938 by George MacLeod, then a Church of Scotland parish minister in Glasgow. While the IC is responsible for leading worship in the abbey church and in the Michael Chapel, HES has responsibility for visitor-facing functions, maintenance, and conservation of the buildings.

The island's residents have free access to the HES-managed site, and the abbey is regularly used for concerts and performances.

Gaelic was the principal language spoken on Iona until the end of the 19th century. The HES re-presentation of the abbey features significant Gaelic language content, and with Gaelic training being offered to staff. Gaelic choirs regularly perform in the abbey church.

Spiritual values:
For many, Iona is not just another stop in the tourist agenda, but is a very special destination with a strongly spiritual element. It has a justifiably high profile as a world class spiritual place. Many visitors, not only Christian, feel a pull to Iona, and are rarely disappointed. Rev George MacLeod described Iona as a *thin place - only a tissue paper separating the material from the spiritual*, echoing sentiments expressed 1250 years before by Adomnán in his *Life of Columba*.

The IC provide a continuity of religious community and worship at the abbey, as inheritors of the 1000 year span of medieval religious community. This adds a unique and vital dimension to the life of the abbey, which is appreciated by many visitors and contributes greatly to the special sense of place.

The IC lead services in the abbey church, twice daily from March to October. And this is the venue for a weekly ecumenical Sunday service shared by Bishops House (Episcopal) and the RC House of Prayer establishments on the island.

Reilig Odhrain, the ancient but also modern burial ground, contains many more recent burials of islanders and notable individuals from the 19th century until the present day.

Use Values
Economic: The island is considered to be thriving, with the economy (excepting crofting) being largely driven by tourism, for which the abbey and the natural beauty of the island are principal draws. Visitor numbers to the island are estimated at around 130,000. Around 64,000 visitors are counted to the abbey annually, though more may visit outwith official opening times.
There have been recent national initiatives to promote long-distance pilgrimage, walking and cycling routes including St Columba's Way, from Iona to St Andrews.

Access & Education:
The abbey plays a role in the formal educational life of the small primary school on Iona, as the focus for history projects and outdoor learning. School concerts and church services take place at the abbey. HES has online resources related to the abbey available to visiting school groups, who come from Mull and further afield.

3 Major gaps in understanding

- As well as working on the publication of the results of the Charles Thomas excavations, staff in Glasgow University

Archaeology Department are also working towards the production of a new interdisciplinary Research Framework for Iona. They have created the Iona Research Group, and have instigated a field project, aimed at re-excavation of some of Thomas' trenches where possible important features were revealed.

- Was there a prehistoric settlement on the abbey site, related to part of the west vallum bank, and the south-east enclosure identified by remote sensing?
- Were there multiple early churches and chapels here?
- What was the original extent of the early monastic burial ground of Reilig Odhrain?
- What were the 'Tombs of the Kings' in Reilig Odhrain, and could they have any relationship to the shrine posts found here?
- Do parts of Columba/Iona metalwork reliquaries survive in museum collections at home and abroad?
- Can more data be recovered from other unpublished excavations eg Cruden's work especially around the shrine chapel c. 1950?
- What was the impact on the buildings of the early monastery as a result of the repeated Viking raids?
- What was the relationship between the creation of the Iona high crosses and the Anglo Saxon examples at Bewcastle and Ruthwell?
- The assemblage of skeletal remains needs to be assessed for potential for study.
- What was the appearance of the monastery immediately before the shift to the Benedictine rule?
- To what extent was it a popular place of pilgrimage in the Benedictine period?
- What were Iona's relations with other religious houses in Argyll?
- How many of the West Highland graveslabs were carved on Iona?

4 Associated properties

St Ronan's church Iona, Iona Nunnery, Kildalton Cross, Maclean's Cross, Columba Centre collections store Fionnphort, Saddell Abbey, Oronsay Priory, Ardchattan Abbey (the 4 other religious houses in Argyll all supported by the clan chiefs like Iona Abbey), Finlaggan; Clonmacnois, Co Offaly, Ireland; Glendalough Co Wicklow; Bewcastle and Ruthwell crosses; Nigg cross slab.

5 Keywords

Columba, Adomnán, monastery, vallum, Insular, Book of Kells, shrine chapel, pilgrimage, high crosses, Benedictine, clan MacDonald, Iona Community.

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Appendix 1 – Timeline

- Mesolithic hunter-gatherers - Iona settled in early prehistoric times, flint tools and debris are routinely found in excavations, some dating back more than 5000 yrs.
- c 1000 BC - burial under cairn at Blàr Buidhe, just south-west of St Columba Hotel, the oldest upstanding remains on the island.
- c 100 BC – hill fort constructed by Iron Age community at Dùn Bhuirg, near the island's west coast.
- 40 BC – AD 220 – radiocarbon date from beneath west vallum bank at Cnoc nan Carnan, shows that at least part of the vallum enclosure is prehistoric in origin.
- c AD 500 – ruling dynasties of the Dal Riata Co Antrim and Argyll kindreds, closely related across the North Channel, Gaelic society developing in parallel.
- 521 – birth of Columba (Latin for dove) Gartan, Co Donegal, member of the kindred of the northern Ui-Neill and therefore of royal blood.
- 563 - Columba arrived in Dal Riata (Argyll) with 12 companions from Ireland, having already had 20 year career as controversial churchman in Ireland.
- Mid to later 6th cent – confederation of dependent monasteries founded nearby and eventually further afield.
- 574 – Columba is said to have participated in enkingment of Áedán mac Gabráin as king of Dalriada, probably at Dunaad, one of the earliest such ceremonies in Europe. The historicity of this event is debated.
- 585-89 – Columba founds and stays at monastery at Durrow, Ireland.
- 9 June 597 - St Columba dies aged 75 in his church at Iona.
- 600s - Iona became a place of pilgrimage with the relics of St Columba as its focus.
- 635 – King Oswald of Northumbria gifts the tidal island of Lindisfarne as the location for a monastery founded by Iona monk Aidan as a daughter house of Iona.
- 635-51 – Aidan rules Northumbrian church from Lindisfarne.
- 679–704 – Adomnán (b. c 627/8) rules as 9th abbot of Iona.
- c692 - Adomnán completes the life of St Columba.

- 700s - Iona became a leading centre of Insular Art, the most tangible surviving evidence of the rich cultural and political standing of Iona are its High Crosses created by a school of carvers on Iona.
- 715 -17 – removal of Iona control of Iona-founded monasteries from Pictish eastern heartland by King Nechtan.
- By c740 - under Abbot Cú Chuimne the monastery produced a large, influential and widely-used collection of canon law ***Collectio canonum Hibernensis***
- 731 – Bede writes in his *History* inferring that C's body still buried
- 736 – Brutal assault on Argyll by Pictish king Óengus son of Fergus (d761) of Fortrui. Devastation of Dunaad.
- 741 – 'Good the day when Óengus took Alba..' a turning point in Scottish history. Óengus returned to Argyll in force. Crushes the Dal Riata and establishes direct rule of the territory, including Iona, under Pictish yoke.
- c750 – Columba's grave opened to provide access to relics. First shrine chapel built
- 753 – relics taken on circuit around Ireland during enactment of Law of Colum Cille (contents unknown) by Domnall, King of Tara. Relics taken to Ireland again in 757 and 778.
- c795 – Book of Kells completed in Iona scriptorium. First Viking raid.
- 802 – Viking raid, Iona burnt.
- 806 – Viking raid, 68 of the community killed.
- 807 – abbot Cellach and some Iona monks move to found the new abbey at Kells, Co Meath in Ireland, which remained the political head of the Columban monastic federation for next 350 years.
- 814/5 – Dunkeld founded taking power from Iona as centre of the Church. Some of Columba's relics moved there.
- 825 – Viking raid, murder of abbot Blathmac.
- 847 – Dal Riata dynasty takes political control of Pictland under king Cináed mac Alpín (Kenneth MacAlpin). Creating single kingdom of Alba, king of Scots and Picts, built a new church at Dunkeld honouring the relics.
- 878 – further and final division of relics between Kells and Dunkeld, with a shrine going to Ireland. Shift of patronage also to Irish kings, eventually resulting in decline of Iona's importance from which it did not recover until the Benedictine re-founding.
- 986 Christmas night – Viking raid, Danes from Dublin, abbot and 15 monks killed, at White Strand of the monks (Tra' Bàn nam Manach) at north end.
- By 10th cent – Norse living in Scotland & Ireland converting to Christianity
- 10th and 11th centuries - Columban abbots continued to be appointed until the end of the 12th century, although few details are known about the form and development of the community at this time.
- 1098 - Magnus Barelegs, King of Norway, visited Iona while establishing his royal authority over the Western Isles, causes the door

of the shrine chapel to be sealed up allegedly due to dread of the power contained therein.

- 1164 – Somerled, king of the Isles invites an Irish reforming abbot to Iona, but dies the same year at battle of Renfrew. He is buried on Iona and establishes the abbey as the spiritual home of his mighty MacDonald dynasty.
- c1200 – Benedictine Abbey and Augustinian nunnery founded by Ranald, king of the Isles, son of Somerled. Established with extensive lands chiefly in Mull, Colonsay, Canna, and Coll, from which rents usually paid to the monks in kind – oatmeal, cheese and salt beef.
- 1204 - building site attacked and badly damaged by two NI Bishops along with abbots of Derry and Armagh, seeking to retain primacy over Columban *familia.* Newly strained relations between Iona and the Columban church in Ireland. The Columban familia in Ireland and their political allies, the Cenél nEógain, strongly resented that Iona Abbey became Benedictine. The Columban familia in Ireland would not accept the loss of its connections with and influence over Columba's own foundation.
- c1247 – abbot of Iona acknowledged Bishop of Dunkeld as his superior, before ecclesiastical authority formally transferred from Diocese of the Isles.
- 1266 – Treaty of Perth cedes the Western Isles, including Iona, to the realm of the Scottish king, Alexander III. Although under the control of the church in Trondheim until later 15th cent (diocese of Sodor, Norway). Scottish kings were able to influence the appointment of abbots and a special relationship developed with the bishops of Dunkeld.
- c1420 – Donald, Lord of the Isles donated gold and silver to make a new reliquary for the hand of St Columba, presumed to be the principle relic owned by the abbey by this time.
- 1430s -70s – rebuilding takes a number of decades. South side of the church widened along its length, and removal of the rotting floor above the crypt thus gaining impressive height for the east end. New aisle built on south side of choir with an arcade of 3 pointed arches, capitals decorated, and one inscribed with the name of the Irish master mason c 1460. Effigies of Abbot Dominic (d. c 1465) and Abbot John MacKinnon in choir. South choir aisle capitals, angels weighing souls with devil depressing one side of scales.
- 1493 - the end of the Lordship of the Isles came when John Macdonald II forfeited his estates and titles to James IV of Scotland, and thus the end of the Macdonald patronage of the abbey.
- 1499 – became seat of the bishopric of the Isles.
- 16th century - Bishop John Campbell appointed Commendator in 1499 when the abbacy and the bishopric of the isles were brought together by Papal decree. Monastic life continued albeit in a reduced form. The Reformation of 1560 had limited impact; two of the recent bishop-Commendators had been Protestant sympathisers, and by this time the number of monks was small. Some of them were allowed to carry on

living in the secularised abbey buildings. The monastery was much reduced by this time and so the Reformation probably had little impact.

- 1587 – island, monastery and its estates bestowed on Hector Maclean of Duart (held from the Marquis of Argyll).
- 1609 - At a court held on Iona, Highland chiefs put their signature to the nine 'Statutes of Iona', for James VI/I requiring, amongst other measures, that Highland chiefs send their heirs to Lowland Scotland to be taught in English-speaking Protestant schools. The statutes are often considered to be the first in a series of government measures aimed at the break-up of traditional Gaelic culture and tradition.
- 1635 - repairs carried out to the church, under a scheme supported by Charles I, when it was made Cathedral of the Isles for a few years.
- 1690s – Iona and old abbey and nunnery lands in the Hebrides and west coast passed to Campbell Earl of Argyll. Visited by author Martin Martin.
- 1773 – visited by Boswell and Johnson
- 1810 – visited by Walter Scott
- 1829 – On August 7, visited by composer Felix Mendelssohn, whose trip to Staffa and Fingal's Cave helped inspire Hebrides Overture.
- 1833 – visited by Wordsworth, composed four sonnets.
- 1854 – Society of Antiquaries of Scotland urge 8th Duke of Argyll to take steps to preserve the abbey, nunnery and Reilig Odhrain, due to damage caused by digging up the graveslabs, and the poor state of preservation.
- 1858 – 8th Duke has finest slabs in Reilig Odhrain placed in railed enclosures, 'Ridge of the Kings' and 'Ridge of the Chiefs'.
- 1860s – opening of the two hotels
- 1874 – Sir Henry Dryden carrying out measured surveys at the abbey.
- 1874-76 consolidation of ruins by R Rowand Anderson
- 1899 – 8th Duke of Argyll, under pressure to preserve the church, gifts abbey ruins to newly formed Iona Cathedral Trust, so 'that the Cathedral shall be re-roofed and restored'.
- 1902-05 church restoration for Iona Cathedral Trustees by T Ross and J Honeyman – choir, transepts and crossing.
- 1908-10 nave restoration by P MacGregor Chalmers, funded by Woman's Guilds in the Church of Scotland, mobilised by Helen Campbell of Blythswood.
- 1921-26 – repairs by HM Office of Works on behalf of Iona Cathedral Trust, chiefly in the cloister and in St Oran's chapel, where the masonry was consolidated and the floor relaid.
- 1938 - George MacLeod, then a parish minister in Govan, Glasgow, recognised the widening gap between the Church and the real lives of his parishioners. MacLeod founded the Iona Community and using designs by Ian G Lindsay rebuilt the cloister and constructed a new west range. Not without controversy in the wider Church of Scotland and on the island, where the parish minister and the local population had no involvement in the project. Puts unemployed men from Govan

together with trainee ministers to work on rebuilding the abbey, although soon broadened to include others.

- 1938-65 – restoration of the monastic buildings for the Iona Community by I G Lindsay. Despite shortages, some voluntary work carried on through WWII.
- 1952 –the Queen visits Iona with the Duke of Edinburgh, just six months after ascending to the throne.
- 1962 – shrine chapel rebuilt
- 1979 – after three centuries of ownership, island sold by the Argyll Estates for death duties. Bought for the nation by the Hugh Fraser Foundation and placed in the care of NTS. Ownership of the abbey retained by Iona Cathedral Trust.
- 1982 – publication of RCAHMS Argyll 4 Iona volume.
- May 1994 - Labour Party leader John Smith was buried in the modern extension to the burial ground of Reilig Odhrain.
- 1999 - Iona Abbey into care of HS, with repair and conservation of the church and claustral ranges still housing the Iona Community.
- 2013 – major HS redisplay project and opening of refurbished site museum.

Property in Care (PIC) ID:	PIC077 & PIC091
Designations:	Scheduled Monument (SM90350) & (SM90173)
Taken into State care:	1999 (Leased) & 1956 (Guardianship)
Last reviewed:	2005

HISTORIC ENVIRONMENT SCOTLAND

STATEMENT OF SIGNIFICANCE

IONA NUNNERY & MACLEAN'S CROSS, IONA

We continually revise our Statements of Significance, so they may vary in length, format and level of detail. While every effort is made to keep them up to date, they should not be considered a definitive or final assessment of our properties.

IONA NUNNERY AND MACLEAN'S CROSS

BRIEF DESCRIPTION

Iona Nunnery comprises the ruins of an early 13th century Augustinian nunnery dedicated to St Mary the Virgin, one of only two Augustinian nunneries in Scotland and one of the best-preserved examples of a medieval convent in Britain. Founded c.1203 probably by Ranald, Lord of the Isles, the nunnery is contemporary with the adjacent abbey[1], and stands on the north edge of Baile Mòr, overlooking St Ronan's Bay.

The complex follows a conventional quadrangular plan with a church and to the south. Only part of the church and south range stand to any height.

To the east of the nunnery stands St Ronan's Chapel, a 12-th or 13-th century building that served as the island's parish church until the 17th century. Like the nunnery, the church is built of pink granite and dark grey rubble. The building has a modern roof and is used to store an extensive collection of sculptured stones, including part of the Iona collection of medieval effigies and graveslabs carved in the West Highland tradition.

MacLean's Cross stands on a rubble base in or near its original position on the west side of the road between the abbey and the nunnery. The tall decorated shaft and cross, formed from a single thin slab of chlorite schist, topped with a disc head with reduced lateral arms. It is a product of the Iona School of carvers and probably dates to 15th century.

CHARACTER OF THE MONUMENT

Historical Overview

- Burials from Cladh Ronain may date to the first Christian occupation of Iona between 6th and 8th century.
- First church built on the site of St Ronan's Church c.8th century.
- 12th century: the medieval chapel of St Ronans is built directly over the footprint of the earlier church.
- 1203: Somerled's son Ranald (Raghnall) establishes a house of Augustinian canonesses at Cladh Ronain, and makes his sister Beathag the first prioress.
- In the 15th century, alterations are made to the conventual buildings, a wooden gallery is created at the W end of the nave, and the cloister garth is enlarged.
- In the 15th century, the MacLeans of Duart commissions a freestanding cross for the roadside between the abbey and nunnery, it is very similar to one erected at this period by Duncan MacMillan at Kilmory Knap chapel.
- 1569: Mary, Queen of Scots, grants the title of prioress and the nunnery to Marion MacLean, the last prioress.

[1] This document should be read in conjunction with the Statement of Significance for Iona Abbey

- 1574: Prioress Marion MacLean passes the nunnery and its lands to Hector MacLean of Duart.
- The possessions of the MacLeans of Duart, including Iona Abbey and the nunnery, pass to the Duke of Argyll.
- From the mid 17th century St Ronan's Church is no longer used as a parish church, although Cladh Ronain remains a burial ground for women and children until the 18th century.
- c.1830: Vaulting within the chancel collapses, leaving the church entirely roofless.
- 1874-75: Repairs at the nunnery are directed by the renowned architect Robert Rowand Anderson for the 4th Duke of Argyll.
- c.1890s: The Duke gifts Iona abbey and nunnery to the Iona Cathedral Trustees.
- 1917: Further repairs within the nunnery church.
- 1922: Iona Cathedral Trustees undertake restoration works on the sacristy and north chapel of the church.
- 1923 Further repairs carried out within the church. Work within St Ronan's Chapel reveals a gold finger ring, two fragments of a gold fillet, and a piece of gold wire.
- 1993 Excavations by AOC within St Ronan's Chapel reveal an earlier structure and evidence of an early Christian burial.
- 1995: AOC conduct geophysical survey, recording what may be the remains of a road surface to the north-east of the nunnery.

Archaeological Overview

- The condition and extent of the buildings are documented through accounts published by travellers and antiquarians, including Martin Martin (1694), Thomas Pennant (1779), Johnson and Boswell (1774) and Sir Walter Scott (1810). In the late 19th century several antiquarians published descriptions of the nunnery in varying degrees of detail, such as Skene's (1875) historical overview of the abbey and nunnery and the survey of the ruins by MacGibbon and Ross (1896-97).

- The earliest recorded archaeological discoveries made at the nunnery are the finds uncovered during repair works in 1922 and 1923. Four silver spoons and a gold fillet are found beneath the floor of the nunnery church. Fragments of linen cloth adhering to the spoons indicated that they had been wrapped and then buried. The fillet, found in two parts, comprises a long thin piece of beaten gold bearing an elaborate plant scroll pattern. These articles appear to have been hidden at an unknown date, as one of the silver spoons found within the nunnery church retained traces of roughly woven linen, presumably a bag or covering. The spoons are of fine workmanship and A O Curle considered them to be of 15th or 16th century date, based on stylistic similarities to English and Continental spoons. Curle suggests an earlier date for the gold fillets, possibly 13th or 14th century.

- In 1992 excavations within St Ronan's Chapel demonstrated the site's long history as a place of burial and worship. Three broad phases of activity

were defined. Between the mid- 6th and 12th centuries the site served as a burial ground, perhaps dating to the first period of missionary activity on the island. Unfortunately, there was a lack of dating evidence and the human remains were unsuitable for radiocarbon dating. Between the 8th and 12th centuries a small rectangular stone building, with lime-washed clay-bonded walls was erected in the burial ground, overlying a number of burials. Finally, in the 12th or 13th century, this building was demolished and the present St Ronan's Chapel erected directly over its footprint.

- A large number of later burials were recovered from within St Ronan's Chapel and the immediate area around it. The overwhelming majority of these burials were female or children, confirming traditional accounts that the site was reserved for women and children long after the church went out of use.

- A geophysical survey carried out in 1995 by AOC Archaeology Ltd traced a curvilinear anomaly interpreted as a road.

Artistic/Architectural Overview

- The convent of St Mary the Virgin is one of the best examples of a small medieval convent in Britain, and is the only surviving house of Augustinian nuns in Scotland (the second house was in Perth). Although ruinous since the Reformation, the convent preserves its original 13th-century layout, although some changes to the church and the E and S ranges were made in the 15th century.

- In plan, the convent follows the conventional form of many other religious houses, its church being situated N of the cloister with domestic ranges on the E, S and W enclosing a central garth (enlarged in the 15th century). Although mostly reduced to footings, parts of the church and the gables of the S range stand to a substantial height.

- The W and N walls of the church stand to their original height, while the aisle chapel was restored in the 1920s. The church comprises an undivided nave and chancel, although there was almost certainly a timber screen between them. An aisle runs about two-thirds of the length of the nave. The nave arcade capitals show a range of carving, including animals and stylised plant decoration. The small chapel at the E end of the nave aisle is covered by a fine rib-vault, a smaller version of the vault that covered the chancel prior to its collapse in the 1830s. Along the W wall of the nave are six sculptured corbels, evidence of a 15th-century enlargement of the convent church by the insertion of a gallery. The corbels bear a variety of decoration, including the Annunciation, an angel, and a human face.

- Enlarged in the 15th century, the E range comprises three ground floor chambers, including the chapter-house with stone benches around its walls. Comparison with other religious houses indicates that the upper floor of the E range probably housed the dormitory. The S range housed the refectory,

a large chamber subsequently adapted for domestic use by the insertion of an upper floor. Within the Refectory is a possible *sheila-na-gig* carving (a female fertility symbol), although the sculpture is heavily worn. Almost nothing survives of the W range, the majority of it lies beneath the modern road that skirts the nunnery. Only the inner wall remains standing, and it is possible the range contained guest accommodation and the convent's public entrance.

- St Ronan's Chapel, a small rectangular building constructed of the same pink granite rubble and dark grey Torridonian stone, stands to the NW of the nunnery and survives to wallhead height. In the 1950s (renewed in 1990s by John Renshaw for the Iona Cathedral Trust), the Ministry of Works installed an inverted glass roof (as at Kilmory) with the intention of using the ruin as a stone store. The collection is significant, comprising fragments of early Christian crosses and late medieval West Highland graveslabs, several of which bear inscriptions and effigies, carved in the style of the Iona 'school'. Many of these slabs appear to commemorate nuns and noblewomen.

- MacLean's Cross is a product of the Iona School of carving – it is decorated on both faces, the front of the cross faces W and has a representation of the Crucified Saviour clothed in a long robe on the disc head and fleur-de-lis on the upper right-hand arm, the left arm had a chalice, now lost. The shaft has a continuous mesh of ornament of intertwined plant stems. The rear of the cross is decorated largely with intertwined foliaceous ornament but at the top of the shaft is a pair of animals and on the right arm there has been an angel. A panel at the foot of the shaft bears an inscription in Lombardic capitals that is no longer legible.

Social Overview

- The lack of any formal evaluation makes it difficult to assess the nunnery's present social significance.

- Iona's built and natural heritage attracts a large number of visitors each year.

- Although the nunnery has no direct association with St Columba, it is one part of the island's heritage, widely stated by many writers as occupying a special place in the national consciousness.

Spiritual Overview

- No formal studies have been carried out to gauge the nunnery's present spiritual significance. However, the island remains an important place of pilgrimage, contemplation and worship for Christians around the world. This is demonstrated by a religious group for women around the world taking a close interest in plans for the nunnery's conservation.

- As a former convent, the monument is likely to retain some religious associations, particularly as Cladh Ronain remained in use as a burial ground for women and children until the 18th century.

Aesthetic Overview

- Iona's unspoilt character cannot be stressed highly enough as it provides a stunning backdrop for the built heritage, and gives visitors a sense of the nunnery's original setting.

- The nunnery ruins themselves are particularly attractive, constructed of pink and grey masonry.

- The pleasant cloister garth offers visitors a peaceful and contemplative space in which to admire the ruins.

What are the major gaps in understanding of the property?

- Our knowledge of the nunnery's history is very limited and patchy, particularly the role of the convent after the Reformation.

- The level of survival of the W range, most of which lies beneath the modern road, has never been tested.

- The lack of firm dates from the early Christian phases beneath St Ronan's Church limits our understanding of the site's early history.

ASSESSMENT OF SIGNIFICANCE

Key points

- Iona Nunnery is one of the best-preserved medieval nunneries in Britain, and one of only two houses of Augustinian nuns established in Scotland.
- Iona Nunnery forms part of an internationally-renowned group of monuments set within an almost wholly unspoilt landscape, attracting what is thought to be in excess of 100,000 visitors each year.
- The nunnery is built adjacent to an early Christian burial ground, which may be as old as the primary phase of missionary activity on Iona, forming a link between the early monastery and the later convent.
- Architectural details throughout the nunnery are of high quality indicating its importance and significance. The convent church possessed one of the few rib-vaults in the Western Highlands.
- The 15th century enlargements suggest the nunnery continued to flourish in the later Middle Ages, a time when many religious houses were declining.
- St Ronan's Church, adjacent to the nunnery, occupies the site of an early Christian church possibly dating from the 8th century, itself built on the site of an earlier burial ground. It houses an excellent collection of late medieval West Highland style graveslabs, all the work of masons of the Iona School of carving. Iona was instrumental in the creation of a distinctive West

Highland style of carving, one of the most important cultural developments in late medieval Scotland.

- Several famous travellers have visited the monument since the Reformation, including Martin Martin, James Boswell and Dr Samuel Johnson, Sir Walter Scott, Prince Albert and Felix Mendelssohn.
- Prince Albert's visit in 1847 helped create an interest in the island as a fashionable holiday destination, much in the same way as Victoria and Albert's travels through the Highlands did.
- MacLean's Cross is one of a significant group of 15th-century carved stones produced by the Iona School of carvers.

Associated Properties

Iona Abbey (early monastery of similar date to the early burials found at St Ronan's Chapel: medieval abbey re-founded 1203 by Reginald, Lord of the Isles. Iona abbey possesses one of the finest collections of West Highland sculpture, including slabs from the nunnery burial ground); **Paisley Abbey** (also founded by Reginald/Ranald); St Leonard's nunnery, Perth (only other recorded foundation of Augustinian nuns in Scotland); Duart Castle (the last prioress and convent passed their lands to the heritage of Hector MacLean of Duart in 1574); St Bothan's nunnery (near the of parish church at Abbey of Bathans); North Berwick Nunnery.

Keywords St Ronan; Earl Ragnall/Ranald/Reginald; Bethoc/Beathag/Beatrice; MacLean, Duke of Argyll, convent; Augustinian nuns; sheila-na-gig; corbel; cloister; chapter-house; refectory; rib-vault, late medieval graveslab

Appendix 2

HER Gazetteer

WOSASPIN	SITE NAME	SITETYPE
210	Maclean's Cross, Iona / Mclean's Cross	Cross
211	St Oran's Chapel and Reilig Odhrain, Iona	Chapel; Burial-ground; Cross-slab; Well
212	Tobar a' Cheathain, Iona	Well
213	St Mary's Chapel, Iona	Chapel
214	Cladh nan Druineach, Iona	Enclosure; Burial-ground (possible)
215	Iona Nunnery, Iona	Nunnery
216	Martyr Street, Iona	Road
217	Sraid nam Marbh, Iona	Road
218	Main Street, Iona	Road
219	St Ronan's Street, Iona	Road
220	'Threld', Iona	Village
221	Iona Abbey, Iona	Coin Hoard
222	Blar Buidhe, Iona	Cairn; Corn-drying Kiln (possible)
224	St Ronan's Church, Iona / Teampull Ronaig / Cladh Ronain	Church; Burial-ground; Hoard; Gold Objects; Museum
235	An Eala, Iona	Long Cists; Mound
236	Cill Chainnich, Iona / St Cainneach's Chapel / Cladh Chainnich	Chapel; Burial-ground
240	St Brandon's Cross, Iona	Cross
242	St Adamnan's Cross, Iona / Port a'Chroisein	Cross
243	Iona, Early Christian Monastery	Monastic Settlement; Battle Site or Skirmish
244	Iona Monastery, Torr an Aba / Tor an Aba / Tor Abb / Dum Ni Manich	'Cell'; Building; Cross-base
245	Iona Monastery, Vallum	Enclosure; Sanctuary Marker
245	Iona Monastery, Vallum	Enclosure; Sanctuary Marker
246	Iona Monastery, St Columba's Shrine	Shrine
247	Iona, St Martin's Cross	Cross
248	St John's Cross, Iona	Cross
249	St Matthew's Cross, Iona	Cross
250	St Oran's Cross, Iona	Cross
251	Iona	Burial
252	Reilig Odhrain, Iona	Ditches
253	Reilig Odhrain, Iona	Post-holes; Pits; Enclosure; Cross-base; Corn-drying Kiln; Structure
254	Reilig Odhrain, Iona	Fint Working Site; Scraper; Debitage
258	Iona Abbey / Iona, St Mary's Cathedral	Abbey
258	Iona Abbey / Iona, St Mary's Cathedral	Abbey
258	Iona Abbey / Iona, St Mary's Cathedral	Abbey
258	Iona Abbey / Iona, St Mary's Cathedral	Abbey
261	Tigh-an-Easbuig, Iona / Tigh an Easbuig	Building
12195	Iona, Chapel and Burial-ground / St Ronan's Church	Chapel; Burial-ground

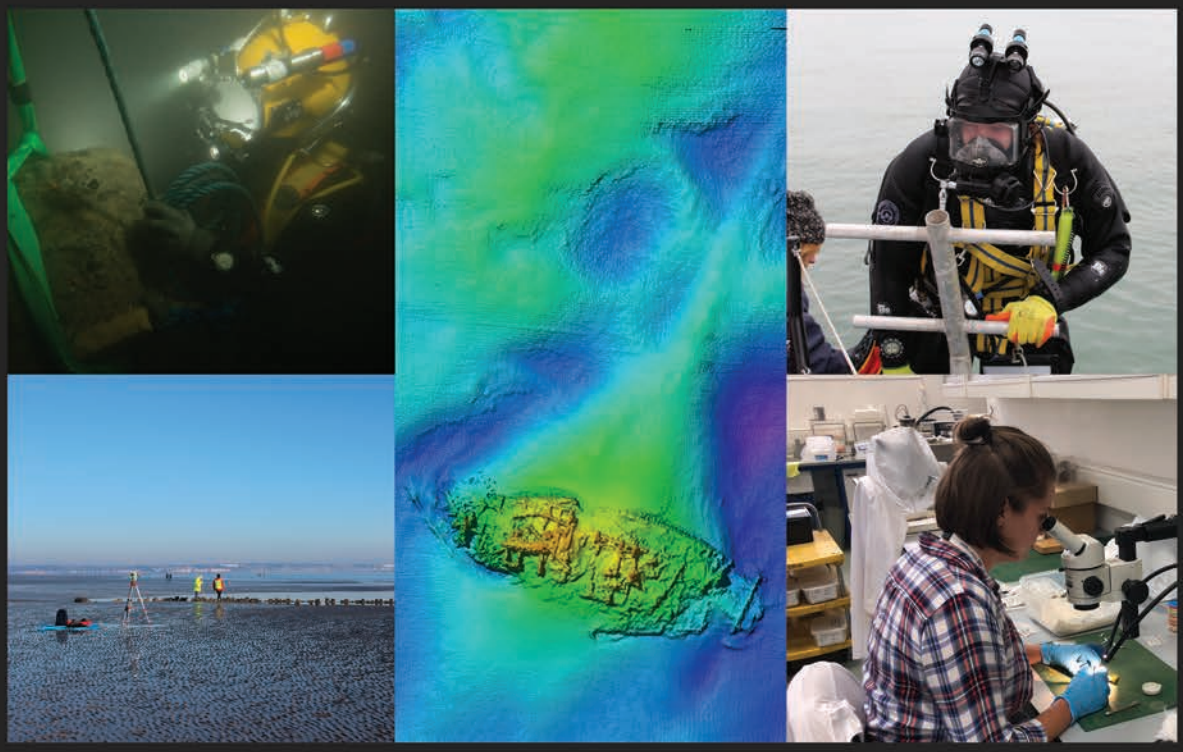
WOSASPIN	SITE NAME	SITETYPE
13558	Iona Abbey	Midden
13559	Sruth a' Mhuilinn, Iona	Mill (possible)
20992	Iona Church / Iona Kirk / Telford Church / Iona Parish Church	Church
20993	Iona Manse / Telford Manse	Manse
21928	Iona Abbey Museum / St Mary's Abbey Museum / Abbey Museum / Infirmary	Museum
21929	Iona Abbey, Michael Chapel	Chapel
43378	Iona, Blair Buidhe	Structure; Enclosure
43380	Iona, Port Nam Mairtir	Memorial
43616	Caol Ithe, Iona	Farmstead
45963	Iona, Maol	Rig
46066	Iona, Pier	Pier
46272	Iona, Abbey	Crosses; Cross-slabs
46273	Iona, Nunnery	Cross; Cross-slabs
46274	Iona, St Oran's Chapel and Reilig Odhrain	Crosses; Cross-slabs
46275	Iona, St Ronan's Church / Nunnery Museum	Crosses; Cross-slabs; Shrine
46278	Iona, St Columba Hotel / Carraig Bheig	Cross-slab
46290	Iona, Iona Nunnery	Sheela-na-gig
46525	Fionnphort, St Columba Centre	Museum; Cross-inscribed Stone; Inscribed Stone
51959	Iona, Iona Abbey, Abbot's House / Abbots House; St Mary's Cathedral; St Mary's Abbey	Abbey
55222	Iona, Baile Mor, Glebe Field	Structure
59899	Oran Cottage	Midden; Pottery; Lithics

rpsgroup.com

APPENDIX 16.2

Archaeological Assessment of Hydrographic Data

Iona and Fionnphort



Archaeological Assessment of Hydrographic Data

MSDS Marine

2021/MSDS21180/1

Iona and Fionnphort

Archaeological Assessment of Hydrographic Data

Project Name	Iona and Fionnphort – Archaeological Assessment of Hydrographic Data
Client	RPS Ltd
MSDS Marine Project Number	MSDS21180
Author and contact details	Mark James mark@msdsmarine.co.uk 07917 703 176
Origination date	27/07/2021
Reviser (s)	Mark James
Date of last revision	09/08/2021
Quality Assurance Approval	Sally Evans
Version number:	1.1
Summary of changes	Addressing client comments

Contents

Figures

List of Abbreviations

AEZ	Archaeological Exclusion Zone
Aspect	Aspect Land and Hydrographic Surveys Ltd
CD	Chart Datum
EIA	Environmental Impact Assessment
IHO	International Hydrographic Organisation
kHz	Kilohertz
m	Meters
MSDS Marine	MSDS Marine Ltd
PAD	Protocol for Archaeological Discoveries
RPS	RPS Ltd
RTK	Real Time Kinematic
UKHO	United Kingdom Hydrographic Office
Wrecksite	Wrecksite.EU

1.0 Introduction

1.0.1 MSDS Marine Ltd (MSDS Marine) were commissioned by RPS Ltd (RPS) to undertake an archaeological assessment of hydrographic data collected in advance of a marine licence application for development works at Iona and Fionnphort, Scotland (Figure 1). The assessment is being undertaken to inform the Environmental Impact Assessment (EIA) process.

1.0.2 Broadly, the development seeks to undertake ferry berthing improvements at each end of the ferry route between Iona and Fionnphort to the following proposed specifications;

Iona

1.0.3 The development at Iona proposes to construct a rock-armour breakwater c.50 m south of the existing slipway and covering an area c. 6,000 m^2. Alongside the existing slipway and extending c.30 m past to the east twelve piles are proposed. To the north-east of the existing slipway an area c.3,400 m^2 is proposed to be dredged to 3.0 m below Chart Datum (CD). See Figure 2.

Fionnphort

1.0.1 The development at Fionnphort propose to construct a rock-armour breakwater c.30 m to the south-west and extending north-east past the existing slipway and covering an area c.8,000m^2. Alongside the south-eastern edge of the proposed breakwater are nine proposed pile locations in association with a gangway. To the north of the existing slipway an area c.12,700 m^2 is proposed to be dredged to 3.0 m below CD. See Figure 3.

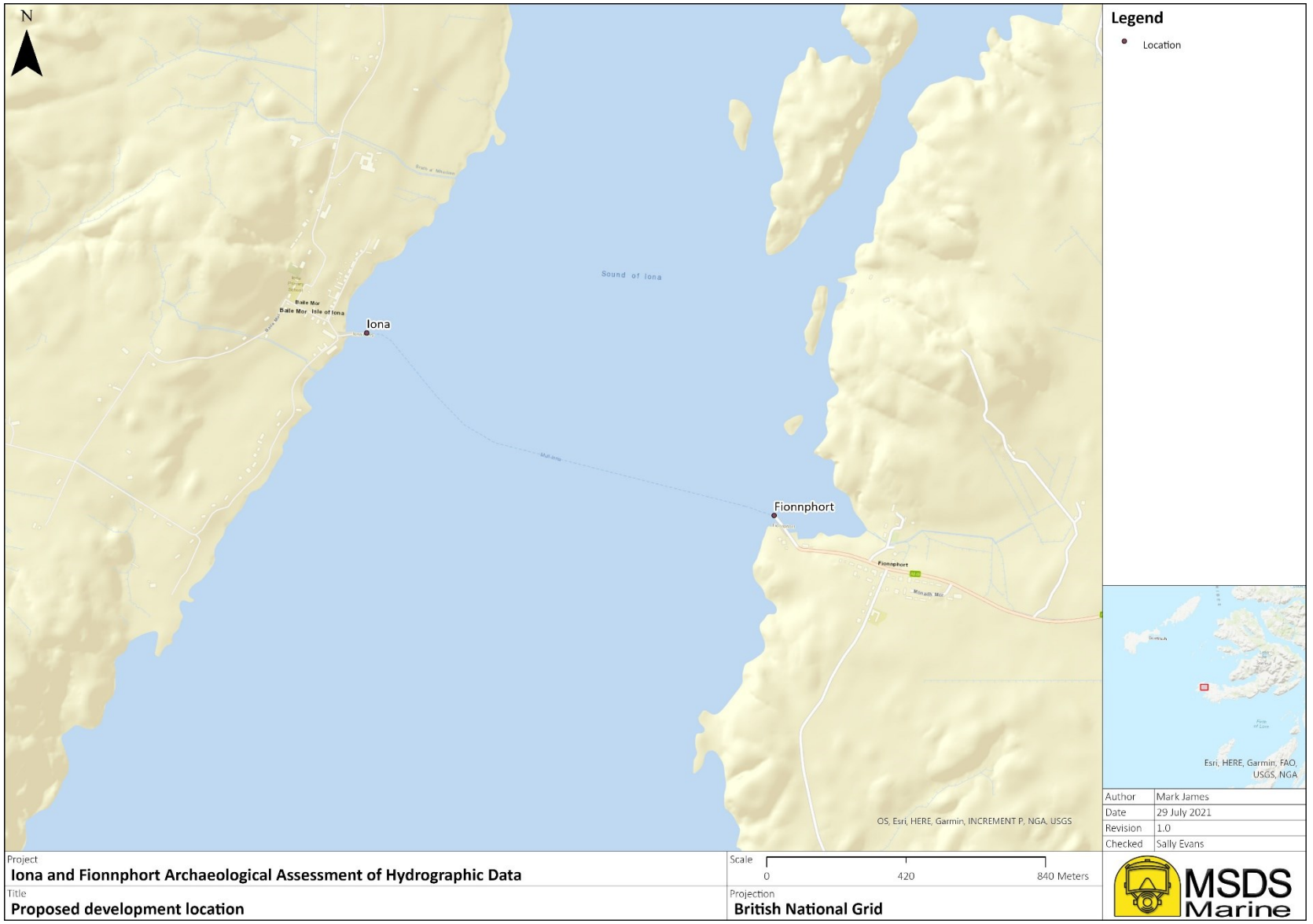


Figure 1: Proposed development location

Figure 2: Proposed development location, Iona

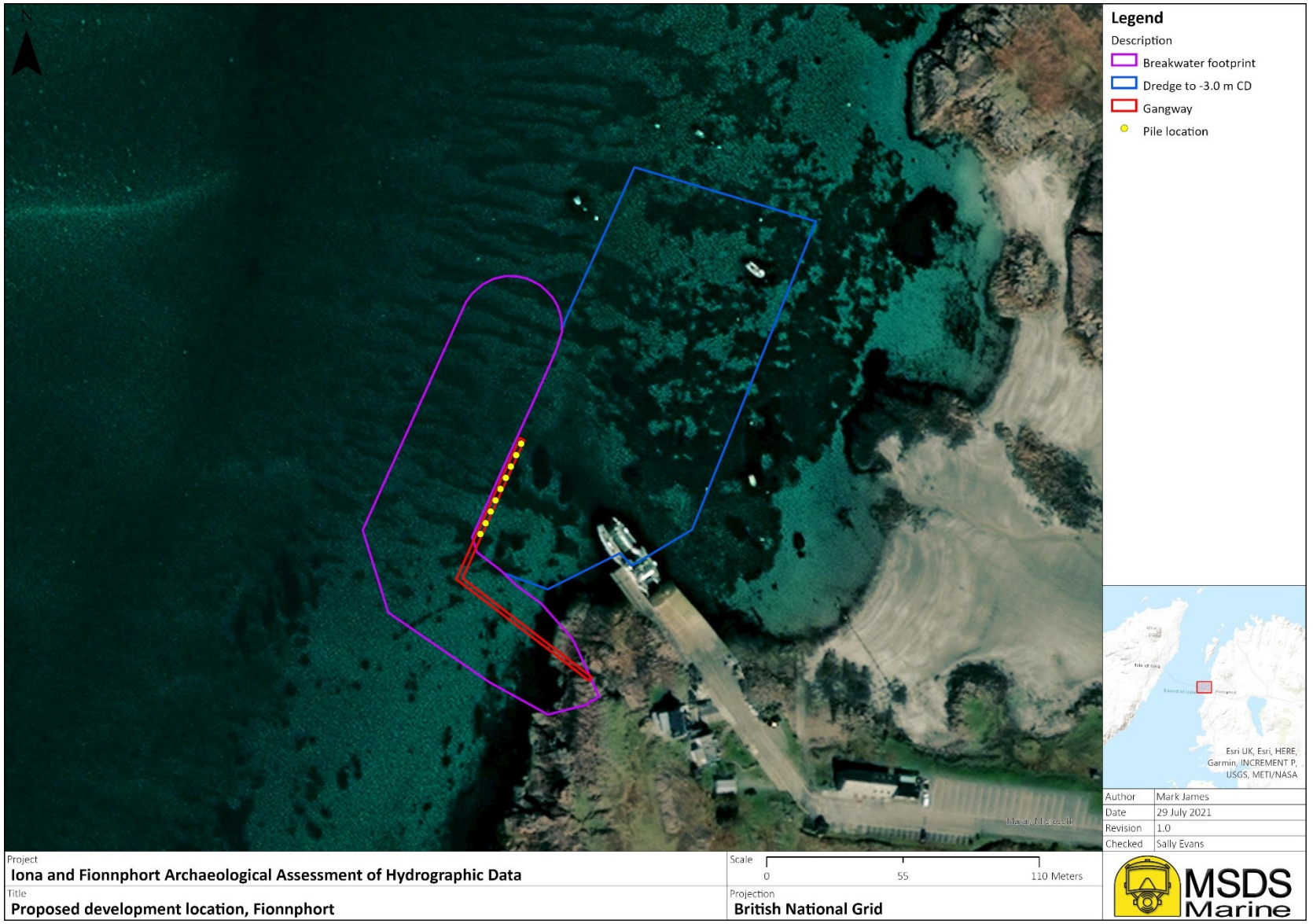


Figure 3: Proposed development location, Fionnphort

2.0 Aims and Objectives

2.0.1 The principle aim of the archaeological review of hydrographic data is to establish the presence of potentially significant archaeological material on the seabed. The identification of material allows for strategies to be recommended to mitigate against any negative effects that may be caused by the development process.

2.0.2 The objectives of the archaeological interpretation can be summarised as follows:

- To establish the presence of anthropogenic material of archaeological potential;
- to interpret the identified anomalies as to their potential to be of archaeological significance; and
- to recommend mitigation strategies for the anomalies appropriate to their archaeological potential.

3.0 Method

3.1 Data Available

3.1.1 Data were collected by Aspect Land and Hydrographic Surveys Ltd (Aspect) during November 2020, mobilising the sensors detailed in Table 1 below[1]. The data collection was specified to meet, or exceed, the International Hydrographic Organisation (IHO) Special Order Standard[2]. The IHO Special Order states that 100% coverage of the survey area must be achieved enabling the detection of cubic features greater than 1 m. The specification was achieved and exceeded. The final data density was better than 0.25 m across the majority of the survey area. Coverage is presented in Figure 4.

Sensor type	Sensor
Position and motion	Trimble Applanix POS MV
RTK Corrections	Base station
Multibeam Echosounder	R2Sonic 2022 @ 400 kHz

Table 1: Mobilised survey sensors

3.1.2 The archaeological assessment of hydrographic data uses the most recent, and highest resolution data which was that collected by Aspect in 2020. However, survey data from previous years was provided to the specifications in Table 2.

Year	Project reference	Resolution
2014	A5314 Iona	0.3 m
2015	A5469 Fionnphort	0.3 m
2017	A6099 Iona and Fionnphort	0.5 m
2020	A7482 Sound of Iona	0.5 m

Table 2: Previous survey specifications

3.1.3 The 2020 data were provided to MSDS Marine as un-gridded points files, with navigation and tidal corrections applied. Previous years data were provided gridded to the values in Table 2.

3.1.4 All data were supplied relative to British National Grid (OSGB36).

[1] Aspect Land and Hydrographic Surveys Ltd, 2020. *Topographic, Multibeam Bathymetric Survey. Sound of Iona, Argyll.* A report for Argyll and Bute Council. Report Ref: A7482.
[2] International Hydrographic Organisation, 2020. *IHO Standards for Hydrographic Survey*. IHO Publication No. 44, 6th Edition.

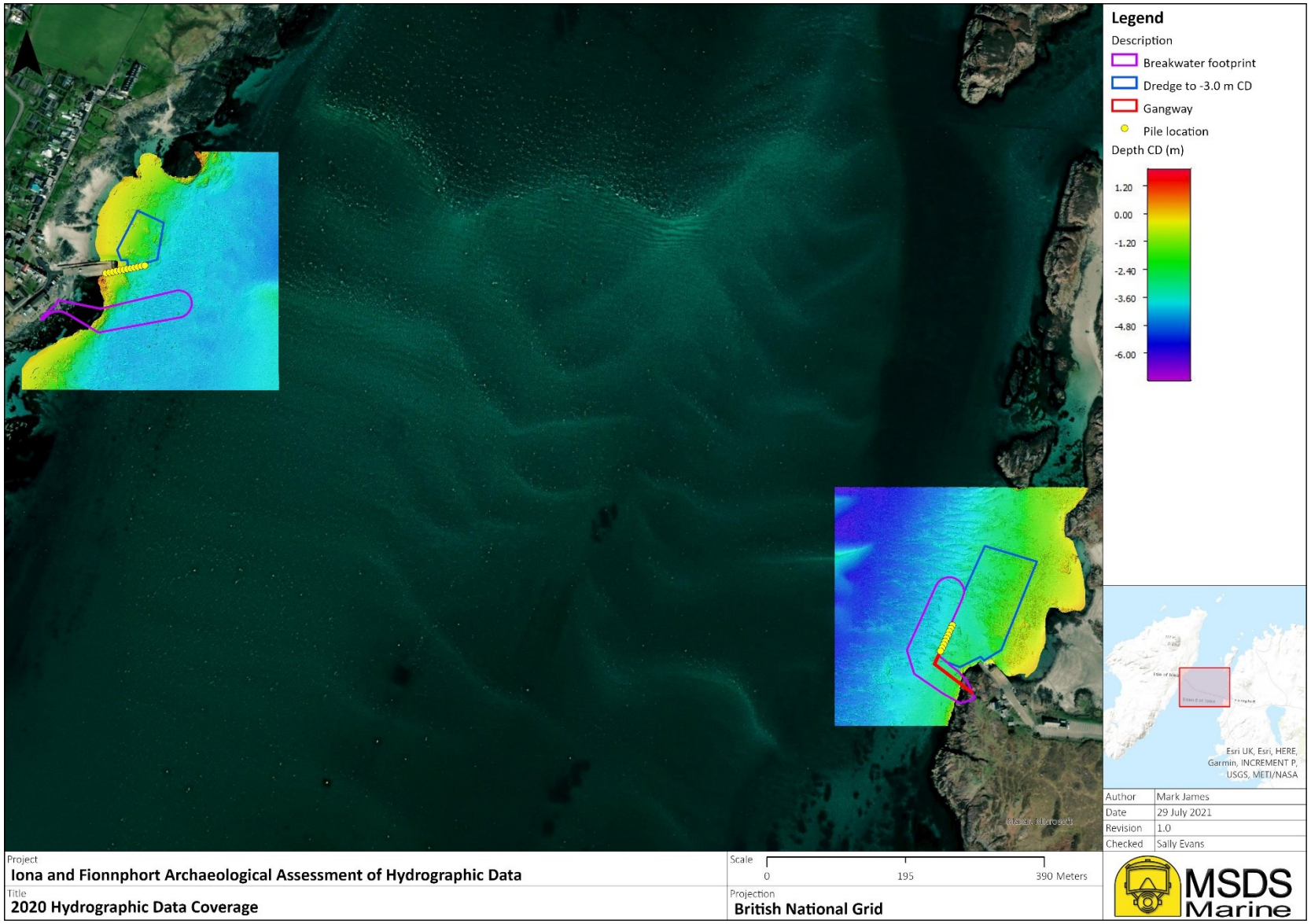


Figure 4: 2020 Hydrographic data coverage

3.2 Archaeological Assessment

3.2.1 The archaeological assessment was undertaken by a qualified and experienced marine archaeologist with a background in geophysical and hydrographic data acquisition, processing, and interpretation.

3.2.2 The assessment considered the provided 2020 data extents around the proposed development areas, the data included a suitable buffer. Data from previous years were assessed to ensure no features were hidden by the movement of sediment, and where they extended past the extents of the 2020 data to contextualise the area.

Hydrographic Data Assessment

3.2.3 Following delivery of the required datasets, an initial review was undertaken to gain an understanding of the geological and topographic make-up of the survey area. Within the extent of the survey area, the potential for variation in the seabed is high and can affect the interpretation of anomalies.

3.2.4 The datasets were reviewed on a 10 m x 10 m grid basis and all anomalies of potential anthropogenic origin identified and recorded. Records include at a minimum (where appropriate) an image of the anomaly, dimensions, and a description. An archaeological potential was assigned to the anomaly following the criteria outlined in Table 3 below.

Potential	Criteria
Low	An anomaly potentially of anthropogenic origin but that is unlikely to be of archaeological significance – Examples may include discarded modern debris such as rope, cable, chain, or fishing gear; small, isolated anomalies with no wider context; or features that appear geological in origin but may have the potential to be anthropogenic.
Medium	An anomaly believed to be of anthropogenic origin but that would require further investigation to establish its archaeological significance – Examples may include larger unidentifiable debris or clusters of debris, unidentifiable structures, or large magnetic anomalies.
High	An anomaly almost certainly of anthropogenic origin and with a high potential of being of archaeological significance – high potential anomalies tend to be the remains of wrecks, the suspected remains of wrecks, or known structures of archaeological significance.

Table 3: Criteria for the assessment of potential

3.2.5 Anomalies assessed as having archaeological potential were compiled into a gazetteer and a shapefile created for further assessment alongside known features such as wrecks, mooring buoys, third party assets such as cables and pipelines and other seabed structures. Satellite imagery was also viewed as due to the water clarity in the Sound of Iona seabed features were visible within this data.

3.2.6 The data was assessed in this way to ensure that anomalies were not unnecessarily identified as having archaeological potential when the origination can be identified.

3.2.7 The interpretation of hydrographic data is, by its very nature, subjective; however, with experience and by analysing the form, size, and characteristics of an anomaly a reasonable degree of certainty as to the origin of an anomaly can be achieved.

3.2.8 Measurements can be taken in hydrographic processing software, and whilst largely accurate, discrepancies can be noted due to a number of factors. Where there is uncertainty as to the potential of an anomaly, or its origin, a precautionary approach is always taken to ensure the most appropriate and robust mitigation for the historic environment.

3.2.9 It should be noted that there may be instances where an anomaly may exist on the seabed but not be visible in the geophysical data. This may be due to being covered by sediment, being obscured from the line of sight of the sonar, or outwith the capabilities or specification of the survey.

3.3 Mitigation

3.3.1 To ensure the most appropriate and robust mitigation for the historic environment without unnecessarily impacting the development, mitigation recommendations were determined on an anomaly-by-anomaly basis and considered all available data including: potential significance, size, seabed type, seabed dynamics, the development type and potential negative impact. Mitigation strategies were based on the criteria in Table 4.

Potential	Criteria
Low	No archaeological significance interpreted. Maintain an operational awareness of the anomaly's location, and reporting through an agreed protocol for archaeological discoveries (Annex B) should material of potential archaeological significance be encountered.
Medium	Avoidance of the anomaly's position and where appropriate an archaeological exclusion zone may be recommended. Ground truthing of the anomaly through the use of divers or an ROV would establish the archaeological potential.
High	Archaeological exclusion zones will be recommended based on the size of the anomaly, any outlying debris and the seabed dynamics as interpreted from the hydrographic data.

Table 4: Mitigation criteria

4.0 Results

4.0.1 A total of ten anomalies of potential anthropogenic origin were identified within the survey extents. Seven anomalies in relation to Fionnphort, one of which is in the proposed development footprint, and three in relation to Iona, none of which are in the development footprint. The anomalies are categorised by potential in Table 5 and the locations presented in Figure 5.

Potential	Iona development footprint	Fionnphort development footprint	Iona wider area	Fionnphort wider area	Total
Low	0	1	3	6	10
Medium	0	0	0	0	0
High	0	0	0	0	0
Total	**0**	**1**	**3**	**6**	**10**

Table 5: Distribution of anomalies by potential

4.0.2 All the identified anomalies were identified as of low archaeological potential. Low potential anomalies are discussed further in Section 4.1.

4.1 Low Potential Anomalies

4.1.1 Ten anomalies were identified as of low archaeological potential within the assessment extents, one of which falls within the development footprint. The anomalies are broken down into the following categories, Table 6.

Category	Iona development footprint	Fionnphort development footprint	Iona wider area	Fionnphort wider area
Potential debris	0	0	2	2
Likely geological	0	1	1	2
Linear feature	0	0	0	2

Table 6: Low potential anomaly categories

4.1.2 The anomalies identified as of low archaeological potential are mixture of small features often potentially geological in form, or likely representing modern debris. Each anomaly was reviewed and established to be of low archaeological potential.

4.1.3 Low potential anomalies have been assessed against all available evidence and are deemed to be unlikely to be of archaeological significance and as such will not be discussed further within the results section of this report. The distribution of low potential anomalies is shown in Figure 6 and Figure 7.

4.1.4 Further information regarding mitigation can be found in Section 6.0, and a gazetteer of low potential anomalies, including positions and dimensions can be found in Annex A – Gazetteer of Archaeological Anomalies.

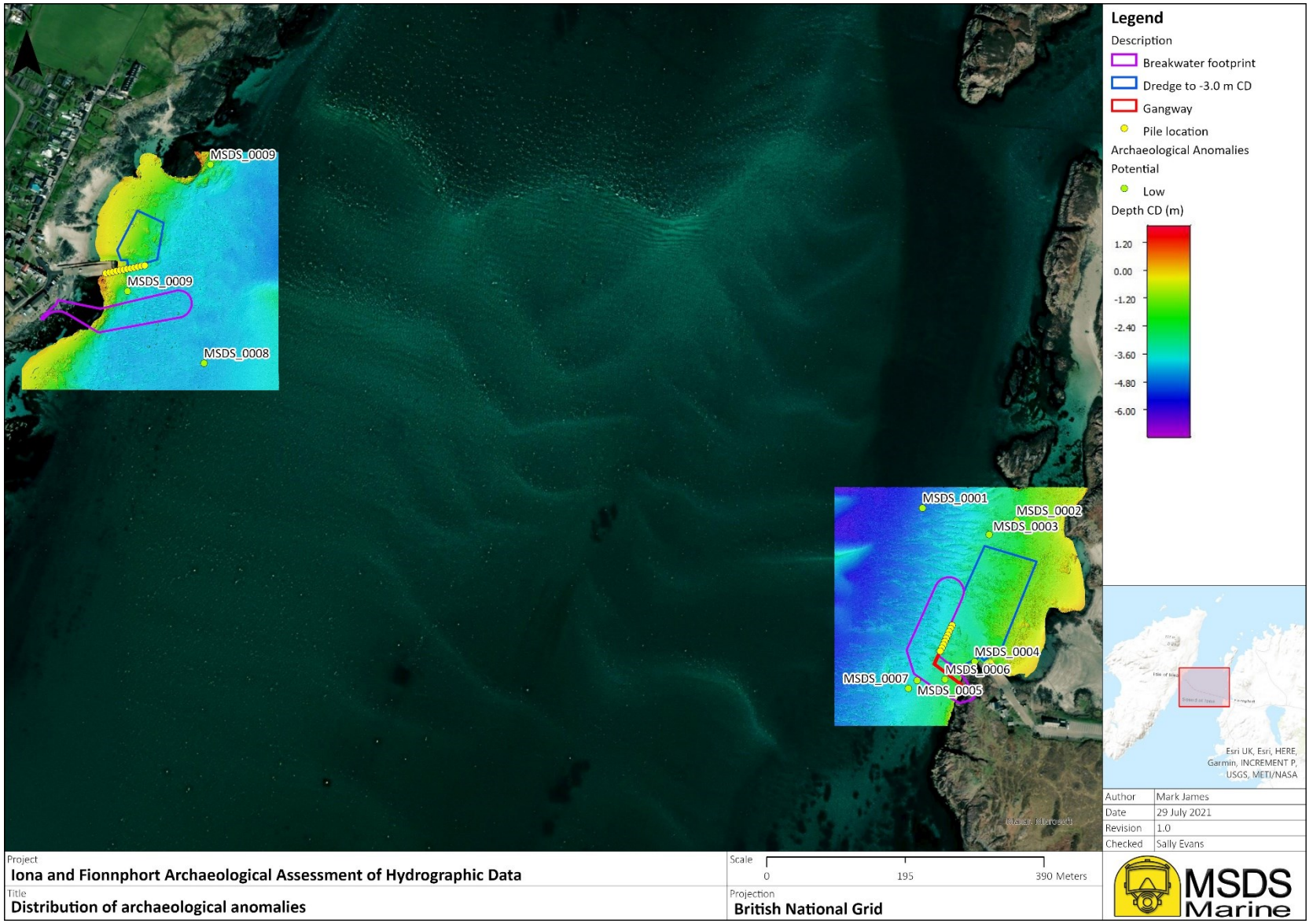


Figure 5: Distribution of archaeological anomalies

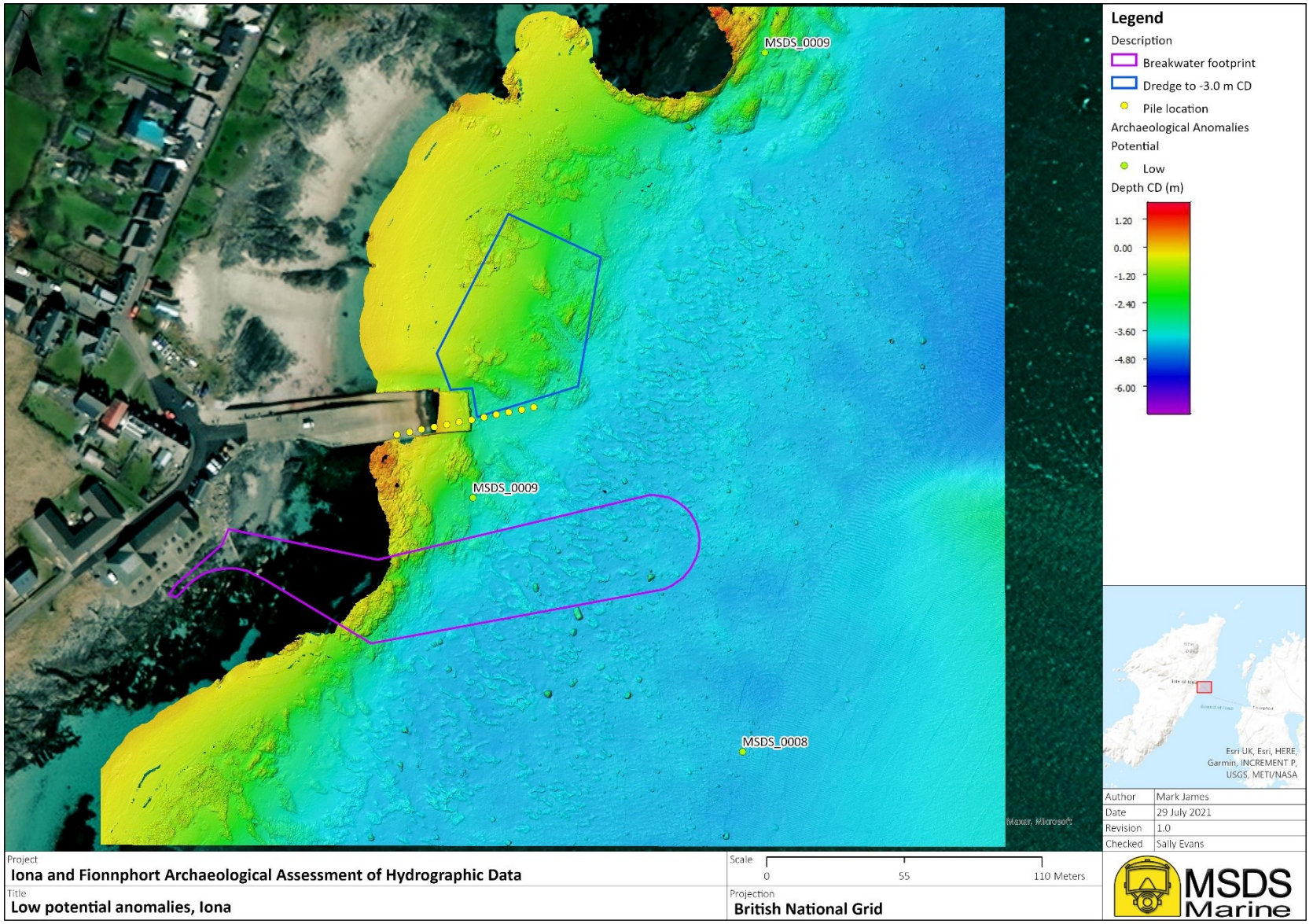


Figure 6: Low potential anomalies, Iona

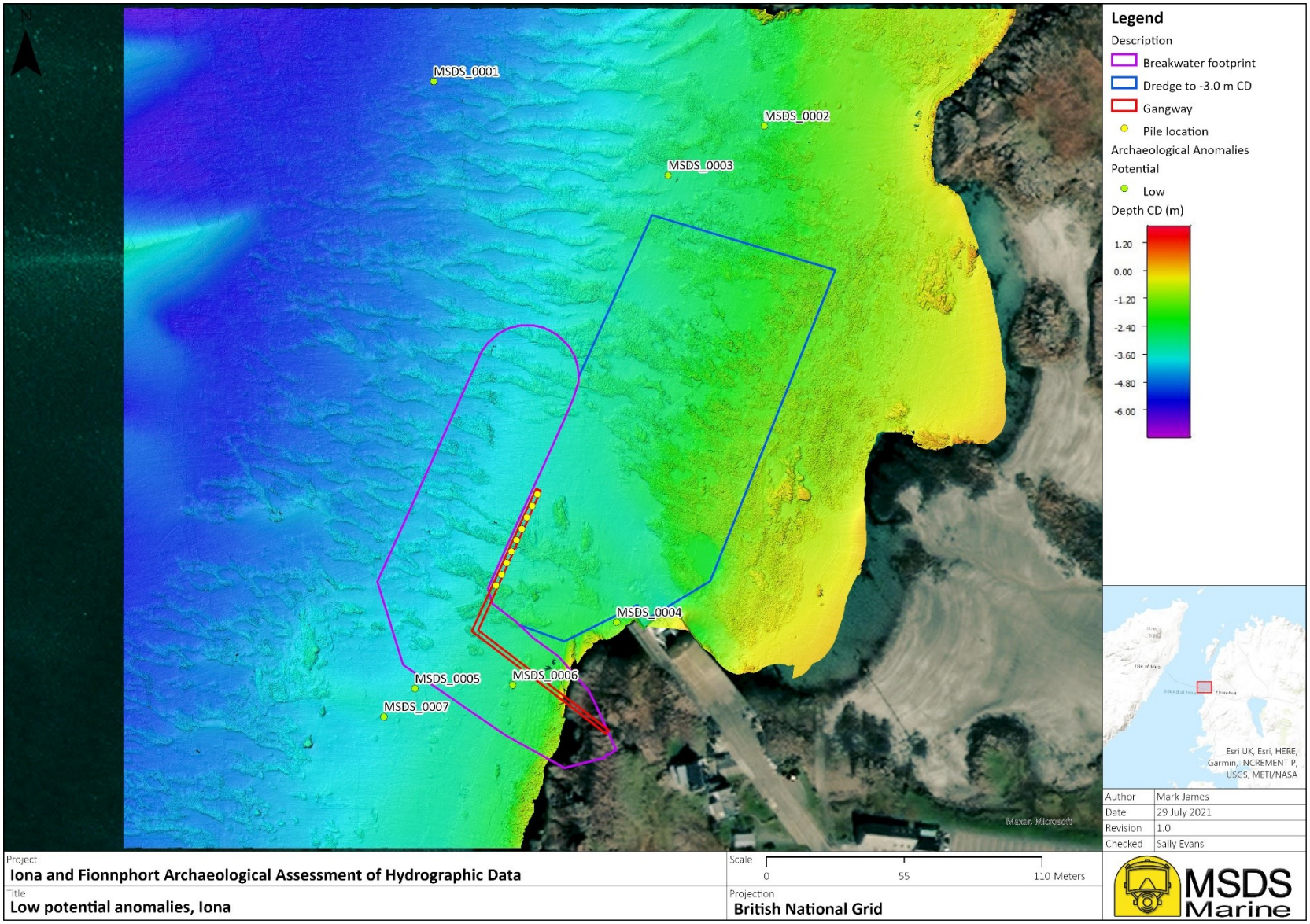


Figure 7: Low potential anomalies, Fionnphort

5.0 United Kingdom Hydrographic Office and Wrecksite Data

5.0.1 United Kingdom Hydrographic Office (UKHO) and Wrecksite.EU (Wrecksite) data were obtained for the Sound of Iona for the cross correlation of anomalies identified within the hydrographic data. No records were present in either dataset within the Sound of Iona area.

6.0 Mitigation

6.1 Low Potential Anomalies

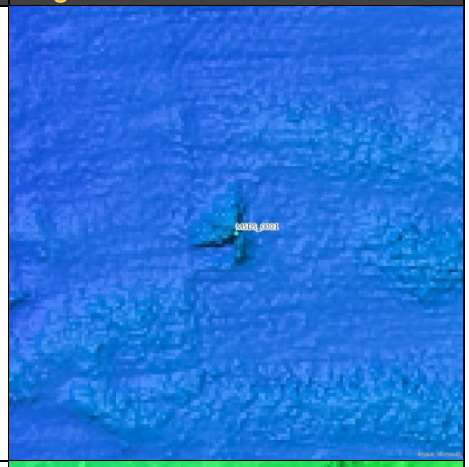
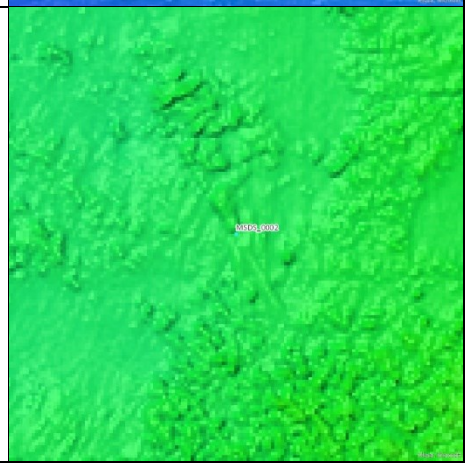
6.1.1 Low potential anomalies have been identified as potentially anthropogenic in origin but unlikely to be of archaeological significance and no exclusion zones are recommended for these anomalies. Should material of potential archaeological significance be identified during the course of pre-development and development works they should be reported under an appropriate Protocol for Archaeological Discoveries (PAD) such as that included as Annex B, which is based on the Crown Estate's *Protocol for Archaeological Discoveries: Offshore Renewables Projects*[3].

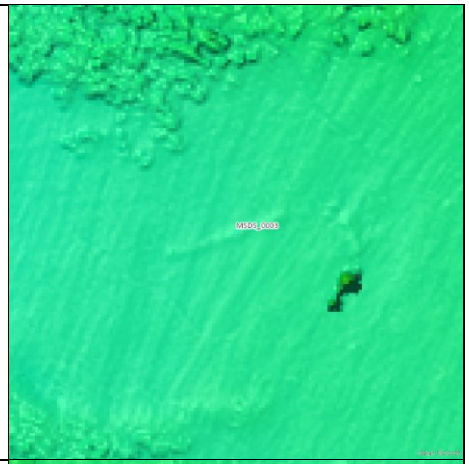
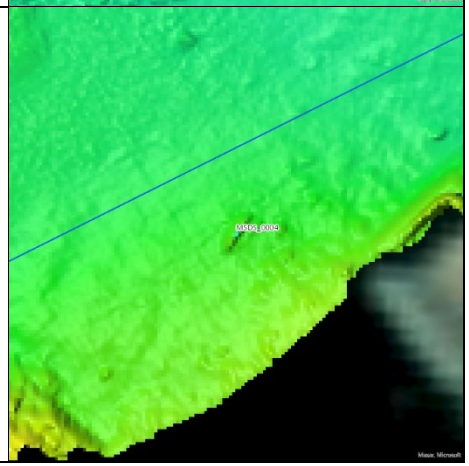
6.2 Archaeological Exclusion Zones

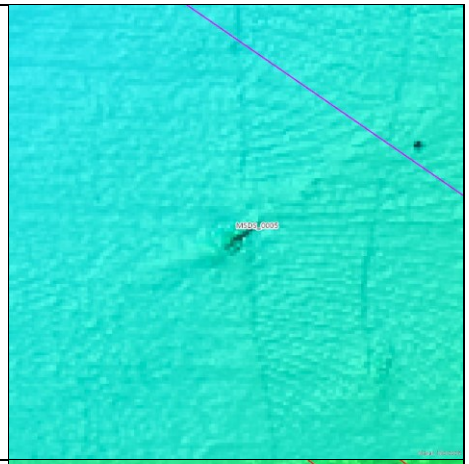
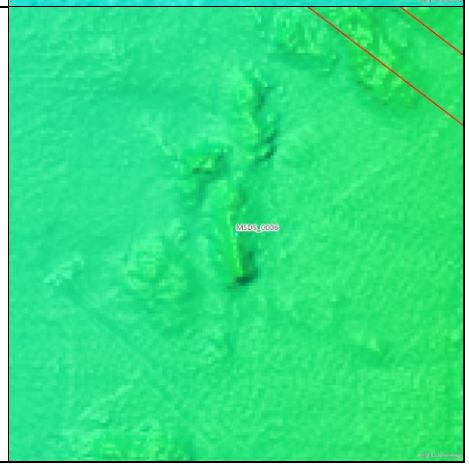
6.2.1 No Archaeological Exclusion Zones (AEZs) are recommended within the development footprint or within the extents of the 2020 hydrographic data.

[3] The Crown Estate, 2014. *Protocol for Archaeological Discoveries: Offshore Renewables Projects.* Wessex Archaeology, Salisbury.

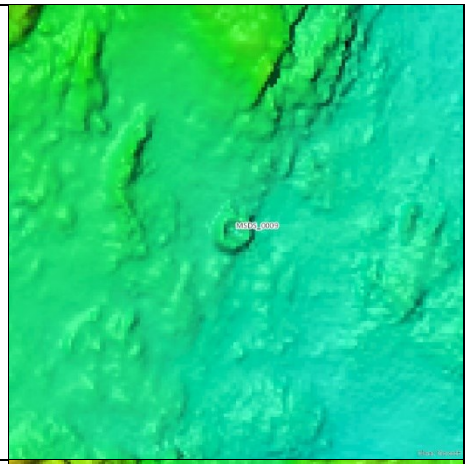
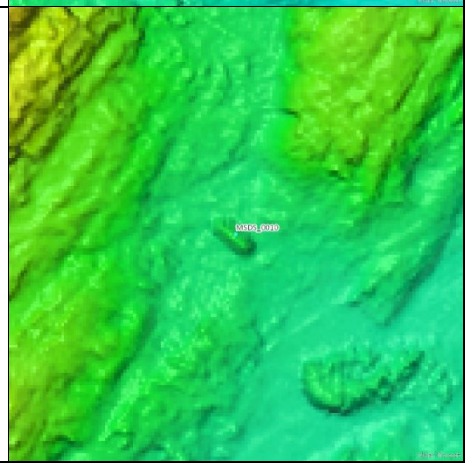
7.0 Annex A – Gazetteer of Archaeological Anomalies

ID	Potential	Length (m)	Width (m)	Description	X (OSGB36)	Y (OSGB36)	Image
MSDS_0001	Low	2.4	1.1	Likely geological	129815.9	723665.1	
MSDS_0002	Low	7.1	0.3	Linear feature	129947.9	723647.3	

MSDS_0003	Low	4.3	0.3	Linear feature	129909.5	723627.6	
MSDS_0004	Low	1.5	0.4	Potential debris	129889.0	723449.0	

MSDS_0005	Low	2.4	1.2	Potential debris	129808.4	723422.5	
MSDS_0006	Low	2.4	0.4	Likely geological	129847.4	723423.9	

MSDS_0007	Low	3.1	2.1	Likely geological	129796.0	723411.3	
MSDS_0008	Low	2.3	1.1	Likely geological	128805.3	723868.6	

MSDS_0009	Low	1.3	1.3	Potential debris	128697.6	723970.1	
MSDS_0010	Low	1.4	0.7	Potential debris	128814.3	724148.0	

8.0 Annex B – Protocol for Archaeological Discoveries

8.1 Purpose of the document

8.1.1 This annex sets out the procedure for reporting discoveries of potential archaeological interest made offshore of the Mean High Water Springs (MHWS) level during the course of activities associated with the Proposed Development.

8.1.2 Any archaeological finds made by project staff are important because they may shed light on past human use of the landscape, sea, and seabed. The information that such discoveries bring to light can help archaeologists to better understand what happened in the past, and therefore to better protect those aspects of our history and prehistory that should be conserved on behalf of future generations.

8.1.3 The aim of the Offshore Protocol for Archaeological Discoveries (PAD) is to reduce any adverse effects of the development upon the historic environment by enabling people working on the project to report their finds in a manner that is both convenient to their every-day work and effective with regard to curatorial requirements. The use of the PAD also allows legal obligations under certain Acts to be met (see Sections 8.6 and 9 for details).

8.1.4 The client will ensure their obligations are met by using the protocol set out within this document which ensures the reporting of potential archaeological finds, cessation of activities while the find is reviewed, and curatorial advice being sought on mitigation where necessary (where confirmed archaeological features or finds are identified).

8.2 Protocol Details and Version

8.2.1 The Protocol that will be used is based on the *Protocol for Archaeological Discoveries for Offshore Renewables Projects* introduced by The Crown Estate (The Crown Estate 2014).

8.3 Operations of the Protocol

Overview of the PAD

8.3.1 The PAD has been designed to allow Developers to report unexpected finds of archaeological interest made on the seabed or in the intertidal zone during the course of offshore construction works. A series of actions is defined for such cases, summarised below and in Table 7.

8.3.2 The PAD anticipates discoveries being made by **Project Staff** who report to the **Site Champion** (for example the Vessel Master or Client Representative) on their vessel; who then completes a series of steps including stopping work and reporting the find to the **Nominated Contact** (typically an archaeological advisor such as a Retained Archaeologist[4] or Archaeological

[4] Conditions of consent can often refer to the need for an Archaeological Written Scheme of Investigation (WSI), to be produced in line with key guidance including The Crown Estate (2010) *Model Clauses for Archaeological Written Schemes of Investigation.* The WSI will typically contain details of an archaeological consultant contracted as a 'Retained Archaeologist' who may in many cases play the role of the Nominated Contact under the PAD.

Consultant) and the Developer's Project Manager. The Nominated Contact will provide specialist advice and technical support services relating to the identification of the find[5].

8.3.3 The Nominated Contact will liaise with the Developer's Project Manager and the Archaeological Curator, along with any additional relevant stakeholders depending on the nature of the find, and planned activities within the area. If the find or feature is determined to be of archaeological interest then suitable mitigation measures will be devised in consultation with the Archaeological Curator.

8.3.4 The Nominated Contact, along with the Developer's Project Manager and contractors shall draw to the attention of all relevant staff the potential for archaeological material to be found in the course of survey, construction and installation work and inform them of the possible importance of such finds.

8.3.5 Personnel working on the project will be briefed on the Protocol for Archaeological Discoveries and copies of this Protocol will be available onboard the installation vessels and on all sites.

[5] Note, the Crown Estate (2014) *Protocol for Archaeological Discoveries* includes an additional step whereby the report is passed to the Implementation Service who provide additional support on identification and input into mitigation. This Service is run by an archaeological contractor. However, typically the project's archaeological advisor (e.g. their Retained Archaeologist or Archaeological Contractor), has access to all project datasets and has a strong understanding of the archaeological potential of the area and are therefore often best placed to give this advice. As such there is no need for the inclusion of the additional step of corresponding with the Implementation Service.

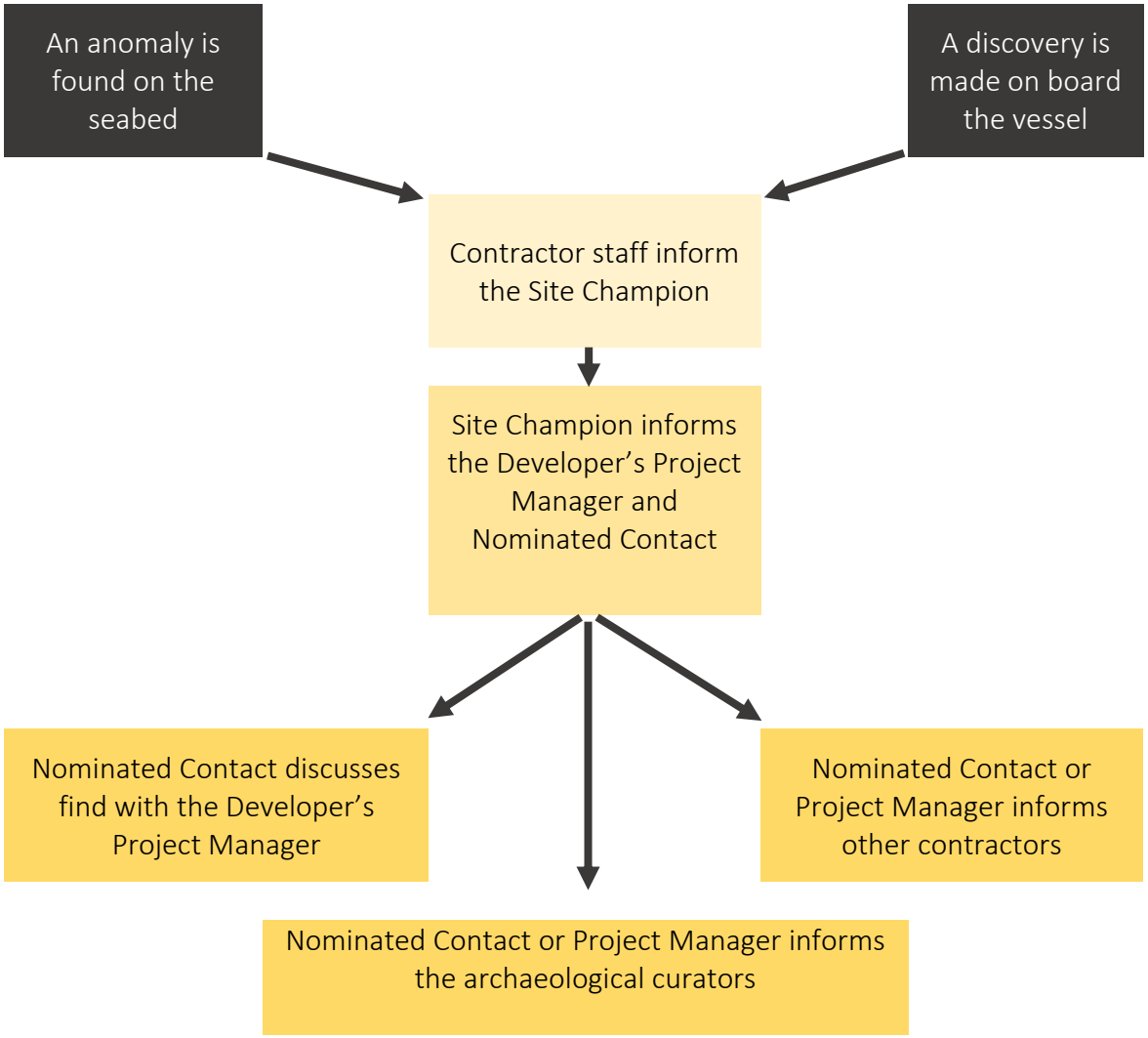


Table 7: Summary of the key roles and chain of communication

8.4 Actions by the Project Staff and Site Champion

8.4.1 Actions required by the Project Staff and Site Champion are set out in Table 8 and are discussed here.

8.4.2 The first step is the recognition of a find of potential archaeological interest. If finds or features are identified by the Project Staff they should then be reported to the Site Champion. The Site Champion will then undertake a series of actions: Stop; Record and Inform, as set out within Table 8. They should ensure works in the vicinity are stopped and a Temporary Archaeological Exclusion Zone (TAEZ) is put in place. They should ensure that the find is recorded in the vessel log, navigational software and within the Preliminary Record Form (see Section 10). The Site Champion should inform the Nominated Contact and Developer's Project Manager and pass over any records. They should also ensure that if any finds have been recovered from the seabed, that they are stored appropriately. Advice on storage is set out within this document and can be sought from the Nominated Contact.

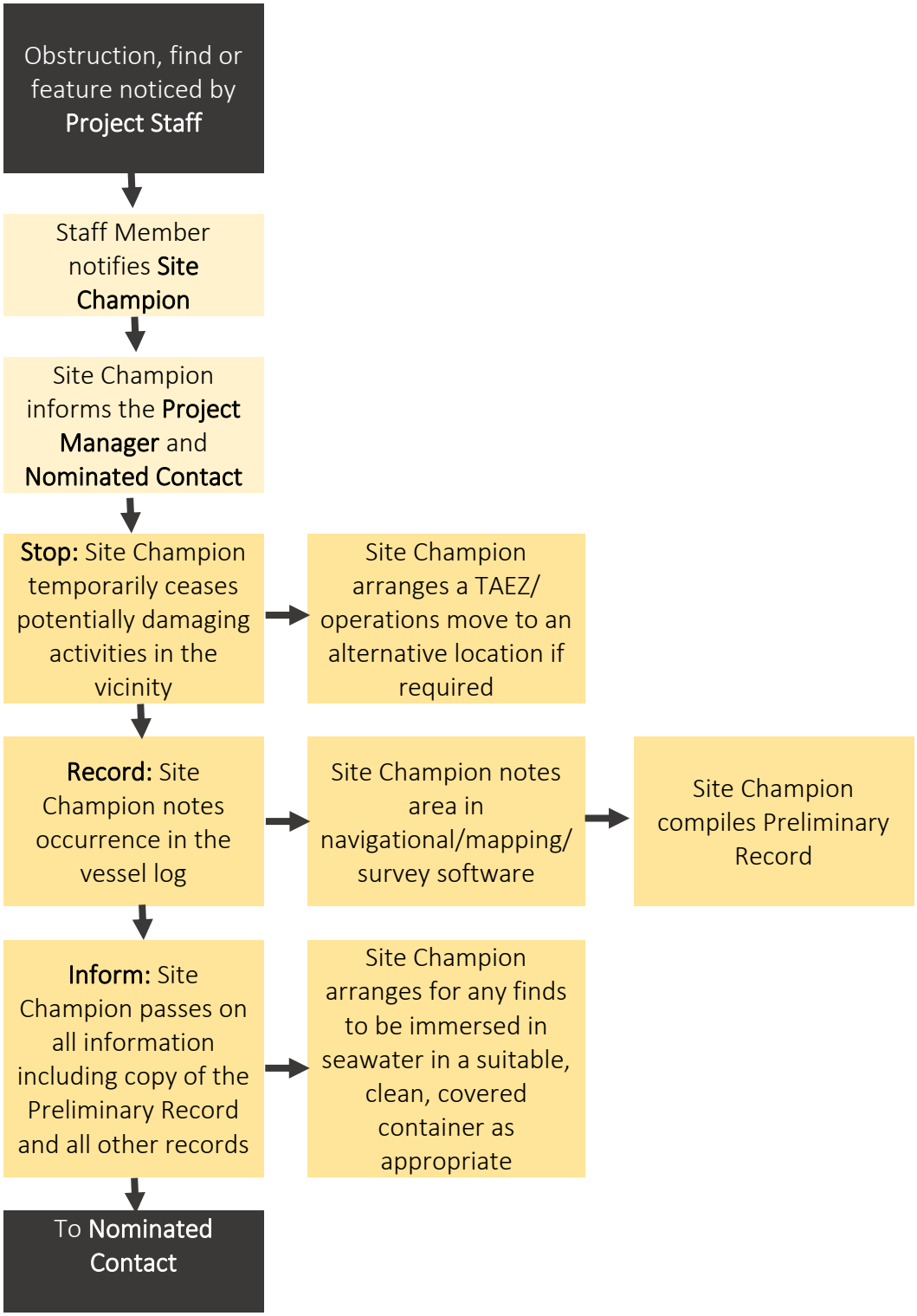


Table 8: Actions by the Project Staff and Site Champion

8.5 Actions by the Nominated Contact

8.5.1 Actions required by the Nominated Contact are set out in Table 9. The Nominated Contact will confirm the details laid out in the Preliminary Record with the Site Champion and then discuss with the Developer's Project Manager and pass on the details of the discovery. The Project Manager will inform any other vessels working in the area of the exclusion zone.

8.5.2 The Nominated contact will then review the discovery in order to determine whether it is of low or high archaeological potential. Low potential finds may be isolated finds (including anchors) or peat deposits that do not contain prehistoric archaeological remains. **High potential finds include finds that predate 1800 AD, finds that relate to an aircraft, multiple finds from the same area, reports indicating the presence of a wreck or other structural remains, or peat or other fine-grained sediments that contain worked flint, charcoal, or bone.**

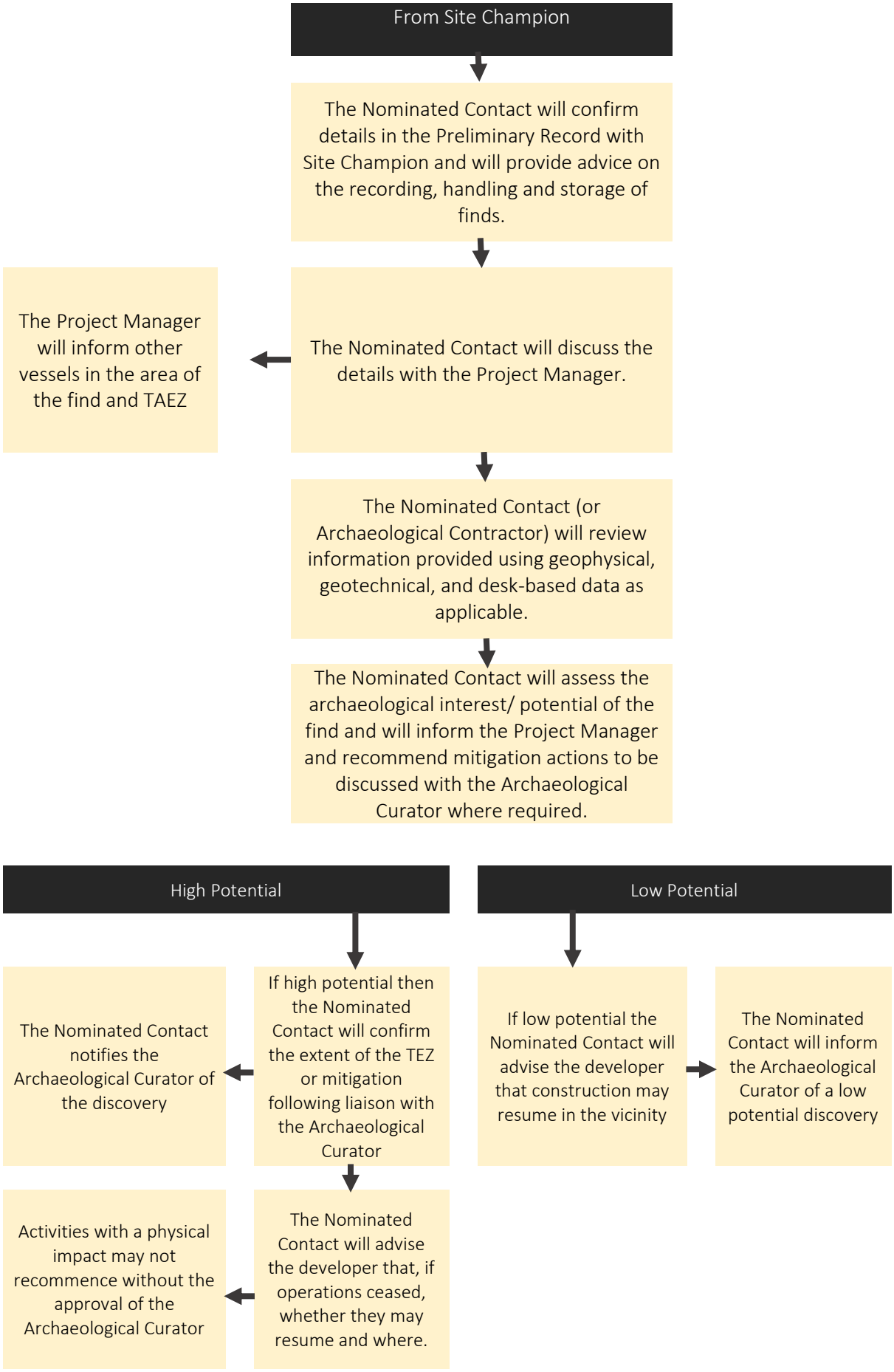
8.5.3 Once the potential has been established, the Nominated Contact will inform the Developer's Project Manager of this.

8.5.4 For reports that are deemed low potential, the Nominated Contact will generally advise that isolated finds be moved to wet storage and request an 'as found' record and an 'as left' record with photos and positions. The Nominated Contact should be contacted prior to moving any find using the PAD process.

8.5.5 For reports that are deemed high potential, the Nominated Contact (or archaeological contractor as necessary) will conduct a review of geophysical data and recommend the extent of the exclusion zone. They may also recommend other mitigation such as further archaeological investigation. Mitigation strategies will be devised in liaison with the Developer's Project Manager and the Archaeological Curator. The Nominated Contact will also advise when and where operations can continue. Physical impacts may not occur within exclusion zones without the approval of the Archaeological Curator.

8.5.6 The Nominated Contact will then make arrangements for any finds which have been recovered to be held in the possession of the developer. They will also produce a summary record and provide this to relevant stakeholders. A summary record will include advice on the identification of finds and the character of their seabed locations, an assessment of the archaeological potential of the report which will include the rationale for the conclusion reached, and advice on actions to be taken in respect of the discovery, including any recovered finds.

8.5.7 Any further actions taken are the responsibility of the developer, and are to be agreed with the Regulator and Archaeological Curator with the assistance of the Nominated Contact.


From Site Champion
The Nominated Contact will confirm details in the Preliminary Record with Site Champion and will provide advice on the recording, handling and storage of finds.
The Nominated Contact will discuss the details with the Project Manager.
The Project Manager will inform other vessels in the area of the find and TAEZ
The Nominated Contact (or Archaeological Contractor) will review information provided using geophysical, geotechnical, and desk-based data as applicable.
The Nominated Contact will assess the archaeological interest/ potential of the find and will inform the Project Manager and recommend mitigation actions to be discussed with the Archaeological Curator where required.
High Potential
Low Potential
If high potential then the Nominated Contact will confirm the extent of the TEZ or mitigation following liaison with the Archaeological Curator
The Nominated Contact notifies the Archaeological Curator of the discovery
The Nominated Contact will advise the developer that, if operations ceased, whether they may resume and where.
Activities with a physical impact may not recommence without the approval of the Archaeological Curator
If low potential the Nominated Contact will advise the developer that construction may resume in the vicinity
The Nominated Contact will inform the Archaeological Curator of a low potential discovery

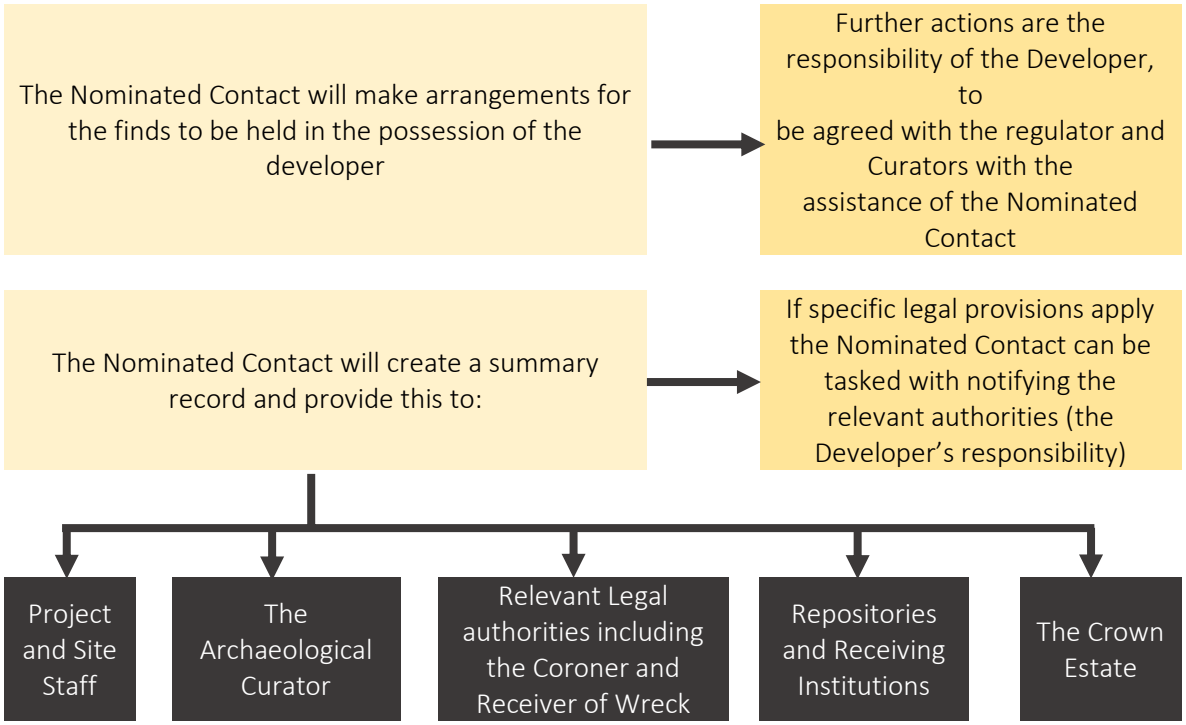


Table 9 Actions by the Nominated Contact

8.6 Legal Implications

8.6.1 It should be noted that if the wreck of an aircraft is encountered it can be automatically protected as a protected place under the terms of the Protection of Military Remains Act 1986 and it is an offence to tamper with, damage, or move the wreck or to remove items.

8.6.2 Furthermore, all items of 'wreck' are reportable to the Receiver of Wreck under the terms of the Merchant Shipping Act 1995. Reporting discoveries, anomalies and finds via the PAD will be sufficient to meet the requirements of the Act.

8.6.3 Other acts may apply in certain situations, depending on the nature of the find. Reporting under the PAD will result in advice from the Nominated Contacts in regards to specific legal requirements for different types of find. Specific Acts of relevance to different finds are detailed in Section 9 of this document.

9.0 Guidelines for Identifying and Handling Finds

9.1.1 The following guideline can be used to identify any discovered material and must be referred to when planning appropriate handling and storage. Advice on the identification of finds has been provided following the accepted advice provided by The Crown Estate in their Protocol for Archaeological Discoveries (2014).

9.1.2 Archaeological material can come in a variety of sizes, shapes, and materials. Materials can degrade in different ways so it is important that they are handled with care and that the appropriate handling and storage techniques are applied.

9.1.3 Finds are vulnerable to deterioration at all times, whether they are recovered or not. Fragile material, such as wood, can be damaged by the force of passing machinery. It is crucial that all finds be treated carefully, and interfered with as little as possible.

9.1.4 Leaving finds in situ is the best way to manage them. Once a find is recovered to the surface, it requires conservation which can be difficult and expensive to administer.

9.2 General advice for finds handling and storage:

- ⊕ Handle all finds carefully
- ⊕ Photograph all sides of a find with a scale
- ⊕ Take close up photographs of any markings, glazing, or imagery
- ⊕ Keep finds wet and ensure the water is changed regularly if biological growth is detected
- ⊕ Keep finds cool and ideally in the dark
- ⊕ Keep finds in protective containers where possible
- ⊕ Label any finds
- ⊕ Contact MSDS for advice on finds storage
- ⊗ Do not attempt to clean the find by removing any sediment build up, concretion, or marine life
- ⊗ Do not allow finds to dry out
- ⊗ Do not handle finds more than necessary

9.3 Metal

9.3.1 Metal is likely to survive in the marine environment, though it may corrode when in water or form concretions of material (a hard mass of material which typically has a mineral matrix, commonly formed around ferrous objects in particular). Typical metal finds might include ingots, ballast, coins, ornaments, tools, weapons, aircraft or ship parts, and personal items. If potential unexploded ordnance (UXO) is encountered this should be dealt with under a UXO protocol.

9.3.2 The Crown Estate (2014) Guidance for the identification of metals is as follows:

Iron and Steel

9.3.3 The potential range and date of iron and steel objects is so wide that it is difficult to provide general guidance. In broad terms, iron and steel objects which are covered by a thick

amorphous concrete-like coating ('concretion') are likely to be of archaeological interest and should be reported. Pieces of metal sheet and structure may indicate a wreck and should be reported. Specific operational measures are likely to apply in respect of ordnance (cannonballs, bullets, shells) which should take precedence over archaeological requirements. However, discoveries of ordnance may be of archaeological interest, and they should be reported.

Other Metals

9.3.4 Items made of thin, tinned or painted metal sheet are unlikely to be of archaeological interest. Aluminium objects may indicate aircraft wreckage from World War Two, especially if two or more pieces of aluminium are fixed together by rivets. All occurrences should be reported' and remains of this nature may be subject to the Protection of Military Remains Act 1986. 'Copper and copper alloy (bronze, brass) objects might indicate a wreck, or they may be very old. All occurrences should be reported. Precious metal objects and coins are definitely of archaeological interest because they are relatively easy to date. All occurrences should be reported' (The Crown Estate 2014: 19)

Actions to take:

9.3.5 If possible, do not recover metal. It can be difficult and expensive to conserve and some types of site, such as aircraft, can be covered by specific legislation which prohibits recovery without appropriate licences.

9.3.6 For metals which are lifted, lifting should be carried out carefully and the find should be photographed. All metals should be stored in cool seawater. Different metals should not be stored together. The shape of the concretion can be used to identify the item and as such concretions should not be removed. If the find is too large to cover in seawater, wrap it in soaked material and keep wet. Some metal products e.g. lead, pewter and copper salts can be toxic, so handle with gloves or wash hands thoroughly after contact.

9.3.7 Metals can sometimes be identified the colour of their corrosion. Table 10 below aims to help identify the type of metal used;

Metal	Corrosion
Gold	No corrosion
Silver	White, waxy layers that turn lilac in the light
Copper/Copper Alloy e.g., Bronze	Dark red/purple/green/blue
Iron/Steel	Black or rusty with a crust of concretion.
Lead	Grey or white crystals
Pewter/Tin/Lead Alloy	Grey surface, possibly crystalline, soft or friable
Aluminium	Little corrosion

Table 10 Guidance on the identification of metals

9.4 Ceramics

9.4.1 Pottery can be made from china, porcelain, terracotta, earthenware and other clay-based materials. Typical finds might include crockery, ornaments, clay pipes, lamps, containers and tableware.

9.4.2 Any fragment of pottery is potentially of interest, especially if it is a large fragment. Items which look like modern crockery can be discarded, but if the item has an unusual shape, glaze or fabric it should be reported (The Crown Estate 2014: 19). Additionally, clay pipes should be reported.

Actions to take:

9.4.3 Photograph finds with a scale, especially if they have any glazing or markings. Store in saltwater.

9.5 Ceramic Building Material

9.5.1 Ceramic building material can be in the form of bricks, building blocks, mudbricks, and tile. Bricks and tile can appear unusually shaped. Ceramic building material can be evidence of a ship, or submerged settlement.

9.5.2 Bricks with modern proportions and v-shaped hollows ('frogs') are of no archaeological interest. Unfrogged, 'small', 'thin' or otherwise unusual bricks may date back to Medieval or even Roman times and should be reported (The Crown Estate 2014: 19). Occurrences of tile should also be reported.

Actions to take:

9.5.3 Photograph finds with a scale, especially if they have any glazing or markings on them. Store in saltwater.

9.6 Stone

9.6.1 Stone has been used by humans for thousands of years and it very durable underwater, making it a common find. There are different types of stone: quartz, limestone, marble, granite, obsidian, slate, sandstone, and flint. Typical finds might include ballast, anchors, millstones building material, shot, carvings, tools, sculptures, whetstones, flint or stone tools and other personal items.

9.6.2 Small to medium size stones that are shaped, polished and/or pierced may be prehistoric axes. All occurrences should be reported. Objects such as axe heads or knife blades made from flint are likely to be of prehistoric date and should be reported. Large blocks of stone that have been pierced or shaped may have been used as anchors or weights for fishing nets. All occurrences should be reported. The recovery of numerous stones may indicate the ballast mound of a wreck, or a navigational cairn. All occurrences should be reported (The Crown Estate 2014: 19).

Actions to take:

9.6.3 Photograph with a scale and then store in water or wrap in soaked towelling.

9.7 Skeletal Material and Faunal Remains

9.7.1 Skeletal finds and faunal remains can come in the form of bone, ivory, tooth, antler, baleen, tortoiseshell, tusk, or shell. Typical finds might include human, or animal remains, personal items such as combs or jewellery, carvings, and tool handles.

9.7.2 Discoveries of animal bone, teeth and tusks are of archaeological interest because they may date to periods when the seabed formed dry land and should be reported. Such bones, teeth, tusks etc. may have signs of damage, breaking or cutting that can be directly attributed to human activity. Large quantities of animal bone may indicate a wreck (the remains of cargo or provisions) and should be reported. Human bone is definitely of archaeological interest, and may, if buried and found within territorial waters, be subject to the provisions of the Burial Act 1857. Alternatively, it may be subject to the Protection of Military Remains Act 1986. Any suspected human bone should be reported and treated with discretion and respect.

9.7.3 Objects made out of bone – such as combs, harpoon points or decorative items – can be very old and are definitely of archaeological interest. All occurrences should be reported (The Crown Estate 2014: 19).

Actions to take:

9.7.4 Skeletal finds are vulnerable to environment change, so if any are recovered, ensure they are photographed with a scale and then immediately submerged in seawater and sealed in a suitable container. Change the water if biological growth occurs e.g. algae mould.

9.8 Wood

9.8.1 Wooden finds could be evidence of a wrecked vessel. Typical wooden finds might include small personal items e.g. tools and bottle corks, or larger finds e.g. ships timbers, furniture, chests, barrels, dwelling posts, and wattle panels.

9.8.2 Light coloured wood, or wood that floats easily, is probably modern and is unlikely to be of archaeological interest. 'Roundwood' with bark – such as branches – is unlikely to be of archaeological interest, although it may provide paleo-environmental evidence. However, roundwood that has clearly been shaped or made into a point should be reported. Pieces of wood that have been shaped or jointed may be of archaeological interest, especially if fixed with wooden pegs, bolts, or nails – all occurrences should be reported. Objects made out of dark, waterlogged wood – such as bowls, handles, shafts and so on – can be very old and are definitely of archaeological interest. All occurrences should be reported (The Crown Estate 2014: 19).

Actions to take:

9.8.3 Timber finds are often very fragile and so must be lifted with care. Photograph with a scale. Do not allow the wood to dry out and ensure that it has sufficient support to stop it falling apart and submerge it in seawater. Keep the find in a cool and dark area. Change the water if biological growth is detected e.g. algae or mould. If the find is too large to store in water, try to keep it damp and cool in a darkened area.

9.9 Peat and Clay

9.9.1 Peat is black or brown fibrous soil that formed when sea level was so low that the seabed formed marshy land, for example on the banks of a river or estuary. Peat is made up of plant remains, and also contains microscopic remains that can provide information about the environment at the time it was formed. This information helps us to understand the kind of landscape that our predecessors inhabited, and about how their landscape changed. It can also provide information about rising sea-level and coastline change, which are important to understanding processes that are affecting us today. Prehistoric structures (such as wooden trackways) and artefacts are often found within or near peat, because our predecessors used the many resources that these marshy areas contained. As these areas were waterlogged and have continued to be waterlogged because the sea has risen, 'organic' artefacts made of wood, leather, textile and so on often survive together with the stone and pottery which are found on 'dry' sites.

9.9.2 Fine-grained sediments such as silts and clays are often found at the same places as peat. These fine-grained sediments also contain the microscopic remains that can provide information

about past environments and sea level change. Any discoveries of such material would be of archaeological interest, and their occurrence should be reported (The Crown Estate 2014: 20).

Actions to take:

9.9.3 Any sediments collected should be stored in a sealed container with seawater and keep cool. Do not try to break apart the deposits.

9.10 Fibre and Textiles

9.10.1 Fibrous finds are unlikely to survive in marine conditions, but occasionally they do. Typical fibrous finds might include ropes and rigging, weaving, sailcloth, sacks, clothing, basketry, fishing nets etc.

Actions to take:

9.10.2 Due to the incredibly fragile nature, once any fibrous or textile find has been recovered it must be dealt with quickly. Take photographs with a scale, but do not use flash. Carefully place it in a sealed container. Try to keep it out of the light. If possible, keep the find in its original burial deposit i.e. the sediment it was found in, and seawater. This will help to protect the material.

9.11 Plastic, Rubber etc.

9.11.1 In most cases, rubber, plastic, Bakelite and similar modern materials are not of archaeological interest and can be disregarded. One exception is where such materials are found in the same area as aluminium objects and structures, which may indicate aircraft wreckage from World War Two. Such material should be reported (The Crown Estate 2014: 14) and should not be removed from the site.

Actions to take:

9.11.2 Do not bend or clean any plastic or rubber finds. Photograph the find with a scale and then store in seawater in a cool and dark area.

9.12 Resinous or Mineral Substance

9.12.1 These materials include amber, jet, coal, or bitumen. Typical finds might include ornaments, jewellery, beads, sealants, or caulking materials, all of which would be of archaeological interest and should be reported.

Actions to take:

9.12.2 These finds might appear stable, but if they are not stored properly, they may begin to deteriorate. Photograph a find with a scale, and then keep stored in seawater.

9.13 Glass

9.13.1 Glass artefacts are found on the seabed. Finds may include bottles, beads, panes of glass from ship's windows. Unless obviously modern (beer bottles etc) glass finds should be reported, particularly where it occurs alongside other finds as this may represent a wreck site.

9.13.2 Glass is likely to survive in marine conditions, but it does degrade; glass deterioration is usually categorised by leaching, with causes an iridescent pattern to form on the glass, it looks somewhat like an oil slick. It can also begin to flake away.

Actions to take:

9.13.3 Photograph with a scale before packing carefully to avoid breakage. Ensure it is covered in cool seawater in the dark.

10.0 Preliminary Record Form

10.0.1 Preliminary Record Form: Discoveries on the seabed/ on board a vessel/ within a core

Protocol for Archaeological Discoveries	
Preliminary Record Form: Discoveries on the seabed/ on board/ in the intertidal zone / on land	
Company Name	
Vessel/ Team Name	
Site / Sea Area Name	
Date	
Time of compiling information	
Name of compiler (Site Champion)	
Name of finder (if different from above)	

Time at which discovery was encountered			
Vessel position at time when anomaly was encountered			
Latitude		Longitude	
Datum (if different from WGS84)			
Original position of the anomaly on the seabed, if known			
Notes on likely accuracy on position stated above:			
How accurate is the position?			
Is the position the original position or has the material been moved by operations?			
Details of circumstances that led to the discovery			
Description of the find / anomaly			
Apparent size /extent of the anomaly			
Details of any find(s) recovered			
Details of any photographs, drawings of other records made of the find(s) e.g. location figure			
Details of treatment or storage of find(s)			
Date and time Nominated Contact informed			
General notes			
If discovered on the seabed:			

Derived from e.g. Obstacle Avoidance Sonar, Cable Tensiometer?			
Apparent size/ extent of anomaly (length, width, height above seabed)			
Extent of deviation/ route development			
Signed		Date	

APPENDIX 18.1

Scottish Greenhouse Gas Statistics 2021

SCOTTISH GREENHOUSE GAS STATISTICS 2021

18.1 Scottish Greenhouse Gas Statistics 2021

18.1.1 Source emissions

A measure of the actual emissions or removals in Scotland including international aviation and shipping. This measure can be used for UK and international comparisons.

There was 41.6 MtCO2e in 2021.

- Down 49.2% from 1990.
- Down 2.4% from 2020.

18.1.2 Emissions for reporting against targets

The Committee for Climate Change (CCC) recommended a new method of reporting emissions for the purposes of monitoring performance against targets for the June 2020, and future, publications. This is known as the GHG Account.

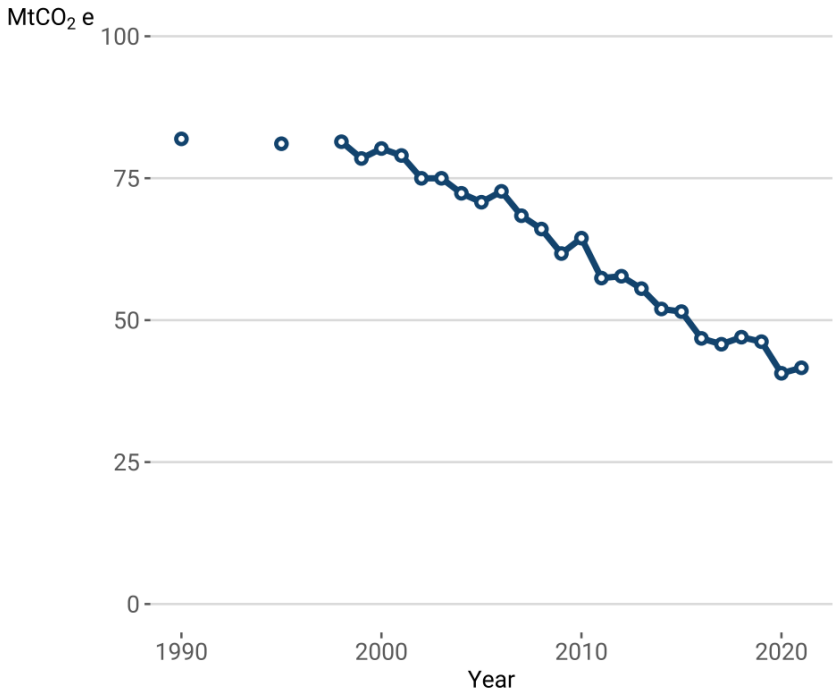
On this adjusted basis, the GHG account reduced by 49.9% between the baseline period and 2021.

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 specifies a target reduction of 51.0% reduction over the same period. Therefore, the interim target for 2021 has not been met.

18.1.3 Key trends – Source Emissions

Between 1990 and 2021, there was a 49.2% reduction in estimated emissions, a 41.6 MtCO2e decrease as shown in Figure 0.1.

Figure 0.1: Scottish Greenhouse Gas Emissions, 1990 to 2021. Values in MtCO2e



(Source: Scottish Greenhouse Gas Statistics 2021)

The most significant contribution from this overall reduction came from:

- Reduction in Energy Supply emissions (such as power stations) (-16.8 MtCO2e; 77.6 per cent reduction)
- 'Land Use, Land Use Change and Forestry' (LULUCF) reducing its net emissions over the period, reducing by 5.7 MtCO2e since 1990.
- Reduction in Waste Management emissions (such as Landfill) (-5.0 MtCO2e; a 76.2 per cent reduction)
- Reduction in Business emissions (-4.2 MtCO2e; a 35.3 per cent reduction)
- Reduction in Domestic transport emissions (-2.6 MtCO2e; a 19.3 per cent reduction) Introduction to Greenhouse Gases

This publication uses the results of the Scottish Greenhouse Gas Inventory for 1990-2021 which is compiled in line with international guidance from the Intergovernmental Panel on Climate Change (IPCC). The data is reported by source sector, such as energy supply, and greenhouse gas, such as carbon dioxide.

"Scottish Greenhouse Gas Emissions 2021" includes data on two categorisations of greenhouse gas emissions.

- Estimated net source emissions. These are sometimes referred to as "territorial" emissions, as they are produced within a country's territory or economic sphere.
- GHG account. These are net source emissions which have been adjusted to remove the effect of successive revisions to the data over time.

The publication does not include any information on consumption-based emission estimates, which refers to GHG emissions associated with the spending of Scottish residents on goods and services wherever in the world these emissions arise together with emissions directly generated by Scottish households, through private heating and motoring.

The table below shows how to use the different categorisations of statistics on greenhouse gas emissions.

Table 0.1: Guidance on the use of Estimated Source Emissions and GHG Account

	Estimated Source Emissions	GHG Account
Use for reporting progress against Scotland's Climate Change Targets	×	✓
Can be compared with EU countries	✓	×
Can be compared with UK[1]	✓	×
Includes International Aviation and Shipping	✓	✓

[1] Direct comparisons between Scotland and the UK can be made by adding up the results for the four Devolved Administrations separately. The UK figure in this case would exclude offshore emissions.

	Estimated Source Emissions	GHG Account
Includes North Sea Oil & Gas	×	×
Data on individual GHG	✓	×
Data on sectoral emissions	✓	×
Base Year	1990	Baseline Period (Variable)

18.1.4 Which Greenhouse Gases are Reported on and how do they contribute to Global Warming?

The basket of greenhouse gases consists of carbon dioxide, methane, nitrous oxide, and the four F-gases (hydrofluorocarbons- HFCs, perfluorocarbons – PFCs, sulphur hexafluoride- SF_6 and nitrogen trifluoride- NF_3).

These gases are weighted by Global Warming Potential (GWP), so that total greenhouse gas emissions can be reported on a consistent basis. The GWP for each gas is defined as its warming influence relative to that of carbon dioxide over a 100-year period. Greenhouse gas emissions are then presented in carbon dioxide equivalent (CO_2e) units. In the case of some of the F-gases, the global warming potential is listed as being within a range of values, due to the gases existing as a variety of isotopes with differing GWPs.

Table 0.2: List of GHG and their contribution to Scotland's net GHG emissions, 2021

Name of GHG	Chemical Formula	Global Warming Potential (GWP) (Conversion Factor to Carbon Dioxide Equivalent)	Contribution to Scotland's Net Greenhouse Gas Emissions, 2020 (in $MtCO_2e$)	Percentage of Scotland's Net Greenhouse Gas Emissions, 2020 (in $MtCO_2e$)
Carbon dioxide	CO_2	1	27.5	66.0%
Methane	CH_4	28	10.2	22.4%
Nitrous oxide	N_2O	265	3.0	7.2%
F-gases 2, of which….			0.9	2.2%
• Hydrofluorocarbons	HFC	4 -12,400	0.8	2.0%
• Perfluorocarbons	PFC	6,630-11,100	0.1	0.1%
• Sulphur hexafluoride	SF_6	23,500	0.0	0.1%
• Nitrogen trifluoride	NF_3	16,100	0.0	0.0%

Name of GHG	Chemical Formula	Global Warming Potential (GWP) (Conversion Factor to Carbon Dioxide Equivalent)	Contribution to Scotland's Net Greenhouse Gas Emissions, 2020 (in $MtCO_2e$)	Percentage of Scotland's Net Greenhouse Gas Emissions, 2020 (in $MtCO_2e$)
Total Net Greenhouse Gases			41.6	100.0%

The above GWPs are based on international reporting standards, as set by the IPCC.

18.1.5 Reporting of the Baseline Period and 1990

A single 1990 Base Year is used for all estimated source emissions. This year is referred to as "1990" in charts, tables and text.

A different baseline is used for the reporting progress against Scotland's Climate Change Targets, using the GHG account. This is referred to as "Baseline Period" when referring to changes over time in the charts, tables and text.

The Baseline Period for reporting against Climate Change Targets is:

- 1990 for carbon dioxide carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N2O).
- 1995 for Fluorinated gases (F gases)[2]: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6), nitrogen trifluoride (NF_3).

[2] The Kyoto Protocol allows Parties flexibility to choose either 1990 or 1995 as the base year for the industrial gases. Using a 1995 base year is in line with the approach adopted by the UK Government and many EU Member States.

18.1.6 Categories

For the purpose of reporting, GHG emissions are allocated into the following sections:

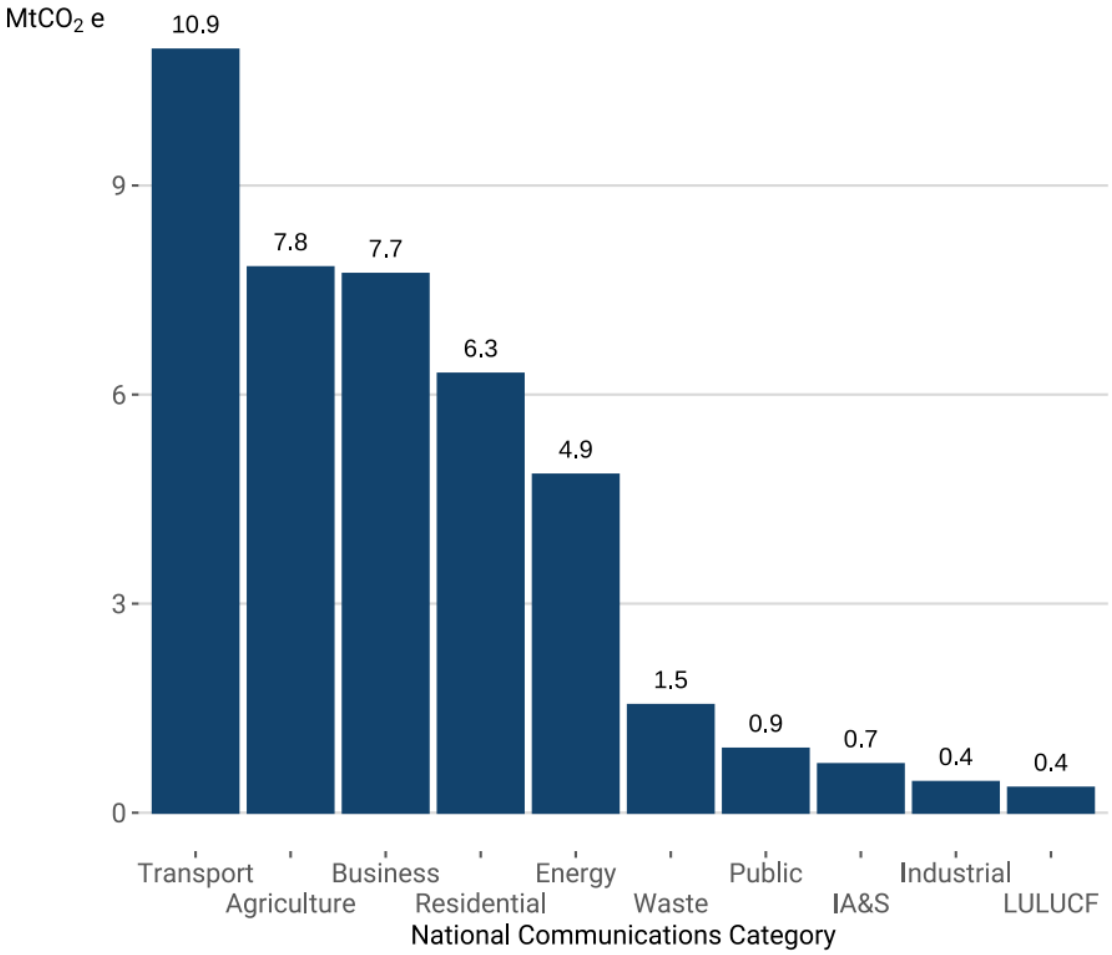
- Energy Supply: Emissions from fuel combustion for electricity and other energy production sources, and fugitive emissions from fuels (such as from mining or onshore oil and gas extraction activities). North Sea oil & gas emissions are not allocated to Scotland[3].
- Business: Emissions from fuel combustion and product use in industrial and commercial sectors, and F gas emissions from refrigeration and air conditioning in all sectors. Includes industrial off-road machinery
- Industrial Processes: Emissions resulting from industrial processes, except for those associated with fuel combustion which are included in the Business sector.
- Transport (excluding International Aviation and Shipping): Emissions from domestic aviation, road transport, railways, domestic navigation, fishing and aircraft support vehicles.
- International Aviation and Shipping: This category is called "Exports" in some inventories. Includes emissions from international aviation and shipping.
- Public: Emissions from combustion of fuel in public sector buildings.
- Residential: Emissions from fuel combustion for heating/cooling and garden machinery and fluorinated gases released from aerosols/metered dose inhalers.
- Agriculture: Emissions from livestock, agricultural soils (excluding carbon stock changes which are included in the LULUCF sector), stationary combustion sources and off-road machinery.
- Waste Management: Emissions from waste disposed of to landfill sites, waste incineration, and the treatment of wastewater.
- Land Use, Land Use Change and Forestry (LULUCF)– Emissions/removals of CO_2 from changes in the carbon stock in forestland, cropland, grassland, wetlands, settlements and harvested wood products, and of other greenhouse gases from drainage (excl. croplands and intensive grasslands) and rewetting of soils, nitrogen mineralisation associated with loss and gain of soil organic matter, and fires. Because the impact of biomass harvest on carbon stocks in ecosystems is included in this sector, any emissions of CO_2 from burning biomass (regardless of the country of origin) are excluded from other sectors to avoid double counting them.

[3] Emissions of GHGs from offshore oil and gas exploration and production are classified within the Greenhouse Gas Inventory as "Unallocated" emissions and not attributed to any of the devolved administrations.

18.2 Results – Net Sources of Scottish Greenhouse Gas Emissions

In 2021, Domestic transport (excluding International Aviation and Shipping) (10.9 $MtCO_2e$) was the largest source of net emissions, followed by Agriculture (7.8 $MtCO_2e$), Business (7.7 $MtCO_2e$), Residential (6.3 $MtCO_2e$) and Energy Supply (4.9 $MtCO_2e$). Figure 0.2 and Table 0.3 show these results.

Figure 0.2: Sources of Scottish Greenhouse Gas Emissions, 2021. Values in MtCO2e



(Source: Scottish Greenhouse Gas Statistics 2021)

Table 0.3: Scottish Greenhouse Gas Emissions by Gas and by National Communications Category, 2021. Values in $MtCO_2e$

NC Category	Carbon Dioxide	Methane	Nitrous Oxide	Fluorinated gases	Total
Agriculture	1.2	4.6	2.0	0.0	7.8
Business	6.8	0.0	0.1	0.8	7.7
Energy Supply	4.4	0.4	0.0	0.0	4.9
Industrial processes	0.4	0.0	0.0	0.0	0.4
International aviation and shipping	0.7	0.0	0.0	0.0	0.7
Land use, land use change and forestry	-4.0	3.7	0.7	0.0	0.4

NC Category	Carbon Dioxide	Methane	Nitrous Oxide	Fluorinated gases	Total
Public	0.9	0.0	0.0	0.0	0.9
Residential	6.1	0.1	0.0	0.1	6.3
Transport	10.8	0.0	0.1	0.0	10.9
Waste Management	0.0	1.4	0.1	0.0	1.5
Grand Total	27.5	10.2	3.0	0.9	41.6

18.2.1.1 Main Points

Carbon dioxide was the main greenhouse gas emitted or removed in most sectors, with the exceptions of the Agriculture and Waste Management sectors.

Methane was the main net gas emitted in the agriculture (4.6 $MtCO_2e$), followed by nitrous oxide (2.0 $MtCO_2e$) and carbon dioxide (1.2 $MtCO_2e$).

Almost all emissions in the Waste Management sector were emitted in the form of methane (1.2 $MtCO_2e$).

All sectors exhibit a general downwards trend between 1990 and 2021:

- Energy Supply emissions have seen the largest decrease in GHG emissions (-16.8 $MtCO_2e$, a reduction of 77.6%) followed by LULUCF (-5.7 $MtCO_2e$, a reduction of 94.1%), Waste Management (- 5.0 MtCO2e, a reduction of 76.2 per cent), and Business (-4.2 MtCO2e, a reduction of 35.3 per cent).
- This is as a result of the change in electricity supply sector, with renewables on the increase, and fossil fuels and nuclear energy decreasing.

Overall, the gigawatt-hours of electricity generated in Scotland decreased by 7.0 per cent between 2020 and 2021. Renewables were the single largest source of electricity generated in Scotland in 2021 at 57.0 per cent, followed by nuclear generation at 29.8 per cent with fossil fuel generation making up only 10.9 per cent of total electricity generation.

18.2.1.2 Total Emissions

Overall, there has been a 40.3 MtCO2e (49.2 per cent) decrease in net emissions between 1990 and 2021. Total emissions have increased by 1.0 MtCO2e (2.4 per cent) between 2020 and 2021.

18.2.1.3 Land Use, Land Use Change and Forestry (LULUCF)

LULUCF is a net source of GHG emissions in Scotland in 2021, emitting 0.4 MtCO2e of net emissions. In 1990 net emissions were 6.0 MtCO2e. In the periods 2011-2014, and 2016-2017, LULUCF exhibited net removals of greenhouse gases in Scotland.

For each sub-sector of the land use sector in 2021, that the net total includes some significant emissions sources, and equally significant ‘sinks’ which remove carbon dioxide from the atmosphere. Forestry and the related 17 ‘harvested wood products’ categories are net sinks of GHG emissions in 2021, removing a net amount of GHG emissions of 7.3 MtCO2e and 1.7 MtCO2e respectively. All other land use types are net sources of greenhouse gas emissions, with croplands, grassland, settlements and wetland showing substantial net emissions to the atmosphere.

18.2.1.4 Domestic transport

Domestic Transport has consistently been a large part of Scotland's emissions. This sector showed dramatic reduction in emissions associated with the COVID-19 lockdown in 2020 (-2.6 MtCO2e) but have rebounded in the latest year by 1.1 MtCO2e.

18.2.1.5 Energy supply

Energy Supply was historically the biggest contribution to emissions, but has seen large changes over the period covered by these statistics, reducing from 21.7 18 MtCO2e in 1990 to 4.9 MtCO2e in 2021 (77.6 per cent reduction). Overall emissions reductions in this sector are mainly due to reductions in emissions from power stations and the complete cessation of coal use for electricity generation in Scotland.

Between 2020 and 2021 Energy Supply emissions decreased by 0.5 MtCO2e (9.2 per cent decrease). This decrease was driven by a decrease in CO2 emissions from power stations.

EfW emissions have historically been very low and only reached a notable level from 2019 when these emissions equalled 0.3 MtCO2e. Emissions have stayed at this level since, but we expect future increases in these emissions as more plants, currently under construction, begin operation. In 2021, EfW plants contributed 19 per cent of total emissions from electricity generation.

18.2.1.6 Business

This sector has seen a 4.2 MtCO2e (35.3 per cent) fall in emissions between 1990 and 2021. Much of this decrease occurred between 1990 and 1995 – linked to a decline in emissions from manufacturing and the iron and steel industry over this time period. There was a further smaller reduction between 2008 and 2009 (-1.0 MtCO2e), coinciding with the recession. Between 2020 and 2021 there was a reduction of 0.2 MtCO2e in total emissions from business.

18.2.1.7 Agriculture

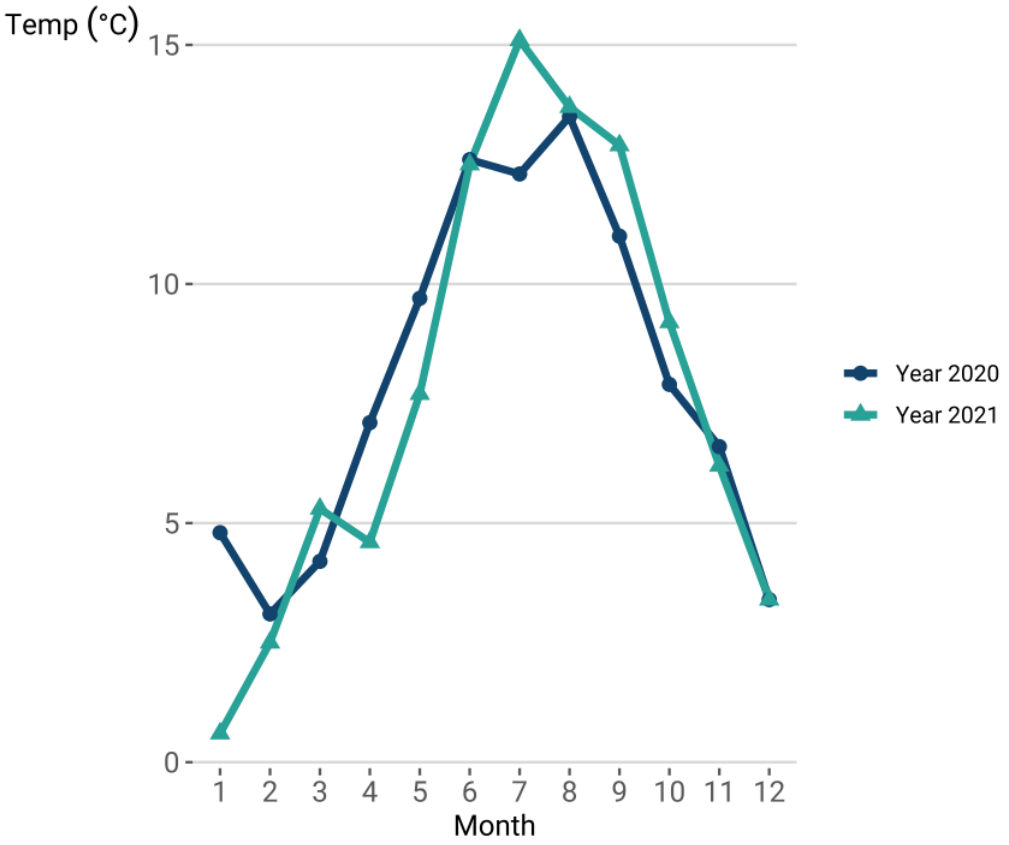
This sector has seen a 0.9 MtCO2e (10.8 per cent) fall in emissions between 1990 and 2021. Between 2020 and 2021 there was an increase of 0.1 MtCO2e (1.9 per cent).

18.2.1.8 Residential

The residential sector is dominated by direct fuel combustion for home heating in households. There has been a reduction of 21.0 per cent between 1990 and 2021. This long-term decrease is mainly due to a switch from less efficient solid and liquid fuels to natural gas for heating, and improvements in energy efficiency.

Residential emissions increased between 2020 and 2021 from 5.9 MtCO2e to 6.3 MtCO2e (+7.2 per cent). This change in emissions was caused by relatively colder temperatures in January, February and April 2021, resulting in more fuel being used for domestic heating.

Figure 0.3: Mean air temperature by month, Scotland. 2020 and 2021. Values in °C



(Data Obtained from Met Office[4])

18.2.1.9 International aviation and shipping

International aviation was affected dramatically during the early part of the COVID-19 restrictions with international shipping affected to a lesser degree.

- Between 1990 and 2021, international aviation and shipping decreased by 0.6 MtCO2e (47.3 per cent).
- Between 2020 and 2021 international aviation and shipping emissions decreased by a further 0.1 MtCO2e (15.2 per cent decrease).

18.2.1.10 Waste management

Waste management emissions are dominated by methane emissions. Emissions from Waste Management have been relatively static over recent years, with a value of 1.5 MtCO2e for 2021, with no significant change from 2020.

However, between 1990 and 2021 emissions reduced by 5.0 MtCO2e (76.2 per cent). This decrease is largely due to the progressive introduction of methane capture and oxidation systems within landfill management.

[4] Source Met Office: http://www.metoffice.gov.uk/pub/data/weather/uk/climate/datasets/Tmean/date/Scotland.txt

18.2.1.11 Public

The main source of emissions from this sector is the use of natural gas for heating public buildings.

- There was a 1.3 MtCO2e (59.5 per cent) fall in emissions from public sector buildings between 1990 and 2021.
- Emissions over the last few years have been relatively flat, with a value of 0.9-1.0 MtCO2e between 2014 and 2021.

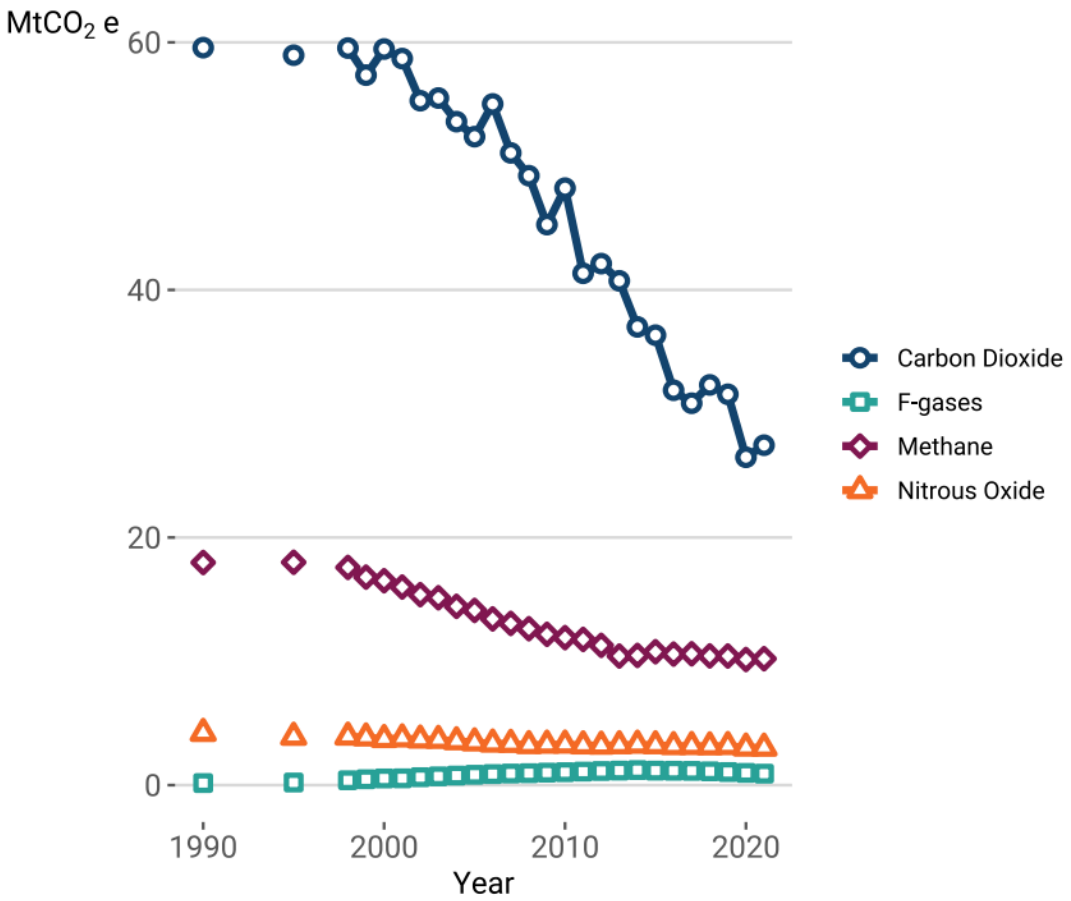
18.2.1.12 Industrial processes

This sector has seen a 1.4 MtCO2e (76.4 per cent) decrease from 1990 to 2021. Values have been relatively stable in recent years, with 2021 having a value of 0.4 MtCO2e. Most of the decrease in the sector happened between 1990 and 1995 and was associated with decreased emissions in the Nitric acid production industry and from a process known as sintering – a process associated with the iron and steel industry.

18.2.1.13 Emissions by type of gas

Figure 0.4 shows the trends in emissions, broken down by gas from 1990 to 2021.

Figure 0.4: Scottish Greenhouse Gas Emissions, by Gas, 1990-2021. Values in MtCO2e



(Source: Scottish Greenhouse Gas Statistics 2021)

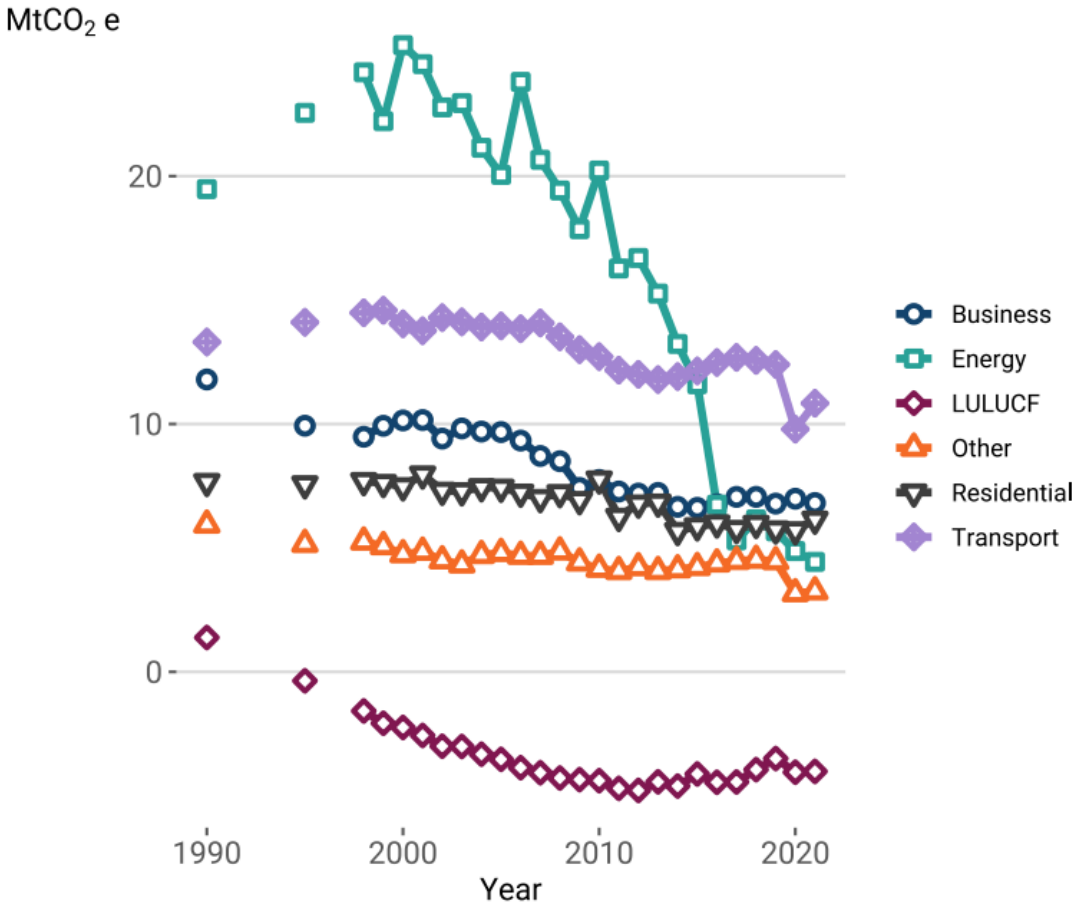
Carbon dioxide is by far the largest contributor to Scottish greenhouse gas emissions in all years (66.0 per cent of all emissions in 2021) and is the most 22 volatile series of all gases – largely driven by changes in energy supply emissions and to a lesser extent, emissions from the residential and business categories.

Methane is the second most common greenhouse gas in 2021 (24.5 per cent of all net emissions) followed by nitrous oxide (7.2 per cent) and F-gases making up the remainder (2.2 per cent).

Carbon dioxide has seen the largest reduction from 1990 to 2021 (32.1 MtCO2e reduction). There have also been reductions in both methane (7.8 MtCO2e reduction) and nitrous oxide (1.2 MtCO2e reduction). Emissions from fluorinated gases showed a large increase from 1990 to 2013 but have been declining since 2016. Although they remain small in absolute terms, driven by the introduction of hydrofluorocarbons (HFCs) from 1995 onwards. These HFCs replace chlorofluorocarbons (CFCs) which were banned by the Montreal Protocol due to their impact on the ozone layer.

18.2.1.14 Carbon dioxide (CO2)

Figure 0.5: Carbon Dioxide (CO2) Emissions by National Communications Category, 1990 to 2021. Values in MtCO2e

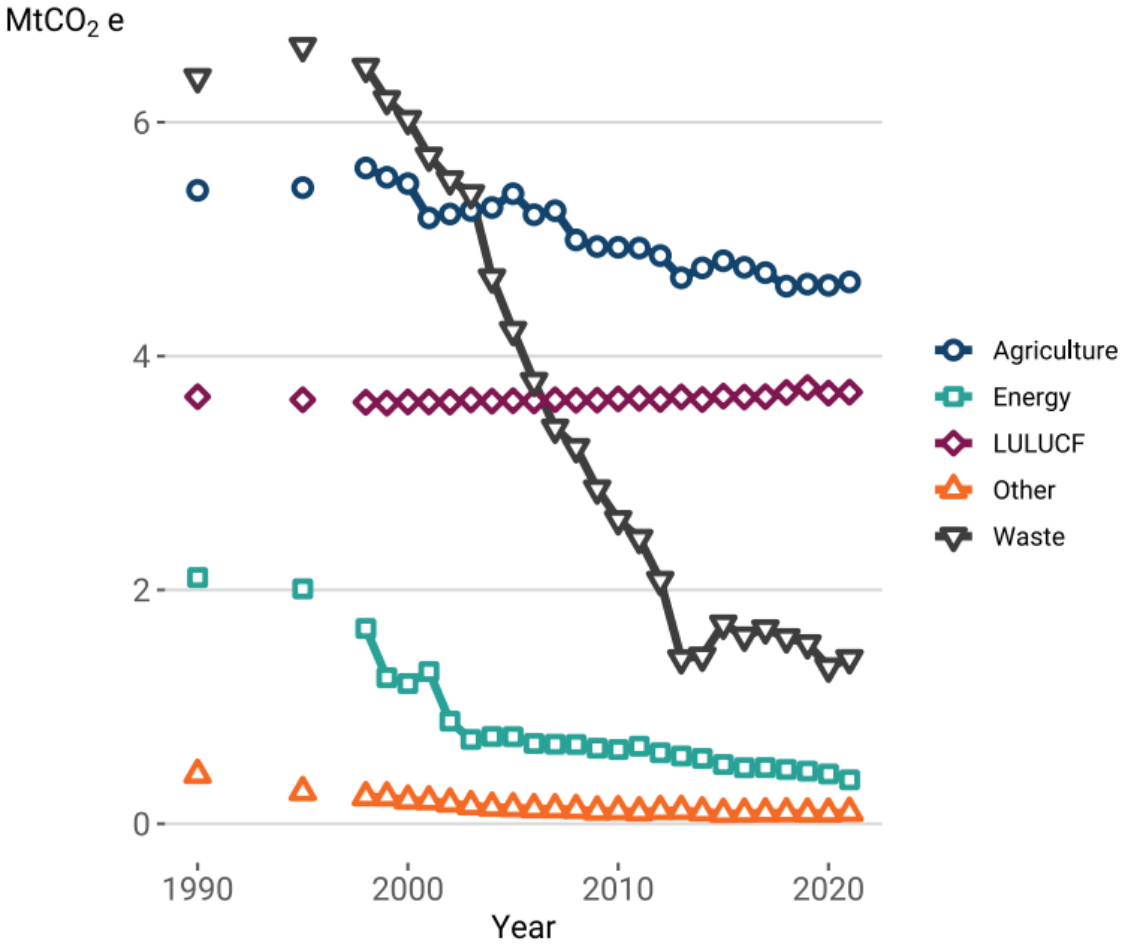


(Source: Scottish Greenhouse Gas Statistics 2021)

- Figure 0.5 shows that Energy Supply is a key source of carbon dioxide emissions in all years between 1990 and 2015, after which the change in fuels used in electricity generation substantially reduces CO2 emissions from this source. Change in energy supply emissions is the main driver of changes in total carbon dioxide emissions. Emissions from this category have been volatile, with the highest emissions occurring between 1995 and 2003, and a spike in 2006, related to a greater use of coal in that year. •
- Transport (excluding international) is the next most common source of carbon dioxide emissions across the entire time-series. In 2015 Transport became the highest source of emissions for the first time in the time series.
- Despite revisions to total greenhouse gases for the LULUCF sector, it has become a much greater net CO2 sink for Scotland over the period. In 1990 it emitted 1.4 MtCO2 of net CO2 emissions. From 1995, this sector became a net-CO2 sink, reaching a maximum in 2012 when it acted to sequestrate 4.8 MtCO2.

Since that time, this net CO2 sink has been generally reducing to its current (2021) level where it reached net CO2 emissions of -4.0 MtCO2 These 24 trends reflect forestry planting activities in the early 1990s reaching maturity and gradually reducing its potential to remove CO2.Methane (CH4)

Figure 0.6: Methane (CH4) Emissions by National Communications Category 1990 to 2021. Values in MtCO2e

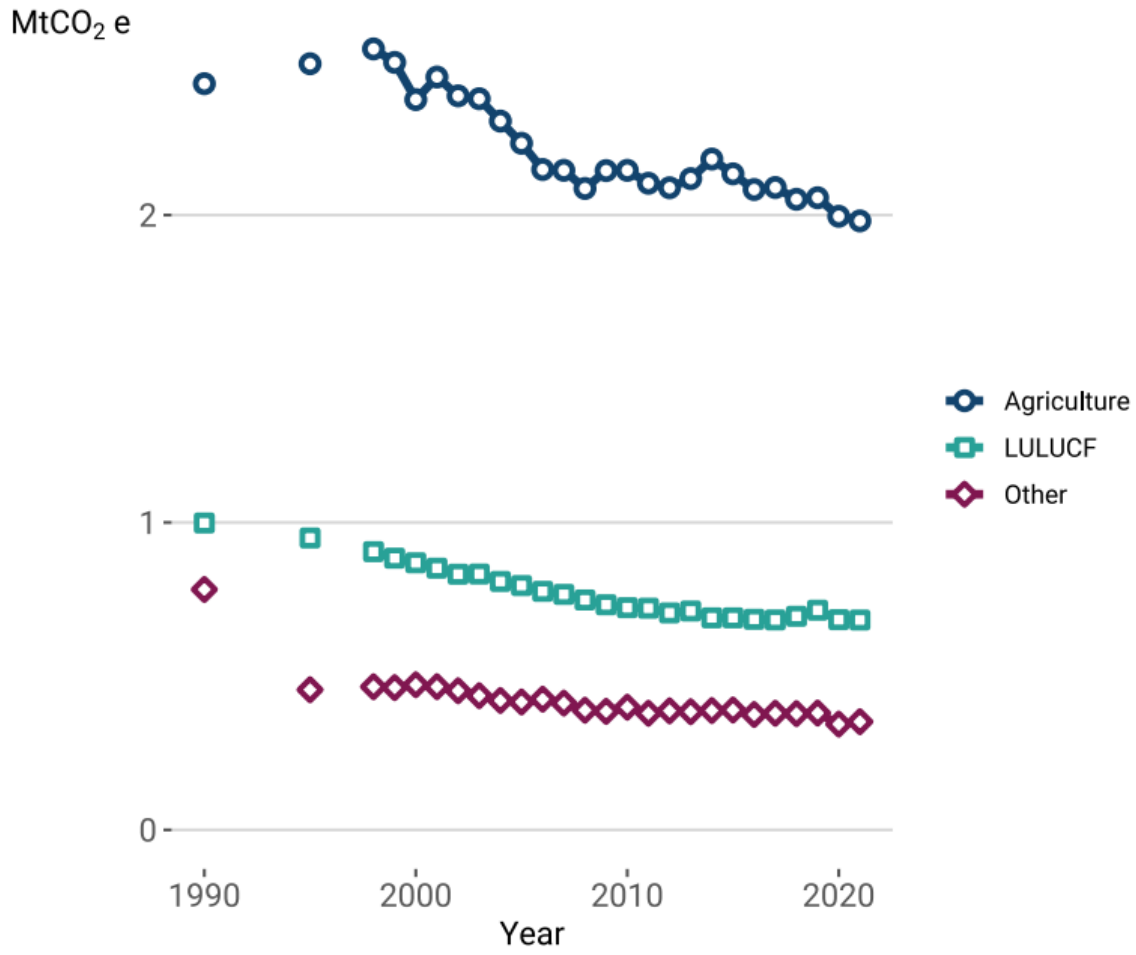


(Source: Scottish Greenhouse Gas Statistics 2021)

- Methane emissions from Waste Management have fallen by 5.0 MtCO2e between 1990 and 2021 (a 77.9 per cent reduction). This is largely due to the progressive introduction of methane capture and oxidation systems within landfill management.
- In the Energy Supply sector, methane emissions have fallen by 1.7 MtCO2e between 1990 and 2021 (a 82.1 per cent reduction), partly due to reductions in emissions from sources such as coal mining.
- Methane emissions in the Agriculture sector have fallen by 0.8 MtCO2e between 1990 and 2021 (a 14.5 per cent reduction). This is mainly due to a decrease in livestock numbers (particularly cattle and sheep).
- Land Use emissions of methane have risen very slightly over the entire time series.

18.2.1.15 Nitrous oxide (N2O)

Figure 0.7: Nitrous Oxide (N2O) Emissions by National Communications Category, 1990 to 2021. Values in MtCO2e

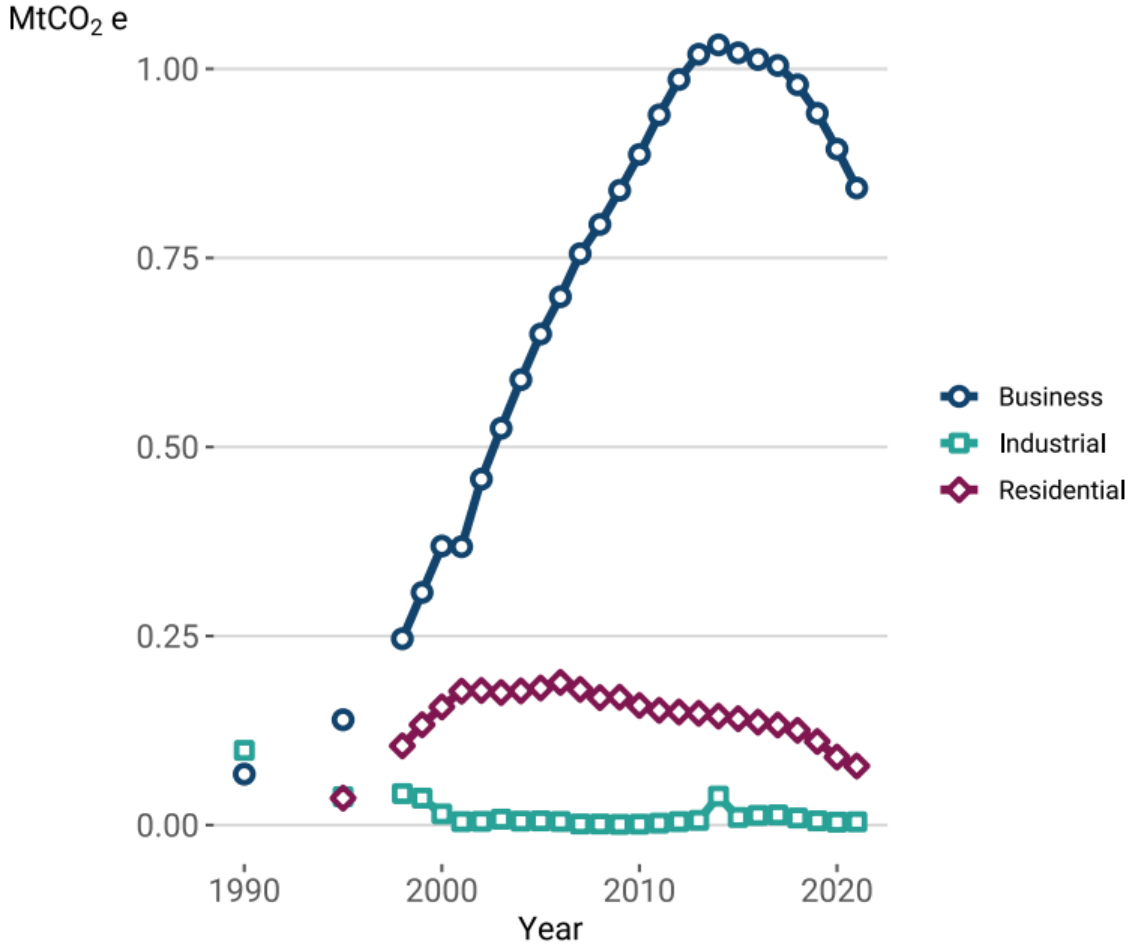


(Source: Scottish Greenhouse Gas Statistics 2021)

- Agriculture is by far the main contributor to emissions of nitrous oxide. These are largely produced by agricultural practices on soils, and to a lesser extent by animal manures. Emissions of nitrous oxide in this sector have fallen by 0.4 MtCO2e between 1990 and 2021 – an 18.4 per cent reduction.
- 'Land Use, Land Use Change and Forestry' fell by 0.3 MtCO2e (31.6 per cent reduction) between 1990 and 2021.

18.2.1.16 Fluorinated gases (F-gases)

Figure 0.8: F-gas Emissions by National Communications Category, 1990 to 2021. Values in MtCO2e



(Source: Scottish Greenhouse Gas Statistics 2021)

- F gases are the most potent greenhouse gases with high global warming potentials but they are emitted in very small quantities. As a result, they contribute less to global warming than the other greenhouse gases in Scotland. (For targets these gases use 1995 as a baseline year rather than 1990)
- There is a sharp increase in HFC gases of 0.9 MtCO2e between 1990 and 2014 (from 0.2 MtCO2e in 1995 to 1.2 MtCO2e in 2014), but have since decreased every year from that peak. This change is almost entirely in the Business sector. This increase is because F gases were introduced to replace chlorofluorocarbons (CFCs), which were used in appliances such as industrial air conditioning units. CFCs were banned under the Montreal Protocol, as they were contributing to the depletion of the ozone layer.
- F gas emissions in the residential sector result from the use of aerosols and asthma inhalers, and represent around 0.1 MtCO2e in 2021.

18.3 Scotland's GHG Account for Assessing Progress Against Statutory Targets

The Committee on Climate Change (CCC) used the term "GHG Account" to refer to their recommended manner of accounting for emissions, which is intended to better separate the impacts on targets of scientific and methodological improvements to the GHG inventory, from those of 'on-the-ground' policy actions.

At the heart of this method is the freezing of inventory methods (the scientific methods used for the measurement and estimation of emissions levels) between the time that target levels are set (or reviewed through independent advice from the CCC) and the time when target outcomes come to be reported. To ensure that the inventory methods used for the purpose of reporting target outcomes do not become too far separated from the best science and evidence, the base inventory will be re-aligned to the most up to date inventory methods at least every 5 years.

In accordance with advice from the Committee on Climate Change, the calendar year 2020 (for which emissions data was first published in June 2020) has been selected as the base inventory for reporting progress to the 2021 interim target.

- The Baseline period uses a 1995 base-year for F-Gas emissions, and 1990 for all other greenhouse gases.
- Where data does not exist for a particular year, revisions are carried over from the previous complete year.
- There has been a 49.9% reduction from baseline levels in 2021 and, as a result, **the statutory emissions reduction target for 2021 has not been achieved.**

18.4 Revisions to the Inventory and Methodology

18.4.1 Compilation of the GHG inventory

Most emission estimates are compiled by combining activity data (such as fuel use) with a suitable emission factor (such as amount of CO2 emitted per unit of fuel used).

Estimates of emissions from the industrial sector are often compiled based on plant-specific emissions data. Emissions from some sectors are based on more complicated models - such as the model used to estimate emissions from landfill, and the model used to estimate the carbon dynamics in soils when trees are planted.

Much of the data on net emissions from 'agriculture' and 'land use, land use change and forestry emissions' are based on modelled data for Scotland, which are consistent with, but not constrained to, the UK totals and thus are known as "bottom up" estimates.

Many of the remaining emissions sources within the inventory have been collated on a "top down" approach where estimates of emissions have been apportioned to Scotland using proportions of energy use in the Department of Business, Energy and Industrial Strategy (BEIS) Publication "Digest of UK Energy Statistics (DUKES)". This approach is prompted by data availability on emissions being more limited at the sub-UK level.

18.4.2 Details of main revisions and interpretation of revisions to the inventory

Revisions to emission inventory estimates reflect the continuous development of scientific understanding of emissive processes, and the improvement to underlying data and methods to generate accurate emission estimates.

18.4.2.1 LULUCF revisions

There was a substantial revision to the LULUCF category in both the baseline period and the latest year – affecting all intervening years. These revisions represent a profound improvement to the underlying data and methodology used to construct emissions estimates for LULUCF emissions.

This improvement is as a result of a new method which uses multiple time-series sources e.g., remote sensing data to arrive at frequently updated probabilistic estimates of land use for each land area.

18.4.2.2 Energy supply

Recalculations are primarily due to revisions to DUKES data in later years and change in activity data for petroleum refining.

18.4.2.3 Business

There were large revisions to the UK inventory due to new bottom-up estimates of offroad machinery fuel use by machinery type, resulting in the reallocation of residual fuel use in other sectors. Integration of new mapping grids for the use of fuels at industrial sites, particularly for gas oil, coal, fuel oil and natural gas use impacts emissions across the time-series. Emissions for later years of the time-series were affected by recalculations in the DUKES activity data.

18.4.2.4 Residential

Large recalculations in 2019 and 2020 due to revisions to the DUKES activity data. Domestic combustion of natural gas was revised for 2019 and 2020 due to updates to the Carbon Emission Factors in the Local Distribution Zone (LDZ) data. Minor recalculations throughout the time series due to revisions to the calorific values in the domestic combustion model.

18.4.2.5 Interpretation of uncertainties in the inventory

In the inventory, there will be uncertainty inherent in any process or calculation that uses sampling, estimation or modelling.

Estimates of greenhouse gases are compiled by a consortium of contractors. The source emissions are based upon a range of data sources, ranging from model-based estimates to point source emission data. Consequently, these estimates are subject to a degree of uncertainty.

The Scottish Government previously commissioned research to overhaul and update the uncertainties model used for the Scottish greenhouse gas inventory. A detailed study was carried out in parallel with the compilation with the 1990-2014 Scottish greenhouse gas inventory to review and improve the uncertainty calculations.

18.4.2.6 Future revisions to the inventory

Every year, greenhouse gas inventories are updated to reflect improvements in the underpinning science, data and modelling which often result in revisions to the entire time series. These revisions also reflect changes to the Intergovernmental Panel on Climate Change (IPCC) guidelines. The Scottish Government is represented at the UK's National Inventory Steering Committee, where improvements to the Scottish and UK inventories are discussed.

Following the recent UNFCCC COP26 meeting in Glasgow, it was confirmed that the greenhouse gas warming potentials used in this release will move to those presented in IPCC Annual Report 5 (AR5) without climate feedback effects. This change is expected to occur in the next edition of this publication and will result in methane moving from a GWP multiplier of 25 to 28, and nitrous oxide reducing from 298 to 265. Other changes to individual isotopes of fluorinated gases will also be made.

18.5 Exclusions, Glossary and References

18.5.1.1 Why are some greenhouse gas emissions not considered in this statistics release?

The methods used to compile the Scottish Greenhouse Gas Inventory are consistent with international reporting and are therefore comparable to the greenhouse gas emission estimates reported by all other EU Member States and other Annex 1 parties8 to the UNFCCC. All countries estimate and submit their greenhouse gas inventory estimates to be consistent with methods set out in international guidance for national inventory methods from the Intergovernmental Panel on Climate Change (IPCC), known as the IPCC (2006) guidelines. The IPCC (2006) guidelines state that national inventories should report on all anthropogenic (human) emissions and removals of greenhouse gas emissions, as a result of human activities within a country's territorial sphere.

However, there are some emissions and removals of carbon dioxide that occur as a result of short-cycle biogenic processes. This biocarbon has only recently been abstracted from the atmosphere before it is then re-released as carbon dioxide. In accordance with the IPCC (2006) guidelines, these emissions and sinks are therefore excluded from the greenhouse gas inventory, as they could lead to double counting. If countries do choose to estimate these biocarbon emissions, they are reported outside of the national inventory total, as a memo item to that country's submission to the UNFCCC. This means that some sources and sinks of greenhouse gases are not included in the Scottish and UK inventory totals.

Examples of reasons for why some sources and sinks of greenhouse gases are not included in the greenhouse gas inventory.

1. Due to short cycle biocarbon (carbon only been recently abstracted from the atmosphere)

- **Carbon dioxide (CO2) emissions from biomass combustion.** For example, this includes CO2 emissions from biomass power stations.
- **Process emissions in food and drink production.** These include CO2 emissions from brewing, fermenting and malting and in the production of food.
- **CO2 emissions from biodegradable waste to landfill.** Emissions are not estimated where they arise from biogenic sources of waste such as food. Fossil-derived organic matter (such as plastic) is assumed to be non-biodegradable and there are no emissions associated with its decomposition.

However, methane (CH4) emissions from biodegradable waste sent to landfill are considered in these greenhouse gas statistics as they are formed by the anaerobic (oxygen-free) decay of organic matter in solid waste disposal sites.

2. Where there has been no anthropogenic influence

- **Natural accumulation and storage of carbon in peatland**. For emissions or removals of peatland to be considered for IPCC reporting, they require humans to alter the peatland – either through wetland drainage, rewetting, peatland extraction or through another land use change. The UK and Scotland has elected to include the IPCC (2006) Wetlands Supplement as part of their inventory reporting from the 1990-2019 vintage of the inventory: http://www.ipcc-nggip.iges.or.jp/home/wetlands.html

3. **Beyond the territorial definitions as prescribed by the IPCC (2006) reporting requirements**

- "Blue carbon". Blue carbon refers to the carbon captured by the world's oceans and coastal ecosystems. The carbon captured by living organisms in oceans is stored in the form of biomass and sediments from mangroves, salt marshes and seagrasses. However, it should be noted that research in underway to being to develop estimates of the environmental changes resulting from changes to coastal wetlands environments.

APPENDIX 19.1

Hazard Identification Record

Hazard Identification Record

Grouped Risk Event	Source and/or Pathways	Reasonable worst case scenario	Navigation & Safety	Biodiversity	Coastal Processes	Water Quality	Flood Risk	Climate Change	Population & Human	Cultural Heritage	Landscape & Visual	Waste	Primary Mitigation	Tertiary Mitigation	Could this lead to a major accident and/or natural disaster with primary and tertiary mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with primary and tertiary mitigation in place?	If no, what secondary mitigation measures recommended?
Major boat/construction vessel collision (either with existing infrastructure, new infrastructure, other vessels or running aground).	Working within existing ferry operation routes and/or leisure areas (e.g., sea kayaking and other water sports).	Death and/or injury to a member of the public or construction worker.	✓	×	×	×	×	×	✓	×	×	×	- Lighting on Breakwater	- Marine liaison officer - AIS coverage - Notices to mariners (Issued by ABC) - Passage planning - Operational planning - Update ALRS and signalling directions - Communication to stakeholders on moving buoyed areas - Safety lighting - Shore-side facility maintenance plan	Yes	No	- Safety boat - Weather forecasting - Operational weather limits - Aids to navigation
Accident to the general public on or near the shoreline (e.g., people swimming etc.)	Working nearby to the shoreline while constructing the Breakwater.	Death and/or injury to a member of the public	✓	×	×	×	×	×	✓	×	×	×	- Lighting on Breakwater - Safety fencing	- Marine liaison officer - AIS coverage - Notices to mariners (Issued by ABC) - Passage planning	Yes	No	- Safety boat - Weather forecasting - Operational weather limits - Aids to navigation

Grouped Risk Event	Source and/or Pathways	Reasonable worst case scenario	Navigation & Safety	Biodiversity	Coastal Processes	Water Quality	Flood Risk	Climate Change	Population & Human	Cultural Heritage	Landscape & Visual	Waste	Primary Mitigation	Tertiary Mitigation	Could this lead to a major accident and/or natural disaster with primary and tertiary mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with primary and tertiary mitigation in place?	If no, what secondary mitigation measures recommended?
														- Operational planning - Update ALRS and signalling directions - Communication to stakeholders on moving buoyed areas - Safety lighting - Shore-side facility maintenance plan			
Man overboard during construction	Working in a marine setting.	Death and/or injury to a construction worker	✓	×	×	×	×	×	×	×	×	×	N/A	- Marine liaison officer - Passage planning - Shore-side facility maintenance plan	Yes	No	- Weather forecasting - Operational weather limits - Safety boat
Major pollution or sedimentation event affecting nearby designated sites / areas.	Working within, or in close proximity to, an SAC, SPA, SSSI, MPA or NNR.	Severe long-term or permanent detrimental impact on sites and qualifying species / features.	×	✓	✓	✓	×	×	×	×	×	✓	- Use of local materials - Use of clean quarried rock - Incorporation of utilities infrastructure (i.e., sewer network, electricity cables, telecommunication	- Construction Environmental Management Plan (CEMP) which includes pollution prevention measures.	Yes	No	- Availability of pollution response equipment.

Grouped Risk Event	Source and/or Pathways	Reasonable worst case scenario	Navigation & Safety	Biodiversity	Coastal Processes	Water Quality	Flood Risk	Climate Change	Population & Human	Cultural Heritage	Landscape & Visual	Waste	Primary Mitigation	Tertiary Mitigation	Could this lead to a major accident and/or natural disaster with primary and tertiary mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with primary and tertiary mitigation in place?	If no, what secondary mitigation measures recommended?
													cables, gas pipelines etc.)	- Environmental Management Plan (EMP) - Navigation safety management processes to manage vessel movements. - Shore-side facility maintenance plan			
Major coastal flood event during construction of the Breakwater	Working in a coastal location	Death and or injury to a construction worker.	✓	×	✓	×	✓	✓	✓	×	×	×	N/A	- Use SEPA's Floodline Warning Service to manage risk of flooding to works from extreme tidal events. - Shore-side facility maintenance plan	Yes	Yes	N/A

Grouped Risk Event	Source and/or Pathways	Reasonable worst case scenario	Navigation & Safety	Biodiversity	Coastal Processes	Water Quality	Flood Risk	Climate Change	Population & Human	Cultural Heritage	Landscape & Visual	Waste	Primary Mitigation	Tertiary Mitigation	Could this lead to a major accident and/or natural disaster with primary and tertiary mitigation in place?	Is the reasonable worst consequence managed to an acceptable level with primary and tertiary mitigation in place?	If no, what secondary mitigation measures recommended?
Scour of the toe of the breakwater leading to movement and/or damage that could cause a health & safety risk	Working in a marine setting with strong tidal influence and wave propagation	Death or injury to a maintenance worker, vessel operator or member of the public	✓	×	✓	×	×	×	✓	×	×	×	- Scour protection on breakwater toe	N/A	Yes	No	- Maintenance dredging to account for any movements of the breakwater

APPENDIX 20.1

Outline Construction Environmental Management Plan (oCEMP)

OUTLINE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (OCEMP)

Iona Breakwater Project

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Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
F01	oCEMP	Various	Dr Laura McAnallen Richard Bingham	Grace Glasgow	24/02/2023
F02	Final with updated potential dredge deposit location information	Various	Richard Bingham	Grace Glasgow	16/08/2023

Approval for issue

Grace Glasgow		16 August 2023

Prepared by:

RPS

James Hamilton
Project Engineer

Elmwood House
74 Boucher Road, Belfast
Co. Antrim BT12 6RZ

T +44 2890 667 914
E james.hamilton@rpsgroup.com

Prepared for:

Argyll & Bute Council

Elsa Simoes
Infrastructure Design Manager

Argyll and Bute Council
Kilmory, Lochgilphead
PA31 8RT

T 01546 604531
E Elsa.Simoes@argyll-bute.gov.uk

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1 INTRODUCTION

1.1 Project Background

Iona is a small island located to the west of the Isle of Mull. The Sound of Iona, which is orientated north-by-northeast to south-by-southwest and is open to the Atlantic Ocean particularly from the southwest, separates the Isle of Iona and the Isle of Mull. At Iona, an existing ferry terminal, comprising a pier and a steep slipway, is located within the small village of Baile Mòr. A small-scale passenger ferry operates from this location between the Iona ferry terminal and the Fionnphort ferry termina, on the Isle of Mull.

As part of the Argyll & Bute Council (ABC) Local Development Plan (LDP)1, a new strategy for Oban, Lorn and the Isles was developed in order to address known infrastructure constraints and improve ferry services.

In 2019, a Feasibility Study was undertaken by Byrne Looby (Byrne Looby, 2019) on behalf of ABC whereby five different options for a rubble mound breakwater, as well as construction methodologies were explored. The Proposed Development builds on Option 1B of the Byrne Looby Feasibility Study (Bryne Looby, 2019) and consists of a new rock armour breakwater and dredging.

1.2 Description of Works

The Proposed Development consists of the construction of a new rock armour breakwater (185m crest length) to the south of the existing slipway. Minor overburden dredging (2,017m^2 area, 1,225m^3 dredge volume) will be required in order to accommodate the new navigation channel requirements. Descriptions of these proposed activities are provided in the sub-sections below and illustrated in Figure 1-1.

[1] Argyll & Bute Local Development Plan - https://www.argyll-bute.gov.uk/ldp

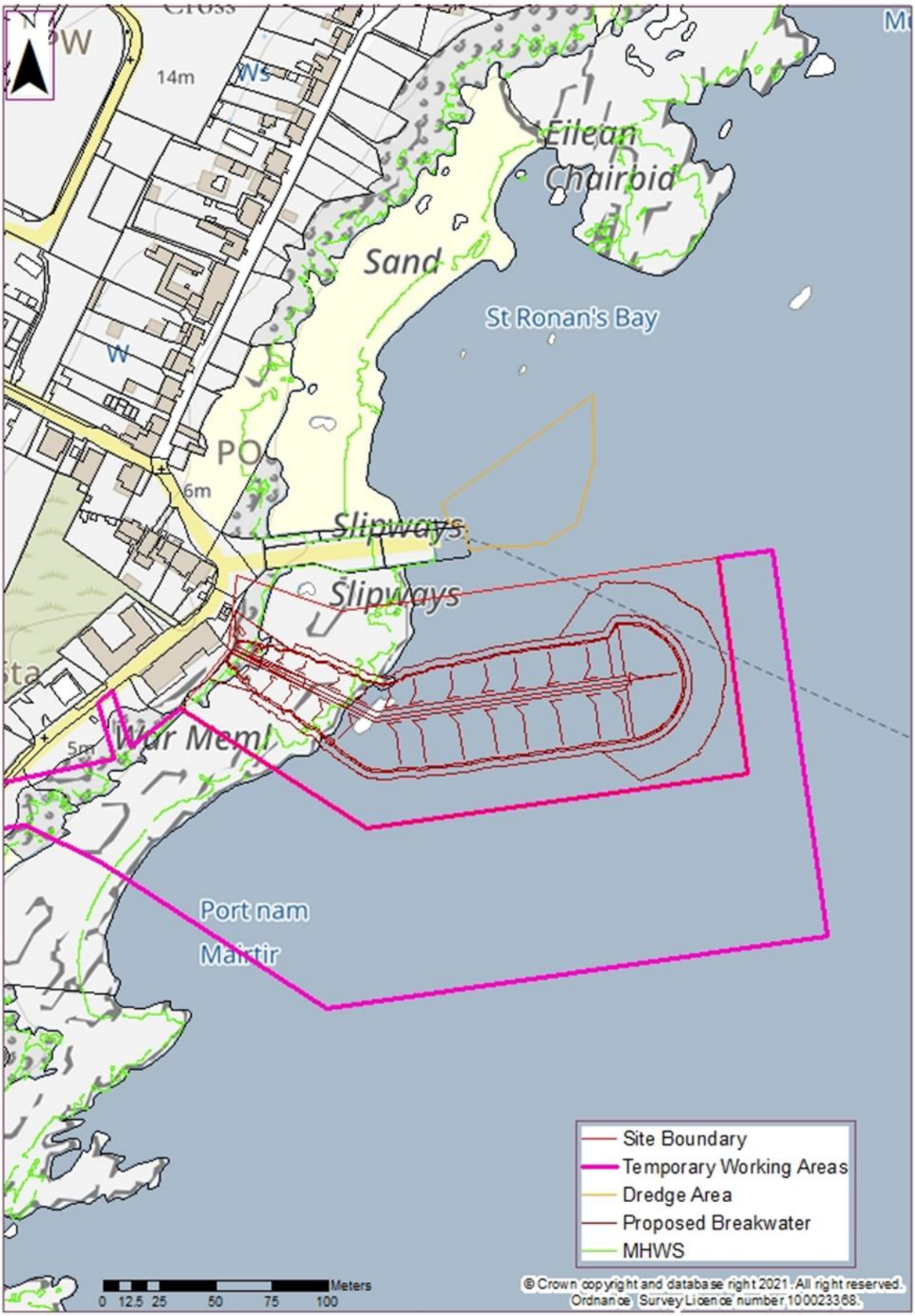

Figure 1-1 Proposed Development overview, site boundary and working areas

1.2.1 Rock Armour Breakwater

The function of the structure is primarily to provide defence from waves propagating from the prevailing southerly direction and provide protection for slipway users and ferry vessels. The breakwater will result in an overall reduction of wave heights at the structure. This will significantly reduce the risks to ferry operators and passengers and vehicles boarding and disembarking the ferry. The reduction in wave height provides a greater grip between the ferry ramp and the slipway deck.

The design details of the rock armour breakwater are listed below:

- The breakwater will be located approximately 70m south of the existing slipway in Iona.
- Crest length of circa 185m.
- 2:1 slope on outer face (non-slipway side) and 1:1.5 on the inner face (slipway side).
- The proposed maximum crest level will be 7.71m CD.
- Due to high flows through the crest during storm conditions, the crest width will be 4m.
- The base of the breakwater will be lined with a tear resistant geotextile membrane with the bedding placed on top of this layer will comprise of a 500mm deep layer of 300-1000kg graded rock.
- The core will be constructed of 1000 – 3000kg graded rock.
- The outer layer will be constructed of 3000-6000kg graded rock.
- A 3m wide and 2.5m high toe will be constructed on each face of 3000-6000kg graded rock. The toe will not be visible as it will be under a layer of sediment. Therefore, an area of sediment will need to be excavated, however this material will be replaced after construction is completed
- At the end of the breakwater, a 5:1 batter will be constructed of 1000-3000kg of graded rock
- The overall footprint of the breakwater is approximately 2.18ha.
- The rock armour breakwater will be constructed of clean quarried rock.
- The estimated volume of rock armour required for the proposed breakwater is 149,812 tonnes.

It is likely that local sources of rock armour will not be suitable, however Glensanda Quarry (Aggregate Industries) in Oban has been identified as a quarry which will be capable of producing rock armour material to a grading sufficient for the application at Iona. The quarry is equipped with marine loading facilities.

1.2.2 Dredging

In order to accommodate the new navigation channel requirements, some dredging works will be required, however these will be minor in nature and comprise overburden dredging only. The approximate dredge area is 2,017m^2. The approximate dredge volume to be removed is 1,225m^3. It is proposed that this is carried out by a backhoe dredger, with the material deposited at the potential location as shown in Figure 1-2.

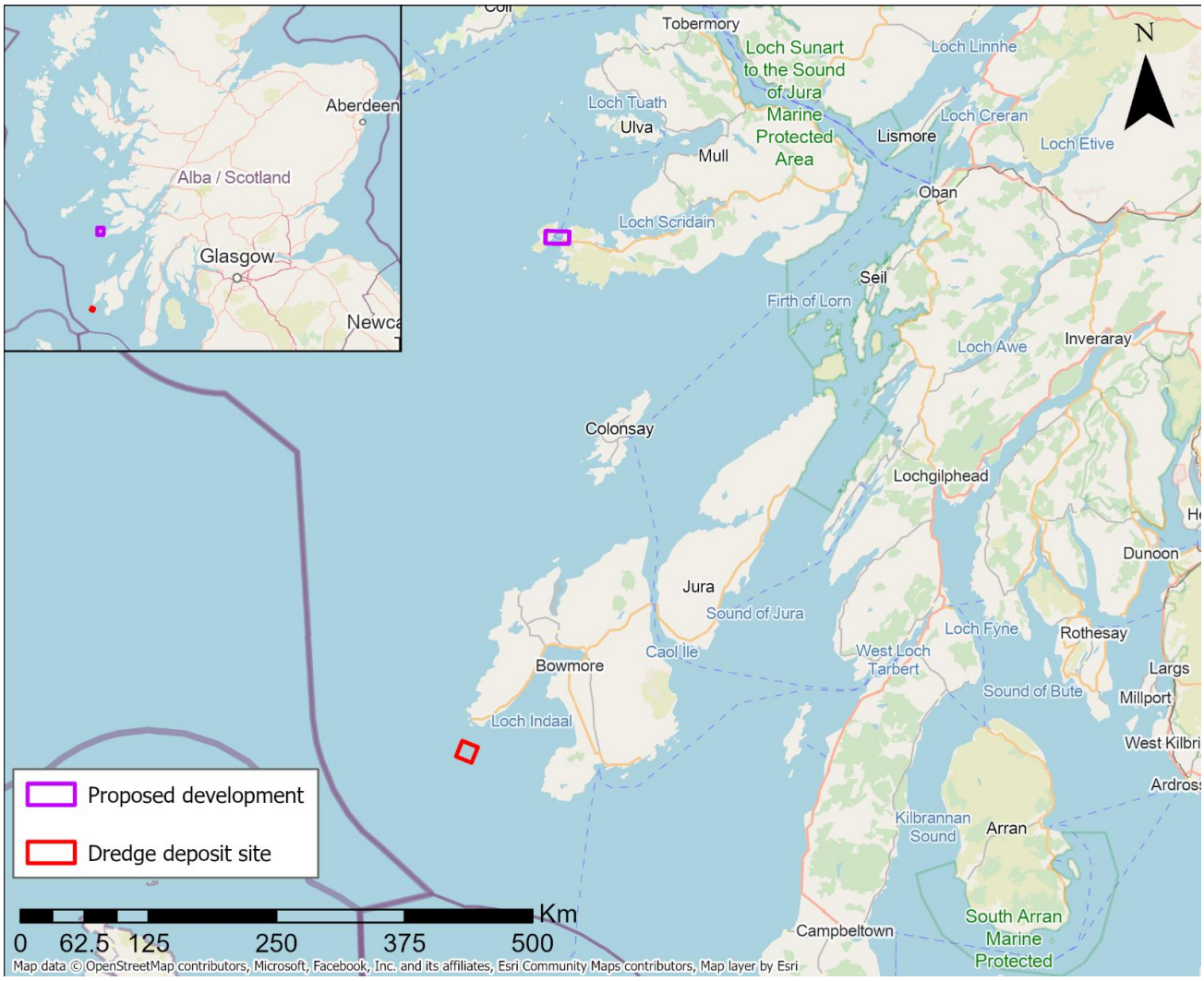

Figure 1-2 Potential dredge deposit location (shown in red)

In November 2020, ABC commissioned Structural Soil Limited to undertake a ground investigation at the Proposed Development site. This included three seabed sediment cores within the dredge area and six grab samples in the vicinity of the breakwater. The sediments were analysed for a suite of chemical parameters and screened against Marine Scotland Revised Action Levels (AL) 1 and 2, in order to identify any contamination which may be present. All samples within the dredge area were below the revised AL1 and AL2 Action Levels.

1.2.3 Other Technical Information relating to the Proposed Development

- Design Life: The design life of the structure is 120 years in accordance with the UK National Annex to BS EN 1990:2002, Category 5.
- Transport of Material to site: Materials are expected to be transported to site by barge and installed from a barge. Transport by road will be minimal – there is no estimated impact on the road transport network.
- Duration of Works: The duration of the works at Iona is estimated to be 52 weeks.

- Dredging: It is expected that dredging work will last for a maximum of 1 week. The dredge pocket will be undertaken prior to breakwater construction.
- Maintenance: Maintenance dredging will be required after construction is complete. The frequency of maintenance dredging will be established as part of the construction contract following the construction of the breakwater. Maintenance of the breakwater will be required as rock armour will move/adjust for a period of time. Defect period is expected to be 104 weeks during which the breakwater will be monitored, and any movement recorded and reported. After this, the breakwater will be inspected as part of the ongoing seabed bathymetric surveys regime. Systematic surveying of the UK's coastal waters is administered by the Maritime and Coastal Agency (MCA) under the Civil Hydrology Programme.
- Services: Mains electric is known to be present well to the north of the site and the proposed works will have no interference with these services.
- Current ferry services: Given that the breakwater is proposed to be located c.70m south of the existing slipway, it is expected that current ferry operations are not likely to be disturbed during the construction phase. Dredging activities are expected to be undertaken overnight, or as arranged with the ferry operator CalMac Ferries Ltd., to minimise any disturbance during this time.

1.2.4 Outline Method Statement

The outline method of construction is likely to be:

1. Undertaking of site dilapidation survey and level surveys as required to show the condition of the surrounding area and roads prior to the start of the works.
2. Site welfare facilities, site compound and storage areas established within the area. The site boundaries on land around the site compound and storage areas shall be defined with Heras fencing. Working area over water shall be marked with indicative safety buoys deployed at approx. 10m centres to delineate.
3. Dredging Works:
    a) Mobilisation of dredging plant to site.
    b) Pre-dredge bathymetric survey.
    c) Removal/relocation of existing private moorings and buoys from within the site boundary, working areas and dredging area and subsequent installation of the mooring at temporary locations nearby.
    d) Dredge pocket to the northeast of the existing Iona slipway. As part of the dredging is along the ferry route, the dredging operations shall be overnight or as arranged with the ferry operator CalMac Ferries Ltd.
    e) Post-dredge bathymetric survey.
4. Construction of Breakwater:
    a) Mobilisation of plant and operations team to site.

b) Rock armour and materials for breakwater delivered to site by barge. Rock armour can be stored below MHWS on the south side of the proposed breakwater.

c) Removal of existing toilet block septic tank outfall pipe with concrete surround.

d) Formation of breakwater footprint.

e) Installation of Geotextile membrane.

f) Installation of secondary rock and primary rock to existing seabed level.

g) Partial reinstatement with new pipe and concrete surround (the section from the septic through the breakwater to where it breaks through the south face only).

h) Installation of inner core & primary rock armour.

i) Installation of beacon access steps.

j) Installation of navigation beacon to crest of breakwater.

k) Reinstatement of breakwater toe to existing seabed level with site won seabed material.

l) Disposal of surplus seabed material in accordance with Marine Dredging Licence.

m) Installation of final length of pipe and concrete protection for the toilet block septic tank outfall to reinstate its original length.

n) Installation of rock armour along shore between existing slipway and south end of existing restaurant.

o) Reinstatement of private moorings and buoys to final, permanent locations.

p) Removal of safety buoys marking out the site.

q) Installation of security gate.

r) As-built surveys.

s) Demobilisation.

t) Submission of Health and Safety File.

1.3 Objectives of the Construction Environmental Management Plan

This document comprises an outline Construction Environmental Management Plan (oCEMP) for the Proposed Development. It is a 'live' document and will be updated as the project progresses, including incorporating the requirements of conditions attached to statutory consents granted in respect of the Proposed Development.

This oCEMP sets out the **minimum requirements** which will be adhered to during the construction phase of the Proposed Development.

ABC is the applicant for the Proposed Development. ABC seeks to achieve the highest possible standards of environmental management during both the construction and operation of the Proposed Development.

2 SUMMARY OF MITIGATION MEASURES

2.1 Mitigation Measures Arising from the EIAR

The EIAR assesses the likely significant impacts arising from the Proposed Development. Where required, mitigation measures are identified and described within individual topic chapters. These are measures which could avoid, prevent, reduce and, where possible, offset likely significant adverse effects upon the environment.

Table 2.1 summarises the mitigation measures and monitoring recommended within the EIAR.

Table 2.1: Mitigation measures and monitoring recommended within the EIAR

Potential Effects	Summary of Proposed Mitigation
CHAPTER 6: Navigation & Safety	
Ferry or tour boat allision (heavy contact) with the Proposed Development. Dredger flooding whilst engaged in operations. Dredge/construction plant impact with the Proposed Development during construction phase. Recreational or fishing vessel allision with the Proposed Development. Dredge/construction plant collision with recreational/fishing vessel. Tug and tow collision with recreational/fishing vessel. Tug and tow collision with ferry/tour boat. Accident spill during marine works. Heavy lift failure, or failure of lifting gear. Small non-powered craft displaced by the Proposed Development. Ferry or tour boat allision with the breakwater. Small non-powered craft displaced by the breakwater.	• Marine liaison officer – the marine liaison officer provides a point of contact for the marine works, will provide safety information to vessels navigating in the area and coordinate with local authorities during emergency situations. This is just to provide a central point of contact. • AIS coverage – all dredge/construction vessels, including barges to carry AIS (A or B (see Volume III, Appendix 6.1, Section 2.1 for definitions of AIS signals)). • Notices to mariners – issued by Argyll & Bute Council containing details about the construction works. These should be issued prior to any works (or any related activities such as diving or towage movements). • Availability of pollution response equipment – pollution response equipment should be available and carried by the contractors for use at Iona. The equipment should be appropriate for the type and scale of pollution that may occur. • Weather forecasting – a weather forecasting service should be regularly monitored to indicate any periods of upcoming adverse weather conditions. Appropriate actions should then be taken to mitigate any potential situations that may arise. These actions should be documented in the safety management system, detailing the specific weather conditions that will necessitate action(s). • Operational weather limits – including maximum wave and wind limits for construction activities should be detailed in the contractors 'Risk Assessment Method Statement'. • Promulgation of information – information on the proposed development and upcoming operations with associated vessel movements should be provided to local stakeholders. A website page (potentially on the Council's website) for the project, providing information and a method to contact the project would allow any vessels in the area to obtain information. • Aids to navigation, Provision and maintenance of – aids to navigation should be provided after consultation and approval of the NLB. Marine works to be illuminated at night. The aids to navigation must be maintained to provide the availability of the aids to navigation required by the NLB with any out of service periods reported via the Local Aids to Navigation (LATON) system. • Safety boat – the safety boat should be appropriate for the wind and wave conditions in the area. It should be available on site and manned during construction operations in order to provide quick assistance if any incident was to occur. • Passage planning – CalMac should update their passage plan, both during the works and on completion of the works to recognise the altered route. • Operational planning – capital dredging should be scheduled, as far as possible, to avoid disruption to ferry operations. • Review of available powers – Argyll & Bute Council should review their powers in relation to operating the port facility at Iona to determine whether further powers are required to ensure navigational safety. • Update ALRS volume 6 and Sailing Directions – updates to include new structures after completion of the marine works. • Shore side facility maintenance programme – to schedule the maintenance of the site, including the AtoN. • Communications – stakeholders should be informed of the need to move buoyed areas prior to construction and advised of other suitable locations. • Safety - Lighting - it is important that any marine works at night or at times of reduced visibility are sufficiently illuminated in accordance with the Health and Safety Executive (HSE) Approved Code of Practice (ACOP) 'Safety in Docks' (HSE, 2014). The guidance on illumination levels is

Potential Effects	Summary of Proposed Mitigation
	drawn from the 'Safety and Health in Ports' code of practice published by the International Labour Organization; this states that: "On access routes for people, plant and vehicles and in lorry parks and similar areas, the minimum level of illumination should not be less than 10 lux. In operational areas where people and vehicles or plant work together, the minimum level of illumination should not be less than 50 lux". (ILA, 2016). This level of illumination must be balanced alongside the requirements provided in the British Standard Institute (BSI) publication 'Design of Road Lighting' BS5489.
CHAPTER 7: Terrestrial Biodiversity	
Temporary disturbance/ loss of habitat arising from activities within the terrestrial area of the Temporary Work Area (namely the establishment of a work compound and storage of rock).	• Production of an Otter Species Protection Plan (see Volume III, Appendix 7.2) and adherence to all recommendations made within. • Production of a Construction and Environmental Management Plan (CEMP). • An Ecological Clerk of Works (ECoW) will be appointed to monitor the works in respect to otter activity. • No additional mitigation measures are required for the operational phase of the Proposed Development. The Environmental Management Plan (EMP) will manage the risks of all operational activities, facilities and cargo handled by the port and will include best practice measures to control pollution following standard guidelines such as the Environment Agency Pollution Prevention Guidelines. This will be considered sufficient to limit any potential impacts relating to pollution events.
Temporary disturbance/loss of habitat due to airborne noise and visual disturbance from construction activities.	
Permanent loss of habitat arising from reclamation of seabed during the construction of a new rock armour breakwater to the south of the existing slipway.	
Temporary effects on prey species due to underwater noise arising from construction activities (notably dredging and vessel noise), increased suspended sediment concentrations and sediment deposition.	
Long term increase in disturbance to habitat arising from increased levels of marine activity due to improved ferry services.	
Long term increase in disturbance of habitat due to airborne noise and visual disturbance associated with the increase in terrestrial activity.	
Long term effects on prey species due to noise arising from vessels and potential for pollution events linked with increased levels of marine activity.	
CHAPTER 8: Marine Biodiversity	
Temporary disturbance/ loss of habitat arising from capital and maintenance dredging activity.	• Production of a CEMP - Control of pollution during construction will be set out in a CEMP. This will include best practice measures to prevent accidental spillage of chemicals during construction activities. • Production of an EMP - The EMP will manage the risks of all operational activities, facilities and cargo handled by the port and will include best practice measures to control pollution following standard guidelines such as the Environment Agency Pollution Prevention Guidelines.
Increased suspended sediment concentrations and sediment deposition.	
Resuspension of contaminated sediments.	

Potential Effects	Summary of Proposed Mitigation
Temporary disturbance/loss of habitat arising from the displacement/compaction of the seabed by anchors and jack-up barge spud legs.	• Production of an Invasive and Non-Native Species (INNS) Management Plan - A document detailing how the risk of potential introduction and spread of INNS should be produced. The plan will outline measures to ensure vessels comply with the International Maritime Organization (IMO) ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as measures to be adopted if a high alert species is recorded. • Plant, equipment and material (where required) will follow the 'check, clean, dry method'. • The presence of sensitive features onboard the ship's navigation systems will aid the vessel master in placing either anchor or jack-up legs to avoid these sensitive features. • Production of a Seagrass Compensation and Monitoring Plan - to ensure that seagrass habitat is not permanently lost, compensation will be undertaken to ensure that the habitat is restored. An assessment has already been undertaken in the form of the intertidal and subtidal survey, with the extent of biotopes derived. This data will be used to inform the 'Seagrass Compensation and Monitoring Plan'.
Permanent habitat loss arising from placement of material on the seabed for the breakwater.	
Underwater noise.	
Disturbance and collision risk to marine mammals from increased vessel traffic during construction.	
Changes in the hydrodynamic regime due to the presence of the breakwater.	
CHAPTER 9: Ornithology	
Temporary disturbance/loss of habitat arising from activities within the terrestrial area of the Temporary Work Area (namely the establishment of a work compound and storage of rock).	• The most highly sensitive IOF are non-breeding populations and therefore measures to reduce disturbance around the nearshore area shall be undertaken as far as is practical during the period between September and April. • Methods to attenuate noise will be utilised, notably the use of sound walls and any modification of drilling rigs that would reduce noise levels. • Works undertaken in the vicinity of roosting birds or near occupied nests of sensitive species will be supervised by a suitably qualified and experienced ECoW to determine if additional measures may be required. • Near-shore vessel-based activities should aim to reduce disturbance to foraging seabirds and waterfowl, particularly if works coincide with the winter period when divers, grebes and sea duck may be present.
Temporary disturbance/loss of habitat due to airborne noise and visual disturbance from construction activities.	
Permanent loss of habitat arising from reclamation of seabed during the construction of a new rock armour breakwater to the south of the existing slipway.	
Temporary effects on prey species due to underwater noise arising from construction activities (notably dredging and vessel noise), increased suspended sediment concentrations and sediment deposition.	
Long term increase in disturbance to habitat arising from increased levels of marine activity due to improved ferry services.	
Long term increase in disturbance of habitat due to airborne noise and visual disturbance associated with the increase in terrestrial activity.	
Long term effects on prey species due to noise arising from vessels and potential for pollution events linked with potential increased levels of marine activity.	
CHAPTER 10: Terrestrial Noise & Vibration	

Potential Effects	Summary of Proposed Mitigation

Worst case construction noise predictions exceed the 65 dB BS 5228 noise limit at a number of construction noise receptors during day-time hours.
 	
Worst case construction noise predictions exceed the 45 dB BS 5228 noise limit at a number of construction noise receptors during night-time hours.
 	
Unmitigated construction noise daytime predictions in excess of 65 dB would be deemed to have a temporary moderate impact at four receptors of medium sensitivity, and temporary moderate / major impact at one receptor of high sensitivity.
 	
Worst case construction noise predictions exceed the 45 dB night-time BS 5228 noise limit for all construction noise receptors during night-time hours. Unmitigated construction noise night-time predictions in excess of 45 dB would be deemed to be temporary moderate / major adverse impact at all medium and high sensitivity receptors.
	• Mitigation in the form of timely and effective stakeholder consultation should be undertaken. This would ensure that residents are kept informed of on-going and future operations. For example, local residents would be informed by letter drop of proposed works, particularly where these are due to occur outside standard working hours. The letter would include details of proposed cause, start dates and duration of works to be carried out.
	• In order to minimise the likelihood of complaints, Argyll & Bute Council and affected residents should be kept informed of the works to be carried out and of any proposals for work outside normal hours. All complaints will be recorded by the appointed contractor. The appointed contractor will investigate the circumstances and ensure the necessary corrective measures are taken.
	• Night-time construction noise impact indicates that there is the potential for significant impact without mitigations. Screening at source of potentially affected receptors would ensure that the BS 5228 noise limit is achieved reducing impact to temporary minor adverse.
	• Construction mitigation measures will be put in place to ensure construction noise levels are attenuated and reduced where necessary.
	• Best practice measures will be employed to ensure that construction phase noise levels are reduced to the lowest possible levels.
	• BS5228:2009+A1:2014 – Noise and vibration control on construction and open sites outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures will be applied by the contractor where appropriate during the construction phase of the Proposed Development. Construction best practice measures which will be implemented included below:
	  ○ Ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order
	  ○ Careful selection of quiet plant and machinery to undertake the required work where available
	  ○ Machines in intermittent use will be shut down in the intervening periods between work
	  ○ Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, temporary construction barriers or enclosures will be utilised around noisy plant and equipment
	  ○ Handling of all materials will take place in a manner which minimises noise emissions
	  ○ Audible warning systems will be switched to the minimum setting required by the Health & Safety Executive
	• Although recognised that the choice of dredgers is likely to be determined by the engineering requirements and the suitability of available equipment, dredging activities should be planned where possible to reduce the overall source noise level during the works – e.g. limiting night-time works directly adjacent to noise-sensitive properties etc.
	• Any dredger used for the works will be expected to be fitted with effective engine exhaust silencers, and there will be a requirement placed on the chosen dredger operator to ensure that all engine silencers are effective and reducing engine exhaust noise levels to the lowest reasonably practicable level.
	• Screening shall be provided nearest to those properties most likely to experience high noise levels from dredging, particularly during more sensitive night-time periods.

CHAPTER 11: Water Quality	

Potential Effects	Summary of Proposed Mitigation
There is the potential for increased suspended sediment during the construction works of the breakwater and the dredging process. Any sediment plumes generated during disposal are expected to be limited but may result in a temporary increase in turbidity. The presence of physical alterations within a waterbody has the potential to impact on the hydromorphology of the waterbody. Dredging activities associated with the Proposed Development are likely to produce noise which is likely to disturb species in the area resulting in temporary, localised impact. There is potential for accidental oil/ fuel spillages on site due to increased vessel presence and associated fuel storage.	• SEPAs standing advice for "Construction Activities – Pollution Prevention" should be used. • Mitigation measures required to reduce the potential impacts from noise have been identified and included and the impacts of dredging and suspended solids on general marine life. These measures follow the Joint Nature Conservation Committee recommendations and guidance for minimising risk to marine wildlife (JNCC, 2010). • No losses of concrete (cement) to the waters will be permitted during the works. • Fuel, oil and chemical storage must be sited on an impervious base within a bund and secured. The base and bund walls must be impermeable to the material stored and of adequate capacity. GPP2 shall be implemented to ensure safe storage of oils and chemicals. • The safe operation of refuelling activities shall be in accordance with PPG 7 "Safe Storage – The safe operation of refuelling facilities" (Environment Agency, 2011b). • With regard to potential oil spills during construction, an emergency spill kit and oil spill containment equipment will be located at strategic locations adjacent to the works. • An Oil Spill Contingency Plan which must be adhered to by all staff including those employed to carry out works. Its primary purpose is to set in motion the necessary actions to stop or minimise the discharge and to mitigate its effects. Effective planning will ensure that the necessary actions are taken in a structured, logical and timely manner. • Given that there will be berthing of oil, gas and renewables supply vessels and associated refuelling, a full retention oil separator is recommended to mitigate for the potential impacts of fuel/ oil spillage or leakage. This is recommended to be maintained in accordance with the manufacturer's instructions by experienced personnel. • SEPA's Standing Advice for Construction activities – pollution prevention has been consulted and will be adhered to. • The contractors Environmental Clerk of Works will be required to monitor mitigation measures and auditing of the contractor's environmental controls will be undertaken by the clients representative. • A 'Seagrass Compensation and Monitoring Plan' has been proposed to counter the direct habitat loss predicted to occur as a result of the Proposed Development. This will ensure that the loss of existing seagrass habitat is compensated ensuring no net loss of habitat.
CHAPTER 12: Flood Risk	
The existing slipway and pier are currently at risk of coastal flooding, and this will still be the case with the Proposed Development. Minor local changes to the currents are expected around the breakwater such as an increase in the current velocity around the structure.	• Contractor to sign up to SEPA's Floodline flood warning service in order to get notified when the area is at risk of flooding. • Use the Scottish Flood Forecast by the Scottish Flood Forecasting Service (SFFS), which provides 3-day flood forecasts and is updated daily. • Tidal warning will be the key mitigation measure for the operation of the site. The Floodline Warning Service and the Scottish Flood Forecast as described above can be used.
CHAPTER 13: Coastal Processes	
Scour around the toe of the breakwater. Sediment build up to the northern side of the breakwater (infilling the dredged pocket).	• Scour protection is proposed as part of the operational phase of the Proposed Development to mitigate the impact of scour around the toe of the breakwater during periods of maximum flood velocity which would be expected during a 1 in 1 year 240° storm event during the flood tide. • Maintenance dredging would be required after construction is completed. The frequency of maintenance dredging would be established as part of the construction contract following the construction of the breakwater.
CHAPTER 14: Population & Human Health	
Construction noise is predicted to be within limits set to be protective of health and the environment in most	• Mitigations measures related to noise impacts are included in Chapter 10.

Potential Effects	Summary of Proposed Mitigation
cases. However, when considering a worst-case scenario, Chapter 10 identifies that there is potential for construction noise to exceed limits (both day-time and night-time) at a small number of individual receptors that are located closest to the construction activities, with the receptors most likely to be impacted being non-residential. Disruption or disturbance to recreation could effect the vulnerable sub-population (dependents with children or people with existing poor physical or mental health). There is the potential for construction to affect sea users including sea kayakers and sail boats which are used for leisure boating and recreation in the Sound of Iona. This effect would possibly occur during dredging or when there is other disruption in the construction area. This change would mostly affect residents in the local community.	• A CEMP will be produced as part of application process. The CEMP will outline how the effects of construction can be managed by good practice and environmental controls which are routinely and successfully applied on other similar development proposals. • The CEMP should also set out a clear plan for managing access to the Sound of Iona during construction. This would include designating safe alternative transport routes and appropriately communicating these to local populations (including through the use of Gaelic materials). • The CEMP should also set out a plan for engagement with the local population. This could include information on timings updates, affects to any services/deliveries/access and a complaints procedure. Engagement should be culturally appropriate, including provision of non-technical information and communication in Gaelic. • Opportunities to include the local population in construction of the Proposed Development can be beneficial for health. Actions to ensure positive outcomes include providing opportunities for training and upskilling as well as prioritisation of hiring for local populations.
CHAPTER 15: Landscape & Visual	
No specific landscape mitigation measures have been proposed as part of the Proposed Development. The design of the Proposed Development has “built-in” mitigation through steps such as optimising the new breakwater height to maintain as low a height as possible and the use of natural rock to form the breakwater. The minimal lighting required for safety has been provided.	
CHAPTER 16: Cultural Heritage	
stripping of topsoil for the compound may result in the disturbance of features associated with An Eala, in particular a revetting wall and possible ditch. The change in setting of heritage assets including Iona Nunnery, MacLean’s Cross, St Mary’s Abbey and Replica of St John’s Cross. Change of appearance / character of Iona Conservation Area.	• A reporting protocol has been developed to allow for the reporting and thereby appropriate recovery and recording of any cultural material encountered during the construction phase below the high-water mark. • Potential construction impacts above the high-water mark can be avoided by relocating the compound or be mitigated through a programme of archaeological works. • A programme of archaeological work would offset the physical loss or disturbance of features affected by allowing for them to be recorded appropriately, with reporting to an appropriate level. • Works must be undertaken in line with a Written Scheme of Investigation (WSI) agreed with WoSAS and approved by the Local Planning Authority.
CHAPTER 17: Waste	
There is the potential for quantities of materials to be deposited in landfill sites. The use of non-permitted waste contractors or unlicensed facilities could give rise to inappropriate management of waste and result in environmental impacts/ pollution. Excess materials and packaging, over-ordering materials, off-cuts, damaged materials and poor storage during the construction phase.	• Argyll & Bute Council and their appointed contractor will ensure that all waste materials leaving the site will be transported via road by a registered and licensed carrier and arrive at a licensed / permitted site. Waste will only be disposed or recovered through licenced operators and in accordance with national waste legislation. • Site Waste Management Plan (SWMP). • CEMP. • Construction Phase Monitoring.

Potential Effects	Summary of Proposed Mitigation
The proposed development would support a slight increase in tourism using the ferry service and fishing/commercial vessels using the berthing opportunities which would result in a slight increase in litter and waste generation.	
CHAPTER 18: Greenhouse Gas Assessment	
Potential impacts during the construction phase could include: • Inaccessible construction site due to severe weather events (flooding, snow and ice, storms) restricting working hours and delaying construction; • Health and safety risks to the workforce during severe weather events; • Unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities; and • Damage to construction materials, plant and equipment, including damage, material storage areas and worksites, for example from stormy weather.	• Operational Environmental Management Plan (OEMP) - An OEMP will be developed to guide ongoing operations and maintenance activities during the life-cycle of the Project. The OEMP will also set out the procedures for managing and delivering the specific environmental commitments as per each technical chapter for each receptor over the operational period. • Adherence with the International Convention for the Prevention of Pollution from Ships (MARPOL) - All vessels will adhere to MARPOL requirements. Accordance with this will help to ensure that the potential for release of pollutants is minimised during operations. • Adherence with the International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the 'BWM Convention').
Potential impacts on the Proposed Development during the operational phase include: • Material and asset deterioration due to high temperatures; • Health and safety risks to ferry users; • Damage to access roads from periods of heavy rainfall; and • Flood risk (surface, groundwater, fluvial and snow/ice melt) on the road network and damage to drainage systems with the potential for increased runoff from adjacent land contributing to surface water flooding.	
CHAPTER 19: Risk of Major Accidents & Disasters	
Major boat/construction vessel collision/allision (either with existing infrastructure, new infrastructure, other vessels or running aground).	• Lighting at the end of the Breakwater – to avoid contact between vessels and the breakwater during the operation phase. • Scour protection – to reduce scour around the toe of the breakwater and avoid damage and movement of rock armour. • Type and sources of construction materials – constructing the breakwater from clean quarried local rock should help reduce the risk of pollution during construction phase and reduce transport distances.
Accident to the general public on or near the shoreline.	
Man overboard during construction.	

Potential Effects	Summary of Proposed Mitigation
Major pollution or sedimentation event affecting nearby designated sites. Scour of the toe of the breakwater leading to movement and/or damage that could cause a health & safety risk.	• Utilities infrastructure – avoidance of sewer, telecommunications, gas and electricity infrastructure during construction is key as well as incorporating any existing infrastructure into the project design to avoid any unnecessary risks. • Safety fencing – to keep the general public away from construction areas or areas of potential danger. • Safety Boat – to help avoid collisions between vessels and contact with the shoreline or infrastructure during the construction phase. • Navigational Aids – to help avoid collisions between vessels and contact with the shoreline or infrastructure during both the construction and operation phase. • Safety lighting – to help avoid collisions between vessels and contact with the shoreline or infrastructure during both the construction and operation phase. • AIS coverage – to help avoid collisions between vessels during the construction phase. • Weather forecasts and operational weather limits – to avoid hazardous conditions during construction. • Updating ALRS and signalling directions – to help avoid collisions between vessels and contact with the shoreline or infrastructure during both the construction and operation phase. • Pollution response equipment – to help quickly respond to a major pollution event during the construction phase • SEPA's Floodline Warning Service – to be aware and plan for coastal flood events during the construction phase. This service also includes information on tidal extremes and may also be useful during the operation phase. • ECoW – appointed to monitor the works in respect to biodiversity and species in the area. • Correct and secure storage of fuels, oils and chemicals – must be sited on an impervious base within a bund and secured. The base and bund walls must be impermeable to the material stored and of adequate capacity. • Marine Liaison Officer – to provide a point of contact for the marine works providing safety information to vessels in the area during the construction phase. • Notices to mariners – to provide details of construction activities. • Passage and operational planning – to provide details of altered routes during the construction and operation phase and scheduling construction activities to reduce disruption. • Communicating with stakeholders – to inform locals of movement of buoyed areas during the construction phase. • Navigation safety management process – to help manage vessel movements during the construction phase. • Adherence to a CEMP. • Adherence to an Operational Environmental Management Plan (OEMP). • Adherence to an EMP. • Ensure waste arisings from the construction phase (especially with sediment disposal) are dealt with in a sustainable and legislatively compliant manner. • Oil Spill Contingency Plan – to set in motion the necessary actions to stop or minimise the discharge and to mitigate its effects. • The safe operation of refuelling activities shall be in accordance with PPG 7 "Safe Storage". • Adherence with the International Convention for the Prevention of Pollution from Ships (MARPOL) – to help to ensure that the potential for release of pollutants is minimised during operations. • Adherence to a SWMP. • Construction Phase Monitoring.

3 MANAGEMENT OF ENVIRONMENTAL IMPACT

3.1 Roles and Responsibilities

ABC intends to appoint a Contractor(s) to undertake construction activities. Mitigation measures set out in the oCEMP will form part of the Contract Documents for the construction phase to ensure that the Contractor(s) undertakes works required to implement the mitigation measures.

ABC will appoint a suitably qualified person to the role of Environmental Clerk of Works to monitor the Iona Breakwater Project construction works. The Environmental Clerk of Works will provide monthly reports to ABC, or as deemed necessary. The Environmental Clerk of Works will work closely with the Contractor's site supervisors to monitor activities and ensure that all relevant environmental legislation is complied with and that the requirements of the CEMP are implemented. The Environmental Clerk of Works will have the authority to review method statements, oversee works and instruct action, as appropriate, including the authority to require the temporary cessation of works, where necessary.

3.2 Hours of Working

Where construction activities take place for the development in the vicinity of residential properties, the activities will operate between the hours of 07:00 and 19:00 on Mondays to Fridays, between 07:00 and 13:00 on Saturdays and there will be no activity on Sundays or Bank Holidays in accordance with the requirements of the EIAR. Day-time noise levels should not exceed the threshold limit of 65dB.

Where additional working hours, such as night-time working (23:00 – 07:00) are required, noise levels should remain below the threshold limit of 45dB.

All affected residents and stakeholders shall be notified on receipt of any approved derogations including the rationale for the extended working hours.

3.3 Approach to Community Engagement

ABC are in regular engagement with local community groups and local fishermen. This engagement should continue throughout the duration of the Proposed Development.

3.4 Construction Phase Monitoring

Navigation & Safety:

During the marine works there is a risk of lifting gear failure whilst a load is slung or a heavy load is transferred between vessels, a vessel and the marine works, or rock is placed along the breakwater. The prevailing weather conditions will be the main factor leading to this impact occurring; especially high wind conditions affecting cranes, and large swell causing movement of vessels. Monitoring of weather conditions should be undertaken to track operational weather limits (maximum wind/ wave limits for construction).

Marine Biodiversity:

Permanent habitat loss arising from the placement of material on the seabed for the breakwater is likely to have a significant effect on the seagrass Priority Marine Feature found within the breakwater footprint. As the receptor is being directly affected due to the placement of rock armour, there will be no possibility of being able to mitigate for this loss. A 'Seagrass Compensation and Monitoring Plan' is therefore required to assess and reduce the impact where possible.

Noise:

Construction noise monitoring will be undertaken as part of noise control planning at nearby sensitive receptors.

Water Quality:

The contractors Environmental Clerk of Works will undertake regular checks and monitoring of grab samples, while auditing of the contractors' environmental controls will also be undertaken by the clients representative.

Waste:

Records will be kept for each waste material which leaves the site, whether for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the waste arising on site during the construction phase. The following should be recorded:

- Waste taken off-site for reuse;
- Waste taken off-site for recovery;
- Waste taken off-site for recycling; and
- Waste taken off-site for disposal.

For each movement of waste off-site a signed waste collection docket will be obtained from the waste contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

If waste movements are not accounted for, the reasons for this shall be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

The contractor will be responsible for conducting an audit of the waste practices at the site during the construction phase of the development.

Upon completion of the construction phase a final report will be prepared summarising the outcomes of waste management processes adopted and the total recycling/ reuse/ recovery figures for the development.

3.5 Environmental Management Plans

3.5.1 Otter Species Protection Plan

The following guidelines will be complied with throughout the construction phase of breakwater to ensure impacts to otters and their habitats are limited:

- An ECoW should be present on site to oversee enabling works and construction including dredging works; and contribute to all relevant construction method. They should be a suitably experienced individual, whose role would ensure works are carried out in accordance with the CEMP produced for the Proposed Development, ensuring compliance with international and national legislation and planning conditions. Once works are underway, the ECoW would work full time on site providing ecological and pollution control advice and supervision for all relevant mitigation measures;
- No work should be carried out within 30m of any otter shelter or 200m of any breeding holt, except under license from NatureScot. Should a licence be required for any works, the ECoW will be responsible for ensuring compliance with any licensing conditions;
- No works resulting in large scale noise or vibration such as pile driving or blasting should be undertaken within 100m of any otter shelter, unless under license from NatureScot;
- Ensure all rubbish and materials will be collected and removed from site on a regular basis to prevent trapping or injury of any wildlife;
- Any excavations, including trenches and trial pits more than 0.5 m deep will be covered in the evening to prevent animals falling in. Where pits and trenches cannot be closed or filled on a nightly basis, ensure that a plank is placed into the excavation so an animal can use this as a means of escape if necessary;
- Any open pipes, whether installed or being stored, should be closed to prevent any animals entering and becoming trapped;
- In the unlikely event of discovering any evidence suggesting otter presence within the footprint of the works, work must stop immediately and the ECoW should be contacted for advice on how to proceed;
- Night working should be avoided wherever possible. Where this is not possible, lighting should be focussed on the works area(s) and directed away from water and areas of potential otter foraging. Lighting should be kept to an absolute minimum within 100m from any identified otter shelter;
- Toolbox talks on otters should be given to all construction staff on site and an emergency procedure protocol given to contractors in the event of encountering an otter or discovering a new shelter; and
- If otters or new shelters are recorded during construction, all of the following emergency procedure must be adhered to:
    - All works, in the vicinity of the otter are to stop immediately and the ECoW contacted;
    - The ECoW will review the situation and install the relevant exclusion zone and timings;

- Should micrositing of works outwith exclusion zones applied to new shelters not be possible, an application to NatureScot will be required;
- Consultation with NatureScot will be undertaken, if required;
- Mitigation measures additional to those already in place may be required;
- Incident, outcomes and recommendations will be recorded; and
- Works will only recommence following advice from the ECoW. In the unlikely event of an otter being injured or killed, or shelters damaged, the ECoW will be contacted immediately. They will attend the site and make a written and photographic record. This will record the time, location, personnel involved, and the details of the incident. This information will be supplied within 24 hours to NatureScot and the developer.

3.5.2 Invasive Non-Native Species Management Plan

A document detailing how the risk of potential introduction and spread of Invasive and Non-Native Species (INNS) should be produced. The plan will outline measures to ensure vessels comply with the International Maritime Organization (IMO) ballast water management guidelines, it will consider the origin of vessels and contain standard housekeeping measures for such vessels as well as measures to be adopted if a high alert species is recorded.

Plant, equipment and material (where required) will follow the ‘check, clean, dry method’.

3.5.3 Seagrass Compensation and Monitoring Plan

A Seagrass Compensation and Monitoring Plan will be implemented as part of the Proposed Development in order to counter the direct habitat loss predicted to occur. This will ensure that the loss of existing seagrass habitat is compensated ensuring no net loss of habitat. An assessment has already been undertaken in the form of the intertidal and subtidal survey, with the extent of biotopes derived. This data will be used to inform the plan.

order. Machines in intermittent use will also be shut town in the intervening periods between work.

3.5.4 Site Waste Management Plan (SWMP)

Construction waste will be managed as part of a SWMP, prepared and implemented by the appointed contractor for the duration of the construction works. The SWMP will contain procedures for the management of waste and assist with providing a complete audit trail. The SWMP will be a live document and will be subject to revision throughout the course of the construction phase.

The SWMP will:

- Include specific details on the projected waste types and subsequent management;
- Identify and capture the decisions made in the design process to reduce waste generation;
- Identify the methodologies for waste management at each stage of the project;

- Identify how the waste will be dealt with (i.e., disposal, re-use on/off site etc.); and
- Identify potential end markets e.g., reuse, recycling facilities, waste treatment facilities and disposal sites.

The SWMP will specify procedures for:

- On-site segregation of waste at source where practical;
- On-site segregation of waste materials into appropriate categories;
- On-site segregation of non-hazardous waste materials into appropriate categories such as:
    - Metals;
    - Timber.
- On-site segregation of any hazardous waste materials into appropriate categories such as:
    - Any contaminated soils;
    - Waste oil and fuels;
    - Paints, glues, adhesives and other known hazardous substances.

The SWMP will additionally specify:

- Measures to ensure monitoring and updating of records under Duty of Care requirements;
- Measures to avoid over-ordering and generation of surplus waste materials;
- Measures to ensure appropriate staff training and levels of awareness in relation to waste management;
- Measures and procedures to monitor waste flows on site;
- Steps to be taken with materials suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
- Implement a 'just in time' materials delivery systems to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site. The waste storage area(s) will be assigned, and all construction staff provided with training regarding the waste management procedures on commencement of the project.

All waste leaving the site will be recycled, recovered or reused where possible, with the exception of those waste streams for which appropriate facilities are currently not available.

Waste streams will be collected by an appropriately licensed and permitted private waste contractor, appointed by the contractor for recycling, recovery or disposal at suitably licensed facilities.

3.6 Operational Environmental Management Plan (OEMP)

An OEMP will be developed to guide ongoing operations and maintenance activities during the life-cycle of the Project. The OEMP will also set out the procedures for managing and delivering the specific environmental commitments as per each technical chapter for each receptor over the operational period.

4 SITE SAFETY

4.1 Weather and Working Conditions

4.1.1 Weather Forecasting

The contractor to sign up to SEPA's Floodline flood warning service in order to get notified when the area is at risk of flooding (tidal warning). In addition, the contractor must use the Scottish Flood Forecast by the Scottish Flood Forecasting Service (SFFS), which provides 3-day flood forecasts and is updated daily. Weather forecasting service will be regularly monitored to indicate any periods of upcoming adverse weather conditions. Appropriate actions will then be taken to mitigate any potential situations that may arise. These actions should be documented in the safety management system, detailing the specific weather conditions that will necessitate action(s).

4.1.2 Operational Weather Limits

Operational weather limits will be set to ensure work is not carried out when conditions are considered to be unsafe. These limits will be dictated by maximum wave and wind limits and will be detailed in the contractor's Risk Assessment Method Statement.

4.2 Health & Safety

Safety will be of prime importance during the construction phase of the Proposed Development. The works will be subject to the Health and Safety at Work Act 1974. All aspects of design construction will be reviewed with regard to health and safety and a risk assessment will be carried out.

A Project Supervisor (Design Process) will be appointed by ABC to produce a pre-tender Health and Safety Plan for the project. The Principal Contractor will be responsible for the control and coordination of health and safety during the works and will be appointed as the Project Supervisor (Construction Stage).

All individuals working on the Project will be required to undertake induction procedures. Such will be designed to make individuals aware of all the issues associated with the Project and will include, but not be limited to:

- The terms of the CEMP;
- Marine safety;
- Working hours;
- Access arrangements;
- Health, safety and environmental policy procedures;
- Code of conduct within the site and surrounding area;
- Statutory obligations of individuals on site;
- Public access;
- Lighting requirements;

- Complaints and disciplinary procedures;
- Protection of the water environment;
- Protection of wildlife and habitats;
- Noise; and
- Emergency procedures.

Visitors will not be allowed onto the site unless demonstrating they have undertaken appropriate construction site Health & Safety training and have received formal induction or are accompanied by and authorised person who has completed the induction. All visitors will be required to sign a visitor's book.

5 CONCLUSION

This oCEMP sets out the overall management strategy for the Proposed Development. The oCEMP aims to ensure the management of pre-construction and construction activity is carried out in a planned, structured and considerate manner which minimises the impacts of the works on the local environment, residents and commercial activities in the vicinity of the site. Due to the nature of construction works, there may be unforeseen events which occur at the site and the project team will actively manage any changes and discuss with the relevant authorities, where required. The project team are committed to ensuring that the construction activities to be carried out are pro-actively managed so as to minimise potential impacts.