BALLYMASTONE PHASE 3 LRD

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) VOLUME 3: APPENDICES

BSM Est. 1968 Brady Shipman Martin Built. Environment.

Environmental Assessment **Built Environment**

Client: Glenveagh Living Limited

Date: 16 October 2025

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Appendix 8.1 Bat Survey Report



A bat assessment of Ballymastone, Phase 3

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For Glenveagh Living Limited

10/9/2025

Summary

Bat activity surveys at Ballymastone Phase 3 on 14–15 July 2025 recorded four species using the site, common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), Leisler's bat (*Nyctalus leisleri*), and Nathusius' pipistrelle (*P. nathusii*).

Activity was concentrated along hedgerows, treelines, and the site periphery, with frequent feeding and commuting by pipistrelles through the evening and into dawn. A roost check confirmed one Leisler's bat occupying a Schwegler box on a large oak between fields. Static and handheld detectors indicated high soprano activity, regular common pipistrelle passes/feeding, occasional Leisler's, and a single Nathusius' record. Conditions were suitable though intermittently wet.

The proposed development risks moderate, long-term effects on individual bats via loss of commuting/foraging habitat and light pollution, and a slight long-term effect from reduced future roost potential if trees/hedgerows are removed. With mitigation, residual effects are expected to be slight or imperceptible at the individual level and not significant at population level.

While a Leisler's bat was found in roosting in the bat box on the oak tree between fields. It is understood that the tree in question is scheduled to be retained.

Bat species found feeding and commuting on the site

Common pipistrelle	*Pipistrellus pipistrellus*
Soprano pipistrelle	*Pipistrellus pygmaeus*
Leisler's bat	*Nyctalus leisleri*
Nathusius' pipistrelle	*Pipistrellus nathusii*.

Recommendations

(1) A derogation licence must be sought from NPWS prior to any work commencing **If the mature oak with existing bat boxes must be modified in any way**. It is understood that there are no tree removals and this would apply to surgery rather than felling.

(2) No treework can take place on any trees with roost potential from May to September as bats may be breeding.

(3) 3 bat tree boxes, 3 Schwegler 2F Schwegler bat boxes with front panels must be put in place. These should be placed on trees at least 3m high, with a clear drop below (as bats need to drop to start their flight). These can be purchased from www.nhbs.com (or using the links included below) and must be placed in a dark area.

Bat tree box - https://www.quickcrop.ie/products/bat-tree-box-vkws8.html?searchid=1989103&search_query=bat+boxes
Schwegler 2F bat box - https://www.quickcrop.ie/products/schwegler-bat-box-2f-with-double-front-panel.html?searchid=1989104&search_query=bat+boxes

(4) Bats will suffer a loss of feeding. Native shrubs and trees must be used within the new development. Where other climbers and shrubs are required, they should be taken from the approved list from the All-Ireland Pollinator Plan:
https: pollinators.ie/wp-content/uploads/2023/04/Top-Ten-pollinator-plants-Guide-WEB.pdf

Semi-mature and mature trees and hedgerow should be planted within the new development.

(5) If bats are discovered at any stage of the development, building work must cease and both the author of this report and the NPWS Conservation Ranger must be contacted.

(6) A dark sky area must be designated within the development to provide commuting and feeding corridors, and light spillage and pollution must be kept to a minimum with the use of cowls, caps, and low-level bollard lighting where possible. No bat boxes should be illuminated.

Lighting design will be in accordance with:

Bats and Lighting – Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, 2010) https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Lighting.pdf

Bats and Artificial Lighting at Night, Institute of Lighting Professionals, 2023 https://theilp.org.uk/publication/guidance-note-8-bats-and-artificial-lighting/

Guidance Notes for the Reduction of Obtrusive Light GN01-21 (Institute of Lighting Professionals, 2021) https://theilp.org.uk/publication/guidance-note-1-for-the-reduction-of-obtrusive-light-2021/

Dark Sky Ireland's Environmentally Friendly Lighting Guide https://www.darksky.ie/lighting-documents/#guidelines

(8) Monitoring of trees should take place within a year of the addition of lighting to gain insights to the effectiveness of mitigation measures.

Preliminary survey details

Habitat classification and descriptions (Fossitt 2000) – see Habitat section for full discussion. The principal habitats of interest for bat fauna are unmanaged pasture, hedgerow and tree-lines.

Connectivity – Map of site showing the wider area with ecological features

Date: [Monday,14/7/2025]

Sunrise time: [05:15]

Sunset time: [21:45]

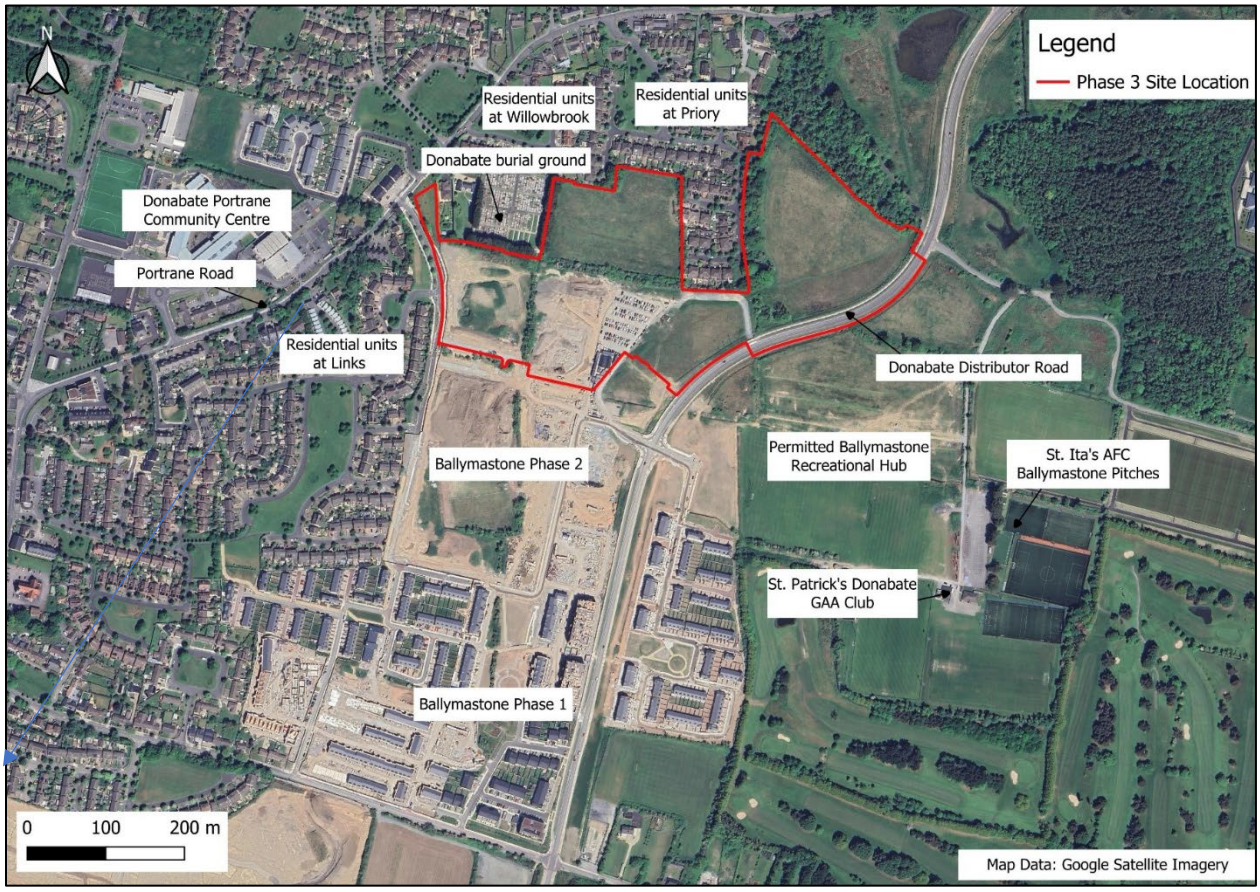
Lux Levels

0 lux on site

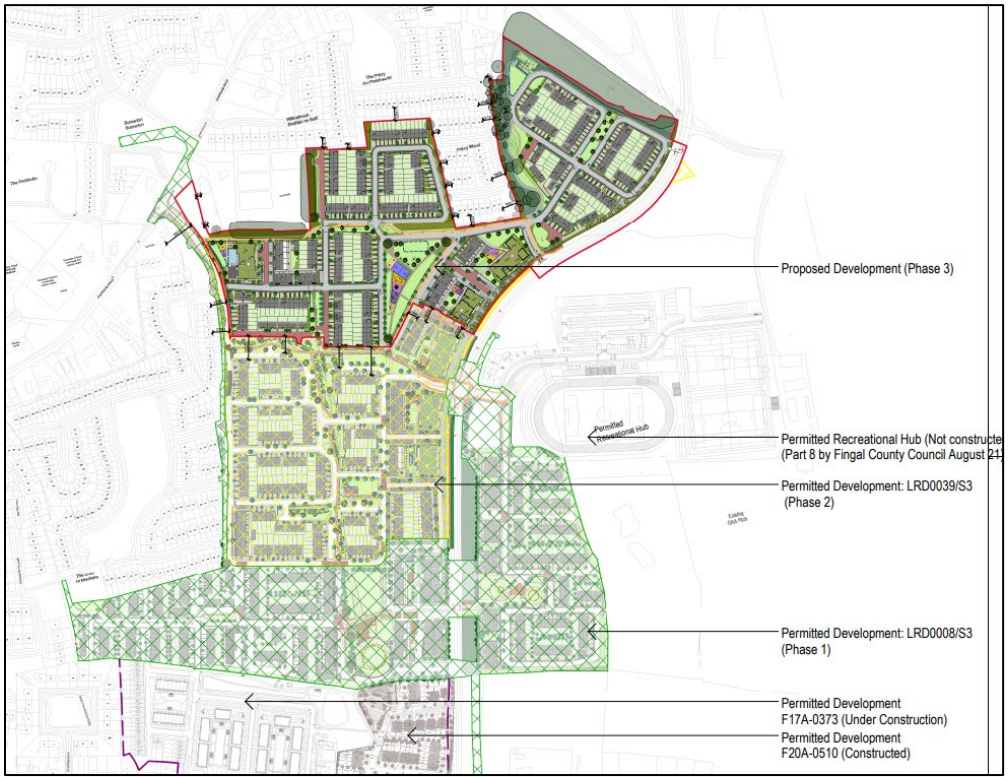
Temperature and weather conditions

Temperature during the evening survey was 15°C, with a temperature of 13°C during the morning survey. Intermittent light rain was recorded throughout the night.

Proposed works



Wildlife Surveys Ireland







The proposed development will consist of the construction of a residential development, which represents Phase 3 of the wider development of the Ballymastone Lands, ranging in height from 2- to 6-storeys, to accommodate 398 no. residential dwellings (including a mix of apartments, duplexes and houses), private amenity space, a crèche (c. 646sq.m), and a community space (c. 100sq.m). The site will accommodate 316 no. car parking spaces in total (comprised of 288 no. residential spaces,10 no. spaces for the proposed crèche/community space, 6 no. EV charging spaces including accessible spaces, and 12 no. spaces ducted for future provision), 1,619 total no. bicycle parking spaces, new pedestrian/cycle links, road improvements, storage, services (including water, wastewater, electricity and telecommunications) and plant areas. Landscaping will include communal amenity areas, SuDS features, and significant public open space (c. 15.3% of the net site) including outdoor exercise and play equipment.

Complexity of lands and ability to cover ground during surveys

All areas for this phase of development were accessible.

Other notes on survey conditions

One bat box erected for previous mitigation for phases of development was not found and is presumed to have fallen down. This bat box had been used by Leisler's bats based on previous surveys of this area.

Survey constraints

(1) Mobility of bats: Bat species are mobile and can move from roost to roost, depending on roost availability, feeding availability and weather conditions. They may move to roosts which have not been identified in this report in order to hibernate or create mating or feeding perches. A bat survey is a snapshot of bat activity over the survey time.

(2) Identification of bats: It can be difficult to differentiate *Myotis* species. For this reason, sound files are included within the report. Brown long eared bats are very quiet, and their presence can be overlooked in bat surveys as they may not register on bat detectors.

Methodology

Surveyors

Ferdia Keeley and Hugh Keeley of Wildlife Surveys Ireland carried out this survey. The bat box examination was conducted by Brian Keeley (licensed to disturb roosts and capture and handle bats).

Equipment

- Exide Lamps (one per surveyor)
- Petzl Tikka Head torches (one per surveyor)
- BatLogger M2 time expansion detectors and Kaleidoscope Pro sound analysis software with GPS (one per surveyor)
- One thermal imager per surveyor
- One Songmeter Mini Bat detector placed overnight at Ballymastone
- Mobile phones for communication during the survey (one per surveyor)
- One lux meter per surveyor

Survey procedure

Surveyors arrive on site shortly before sunset. All lands, trees, buildings and hedgerows are assessed for suitability for bats, including their suitability as feeding habitat and/or suitability as bat roosts. Areas and features with high potential are identified throughout the site and used as points of interest during the active survey. Survey routes are planned so that a surveyor can efficiently cover as much land as possible while maintaining a focus on these key points of interest. Larger sites are divided up into sections to be covered across multiple nights. Static bat monitoring devices are placed near areas and features of especially high interest, particularly features that bats may be using as roosts, in order to provide a timeline of bat activity throughout the night.

Over the next 90 minutes, surveyors cover the walkable area of the site along their planned routes, with adjustments being made to account for especially high or low bat activity in an area – for example, a surveyor may examine a tree associated with a high level of bat activity, as it may be a bat roost. After the 90 minutes have elapsed, most bats will already have emerged from their roosts in order to feed for the night, making

the period shortly after sunset one of the best times to identify roosts and feeding habitats.

Surveyors return to a site approximately 90 minutes before sunrise the next morning. At this time, any changes in temperature and weather conditions are noted, as well as any other factors (e.g. street lighting) that may have impacted bat activity during the night. Surveyors cover the site area again, this time with particular attention paid to possible roosts, as bats can be seen returning to their roosts during this time period. Any static monitors left out the previous night are collected for analysis.

Surveys are conducted with reference to the following documents –

(1) NPWS BAT MITIGATION GUIDELINES FOR IRELAND – V2 Ferdia Marnell, Conor Kelleher & Enda Mullen
(2) Heritage Council's Bat Survey Guidelines for the Traditional Farm Buildings Scheme
(3) Bat Surveys for Professional Ecologists – Good Practice Guidelines 4th Edition, 2024. Developed on behalf of the Bat Conservation Trust
(4) UK Bat Mitigation Guidelines (CIEEM, 2025)

Both emergence and return surveys are necessary on most occasions and go beyond these guidelines to ensure dawn roosts are located.

Survey:

Tree assessment

Tree Bat Roost Category Classification System (Collins, 2016).

Tree Category

Description 1 Trees with multiple, highly suitable features (Potential Roosting Features = PRFs) capable of supporting larger roosts;
Description 2 Trees with definite bat potential but supporting features (PRFs) suitable for use by individual bats;
Description 3 Trees have no obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some features (PRFs) which may have limited potential to support bats;
Description 4 Trees have no potential.



Description 1 oak, Roost confirmed in bat box



Description 1 oak



Treeline with description 3/4 trees, some having roosting potential.



Description 4 western field.



Description 4 treeline western field



Description 3 trees western field

Emergence/re-entry survey

Bat activity on July 14th 2025 included frequent recordings of common and soprano pipistrelles. Commons were noted moving from the east at 22:05, passing and feeding under trees and oaks throughout the evening. A soprano was observed under trees at 22:09, with further soprano activity near bat boxes at 22:16, though no emergences were confirmed. Commons continued to pass and feed along hedgerows, roads, and treelines, including at 22:33, 22:42, 22:45, 22:49, and 22:56, with soprano activity still evident at 22:58. The last evening record was of a common pipistrelle moving east along the road at 23:11.

During the dawn survey on July 15th, pipistrelles were recorded under trees at 04:20, a soprano at 04:23, and further soprano activity at 04:52. The final soprano was observed along a treeline at 04:57, before disappearing to the north east at 04:59.

On July 14th, observations included a pipistrelle passing overhead towards the surveyor at 22:08, followed by a soprano feeding in the middle of the field fuels at 22:24 and again along a hedge at 22:28. Continued soprano feeding was noted along the southern hedgerow at 22:41, returning again along the same hedge at 22:52.

During the dawn survey on July 15th, soprano activity was seen along hedgerows at 04:35, feeding at the graveyard border at 04:37, and again feeding along trees at 04:52. At 04:56, a soprano was recorded feeding along treelines before heading south towards the construction site.

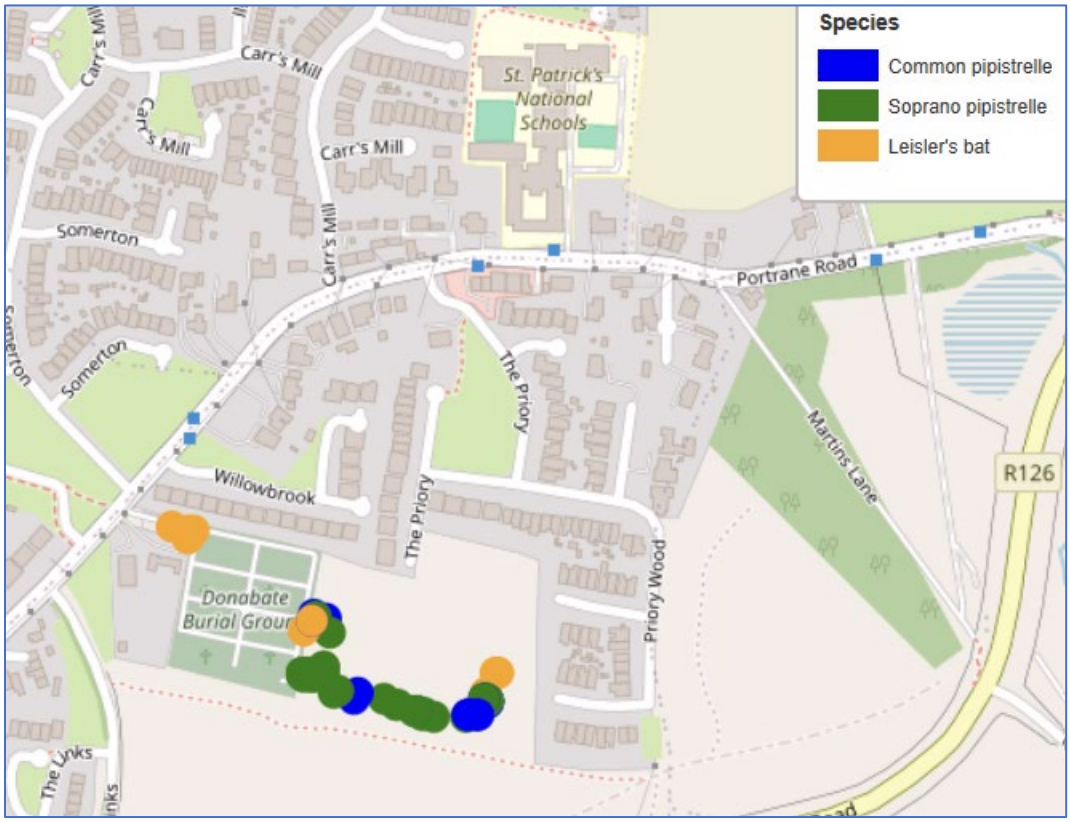
Song Meter Mini Bat data

Species	**Bat passes per hour**				
	11	**12**	**1**	**2**	**Grand total**
Leisler's bat	**1**		**4**		**5**
Common pipistrelle	**13**	**6**	**13**	**3**	**35**
Soprano pipistrelle	**46**	**27**	**1**		**74**
Grand total	**60**	**33**	**18**	**3**	**114**

Surveyor 1 Batlogger data

Species	**Bat passes per hour**		
	10	**16**	**Grand total**
Leisler's bat	**2**		**2**
Common pipistrelle	**13**	**3**	**16**
Soprano pipistrelle	**40**	**18**	**58**
Grand Total	**55**	**21**	**76**

Surveyor 1 Batlogger data Bat Map

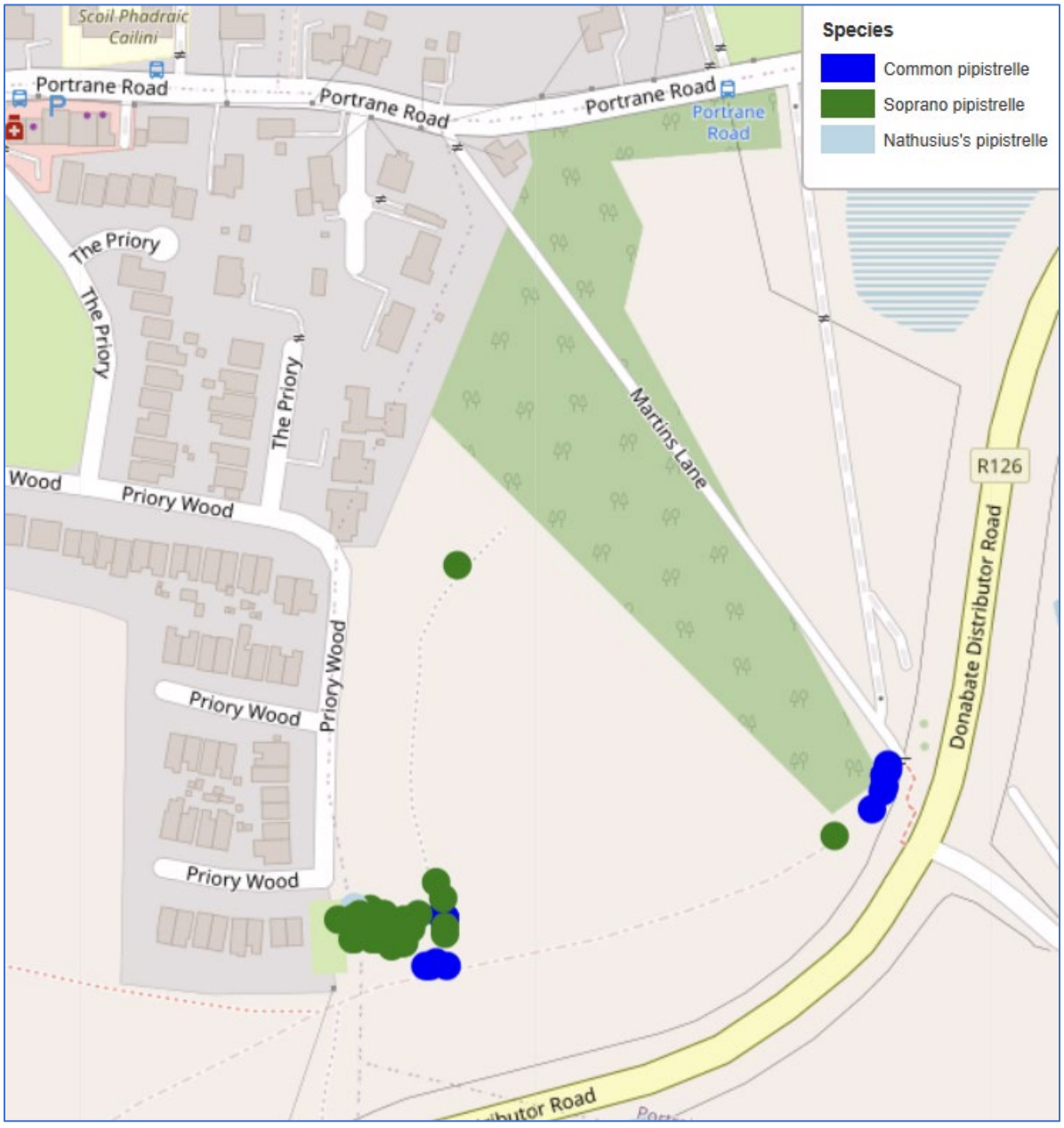


Surveyor 2 Batlogger data

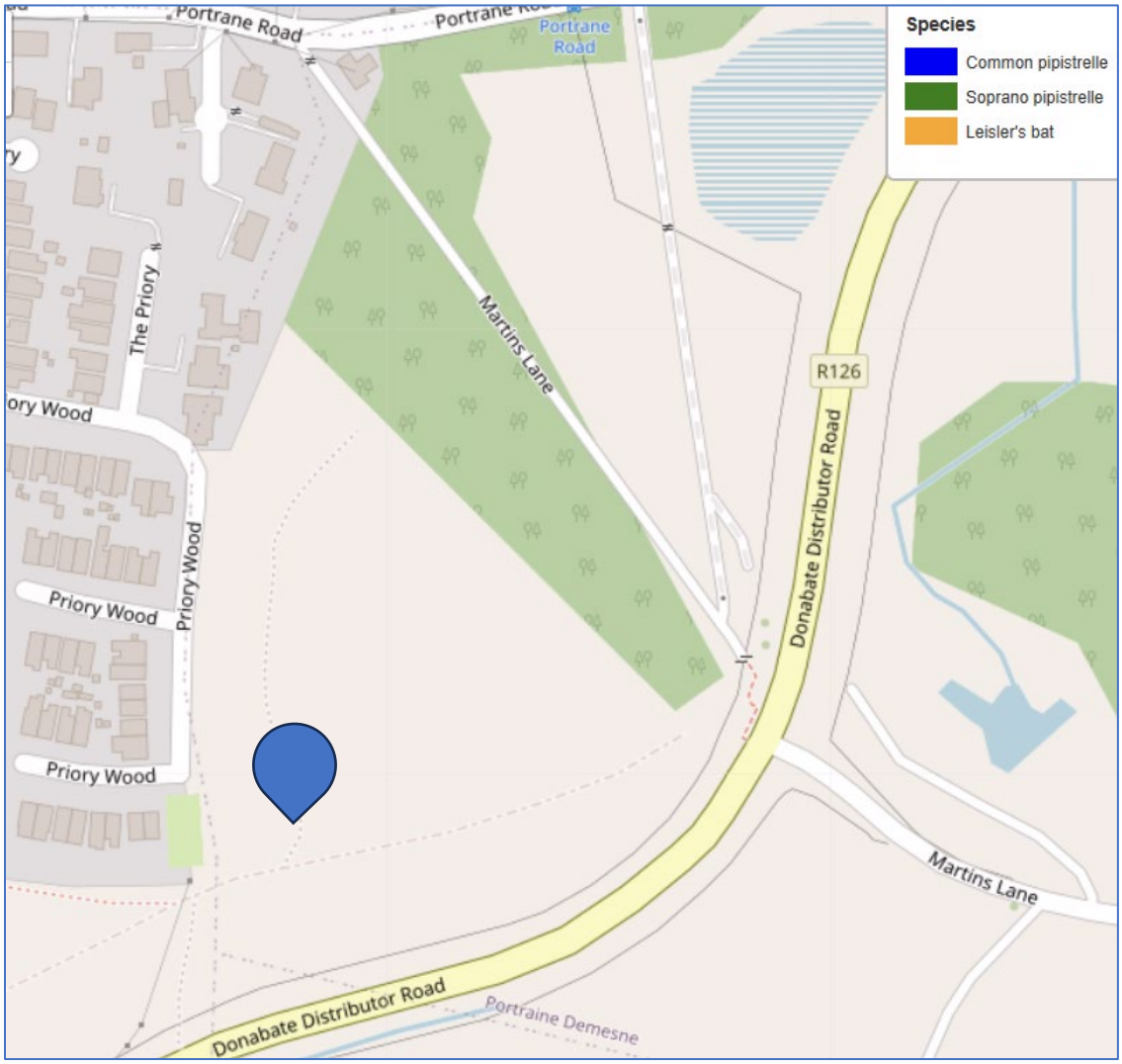
Species	Bat passes per hour			
	11	**12**	**5**	**Grand Total**
Nathusius pipistrelle	1			1
Common pipistrelle	37	1		38
Soprano pipistrelle	18	9	62	89
Grand Total	**56**	**10**	**62**	**128**

Wildlife Surveys Ireland

Surveyor 2 Batlogger data Bat Map



Song Meter Mini Location



Blue Icon-Song Meter Mini Location

Bat box Inspection

Two surveyors, Brian Keeley and Ferdia Keeley, inspected the bat boxes onsite for the presence of roosting bats. One Leisler's bat was found in one of the two remaining Schwegler bat boxes placed on the large oak tree between fields.





Results of survey

The results of survey conclude the site to be of feeding and commuting significance to four bat species, with vegetation in the area providing wind cover for feeding.

The large oak tree in the eastern field bat box was found to contain one roosting Leisler's bat upon inspection.

Potential impacts

Predicted Impacts Before Mitigation

(1) Loss of feeding and commuting habitat .Three species of bat are feeding and commuting along and within the grassland and hedgerow which may be removed in this development. There will be a loss of feeding for birds in the existing lawns. This will not affect the conservation status of any species present even in the absence of mitigation. This will have a moderate long-term impact on individuals within these species.

(2) Loss of roosting habitat. The trees if allowed develop would have roosting potential. Removal of the trees and hedgerow will have a slight long-term impact on individual bats.

(3) Light Pollution -Lighting of the development and areas around it will have a moderate long-term impact on individual bats. This would be a continuous negative impact on bat life.

Mitigation and recommendations

Mitigation measures should follow the hierarchy of 1) avoid the impact, 2) reduce or minimise the scale or severity of the impact and, if these are not possible, then 3) abate the impact at the source or 4) abate the impact at the receptor through provision of alternative feeding areas, roosts or flight path features (e.g. hedgerows, treelines).(*Bat Conservation Ireland Appropriate Assessment Guidelines)*

Mitigation by remedy

(1) A derogation licence must be sought from NPWS prior to any work commencing If the mature oak with existing bat boxes must be modified in any way. It is understood that there are no tree removals, and this would apply to surgery rather than felling.

(2) No tree work can take place on any trees with roost potential from May to September as bats may be breeding.

(3) 3 bat tree boxes, 3 Schwegler 2F Schwegler bat boxes with front panels must be put in place. These should be placed on trees at least 3m high, with a clear drop below (as bats need to drop to start their flight). These can be purchased from www.nhbs.com (or using the links included below) and must be placed in a dark area.

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Semi-mature and mature trees and hedgerow should be planted within the new development.
(5) If bats are discovered at any stage of the development, building work must cease and both myself and the Conservation Ranger must be contacted.

(6) A dark sky area must be designated within the development to provide commuting and feeding corridors, and light spillage and pollution must be kept to a minimum with the use of cowls, caps, and low-level bollard lighting where possible.

Lighting design will be in accordance with:

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Dark Sky Ireland's Environmentally Friendly Lighting Guide https://www.darksky.ie/lighting-documents/#guidelines

Mitigation Options and Recommendations (Eurobats)

	Measure	Recommendations
Avoidance	*Conserve dark areas*	High priority areas that should remain dark: • protected areas, including roosting and underground hibernation sites • feeding areas (natural areas, vegetation patches) • commuting routes (forest edges, hedgerows, rivers, tree lines)
Only if lighting is necessary, and after an assessment of bat occupancy and patterns of activity within the landscape framework of functional habitats:		
Mitigation	*Part-night lighting*	Turn off public outdoor lighting within **2 hours after sunset** (civil twilight): • Especially during bat reproduction and migration periods • Particular attention within home ranges of maternity colonies
	Dimming	• Adapt dimming strategy to human activities • Keep illuminance levels as low as possible according to EU standards (not going over minimum illuminance required)
	Avoid light trespass	Avoid light trespass over 0.1 lx on surrounding surfaces: • Use fully shielded luminaires • No illumination at or above horizontal • Control street light height, especially along pedestrian pathways and tree lines • Use fewer light sources at points low to the ground • Consider the interaction between light from luminaires and reflecting structures, such as roads and walls
General lighting and not sports lighting	*Adapt lamp spectra*	Avoid lamps emitting wavelengths below **540 nm** (blue and UV ranges) and with a correlated colour temperature > 2700 K
Compensation	*Restore dark areas*	No net loss of darkness: • Restore darkness to the same extent as the proportion of dark areas lost • Enhance alternative dark corridors that connect roosts and feeding areas

The Eurobats guidelines (Voigt et al. 2018) for lighting at night and bat conservation considerations include:

- **Limiting the duration of night-time lighting**
- **Dimming illuminance and limiting light trespass**
- **Limiting the short wavelength (UV and blue) content of the light spectrum** (wavelengths in the UV range can be filtered without any decrease in *illuminance* level)

There are several ways of lessening the impact of lighting upon bats. A number of these are given here:

1. **Lighting must be cowled if required to prevent light overspill on to surrounding trees**
   Light modelling would provide appropriate information on how light will be restricted from the trees while providing illumination for pedestrians and cyclists. Internal louvres are the most efficient means of controlling light overspill / pollution.

2. **Lighting operation should be based on levels of activity**
   This should mirror the levels of use of the infield area. Lighting is unnecessary except at times of darkness and when games or training is under way.

3. **Lighting should be sufficiently controlled to provide for low levels at ground level.** The design should strive to achieve 3 lux at ground level in the case where bats are found to be present, through landscaping or similar, to control spill as required. It is easier to control light overspill from shorter columns, but this is not possible for sports lighting. The measures below may assist in creating darker areas for bats that would in some areas be less than 3 lux.

4. **LED lights should be considered as the option for the lighting**
   LED lights are an energy efficient and highly controllable light source, are highly adaptable in terms of direction and strength and can be timed to switch on and off as they light quickly to the level required. These should ensure energy efficiency and money-saving as well as ecological advantages.

5. **Planting should be used to reduce / prevent light overspill and create commuting corridors**
   Planting of treelines and hedgerow can prevent lighting from creating a barrier to movement and provide feeding for birds and mammals lost by the removal of vegetation. This should include species that will grow to tree height rather than low shrubs.

(8) Monitoring of the bat boxes should take place within a year of the development being built, and the location of the bat boxes should be changed if they are unused and their site is unsuitable.

Impacts after mitigation

1) Loss of feeding and commuting habitat .The addition of semi mature trees and hedgerow will lead to a slight long-term impact on individuals within these species. After mitigation there will be a slight negative medium term impact as it will take time for shrubs to grow to maturity and support insect life. Loss of roosting habitat. The addition of bat boxes will reduce the impact to an imperceptible long term negative impact on individual bats.
2) Light Pollution – There will be light pollution with this development. However creating dark sky areas within the development will reduce the impact to a slight long term negative impact on individual bats.

This will result in an imperceptible negative impact on local bat populations, with proper implementation of the above measures.

Bat Biology

Female bats gather in groups known as maternity roosts in summer to have their young. They generally have one baby each year, so are slow to reproduce, and disturbance of a maternity roost can be catastrophic.

In winter bats move to old stonework, trees and caves to hibernate. They are especially vulnerable here as they are slow to awaken, and if tree felling is carried out, they can easily be killed.

Species descriptions from Bat Conservation Ireland (2025), Biodiversity Ireland (2025) and further as listed below:

Common Pipistrelle and Soprano Pipistrelle

Pipistrellus pipistrellus and *Pipistrellus pygmaeus*

Ireland's two smallest bat species, and also the commonest, the common and soprano pipistrelles are the bats most likely to be seen flying around soon after dusk in both urban and rural areas. Both have a rapid, twisting flight as they pursue tiny prey of midges, mosquitoes and small moths. A single pipistrelle (weighing no more than 5-6g, the weight of a 1-euro piece) may consume as many as 3,000 of these insects in one night. Pipistrelles are frequently found roosting in houses, although they also roost in other locations such as tree holes. In houses they prefer to occupy confined spaces such as behind hanging tiles and soffit boards or between roofing felt and roof tiles, rather than the main attic space.

The two are called common and soprano because the latter echolocates at a higher frequency peaking at 55kHz, compared with the former which echolocates at a peak frequency of 46kHz. The soprano pipistrelle tends to form nursery (or maternity) roosts with larger numbers of individuals (up to 1,500) compared with the common pipistrelle which would typically have a much smaller nursery roost size.

Trends in these species are monitored annually using the Car-based Bat Monitoring Scheme. Results from this scheme indicate that since 2003 the

soprano pipistrelle has increased significantly while the common pipistrelle has also increased, albeit more slowly. The reasons for these increases are poorly understood but both species may be recovering from past declines, or responding to increased woodland cover and/or climate change.

Conservation status

HABITATS DIRECTIVE ARTICLE 17 REPORTING
Range: Favourable
Population: Favourable
Habitat: Favourable
Future Prospects: Favourable
Overall Assessment of Conservation Status: Favourable
Overall Trend in Conservation Status: N/A
Source: NPWS 2013.

IUCN Conservation Status
Ireland: Least Concern
Europe: Least Concern
Global: Least Concern
Sources: (1) Marnell, F. et al 2009; (2) Hutson T., et al 2007 (3) Hutson, A.M. et al 2008

Legal status
Protected by the following legal instruments:
- Habitats Directive (92/43/EEC), Annex IV
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) Appendix II
- Agreement on the Conservation of Populations of European Bats (EUROBATS)
- Wildlife Act (1976)
- Wildlife (Amendment) Act (2000)
- Wildlife (N.I.) Order of 1985

Nathusius' pipistrelle

Pipistrellus nathusii

The first confirmed Irish breeding colony of this bat was discovered in May 1997 near Lough Neagh. Since then it has been found across Northern Ireland but mainly close to Loughs Neagh and Erne. The Nathusius' pipistrelle has been recorded by bat detector in a number of counties in the Republic and small roosts have been found here but it has not yet been confirmed breeding. This bat has similar features to the two other pipistrelles so it is possible that it has been under-recorded in roosts, or the Irish population may be recent in origin.

Research by the Centre for Irish Bat Research suggests that its population is expanding due to global warming. The Nathusius' pipistrelle is migratory in Europe, migrations of more than 1,600km have been recorded between summer and hibernation sites. It is not known whether the Irish population migrates within or from Ireland to another country to overwinter, although there is evidence that Nathusius' pipistrelle bats migrate from Britain to overwinter on continental Europe. The Nathusius' pipistrelle often forages over water or along forest tracks.

The species is recorded by the Car-based Bat Monitoring Scheme, although in such low numbers that its annual population trend is difficult to establish with certainty.

Conservation status

HABITATS DIRECTIVE ARTICLE 17 REPORTING
Range: Unknown
Population: Unknown
Habitat: Favourable
Future Prospects: Unknown
Overall Assessment of Conservation Status: Unknown
Overall Trend in Conservation Status: N/A
Source: NPWS 2013.

IUCN Conservation Status
Ireland: Least Concern
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Sources: (1) Marnell, F. et al 2009; (2) Hutson T., et al 2007 (3) Hutson, A.M. et al 2008

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Leisler's bat

Nyctalus leisleri

This is the biggest Irish bat and it is often found roosting in buildings although 13% of its roosts recorded in Ireland have been in trees. The Leisler's bat has distinctive level flight at greater heights than the other Irish species, from which it dives down after dung flies and beetles. It can be seen soon after sunset flying over open spaces such as parks and fields. Because it is one of the first bats to emerge in the evening and is quite large, the Leisler's may be confused with swifts that may also be flying around. They are best told apart by the wing shape, the swift's wings are smoothly curved and scimitar-like. Swifts also shriek, while the Leisler's bat is inaudible without a bat detector. The Leisler's bat is rare in Britain and the rest of Europe but it is relatively common here. For this reason the Irish population of Leisler's bats is considered of International Importance.

Leisler's bat is monitored by the Car-based Bat Monitoring Scheme and its annual trend has shown significant increases since 2003. The reasons for the increase is poorly understood but it may be recovering from past declines, or responding to increased woodland cover and/or climate change.

Conservation status

HABITATS DIRECTIVE ARTICLE 17 REPORTING
Range: Favourable
Population: Favourable
Habitat: Favourable
Future Prospects: Favourable
Overall Assessment of Conservation Status: Favourable
Overall Trend in Conservation Status: N/A
Source: NPWS 2013.

IUCN Conservation Status
Ireland: Near Threatened
Europe: Least Concern
Global: Least Concern
Sources: (1) Marnell, F. et al 2009; (2) Hutson T., et al 2007 (3) Hutson, A.M. et al 2008

Legal status
Protected by the following legal instruments:
- Habitats Directive (92/43/EEC), Annex IV
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) Appendix II
- Agreement on the Conservation of Populations of European Bats (EUROBATS)
- Wildlife Act (1976)
- Wildlife (Amendment) Act (2000)
- Wildlife (N.I.) Order of 1985

Legislation

Bats are protected under the 1996 Wildlife Act, the 2000 Wildlife (Amendment) Act, S.I. No 477 of 2011, The Habitats Directive, The Bonn and Bern Convention, and the Eurobats agreement.

The European Community (Natural Habitats) Regulations S.I. No 477 of 2011 states:

51. (1) The Minister shall take the requisite measures to establish a system of strict protection for the fauna consisting of the species referred to in Part 1 of the First Schedule. (2) Notwithstanding any consent, statutory or otherwise, given to a person by a public authority or held by a person, except in accordance with a licence granted by the Minister under Regulation 54, a person who in respect of the species referred to in Part 1 of the First Schedule— (a) deliberately captures or kills any specimen of these species in the wild, (b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration, (c) deliberately takes or destroys eggs of those species from the wild, (d) damages or destroys a breeding site or resting place of such an animal, or (e) keeps, transports, sells, exchanges, offers for sale or offers for exchange any specimen of these species taken in the wild, other than those taken legally as referred to in Article 12(2) of the Habitats Directive, shall be guilty of an offence. (3) The prohibitions referred to in paragraph (2) shall apply to all stages of life of the biological cycle of fauna to which this Regulation applies. (4) The Minister shall establish a system to monitor the incidental capture and killing of fauna consisting of the animal species referred to in Part 1 of the First Schedule and, having regard to the information gathered, he or she shall conduct further research or take such conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.

The EU Habitats Directive (92/43/EEC) lists all Irish bat species in Annex IV and one Irish species, the lesser horseshoe bat (Rhinolophus hipposideros), in Annex II. Annex II includes animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation (SACs) because they are endangered, rare, vulnerable or endemic. Annex IV includes various species that require strict protection. Article 11 of the Habitats Directive requires member states to monitor all species listed in the Habitats Directive and Article 17 requires States to report to the EU on the findings of monitoring schemes.

The Bern and Bonn Conventions:

Ireland is also a signatory to a number of conservation agreements pertaining to bats such as the Bern and Bonn Conventions. The European Bats Agreement (EUROBATS) is an agreement under the Bonn Convention. Ireland and the UK are two of the 31 signatories. The Agreement has an Action Plan with priorities for implementation. Devising strategies for monitoring of populations of selected bat species in Europe is among the resolutions of EUROBATS.

1.3.1 The Bern Convention:

Article 6 of the “Convention on the Conservation of European Wildlife and Natural Habitats’ (Berne Convention) reads:

“Each Contracting Party shall take appropriate and necessary legislative and administrative measures to ensure the special protection of the wild fauna species specified in Appendix II. The following will in particular be prohibited for these species:

a) all forms of deliberate capture and keeping and deliberate killing;

b) the deliberate damage to or destruction of breeding or resting sites;

c) the deliberate disturbance of wild fauna, particularly during the period of breeding, rearing and hibernation, insofar as disturbance would be significant in relation to the objectives of this Convention; ...

Appendix II lists strictly protected fauna species and this list includes “Microchiroptera, all species except Pipistrellus pipistrelles”.

The EUROBATS Agreement:

The ‘Agreement on the Conservation of Populations of European Bats’ (EUROBATS) was negotiated under the ‘Convention for the Conservation of Migratory Wild Species’ (Bonn Convention) and came into force in January 1994. The legal protection of bats and their habitats are given in Article III as fundamental obligations:



“1. Each Party shall prohibit the deliberate capture, keeping or killing of bats except under permit from its competent authority

2. Each Party shall identify those sites within its own area of jurisdiction which are important for the conservation status, including for the shelter and protection, of bats. It shall, taking into account as necessary economic and social considerations, protect such sites from damage or disturbance. In addition, each Party shall endeavour to identify and protect important feeding areas for bats from damage or disturbance.”

The Agreement covers all European bat species.

Contact Details: Our email address is briantkeeley@gmail.com or batsurveydm@gmail.com. Our phone numbers are 087 7454233 or 087 6753201.Our website is https://www.wildlifesurveys.net/

About Our Team

Wildlife Surveys Ireland Ltd. was founded by Brian Keeley and Donna Mullen. The company undertakes a variety of ecological evaluations and operations and have provided advice to County Councils, government departments, NPWS, OPW, developers, individuals applying for planning applications, local community groups, Tidy Towns organisations and many more. Brian and Donna have been engaged in bat detector surveys since the late 1980s on a voluntary basis, and were first trained by Bat Conservation Trust in 1992. They have been involved in surveying for over 30 years and have surveyed in every county on the island of Ireland.

Brian and Donna are engaged in all surveys undertaken by Wildlife Surveys Ireland and are involved in the fieldwork for all larger projects or where there is a project that requires long-term experience and expertise. All reports are co-wriiten by either Director and the principal fieldworker, to ensure that they address the issues of bat conservation correctly and thoroughly.

We trial our mitigation at our own nature reserve in North Meath – Golashane Nature Reserve, so we have first hand knowledge of working mitigation.
Our company was a finalist in the RDS Rural Sustainability Awards in May 2022. In 2019, we achieved a Rural Inspiration Award, and presented our work on our nature reserve to Mr Phil Hogan in Brussels. A tree is planted on our reserve for each survey and 5% of our company profits are given to charities.

Brian Keeley BSc (Hons) zool

Director

Brian has been involved in overseas survey work in Wales, England, France, Hungary and Poland and was involved in the compilation of the NRA / TII publications on bat survey and mitigation for roads. Brian has been involved in bat conservation since 1988 and founded the Dublin Bat Group (and later Bat Conservation Group Dublin) and Bat Conservation Ireland and has served as chair of this group for much of its existence. Brian is still a Council member of BCIreland. Brian has been vaccinated against Rabies and is licensed to disturb roosts for the purpose of survey.

Donna Mullen M.P.P.M D.E.N.V.S.P

Director
Donna Mullen is a founder member of Bat Conservation Ireland and the Irish Environmental Network. She was involved in drawing up the guidelines for the Heritage Council on bats and traditional farm buildings and has worked on providing new roosts and adapting old roosts to facilitate bats. This work includes surveying, advising architects, working with derogations and monitoring. She has also worked worked with the Irish Landmark Trust and the OPW providing advice on castles and old buildings. She has a strong interest in environmental law and worked on case 183/05 which was successful in the ECJ. She has recently published a book “Make Your Home A Nature Reserve” – O Brien Press, and is a frequent contributor on wildlife matters with the Claire Byrne Show on RTE. Donna has been vaccinated against Rabies and is licensed to disturb roosts for the purpose of survey.

Ferdia Keeley BSc (Hons). Cert in Field survey techniques

Field ecologist

Ferdia Keeley has been undertaking bat surveys for seven years. During this time, he has been tutored by both Brian and Donna in bat activity survey techniques and has operated a variety of bat detectors including Echometer EM2 and EM3, Echometer Touch, Echometer Touch 2 Pro, Anabat, Batbox III, Pettersson D240X and most recently Batlogger M2. Ferdia has also installed static monitors within sites: Songmeter 2, Songmeter Mini Bat and Songmeter Mini Bat 2. Ferdia has been trained in bat tree surveys with Flight Ecology Surveying England.. He is training with Bat Conservation Ireland for trapping techniques and has been training with WSI in capturing and handling bats and identification of Irish bats. Ferdia has been vaccinated against Rabies and is licensed to disturb roosts for the purpose of survey. (Note: the welfare of bats is paramount in the survey work of WSI and once a roost has been established, no further disturbance to the roost is permitted).

Saoirse Keeley BCL(Hons) (Law and business, Maynooth University)

Legal support

Saoirse has a bachelor's degree in law and business,and has a particular interest in European Law and Environmental Regulation. She helps with the preparation of environmental reports and contributes to applications for derogation licences. Her understanding of legal frameworks – particularly around EU and constitutional environmental legislation – has been really useful in ensuring our work meets regulatory requirements. She also brings strong research, analytical and communication skills to the team. Saoirse has also trained with Bat Conservation Ireland and frequently leads bat walks. Saoirse is rabies vaccinated.

Hugh Keeley

Student surveyor

Hugh assists in surveying under instruction from a senior ecologist. Hugh has an interest in business economics and is studying for a degree in Maynooth University. Hugh assists with bat walks and talks and is particularly good in dealing with bat rehabilitation. Hugh is vaccinated against rabies.

Appendix I -Definition of Effects – EPA 2017

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics

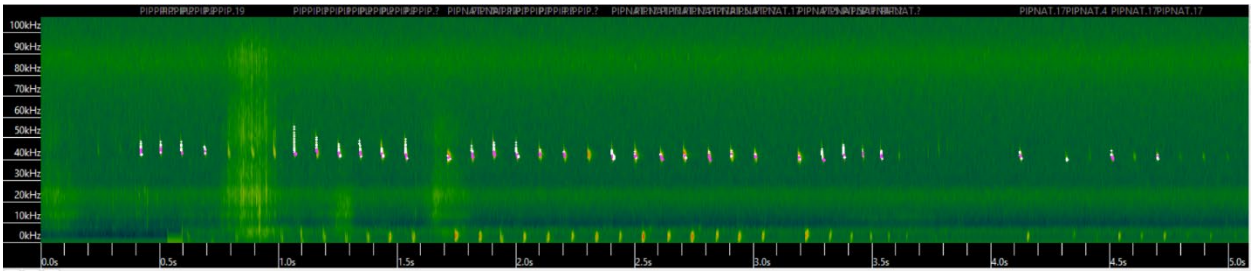
3.5.2.3 Criteria Used to Define Duration of Effects

In line with the EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects. See Table 4, below.

TABLE 4. DEFINITION OF DURATION OF EFFECTS.

Quality	Definition
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years
Reversible Effects	Effects that can be undone, for example through remediation or restoration

Appendix II – Bat Data



Nathusius pipistrelle 23:05

DATE	TIME	PULSES	MANUAL ID
15/07/2025	01:09:04	9	Leisler's bat
15/07/2025	01:09:25	5	Leisler's bat
14/07/2025	23:51:10	3	Soprano pipistrelle
15/07/2025	01:25:09	2	Leisler's bat
15/07/2025	01:10:25	2	Leisler's bat
14/07/2025	23:15:09	4	Leisler's bat
14/07/2025	23:22:47		Soprano pipistrelle
14/07/2025	23:30:40		Soprano pipistrelle
14/07/2025	23:45:08		Common pipistrelle
15/07/2025	00:04:06		Common pipistrelle
15/07/2025	01:15:30		Common pipistrelle
14/07/2025	23:43:39	70	Common pipistrelle
14/07/2025	23:44:08	65	Common pipistrelle
14/07/2025	23:43:53	45	Common pipistrelle
15/07/2025	01:28:05	35	Common pipistrelle
15/07/2025	01:14:42	34	Common pipistrelle
14/07/2025	23:30:54	40	Common pipistrelle
15/07/2025	02:12:34	34	Common pipistrelle
15/07/2025	01:28:14	31	Common pipistrelle
15/07/2025	01:35:15	29	Common pipistrelle
14/07/2025	23:39:05	40	Common pipistrelle
14/07/2025	23:21:33	26	Common pipistrelle
15/07/2025	02:12:44	23	Common pipistrelle
14/07/2025	23:44:39	18	Common pipistrelle

14/07/2025	23:39:20	21	Common pipistrelle
15/07/2025	01:36:11	14	Common pipistrelle
15/07/2025	00:50:07	19	Common pipistrelle
15/07/2025	01:28:32	13	Common pipistrelle
15/07/2025	02:13:02	15	Common pipistrelle
15/07/2025	00:40:58	12	Common pipistrelle
15/07/2025	01:17:37	12	Common pipistrelle
15/07/2025	00:18:25	12	Common pipistrelle
15/07/2025	01:11:43	12	Common pipistrelle
15/07/2025	01:24:59	15	Common pipistrelle
15/07/2025	01:26:03	10	Common pipistrelle
15/07/2025	00:10:08	10	Common pipistrelle
14/07/2025	23:39:36	8	Common pipistrelle
14/07/2025	23:42:49	7	Common pipistrelle
14/07/2025	23:44:49	8	Common pipistrelle
15/07/2025	01:24:39	5	Common pipistrelle
15/07/2025	00:18:35	2	Common pipistrelle
14/07/2025	23:14:59	2	Common pipistrelle
15/07/2025	01:03:35	4	Common pipistrelle
14/07/2025	23:59:29	81	Soprano pipistrelle
15/07/2025	00:02:54	70	Soprano pipistrelle
14/07/2025	23:56:40	57	Soprano pipistrelle
14/07/2025	23:28:30	43	Soprano pipistrelle
14/07/2025	23:31:21	42	Soprano pipistrelle
14/07/2025	23:21:12	38	Soprano pipistrelle
15/07/2025	00:02:49	37	Soprano pipistrelle
14/07/2025	23:29:54	37	Soprano pipistrelle
14/07/2025	23:42:33	32	Soprano pipistrelle
14/07/2025	23:55:54	32	Soprano pipistrelle
14/07/2025	23:31:37	31	Soprano pipistrelle
14/07/2025	23:59:24	31	Soprano pipistrelle
14/07/2025	23:54:35	30	Soprano pipistrelle
15/07/2025	00:03:35	30	Soprano pipistrelle
14/07/2025	23:27:27	28	Soprano pipistrelle
15/07/2025	00:01:08	28	Soprano pipistrelle

15/07/2025	00:22:25	28	Soprano pipistrelle
14/07/2025	23:26:55	27	Soprano pipistrelle
14/07/2025	23:22:22	27	Soprano pipistrelle
14/07/2025	23:56:55	27	Soprano pipistrelle
14/07/2025	23:56:25	28	Soprano pipistrelle
15/07/2025	00:00:38	26	Soprano pipistrelle
14/07/2025	23:55:08	24	Soprano pipistrelle
14/07/2025	23:20:00	23	Soprano pipistrelle
14/07/2025	23:27:10	23	Soprano pipistrelle
15/07/2025	00:00:22	23	Soprano pipistrelle
14/07/2025	23:28:45	24	Soprano pipistrelle
14/07/2025	23:56:09	23	Soprano pipistrelle
15/07/2025	00:02:02	21	Soprano pipistrelle
14/07/2025	23:28:15	22	Soprano pipistrelle
15/07/2025	00:01:40	22	Soprano pipistrelle
14/07/2025	23:55:23	24	Soprano pipistrelle
15/07/2025	00:01:45	25	Soprano pipistrelle
14/07/2025	23:27:59	20	Soprano pipistrelle
14/07/2025	23:48:29	20	Soprano pipistrelle
15/07/2025	00:03:50	19	Soprano pipistrelle
15/07/2025	00:02:18	22	Soprano pipistrelle
14/07/2025	23:30:24	19	Soprano pipistrelle
14/07/2025	23:53:29	17	Soprano pipistrelle
15/07/2025	00:03:04	17	Soprano pipistrelle
15/07/2025	00:02:34	17	Soprano pipistrelle
14/07/2025	23:59:07	19	Soprano pipistrelle
14/07/2025	23:21:02	16	Soprano pipistrelle
15/07/2025	00:03:20	15	Soprano pipistrelle
15/07/2025	00:19:33	16	Soprano pipistrelle
14/07/2025	23:22:55	17	Soprano pipistrelle
15/07/2025	00:43:47	14	Soprano pipistrelle
14/07/2025	23:29:17	15	Soprano pipistrelle
14/07/2025	23:28:51	13	Soprano pipistrelle
14/07/2025	23:27:42	14	Soprano pipistrelle
14/07/2025	23:19:44	11	Soprano pipistrelle

14/07/2025	23:20:17	11	Soprano pipistrelle
15/07/2025	00:00:53	11	Soprano pipistrelle
15/07/2025	01:26:20	14	Soprano pipistrelle
14/07/2025	23:44:03	15	Soprano pipistrelle
15/07/2025	00:22:35	8	Soprano pipistrelle
14/07/2025	23:44:18	10	Soprano pipistrelle
14/07/2025	23:31:52	7	Soprano pipistrelle
14/07/2025	23:54:58	6	Soprano pipistrelle
14/07/2025	23:48:23	6	Soprano pipistrelle
14/07/2025	23:55:39	6	Soprano pipistrelle
15/07/2025	00:19:39	6	Soprano pipistrelle
15/07/2025	00:04:27	6	Soprano pipistrelle
14/07/2025	23:44:24	7	Soprano pipistrelle
14/07/2025	23:20:23	5	Soprano pipistrelle
15/07/2025	00:02:24	5	Soprano pipistrelle
15/07/2025	00:22:17	5	Soprano pipistrelle
15/07/2025	00:21:56	5	Soprano pipistrelle
15/07/2025	00:01:23	3	Soprano pipistrelle
15/07/2025	00:04:22	2	Soprano pipistrelle
15/07/2025	00:00:06	4	Soprano pipistrelle

Appendix III – Data from Bat Conservation Ireland – Records from within a 10km radius of the site

BCIreland data: search results 3 Sep 2025

Search parameters: Roosts with observations of all species within 10000m of O239498			
Roosts			
Name	**Grid reference**	**Species observed**	
153 Ard na Mara	**O2145**	**Unidentified bat**	
15DITA10WC	**O2550**		
15DITA11WC	**O2550**		
15DITA12WC	**O2550**	**Nyctalus leisleri**	
15DITA13WC	**O2450**		
15DITA14WC	**O2450**		
15DITA15WC	**O2450**		
15DITA16WC	**O2450**		
15DITA17WC	**O2450**		
15DITA18WC	**O2450**		
15DITA19WC	**O2450**		
15DITA1WC	**O2549**		
15DITA20WC	**O2450**		
15DITA21WC	**O2450**		
15DITA22WC	**O2450**		
15DITA23WC	**O2450**		
15DITA24WC	**O2450**		
15DITA25WC	**O2450**		
15DITA26WC	**O2450**		
15DITA27WC	**O2450**		
15DITA28WC	**O2450**		
15DITA29WC	**O2550**		
15DITA2WC	**O2549**		
15DITA30WC	**O2550**		
15DITA3WC	**O2549**		
15DITA4WC	**O2550**		
15DITA5WC	**O2550**		
15DITA6WC	**O2550**		
15DITA7WC	**O2550**		
15DITA8WC	**O2550**	**Pipistrellus spp. (45kHz/55kHz)**	

15DITA9WC	O2550	Pipistrellus spp. (45kHz/55kHz)
52 River Valley Grove	O1745	Pipistrellus spp. (45kHz/55kHz)
Agricultural Buildings, St. Itas	O2550	Plecotus auritus,Pipistrellus pygmaeus
Farm building Newtowncorduff	O1953	Plecotus auritus
Flatroof Building, St. Itas	O2450	Plecotus auritus,Pipistrellus pygmaeus,Pipistrellus pipistrellus (45kHz)
Garage house roost	O2241	Pipistrellus pygmaeus
Haybarn, Fingal Co. Council Depot	O2050	Pipistrellus spp. (45kHz/55kHz)
House	O2256	Pipistrellus pipistrellus (45kHz)
Kinsaley House	O2142	Plecotus auritus,Pipistrellus spp. (45kHz/55kHz)
Martin Residence	O2350	Unidentified bat
Roncallic House	O2254	
Santry, Tree Roost	O1640	Unidentified bat
Seamount House	O2345	Pipistrellus pipistrellus (45kHz)
Seamount Lodge	O2345	Plecotus auritus
Skidoo House	O1550	Pipistrellus pygmaeus
Skidoo House stable	O1550	Pipistrellus pygmaeus
Stone walled storage shed, Lambay Island	O3050	Plecotus auritus
Thompson Residence	O2353	Unidentified bat
Tree	O2052	Pipistrellus pygmaeus
Unused Building, Fingal Council Depot	O2050	Pipistrellus spp. (45kHz/55kHz)

Appendix 8.2 Bird Survey Report

Late Season Breeding Bird Survey Ballymastone Lands

Donnabate

Co Dublin

John Fox

August to September 2025.



Fig 1. Yellowhammer on Brambles. Red Listed Possible Breeding Species at Ballymastone in 2025. (Photo. J Fox)

John Fox

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Fairview,

Dublin 3

foxjohn3@gmail.com

Summary:

During August and early September 2025, breeding bird surveys were undertaken on the area known as Ballymastone Lands, Co Dublin. The lands were visited on three separate dates. The visits were made on the 1st and 20th of August and the 5th of September 2025.

The three visits were undertaken in the early morning. During each visit the lands were walked slowly for about one hour and forty minutes. The route walked focused primarily on existing hedge rows, areas of scrub and areas with mature trees. Bird Species that were heard or seen were recorded, their position noted, and a breeding status assigned to them according to observed behaviour.

Data from the three visits were amalgamated and approximate positions for the birds as seen or heard were plotted on aerial photographs. Approximate populations, breeding status and conservation status were assigned to each species. A species table and a distribution map of the red and amber listed species for the lands were prepared.

A total of 26 common bird species of Ireland were recorded on the lands, none of which were confirmed as breeding. Two species of high conservation concern (Red listed) were recorded, both of which were possibly breeding on the lands. Seven species of medium conservation concern, (Amber listed), were recorded of which four species were possibly breeding on the lands. The remaining 17 species recorded were of least conservation concern, (Green listed) 15 of which were possibly breeding on the lands, with the remaining two species not breeding on the lands. Four of the species recorded were seen in flight or foraging only and most probably were not breeding on the lands. No bird species were confirmed to breed on the lands due mainly to the lateness of the starting date.

Introduction:

This survey of the breeding birds at Ballymastone Lands, Donabate, Co Dublin, was commissioned by Brady Shipman Martin on behalf of Glenveagh Living Limited in late July 2025. The survey was undertaken during August and early September of 2025, these being the latest months in which to conduct breeding bird surveys in Ireland.

This survey aims to describe the distribution and abundance of breeding birds occurring on the lands known as Ballymastone Lands during the survey period ,as outlined on the aerial photography at fig 5.

Study area:

The lands are approximately 12 hectares in area and are of mixed habitat types. These include, a building site, areas of hard standing, spoil heaps, previously tilled land, bare ground, dry meadow, grassy verges, hedgerow, tree lines and scrub.

In 2024/2025 most the lands were fenced off and made secure apart from one field in the northeastern part of the site. Almost all leisure activities have now ceased on the lands due to construction activities and the erection of new fencing, apart from in the field on the northeastern corner where some dog walking was still ongoing. The lands are generally flat. There are a number of remaining overhead cables crossing the lands.

The two most northerly field are still fallow, formerly tilled land that is now recolonising areas of scrub dominated by rank grasses and other common plants. The remainder of the lands are now an active building site where some hedges and tree lines remain, which are significantly degraded.



Fig 2. Meadow Pipit. Red listed species. Possible breeding species at Ballymastone Lands in 2025. (Photo:John Fox)



Fig 3. Recently mowed field and boundary with wooded area, Ballymastone Lands at the Northern Boundary in 2025.



Fig 4. Edge of construction area, spoil heap and retained hedgerow at Ballymastone Lands in 2025. (Photos J Fox)

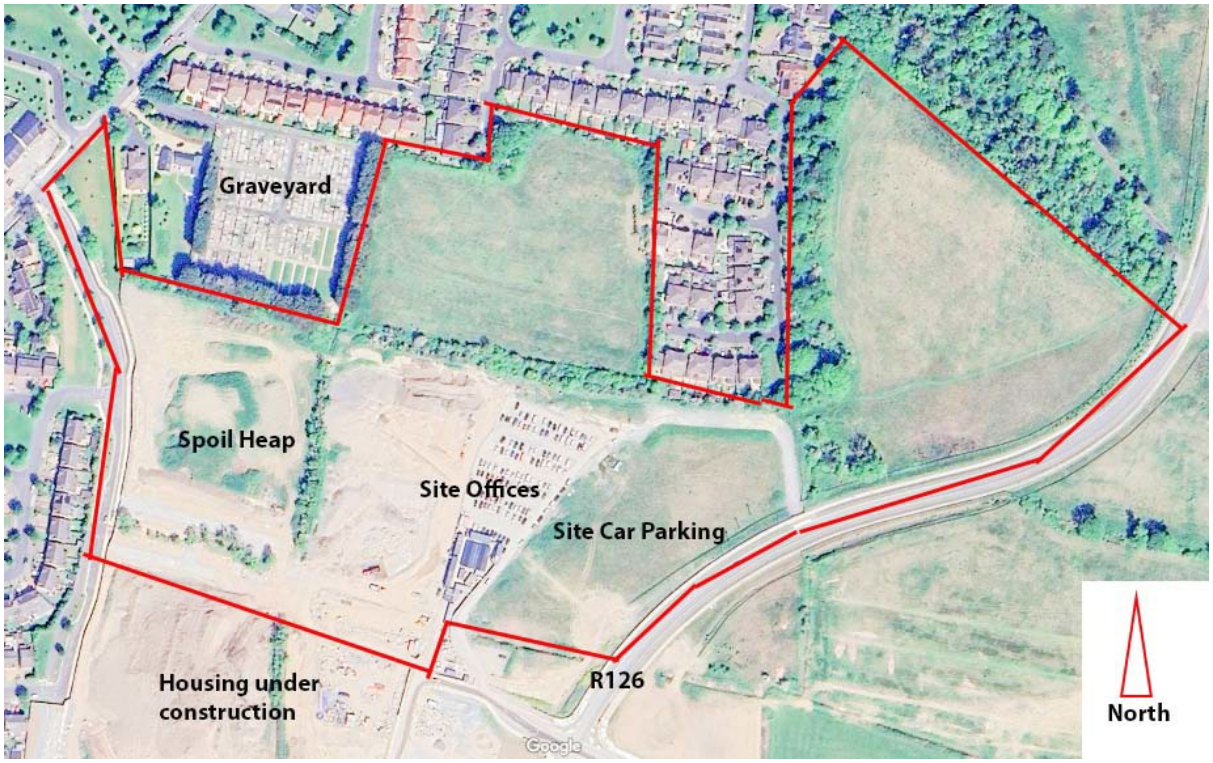


Fig 5. Ballymastone Lands. Overall site aerial photography. Red line encloses approximate extent of lands surveyed,

Methodology:

The site was visited on three occasions. The first visit was undertaken on the 1st of August and the final one on the 5th of September 2025. The visits were timed for early morning to coincide with the period when many breeding birds are most active and therefore most easily observed.

The visits were all for about 1 hours and 40 minutes. A total time of about 4 hours and 20 minutes were spent surveying the lands. Visits were spread as much as possible to achieve the best overview of breeding activity within the very restricted time period available.

Table 1 shows the timing of each visit together with weather conditions.

Date	Start	Finish	Wind Km/hr	Cloud Octas	Rain	Visibility
01/08/2025	07.00	08.40	NW 21	8/8	None	Good
20/08/2025	07.00	08.40	ENE 21	8/8	None	Good
05/09/2025	07.00	08.45	SW 14	6/8	None	Good

All visits were undertaken when weather conditions were suitable for surveying. All species present, were recorded, and their breeding status was determined where possible by observation of bird behaviour against a series of standardised behavioural indicators. Binoculars (42x10) were used throughout each survey period to aid with identification of species and activities.

Conservation Status: A list of "Birds of Conservation Concern in Ireland 4: 2020 to 2026" (Gilbert et all 2021) indicates three categories of concern as follows. See appendix 1 for more detail.

- Red list species (high conservation concern).
- Amber list species (medium conservation concern).
- Green list species (least conservation concern).

These statuses have been assigned to all regularly occurring species in Ireland. The criteria on which they have been assessed is based on their international conservation status, historical breeding declines, recent population declines, European conservation status, breeding rarity, localised distribution and the international importance of populations.

Breeding Status Indicators: The following breeding status indicators were used to establish breeding status.

1. **Confirmed Breeding**: Eggs/nest, Occupied nest, Adult carrying faecal sac or food for young or recently fledged young.
2. **Probable Breeding**: Paired birds seen, Agitated behaviour, Permanent territory, Courtship or display, Nest building or visiting a nest site.
3. **Possible Breeding**: Species in suitable habitat during breeding season or singing male present.
4. **Non Breeding**: Birds present but not likely breeding due to a lack of suitable nesting habitat and no behavioural evidence to suggest breeding on the site.

The site was entered from the northeast via the construction site entrance from the R126.

All accessible areas of the lands were walked slowly. The approximate location of all birds seen and heard were noted on aerial photography of the lands, together with any information about their breeding status. Emphasis was placed on walking along lines of mature hedge rows and through areas of scrub as these were the habitats potentially most suitable for breeding birds. Weather conditions were also noted during each visit, including rainfall, cloud cover, wind speed and visibility. See Table 1.

Results:

A total of 26 bird species were recorded on or over the site.

Two red listed species were observed, Meadow Pipit and Yellowhammer. Both Meadow Pipit and Yellowhammer could only be identified as possible breeding species.

Seven amber listed species were observed of which only four, Goldcrest, Starling, House Sparrow and Linnet were identified as possibly breeding on or close to the lands. The remaining three amber listed species, Herring Gull, Barn Swallow and House Martin were identified as nonbreeding species due to a lack of suitable nest sites. House Martin however probably nested close to the lands- under the eaves of houses nearby.

An additional 17 green listed species were observed of which fourteen were identified as possible breeding on the survey lands. Those species were Woodpigeon, Collared Dove, Wren, Dunnock, Robin, Blackbird, Mistle Thrush, Willow Warbler, Great Tit, Blue Tit, Magpie, Hooded Crow, Chaffinch and Goldfinch. Three green listed species were observed as non-breeders. Those species were Great Black-backed Gull, Feral Pigeon and Rook.

The visits in 2025 confirmed that much breeding habitat has been lost to permitted construction.

Table 2. Ballymastone Lands, Donabate, Co Dublin. Bird Species Identified, Numbers Present and Breeding Status, 2025.

Common Name	BTO Code	Species	Breeding Status	Estimated Numbers Present
Herring Gull	HG	*Larus argentatus*	Non-Breeding	Fly over only
Gt Black-backed Gull	GB	*Larus marinus*	Non-breeding	Fly over only
Feral Pigeon	FP	*Columba livia (domest)*	Non-Breeding	Ringed racing bird
Woodpigeon	WP	*Columba palmubus*	Possible Breeding	6 to 8 pairs
Collared Dove	CD	*Streptopelia decaocto*	Possible Breeding	1 pair
Barn Swallow	SL	*Hirundo rustica*	Non-Breeding	Birds in flight
House Martin	HM	*Delichon urbicua*	Non-Breeding	Birds in flight
Meadow Pipit	MP	*Anthus pratensis*	Possible Breeding	1 pair
Wren	WR	*Troglodytes troglodytes*	Possible Breeding	6 singing males
Dunnock	D.	*Prunella modularis*	Possible Breeding	2 birds
Robin	R.	*Erithacus rubecula*	Possible Breeding	3-4 Singing males
Mistle Thrush	M	*Turdus pilaris*	Possible Breeding	2 pairs
Blackbird	B.	*Turdus merula*	Possible Breeding	5 to 6 birds
Willow Warbler	WW	*Phylloscopus trochilus*	Possible Breeding	1 bird
Goldcrest	GC	*Regulus regulus*	Possible Breeding	3 singing males
Great Tit	GT	*Parus major*	Possible Breeding	1 bird
Blue Tit	BT	*Parus caeruleus*	Possible Breeding	3 to 5 birds
Magpie	MG	*Pica pica*	Possible Breeding	1 to 2 pairs
Rook	RO	*Corvus frugilegus*	Non-breeding	2 birds
Hooded Crow	HC	*Corvus corone cornix*	Possible Breeding	2 to 3 birds
Starling	SG	*Sturnus vulgaris*	Possible Breeding	4 -10 birds
House Sparrow	HS	*Passer domesticus*	Possible Breeding	2 birds
Chaffinch	CH	*Fringilla coelebs*	Possible Breeding	2 to 3 birds
Linnet	LI	*Carduelis cannabina*	Possible Breeding	4 to 6 birds
Goldfinch	GO	*Carduelis carduelis*	Possible Breeding	50 to 60 birds
Yellowhammer	Y	*Emberiza citrinella*	Possible Breeding	1 singing male

Text colour indicates species conservation status (Red, Amber or Green listed).

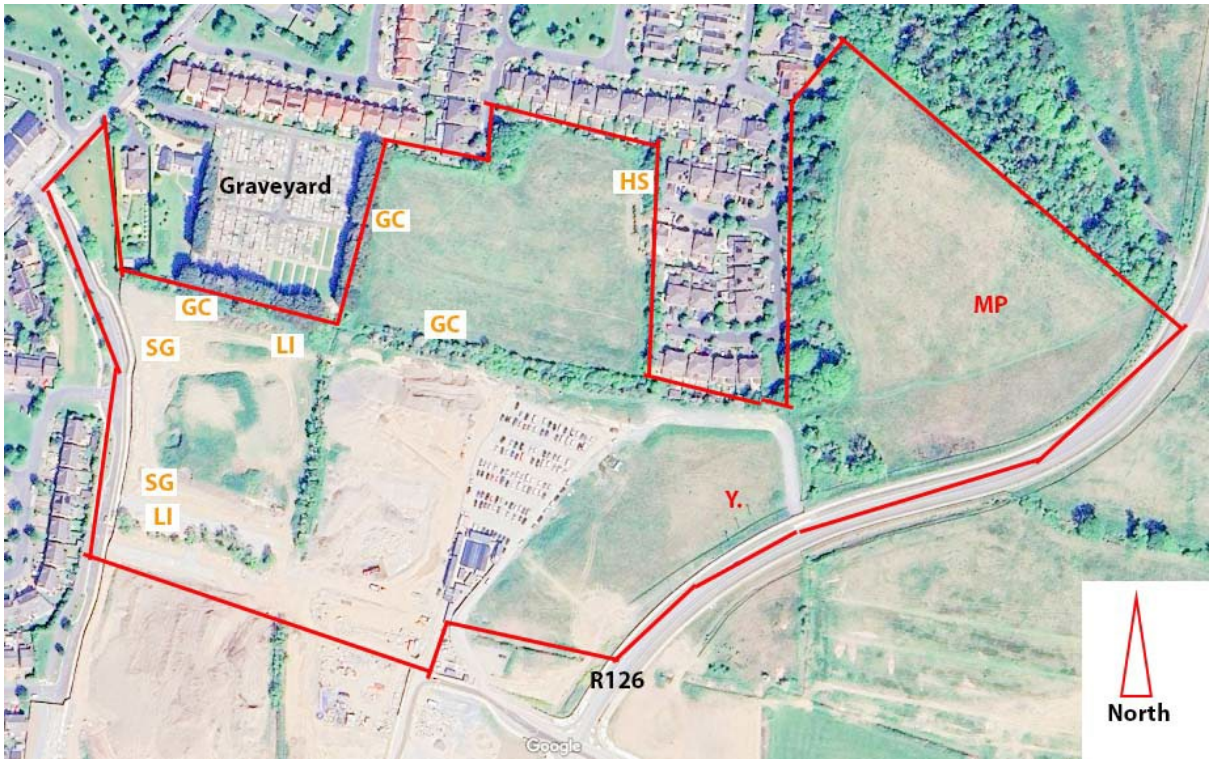


Fig 6. Red and Amber listed Bird Distribution Map, Ballymastone Lands, 2023. (For BTO Codes see Table 1). Most species indicated were recorded in numerous areas but have been shown roughly where they were recorded regularly or most frequently over several visits.

Discussion:

In 2025 birds were recorded in all areas of the lands, with hedges and trees producing most records. Areas of scrub, meadows and previously arable land, then fallow, also produced many records. The spoil heaps held good numbers of finches particularly Goldfinch which were attracted to the many seed heads on the thistles growing there. Many of the Goldfinches were juvenile birds.

Very little breeding behaviour was observed due to the lateness of the survey period. That said many species were seen and heard singing from prominent perches such as trees, fences and overhead cables.

The two red listed species were only recorded during the first visit in early August both were seen along the eastern boundary with the Yellowhammer seen singing from powerlines close to the R126.

Three amber listed species Herring Gull, Barn Swallow and House Martin were seen in flight over the lands only and did not breed on the lands due to the lack of suitable nest sites. The remaining four Amber listed species were seen or heard infrequently. Goldcrest were heard singing from the pines along the boundaries to the graveyard during all visits. Starlings were frequently seen in small foraging flocks of less than ten bird usually close to nearby housing.

House Sparrow was only recorded during the last visit close to the housing north of the lands. Just two birds were identified. Small numbers of Linnets were found in the large flocks of foraging Goldfinches during the visits in August.

The 26 species encountered on the site are all widespread common birds of Ireland. Most species observed are currently green listed as species of least conservation concern in Ireland. During a 2021 Breeding Bird Survey carried out by the author on these and adjoining but now developed lands, a total of 40 species were recorded. All were also widespread common birds of Ireland.

The fourteen additional species from the 2021 survey that were not recorded during the 2025 survey were Kestrel (red listed), Skylark and Greenfinch (Amber listed), Mallard, Buzzard, Pheasant, Song Thrush, Blackcap, Whitethroat, Sedge Warbler, Chiffchaff, Long-tailed Tit, Jackdaw, Bullfinch, (Green listed). Why these species were not recorded during 2025 surveys is difficult to say but a number of factors are probably at play including changes to the habitat over the four-year period, the reduced survey area and the lateness of the survey period in 2025.

During previous breeding bird surveys of these and additional lands, Meadow Pipits were observed on many occasions in the southern and eastern parts of the lands. They were seen to be agitated, were engaging in flight displays and song indicating them to be holding permanent territory. A Meadow Pipit was seen carrying food on more than one occasion confirming breeding on the lands. Juvenile birds were also identified. Nests were probable on the ground in grassed areas that are undisturbed. During the 2025 late season breeding bird survey however, just two Meadow Pipits were seen, and very little evidence of breeding was recorded.

In 2025 Yellowhammer was identified only as a possible breeding species. A single male was observed singing from power cables close to the R126 near the northern end of the site during the first visit. The numbers of breeding Yellowhammers on these lands appear to have declined significantly since the breeding survey undertaken in 2021, when breeding was confirmed and perhaps five pairs were present.

A third Red listed species; Kestrel, was identified during the 2021 survey but was not thought to breed on the lands. No Kestrels were seen during the 2025 survey.

In 2023 a single amber listed species, Skylark was identified as a probably breeding species on the lands. Skylark were seen singing over several areas of the lands with nesting probable in areas to the south and east of the lands. Skylark was not recorded during the 2025 surveys.

Conclusion:

The surveys were carried out between early August and early September of 2025 that being the only time of year available to conduct a breeding bird survey following appointment in August.

26 species, typical of the type of habitats were recorded on the lands. Of these, 20 were identified as possibly breeding. The remaining six species most probably do not breed on the lands, but some may breed on lands, buildings, or structures close to the site. The site is probably used by those nonbreeding species for foraging or roosting. No nocturnal species were detected on the lands.

The two red listed species were identified as a possible breeding species on the lands. Four amber listed species were also identified as possibly breeding on the lands and a further three amber listed species probably did not breed on the lands in 2025.

The areas of meadow, scrub, mature trees and hedgerows are the habitats of most importance for the breeding birds present on the site. Any hedgerow, scrub or tree removal should only be undertaken outside the breeding season. All mature trees should be retained where possible and checked for existing active nests before removal.

The site also supported many wintering species including some already mentioned and others not commonly found in Ireland during the breeding season. These include waterbirds such as Snipe.

Appendix 1.

Birds of Conservation of Concern in Ireland (BoCCI)

The first comprehensive analysis of the population status of birds on the island which identified those species most in need of conservation was published 16 years ago. (Newton et al 1999). It was an initial review followed the publication of the Irish Red Data Book by Wilde in 1993. A further review followed several years later (Lynas et al 2007), which include data for the first time on an all- Ireland basis. A third review six years later BoCCI (Colhoun and Cummin 2013) followed and was also on an all-Ireland basis. BoCCI in Ireland 4: (Gilbert et all 2021) was published this year and forms the basis on which the conservation statuses were assigned to the bird species in this report.

Seven quantitative criteria have been adopted to determine population status for birds in Ireland.
These include, assessments of global and European conservation status, recent population decline (both in terms of numbers and distribution), historical population decline, breeding rarity, localised distribution and international importance.

The status of 211 species in Ireland was assessed against each of the chosen criteria.

Of these 54 species, were assigned to the Red List. A further 79 species were assigned to the Amber List. The remaining 78 species were assigned to the Green List. In terms of conservation concern the Red listed species are species of immediate conservation concern, Amber listed species are of medium-term concern while Green listed species are currently of least conservation concern.

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Appendix 9.1 NRA Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes

Box 4.1: CRITERIA FOR RATING SITE ATTRIBUTES - Estimation of Importance of Soil and Geology Attributes

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality, significance or value on a regional or national scale Degree or extent of soil contamination is significant on a national or regional scale Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale*	Geological feature rare on a regional or national scale (NHA) Large existing quarry or pit Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale Degree or extent of soil contamination is significant on a local scale Volume of peat and/or soft organic soil underlying route is significant on a local scale*	Contaminated soil on site with previous heavy industrial usage Large recent landfill site for mixed wastes Geological feature of high value on a local scale (County Geological Site) Well drained and/or highly fertility soils Moderately sized existing quarry or pit Marginally economic extractable mineral resource
Medium	Attribute has a medium quality, significance or value on a local scale Degree or extent of soil contamination is moderate on a local scale Volume of peat and/or soft organic soil underlying route is moderate on a local scale*	Contaminated soil on site with previous light industrial usage Small recent landfill site for mixed wastes Moderately drained and/or moderate fertility soils Small existing quarry or pit Sub-economic extractable mineral resource
Low	Attribute has a low quality, significance or value on a local scale Degree or extent of soil contamination is minor on a local scale Volume of peat and/or soft organic soil underlying route is small on a local scale*	Large historical and/or recent site for construction and demolition wastes Small historical and/or recent landfill site for construction and demolition wastes Poorly drained and/or low fertility soils Uneconomically extractable mineral resource

* *relative to the total volume of inert soil disposed of and/or recovered*

Box 4.2: CRITERIA FOR RATING SITE ATTRIBUTES - Estimation of Importance of Hydrology Attributes

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

Box 4.3: CRITERIA FOR RATING SITE ATTRIBUTES - Estimation of Importance of Hydrogeology Attributes

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers Locally important potable water source supplying >1000 homes Outer source protection area for regionally important water source Inner source protection area for locally important water source
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer Potable water source supplying >50 homes Outer source protection area for locally important water source
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Box 4.4: CRITERIA FOR RATING IMPACT SIGNIFICANCE AT ROUTE SELECTION STAGE - Rating of Significant Environmental Impacts at Route Selection Stage

Impact Level	Attribute Importance				
	Extremely High **	Very High	High	Medium	Low
Profound	Any permanent impact on attribute	Permanent impact on significant proportion of attribute			
Significant	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute		
Moderate	Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute	
Slight		Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute
Imperceptible			Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute

** ***In rating impacts on an 'European site' account must be taken of Article 6(3) and 6(4) of the Habitats Directive*** *(Council Directive 92/43/EEC). Also see guidance contained within Guidelines for Assessment of Ecological Impacts of National Road Schemes (Rev 2, National Roads Authority, 2008)*

Appendix 10.1 Criteria for Rating the Magnitude and Significance of Impacts at EIA Stage National Roads Authority

Appendix 10.1: Criteria for Rating the Magnitude and Significance of Impacts at EIA Stage National Roads Authority (NRA-TII, 2009)

Table 10.1 Criteria for Rating Size Attributes – Estimation of Importance of Hydrological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes.

Importance	Criteria	Typical Examples
		Quality Class C (Biotic Index Q3, Q2- 3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 10.2 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrological Attributes (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm. Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually. Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm. Minor loss of fishery.

Magnitude of Impact	Criteria	Typical Examples
		Calculated risk of serious pollution incident >0.5% annually. Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

Table 10.3 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

Appendix 10.2 Water Framework Directive (WFD) Assessment



Water Framework Directive Assessment

Project Title: Water Framework Directive Assessment for Ballymastone Phase 3 EIAR Residential Development

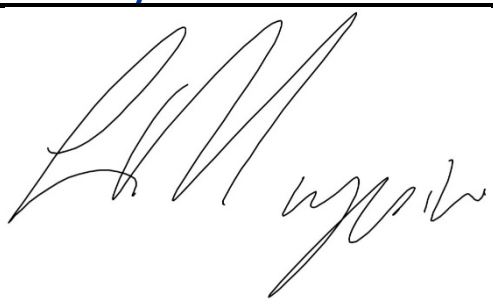
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1. INTRODUCTION

1.1 OBJECTIVE OF ASSESSMENT

AWN Consulting Limited (AWN) has prepared this Water Framework Directive (WFD) Assessment to support the competent authority, in determining if there is a likelihood of significant effects on the Water Framework status of the receiving waterbodies as a result of the proposed Residential Development.

This WFD Assessment has been prepared in response to the requirements of the Water Framework Directive 2000/60/EC. This WFD compliance document should be read in conjunction with Chapter 10 (Hydrology) of the Environmental Impact Assessment Report (EIAR).

The objective of the assessment is to address if the proposed development may compromise WFD status objectives including:

- Does the development cause deterioration of a water body from its current status or Impede its potential for reaching "Good" status?
- Does the development impact on any water dependent protected areas, priority species, habitats etc.?
- Does the development support the achievement of water body objectives and programme of measures?

1.2 SITE SETTING AND HISTORY

The proposed development site is c. 11.28 hectares (Ha) gross site area which is located at Ballymastone, Donabate, Co. Dublin. The majority of the site exists currently as portions of grassland fields / plots characterised by a previous (historic) agricultural function, which consisted of arable agricultural activities. At present, the site is predominantly comprised of greenfield land, with the exception of a localised part (central southern portion) of the site which is occupied by an actively operating construction compound under works permitted for Phase 2 by An Coimisiún Pleanàla (FCC Ref. LRD0008/S3 & ABP Ref. 315288). The newly constructed extension to the R126 (DDR), which forms the east boundary of the site, allows traffic to bypass Donabate village. The site is bounded to the east by the recently constructed Donabate Distributor Road (DDR) and further east by the permitted (not yet constructed) FCC recreational hub to the east. Donabate Golf Club and St. Ita's Demesne are also located further to the east of the subject site, situated on the eastern side of the DDR route. The site is bound to the west by The Links residential development. and the site is bounded to the north by the Cemetery (Donabate Burial Ground) and residential estate developments, namely Willowbrook and The Priory. The Ballymastone Masterplan (Phase 1 and 2) occupies land directly/immediately south of the site.

A network of hedgerows and drainage ditches are located throughout the site. Phases 1 and 2 of the development are currently under construction to the south of the proposed site (Phase 1 - FCC Ref. LRD0008/S3 & ABP Ref. 315288; Phase 2 - LRD0039/S3 & ABP-320885). Further developments in the vicinity of the proposed site are located south of Phase 1 which are mainly large-scale residential developments. An underground wastewater pump station (F19A/0243/ABP-307657-20) has been constructed south of the Phase 1 development, which is located to the south of the Masterplan development lands.

The lands are within the jurisdiction of Fingal County Council's Development Plan, 2023 – 2029. They are primarily zoned 'RA', Residential Area, to 'provide for new residential communities subject to the provision of the necessary social and physical infrastructure'. The Ballymastone area is one of the main development areas within the Donabate Local Area Plan 2016 (as extended). Phase 1 of the overall development is

currently under construction. Phase 3 of the development utilises infrastructure that is being constructed as part of Ballymastone Phase 1 permitted under FCC Reg. Ref. LRD0008/S3 & ABP Ref. 315288 and Phase 2 also permitted by An Coimisiún Pleanàla (FCC Ref. LRD0039/S3 & ABP Ref. 320885).

The topography of the site is relatively flat/level, characterized by minor localized undulations throughout the site, with a high point located at the elevated central eastern portion of the site adjacent to the DDR from where it falls to the North. A network of hedgerows and drainage ditches are located throughout the site. The recently constructed Donabate Distributor Road (DDR) lies immediately east, forming the eastern boundary of the site. A network of hedgerows and drainage ditches are located throughout the site.

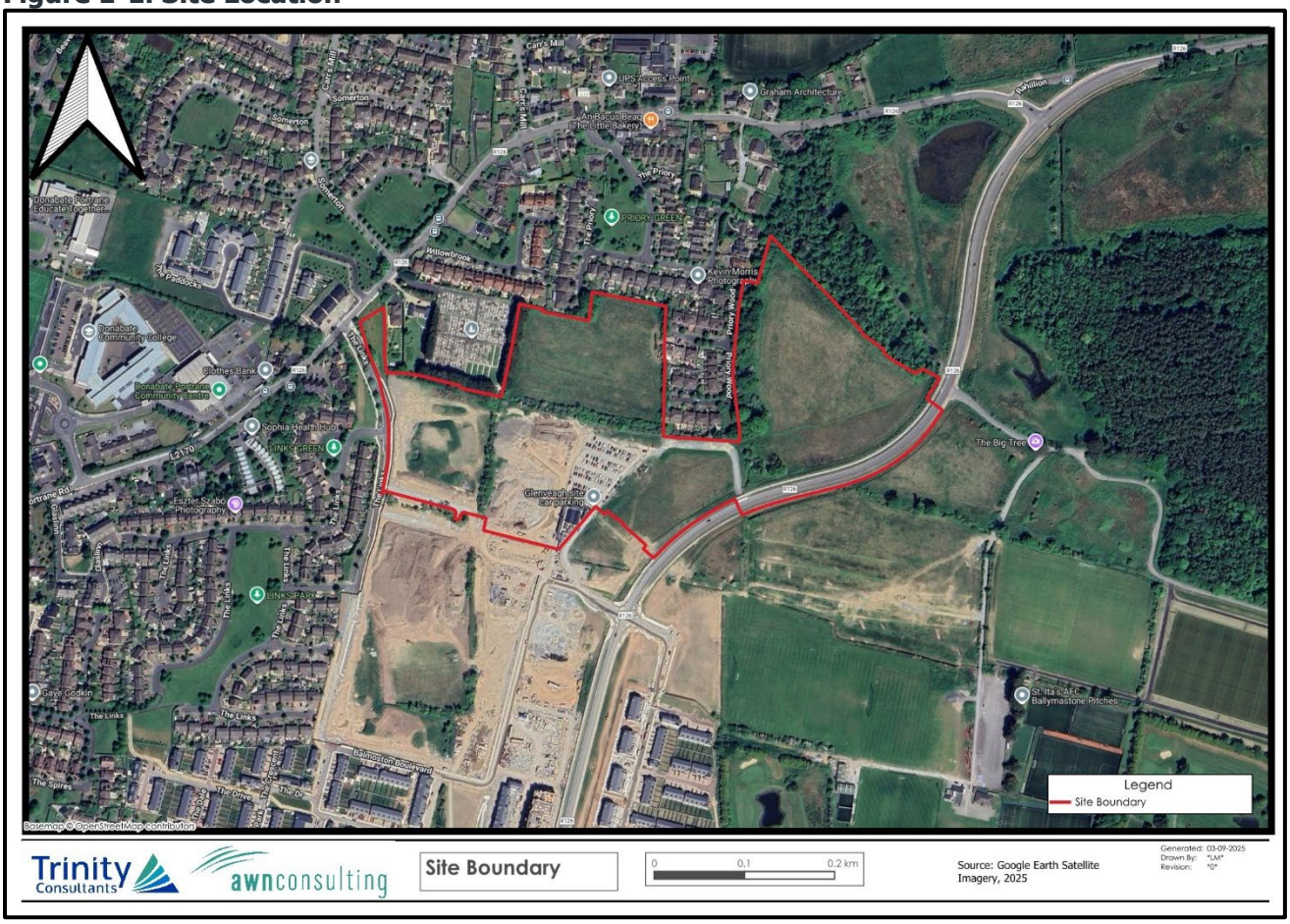
A review of the GSI online data base confirmed that no geological heritage site has been identified in the immediate vicinity of the proposed development site. Portrane Shore (Site Code: DF001) and Malahide Point (Site Code: DF020) are the closest audited sites to the proposed development, which are located approximately 1.5km and 1.6km to the east and southeast of the site, respectively, at the point of closest proximity. The proposed development will have no interaction with locations due to the separation distance and low potential for a source-pathway-receptor linkage.

There nearest Integrated Pollution Prevention and Control (IPPC) facility (Evode Industries Limited, P0083) is located c. 5.3 km south-west of the site at Newtown, Swords, Co. Dublin. The nearest Industrial Emissions Directive (IE) licenced facility (Balleally Landfill, W0009) is located 2.2km north-west of the site at Balleally, Lusk, Co. Dublin. The proposed development will have no interaction with these licensed facilities due to the separation distance.

Consultation with Fingal County Council has confirmed that there are no known illegal / historic landfills within 500 m of the site.

Historical Ordnance Survey (OSi) maps were examined. OSi maps were available from 1829 (the historic 6" maps) and 1900 from the historic 25" maps. The historic maps indicate that the subject site was greenfield up to the present day with land use being characterised by a previous agricultural function. No evidence was noted to indicate quarrying etc have been undertaken on the subject site.

Figure 1-1. Site Location



1.3 EXPERIENCE OF AUTHORS

This Chapter has been written and prepared by Luke Maguire Environmental Consultant and Geoscientist (BSc) at AWN Consulting and Marcelo Allende (BSc, BEng) Principal Hydrological Consultant at AWN Consulting.

Luke Maguire; is an Environmental Consultant at AWN with over 4 years of experience in Environmental Consulting and water resources. Luke holds a B.Sc. in Geoscience (Geology, Hydrology, Geochemistry, Geophysics, Climate and Environmental studies) from Trinity College University of Dublin and has worked on a range of developments including pharmaceutical plants, medical device facilities, ICT facilities and energy projects. Luke has experience in contaminated soil sampling and analysis, basement impact assessments, bulk excavations and largescale dewatering processes. Additionally, Luke has gained experience in Environmental Impact Assessment Reporting (EIAR), Hydrological Risk Assessment, Flood Risk Assessments (Stage 1 & 2) and WFD Assessment Reporting and has worked in multiple Environmental monitoring disciplines such as Chemical Wastewater, Ground Gas, Surface Water, and Groundwater Monitoring at numerous sites across Dublin.

Marcelo Allende is a Principal Environmental Consultant (Hydrologist) with AWN Consulting with over 20 years of experience in water resources technical studies, conceptual and numerical hydrological/hydrogeological modelling and environmental consultancy. Marcelo holds a degree in Water Resource Civil Engineering (BEng, Hons) from the University of Chile and a Bachelor of Science in Engineering (BSc, Hons). He has worked on a wide of range of projects including multi-aspect environmental investigations, geo-environmental impact assessments, surface and groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, strategic and site

specific flood risk assessments (Stage 1,2 and 3), Due Diligence reporting, baselines studies, soils, surface water and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama. He also has detailed knowledge of environmental guidance, legislation, regulations & standards and expertise in GIS (expert level) and MATTE studies at COMAH establishments. He is currently a member of the International Association of Hydrogeologists (IAH, Irish Group) and a member of Engineers Ireland (MIEI).

1.4 LEGISLATION AND GUIDANCE

The Water Framework Directive (WFD) 2000/60/EC aims to protect and enhance the quality of the water environment (both surface water and groundwater) across all European Union member states. The WFD was transposed into Irish law by the European Communities (Water Policy) regulations 2003 (S.I. No 722 of 2003). The WFD requires that EU Member States achieve at least "Good" status for all water bodies by the year of 2027 at the latest. Additionally, where Member States assign "High" status objectives to water bodies, the "High" status must be achieved or maintained by 2027.

The concept of 'deterioration of the status' of a body of surface water in Article 4(1)(a)(i) of Directive 2000/60 is interpreted as meaning that there is deterioration as soon as the status of at least one of the quality elements, within the meaning of Annex V to the directive, falls by one class, even if that fall does not result in a fall in classification of the body of the surface water as a whole. However, if the quality element concerned, within the meaning of that annex, is already in the lowest class, any deterioration of that element constitutes a 'deterioration of the status' of a body of surface water, within the meaning of Article 4(1)(a)(i).

As part of the WFD implementation process the EPA completes a risk assessment and the outcomes are implemented through River Basin Management Plans (RBMPs) in six-year cycles. Ireland is currently in WFD third cycle 2022-2027 i.e. Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024). Waterbodies are either "At Risk" or "Not at Risk" of meeting WFD environmental objectives. Where a waterbody is "At Risk", the EPA determines the significant pressures that are placing the water body at risk of meeting its status objective. This determination focuses the Programme of Measures for the relevant subcatchment(s).

The primary aim of the RBMP is that water bodies identified as being 'At Risk' of not achieving their WFD environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. The EPA determines the significant pressures that are placing the water body at risk of meeting its status objective. This determination focuses the programme of Measures for the relevant subcatchment(s).

As part of its role, the EPA and other stakeholders such as local authorities must consider whether proposals for new developments (other than where exemptions apply Article 4.4 - 4.7 of the WFD) have the potential to:

- Cause a deterioration of a water body from its current status or potential; and/ or
- Prevent future attainment of good status or potential where not already achieved.

As a result, new developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the WFD objectives of the potentially affected water bodies.

1.5 METHODOLOGY

This WFD assessment is based on desktop review of the Environmental Protection Agency (EPA) dataset which was obtained from the www.catchments.ie (accessed September 2025).

The water bodies identified for this assessment are related to the vicinity of the proposed development and its direct or indirect hydrological or hydrogeological connection. From the aforementioned source of information, the WFD Status classification and Risk score was obtained for the identified water bodies.

Besides the status classification of water bodies, the WFD also requires that 'designated sites' meet their environmental requirements and conservation objectives. Designated sites are Natura 2000 sites (Special Areas of Conservation, SACs, with water-dependent habitats, and Special Protection Areas for species listed in the EU Habitats Directive); drinking water protected areas; bathing waters; shellfish waters; salmonid waters; and nutrient sensitive waters. Environmental requirements and conservation objectives for designated sites are stipulated in existing regulations or are being developed by the relevant public bodies (e.g., National Parks and Wildlife Service for SACs).

1.5.1 WFD Risk Status

The WFD Risk score (determined by the EPA) is the risk for each waterbody of failing to meet their WFD objectives by 2027.

The three risk categories are:

- Waterbodies that are 'At Risk' of not meeting their Water Framework Directive objectives. For these waterbodies an evidence-based process was undertaken to identify the significant pressures; once a pressure is designated as 'significant', measures and accompanying resources are needed to mitigate the impact(s) from this pressure. These 'At Risk' waterbodies require not only implementation of the existing measures described in the various regulations, e.g., the Good Agricultural Practices Regulations, but also in many instances more targeted supplementary measures that may have to be taken by a variety of actors, in both the public and private sector.
- Waterbodies that are categorised as 'Review' either because additional information is needed to determine their status before resources and more targeted measures are initiated or the measures have been undertaken, e.g., a wastewater treatment plant upgrade, but the outcome hasn't yet been measured/monitored.
- Waterbodies that are 'Not at Risk' and therefore are meeting their Water Framework Directive objectives. These require maintenance of existing measures to protect the satisfactory status of the water bodies.

1.5.2 WFD Water Body Status

Surface water body status is classified by the EPA on the basis of chemical and ecological status or potential. This system is summarised in Appendix A Figure 1. Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. This system is summarised in Appendix A Figure 2.

1.5.3 Methodology for Determination of No Deterioration

Proposed developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the objectives defined for potentially affected water bodies.

1.5.3.1 Surface Water No Deterioration Assessment

Table 1-1 below presents the matrix used to assess the effect of the proposed development on surface water status or potential class. It ranges from a major beneficial effect (i.e., a positive change in overall WFD status) through no effect to deterioration in overall status class. The colour coding used in Table 1-1 is applied to the No Deterioration Assessment' spreadsheet provided in Appendix A of this report.

Table 1-1 Surface Water Assessment Matrix

Effect	Description/ Criteria	Outcome
Major Beneficial	Impacts that taken on their own or in combination with others have the potential to lead to the improvement in the ecological status or potential of a WFD quality element for the entire waterbody	Increase in status of one or more WFD element giving rise to a predicted rise in status class for that waterbody.
Minor/ localised beneficial	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the waterbody or any quality elements	Localised improvement, no change in status of WFD element
No Impact	No measurable change to any quality elements.	No change
Localised / temporary adverse effect	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary deterioration that does not affect the overall WFD status of the waterbody or any quality elements. Consideration will be given to habitat creation measures.	Localised deterioration, no change in status of WFD element when balanced against mitigation measures embedded in the project.
Adverse effect on class of WFD element	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the WFD status class of one or more biological quality elements, but not in the overall status of the waterbody. Consideration will be given to habitat creation measures.	Decrease in status of WFD element when balanced against positive measures embedded in the project.
Adverse effect on overall WFD class of waterbody	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the ecological status or potential of a WFD quality element, which then lead to a deterioration of status/potential of waterbody.	Decrease in status of overall WFD waterbody status when balanced against positive measures embedded in the project.

1.5.3.2 Groundwater No Deterioration Assessment

Table 1.2 below presents the matrix used to assess the effect of the proposed development on groundwater status class. It ranges from a beneficial effect but no change in status to deterioration in overall status class. The colour coding used in Table 1-2 is applied to the final 'No Deterioration Assessment' spreadsheet in Appendix A of this report.

Table 1-2 Groundwater Assessment Matrix

Magnitude of Impact of the proposed development on WFD Element	Effect on WFD Element within the assessment boundary	Effect on Status of WFD element at the Groundwater Body Scale

Impacts lead to beneficial effect	Combined impacts have the potential to have a beneficial effect on the WFD element.	Improvement but no change to status of WFD element
No measurable change to groundwater levels or quality.	No measurable change to WFD elements.	No change and no deterioration in status of WFD element
Impacts when taken on their own have the potential to lead to a minor localised or temporary effect	Combined impacts have the potential to lead to a minor localised or temporary adverse effect on the WFD element.	Combined impacts have the potential to lead to a minor localised or temporary effect on the WFD element. No change to status of WFD element and no significant deterioration at groundwater body scale.
Impacts when taken on their own have the potential to lead to a widespread or prolonged effect.	Combined impacts have the potential to have an adverse effect on the WFD element.	Combined impacts have the potential to have an adverse effect on the WFD element, resulting in significant deterioration but no change in status class at groundwater body scale.
Impacts when taken on their own have the potential to lead to a significant effect.	Combined impacts in combination with others have the potential to have a significant adverse effect on the WFD element.	Combined impacts in combination with others have the potential to have an adverse effect on the WFD element AND change its status at the groundwater body scale

1.5.4 Assessment against Future Status Objectives

The assessment considers whether the proposed development has the potential to prevent the implementation or impact the effectiveness of the defined measures to achieve the objectives in the RBMP. The Water Action Plan 2024 has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the proposed development.

2. Water Body Identification

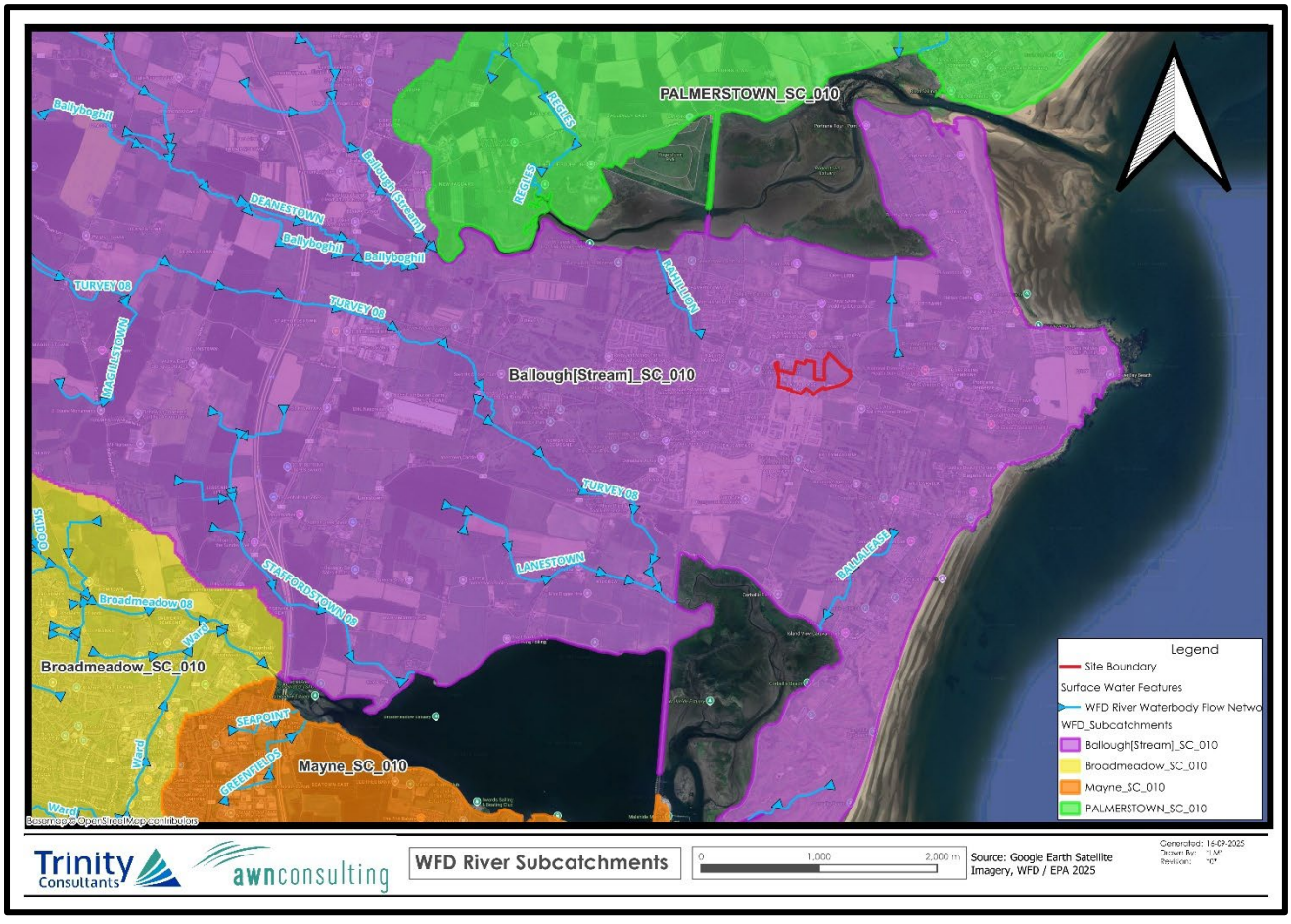
2.1 Surface Water Bodies

2.1.1 Regional Hydrological Environment

The subject site is located within the former Eastern River Basin District (ERBD, now the Irish River Basin District), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD).

According to EPA Maps, the proposed development site lies within the Nanny-Delvin Catchment (Catchment ID: 08) and the Ballough Stream sub-catchment (Ballough [Stream]_SC_10 WFD Sub-Catchment). Figure 2-1 presents the regional drainage sub catchments with the site identified with red boundary.

Figure 2-1. Hydrological Environment and River Sub-Catchments (EPA, 2025)



2.1.2 Local Hydrological Environment

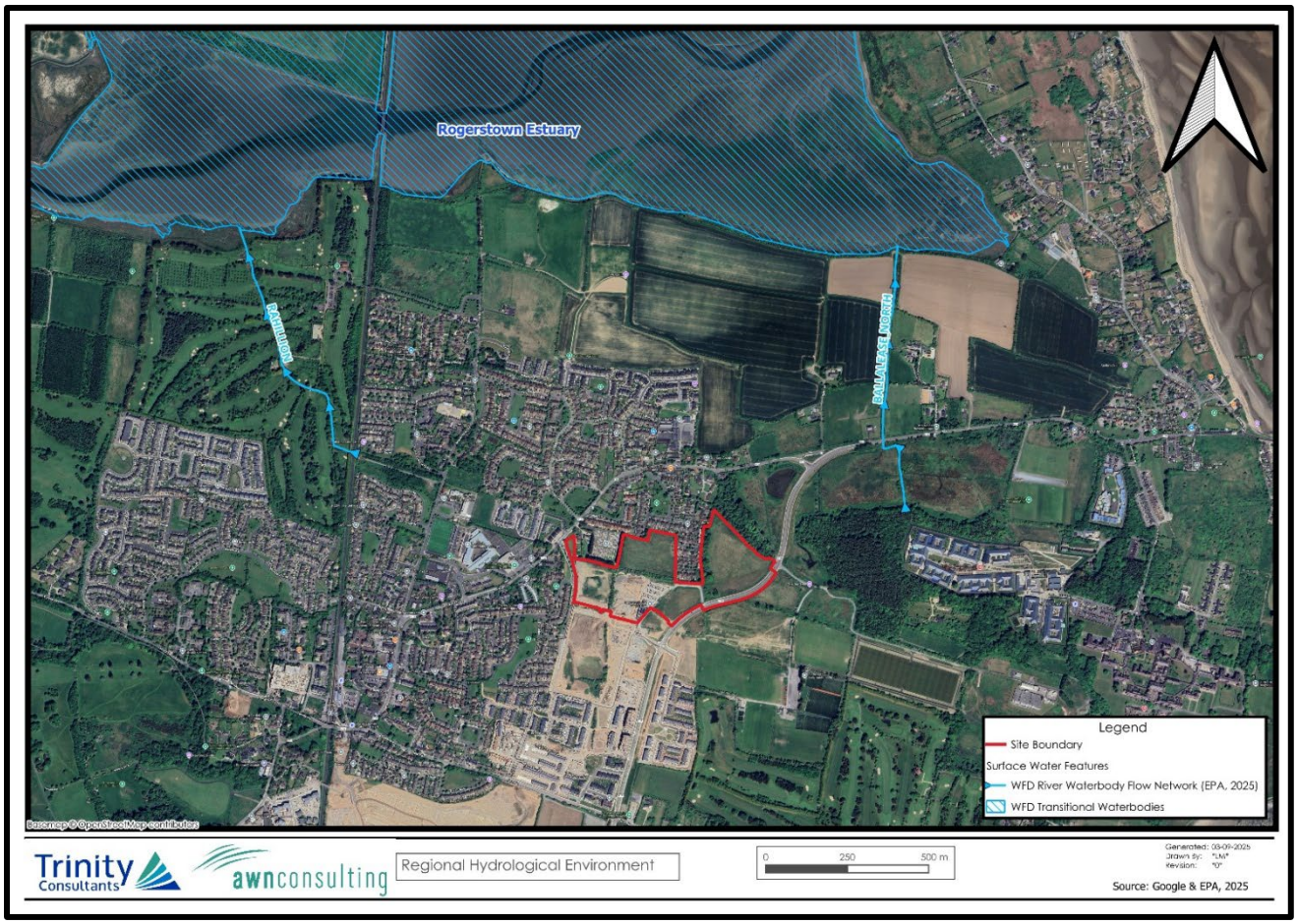
Historical mapping dated from 1829 to the early 1900s were examined for any indications of other hydrological features or watercourses in the immediate vicinity of the site. The historical maps do not depict any surface water features, springs (rise) located within or traversing the site or in close proximity to the agricultural plots which occupied the region.

The current EPA watercourse mapping does not depict/include any existing streams or river watercourses within the subject site boundaries, and a review of the historical mapping records provided within the GeoHive website do not indicate any notable watercourses within the site. The nearest watercourses to the site are the Rahillion River which resides c. 705m to the west / north-west of the site and the Ballalease North which is located c. 440m to the north-east of the site at the point of closest proximity. Both watercourses are hydrologically connected to the Rogerstown Estuary transitional waterbody, which hosts Natura 2000 sites (Rogerstown Estuary SAC/SPA, 0.85 km north of the site) – See Figure 2-2 below.

Currently, the site is drained by a network of drainage ditches which traverses the site and convey flow into the Beaverstown Stream (EPA name "Rahillion", WFD name "Ballyboghil_010" EPA Code:08R23) which flows c. 705m to the north-west of the site and the Portrane Stream (Portrane Canal) (EPA name: "Ballalease North", WFD name: "Ballyboghil_010", EPA code:08B45) catchment to c. 440m northeast of the site. (Figure 2-2 below). Both of these catchments then discharge to the Rogerstown Estuary to the north of the site (c. 1km).

The site has a hydrological linkage / connection to the Rogerstown Estuary transitional waterbody (EU Code:IE_EA_050_0100) via the existing drainage drainage ditches which traverse the site and convey flow to the Beaverstown stream and Portrane stream (Portrane Canal) which subsequently discharge to the Rogerstown Estuary.

Figure 2-2. Local Hydrological Environment



2.1.2.1 Existing Surface Water Drainage

The site is characterized as greenfield grassland and hedgerow, therefore at present drainage predominantly involves overland flow to onsite drainage ditches which traverse the site, coupled with drainage to ground whereby surface water and rainfall, is generally percolated to ground through the site via infiltration to grass and soil under the influence of gravity.

As mentioned above, a network of hedgerows and drainage ditches are located throughout the site, which direct and convey flow downstream to the Beaverstown stream ("Ballyboghil_010") and the Portrane stream (Portrane Canal) ("Ballalease North"), both of which discharge to the Rogertsown Estuary, which in turn, ultimately outfalls to the Northwest Irish Sea.

Surface water runoff from the existing DDR is collected via road gullies into existing carrier drains running along the road and transferred into 5No. attenuation ponds along the length of the DDR. Part of the Ballymastone Phase 2 lands discharges to the existing 1350mm surface water culvert to the northwest of the site which in turn discharges to Rogerstown Estuary to the north. The remaining lands discharges into the existing ditches (following attenuation) which eventually flow to the Portrane Canal and then onto the Rogerstown Estuary to the north. (refer to Figure 2-3 below).

Figure 2-3 Local Surface Water Drainage (Source: DBFL Consulting Engineers, 2025)



Existing Foul (Wastewater) drainage

The site has no existing foul loading and no existing foul / wastewater connections to the public sewer or nearby Portrane Rush Lusk Wastewater Treatment Plant as it is predominantly greenfield.
There is an existing 300mm foul sewer running through the recently constructed DDR. During the construction of Phase 2 of the development the proposed foul infrastructure leading towards and from the

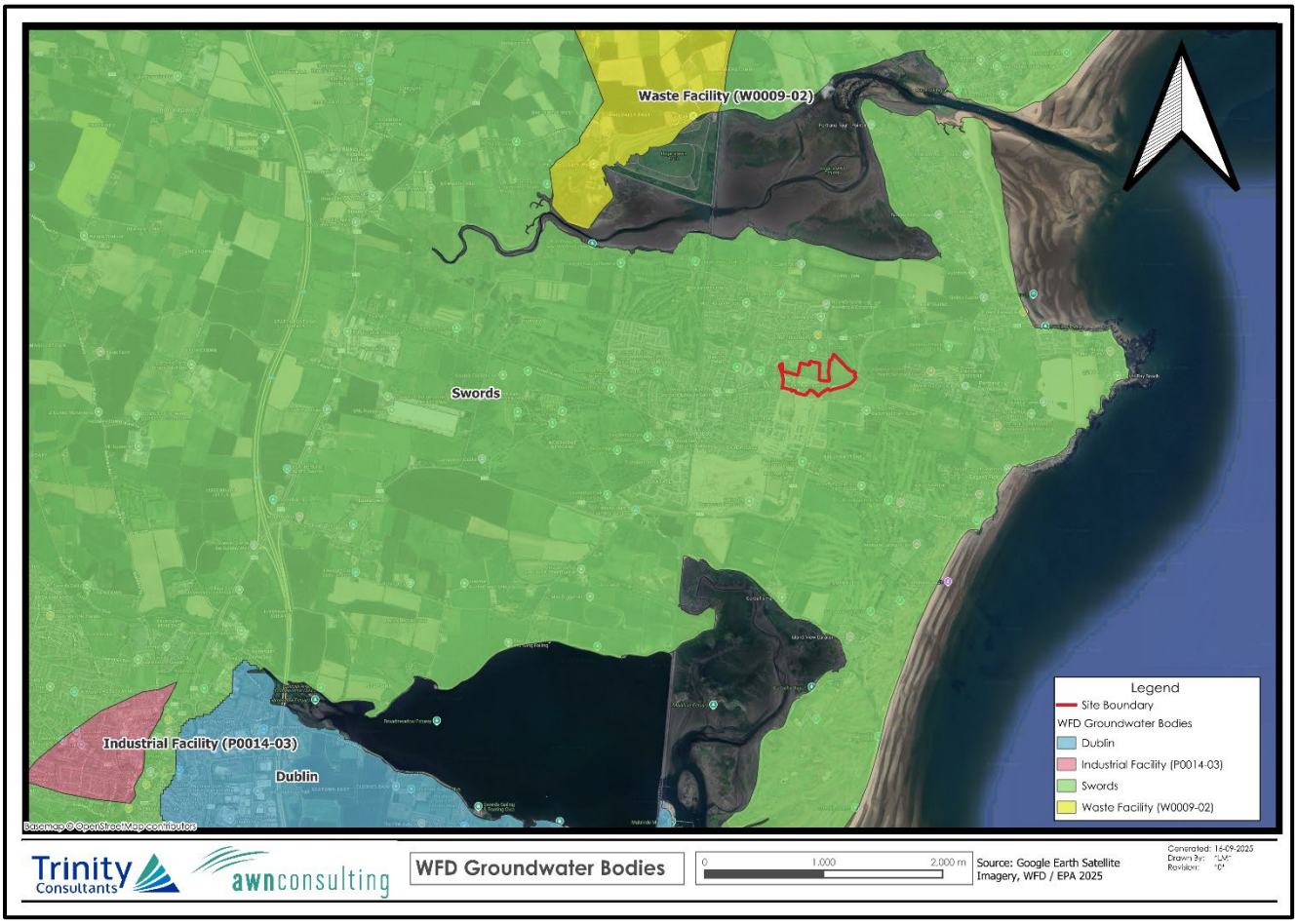
Foul Pump Station in the Northeast of the site will be put in place. The majority of phase 3 will be served by this infrastructure.

2.2 Groundwater Bodies

2.2.1 Regional Groundwater Bodies

The Groundwater Body (GWB) underlying the site is Swords Groundwater Body (EU code: IE_EA_G_011). Refer to Figure 2-4 below which indicates the groundwater bodies in the region / context of the site.

Figure 2-4. WFD Groundwater Bodies (EPA, 2025)



2.2.2 Local Hydrogeology

Inspection of the available GSI (2025) records and online mapping database shows that the bedrock geology of the site and the surrounding area is dominated by rocks from the Ordovician to the upper Devonian age. The western and central parts of the site are located over calcareous shales, siltstones and sandstones, and occasional thin limestones at its base referred to as the Malahide Formation (rock unit code: CDMALH). The east/northeastern portion of the site is underlain by the Portrane Volcanic Formation (rock unit code: PORV) which comprises lithologies of Andesite, tuff, pebbly mudstone and shale.

Land directly to the south of the site overlies red coarse-grained lithic sandstone and quartz pebble conglomerate referred to as the Donabate Formation (rock unit code: CDDONB).

According to the GSI (2025), the regional area is highly geologically variable. In terms of the structural geology of the area, the GSI database (100K structural database) indicates multiple structural features (faults & unconformities) in the wider region of the site, with one fault line traversing the eastern portion of the site. This fault trends in a Northwest-Southeast direction / orientation.

According to the GSI Karst database there is no evidence of karstification (bedrock prone to dissolution leading to underground drainage systems such as caves and large crevices) in this area. This would not be expected in this type of Limestone. Given the lack of karstification in this region, there is no known underground traced flow paths.

During the ground investigations carried out by GII, only one borehole (BH19, western portion of the site) encountered bedrock which was found at a depth of 10.50mbgl (BH19) in Strong massive reddish grey fine grain lithicarkose sandstone with quartz cementations and veining, overlying a strong massive reddish grey fine to coarse grain lithic arkose conglomerate with quartz cementation and veining, was recovered from the coring samples. This is typical of the Donabate Formation. No Bedrock was encountered in the eastern portion of the site down to a maximum depth of 14.7mbgl. Aquifers are generally classified as rocks or other matrices that contain sufficient void spaces and which are permeable enough to allow water to flow through them in significant quantities. The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater transmissivity (mm^3/d).

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (mm^3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

The GSI (2025) classifies the principal aquifer types in Ireland as:

<u>Bedrock Aquifer</u>
Rkc – Regionally Important Aquifer – Karstified (conduit)
Rkd – Regionally Important Aquifer – Karstified (diffuse)
RK – Regionally Important Aquifer – Karstified
Rf – Regionally Important Aquifer – Fissured bedrock
Lm – Locally Important Aquifer – Bedrock which is Generally Moderately Productive
Lk – Locally Important Aquifer – Karstified
LI – Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones
PI – Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones
PU – Poor Aquifer – Bedrock which is Generally Unproductive

<u>Gravel Aquifer</u>
Lg - Locally Important Aquifer - Sand & Gravel
Rg - Regionally Important Aquifer - Sand & Gravel

The bedrock aquifers underlying the central and western portions of the site according to the GSI (www.gsi.ie/mapping) National Bedrock Aquifer Map is classified as (Ll) Locally Important Aquifer, i.e., bedrock aquifer which is moderately productive only in local zones. The GSI (2025) currently indicates

that the eastern portion of the site overlies (PI) Poor Aquifer, which denotes an aquifer which is generally unproductive except in local zones.

The general groundwater flow direction in this aquifer is towards the coast and also towards the overlying rivers. This aquifer is not expected to maintain regional groundwater flow paths. Groundwater circulation from recharge to discharge points will more commonly take place over a distance of less than a kilometre. The majority of groundwater flow will be a rapid flow in to upper weathered zone but flow in conduits is commonly recorded at depths of 30 to 50 mbgl. The aquifer is not considered to have any primary porosity, and flow will be through fractures, some of which will have been enlarged by karstification and dolomitisation. The fissured nature and the moderate permeability of the bedrock close to the surface imply that water will move at high velocities.

The flow paths and key characteristics within the Swords GWB are described as follows (GSI, 2025):

- *Groundwater Flow Paths* : 'The general groundwater flow direction in this aquifer is towards the coast and also towards the overlying rivers. This aquifer is not expected to maintain regional groundwater flow paths. Groundwater circulation from recharge to discharge points will more commonly take place over a distance of less than a kilometre. The majority of groundwater flow will be a rapid flow in to upper weathered zone but flow in conduits is commonly recorded at depths of 30 to 50 mbgl. The aquifer is not considered to have any primary porosity and flow will be through fractures, some of which will have been enlarged by karstification and dolomitisation. The fissured nature and the moderate permeability of the bedrock close to the surface imply that water will move at high velocities.'

- *Main Recharge Mechanisms*: 'Diffuse recharge will occur via rainfall percolating through the subsoil. The proportion of the effective rainfall that recharges the aquifer is largely determined by the thickness and permeability of the soil and subsoil, and by the slope. Due to the generally low permeability of the aquifers within this GWB, a high proportion of the recharge will then discharge rapidly to surface watercourses via the upper layers of the aquifer, effectively reducing further the available groundwater resource in the aquifer. There are areas of very high drainage density, which indicates a large proportion of the effective rainfall becomes surface runoff in this area. The area is located from Swords to Donaghmore about 10 km west of there, and between the Broadmeadow and Ward Rivers.'

- *Main Discharge Mechanisms*: 'The GWB will discharge directly to the Irish Sea along the coast and there will also be discharge to the overlying rivers, if they are in hydraulic continuity with the aquifer'.

- *Summary Key Characteristics*: 'This GWB is located in the north of County Dublin. Elevations range from 100 m OD in the west at Ratoath, Co. Meath to sea level along the coast between Swords and Rush. The area is low lying with elevations reducing toward the east and also more locally towards the streams in the area. The GWB is composed of moderate permeability karstified limestone. Groundwater flow occurs along fractures, joints and major faults. There are a number of warm springs located within this GWB, which suggest deep groundwater circulation is possible. Recharge occurs diffusely through the subsoils and via outcrops. The aquifers within the GWB are generally unconfined but may become locally confined where the subsoil is thicker and/or lower permeability. Most flow in this aquifer will occur near the surface. In general, the majority of groundwater flow occurs in the upper 10 m, comprising a weathered zone of a few metres and a connected fractured zone below this. However, deep-water strikes are commonly found in more isolated faults/ fractures at depths of 30 – 50 mbgl. Flow path lengths are not considered to be on a regional scale and are typically less than 1km in length. Groundwater discharges to the numerous streams and rivers crossing the aquifer, and to the springs and seeps towards the coast'.

Regional groundwater flow would most likely be in line with local topography to the east towards the coastline and northwest Irish Sea. The flow direction in the overburden generally follows no fixed pattern or trend.

These aquifer types are characterised by discrete local fracturing with little connectivity rather than large, connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local to short distances. Therefore, given the local flow paths (<1km) and little connectivity, there is low potential for a hydrogeological connection/linkage to the Natura 2000/conservation/protection areas located at the Northwest Irish Sea SPA and Rogerstown Estuary, located c. 1.6km east and c. 0.85km north of the development, respectively, at the point of closest proximity.

The flow direction in the overburden generally follows no fixed pattern or trend. Flows of this nature are typical of low permeability clay strata with intermittent fill areas, where often the water level measures represent pore water seepages into the overburden monitoring well (opposed to bedrock wells) or perched groundwater conditions (not bedrock aquifer water). The clay is not considered to be a contamination pathway based on the discontinuous perched/pore water table meaning there is no continuous connectivity of shallow groundwater.

Additionally, groundwater is also likely to be in continuity with the Balalease North Stream which represents the most significant hydrological feature in the region of the site, running / flowing north of the site and ultimately discharging to the Rogerstown Estuary.

2.2.2.1 Soils and Subsoils

The Teagasc online mapping (2025) for the site indicates that the soils underlying the site and the surrounding area mainly comprise of BminDW, which is a deep well drained (mainly basic) mineral soil.

The regional overburden deposits are reflective of the Quaternary geological period that extends from around 1.5 million years ago to the present day. This can be further sub-divided into the Pleistocene Epoch, which covers the Ice Age period, and which extended up to 10,000 years ago and the Holocene Epoch, which extends from that time to the present day.

The GSI (2025) mapping database of the Quaternary Sediments / Subsoils in the vicinity of the site indicates one (1) no. principal subsoil type. The predominant subsoil type present across the site is 'Irish Sea Till derived from Lower Palaeozoic sandstones and shales (IrSTLPSsS)'. This till is made up of glacial CLAYs which form a cohesive, low permeability subsoil. According to the GSI (2025) the site is not underlain by any localised zones indicative of 'Bedrock outcrop or near surface subcrop'.

Ground investigations carried out by GII indicates that the subsoil material comprises soil derived from mainly calcareous parent material that includes surface water gleys/groundwater gleys and soil derived from mainly calcareous parent materials that includes grey, brown podzolics and brown earths. A minor region in the site is covered by soil that is mainly derived from calcareous parent materials that includes peaty gleys.

As mentioned above, GII undertook an environmental site investigation from February to July 2022 at the subject site to establish the soil conditions. The sequence of strata encountered were consistent across the site and are generally composed of:

- **Topsoil**: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.40mbgl.
- **Made Ground**: Made ground was encountered in the eastern portion of the site (Area 3, GII Report, 2022) beneath the topsoil, present to a depth of 1.20mbgl, and was typically described as brown

grey slightly sandy slightly gravelly Clay. No Made ground deposits were encountered in the western portion of the site (Area 4).

- **Cohesive Deposits**: Cohesive deposits were encountered beneath the made ground or topsoil and were described typically as light brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders overlying a brown mottled grey slightly sandy slightly gravelly CLAY with occasional cobbles and boulders overlying dark grey slightly sandy slightly gravelly CLAY with occasional cobbles and boulders. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the cohesive till matrix.
- **Granular Deposits**:
  - Eastern / central portion of the site: Granular deposits were encountered within the cohesive deposits at location BH18. The Granular deposit was described as *Brown slightly gravelly slightly silty fine to coarse SAND with occasional cobbles and rare boulders.*
  - Western Portion of the site: Granular deposits were encountered within the cohesive deposits at location TP215 to the southwest of this portion of the site. The Granular deposit was described as *Brown grey slightly clayey sandy angular to subangular fine to coarse GRAVEL with occasional cobbles and rare boulders.*
- **Bedrock:**
  - Eastern Portion of the Site: No bedrock was encountered during the Rotary Cored & Cable Percussion Borehole drilling which extended to a maximum depth of 14.7mbgl.
  - Westen Portion of the site: The rotary core boreholes recovered Medium strong to strong reddish grey massive lithic arkose fine to medium grain CONGLOMERATE with quartz cementation and Medium strong to strong reddish grey massive lithic arkose fine to medium grain SANDSTONE with quartz cementation. This is typical of the Donabate Formation, which is noted on the geological mapping running from the southwest through to the northeast of the proposed site. The depth to rock encountered was 10.50m BGL (BH19).

In line with the use of the site for agriculture, there was no evidence of contamination noted during site investigation. Soil samples were collected throughout the trial pitting exercise that were within the proposed developments red boundary line.

Soil samples were analysed for the following parameters:

- Diesel Range Organics (DRO);
- Mineral Oil;
- Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG);
- Metals (As, Cd, Cr, Pb, Se, Cu, Ni, and Zn);
- Polychlorinated Biphenyls (PCB);
- Volatile Organic Compounds (VOC);
- Semi Volatile Organic Compounds (SVOC); and
- Waste Acceptance Criteria (WAC) for inert waste landfills in accordance with the 2002 European Landfill Directive (2002/33/EC). This suite of parameters includes the following:
  - Mineral oil;
  - Polycyclic aromatic hydrocarbons (PAHs);
  - Polychlorinated biphenyls (PCBs);
  - BTEX compounds (benzene, toluene, ethylbenzene, and xylenes);
  - and methyl tert-butyl ether (MTBE);
  - Total organic carbon (TOC); Leachable component of a range of organic and inorganic parameters.

The soil quality was compared to GAC derived to be protective of human health and ecology for a residential end use, as detailed in above soil guidelines section above.

2.2.2.1.1 Summary of Soil Analysis

Heavy Metals
All heavy metal parameter concentrations recorded in the soil samples are below the most conservative threshold value for the LQM/CIEH for HHRA (Human Health Risk Assessment) Residential Threshold at 1% SOM.

Total Petroleum Hydrocarbons Criteria Working Group (TPH CWG)
All parameters recorded below the laboratory's limit of detection (LOD) for all soil samples collected across the subject site. Therefore, there are no exceedances recorded when these concentrations were compared to the most conservative threshold i.e. LQM/CIEH for HHRA Residential Threshold at 1% SOM.

Polychlorinated Biphenyls (PCBs)
All parameters recorded below the laboratory's LOD for all samples collected across the subject site.

Polycyclic Aromatic Hydrocarbons (PAHs)
All parameters recorded below the laboratory's LOD for all samples collected across the subject site. Therefore, there are no exceedances recorded when these concentrations were compared to the most conservative threshold i.e. LQM/CIEH for HHRA Residential Threshold at 1% SOM.

Waste Acceptance Criteria (WAC) Analysis
All samples were analysed and compared against WAC set out by the adopted EU Council Decision 2003/33/EC. There was no fill material noted during trial pit excavations with all samples being recorded as gravel, made ground or original clay subsoil.

The WAC analysis determined that the representative samples are suitable for classification as Category A – Inert; Category B1 – Inert Landfill or Category B2 – Inert Landfill. Based on the laboratory results and parametric concentrations obtained from the site investigation, material from the sample locations would be acceptable at inert waste facilities. It should be noted that waste facilities develop facility specific criteria also and this should be considered should any soil/ material to be removed from site in the future.

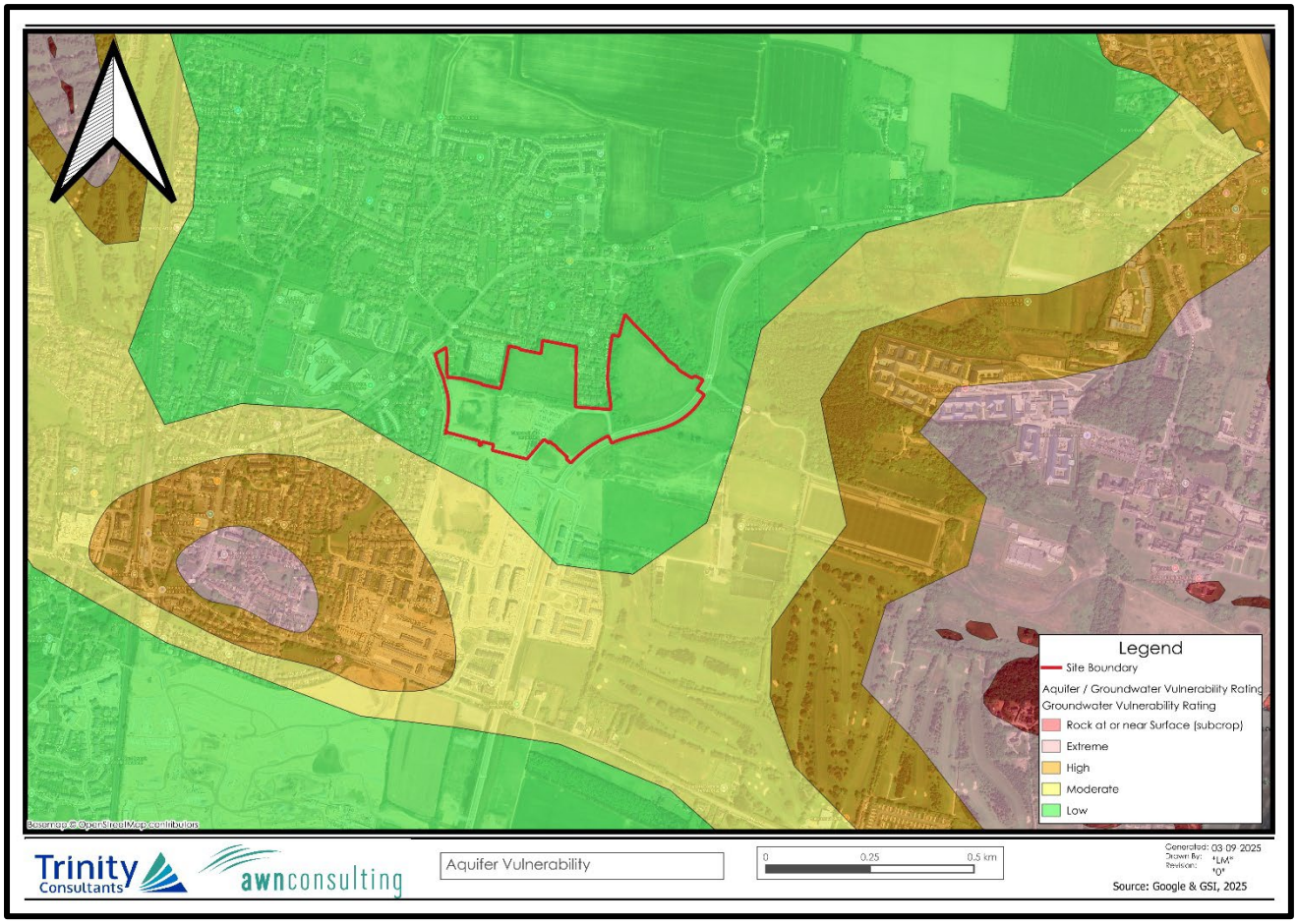
Asbestos
There were no asbestos containing materials (ACM) identified in any of the trial pit or stockpile samples taken.

2.2.2.2 Aquifer Vulnerability

Groundwater vulnerability is an indication of how easily the aquifer can become contaminated by human activity. It is dependent on the thickness and permeability of the overlying soils and depth to the water table. For example, a bedrock aquifer with minimal thickness of overburden or with a thin layer of permeable overburden will be more vulnerable to contamination than a bedrock aquifer which has a thick layer of low permeability overburden. Extreme groundwater vulnerability is also associated with karst landforms as these are a direct pathway for water and contaminants to enter the aquifer from the surface.

The GSI presently classifies the groundwater / aquifer vulnerability of the entire site as 'Low' vulnerability as shown in Figure 2-5, which is indicative of 10m+ overburden thickness of low permeability subsoil (CLAY in this instance). The GSI (2025) does not indicate any bedrock outcrops within the proposed site boundary or in the immediate vicinity. The GSI vulnerability classification is consistent with data obtained from the site investigations carried out by Ground Investigation Ireland (GII, 2022), at the proposed development site, where soft to stiff sandy gravelly glacial Clays with sand lenses were encountered. Bedrock was encountered at the site in one borehole (BH19, western portion of the site) encountered bedrock which was found at a depth of 10.50mbgl (BH19), while no Bedrock was encountered in the eastern portion of the site down to a maximum depth of 14.7mbgl.

Figure 2-5. Groundwater / Aquifer Vulnerability Rating (GSI, 2025)



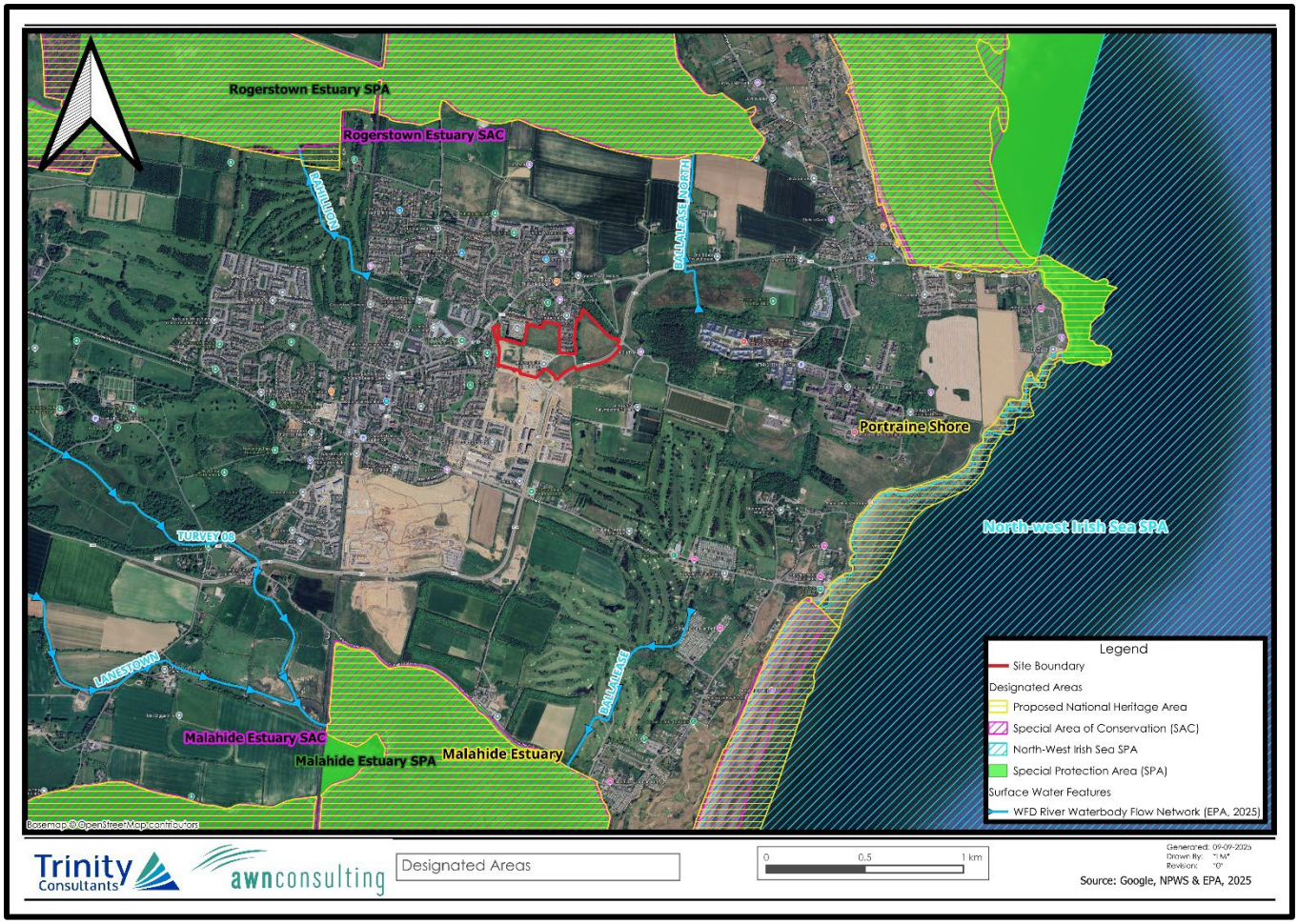
2.2.3 Designated Sites

The NPWS (2025) on-line database have been reviewed to determine the location of areas of conservation within proximity to the proposed development site, and there are no Special Protected Areas (SPA) established under the EU Birds Directive (79/409/EEC), or Special Areas of Conservation (SAC) established under the Habitats Directive on or within the boundary of the proposed development site. Furthermore, there are no Natural Heritage Areas (NHA), or proposed Natural Heritage Areas (pNHA) established under the Wildlife Acts, 1976 and 2000 (as amended). The lands in which the development is located have no formal designations (Refer to Figure 2-6 below)

The relevant (and closest) and European listed conservation sites are as follows (distances listed represent the linear distance at the point of closest proximity);

- Rogerstown Estuary SPA (Site Code: 004015) c. 0.85 km North of the site;
- Rogerstown Estuary SAC (Site Code: 000208) c. 0.85 km North of the site;
- Malahide Estuary SAC (Site Code: 000205) c. 1.6 km South of the site;
- Malahide Estuary SPA (Site Code: 004025) c.1.6 km South of the site

Figure 2-6. Designated Sites (NPWS, 2025)



Hydrological Linkage/Connection Pathway to Designated Areas (Sensitive Receptors)

The site has hydrological connection with Rogerstown Estuary SPA/SAC via the local surface water drainage network which comprises 2no. drainage ditches which convey flow downstream/downgradient to the Beaverstown stream (Rahillion/Ballyboghil_010) which flows c. 705m to the north-west of the site and the Portrane stream (Ballalease North/Ballyboghil_010) c. 440m to the northeast of the site, both of which subsequently discharge to the Rogerstown Estuary, albeit via moderate distance to these receptors, coupled with the significant dilution factor and mixing along the hydrological pathway and downstream in the Rogerstown Estuary (receptor). It should be noted that there is no likelihood of an accidental release of hydrocarbons or silt from the proposed development resulting in any change in surface water quality contributing to these habitats.

Hydrogeological Linkage/Connection Pathway to Designated Areas (Sensitive Receptors)

The proposed development would have no direct hydrogeological (groundwater) connection to the Malahide Estuary SPA/SAC, due to the distance of separation (minimum 1.7km) being greater/larger than the local underground flow paths within the aquifer (<1km). The vertical migration to the underlying bedrock is minimised due to the low aquifer vulnerability (indicative overburden thickness 10m+ Clay), thereby further negating the potential for a hydrogeological linkage pathway to the sensitive receptors.

The proposed development would have a very low potential for a hydrogeological connection / linkage with the Rogerstown Estuary SPA/SAC designated sites listed above via the underlying aquifer due to lengthy underground flow path distances (minimum 0.85km) in an aquifer, which is characterised by low

fracture connectivity, discrete local fracturing with little connectivity rather than large, well-connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local (less than 1km) Such a hydrogeological linkage / connection does involve a significant dilution factor downgradient in the aquifer (swords GWB) and estuaries. Additionally, vertical migration to the underlying bedrock is minimised where overburden soil cover is thick across the site resulting in good natural aquifer protection from any localised diesel/ fuel oil spills during either construction or operational phases.

There are no groundwater dependent wetlands within the downstream zone of influence of the proposed development.

2.2.4 Bathing Waters and Recreational Waterbodies

The local environment also includes areas of natural resources that relate to population and human health that may be impacted by the proposed development, this includes economic resources, recreational and bathing waters, and drinking water resources.

A review of Environmental Sensitivity Mapping online maps that includes the Register of Protected Areas (RPA) under the Water Framework Directive (WFD) has shown that there are no Recreational Waters, Bathing Waterbodies, or Surface Water Drinking RPA, located downstream in the Beaverstown stream (Rahillion/Ballyboghil_010), Portrane stream (Ballalease North/Ballyboghil_010), or Rogerstown Estuary. The nearest bathing waterbody is Portrane, the Brook Beach (BW ID: IEEABWC020_0000_0200) located c. 1.7 km east of the site and has a hydrological connection through the Rogerstown Estuary. The current bathing water quality classification for this site is 'Sufficient Water Quality' (2024).

2.2.5 Surface Water Public Water Supplies

A review of the Environmental Protection Agency's (EPA) online mapping, which includes the Register of Protected Areas (RPA) established under the Water Framework Directive (WFD), indicates Ballough[Stream]_SC_010 (Code: 08_6) and the two nearby tributaries, namely the Beaverstown stream (Rahillion/Ballyboghil_010) and Portrane stream (Ballalease North/Ballyboghil_010) are not located within a designated Surface Water Drinking RPA. This classification of drinking water river lines has been delineated in accordance with the European Communities (Drinking Water) (No. 2) Regulations 2007 (SI No. 278/2007). This regulatory framework aims to ensure the protection of water resources utilised for human consumption, thus safeguarding public health and the environment.

2.2.6 Ground Water Public Water Supplies

There are no recorded Public Supply Source Protection Area or Group Scheme Preliminary Source Protection Areas in the vicinity of the proposed development site. There are no recorded source protection areas / Zones (SPZs, which are zones defined by the GSI within which development is limited in order to protect groundwater from potential pollution) or recorded groundwater resource protection zones in the immediate area of the proposed site, i.e., zones surrounding a groundwater abstraction area. The Public Supply Source Protection Area in closest proximity to the proposed development site is BOG OF THE RING PWS which is located approximately 8.4 km northwest of the site. This Public Supply Source Protection Area does not share a hydrological or hydrogeological connection to the site. The subject development site lies outside of the zone of contribution to this supply.

3. WATERBODY IDENTIFICATION AND STATUS

3.1 Overview of Waterbody Status

A summary of the WFD status and Risk for all relevant waterbodies is provided below in table 3-1

Table 3-1 WFD Waterbodies relevant to the Study Area

Type	WFD Classification	WFD Name/ID	WFD Status (2016-2021)	WFD Risk Score	Location
Surface Water Body	River Waterbody	Beaverstown stream (Rahillion/Ballyboghil_010) (European Code: IE_EA_08B012200)	*'Poor'*	*'At Risk'*	Located c. 705m to the north-west of the site
	River Waterbody	Portrane stream (Ballalease North/Ballyboghil_010) (European Code: IE_EA_08B012200)	*'Poor'*	*'At Risk'*	Located c. 440m to the north-east of the site.
	Transitional Waterbody	Rogerstown Estuary (European Code: IE_EA_050_0100)	*'Poor'*	*'At Risk'*	Located c. 900m to the north of the site.
Groundwater	Groundwater Body	Swords GWB (European Code: IE_EA_G_011)	*'Good'*	*'Not at Risk'*	Located underlying/beneath site

Note: *Note: Beaverstown Stream (Rahillion), and Portrane Stream (Ballalease) both belong to the Ballyboghil_010 WFD River waterbody (European Code: IE_EA_08B012200)*

3.1.1 Surface Waterbody Status

As previously mentioned, the proposed development site lies within the Nanny-Delvin Catchment (Catchment ID: 08) and the Ballough Stream sub-catchment (Ballough[Stream]_SC_10 WFD Sub-Catchment).

This WFD Screening has identified 2 no. WFD surface water bodies which need to be considered: Ballyboghil_010 River waterbody (European Code: IE_EA_08B012200), and Rogerstown Estuary (European Code: IE_EA_050_0100).

Currently, the site is drained by a network of drainage ditches which traverses the site and feed into the Beaverstown Stream (EPA name "Rahillion", WFD name "Ballyboghil_010" EPA Code:08R23) which flows c. 705m to the north-west of the site and the Portrane Stream (Portrane Canal) (EPA name: "Ballalease North", WFD name: "Ballyboghil_010", EPA code:08B45) catchment to c. 440m northeast of the site. Both of these catchments then discharge to the Rogerstown Estuary to the north of the site (c. 0.85 km).

The site has a hydrological linkage / connection to the Rogerstown Estuary transitional waterbody (EU Code:IE_EA_050_0100) via the existing drainage drainage ditches which traverse the site and convey flow to the Beaverstown stream and Portrane Stream (Portrane Canal) which subsequently discharge to the Rogerstown Estuary.

The Water Framework Directive (WFD) Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of 'Good Status' in water bodies that are of lesser status at present and retaining 'Good Status' or better where such status exists at present.

The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means / indicates both 'Good Ecological Status' and 'Good Chemical Status'. In 2009 the first River Basin Management Plan (RBMP) 2009-2015 was published. The second cycle river basin management plan was carried out between 2018-2021 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD). The third cycle (2022-2027) is currently being undertaken.

Surface water quality is monitored periodically by the EPA at various regional locations along with principal and other smaller watercourses. The EPA assess the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality.

In relation to the subject site, there are no EPA quality monitoring station points in close proximity or within any of the previously mentioned watercourses in hydrological connection to the site. Additionally, there are no EPA monitoring stations located in the immediate vicinity or downstream/downgradient of the site. With reference to the site setting, the nearest active EPA surface waterbody monitoring station along the BALLYBOGHIL_010 river waterbody (IE_EA_08B012200) is situated along the Ballyboghil River (BALLOUGH STREAM_020), upstream of the proposed development (Station Name: Corduff Br; EPA Code: RS08B031600). This station is located adjacent to the bridge on the R132 Regional Route c. 1.1km upstream of the outfall/discharge point of the Ballyboghil River to the Rogertsown Estuary (approx. hydrological pathway distance) and c. 4.1km northwest of the subject development at the point of closest proximity (linear Distance).

The most recent status recorded by the EPA in the 'Corduff Br' water quality monitoring station is classified as Q-Value: 3-4 – which denotes 'Moderate' Status (2024), indicating a slightly polluted waterbody and unsatisfactory conditions. However, given the distance of separation and the upstream location of the EPA monitoring station it should be noted that this Q Value/Score is not representative of the local hydrological environment at the subject site.

The Ballalease North (Portrane stream) and Beaverstown Stream (Rahillion Stream) both of which belong to the BALLYBOGHIL_010 river waterbody (European Code: IE_EA_08B012200) most recent WFD River (surface) water status (2016-2021) is 'Poor' with a current WFD risk score (WFD 3rd risk cycle) of 'At risk of not achieving good status'. This rating and the main pressures identified on the BALLYBOGHIL_010 waterbody is attributed to poor ecological and biological status or potential, particularly invertebrate status or potential (Catchments.ie, 2025). Additionally, the BALLYBOGHIL_010 received 'Moderate' (as opposed to 'Good') status on 'Supporting Chemistry Conditions' which is attributed to 'Pass' status in oxygenation conditions, 'Fail' status in Dissolved Oxygen (Saturation %), 'Pass' status in Acidification Conditions (pH)

and 'Moderate' Status in Nutrient Conditions which incorporates Nitrogen (Nitrate) Conditions and Phosphorous (Orthophosphate) Conditions (Catchments.ie, 2025). Refer to Figure 3-1 below.

According to the Ballough[Stream]_SC_010 (Code: 08_6) Subcatchment Assessment report (WFD 2nd Cycle, 2020) the main pressures associated with the BALLYBOGHIL_010 river waterbody is agriculture related.

Figure 3-1. Surface Water Quality for the Ballyboghil_010 River (Surface) Waterbody (Catchments.ie, 2025)

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
▼ Ecological Status or Potential	Monitoring	medium confidence	Poor
▼ Biological Status or Potential			Poor
Invertebrate Status or Potential			Poor
▼ Supporting Chemistry Conditions			Moderate
▼ General Conditions			Moderate
▼ Oxygenation Conditions			Pass
Dissolved Oxygen (% Sat)			Fail
Other determinand for oxygenation conditions			High
▼ Acidification Conditions			Pass
pH			Pass
▼ Nutrient Conditions			Moderate
▼ Nitrogen Conditions			Moderate
Nitrate			Moderate
Ammonium			High
▼ Phosphorous Conditions			Moderate
Orthophosphate			Moderate

The Rogerstown Estuary transitional waterbody (European Code: IE_EA_050_0100) is currently listed as 'At risk of not achieving good status' (WFD 3rd Cycle). The latest Rogerstown Estuary WFD status is 'Poor' (2016-2021). This rating and the main pressures identified on the Rogerstown Estuary are attributed to poor ecological and biological status or potential, in particular 'Poor' Aquatic Flora or Potential, which has been determined by 'Moderate' Macroalgae Status or Potential and 'Poor' Angiosperm Status or Potential. Additionally, the Rogerstown Estuary received 'Moderate' (as opposed to 'Good') status in relation to Hydromorphological Conditions which is determined by Supporting Chemistry Conditions such as oxygenation conditions (dissolved oxygen saturation %) and Nutrient Conditions, particularly phosphorous conditions (Catchments.ie, 2025). Refer to Figure 3-2 below.

According to the Ballough[Stream]_SC_010 (Code: 08_6) Subcatchment Assessment report (WFD 2nd Cycle, 2020) the main pressures associated with the Rogerstown Estuary (downstream/downgradient) include agriculture.

Figure 3-2. Surface Water Quality for the Rogerstown Estuary Transitional Waterbody (Catchments.ie, 2025)

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
▼ Ecological Status or Potential	Monitoring	high confidence	Poor
▼ Biological Status or Potential			Poor
Phytoplankton Status or Potential			High
▼ Other Aquatic Flora Status or Potential			Poor
Macroalgae Status or Potential			Moderate
Angiosperm Status or Potential			Poor
Hydromorphological Conditions			Moderate
▼ Supporting Chemistry Conditions			Good
▼ General Conditions			Good
▼ Oxygenation Conditions			Good
Dissolved Oxygen (% Sat)			Good
Other determinand for oxygenation conditions			Good
▼ Nutrient Conditions			Good
Phosphorous Conditions			High
Specific Pollutant Conditions			Pass
Chemical Surface Water Status			Failing to achieve good

Status Failures Reasons

Benzo(a)pyrene Failure for Chemical Status IE_EA_050_0100
Benzo(b)fluoranthene Failure for Chemical Status IE_EA_050_0100
PBDE - unspecified isomers Failure for Chemical Status IE_EA_050_0100

3.1.2 Ground Waterbody Status

This WFD Screening has identified 1 no. groundwater body which need to be considered: the Swords (GWB) groundwater body (European Code: IE_EA_G_011).

The groundwater body in the region of the site (Swords GWB) for which the site is located entirely within, has a WFD status of "Good" (WFD Period: 2016-2021) and a WFD risk score (3rd Cycle) of "Not at Risk" of not achieving good status, meaning it has achieved its objectives and the overall status is considered good. This status is attributed to the waterbody achieving 'Good' Quantitative Groundwater Status and Chemical Groundwater Status which are determined from multiple tests such as saline intrusion, water

balance, Drinking Water Protected Area Test, Groundwater Dependent Ecosystems (GWDTE) - Quantitative Assessment Test and Impact of Groundwater on Surface Water Ecological/Quantitative Status (Catchments.ie, 2025). Refer to Figure 3-3 below.

Figure 3-3. Groundwater Quality for Swords Groundwater Body (Catchments.ie, 2025)

GW 2016-2021

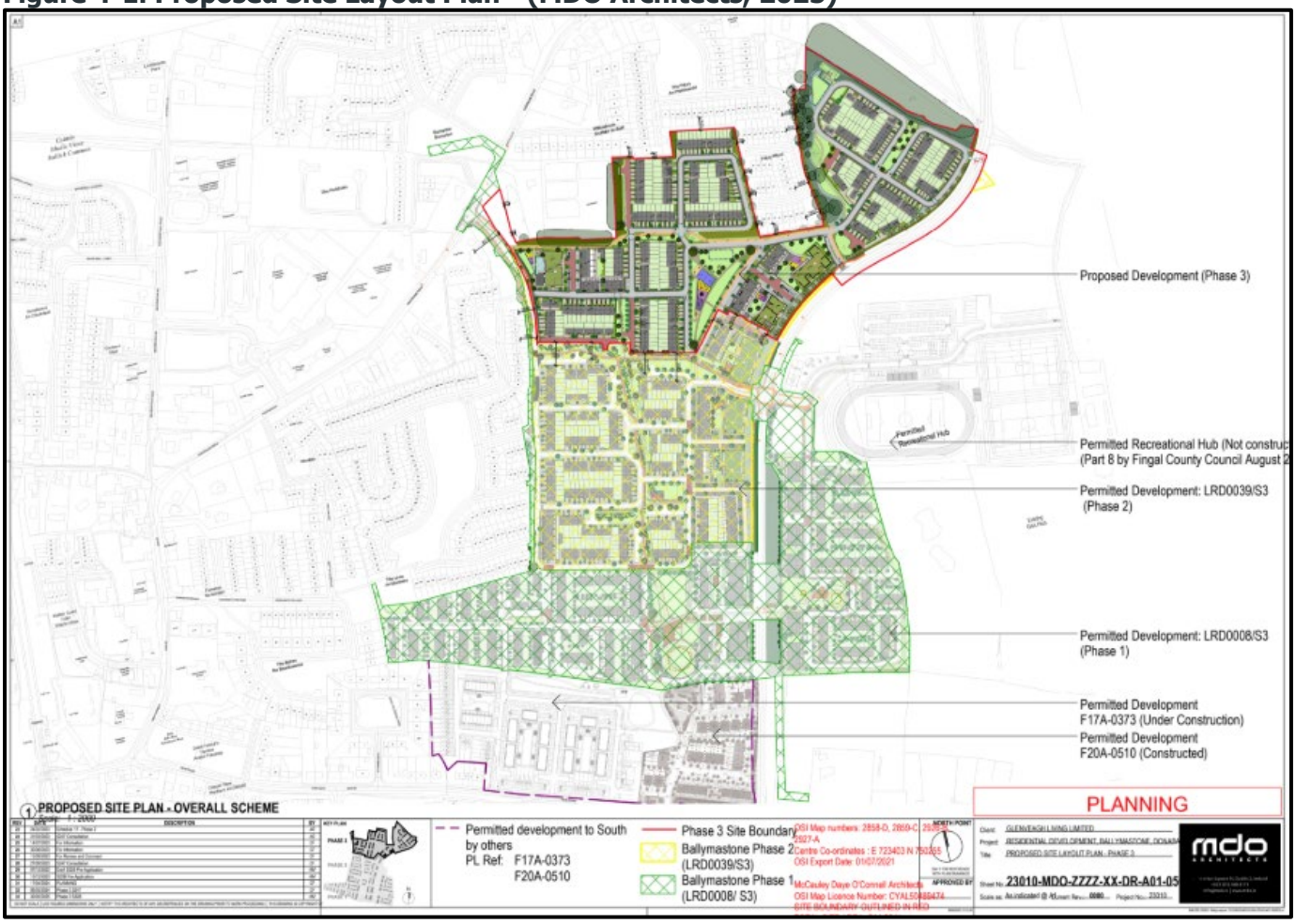
Status	Assessment Technique	Status Confidence	Value	
▼Overall Groundwater Status			Good	
▼Quantitative Groundwater Status			Good	
Saline (or Other) Intrusions Test			Good	
Impact of Groundwater on Surface Water Ecological/Quantitative Status Test			Good	
Groundwater Dependent Ecosystems (GWDTE) - Quantitative Assessment Test			Good	
Water Balance Test			Good	
▼Chemical Groundwater Status			Good	
Saline (or Other) Intrusions Test			Good	
Impact of Groundwater on Surface Water Ecological/Chemical Status Test			Good	
Groundwater Dependent Ecosystems (GWDTE) - Chemical Assessment Test			Good	
Drinking Water Protected Area Test			Good	
General Chemical Assessment Test			Good	

4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The purpose of this section is to provide an overview of the key relevant details of the proposed development which could have an impact on WFD compliance. For a more comprehensive understanding of the proposed development, please refer to Chapter 5 'Description of the Proposed Development' of the EIA Report. Chapter 5 provides a detailed overview of the lifecycle of the project, including reference to the architectural and civil engineering, drawings, plans, reports, and other relevant document in order to define the proposed development.

'In summary, the proposed development will consist of the construction of a residential development, which represents Phase 3 of the wider development of the Ballymastone Lands, ranging in height from 2- to 6-storeys, to accommodate 398 no. residential dwellings (including a mix of apartments, duplexes and houses), private amenity space, a crèche (c. 646sq.m), and a community space (c. 100sq.m). The site will accommodate 316 no. car parking spaces in total (comprised of 288 no. residential spaces,10 no. spaces for the proposed crèche/community space, 6 no. EV charging spaces including accessible spaces, and 12 no. spaces ducted for future provision), 1,619 total no. bicycle parking spaces, new pedestrian/cycle links, road improvements, storage, services (including water, wastewater, electricity and telecommunications) and plant areas. Landscaping will include communal amenity areas, SuDS features, and significant public open space (c. 15.3% of the net site) including outdoor exercise and play equipment.

Figure 4-1. Proposed Site Layout Plan - (MDO Architects, 2025)



The elements of the development which would have potential impact are summarised in Sections 4.1(Construction) and 4.2 (Operation) below.

4.1 Construction Phase

The activities required for the construction phase of the proposed development represents the greatest risk of potential impact on the hydrological and hydrogeological environment.

During construction of the development, the potential of impact on water body status is associated with the following sources:

- Accidental release of suspended solids (muddy water with increased turbidity (measure of the degree to which the water loses its transparency due to the presence of suspended particulates) – arising from excavation, stream works and ground disturbance;
- Accidental release of alkaline water from cement/concrete (increase turbidity and pH) works;
- Accidental release of hydrocarbons and other construction chemicals (ecotoxic) – accidental spillages from construction plant or onsite storage; and
- Accidental release of wastewater (nutrient and microbial rich) – arising from accidental discharge from on-site toilets and washrooms. Construction phase sewerage will be contained in a tank and taken by tanker off site for disposal at a licensed waste management facility.
- Direct physical damage during drainage alignment works which could lead to hydromorphological or hydrological changes if incorrectly designed.

These are temporary short-lived events which could impact on status without mitigation measures being in place. The most likely impact would be to surface water body status as the groundwater bodies are naturally protected by overlying clays at this site. There is no long-term dewatering or water abstractions required during construction so no likely impact on groundwater quantitative status.

4.2 Operational Phase

The proposed activities which could have an impact on water body status during operation can broadly be described as:

- Potential release of leachate to storm sewer/ground
- Potential release of contaminants from a vehicle or foul sewer as described above

Proposed Surface Water Drainage Design

Surface water runoff from the development will be attenuated to greenfield runoff rates (Qbar) in accordance with the Greater Dublin Strategic Drainage Study (GDSDS).

The attenuation systems are designed to accommodate the 100-year critical storm event. Attenuation storage is provided through a combination of above ground and underground attenuation systems. A balance of underground and overground storage is required considering the urban nature of the development and density / open space requirements. SUDS features such as green roofs and the inclusions of permeable paving, tree pits and swales will provide a surface water treatment train and promote source control throughout the development while also providing attenuation storage at source. In some locations. the proposed layout has also managed to include over edge road drainage with surface water flowing directly under drained swales providing treatment and storage at source.

The Phase 3 site (this application area) crosses 2 surface water catchments included within the overall masterplan area. The overall masterplan area was divided into 5 catchments to best utilise the available surface water discharge points. Parts of catchment 4 and 5 are within the Phase 3 site boundary:

- Catchment 4 is separated into sub catchments and discharges to the existing 1350mm surface water culvert to the northwest of the site which eventually discharges to the Rogerstown Estuary to the north. Utilising the 1350mm surface water culvert for the Ballymastone masterplan area is in line with the Donabate LAP.
- Catchment 5 discharge to the existing ditches which eventually flow to the Portrane Canal and then onto the Rogerstown Estuary to the north.

A lot of the drainage infrastructure required for Phase 3 was constructed as part of Phase 1 of the works permitted under FCC Reg. Ref. LRD0008/S3, specifically the connection to the 1350mm culvert and the majority of the attenuation associated with Catchment 4. Similarly, a lot of the drainage infrastructure required for Catchment 5 will be constructed as part of Phase 2 of the works permitted under FCC Reg. Ref. LRD0039/S3, specifically the final outfall to an existing ditch to the Northwest and the majority of the attenuation associated with Catchment 5.

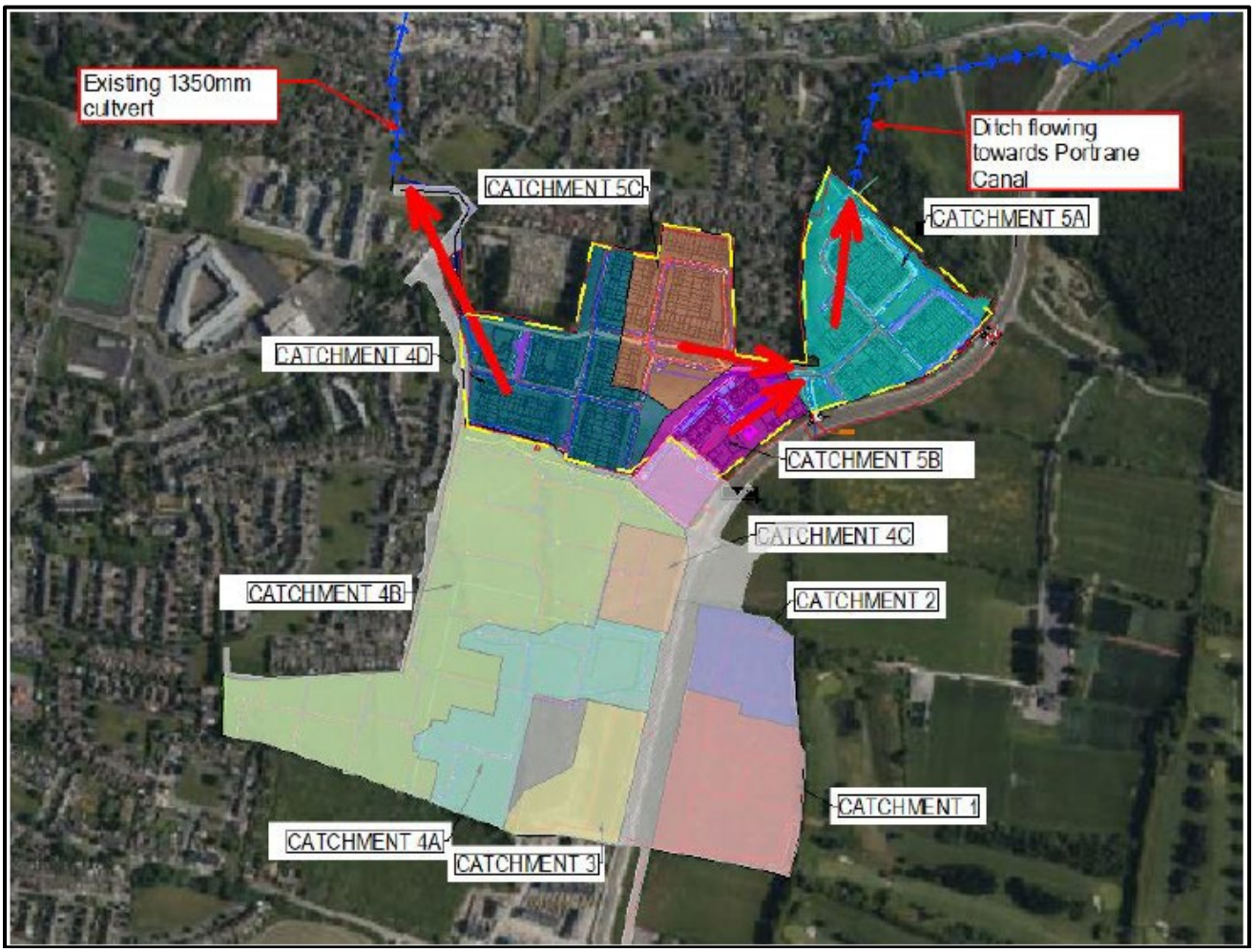
This drainage strategy has been discussed in principle with Fingal County Council's drainage department throughout the planning for the other 2 phases. Due to existing site levels some areas to the south require levels to be raised to provide cover to the drainage network. Attenuation locations avoid the raised areas and generally the underside of attenuations are located on or below existing ground thereby maximising any existing infiltration properties. We note that SUDS / Nature-based SUDS are maximised throughout the scheme but that an element of underground storage is unavoidable due to space restrictions due to the extent of available open space, existing hedgerows & ditches limiting available space etc. It is noted that at the time writing that the majority of surface water drainage, SUDS/NBS and attenuation in Phase

1, which is currently under construction, is now in place as per the approved LRD permitted development under ABP Ref ABP-315288-22 & FCC Ref LRD0008/S3.

This drainage strategy has been discussed in principle with Fingal County Council's drainage department through the Section 247 Pre-Planning and Stage 2 processes.

Refer to the Infrastructure Design Report (Ballymastone, Donabate Phase 3, DBFL Consulting Engineers, 2025) for further details.

Figure 4-2. Masterplan Surface Water Catchment Plan (Source: Figure 6, Infrastructure Design Report Phase 3, DBFL, 2025)



Proposed Foul (Wastewater) drainage design / strategy

The proposed foul drainage system will have 2 different connection points to existing networks. There is a new Irish Water Foul pumping station recently constructed to the south of the development which will serve the southern side of the proposed Phase 3 development. The pump station is fed by a gravity foul sewer falling North to South along the DDR. A rising main takes flow from the pump station to the northern end of the DDR where it is discharged to another gravity sewer. Due to site levels and the invert levels of the gravity sewer in the DDR, the existing gravity sewer in the DDR is only suitable to serve a small portion of the Phase 3 development located in the Southwest of this phase.

The vast majority of the Phase 3 development will discharge to a new proposed Foul Pump Station which is to be located in the Northeast of the masterplan site. Due to the level of the existing gravity foul lines

within the DDR it was not feasible to connect a lot of the site to these via gravity sewers without unrealistic amounts of build-up of the existing ground levels. The Northeast corner of the site was chosen as the most feasible location for the pump station as the ground levels are lowest here so the depth of the pump station could be minimised. This pump station will serve the majority of both phases 2 & 3 of the development. The rising main from the pump station will discharge to the existing gravity sewer flowing North within the DDR.

A full, detailed foul water management strategy for the proposed development is included in the Infrastructure Design Report by DBFL Consulting Engineers, submitted under separate cover as part of the planning application.

The foul discharge from the site will join the public sewer and will be treated at the Portrane Water Wastewater Treatment Plant (WWTP EPA Licence: D0114-02) prior to subsequent discharge to the Northwestern Irish Sea (HA 08) coastal waterbody (EU Code: IE_EA_020_0000).

5. DESCRIPTION OF MITIGATION MEASURES

This section outlines the mitigation measures in place to mitigate negative effects on surface water and groundwater quality and flow during construction and operation phases. Details of mitigation measures are provided in the Construction Environmental Management Plan (CEMP) and the EIAR, specifically chapter 9 (Land, Soils, Geology & Hydrogeology) and chapter 10 (Hydrology).

5.1 Construction Phase

A Preliminary Construction & Environmental Management Plan (CEMP) has been prepared in respect of the proposed development by DBFL Consulting Engineers (refer to standalone document submitted under separate cover). It contains best practice measures and protocols to be implemented during the construction phase of the proposed development to avoid / minimise environmental impacts.

The CEMP and mitigation measures set out in this EIAR will be implemented and adhered to by the construction Contractor and will be overseen and updated as required if site conditions change by the Project Manager, Environmental Manager and Ecological Clerk of Works where relevant. All personnel working on the site will be trained in the implementation of the procedures.

To ensure the CEMP remains fit for purpose, it will be regarded as a live document. The appointed contractor will be responsible for updating the CEMP, as required; e.g. to reflect the publication of relevant new or revised guidelines and / or new statutory requirements. The full schedule of environmental commitments (i.e. all mitigation measures set out in the CEMP, Environmental Impact Assessment Report and Natura Impact Statement submitted as part of the planning application, as well as any applicable conditions of development consent) will be included in the CEMP by the appointed contractor.

The CEMP was formulated in accordance with best international practice including but not limited to:

- CIRIA, (2001), Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- Construction Industry Research and Information Association (CIRIA) Environmental Good Practice on Site (C650), 2005;
- BPGCS005, Oil Storage Guidelines;
- Eastern Regional Fisheries Board, (2006), Fisheries Protection Guidelines: Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites;
- CIRIA (2007). CIRIA 697: The SUDS Manual and CIRIA (2015) 753: The SuDS Manual.
- UK Pollution Prevention Guidelines (PPG) UK Environment Agency, 2004.

<u>Control of Soil Excavation</u>

Site preparation, excavations and levelling works required to facilitate construction of foundations, access roads and the installation of services will require imported material.

- Measures shall be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds distilling tanks, surface water inlet protection, fencing and signage around specific exclusion zones and earth bunding adjacent to open drainage ditches).
- Suitable soils will be reused on site as backfill in the grassed areas, where possible.

- Contractors shall be required to submit and adhere to a method statement indicating the extent of areas likely to be affected and demonstrating that this is the minimum disturbance necessary to achieve the required works.
- Temporary storage of soil will be carefully managed in such a way as to prevent any potential negative impact on the receiving environment and the material will be stored away from any open surface water drains. No soil storing will be allowed within 30 m of the open water where sufficient working areas are available within the site boundaries, which is in line with Inland Fisheries Ireland guidelines.
- Movement of material will be minimised in order to reduce degradation of soil structure and generation of dust.
- Although there is no evidence of historical contamination in the proposed development area, all excavated materials will be visually assessed for signs of possible contamination such as staining or strong odours. Should any unusual staining or odour be noticed, samples of this soil will be analysed for the presence of possible contaminants in order to ensure that historical pollution of the soil has not occurred. Should it be determined that any of the soil excavated is contaminated, this will be disposed of by a licensed waste disposal contractor.
- Stockpiles have the potential to cause negative impacts on air and water quality. Stockpiles will be formed within the proposed development site boundary and the contractor will ensure that there are no direct links or pathways from stockpiles to any surface water body.
- Overburden material will be protected from exposure to wind by storing the material in sheltered parts of the site, where possible.
- Weather conditions and seasonal weather variations shall also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.

Suspended Solids Management

Run off may contain sediment and accidental hydrocarbon leakage for contractor vehicles, however there is no likely discharge from the site (without settlement and treatment) as most drainage is directed to the permitted attenuation pond and interceptor installed during the Phase 1 & Phase 2 development. The following additional mitigation measures will be implemented during the construction phase.

- Measures shall be implemented to capture and treat sediment laden surface water runoff within additional sediment retention ponds where waters are not directed to the Phase 1 & Phase 2 permitted attenuation ponds.
- During earthworks and excavation works care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.
- Run-off water containing silt will be contained on site via settlement tanks and treated to ensure adequate silt removal.
- Silt reduction measures on site will include a combination of silt fencing and settlement measures (silt traps, silt sacks and settlement tanks/ponds).
- Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.
- A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate.
- A stabilised entranceway consisting of an aggregate on a filter cloth base that is located at any entry or exit point of the construction site.
- Aggregate will be established at the site entrance points from the construction site boundary extending for at least 10 m.
- The temporary storage of soil will be carefully managed. Stockpiles will be tightly compacted to reduce runoff and graded to aid in runoff collection.
- Aggregate materials such as sands and gravels will be stored in clearly marked receptacles within a secure compound area to prevent contamination.

- Movement of material will be minimised to reduce the degradation of soil structure and generation of dust.
- Excavations will remain open for as little time as possible before the placement of fill. This will help to minimise the potential for water ingress into excavations.
- Weather conditions will be considered when planning construction activities to minimise the risk of run-off from the site.
- Any surface water run-off collecting in excavations will likely contain a high sediment load. This will not be allowed to directly discharge directly to the stormwater sewer.

Source of Fill Aggregates

All fill and aggregate for the proposed development will be sourced from reputable suppliers. All suppliers will be vetted for:

- Aggregate compliance certificates/declarations of conformity for the classes of material specified for the proposed development;
- Environmental management status; and
- Regulatory and legal compliance status of the company.

Hydrocarbons, Fuel and Other Construction Chemicals (Chemical Handling)

The following mitigation measures will be implemented during the construction phase in order to prevent any spillages to ground fuels and other construction chemicals and prevent any resulting to surface water and groundwater systems:

- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.
- A response procedure shall be put in place to deal with any accidental pollution events and spillage kits shall be available and all personnel working on the site will be suitably trained in the implementation of the procedures.
- Designation of bunded refuelling areas on the Site.
- Provision of spill kit facilities across the Site.
- Where mobile fuel bowsers are used, the following measures will be taken:
  - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use.
  - The pump or valve will be fitted with a lock and will be secured when not in use.
  - All bowsers to carry a spill kit and operatives must have spill response training.
  - Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during the construction phase, the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside a concrete bunded area and labelled clearly to allow appropriate remedial action in the event of a spillage.
- To minimise any impact on the underlying subsurface strata from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas. Oil and fuel storage tanks shall be stored in designated areas, and these areas shall be bunded to a volume of 110% of the capacity of the largest tank/container within the bunded area(s) (plus an allowance of 30 mm for rainwater ingress). Drainage from the bunded area(s) shall be diverted for collection and safe disposal.
- Drainage from the bunded area(s) shall be diverted for collection and safe disposal.
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage.
- All drums to be quality approved and manufactured to a recognised standard.

- If drums are to be moved around the Site, they will be secured and on spill pallets; and
- Drums will be loaded and unloaded by competent and trained personnel using appropriate equipment.

Refuelling of construction vehicles and the addition of hydraulic oils or lubricants to vehicles will take place in a designated area or within the construction compound (or, where possible, off the site). In the event of a machine requiring refuelling outside of this area, fuel will be transported in a mobile double skinned tank. An adequate supply of spill kits and hydrocarbon adsorbent packs will be stored in this area. All relevant personnel will be fully trained in the use of this equipment. Guidelines such as "Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors" (CIRIA 532, 2001) will be complied with.

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained in the implementation of the procedures

Cement / Concrete Works

Where feasible all ready-mixed concrete will be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline wastewaters or contaminated storm water to the underlying subsoil.

No wash-down or wash-out of ready-mix concrete vehicles during the construction works will be carried out at the site within 10 meters of an existing surface water drainage point. Washouts will only be allowed to take place in designated areas with an impervious surface where all wash water is contained and removed from site by road tanker or discharged to foul sewer submit to agreement with Irish Water / FCC.

Pouring of cement-based materials for works will only be carried out in dry conditions. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings and excess concrete will not be discharged directly into the drainage network. Concrete washout areas will be created to avoid any accidental discharge from the proposed development site.

The construction contractor will be required to implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained in the implementation of the procedures.

Control of Water Runoff during Construction

Rainfall at the construction site will be managed and controlled for the duration of the construction works until the permanently intercepted and attenuated surface water drainage system of the proposed site is complete. In the meantime, rainwater will continue to discharge to ground as currently occurs. Temporary construction surface drainage and sediment control measures, including the use of SuDS, will be provided before earthworks commence.

As set out in the CEMP prepared by DBFL Consulting Engineers the following surface water runoff mitigation measures will be implemented:

- Rainfall and all stormwater at the construction site will be managed and controlled for the duration of the construction works. The discharge of this treated water will occur to the storm water network and eventually to the Rogerstown Estuary.
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds/ distilling tanks where measures will be implemented to capture

and treat sediment laden runoff prior to discharge of surface water at a controlled rate. Monitoring of these sediment control measures will be undertaken throughout the construction phase.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds/distilling tanks.
- On-site settlement ponds are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.
- Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed on site.
- Surface water discharge points (not directed to the Phase 1 and Phase 2 permitted attenuation pond) during the construction phase are to be agreed with Fingal County Council's Environment Section prior to commencing works on site.
- Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts.
- Should any discharge of construction water be required during the construction phase, discharge will be to foul sewer. Pre-treatment and silt reduction measures on site will include a combination of silt fencing, settlement measures (silt traps, 20 m buffer zone between machinery and watercourses, refuelling of machinery off-site) and hydrocarbon interceptors (as per Fingal Development Plan, 2023 – 2029).
- Any minor ingress of groundwater and collected rainfall in the excavation will be pumped out during construction and directed to on-site settlement ponds / distilling tanks. It is estimated that the inflow rate of groundwater will be low. Surface water discharge points during the construction phase are to be agreed with Fingal County Council's Environment Section prior to commencing works on site.
- On-site settlement ponds are to included geotextile liners and riprapped inlets and outlets to prevent scour and erosions. Monitoring of the same will be undertaken.
- The use of additional slit traps will be adopted if the monitoring indicates the requirements for the same with no silt or contaminated water permitted to discharge to the sewer.
- Temporary construction surface drainage and sediment control measures, including the use of SuDS, will be provided before earthworks commence.
- All discharges to surface waters will be suitably treated prior to discharge. There will be no direct discharge of surface water from any element of the works without proper attenuation and treatment. Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to open drainage ditches).
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds/ distilling tanks where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

Wastewater Management

Foul wastewater discharge from the site will be managed and controlled for the duration of the construction works.

Site welfare facilities will be established to provide sanitary facilities for construction workers on site. The main contractor will ensure that sufficient facilities are available at all times to accommodate the number of employees on site. Foul water from the offices and welfare facilities on the site will discharge into the existing sewer on site (the cabins may initially need to have the foul water collected by a licensed waste sewerage contractor before connection to the sewer line can be made).

Foul drainage from site offices and compound, where not directed to the existing wastewater network, will be contained and disposed of off-site in an appropriate manner or to a licenced facility and in accordance with the relevant statutory regulations to prevent the pollution of watercourses.

The construction contractor will implement emergency response procedures, and these will be in line with industry guidance. All personnel working on the Site will be suitably trained in the implementation of the procedures.

5.2 Operational Phase

Surface Water Quality

The design has taken account of the potential impacts of the development on surface water quality; measures have been incorporated in the design to mitigate these potential impacts.

The proposed development stormwater drainage network design includes sustainable drainage systems (SuDS). These measures by design ensure the stormwater leaving the site is to be attenuated and treated within the new development site boundary to ensure suitable quality, before discharging to the existing local drainage network which subsequently outfalls to Rogerstown Estuary. SuDS are drainage systems that are environmentally beneficial, causing minimal or no long-term detrimental damage. The SuDs design is set out in the Infrastructure Design Report (DBFL Consulting Engineers, 2025) and uses green roofs, underground attenuation system, detention/infiltration basins, vortex flow control device (Hydrobrake or equivalent), bio-swales with filter drains, infiltration blankets, rain gardens, tree pits, permeable paving (porous surfacing), an oil separator, and petrol / hydrocarbon interceptors (or equivalent).
The purpose of the SuDs design is to:

- Treat runoff and remove pollutants to improve quality;
- Restrict outflow and control quantity;
- Increase amenity value.

The layout of the proposed surface water drainage network is shown on the DBFL Consulting Engineers Drawing Set (2025) included with this Application. It is proposed to separate the surface water and wastewater drainage networks, which will serve the proposed development, and provide independent connections to the local public surface water and wastewater sewer networks respectively. Waste water will be discharged in accordance with the UÉ licence requirements.

Surface Water Flow and Quantity

The design has taken account of the potential impacts of the development on surface water flow; measures have been incorporated in the design to mitigate these potential impacts.

As set out in the Infrastructure Design Report (DBFL Consulting Engineers, 2025), flow restriction is achieved by means of a vortex flow control device (Hydrobrake or equivalent)installed at the outfall of the surface water catchment within the development, with the excess storm water stored on site for the duration of the storm periods of up to 1 in 100 years.

Surface water runoff from the proposed Phase 3 development and the wider Ballymastone masterplan area will be attenuated to greenfield runoff (Qbar). For the Ballymastone masterplan area, this is calculated as 55.04 l/s using the Institute of Hydrology equation, as recommended in the Greater Dublin Strategic Drainage Study (GDSDS) based on an area of 11.28 Ha. This area is within the catchment of the new drainage networks and excludes open space areas not within new drainage networks. The overall catchment and a catchment plan strategy is shown on drawing number 20003-DBF-XXXX-XX-DR-C01-133015

All the storm water from the proposed development shall be collected in separate storm pipes and shall be discharged into an underground attenuation system. The attenuation tanks shall be designed for 1-in

100-year storm event plus 20% climate change factor without any overland flooding. The attenuation tank shall be provided with flow control device to restrict the storm water run-off to greenfield rate.

The proposed development includes a new surface water network which will reduce/mitigate any pluvial flood risk to the site in line with SuDS measures. The surface water network, attenuation storage and site levels are designed to accommodate a 100-year return period storm event and includes climate change provision. Lowest building Floor levels of houses are set above the 100-year flood levels by a minimum of 0.5m above the top water level in the corresponding attenuation facility in accordance with recommended minimum freeboards for protection. All footpaths are falling away from houses. For storms events, exceeding a 100-year return period, the development has been designed to provide overland flood routes along the various development roads towards green areas or drainage outfalls, where possible. (Refer to the 'Site Specific flood Risk Assessment' (SSFRA) by DBFL Consulting Engineers, which is included as a separate report).

Groundwater Quality

The proposed development does not include any bulk chemical storage including fuel storage. As the site will be paved and drained, any fuel spills from cars will drain the hydrocarbon interceptors on the stormwater drainage system. All stormwater drainage is through the permitted attenuation pond.

During the operational phase of the proposed development, there is limited potential for Site activities to impact on the geological and hydrogeological environment of the area. There will be no impact on local or regional groundwater resources (abstraction) as a result of the proposed development.

The proposed development design includes hardstand cover across the site and the proposed surface water drainage system for this development has been designed as a sustainable urban drainage system (SuDS). The surface water design has been designed in accordance with the Greater Dublin Regional Code of Practice for Drainage Works and Sewers for adoption. The drainage network will consist of attenuation to the green-field runoff using a flow control device (hydrobrake) from the site. Any localised car leaks will therefore discharge to the stormwater drainage and be treated in Petrol interceptors (oil separators) prior to outfalling into the main system. Therefore, the risk of accidental discharge has been adequately addressed through design. The purpose of these SuDS features is to treat runoff and remove pollutants to improve quality, restrict outflow and control quantity and increase overall amenity value.

Foul (Wastewater) Drainage

The foul discharge from the site will join the public sewer and will be treated at the Portrane Water Wastewater Treatment Plant (WWTP EPA Licence: D0114-02) prior to subsequent discharge to the Northwestern Irish Sea through a primary discharge point located east of St. Ita's Hospital, offshore of the Donabate – Portrane peninsula. This WWTP is required to operate under an EPA licence and meet environmental legislative requirements as set out in its licence prior to discharge to the Irish Sea.

6. NO DETERIORATION ASSESSMENT

During construction and operation, design mitigation measures (as outlined in Section 5) will be implemented to ensure protection of the hydrological and hydrogeological environment.

Overall, with design and mitigation measures in place, there are no likely significant effects on surface water and groundwater as a result of the proposed development. The WFD status classification or the ability to deliver the programme of measures will not be affected by the proposed development.

As outlined in section 2.2.3, the proposed development is hydrological linked with the following designated (Natura 2000) sites:

- Rogerstown Estuary SPA (Site Code: 004015) c. 0.85 km North of the site;
- Rogerstown Estuary SAC (Site Code: 000208) c. 0.85 km North of the site;

6.1 Hydrological Environment

The proposed development has a hydrological connection to the Beaverstown stream (Rahillion/Ballyboghil_010), Portrane stream (Ballalease North/Ballyboghil_010) and the Rogerstown Estuary (WFD Transitional Waterbody). The proposed surface water (stormwater) drainage discharges ultimately discharge to the Rogerstown Estuary.

During construction, there are mitigation and design measures which will be implemented to protect the hydrological (and hydrogeological) environment. There is a potential of accidental discharges should mitigation fail during the construction phase, however these are temporary short-lived events that will not impact on the water status of waterbodies long-term and as such will not impact on trends in water quality and over all status assessment. The project-specific Construction and Environmental Management Plan (CEMP) which the works contractor will develop shall implement strict mitigation measures to ensure the protection of the hydrological (and hydrogeological) environment during construction which will ensure that there will be no negative impact on the quantitative or qualitative or morphology of the nearby watercourses.

There are limited indirect discharges of water during the operational phase to open waterbody/ watercourse and no groundwater dewatering for the proposed development. The discharges will be adequately treated via SuDS measures, hydrobrake (or equivalent) and oil/hydrocarbon interceptor to ensure there is no long-term negative impact to the WFD water quality status of the receiving watercourse. The SuDS and proposed measures have been designed in detail with the ultimate aim of protecting the hydrological (& hydrogeological) environment. The SuDS and project design measures will be maintained correctly as per specifications to ensure long-term/ on-going integrity of same.

There are no changes to the overall hydrological and hydrogeological regime as a result of the proposed development. There are no proposed diversions of any drainage ditches or waterbodies as part of the proposed development.

Overall, the potential effects on the current status of the waterbodies are considered no impact i.e. no change to the WFD status or elements in terms of the hydrological environment.

During operation, to mitigate potential contamination from surface water runoff, which may originate from roads, car parks, and hardstanding areas, a sustainable urban drainage system (SuDS) will be implemented. This system is designed to minimize the risk of contaminants, such as hydrocarbons, entering the stormwater drainage network and subsequently impacting surface water bodies like the

Beaverstown stream (Rahillion/Ballyboghil_010), Portrane stream (Ballalease North/Ballyboghil_010) and the Rogerstown Estuary as well as groundwater bodies i.e. the Swords GWB underlying the site.

The surface water drainage strategy integrates various treatment measures and attenuation which include an attenuation pond which incorporates silt remediation mitigation measures. These features will effectively manage surface water flows, directing them to the attenuation storage system and to maximize their storage potential. The flow control devices will be to ensure the surface water runoff is stored maximising storage potential, prior to entering the network downstream.

The SuDS and proposed measures have been designed in detail with the ultimate aim of protecting the hydrological (& hydrogeological) environment. The proposed operational design of the proposed development will not contribute towards degrading the WFD status of the aforementioned waterbodies. Overall, the potential effects on the current status of the surface waterbodies are considered no impact i.e. no change to the WFD status or elements in terms of the hydrological environment.

With the design and mitigation measures in place and the distance to receptors (significant dilution/mixing and other attenuation mechanisms that will take place along the pathway), there is no potential for any change in water dependent habitat requirements as a result of the proposed development.

There are no source pathway linkages to Public Water Supplies.

It should be noted that the peak foul (wastewater) effluent discharge, calculated for the proposed development as 6.138 l/s would equate to 1.13% of the licensed discharge at Portrane WWTP [peak hydraulic capacity]. This Annual Environmental Report (AER, 2024) has been prepared for D0114-02, Portrane, Donabate, Rush, Lusk, in Dublin, the WWTP has adequate capacity with the capacity not projected to be exceeded within the next three years (not before 2027) and therefore there would be no measurable impact on the overall water quality.

As such, this flow and treatment at Portrane, Donabate, Rush, Lusk WWTP would not have a measurable impact on the overall current water quality and Water Body Status within the Northwestern Irish Sea Coastal Waterbody and therefore would not have an impact on the current Water Body Status (as defined within the Water Framework Directive).

6.2 Hydrogeological Environment

As mentioned above, the proposed development will not involve dewatering of the subsoils and within the Swords Groundwater Body. As such the proposed development will not have an impact on the quantitative aspects in consideration of water body status such as baseflow for the hydrological waterbodies. During operation, there is no current proposal for long-term or significant dewatering.

For the construction phase, there are mitigation and design measures which will be implemented during this phase to protect the hydrogeological environment. There is a potential of accidental discharges during the construction phase, however these are temporary short-lived events that will not impact on the water status of the underlying bedrock aquifer long-term and as such will not impact on trends in water quality and over all status assessment.

The project-specific CEMP which the works Contractor will develop will implement strict mitigation measures to ensure the protection of the hydrogeological environment during construction which will ensure that there will be no negative impact on the quantitative or qualitative of the underlying bedrock aquifer (Swords GWB).

There is no potential for change in groundwater levels as a result of local changes in the groundwater regime at the site due to the limited extent of dewatering activities and the natural recharge capacity of

the underlying "(LI) Locally Important Aquifer – Moderately Productive only in Local Zones". This ensures that the aquifer's integrity and functionality remain unaffected. In addition, the mitigation measures that will be implemented during construction (as set out in the CEMP) and operational design measures (SuDS) will ensure there are no potential impacts on the hydrogeological environment.

Therefore, there is no potential for change in water quality or levels as there are no local changes in the groundwater regime at the site. There are no planned discharges to groundwater during the operational phase and no long-term groundwater dewatering for the project. The proposed development design includes hardstand cover and green areas across the site.
In terms of the operational phase, the risk to the aquifer is considered to be low due to the presence of handstand and a drainage system incorporating use of oil / hydrocarbon / petrol interceptors (or equivalent) on the stormwater drainage system prior to discharge from the site.

Overall, the potential effects on the WFD status to the groundwater bodies are considered no impact i.e., no change to the current status or elements in terms of the underlying hydrogeological environment.

There are no source pathway linkages to Groundwater Water Supplies.

6.3 Assessment In Terms of Future Good Status

At present there are no local targeted measures within the catchments to maintain or achieve improvements to the status of the water bodies. However, the following are some pressures associated with waterbody catchments:

- Physical Modifications.
- Management of pollution from agricultural activities.
- Management of pollution from sewage and waste water.
- Management of pollution from urban environments.
- Changes to natural flow and levels of water.
- Managing invasive non-native species.

The proposed development will incorporate SuDs measures within the landscape and drainage design in order to manage run-off quality and foul sewers management will be in compliance with UÉ specifications. No dewatering is required during operation. All discharges will be adequately treated through the proposed SuDs measures as above. As such there will be no change to the existing status as a result of the proposed development.

Based on the above information it is not considered that any aspects of the proposed development will prevent the WFD objectives from being achieved or to meet the requirements and/or objectives in the Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024).

7. CONCLUSIONS

Appendix A presents the methodology for the surface water and groundwater assessments to determine waterbody status.

Appendix B contains the background information and the WFD classification elements for surface water and groundwater body status. The colour coded system referred to in Appendix B – Table 1 and Table 2 are used to give a visual impression of the surface water and groundwater assessment, respectively.

The proposed development site discharges to the existing 1350mm surface water culvert to the northwest of the site (Catchment 4) and to the Ballalease North (Portrane stream) BALLYBOGHIL_010 (European Code: IE_EA_08B012200) river waterbody, both of which eventually outfall to the Rogerstown Estuary to the north (c. 0.85km linear distance at the point of closest proximity).

The WFD assessment indicates that, based on the current understanding of the proposed development, there is no potential for adverse or minor temporary/ long-term or localised effects on the Beaverstown stream (Rahillion/Ballyboghil_010), Portrane stream (Ballalease North/Ballyboghil_010) or the Rogertown Estuary transitional waterbody.

Therefore, it has been assessed that the proposed development will not cause any significant deterioration or change in water body status or prevent attainment, or potential to achieve, future good status or to meet the requirements and/or objectives in the Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024).

The WFD assessment indicates that there is no potential for adverse or minor temporary or localised effects on the Swords GWB. Therefore, it has been assessed that it is unlikely that the proposed development will cause any significant deterioration or change on its water body status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the Water Action Plan 2024 - A River Basin Management Plan for Ireland, (Department of Housing Local Government & Heritage, Sept 2024).

No further assessment of WFD is recommended given that no significant deterioration or change in water body status is expected based on the current understanding of the proposed development during construction and operation.

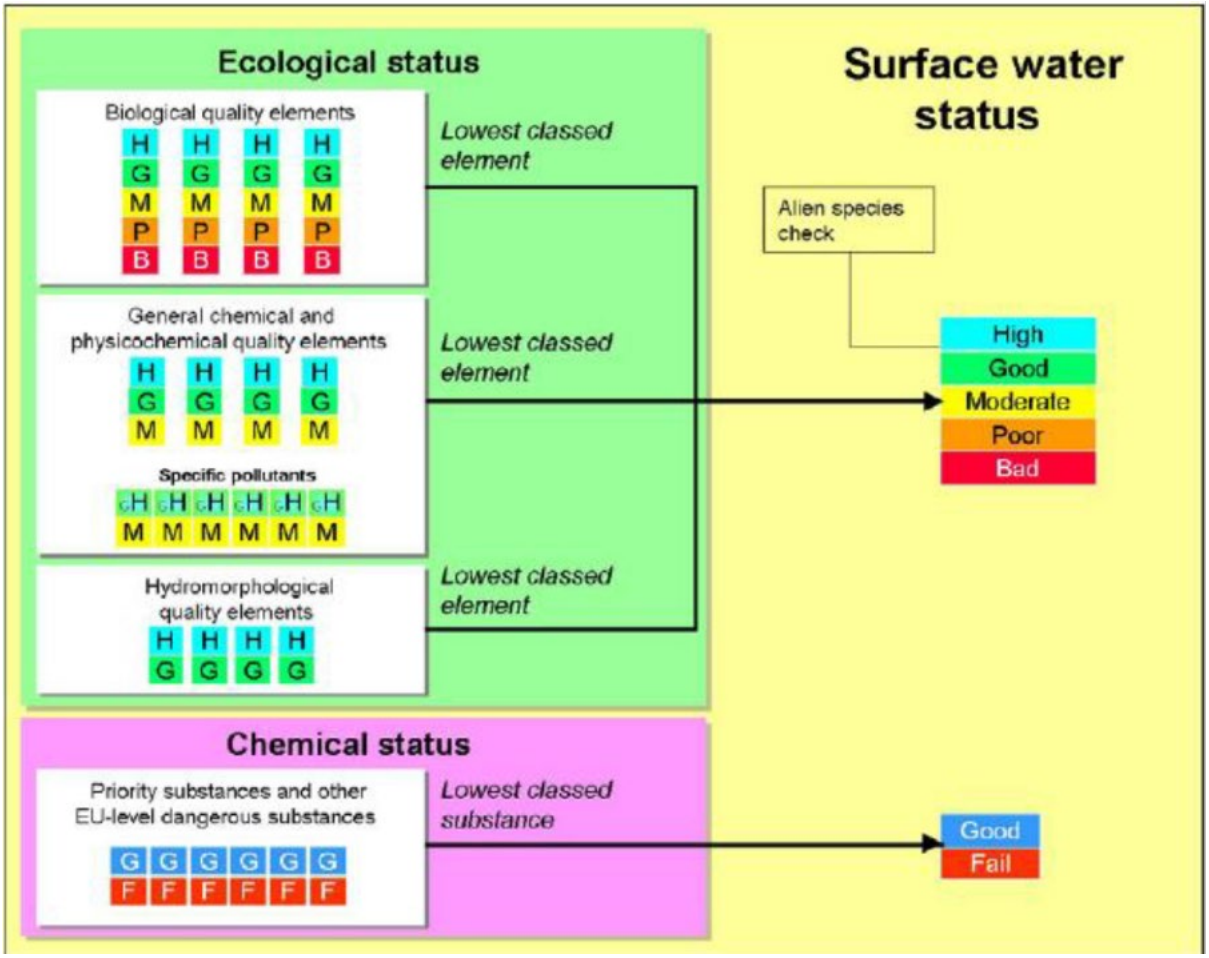
APPENDIX A

WATER FRAMEWORK DIRECTIVE ASSESSMENT MATRIX

1.1 Background to Surface Water Body Status & Groundwater Body Status

Under the WFD, surface water body status is classified on the basis of chemical and ecological status or potential. Ecological status is assigned to surface water bodies that are natural and considered by the EPA not to have been significantly modified for anthropogenic purposes (i.e., culverting). Ecological potential is assigned to artificial and man-made water bodies (such as canals), or natural water bodies that have undergone significant modification. The term 'ecological potential' is used as it may be impossible to achieve good ecological status because of modification for a specific use, such as navigation or flood protection. The ecological potential represents the degree to which the quality of the water body approaches the maximum it could achieve. The worst-case classification is assigned as the overall surface water body status, in a 'one-out all-out' system (i.e., by taking the worst case of all the combined risk outcomes). This system is summarised below in Figure 1.

Figure 1. WFD classification elements for surface water body status (Environmental Agency, 2015)



1.1.2 Chemical Status

Chemical status is defined by compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances, in accordance with the Environmental Quality

Standards Directive (2008/105/EC). This is assigned on a scale of good or fail. Surface water bodies are only monitored for priority substances where there are known discharges of these pollutants; otherwise, surface water bodies are reported as being at good chemical status.

1.1.3 Ecological Status

Ecological status or potential is defined by the overall health or condition of the watercourse. This is assigned on a scale of High, Good, Moderate, Poor or Bad, and on the basis of four classification elements or 'tests', as follows:

- **Biological:** This test is designed to assess the status indicated by a biological quality element such as the abundance of fish, invertebrates or algae and by the presence of invasive species. The biological quality elements can influence an overall water body status from Bad through to High.
- **Physico-chemical:** This test is designed to assess compliance with environmental standards for supporting physicochemical conditions, such as dissolved oxygen, phosphorus and ammonia. The physicochemical elements can only influence an overall water body status from Moderate through to High.
- **Specific pollutants:** This test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic. As with the physico-chemical test, the specific pollutant assessment can only influence an overall water body status from Moderate through to High.
- **Hydromorphology:** For natural waterbodies, this test is undertaken when the biological and physicochemical tests indicate that a water body may be of High status. It specifically assesses elements such as water flow, sediment composition and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydromorphological elements do not support High status, then the status of the water body is limited to Good overall status. For artificial or highly modified waterbodies, hydromorphological elements are assessed initially to determine which of the biological and physico-chemical elements should be used in the classification of ecological potential. In all cases, assessment of baseline hydromorphological conditions are an important factor in determining possible reasons for classifying biological and physicochemical elements of a water body as less than Good, and hence in determining what mitigation measures may be required to address these failing water bodies.

1.2 Background to Groundwater Body Status

Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. Status is assessed primarily using data collected from the EPA monitoring network; therefore, the scale of assessment means that groundwater status is mainly influenced by larger scale effects such as significant abstraction or widespread/ diffuse pollution. The worst-case classification is assigned as the overall groundwater body status, in a 'one-out all-out' system. This system is summarised in Figure 2 below.

1.2.1 Quantitative Status

Quantitative status is defined by the quantity of groundwater available as baseflow to watercourses and water-dependent ecosystems, and as 'resource' available for use as drinking water and other consumptive purposes. This is assigned on a scale of Good or Poor, and on the basis of four classification elements or 'tests' as follows:

- **Saline or other intrusions:** This test is designed to identify groundwater bodies where the intrusion of poor quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.
- **Surface water:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the ecological status of associated surface water bodies.

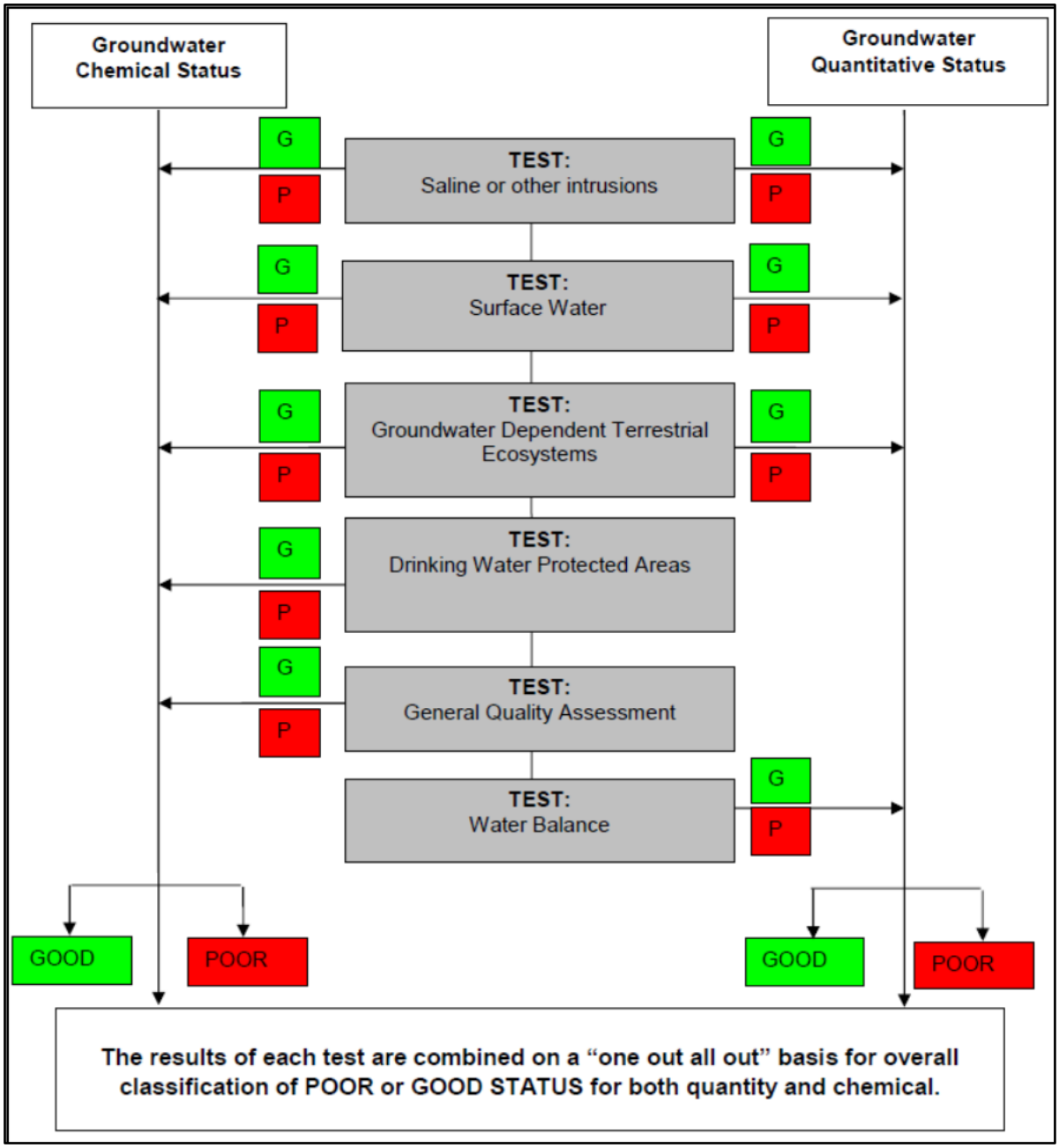
- **Groundwater Dependent Terrestrial Ecosystems (GWDTEs):** This test is designed to identify groundwater bodies where groundwater abstraction is leading to "significant damage" to associated GWDTEs (with respect to water quantity).
- **Water balance:** This test is designed to identify groundwater bodies where groundwater abstraction exceeds the "available groundwater resource", defined as the rate of overall recharge to the groundwater body itself, as well as the rate of flow required to meet the ecological needs of associated surface water bodies and GWDTEs.

1.2.2 Chemical Status

Chemical status is defined by the concentrations of a range of key pollutants, by the quality of groundwater feeding into watercourses and water-dependent ecosystems and by the quality of groundwater available for drinking water purposes. This is assigned on a scale of Good or Poor, and on the basis of five classification elements or 'tests' as follows:

- **Saline or other intrusions:** This test is designed to identify groundwater bodies where the intrusion of poor-quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.
- **Surface water:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the chemical status of associated surface water bodies.
- **GWDTEs:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to "significant damage" to associated GWDTE's (with respect to water quality).
- **Drinking Water Protected Areas (DrWPAs):** This test is designed to identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.
- **General quality assessment:** This test is designed to identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.

Figure 2. WFD classification elements for groundwater body status (Environmental Agency, 2015)



APPENDIX B.

Surface and Groundwater WFD Assessment

Risk screening of potential to cause deterioration of current WFD status										
	Surface Water	Scheme Elements	**Proposed Development**						Mitigation Measures	Overall Impact with mitgation measures
	BALLYBOGHIL_010 (IE_EA_08B012200) **Rogerstown Estuary (IE_EA_050_0100)**	Phase (Construction/ Operation)	Construction	Construction	Construction	Construction	Operation	Operation		
		Identified Quantitative Impacts	Increased run-off and sediment loading	Temporary land-take during the construction phase	Pollution due to accidential discharges or spillages during the construction phase	Scour during the construction phase	Increase in Hardstanding	Discharge of Foul Effluent		
WFD Status	Macrophytes and phytobenthos - combined	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	**Construction:** The project-specific CEMP will include robust mitigation measures to protect the underlying hydrogeological environment. The CEMP will be a live document and it will go through a number of iterations before works commence and during the works. It will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent conditions relevant to the proposed development. These include management of soils, re-fuelling machinery and chemical handling and control of water during the construction phase. **Operation:** The proposed development is designed to ensure the protection of the hydrological environment such as delivery and distribution and use of hydrocarbon/oil interceptors on the stormwater / surface water drainage system and the use of SuDS techniques. In order to limit the surface water discharge from the site to pre-development, greenfield rates, and to ensure improvement in the overall surface water quality before ultimate discharge the principles of Sustainable Drainage Systems, (SuDS) are to be implemented. Details are to be agreed with FCC.	No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Macroinvertebrates		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Fish		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
Physio-Chemical Status	Total Ammonia	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Total Nitrogen		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Ortho-Phosphate		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
Hydromorphological Elements	Quantity and dynamics of river flow	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Connection to Groundwater		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	River continuity		Not Applicable.	Not Applicable.	Not Applicable.	Not Applicable.	Not Applicable.	Not Applicable.		Not Applicable.
	River depth and width variation bed		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Structure and substrate of river bed		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Structure of riparian zone		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status

Risk screening of potential to cause deterioration of current WFD status								
	Groundwater	Scheme Elements	**Proposed Development**				Mitigation Measures	Overall Impact
	IE_EA_G_011 **Swords GWB**	Phase (Construction/ Operation)	Construction	Construction	Operation	Operation		
		Identified Quantitative Impacts	Increased run-off and sediment loading	Pollution due to accidential discharges or spillages during the construction phase	Increase in Hardstanding	Discharge of Foul Effluent		
Quantitative Elements	**Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	**Construction:** In addition to the protection provided by the overburden on site the project-specific CEMP includes robust mitigation measures to protect the underlying hydrogeological environment. These include collection of run-off and attenuation prior to discharge to the offsite drainage ditch, containment of bulk oil tanks, management measures for concrete pouring and wash out to prevent alkaline discharge to ground, soil stockpile management, re-fuelling machinery and chemical handling, control of water during the construction phase and spill control measures. The CEMP sets out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIA Report and any subsequent conditions relevant to the proposed development. **Operation:** The proposed development has a low hazard loading. The proposed development is designed to ensure the protection of the underlying hydrogeological environment through the use of hardstand-reduction and stormwater / surfaec water drainage (and attenuation) through interceptors. These design measures together with the presence of natural soil cover reduce potential for any discharge to the underlying aquifer. In order to limit the surface water discharge from the site to pre-development, greenfield rates, and to ensure improvement in the overall surface water quality before ultimate discharge the principles of Sustainable Drainage Systems, (SuDS) are to be implemented. No signficant abstraction is required which could impact on quantitaive status.	No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Groundwater Dependent Terrestrial Ecosystems (GWDTE's) To assess the impact of groundwater abstractions on the condition of GWDTE'S.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Water balance To identify groundwater bodies where abstractions exceed the available resource.		Not Applicable (no dewatering anticipated)	Not Applicable (no dewatering anticipated)	Not Applicable (no water supply from borehole anticipated)	Not Applicable (no water supply from borehole anticipated)		Not Applicable
Chemical Elements	**Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Groundwater Dependent Terrestrial Ecosystems (GWDTE's) To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Drinking Water Protected Areas (DrWPAs) To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	General quality assessment To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status

Appendix 15.1 Archaeological Test Excavation

Ballymastone, Donabate, Co. Dublin

Archaeological Test Excavation

Client: Glenveagh Living Limited

Licence No: 21E0453

Archaeologist: Aidan O Connell

Author: Aidan O Connell

Report Date: 13th September 2021

Our Ref: 2021_43

Archer Heritage Planning

Ballymastone, Donabate, Co. Dublin

Archaeological Test Excavation

PROJECT NAME	Ballymastone, Donabate, Co. Dublin
MINISTERIAL DIRECTION NO	n/a
EXCAVATION LICENCE NO	21E0453
TOWNLANDS	Ballymastone, Ballisk, Ballalease, Portraine Demesne
SITE TYPE	Archaeological Test Excavation
ITM	723544, 750244
ARCHAEOLOGICAL CONSULTANT	Archer Heritage Planning Ltd.
EXCAVATION DIRECTOR	Aidan O' Connell
REPORT AUTHOR	Aidan O' Connell
REPORT STATUS	Final
DATE OF ISSUE	13 September 2021

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SUMMARY

This report has been prepared by Archer Heritage Planning Ltd for Glenveagh Living Limited detailing the results of test excavations in Ballymastone, Donabate, Co Dublin (Figure 1). Testing was undertaken between the 20 July to the 11 August 2021 by Aidan O Connell of Archer Heritage Planning Ltd under licence (21E0453) from the Department of Housing, Local Government and Heritage (DHLGH) in consultation with the National Museum of Ireland (NMI). A total of 90 test trenches were excavated across the site. In total, 10191 linear meters/18344 sq. m of test trenches were excavated. An additional 284 sq. m was opened around various archaeological features in order to better define their nature and extent. A total of nine archaeological areas are identified within the site; three from desktop sources/previous archaeological investigations and six from the current test trenching programme.

- Archaeological Area 1; ITM 723504, 749918. Circular Enclosure (30m diameter; RMP DU012-088).
- Archaeological Area 2; ITM 723582, 750191. Pit with burnt mound material.
- Archaeological Area 3; ITM 723471, 750317. Levelled *fulacht fia*.
- Archaeological Area 4; ITM 723445, 750216. Pit with burnt mound material.
- Archaeological Area 5; ITM 723705, 750531. Levelled *fulacht fia*.
- Archaeological Area 6; ITM 723703, 750360. Possible enclosure and associated features.
- Archaeological Area 7; ITM 723652, 750325. Levelled *fulacht fia*.
- Archaeological Area 8; ITM 723916, 750557. Levelled *fulacht fia*.
- Archaeological Area 9; ITM 723695, 749978. Two circular huts, 1 Ringditch & 1 burnt spread.

Recommendation 1

It is recommended that the RMP sites located within the scheme (DU012-084, DU012-085 & DU012-088) are preserved in situ under green space. The current proposal (Figure 22) allows for a minimum 10m buffer zone from the edge of known archaeology. Conservation and Management Plans for these areas have been prepared and are detailed below in Appendix 3-4.

Recommendation 2

It is recommended that the identified archaeological sites located outside the green space areas are subject to full archaeological excavation in advance of any development works. The proposed excavation cuttings are located on Figure 22.

Recommendation 3

It is recommended that should development proceed, groundworks across the remainder of the wider development site be monitored by a suitably qualified archaeologist.

Revision	Status	Date	Prepared by	Reviewed by	Approved by
1	DRAFT	23 Aug 2021	AOC	BK	CMG
2	Final	13 Sep 2021	AOC	BK	CMG

1. INTRODUCTION

This report has been prepared by Archer Heritage Planning Ltd for Glenveagh Living Limited detailing the results of test excavations in Ballymastone, Donabate, Co Dublin (Figure 1). Testing was undertaken between the 20th July to the 12th August 2021 by Aidan O Connell of Archer Heritage Planning Ltd under licence (21E0453) from the Department of Housing, Local Government and Heritage (DHLGH) in consultation with the National Museum of Ireland (NMI).

1.1 Proposed Development

It is proposed to develop the site for residential purposes. Currently only a preliminary site layout is available (Figure 2). The preliminary design accounts for archaeological sites entered in the RMP. These are currently located under green space.

2. SITE DESCRIPTION

2.1 Receiving environment

This Archaeological Test Excavation was carried out on a site in the town lands of Ballymastone, Ballisk, Ballalease, Portraine Demesne at Donabate, Co. Dublin (ITM 723544, 750244). The site comprises several different size and shape fields to the east of Donabate. The land is fallow and currently largely overgrown with ragwort and thistle. All the fields are bounded with mature hedge rows.

2.2 Brief archaeological and historical background

In the early medieval period, Donabate formed part of the kingdom of Brega, initially ruled by a dynastic confederation known as the Laigin, but after the seventh century was under the rule of the Síl nAedo Sláine of the Southern Uí Neill. After the area came under the control of the Anglo-Normans in the late twelfth century, the lands around Donabate came under the control of the Archbishop of Dublin, who had his episcopal manor at Swords, Co. Dublin. Around 1230 AD, Donabate church was granted to the monastery of Grane, Co. Carlow and remained in their possession until the dissolution of the monasteries in 1541 (Bates 2001). In the eighteenth century, an extensive tract of land around Donabate was purchased by Charles Cobbe, later Archbishop of Dublin.

The first portion of the name Donabate (Domhnach Bat) most likely originates from the word Domhnach meaning church and Baite meaning wet or swampy. Donabate is also said to derive its name from the Irish 'Domhnach Bat' or 'Dún a' Bháid' meaning church of the ferry, which is supposed to refer to an ancient church in the townland of Ballymadrough west of Donabate near the Malahide Estuary.

The townland of Ballisk (*Baile Uisce*) gained its name from *baile* – town/ home/ homestead and *uisce*- water. The townland of Ballalease North (*Baile Eilís Thuaidh*) gained its name from *baile* – town/ homestead and *Eilís*- a womans name, suggesting the homestead/ area once belonged to *Eilís*. The origins of the townland name Ballymastone are less clear. Both the townlands of Ballymastone (spelled Balmasto) and Ballisk (spelled Balilisk) are noted on the Down Survey map (1656). It was also noted on this map that the Donabate townland of 117 acres was forfeited by Anthony Delahide of Lockhumny (probably Loughshinny) to Lord Fitzharding sometime between 1641 and 1670.

2.3 Record of Monuments & Places

The Record of Monuments and Places (RMP) is a statutory inventory of archaeological sites protected under the National Monuments Acts 1930-2004 (Section 12, 1994 Act), compiled and maintained by the Archaeological Survey of Ireland (ASI). The inventory concentrates on pre-1700 AD sites and is based on a previous inventory known as the Sites and Monuments Record (SMR) which does not have legal protection or status (see www.archaeology.ie). The proposed development is located outside the Zone of Archaeological Potential associated with the medieval settlement of Donabate. There are three RMP sites present within the proposed development: DU012-088 – Enclosure, DU012-084 – Ring-ditch and DU012-085 – Ring-ditch. Those monuments were subject to geophysical survey and test excavation (license numbers 05R012, 07E0650, 06E0027). A selection of RMP entries relevant to this area and within 2000m of the subject site are presented in Appendix 1 and Figure 1.

2.4 Topographical Files

The National Museum of Ireland Topographical Files is the national archive of all known antiquities recorded by the National Museum listed by county and townland/street. These files relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous archaeological excavations. The Museum files present an accurate catalogue of objects reported to that institution from 1928[1]. The topographical files were searched for the townland of Ballisk, Ballalease North and Ballymastone, Co. Dublin. There were no stray finds recovered from these townlands.

2.5 Cartographic Sources

Analysis of historic mapping can show human impact on landscape over a prolonged period. Large collections of historical maps (pre- and early Ordnance Survey maps as well as estate or private maps)

[1] The NMI Topographical Files search was undertaken by the Irish Antiquities Division of the NMI on behalf of Archer Heritage and is gratefully acknowledged,

are held at the Glucksman Map Library, Trinity College and other sources (UCD Library, Ordnance Survey Ireland, local libraries and published material). The following historical maps were consulted in the compilation of this assessment (See Table 1 below & Figure 3 & 4). The subject site is depicted as agricultural land. **No features of archaeological potential were noted within the subject site on the consulted cartographic sources.**

Map	Date	Description
Down Survey	1656	Donabate is marked on this map as larger town with a tower/ important structure noted in the centre of town. This could be relating to the castle/tower house (DU012-005002) located in the centre of Donabate town. The townlands of Portraine, Ballymastone (labelled *Ballmasto*) and Ballisk (labelled *Balilisk*) are labelled on this map. Two towers are depicted within or near these townlands. These cannot be attributed to known monuments.
Historic 6inch	1844	The subject site encompasses parts of 4 townlands; Portraine Demesne, Ballalease North, Ballymastone and Ballisk. It crosses a number of townland boundaries. The land is depicted as large open fields. There are no structures or monuments depicted within the subject area on this map
Historic 25inch	1888-1913	No change
Cassini	1906-30	No change

Table 1: Cartographic sources relating to the site

2.6 Aerial Photographs

Aerial photography (or other forms of remote sensing) may reveal certain archaeological features or sites (earthworks, cropmarks, soil marks) that for many reasons may not be appreciated at ground level. There are a number of available collections including the National Monuments Section, Geological Society of Ireland (1970–73), Ordnance Survey of Ireland (1995, 2000, 2005), National Museum of Ireland (St Joseph CUCAP Collection) and Air Corps (1950's–1970's). The following sources were consulted in the compilation of this assessment (See Figure 3 and Table 2 below):

Aerial Photograph	Date	Description
OSi	1995	Black and white photography. The site appears to be covered with cereal. The western portion of it seems to be unused.
OSi	2000	Full colour. In this photography the site seems to be pastureland. Again the western portion appears unused.
OSi	2005	The field is back to cereal farming, otherwise no change.
Digital Globe	2013	No change
Google Earth	2021	All the land looks unused, former agriculture.

Table 2: Aerial Photographs

2.7 Previous Archaeological investigations

The Excavation Bulletin is a database of summary accounts of archaeological excavations in Ireland and Northern Ireland from 1970 to 2020. Summaries relating to archaeological excavations undertaken by the National Roads Authority are also available on-line and were consulted for any adjacent sites. Reports on licensed archaeological works are also held by the Archive Unit of the National Monuments Section. There were no previous archaeological excavations within the site. There have been many archaeological investigations adjacent to the subject site. These are listed below in Appendix 2.

Considerable archaeological assessment work was carried out for the Local Area Development Plan for Donabate village in 2006. This included a program of geophysical survey and follow up test trenching in the townlands of Ballinmastone and Corballis. The initial testing (Baker 2006; Licence 06E0027) focused on the original proposed route of the distributor road, following a programme of geophysical survey (Leigh 2006; Licence 05R0124). A second phase of geophysical survey (Harrison 2007; Licence 07R0177) followed by additional testing (Frazer 2007; Licence 06E0027ext) was undertaken in 2007. The results of these combined assessments indicated significant archaeological remains adjacent to and within the subject site.

A curvilinear enclosure ditch c. 30m in diameter with further responses both within and outside the potential enclosure was identified through Geophysical Survey 05R124 (Leigh 2006, 7). Subsequent test excavation (06E0027ext; Frazer 2008, 12) confirmed the presence of a ditch, 0.9m wide containing minute fragments of handmade pottery. This site is scheduled for inclusion in the next edition of the Record of Monuments and Places (SMR Ref: DU012-088).

Additional archaeological features were previously identified at the southeast of the subject site. They were first identified in the course of Geophysical Survey 05R0124 and subsequently confirmed by test excavations. In total, four individual sites were identified. Two of these are scheduled for inclusion of the next edition of the RMP. The individual sites are as follows:

- DU012-084; Circular hut site; ITM 723679, 749981
- DU012-085; 12m wide ringditch; ITM 723695, 749978
- No RMP; circular hut; ITM 723712, 749934
- No RMP; Burnt spread; ITM 723661, 749942.

3. METHOD STATEMENT

This assessment aims to establish the archaeological potential of the proposed development area, to determine the potential impact of the proposed development and if necessary, design a suitable mitigation strategy. The following sources were consulted in the preparation of this report:

- Record of Monuments and Places (RMP)[2]
- Topographic files held by the National Museum of Ireland
- Aerial photography (various collections including National Museum of Ireland, Geological Survey of Ireland and/or Ordnance Survey Ireland)
- Historical maps (including early edition Ordnance Survey (OS) maps and pre-Ordnance Survey held at Trinity College Map Library).
- Reference material (journals, papers, books *etc*) held by the National Library of Ireland, local libraries and/or on-line search facilities/collections (*e.g.* JSTOR etc)
- Relevant on-line databases (*e.g.* Excavation Bulletin; NRA Archaeological Database).

4. RESULTS

4.1 Methodology

Test excavation was undertaken from 20th July to 12th August 2021 in mixed weather conditions. A total of 90 test trenches with a combined length of 10191 linear metres were excavated within the site. A 16-ton tracked excavator with a 1.8m grading bucket was used to excavate the trenches which were located across the footprint of the proposed development (Plate 1). Trenches were spaced evenly, with gaps of *c.*20m across the available area. Each trench was inspected for archaeological remains and all trenches were reinstated on completion. The results are listed in Table 3 below.

The fields were in an overgrown state with ragwort and thistle throughout. The topsoil was a friable, light reddish-brown, sandy-silt, with frequent small stone (<100mm diameter) inclusions with a depth of 0.30-0.55m. The natural subsoil comprised a compact, stony clay, stained pink across a large portion of the development area.

4.2 Constraints

There were some constraints encountered during excavation. These consisted of overhead powerlines, a buried watermain and a gasmain.

[2] Archive Unit National Monuments Service, Department of Housing, Local Government and Heritage, Floor 2, Block 6, Irish Life Centre

4.3 Results

A total of 90 test trenches were excavated across the site. In total, 10191 linear meters/18344 sq. m of test trenches were excavated. An additional 284 sq. m was opened around various archaeological features in order to better define their nature and extent (Figures 8-21; Plates 1-44). Trench details are provided below in Table 3. A total of nine archaeological areas are identified within the site, three existing sites and six new sites from the current test excavations. Details are provided below in Section 4.4-4.12

Trench	L x B x D (m)	Orientation	Description
1	55 x 1.8 x 0.27	N-S	No archaeology found
2	55 x 1.8 x 0.33	N-S	No archaeology found
3	55 x 1.8 x 0.42	N-S	No archaeology found
4	156 x 1.8 x 0.29	N-S	No archaeology found
5	207 x 1.8 x 0.38	N-S	No archaeology found
6	199 x 1.8 x 0.44	N-S	No archaeology found
7	203 x 1.8 x 0.29	N-S	No archaeology found
8	209 x 1.8 x 0.41	N-S	No archaeology found
9	210 x 1.8 x 0.21	N-S	No archaeology found
10	153 x 1.8 x 0.29	E-W	No archaeology found
11	145 x 1.8 x 0.25	E-W	No archaeology found
12	131 x 1.8 x 0.23	E-W	No archaeology found
13	100 x 1.8 x 0.27	E-W	No archaeology found
14	70 x 1.8 x 0.31	N-S	No archaeology found
15	73 x 1.8 x 0.30	N-S	No archaeology found
16	122 x 1.8 x 0.31	N-S	No archaeology found
17	229 x 1.8 x 0.36	N-S	No archaeology found
18	122 x 1.8 x 0.28	N-S	No archaeology found
19	132 x 1.8 x 0.30	N-S	No archaeology found
20	46 x 1.8 x 0.34	E-W	No archaeology found
21	46 x 1.8 x 0.37	E-W	No archaeology found
22	46 x 1.8 x 0.41	E-W	No archaeology found
23	32 x 1.8 x 0.39	N-S	No archaeology found
24	38 x 1.8 x 0.27	E-W	No archaeology found
25	11 x 1.8 x 0.27	E-W	No archaeology found
26	46 x 1.8 x 0.27	E-W	No archaeology found
27	107 x 1.8 x 0.43	E-W	No archaeology found
28	76 x 1.8 x 0.41	E-W	F1. 20 sq. m excavated around feature.
29	125 x 1.8 x 0.44	E-W	No archaeology found
30	127 x 1.8 x 0.39	E-W	No archaeology found
31	136 x 1.8 x 0.37	E-W	No archaeology found
32	148 x 1.8 x 0.42	E-W	No archaeology found
33	73 x 1.8 x 0.45	E-W	No archaeology found
34	135 x 1.8 x 0.5	N-S	No archaeology found
35	156 x 1.8 x 0.41	N-S	No archaeology found
36	160 x 1.8 x 0.39	N-S	F2-F4. 97 sq. m excavated around features.
37	161 x 1.8 x 0.42	N-S	F5. 20 sq. m excavated around feature.

Trench	L x B x D (m)	Orientation	Description
38	138 x 1.8 x 0.42	N-S	No archaeology found
39	86 x 1.8 x 0.42	SE-NW	No archaeology found
40	92 x 1.8 x 0.38	N-S	No archaeology found
41	81 x 1.8 x 0.34	N-S	No archaeology found
42	80 x 1.8 x 0.38	N-S	No archaeology found
43	83 x 1.8 x 0.41	N-S	No archaeology found
44	83 x 1.8 x 0.42	N-S	No archaeology found
45	110 x 1.8 x 0.40	E-W	No archaeology found
46	160 x 1.8 x 0.38	E-W	No archaeology found
47	160 x 1.8 x 0.35	E-W	No archaeology found
48	160 x 1.8 x 0.34	E-W	No archaeology found
49	160 x 1.8 x 0.37	E-W	F6-F9; 56 sq. m excavated around features.
50	80 x 1.8 x 0.40	E-W	No archaeology found
51	263 x 1.8 x 0.41	E-W	No archaeology found
52	200 x 1.8 x 0.42	E-W	F10
53	234 x 1.8 x 0.45	E-W	F11
54	62 x 1.8 x 0.44	N-S	No archaeology found
55	23 x 1.8 x 0.46	E-W	No archaeology found
56	20 x 1.8 x 0.45	N-S	No archaeology found
57	60 x 1.8 x 0.42	N-S	F12-13. 10 sq. m excavated around F12
58	60 x 1.8 x 0.40	N-S	F14-F16. 23 sq. m excavated around features.
59	20 x 1.8 x 0.35	N-S	No archaeology found
60	20 x 1.8 x 0.32	N-S	No archaeology found
61	136 x 1.8 x 0.31	E-W	F11. F17.
62	185 x 1.8 x 0.35	E-W	No archaeology found
63	163 x 1.8 x 0.42	E-W	F18-F19. 23 sq. m excavated around features.
64	60 x 1.8 x 0.44	E-W	No archaeology found
65	22 x 1.8 x 0.4	N-S	No archaeology found
66	55 x 1.8 x 1.25-1.7	E-W	All made ground in vicinity of gas main.
67	89 x 1.8 x 0.34	NW-SE	No archaeology found
68	152 x 1.8 x 0.37	NW-SE	No archaeology found
69	187 x 1.8 x 0.35	NW-SE	No archaeology found
70	187 x 1.8 x 0.39	NW-SE	No archaeology found
71	216 x 1.8 x 0.42	NW-SE	F20-F22. 32.5 sq. m excavated around features.
72	278 x 1.8 x 0.41	NE-SW	No archaeology found
73	158 x 1.8 x 0.44	NE-SW	No archaeology found
74	158 x 1.8 x 0.47	NE-SW	No archaeology found
75	158 x 1.8 x 0.45	NE-SW	No archaeology found
76	271 x 1.8 x 0.43	NE-SW	No archaeology found
77	247 x 1.8 x 0.39	NE-SW	No archaeology found
78	42 x 1.8 x 0.37	NW-SE	No archaeology found
79	85 x 1.8 x 0.36	NW-SE	No archaeology found
80	85 x 1.8 x 0.30	NW-SE	No archaeology found
81	85 x 1.8 x 0.32	NE-SW	No archaeology found
82	20 x 1.8 x 0.30	NW-SE	No archaeology found
83	20 x 1.8 x 0.33	NW-SE	No archaeology found
84	20 x 1.8 x 0.34	NW-SE	No archaeology found

Trench	L x B x D (m)	Orientation	Description
85	85 x 1.8 x 0.35	NE-SW	No archaeology found
86	20 x 1.8 x 0.35	NW-SE	No archaeology found
87	20 x 1.8 x 0.36	NW-SE	No archaeology found
88	20 x 1.8 x 0.33	NW-SE	No archaeology found
89	85 x 1.8 x 0.35	NE-SW	No archaeology found
90	152 x 1.8 x 0.40	NE-SW	No archaeology found

Table 3: Excavation Results

4.4 Archaeological Area 1

Archaeological Area 1 is located at the southern end of the proposed development at ITM 723504, 749918. It was first identified in the course of Geophysical Survey 05R124 as a large curving response indicative of a curvilinear enclosure ditch c. 30m in diameter with further responses both within and outside the potential enclosure (Leigh 2006, 7). Subsequent test excavation (06E0027ext; Frazer 2008, 12) confirmed the presence of a ditch, 0.9m wide containing minute fragments of handmade pottery. The current programme of test trenching focussed on the enclosure exterior, in order to fully define the nature and extent of any associated activity (Plate 2). Trenches 20-24 & Trench 26 were excavated to the north, south and east of the enclosure. No additional archaeological features were recorded. Additionally, a short trench (T25) was excavated across the north-western section of the enclosure at an apparent break in the ditch as defined by the earlier geophysical survey. No features were recorded in this trench (Figure 10). This site is scheduled for inclusion in the next edition of the Record of Monuments and Places (SMR Ref: DU012-088).

4.5 Archaeological Area 2

This is a previously unrecorded site. It consists of a pit (F1) located at ITM 723582, 750191 (Trench 28; Figure 11-12; Plate 3). The pit is a sub-circular/oval feature with dimensions of 0.83m N-S x 0.61m E-W. It is filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay) and appears to be an isolated feature. An area of 20 sq. m was excavated around the pit and no additional archaeological features were recorded.

4.6 Archaeological Area 3

This is a previously unrecorded site. It consists of three pits (F2-F4) located at ITM 723471, 750317 (Trench 36; Figure 11-12; Plate 4). F2 is an oval pit with dimensions of 1.5m NE-SW x 0.5m NW-SE, filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay). F3 is a sub rectangular pit with dimensions of 0.9m N-S x 0.6m E-W, filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay). The final pit (F4) measured 1.5m N-S x 1m E-W and was

also filled with burnt mound material. An area of 97 sq. m was excavated around the three features and no further archaeological material was recorded.

4.7 Archaeological Area 4

This is a previously unrecorded site. It consists of a pit (F5) located at ITM 723445, 750216 (Trench 37; Figure 11-12; Plate 5). The pit is a sub-circular feature with dimensions of 0.5m N-S x 0.56m E-W x 0.19m deep. It had concave rounded sides and a rounded base. The pit was filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay) and appears to be an isolated feature. An area of 20 sq. m was excavated around the pit and no additional archaeological features were recorded.

4.8 Archaeological Area 5

This is a previously unrecorded site. It consists of two pits (F6-F7) and two curvilinear drains centred on ITM 723705, 750531 (Trench 49; Figure 18; Plate 6). F6 is a sub-circular pit with dimensions of 1.7m E-W x 1.5m N-S, filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay). F7 is a sub circular pit with dimensions of 1.7m N-S x 1.1m E-W, filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay). These may be the remains of *fulacht fia* troughs. A curvilinear feature (F8) extends from the NE of F7 for 7.7m and may be an associated drain. The final feature in this area (F9) was a curvilinear feature (2.8m long x 0.35m wide). An area of 56 sq. m was excavated around these features and no further archaeological material was recorded. Taken together, they may represent the remains of a ploughed out *fulacht fia* with associated water management features.

4.9 Archaeological Area 6

Archaeological Area 6 is located at ITM 723703, 750360 (Figure 13-16). It was first identified in the course of Geophysical Survey 05R0124 as a series of short linear responses forming a curvilinear pattern, possibly indicative of an enclosure ditch (Leigh 2006, 6). Subsequent test excavation (06E0027ext; Frazer 2008, 8-9) confirmed the presence of archaeological features tentatively interpreted as a circular enclosure c. 50m in diameter with at least 1 internal pit. The current programme of test trenching focussed on the enclosure exterior, in order to fully define the nature and extent of any associated activity (Figure 13-17; Plate 7). A pair of undated drains (F10 & F11; Plates 8-9) were recorded in T52 and T53/T61 respectively. F10 (0.7m wide x 0.3m deep) was located towards the eastern end of Trench 52. It was filled with a compact light brown silty clay and had no associated artefacts, although some fragments of animal bone were recorded within the fill (Figure 13-14; Plate 8). F11 was a similar linear feature recorded in Trench 53 and Trench 61. It had dimensions of 1.14m wide x 0.4m deep (Figure 13 & 15; Plate 9). F12 was a sub-circular pit with dimensions of 0.59m N-S x 0.62m E-W. It was filled with a soft black carbonised silty

clay (Plate 10). A spread of light brown sandy clay with frequent shell inclusions (F13; 1.46m NE-SW x 0.72m NW-SE) was located further south in Trench 57 (Figure 13-14; Plate 11). A similar spread was located further southwest in Trench 61 (F17; 1.8m long x 1m wide; Figures 13 & 15; Plate 13). Finally, two pits and a linear feature (F14-F16) were recorded in Trench 58. An area of 23 sq. m was excavated around these features (Plate 12).

Taken together, the combined evidence from geophysical survey, previous test excavation and the current programme of test excavation indicates an extensive area containing discrete archaeological features, possibly associated with an earth-cut enclosure.

4.10 Archaeological Area 7

This is a previously unrecorded site. It consists of two pits (F18-F19) located at ITM 723652, 750325 (Trench 63; Figures 13 & 17; Plate 14). F18 is an irregularly shaped pit with dimensions of 2.75m E-W x 2.31m N-S, filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay). F19 is a sub circular pit with dimensions of 1m N-S x 1.5m E-W, filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay). These may be the remains of *fulacht fia* troughs. A linear feature extends from the SW of F18 and may be an associated drain. An area of 23 sq. m was excavated around these features and no further archaeological material was recorded. Taken together, they may represent the remains of a ploughed out *fulacht fia* with associated drainage.

4.11 Archaeological Area 8

This is a previously unrecorded site. It consists of a burnt mound (F20) associated with a pit (F21). These are located at ITM 723916, 750557 (Trench 71; Figures 19-20; Plate 15). F20 is a layer of burnt mound material (burnt stones in a matrix of black charcoal rich clay; 6.7m NE-SW x 2.5m NW-SE). F21 is a sub circular pit with dimensions of 0.9m N-S x 0.45m E-W, filled with burnt mound-type material (burnt stones in a matrix of black charcoal rich clay). These are the remains of a levelled *fulacht fia.* A modern linear drain extends between the two archaeological features. An area of 33 sq. m was excavated around these features and no further archaeological material was recorded.

4.12 Archaeological Area 9

Archaeological Area 9 is located at the eastern side of the proposed development. It was first identified in the course of Geophysical Survey 05R0124 and subsequently confirmed by previous test excavations. There are 4 individual archaeological sites, 2 of which are scheduled for inclusion of the next edition of the RMP. The individual sites are as follows:

- DU012-084; Circular hut site; ITM 723679, 749981

- DU012-085; 12m wide ringditch; ITM 723695, 749978
- No RMP; circular hut; ITM 723712, 749934
- No RMP; Burnt spread; ITM 723661, 749942.

The current programme of test trenching avoided any direct impact on previously recorded archaeological sites and sought only to further define the nature and extent of any associated activity. A single archaeological feature (F23) was recorded in Trench 79. This consisted of a linear drain recorded on the previous geophysical survey (Figure 21; Plate 16). No new archaeological features were recorded.

5. IMPACT ASSESSMENT

Development within the subject site will likely involve considerable ground disturbance works across the area. The following factors were identified in the course of the assessment.

- No potential archaeological features were recorded in cartographic sources relating to the subject site.
- No potential archaeological features were recorded in aerial photos of the subject site.
- There are no protected structures located within the subject site.
- Previous archaeological excavations associated with the Donabate LAP recorded archaeological features within the site.
- Site survey shows that the subject site has historically been and continues to be greenfield.
- Test trenching comprised 90 test trenches with a combined length of 10191 linear metres with an additional 284 sq. m excavated around archaeological features.
- Nine archaeological areas have been identified across the site.
- The preliminary site layout plan provides for green space around Archaeological Area 1 and partial green space around Archaeological Area 9.

5.1 Archaeological Area 1

Archaeological Area 1 is located at the southern end of the proposed development at ITM 723504, 749918. It consists of an earth-cut curvilinear enclosure c. 30m in diameter. Subsequent test excavation (06E0027ext; Frazer 2008, 12) confirmed the presence of a ditch, 0.9m wide containing minute fragments of handmade pottery. The enclosure has been incorporated into the layout and design of the proposed scheme. It is proposed to undertake no ground disturbance works within a 10m buffer zone from the outer edge of the identified archaeological features (see Appendix 3; Conservation and Management Plan). Consequently there will be no adverse impact on buried archaeological features from any future development works in this area.

5.2 Archaeological Area 2

This is a previously unrecorded site. It consists of a single, isolated pit (F1) located at ITM 723582, 750191 and filled with burnt mound material (Trench 28; Figure 11-12; Plate 3). An area of 20 sq. m was excavated around the pit and no additional archaeological features were recorded. Should development proceed at this location, it is anticipated that the predicted impact on the buried archaeological feature from construction groundworks will be direct, negative and permanent.

5.3 Archaeological Area 3

This is a previously unrecorded site. It consists of three pits (F2-F4) located at ITM 723471, 750317 (Trench 36; Figure 11-12; Plate 4). Taken together, these pits are interpreted as a *fulacht fia* where the mound has been levelled by agricultural activity. One or more of the pits may be *fulacht fia* troughs. An area of 97 sq. m was excavated around the three features and no further archaeological material was recorded. Should development proceed at this location, it is anticipated that the predicted impact on buried archaeological features in this area from construction groundworks will be direct, negative and permanent.

5.4 Archaeological Area 4

This is a previously unrecorded site. It consists of a single, isolated pit (F5) located at ITM 723445, 750216 and filled with burnt mound material (Trench 37; Figure 11-12; Plate 5). An area of 20 sq. m was excavated around the pit and no additional archaeological features were recorded. Should development proceed at this location, it is anticipated that the predicted impact on the buried archaeological feature from construction groundworks will be direct, negative and permanent.

5.5 Archaeological Area 5

This is a previously unrecorded site. It consists of two pits (F6-F7) and two curvilinear drains centred on ITM 723705, 750531 (Trench 49; Figure 18; Plate 6). The pits may be the remains of *fulacht fia* troughs. A curvilinear feature (F8) extends from the NE of F7 for 7.7m and may be an associated drain. The final feature in this area (F9) was a curvilinear feature (2.8m long x 0.35m wide). An area of 56 sq. m was excavated around these features and no further archaeological material was recorded. Taken together, they may represent the remains of a ploughed out *fulacht fia* with associated water management features. Should development proceed at this location, it is anticipated that the predicted impact on buried archaeological features in this area from construction groundworks will be direct, negative and permanent.

5.6 Archaeological Area 6

Archaeological Area 6 is centred on ITM 723703, 750360 (Figure 13-16). The combined evidence from geophysical survey and test excavation indicates an extensive area containing discrete archaeological features (pits, linear features and spreads). These archaeological features may be associated with an earth-cut enclosure, indicated in previous assessments by a series of short linear responses forming a curvilinear pattern, possibly indicative of an enclosure ditch, c. 50m in diameter with a central internal pit. Should development proceed at this location, it is anticipated that the predicted impact on buried archaeological features in this area from construction groundworks will be direct, negative and permanent.

5.7 Archaeological Area 7

This is a previously unrecorded site. It consists of two pits (F18-F19) and an associated drain, located at ITM 723652, 750325 and filled with burnt mound material (Trench 63; Figures 13 & 17; Plate 14). These may be the remains of *fulacht fia* troughs. An area of 23 sq. m was excavated around these features and no further archaeological material was recorded. They are interpreted as the remains of a ploughed out *fulacht fia* with associated drainage. Should development proceed at this location, it is anticipated that the predicted impact on buried archaeological features in this area from construction groundworks will be direct, negative and permanent.

5.8 Archaeological Area 8

This is a previously unrecorded site. It consists of a burnt mound (F20) associated with a pit/trough (F21), located at ITM 723916, 750557 (Trench 71; Figures 19-20; Plate 15). These features are interpreted as the remains of a levelled *fulacht fia*. An area of 33 sq. m was excavated around these features and no further archaeological material was recorded. Should development proceed at this location, it is anticipated that the predicted impact on buried archaeological features in this area from construction groundworks will be direct, negative and permanent.

5.9 Archaeological Area 9

Archaeological Area 9 is located at the eastern side of the proposed development. It consists of 4 individual archaeological sites, 2 of which are scheduled for inclusion of the next edition of the RMP. The individual sites are as follows:

- DU012-084; Circular hut site; ITM 723679, 749981
- DU012-085; 12m wide ringditch; ITM 723695, 749978
- No RMP; circular hut; ITM 723712, 749934

- No RMP; Burnt spread; ITM 723661, 749942.

Two of the sites have been incorporated into the layout and design of the proposed scheme. It is proposed to undertake no ground disturbance works within a 10m buffer zone from the outer edge of DU012-084; (Circular hut site; ITM 723679, 749981) and DU012-085; 12m wide ringditch; ITM 723695, 749978 (see Appendix 4; Conservation and Management Plan). Consequently there will be no adverse impact on buried archaeological features from any future development works in these areas. However, It is anticipated that there will be considerable ground disturbance/construction works at the two identified sites (circular hut; ITM 723712, 749934; Burnt spread; ITM 723661, 749942) to the south of this area. Should development proceed at this location, it is anticipated that the predicted impact on buried archaeological features in this area from construction groundworks will be direct, negative and permanent.

Site	Description	Impact	Proposed Mitigation
AA1	Curvilinear earth-cut enclosure, 30m in diameter; DU012-088	No predicted impact	Preservation-in-situ
AA2	Pit	Direct, Negative & Permanent	Full archaeological excavation
AA3	Levelled *fulacht fia*	Direct, Negative & Permanent	Full archaeological excavation
AA4	Pit	Direct, Negative & Permanent	Full archaeological excavation
AA5	Levelled *fulacht fia*	Direct, Negative & Permanent	Full archaeological excavation
AA6	Possible curvilinear enclosure and associated features	Direct, Negative & Permanent	Full archaeological excavation
AA7	Levelled *fulacht fia*	Direct, Negative & Permanent	Full archaeological excavation
AA8	Levelled *fulacht fia*	Direct, Negative & Permanent	Full archaeological excavation
AA9a	DU012-084; Circular hut	No predicted impact	Preservation-in-situ
AA9b	DU012-085; Ringditch	No predicted impact	Preservation-in-situ
AA9c	Circular hut	Direct, Negative & Permanent	Full archaeological excavation
AA9d	Burnt Spread	Direct, Negative & Permanent	Full archaeological excavation

Table 4: Proposed Mitigation

6. RECOMMENDATIONS

6.1 Recommendation 1

It is recommended that the RMP sites located within the scheme (DU012-084, DU012-085 & DU012-088) are preserved in situ under green space. The current proposal (Figure 22) allows for a minimum 10m buffer zone from the edge of known archaeology. Conservation and Management Plans for these areas have been prepared and are detailed below in Appendix 3-4.

6.2 Recommendation 2

It is recommended that the identified archaeological sites located outside the green space areas are subject to full archaeological excavation in advance of any development works. The proposed excavation cuttings are located on Figure 22 and detailed below.

Site	Centre point of proposed excavation cutting	Area
Archaeological Area 2	723582, 750191	100 sq m
Archaeological Area 3	723470, 750316	225 sq m
Archaeological Area 4	723446, 750216	100 sq m
Archaeological Area 5	723705, 750531	225 sq m
Archaeological Area 6	723696, 750367	4600 sq m
Archaeological Area 7	773626,750326	225 sq m
Archaeological Area 8	723918,750559	400 sq m
Archaeological Area 9	723691,749936	1675 sq m

Table 4: Proposed Excavation Areas

6.3 Recommendation 3

It is recommended that should development proceed, groundworks across the remainder of the wider development site be monitored by a suitably qualified archaeologist.

The conclusions and recommendations expressed in this report are subject to the approval of The Department of Housing, Local Government and Heritage (DHLGH) and the relevant local authorities. As the statutory body responsible for the protection of Ireland's archaeological and cultural heritage resource, the DHLGH may issue alternative or additional recommendations.

7. REFERENCES

7.1 Bibliography

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13 September 2021

APPENDIX 1: RECORD OF MONUMENTS AND PLACES

SMR No	Class	Townland	ITM	Distance to site
DU012-005001-	Church	DONABATE	722482, 749979	1000m W
St Patrick's Church of Ireland church (1758) occupies the site of the medieval parish Church of Donabate. A reference from 1275 says there was a monastery of Grey Friars there (Walsh 1888, 196). The Civil Survey (1654-6) mentions the walls of a parish church (Simington 1945, 49). In 1838 there were still some remains of the earlier church to be seen alongside the present building (D'Alton 1838, 324-7). The 18th century church porch incorporates a medieval doorway (c.15th century) with a pointed arch of chamfered limestone and a plain stop.				
DU012-005002-	Castle - tower house	DONABATE	722497, 749981	1000m W
There is a residential tower attached to the east end of St Patrick's C of I Church. It rises to three storeys with a stepped battlemented parapet level (ext dims. L 6.10, Wth 5.4). The cap house, which projects above the battlement level, contains the stairs. There is a carved head projecting from the exterior of the east wall at second floor level. The residential tower is entered through a pointed arched doorway with chamfered jambs which is located in the N. This shows signs of damage and repair. A wooden studded door is still in situ. The first floor chamber contains a wall press and a plain fireplace, the flue for which is carried on corbels in the N wall. Interior is lit by rectangular windows with chamfered granite jambs. Stairs to second floor are damaged. This chamber is lit by plain single slit opes (Healy 1975, 25).				
DU012-005003-	Graveyard	DONABATE	722490, 749966	1000m W
Situated on high ground sloping down to north. The village green is to the south. This is a roughly square (Dim. c 40m) walled graveyard containing 18th-19th century memorials orientated E-W which are around all sides of the church (DU012-005001-) and residential tower (DU012-005002-). It is raised (1-1.5m) above the external ground level. part of the eastern graveyard wall has collapsed into back gardens of relatively new houses whose construction involved cut away of external ground level.				
DU012-005004-	Wall monument (present location)	DONABATE	722482, 749975	1000m W
There are 18th-century and earlier graveslabs in the porch of St Patrick's church of Ireland including one dedicated to John Fitzsimon (d. 1709) and a monument to Patrick Barnewall of Staffordstown and his wife Begnot de La Hoyde who died in 1592. The later contains an inscription and two coats of arms (Healy 1975, 25).				
DU012-019----	Earthwork	CORBALLIS (Nethercross By.)	723050, 749124	1000m SW
The OS 1837 and 1937 map editions show 'site of moat' on a break in slope overlooking Malahide estuary. There are no visible surface traces.				
DU012-020----	House - 16th/17th century	CORBALLIS (Nethercross By.)	723406, 748700	1000m SW
Located on the north shore of Malahide estuary. This two-storey building, rectangular in plan, incorporates a sequence of building phases some of which may date from the 17th century. A dwelling is marked on the Down Survey (1655-6) map at this location. The Civil survey (1654-6) mentions a 'slated house' at Corballis (Simington 1945, 50). There is an irregular pattern of windows in the building. According to the owner an ornamented window was discovered in the W end of the N wall during re-furbishments to the house but is plastered over. Stone mullions were also unearthed in the grounds (Moylan 1961, 23-24). In one of the out-offices running S of the house there is the remains of a stairwell.				
DU012-041----	House - 16th/17th century	BALCARRICK	724837, 749709	1000m SE
The Down Survey (1655-6) map shows a dwelling at Balcarrick. The remains of this are possibly incorporated into the present early 18th century house known as Balcarrick House which is situated along the coast S of Portraine. This is a two-storey oblong block with hipped roof, which is slated. According to the 1976 report the ground floor windows contained glazing bars. house has since been refurbished and windows replaced.				

SMR No	Class	Townland	ITM	Distance to site
DU012-066----	Habitation site	BEAVERSTOWN	722599, 750048	900m W
An archaeological assessment in 2002 revealed prehistoric features. They comprised two distinct clusters of seventeen pits and post-holes forming a semi-circular arrangement spread over an area 8m N-S by 5m. Finds include sherds of early Neolithic pottery and some flint (Hagen, I, 2006, 117).				
DU012-067----	Enclosure	BEAVERSTOWN	722599, 750048	900m W
An archaeological assessment in 2002 revealed a section of curvilinear ditch (L 15m, Wth 1.3m, D0.5-0.7m which produced Beaker pottery. Three features were revealed within the confines of the enclosure including a pit 0.4m in diameter and 0.2m deep which contained a small amount of burnt bone (Hagen, I 2006, 117).				
DU012-082001-	Excavation - miscellaneous	DONABATE	722490, 750031	900m W
This monument was excavated (Licence no. 08E0155) in advance of road widening. Three phases of archaeological activity were identified, the earliest of which was a wide linear ditch (exposed for 99m E-W) that ran along the base of the hill where Donabate church (DU012-005001-) and tower house (DU012-005002-) are located. Radiocarbon analysis of a sample of animal bone from the ditch fill returned an early medieval date (661-778 cal. AD). The second phase consisted of structures (DU012-082002-), drainage ditches and pits dated to the 13th – 14th centuries. An E-W ditch cut into the early medieval ditch and returned a later medieval date from an animal bone sample (1429-1473 cal. AD). The final phase consisted of a post-medieval circular building with a substantial stone footing (interpreted as a possible dovecote), ditches and a metalled path (Kavanagh 2011, 32).				
DU012-082002-	Structure	DONABATE	722487, 750034	900m W
This monument was excavated (Licence no. 08E0155) in advance of road widening. Uncovered at the base of a hill where Donabate church (DU012-005001-) and tower house (DU012-005002-) are located, this was one of two adjacent structures situated on the edge of an early medieval ditch (DU012-082001-). Defined by an L-shaped dry-stone wall (5m E-W) the structure was associated with N – S drainage ditches from which a significant quantity of 12th – 14th century pottery was recovered (Kavanagh 2011, 13).				
DU012-082003-	Structure	DONABATE	722487, 722487	900m W
This monument was excavated (Licence no. 08E0155) in advance of road widening. Uncovered at the base of a hill where Donabate church (DU012-005001-) and tower house (DU012-005002-) are located, this was one of two adjacent structures situated on the edge of an early medieval ditch (DU012-082001-). Defined by a rubble-wall collapse, a flagstone floor and the remains of a dry-stone wall (3m E-W) the structure was located immediately E of the second structure (DU012-082002-). Associated with N – S drainage ditches from which a significant quantity of 12th-14th century pottery was recovered (Kavanagh 2011, 14).				
DU012-082004-	Structure	DONABATE	722484, 750033	900m W
This monument was excavated (Licence no. 08E0155) in advance of road widening. Uncovered at the base of a hill where Donabate church (DU012-005001-) and tower house (DU012-005002-) are located, this structure overlay the backfilled early medieval ditch (DU012-082001-). Defined by an L-shaped dry-stone wall (4.7m E-W x 2.7m N-S) the structure was associated medieval activity including a large sub-rectangular rubbish pit (2m diam.) from which 12th – mid-14th century and a silver farthing from the reign of Edward III (AD 1335-43) were recovered. (Kavanagh 2011, 14)				
DU012-083----	Excavation - miscellaneous	BEAVERSTOWN	722673, 750145	800m W
This monument was excavated (Licence no. 04E0185) in advance of development. Characterised by a series of pits from which medieval pottery was recovered, the site was truncated by post-medieval activity including a curvilinear ditch from which a sherd of 17th century Frechen ware was recovered (Lohan 2002, 19).				
DU012-084----	Ring-ditch	BALLYMASTONE	723679, 749981	Within the site
This monument was subject to geophysical survey (Licence no. 05R012) and test excavation (Licence no. 06E0027) to inform the Donabate Local Area Plan. A circular ditch (5.45m diam.) and possible post or pit were identified. Although no diagnostic material was recovered, it was interpreted on the basis of morphology as a probable prehistoric hut (Baker 2006, 17).				

SMR No	Class	Townland	ITM	Distance to site
DU012-085----	Ring-ditch	BALLYMASTONE	723695, 749978	Within the site
This monument was subject to geophysical survey (Licence no. 05R012) and test excavation (Licence no. 07E0650) to inform the Donabate Local Area Plan. A possible ring ditch (8m diam.) was identified. (Frazer 2007).				
DU012-086----	Burnt mound	CORBALLIS (Nethercross By.)	723496, 749419	600m S
This monument was subject to geophysical survey (Licence no. 05R012) and test excavation (Licence no. 06E0027) to inform the Donabate Local Area Plan. A spread of burnt mound material (4m diam.) was identified (Baker 2006, 10).				
DU012-087----	Burnt mound	CORBALLIS (Nethercross By.)	723385, 749419	600m SW
This monument was subject to geophysical survey (Licence no. 05R012) and test excavation (Licence no. 06E0027) to inform the Donabate Local Area Plan. A spread of burnt mound material (7.5m diam.) was identified associated with a shallow ditch and circular pit (0.62m diam.) (Baker 2006, 12).				
DU012-088----	Enclosure	BALLYMASTONE	723504, 749918	Within the site
This monument was subject to geophysical survey (Licence no. 05R012) and test excavation (Licence no. 07E0650) to inform the Donabate Local Area Plan. A ditched (1m wide) circular enclosure (50m diam.) was identified. (Frazer 2007).				
DU012-095001-	Habitation site	PORTRAINE DEMESNE	724800, 750001	1000m E
This monument was subject to geophysical survey (Licence no. 08R029) and test excavation (Licence no. 10E0121) in advance of the Portrane, Donabate and Lusk Wastewater Treatment scheme. A settlement site extending over an area c. 65m E-W x 90m was identified and preserved in situ. It consists of a possible Bronze Age round house (DU012-095002-), pits, and enclosure ditch. Features to the N are likely to date to the Iron Age or later (McQuade 2011, 37).				
DU012-095002-	House - Bronze Age	PORTRAINE DEMESNE	724798, 749996	1000m E
This monument was subject to geophysical survey (Licence no. 08R029) and test excavation (Licence no. 10E0121) in advance of the Portrane, Donabate and Lusk Wastewater Treatment scheme. A circular structure (6m diam.) was identified represented by a curvilinear slot trench and external postholes (average 0.18m diam.) located at irregular intervals. Located within an area of possible multi-period habitation (DU012-095001-) the structure is associated with an enclosure and a series of pits indicative of domestic occupation (McQuade 2011, 31).				
DU012-095003-	Pit	PORTRAINE DEMESNE	724810, 750020	1000m E
This monument was subject to geophysical survey (Licence no. 08R029) and test excavation (Licence no. 10E0121) in advance of the Portrane, Donabate and Lusk Wastewater Treatment scheme. Located 20m N of prehistoric habitation (DU012-095001-) this monument consisted of domestic settlement characterised by a series of pits. Radiocarbon analysis from one of the pits returned a Neolithic date (2908-2638 BC cal.) (McQuade 2011, 22).				
DU012-097----	Ring-ditch	CORBALLIS (Nethercross By.)	723499, 749530	500m S
Situated in tillage on the edge of the broad crest of a ridge, with extensive views in all directions. The sea is in view to the E and the Broadmeadow River estuary lies to the S. First identified in a geophysical survey in 2005 along with a burnt mound (DU012-086----) at the base of the slope to the S in the same field. Another burnt mound (DU012-087----) was identified in that geophysical survey in the adjoining field to the SW (Baker, 2006a; Frazer 2007a). Test excavations were carried out at the site in in 2006 (Licence No. O6E0027) and the ring-ditch was fully excavated in 2017 in advance of the construction of the Donabate Distributor Road by Liam Coen working with Archer Heritage Planning (Licence No. 17E0407). The site consists of a circular area (diam c. 16m) defined by an enclosing fosse which was recut. The first phase of activity consisted of the excavation of a ring-				

SMR No	Class	Townland	ITM	Distance to site
ditch defined by a broad, fairly deep v-shaped fosse. The fill of this was largely undifferentiated, comprising of a sterile fill which gave the appearance of having been backfilled very quickly after having been dug – there was no silting at the base. The upper ring-ditch which was recut into the earlier fosse was a shallow u-shaped fosse, filled with a darker, charcoal-rich fill with an entrance to the E. This was defined by two rounded terminals with a single central post pit at the centre. No features were recorded in the interior. A stone bead with a central waist somewhat reminiscent of a dumbbell bead, some lithics and burnt bone were recovered from the upper ditch fill.				

APPENDIX 2: PREVIOUS ARCHAEOLOGICAL EXCAVATIONS

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
02E1872	723024, 750778	Beaverstown Road, Donabate, Dublin	2004:0499	E. Stafford
Monitoring of construction-related groundworks was undertaken immediately to the south of Beaverstown House in early 2004. Ground levels throughout the majority of the development site had been raised in the past and, as the construction of housing on the site utilised a series of raft foundations, natural soil levels were not encountered across much of the site. Nothing of archaeological significance was uncovered on the site.				
02E1708 ext.	722621, 750211	Beaverstown, Donabate, Dublin	2004:0500	T. Bolger
Monitoring was carried out at a development at Beaverstown, Co. Dublin. This continued from the programme of monitoring carried out at the site in 2003 (see Excavations 2003, No. 483) and 2004 by Ines Hagan. Monitoring was undertaken of topsoil-stripping in advance of construction of a surface carpark in the north-west corner of the development. No archaeological material was identified.				
04E0185	722595, 750033	Beaverstown, Donabate, Dublin	2004:0501	K. Lohan
Previous monitoring on this site had uncovered a prehistoric site which was excavated by Ines Hagen (Excavations 2003, No. 484, 03E1634). The development site is beside Donabate train station and is comprised of an area proposed for residential use measuring 3.52ha, as well as three small land parcels proposed for future development. The site is bound to the south by Turvey Avenue, to the west by individual properties and a housing estate, to the north by a further housing estate and to the east by the railway line and adjacent carpark. Site access is from Turvey Avenue and a new access is proposed to Donabate train station. The relationship between the eight features on the site is difficult to establish, given the lack of stratigraphical relationship between them and the paucity of finds. However, a number of conclusions can be drawn from the form and content of the features present on the site. The pottery recovered shows both medieval and post-medieval activity on the site. The majority of the medieval pottery came from features F17 and F21. F17, an irregular pit that contained what appear to be puddling deposits, contained five sherds. No other finds were recovered from this pit. F21 was a linear cut. Seven sherds of medieval pottery were recovered from its fill. This feature may have been a small drainage ditch or field boundary. There is some evidence at its eastern end that it has been severely truncated by ploughing activity and that it was originally much deeper. The presence of medieval pottery in the ploughsoil also indicates that features have been truncated by ploughing. There are no features associated with F21 that might indicate that it was part of a field system or complex. The pottery recovered from these features shows a certain amount of wear. The shards are in general very small, and the edges along the breaks are rounded. This would suggest that these features were not the primary deposition location of these fragments. However, the lack of any later pottery or other datable material would indicate that these features are medieval in date. The second group of definitely datable features are two burnt features on the southern edge of the site, F2 and F3. F2, a nearly perfectly circular hearth, contained no pottery but did contain brick, as did F3, a burnt spread. The bricks contained within these features point to a definite post-medieval date for them. The curvilinear feature F9 was also post-medieval in date. The fill of this feature contained a sherd of Frechen stoneware dating to the 17th century, as well as a portion of triangular-bladed iron knife. The final grouping of features are the pits which contain large amounts of shell: F4, F6, F7 and F13. These pits were quite large, ranging from 1.05m to 4.2m in diameter and 0.5-0.3m in depth. The fill of the pits was rich in both seashell and land snail. The fills of F4 and F6 consisted almost exclusively of cockleshell. This would suggest that these pits were dug to dispose of the shells after the harvesting of cockles for domestic use. The fills of F7 and F13 were rich in shell of a variety of species. The fill of these pits seems to have been deposited naturally, with no deliberate infilling of domestic or industrial debris. None of these features contained any datable material.				
93E0179	720219, 750990	Turvey House, Turvey, Dublin	1993:103	D. Murtagh

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
Archaeological monitoring of the removal of demolition rubble at Turvey House, Donabate, was conducted by the writer on behalf of Archaeological Development Services Ltd. for F.L.C. Ireland Ltd., from 26th October to 10th December 1993. The project revealed the upstanding remains of three phases of castle/house construction at the site:1. A 15th-century Tower House with angle-tower and barrel vault over ground floor.2. A late 16th-century house.3. An early 18th-century Georgian mansion. The garden level of Turvey House had withstood the demolition and preserved the outline of the building before its destruction. The upstanding walls averaged 2.2m in height. *Phase 1* This was the construction of a rectangular tower house, 11.5m (east-west) x 8m (north-south), with an angle tower at its north-west corner. There was a barrel vault over the ground floor, now collapsed due to the demolition process. Sections of the vault which remain in situ provide evidence of wickerwork centering. The thickness of the walls average 1.1m. Original features include a double garderobe chute, located in the north wall of the angle tower, and a splayed window embrasure. *Phase 2* The tower house was extended to the south by the addition of an L-shaped building. The walls of this structure average 1m in width. Fragments of four original windows remain in situ, one of which is the sill for a three-light window. A doorway and fireplace, both contemporary with the construction of the building, were also revealed. However, these were not in situ. *Phase 3* A further extension provided a new south-facing facade, which survived until the demolition of Turvey House in 1987. This new building incorporated the two earlier phases and construction included the blocking up of original windows as the symmetry of the early Georgian mansion was imposed on the remodelled structure. The ground at the front of the house was raised and a new doorway was inserted at the former location of the three-light window. Clearance of rubble at the front of the house revealed fragments of the original 18th-century doorway, which was still intact prior to demolition. The pilasters, ionic capitals, segmented pediment and a section of the decorated tympanum were recovered. Future work at Turvey is envisaged, dependent on the recommendations of planning permission.				
06E0027 ext.	723755, 750199	Ballalease North/Ballymastone/Portraine Ballisk, Dublin	2007:426	W. O. Frazer
Testing was undertaken across the Ballymastone lands as part of the Donabate Local Area Action Plan in December 2007. Some 0.2ha of test-trenches were opened across (mostly boggy) greenfields, partly on the basis of geophysical survey (D. Harrison, 07R0177) and previous test excavation by Christine Baker (Excavations 2006, No. 562). Four 'archaeological areas' were identified, all quite truncated and positioned on higher ground. They are all likely to date from the prehistoric or early medieval eras (some areas appear to be multi-phased). The four areas include: a burnt mound/fulacht fiadh and associated ditches (0.45–0.8m and 0.6m wide); a ditch (possibly forming a circular enclosure as much as 50m in diameter; 1m wide) and a large (4.1m by 1.3m) pit filled with midden-type material; a circular ditch enclosure (28m diameter, 0.3–0.9m-wide ditch) with a nearby pit; a circular ditch enclosure/ring-ditch (12m diameter, 0.6–1.15m-wide ditch), a possible round house/small ring-ditch (8m diameter, 0.6m-wide ditch) and a burnt spread/fulacht fiadh near to where another 8m 'hut circle' had previously been identified (Baker, ibid.). None of the circular enclosures had geophysical scans typical of ring-ditch sites, so any such classification is tentative. Several lithics were also recovered from topsoil and from the archaeology areas. The 28m ditch yielded several minute fragments of unidentified hand-made pottery. The 12m ditch yielded a single sherd of possible Leinster cooking ware. A boundary survey of an irregular, kinked field boundary was also undertaken, but yielded no remarkable observations.				
07E0185	722749, 749961	Donabate, Dublin	2007:459	D. Delany
Pre-development testing was carried out in advance of the Portrane–Donabate broadband project in March 2007. The excavation phase of the project involved the opening of a series of trenches throughout the town centre and its hinterland. All of the trenches were located along roads, either in the carriageway proper or the adjoining verge or footpath. There were no river crossings other than at existing bridges. The trenches were 0.6m wide and excavated to a standard depth of 0.9m in carriageways and 0.6m in verges/footpaths. Junction boxes (1.25m2) were excavated where two or more trenches intersected, and at regular intervals along long straight sections. All works within the areas of constraint around recorded monuments were monitored on a full-				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
time basis. The remainder of the works were subject to intermittent monitoring. Testing was carried out in the vicinity of an ecclesiastical site at Donabate. The monument consists of a mid-18th-century Anglican church built on the site of a medieval church and incorporating a medieval doorway. There is a medieval tower attached to the east end of the church. Three trenches were opened along a section of road some 50m to the north of the church. A rough, cobbled surface was uncovered in one of the trenches. Upon removal, it was found to overlay an old box drain built of flat and upright slabs. No archaeological features, finds or deposits were discovered during testing or subsequent monitoring.				
08E0155	722525, 751523	Turvey Avenue, Donabate, Dublin	2008:390	H. Kavanagh
The excavation took place from 27 June to 8 August 2008 prior to the widening of an existing segment of the road at Turvey Avenue, Donabate. The site was located within the Newbridge Demesne and was positioned within the zone of archaeological potential of an ecclesiastical complex (DU012–005) containing a church, a tower-house, a graveyard and a memorial slab. The church, St Patrick's Anglican Church, was constructed in 1758 by Archbishop Cobbe of the nearby Newbridge House on the site of a medieval parish church. No visible remains of the earlier church survive, although a tower-house possibly dating to the 15th century is attached to the eastern end of the surviving 18th-century church building. Phase 1: early medieval activity A wide linear ditch ran east–west down the entire length of the site and was 99m long, 4.5m wide and was on average 1.55m deep but extended east and west beyond the limit of the excavation. It was not the earliest feature on-site as it cut an oblong-shaped pit which was filled with brownish/grey silty clay and contained a small quantity of charcoal, animal bone and shell. The ditch was filled with several layers of silts, sands and clays which contained only a moderate quantity of animal and charcoal flecking. Post-excavation analysis of the animal bone and the soil samples taken should reveal whether this ditch was in fact early medieval in date. Other possible early medieval features included a possible ditch or pit, the majority of which extended beyond the limit of excavation. This ditch or pit terminated close to the southern edge of the main ditch and was cut by a small medieval corn-drying kiln. A small quantity of animal bone was recovered from the primary fill of this feature. Phase 2: medieval activity The remains of a large east–west-orientated rectangular structure were uncovered in the centre of the site. It measured 9m east–west by 7.5m but extended south beyond the limit of the excavation. The existing external drystone walls only survived to a height of 0.32m (2 courses) and were severely truncated at the northern and eastern ends. The remains of a possible internal partition were located at the western end of the structure but the walls were truncated by a number of slightly later medieval features including a small corn-drying kiln. A small flat stone surface was located within the structure at the western end and probably represented the remains of an internal stone floor. Several sherds of late 12th- to mid-14th-century pottery were retrieved from among the stones of the external walls. A number of north–south-orientated ditches ran downslope across the centre of the site. They probably represented the remains of medieval drainage ditches which carried floodwater away from the surrounding area and particularly from the medieval ecclesiastical complex which would have been located on the site of the existing ecclesiastical complex at the top of a hill to the south-east. These ditches truncated the large early medieval ditch which ran east–west across the site. A significant quantity of late 12th- to mid-14th-century pottery was recovered from the fills of the ditches making them broadly contemporary with the rectangular structure. A large subrectangular-shaped rubbish pit located 2m north of the southern limit of excavation was 2.8m long, 2m wide and 1.56m deep. One of the fills, which consisted of dark-brown silty clay, contained a small silver coin/token, iron nails, animal bone and a large quantity of late 12th- to mid-14th-century pottery. A second large irregular-shaped pit was cut by one of the medieval drainage ditches and was 2m long, 1.5m wide and was 0.9m deep. The basal fill contained a small quantity of animal bone and several sherds of late 12th- to mid-14th-century pottery. Both pits appear to be broadly contemporary with the rectangular structure to the west. Phase 3: post-medieval activity The substantial stone footing of a round building, possibly a windmill or a storage building, was located 8.6m west of the medieval rectangular structure. The southern half of the structure extended beyond the southern limit of the excavation but it was possible to establish that the internal area was 4m in diameter. Several sherds of post-				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
medieval pottery were recovered from the foundation cut of the structure. The wall truncated a cobbled surface which may have been the remains of a yard associated with the nearby medieval structure but was cut by an oval pit which was slightly later in date. All these features cut an early medieval linear feature. The remaining post-medieval activity consisted of a series of drainage ditches, pits and gullies which truncated the medieval and early medieval activity in the centre of the site. Three north–south-orientated drainage ditches which ran downslope across the width of the site truncated the east–west-orientated medieval and early medieval ditches. The fills of the post-medieval ditches contained a large quantity of post-medieval and modern finds. A gully which was orientated east–west truncated the upper fill of the large early medieval ditch but was cut by an oval-shaped pit and a second drainage gully. Both gullies were probably associated with the post-medieval drainage activity on the site. The oval pit contained several sherds of 17th-century North Devon gravel-free ware and a small quantity of animal bone; it probably functioned as a rubbish pit. It is probable, given the apparent continuous occupation of the site, that the location of the current ecclesiastical complex was of some importance in the landscape. It has already been established that this site was the location of a medieval parish church which may in turn have been constructed on the site of an earlier medieval ecclesiastical complex. The large ditch may have represented the remains of a defensive ditch which enclosed the complex. A large number of ecclesiastical sites were enclosed during the early medieval period in order to provide extra security as well as defining sacred space from the secular community.				
09E0155	721075, 750555	Turvey Avenue, Donabate, Dublin	2009:305	D. Sweetman
Test-trenching for a new house produced nothing of archaeological interest.				
11E0333	723498, 751070	Beaverstown and Rahillion, Dublin	2011:180	D. Bayley
Testing was undertaken within the site of a proposed residential development at Beaverstown and Rahillion, Donabate, Co. Dublin. Geophysical survey identified two areas of archaeological potential within the area of proposed development, representing possible spreads of burnt material (Licence Ref.: 07R0257). Consultation with the NMS of the DoAHG resulted in the recommendation that test excavation was required to assess the archaeological potential of the site. Testing was carried out within the area of proposed development in order to investigate the archaeological potential of geophysical anomalies and the potential for remains of a ringfort, as indicated in the townland name Rahillion. Twelve test trenches were excavated across the area of proposed development. Nothing of archaeological significance was identified during testing. All of the geophysical anomalies were interpreted as natural variations in subsoil.				
12E253	722440, 749860	Newbridge Avenue, Donabate, Dublin	2012:196	A. O'Connell
An Archaeological Assessment was undertaken in July and August 2012 in response to a request for Additional Information. A geophysical survey (12R096) of the development site recorded various magnetic responses of unclear interpretation. Five test trenches (300 linear metres) were subsequently excavated across the site. No archaeological material was present in these trenches.				
14E0419	722000, 750535	Beaverstown, Dublin	2014:493	D. Delany
Testing was carried out on a proposed residential development site at Turvey Avenue, Donabate, Co. Dublin on 3 November 2014. The testing was in response to recommendations contained in a geophysical report (McCarthy, 2014). Two test trenches (L 30m) were targeted on curvilinear anomalies identified by geophysics. The source of the anomalies was not established but it is possible, as had been suggested in the geophysics report, that the anomalies may relate to recent agricultural activity as evidenced by deep wheel ruts and cultivation ridge and furrow visible on the field surface. A geological source is also possible and the anomalies may relate to bands of rock outcrop uncovered during testing. Monitoring of topsoil strip for Phase 1 of the proposed development was carried out on 25 November 2014. Grey/brown sandy silt topsoil (Depth 0.25m) overlay yellow/brown silty sand subsoil. The soil was quite sterile and the only finds were a couple of modern				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
pottery sherds. Some flint nodules were found but no flakes or worked pieces were present. All future phases of topsoil strip at the site shall be subject to monitoring.				
16E0188	721573, 750082	Newbridge Demesne, Donabate, Dublin	2016:447	D. Murphy
Monitoring at Newbridge House was undertaken from June 13, 2016, to January 2017 within the main courtyard, which was resurfaced, in the south range building which was refurbished, in the area west of the main house and in the southern part of the walled garden. The excavation of trenches for services including surface water and foul drainage, water, CCTV, electrics and communication was also monitored. The drainage system associated with the house and modern disturbance was noted in some of the excavated trenches. Elsewhere it was noted that garden soils overlay the natural subsoil at a depth of 0.3-0.4m. No features of an archaeological nature were identified and with the exception of a farthing (16E0188:002:1) dating to the reign of George II all finds were modern in nature. Archaeological works are now complete at this site.				
17E0239	722405, 750026	St. Patrick's, Donabate, Dublin	2017:500	R. Lynch & J. Whitaker
Testing was undertaken in lands at Turvey Avenue, Donabate, Co Dublin prior to a planning application. It follows a previous impact assessment report carried out by Faith Bailey and Brenda Fuller of IAC Ltd in April 2017 and a geophysical survey carried out by Joanna Leigh on behalf of IAC Ltd. The proposed development area is an irregular green field site. The eastern portion of the site is within the zone of archaeological potential associated with St Patrick's Church, tower house, graveyard and wall monuments (DU012-005001-4). Further sites proposed for inclusion into the record of monuments are located to the immediate north of the proposed development area. These consist of early medieval and medieval remains identified during an excavation in advance of the widening of a section of Turvey Avenue (licence 08E0155). Features associated with the medieval remains extend into the proposed development area. The testing results have shown that there is considerable multi-phased archaeological activity within the central and eastern part of this site. This is in the form of four substantial ditches, up to 12 smaller ditches, several small linear features (gullies, furrows and drains), two pits, a metalled surface, two spreads and a human skeleton. The majority of the features identified in the geophysical survey were confirmed to be archaeological with the exception of the isolated anomalies in the west of the field. While dateable artefacts were not plentiful, those retrieved during the testing indicate that the features range in date from at least the early medieval to post-medieval periods. Proposed development plans are yet to be finalised, however any development in the central and eastern potions of the site will have an adverse impact on the recorded archaeology on the site. Any proposed development in the west of the site may have localised impacts as archaeological features are more dispersed in this part of the site.				
17E0095	723278, 751075	Beaverstown Road, Donabate, Dublin	2017:608	A. O'Connell
An assessment was carried out at the site of a proposed development at lands in Beaverstown, Donabate, Co. Dublin. The site covers an approximate area of 1.067 hectares and is surrounded by agricultural and residential areas north of Donabate. A total of 4 trenches (570 linear metres) were mechanically excavated across the site. No archaeological material was recorded in any of the trenches.				
17E0094	723367, 749270	Donabate Distributor Road, Dublin	2017:619	A. O'Connell
Stage (i) Test Excavations undertaken in advance of the proposed Donabate Distributor Road Project. Testing was undertaken across Greenfield locations in March and April 2017. A total of 136 machine-assisted test-trenches were excavated within the site, amounting to 8912 linear metres (16041.6 sq. m) of test trenches comprising 6.24% of the land made available for the scheme. Three archaeological sites were identified in the course of this assessment. o Corbalis 1 is a 12m wide ringditch recorded at ITM 723506, 749519 by test trenching o Corbalis 2 is a fulacht fiadh recorded at ITM 723496, 749419 in a previous phase of testing o Corbalis 3 is a fulacht fiadh recorded at ITM 723054, 749303 by test trenching				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
The sites were subsequently excavated under separate licenses.				
17E0309	722515, 749565	Corballis, Donabate, Dublin	2017:642	A. O'Connell
An archaeological assessment was carried out at a site of a proposed residential development off the Hearse Road at Corballis, Donabate, Co. Dublin. The overall development covers an approximate area of 7.5ha and is currently set out as four small field under rough grazing and two large fields under tillage. Twenty-three test trenches totalling 2663 linear metres were excavated within the site. No archaeological material was recorded in the excavated test trenches. However, previous archaeological assessments have been undertaken within the site. These comprised geophysical survey (05R0124) followed by targeted test excavation (07E0650) and identified a burnt spread/fulacht fiadh within the site at ITM 722622, 749557. The current phase of test trenching which was carried out across the remainder of the site identified no new sites of archaeological potential.				
17E0608	723041, 749484	Corballis, Donabate, Dublin	2017:646	A. O'Connell
The site of the proposed residential development is located to the south-east of Donabate town centre occupying a large quadrant of land between the New Road, the Corballis Road and the Dublin Belfast Railway Line. The overall development covers an approximate area of c.29.5ha and is currently set out as six medium to large sized fields under tillage. The site contains no RMP sites, although recently discovered excavation sites are located in the wider area. Previous assessments (test trenching and geophysical survey; see 06E0027) undertaken across the site have identified a substantial earth-cut enclosure of probable early medieval date (Corballis 6). Thirty-eight test trenches totalling 10,455 linear meters were excavated within the site. Two archaeological sites were identified in the current assessment, both of which were subsequently excavated under separate licences. These are: Corballis 8 (Fulacht fiadh; 18E0106) Corballis 9 (Fulacht fia; 18E0107).				
17E0630	722825, 749091	Corballis, Donabate, Dublin	2017:649	A. O'Connell
The site is intended for a nature park incorporating Sustainable Drainage Systems intended to serve future housing developments at the north of the proposed Donabate Distributor Road. It covers an area of c.13.6ha and is currently set out as a large sized field under tillage. A single RMP site (DU012-019) is located just beyond the eastern site boundary. Following geophysical survey, thirty-five test trenches totalling 2,905 linear metres were excavated. Four archaeological sites were recorded in testing and were subsequently excavated under separate licences. Corballis 10; Dispersed pits at ITM 722897, 749235; 18E0108 Corballis 11; Fulacht fiadh at ITM 722744, 749031; 18E0110 Corballis 12; Fulacht fia at ITM 722703, 749149; 18E0111 Corballis 13; Dispersed pits at ITM 722670, 749206; 18E0112				
18E0208	722945, 749135	Corballis, Dublin	2018:595	A. O'Connell
Further pre-development testing was carried out on the site of a proposed SUDS area for future housing development at Corballis, Donabate, Co. Dublin. The remainder of the site was previously tested under licence 17E0630. Thirteen test-trenches were excavated to investigate the general potential of the site as well as a portion of the site adjacent to DU012-019 (Earthwork) that had undergone a geophysical survey (17R0170). A single area of archaeology was identified, a spread of burnt mound material/fulacht fiadh in Trench 7 measuring 11m north-east/south-west x 6m with a depth of 0.1m. The site has been preserved in situ.				
17E0407	723507, 749526	Corballis 1, Dublin	2017:662	L. Coen
The site was located on a south-east facing slope in an undulating landscape with panoramic views to the south,				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
east and west. The area of Donabate is located on a peninsula on the north Dublin coast with the sea on three sides. The coastline is c. 1.5km to the east while the tidal estuary is less than 1km to the south. The surrounding landscape comprises fields bounded by hedgerows. Most are under a variety of crops though with some pasture and small scale forestry. The ring-ditch, c. 10.5m in maximum external diameter, had a narrow undug entrance to the south-west and another possible entrance represented by a causeway, c. 0.25m below the top of the cut, in the eastern arc. The ditch measured 1.4-1.5m in width and 0.6-0.7m in depth. Scattered burnt and unburnt human and animal bone fragments throughout the charcoal-stained upper fills of the ring-ditch represent token burials. Two burnt bone beads, a small glass bead and several small fragmentary copper-alloy pieces were also retrieved and appear to represent the remains of personal adornments deposited with the cremation material. No other archaeological features were identified in or around the ring-ditch. A piece of ash (fraxinus) charcoal from one of the lower deposits, C20, returned a date of 20-210 cal AD (95% 2δ). The upper ditch deposits, C04, 07 & 09, were primarily dark sandy silts with frequent charcoal and occasional burnt bone inclusions and filled a series of recuts made in the earlier ditch fills. This shows multi-phase use of the monument. The deposits comprising the earlier fills, C11 & 12, were similar to the surrounding natural subsoil and may represent a bank or mound from the original construction of the ring-ditch that had been deliberately back-filled in a single event. The fill C.20 appeared as a thin lens, maximum 0.06m in depth, within C12 in the western arc of the ring-ditch.				
E1058	723491, 747478	Corballis, Co. Dublin, Dublin	n/a	P. J. Hartnett

Introduction

In June 1950 a human skull was found by a lorry driver while filling sand at a quarry near Malahide, Co. Dublin. The driver removed the skull but left the remainder of the burial in situ. The site was reported to the NMI three months after its initial discovery by Miss Gwendoline Stackpole on behalf of Dr G.F. Mitchell of Trinity College Dublin. According to this report, further bones were still visible in the section of the sandpit, about 0.61m below ground level. The site was visited on 29 August 1950 by P.J. Hartnett, who excavated the remainder of the burial that day. An area measuring 1.83m by 0.91m above the bones was opened for excavation. This revealed an extended inhumation burial with some irregular stones covering the body. This report is based on Hartnett's drawings and report.

Location (Fig. 6.9)

The site was in the townland of Corballis in east County Dublin.[14] It lay on the western side of Malahide Island, a sand bar between 0m and 15m above sea level, only 400m east of the coastline. At the time of excavation three sandpits were open along this stretch of coastline. On the first edition Ordnance Survey sheet for the area the site lies in one of only four fields marked on the sand bar. No other burials are known from this townland.

Description of site

Owing to disturbance of the site, it was not possible to distinguish the outline of the grave-pit in section. The grave was aligned north-west/south-east and broken ends of the humeri were visible in the section at a depth of 0.61m below ground level. Hartnett's excavation of the area above the bones revealed the following stratigraphy. At the top of the section was a layer of fine sand (c. 1.8m thick), but this had been removed by the time of Hartnett's visit. Directly below this was a thick layer of stony gravel. In general this deposit was mixed sand and gravel, but within 0.3m of the body numerous heavy pebbles (some up to 0.15m in greatest dimension) were encountered.[15] The majority of these were water-rolled pebbles. Underneath this and resting directly on the body was a very dark deposit described by Hartnett as 'almost peaty' and interpreted by him as 'decayed turves with which the body had been covered'. No structural slabs were found at the sides of the body or underneath, and the plan of the burial pit was apparently not revealed. The only measurement obtained was the length of the body (without the skull) in position, which was 1.37m.

The grave contained one inhumation burial (P1950:34) accompanied by a roughly rounded limestone pebble (P1950:35), 25mm in diameter (Fig. 6.10). The articulated body was extended on its back in a north-west/south-east direction, with the head to the northwest. The left forearm lay across the chest with the hand resting on the right shoulder, and the right arm was fully extended at the side with the hand underneath the right hip. The feet were close together, but the smaller bones had almost completely disintegrated. Except for the long bones,

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
pelvic bones and some phalanges, the remainder of the bones (vertebrae, ribs, etc.) were in very poor condition. All the bones were blackened when removed from the sand. Underneath the skeleton was a thin layer of very fine white sand. Hartnett describes the bones as 'small'. A very brief report[16] on the teeth suggests that the individual was twelve to sixteen years old. Comment In the present state of knowledge this burial cannot be dated. The limestone pebble lay at body level beside the left thigh and may have had some special significance. Hartnett compared this pebble to a granite pebble that he found possibly accompanying a crouched inhumation at Hempstown Commons, Co. Kildare (Hartnett 1950, 197). 14. Parish of Donabate, barony of Nethercross. SMR DU012-070——. 323567 247455. 15. The horizontal extent of this spread of stones is not known, but it presumably extended over the burial. 16. The report is signed 'Dr Dockrell'. This is probably R.B. Dockrell of the Dublin Dental Hospital.				
n/a	721283, 750788	Turvey, Co. Dublin, Dublin	n/a	n/a
In October 1984 human remains were discovered on Turvey Estate, in the townland of Turvey, near Donabate, north Co. Dublin.[93] The site was reported to the NMI and an investigation was carried out by Michael Ryan. The human remains appear to have been discovered in a disused gravel quarry now partly converted to a cattle shelter. Very little bone was visible in the disturbed area at the time of investigation, and it was decided to postpone excavation until more substantial evidence came to light. 93. Parish of Donabate, barony of Nethercross. IGR 321358 250765. SMR DU008-083——. The site was just 1.6km south-west of the burial site at Balleally West, excavated by Ó Ríordáin and Rynne (this volume, pp 21–8).				
14E0419	722000, 750535	Beaverstown, Dublin	2017:718	D. Delany
Phased archaeological monitoring of topsoil removal was carried out at a large residential development site west of Donabate in March, April and December 2017. This work followed on from geophysical survey and pre-development testing at the site in 2014 and previous phases of archaeological monitoring in 2014 and 2015 (2014:493 & 2015:393). There are no recorded monuments on or within the immediate vicinity of the development site, the nearest being the medieval church and tower house at Donabate (DU012-005) c.500m to the south-east and the 18th/19th-century house at Newbridge Demesne (DU012-060) c.400m to the south-west. The stratigraphy was consistent across the stripped areas with 0.3-0.4m of grey/brown sandy/clayey silt topsoil over light orange/brown silty/clayey sand subsoil. The upper 0.1-0.2m of the subsoil was disturbed as a result of previous cultivation and, like the topsoil, contained occasional animal bone fragments and post-medieval/modern pottery sherds. Occasional stones of white and brown flint were found within the topsoil and subsoil across the site. A few flint flakes were found but none bore evidence of re-touching. No archaeology was found.				
19E0469	724837, 749730	Balcarrick, Donabate, Dublin	2019:437	I. Russell
The assessment was carried out on behalf of Robyn Church following a request for further information associated with a planning application from Fingal County Council (Planning Reference F19A/0173). The site of the proposed development is directly adjacent to DU012-041 (House – 16th/17th century), though the monument is not within the proposed development area. This structure (Balcarrick House) consists of an early 18th-century house with possible elements from an earlier building. Testing was carried out by Deirdre Murphy and Ian Russell on 8 August 2019. The assessment involved the excavation of five test trenches within the footprint of the proposed development. No features or deposits of an archaeological nature were identified, and no finds were recovered. It is therefore recommended that the proposed development be allowed to proceed as planned.				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
18E0414	722547, 749573	Donabate, Dublin	2018:732	F. Bailey
An archaeological excavation was carried out at Donabate, Co. Dublin in advance of a residential development. The excavation exposed a spread of burnt mound material and associated troughs and pits indicative of probable Bronze Age burnt mound or fulacht fiadh activity. Tentative evidence of an associated shelter or wind break structure was also recorded. Post-excavation analysis will aim to obtain a date for the activity, which is likely to represent transient settlement dating to the Bronze Age.				
19E0351	723313, 749851	New Road, Ballisk, Donabate, Dublin	2019:516	J. Hession
A total of 10 test trenches and 23 test pits were excavated across the proposed site. One archaeologically significant feature, a sub-circular pit measuring 0.87m in length by 0.83m in width and 0.1m in depth, was identified and resolved during the test trenching programme. No other features of significance were identified.				
19E0761	723424, 749432	Ballalease South and Corballis, Donabate East, Dublin	2020:101	M. Piera and M. Ni Cheallachain
Archaeological testing was undertaken at Donabate East, Co. Dublin as part of a predevelopment assessment. It follows a previous desktop assessment report (Waters 2019) and geophysical survey carried out across portions of the proposed development in 2005 as part of Donabate Local Area Plan (Licence 05R124). The proposed development area comprises six fields, divided by the Donabate Distributor Road, within the townlands of Ballalease South and Corballis. There is one recorded monument within the western half of the development, a burnt mound (DU012-087), with a further two monuments, a ring ditch (DU012-097) and a burnt mound (DU012-086), are located along the route of the Donabate Distributor Road. These were discovered during previous archaeological work within the site, with the ring-ditch (the very eastern extent of which extended into the proposed development area) and burnt mound being excavated prior to the construction. Seven discrete areas of archaeology were identified during the testing: – Archaeological Area 1: Rectangular enclosure and associated features – Archaeological Area 2: Pit associated with burnt mound activity – Archaeological Area 3: Pits and floor surface with associated post-holes – Archaeological Area 4: Pit and slot trench – Archaeological Area 5: Pit – Archaeological Area 6: Ditch – Archaeological Area 7: Pits A burnt mound (DU012-087) identified during a previous program of testing under licence 06E0027 (Bennett 2006:562, Baker 2009) is also located within the site boundary and is referred to as Archaeological Area 8. Reference: Baker, C. 2009 '562. Ballymastone and Corballis' in Bennett, I. *Excavations 2006*, Wordwell Limited, Dublin, p. 122.				
19E0618	722549, 750095	Braverstown, Donabate, Dublin	2019:648	A. O'Conner

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
Test excavations were undertaken in advance of a proposed residential development at Turvey Avenue, Donabate. A total of seven test-trenches (348 linear metres) were excavated across the site. No archaeological material was recorded.				
14E0419 ext.	722227, 750816	Beaverstown, Donabate, Co. Dunlin, Dublin	2019:687	D. Delany
Human remains and potential archaeological features were discovered during the final phase of monitoring on a development site at Beaverstown, Donabate, Co. Dublin in May 2019. A burial ground, keyhole-shaped kiln and a number of linear features were subsequently excavated at the site between 24th June and 12th July 2019. The excavation revealed a small, probably familial, burial ground of early medieval date located on rising ground in the northwest of the site. The skeletal remains of seven burials and a small quantity of disarticulated human skeletal remains representing two other burials were excavated. The burials were relatively standard; supine, extended, single inhumations, generally orientated west-east and interred in simple earth-dug graves. Six of the seven burials had suffered truncation and in many cases this was extreme. The only burial which was largely intact was SK03, whose grave was significantly deeper than the other six. With almost all age groups and both sexes present the group appears to be broadly representative of all elements of a community. The results of AMS dating places two of the burials in the period spanning the second half of the 6th century and the first half of the 7th century. A third burial returned an earlier date spanning the period from the second quarter of the 5th century to the late 6th century. A small keyhole-shaped kiln (max. dims 3.1m x 1.35m), as yet undated, was excavated 6.5m to the north of the burial ground. It consisted of a bowl (1.55m x 1m), a short and narrow flue (0.8m x 0.3m), and a hearth area (0.6m x 0.55m). The maximum depth of the bowl was 0.4m and the principal fill was compact grey/brown clayey silt with frequent flecks of charcoal and burnt orange clay. A number of linear and curving linear features were investigated across the site. The dominant feature was a curving linear which meandered through the site from southwest to northeast, and was located to the south and east of the burial ground and kiln. The meandering nature of this feature and the results of section cuttings suggest it is an old watercourse which was modified over time, presumably to alleviate local flooding. The second main linear feature extended southeast from the principal linear and terminated in an area of silting in the southeast extent of the site. Section cuttings revealed a regular cut, averaging 1.6m wide and 0.45m deep, with steeply-sloping sides. There were generally three fills and these contained moderate inclusions of animal bone and shell. All other linears were irregular and deemed to be ad-hoc drains and gullies. No artefactual material was found during the course of the three week excavation but two artefacts were recovered during monitoring. A perforated bone pin was found on the surface of the secondary linear in the southeast of the site. It is 83mm long with a flat head containing a central perforation. It may be a shroud pin associated with one of the burials. A body sherd of medieval pottery was found in the vicinity of the burials in the northwest of the site. The blackened exterior suggests it is cooking ware. A small assemblage of animal bones and mollusc shells were recovered from the various section cuttings across the site.				
14E0419	722000, 750535	Turvey Avenue, Beaverstown, Donabate, Dublin	2018:881	D. Delany
Phased archaeological monitoring of topsoil removal was carried out at a large residential development site on the west edge of the Donabate urban area in March, July and October 2018. This work followed on from geophysical survey and pre-development testing at the site in 2014 and previous phases of archaeological monitoring of topsoil removal in 2014, 2015 and 2017 (2014:493, 2015:393 & 2017:718). There are no recorded monuments on or within the immediate vicinity of the development site, the nearest being the medieval church and tower house at Donabate (DU012-005) c.500m to the south-east and the 18th/19th-century house at Newbridge Demesne (DU012-060) c.400m to the south-west. 2018 saw excavations move into the west extent of the larger of the two fields in the north of the development site. The stratigraphy generally comprised of 0.2-0.4m of grey/brown clayey silt topsoil over light orange/brown and grey/brown sandy/silty clay subsoil. The upper 0.1-0.2m of the subsoil was disturbed as a result of previous cultivation and, like the topsoil, contained				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
occasional inclusions of post-medieval/modern pottery sherds and animal bone fragments. As with all previous phases of monitoring at the site, there were also occasional inclusions of white flint stones. The only features uncovered were modern land drains, consisting of east-west linear cuts (Wth. 0.2m; D 0.2m) filled with medium-sized cobbles, and smaller trenches containing corrugated red earthenware pipes (diam. 0.1) set in beds of small cobbles. No archaeology was found.				
99E0690	722725, 749923	Turvey Avenue, Donabate, Dublin	1999:176	C. Walsh
Test excavation was undertaken at a site at Turvey Avenue, Donabate, Co. Dublin, on 25 November 1999. Fingal County Council intends to widen the footpath on the south side of Turvey Avenue, which will entail the scarping of the existing slope to an estimated depth of 0.6m below present ground level. The works to be carried out are adjacent to the medieval church of St Patrick. The fields to the north of the church of St Patrick slope steeply to Turvey Avenue. There is a considerable drop (c. 0.75m) to the existing footpath along Turvey Avenue, resulting from soil build-up along the field boundary. This may represent a plough lynchet. It was noted that a greater build-up of soil occurred at the eastern end of the field, i.e., closest to the tower and church, than elsewhere. The ground is currently in grazing. Five trenches were excavated by mechanical excavator. A considerable amount of activity, ranging in date from probably the medieval period to the 19th-early 20th century, was represented in the test-trenches. The trenches excavated revealed a thick (max. 1.35m) depth of ploughsoil, of probable medieval date. No cultivation furrows or ridges were evident in the soil, and there was no apparent stratification, except that of the upper humic sod level. Finds of recent date were not recovered from the ploughsoil, except where it was evident that a pit (Trench 4) cut into it. No finds of medieval pottery were made from the ploughsoil, but a coin, identified by Michael Kenny as a 'Patrick' dating to 1564, was recovered. Pits containing food debris, bone and shell were uncovered in Trench 1. While these may relate to the cottages present on the north side of Turvey Avenue, there is a strong possibility that they are late medieval in date. Finds of more recent date were recovered from the upper black loam.				
02E1708	722621, 750211	Beaverstown, Donabate, Dublin	2002:0508	I. Hagen
An assessment was carried out at Beaverstown, Co. Dublin, from 12 to 18 November 2002. The development site, two green fields, is near Donabate train station. The proposal comprises the development of residential buildings and the construction of new access roads to Turvey Avenue and the train station (Site A), as well as three land parcels set aside for future development (Site B). The site is in the vicinity of an archaeological complex (SMR 12:5), which includes a church and graveyard, a tower-house and a memorial slab, dating from the medieval to the late medieval period. Testing carried out by Claire Walsh in 1999 in the field to the west of the church (Excavations 1999, No. 176, 99E0690) revealed a considerable amount of activity ranging in date from the medieval to the post-medieval period. Several artefacts have also recently been recovered during metal-detecting in Donabate, including buttons, a spur, a harness, shoe buckles, the foot of a vessel and a musket ball. Artefacts recorded from Beaverstown townland indicate prehistoric activity in the area and include a stone axehead and two flint waste flakes. Seven test-trenches were excavated throughout the development site, both along the gently sloping ground in the south and in the level, low-lying ground to the north, the latter reserved for residential development. The ploughsoil was generally 0.4–0.5m deep and overlay the natural yellow/brown boulder clay. Trench 5, at the south-eastern corner of the site, revealed an area of sandstone conglomerate boulders, which occasionally protruded above present ground level. Artefacts from the topsoil included sherds of post-medieval pottery, iron objects and a badly corroded copper-alloy coin. No archaeological soils or features were revealed in Trenches 1–6. Trench 7, along the gently sloping ground on the line of the proposed access road from Turvey Avenue, produced archaeological features dating to the prehistoric and post-medieval periods. This trench was excavated to the top of the archaeological features, which remain in situ. Post-medieval features were represented by the basal remains of a furrow, 0.35m wide				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
and oriented east–west. Several prehistoric features were uncovered spreading over an area c. 20m long. These included two small pits or post-holes, 0.2m in diameter, both of which produced pottery of possible later prehistoric date. A pit, 0.4m in diameter, was revealed 0.45m below present ground level. It was filled with a grey/brown sandy clay, which included charcoal flecks and some cremated bone.				
02E1708 ext.	722621, 750211	Beaverstown, Donabate, Dublin	2003:483	I. Hagen
An assessment, which had established the potential for archaeological activity within the area, had been carried out within the lands in November 2002 (Excavations 2002, No. 506). The lands under consideration lie adjacent to Donabate train station and Turvey Avenue and are being developed for residential use. Monitoring of topsoil removal commenced in September and continued up to December 2003. Two areas of interest were revealed. One lay along the gently sloping north-facing ground within the proposed main site access, the other within the north-eastern quadrant of the site close to the eastern boundary. The former had been noted during the assessment phase and was excavated under licence 03E1634 prior to construction (No. 484 below). The second comprised a number of shell deposits, which will be investigated in 2004. Two parallel 19th-century iron pipes were noted, which are thought to relate to the water supply for the hospital in Portrane. Several stone land drains ran in an east–west direction across the land and a complex of post-medieval north–south-running furrows was noted throughout the areas monitored. No other deposits of archaeological interest were noted. A flint blade was recovered from the topsoil in the proposed access road to the carpark of Donabate train station.				
03E1634	722600, 750048	Beaverstown, Donabate, Dublin	2003:484	I. Hagen
An assessment, carried out in November 2002 at Beaverstown, Co. Dublin (Excavations 2002, No. 506, 02E1708), had established the presence of prehistoric features within the corridor of the main access road. The lands are being developed for residential use and are located adjacent to Donabate train station and Turvey Avenue. An archaeological complex (SMR 12:5), including a church and a tower-house, is located to the north-west of the site. Monitoring of topsoil removal commenced in September 2003 (No. 483 above, 02E1708 ext.). This excavation was carried out in October 2003. The investigated area (34m north–south by 8–12m) was located along a gentle slope overlooking flat ground to the north. Twenty-eight features dating from the Neolithic to the post-medieval periods were revealed below 0.4–0.5m of topsoil. Two of these, a small pit and a spread of charcoal, were isolated features and could not be assigned with certainty to a particular period. Three features, consisting of two pits and a furrow, belonged to the post-medieval period. The Neolithic period was represented by a cluster of pits and post-holes and the Bronze Age by a section of a curvilinear ditch, which extended beyond the limits of the excavation. Three features, a small pit, a post-hole and a possible cremation burial, were located to the north of the ditch. Neolithic activity Two distinct but related clusters of seventeen pits and post-holes were revealed at a distance of 2m south of the curvilinear ditch. The features were distributed in a semicircular arrangement and spread over an area measuring approximately 8m north–south by 5m. The first cluster included a pit and six post-holes, four of which formed a square, each set at a distance of 0.15–0.35m from each other. The second cluster was found along the western edge of the excavated area at a distance of 2m south-west of Cluster 1. It comprised a pit and six post-holes, five of which were arranged along the sides of the pit. At a distance of 1.5–3m to the south-west lay a further stake-hole, a post-hole and a pit. Finds retrieved from this area included sherds of Early Neolithic pottery and some flint. The activity is likely to be associated with domestic activity, such as refuse pits and small temporary structures. Bronze Age enclosure A section of a curvilinear ditch, possibly representing an enclosure, ran through the entire width of the excavated corridor. Four cuttings were excavated to facilitate the insertion of service pipes, while the remainder of the ditch was preserved in situ. The ditch truncated an earlier pit in the west, which yielded Beaker pottery. Two features post-dated the filling of the ditch, a small pit, 0.4m in diameter, and a post-medieval furrow. Both cut the upper ditch fill. The ditch itself measured 15m long, 1–1.3m wide at the top, 0.4–0.6m wide at the base and 0.5–0.7m deep. It was U-shaped in profile and contained one main fill, which partially overlay two further localised deposits. One sherd of Beaker and a small amount of later Bronze Age pottery was retrieved from these fills. Three features				

Licence	OS Ref	Townland/ Street	Ex. Bull. Ref.	Author
were revealed within the confines of the enclosure, including a post-hole and a pit containing burnt bone. The post-hole, 0.3m in diameter and 0.25m deep, was located in relative isolation, but is likely also to be of Bronze Age date. The pit, 0.4m in diameter and 0.2m deep, contained a small amount of burnt bone and was U-shaped in plan, its sides sloping steeply towards a rounded base.				

APPENDIX 3: ARCHAEOLOGICAL AREA 1 CONSERVATION & MANAGEMENT PLAN

The following measures are proposed to aid in preservation of monument DU012-088 Enclosure:

1. An exclusion zone of 10m will be established from the outer edge of the Enclosure (DU012-088). This exclusion zone will be established by GPS using ITM data generated from previous archaeological assessment and will incorporate the earth-cut enclosure ditch

2. Following establishment of the exclusion zone, it shall be fenced off from the wider construction site by erection of a temporary post and wire fence. The fence line shall be marked with appropriate 'no entry' signage. No groundworks, materials/soil storage or construction traffic shall be permitted within the exclusion zone for the duration of construction works. All site personnel shall be made aware of the location and significance of the monument.

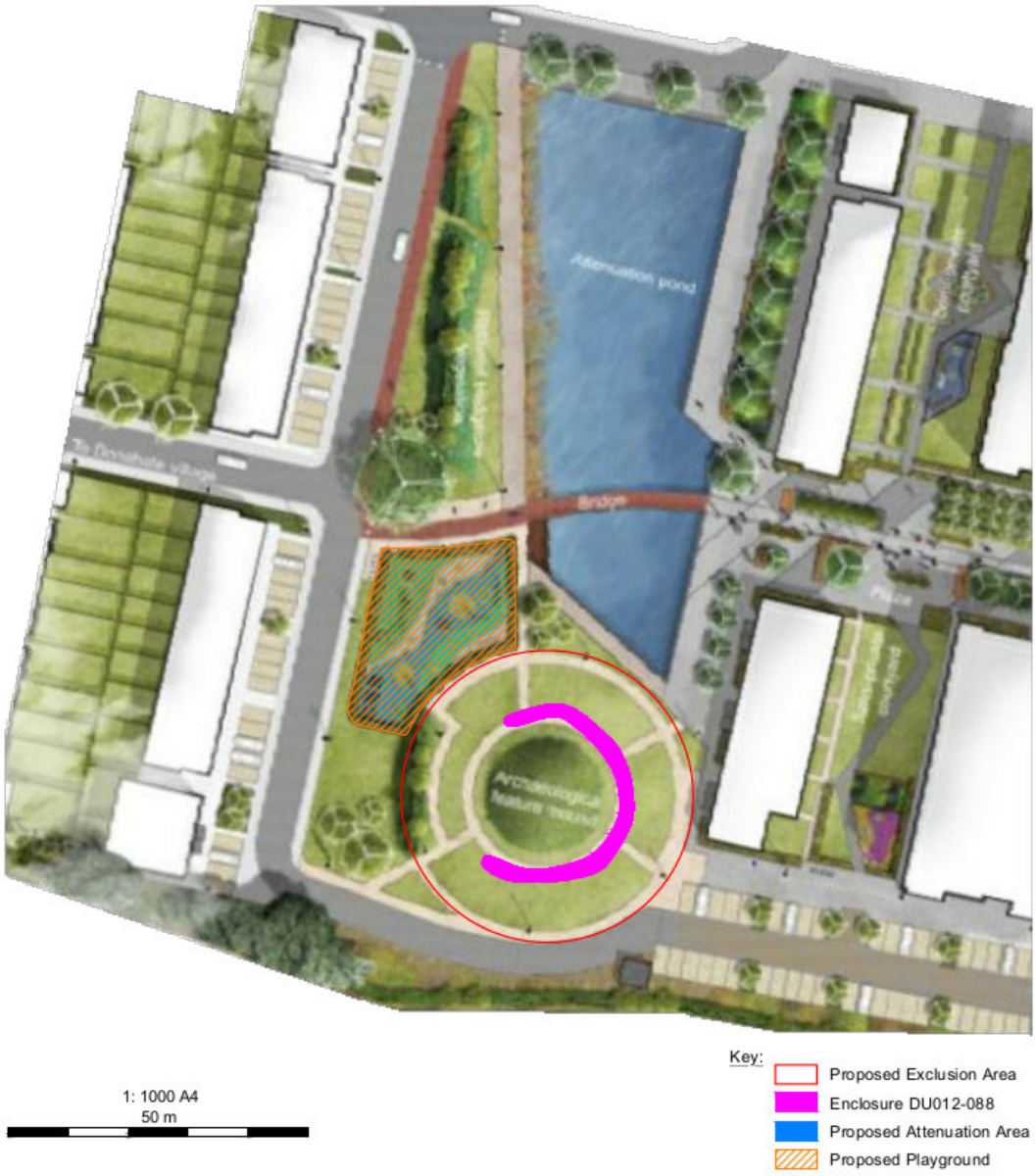
3. Archaeological monitoring of all construction groundworks has been recommended across the wider construction site. Any future proposed methodology for monitoring shall incorporate provision for supervision of the establishment and maintenance of the exclusion zone. It is noted that should further archaeology be uncovered, a mitigation strategy will be agreed with the Department of Housing, Local Government and Heritage (DHLGH) which may include excavation or preservation in situ.

4. On completion of the overall development, the temporary post and wire fencing and signage may be removed. The area of the exclusion zone should be maintained as grassland or planted with shallow rooting/low impact flowers or shrubs. Any pathways incorporated into the green-space shall be low-impact and no bedding material /excavations shall be undertaken below the level of existing topsoil.

5. A suitable interpretation panel (see example attached) describing the nature and significance of the monument in text and illustration may be erected at an appropriate location near to the monument.

6. With regards to future maintenance needs, it is recommended that no heavy plant machinery (e.g. agricultural tractors) be utilised for grass mowing.

This plan is subject to agreement with the Department of Housing, Local Government and Heritage in advance of the commencement of construction works.



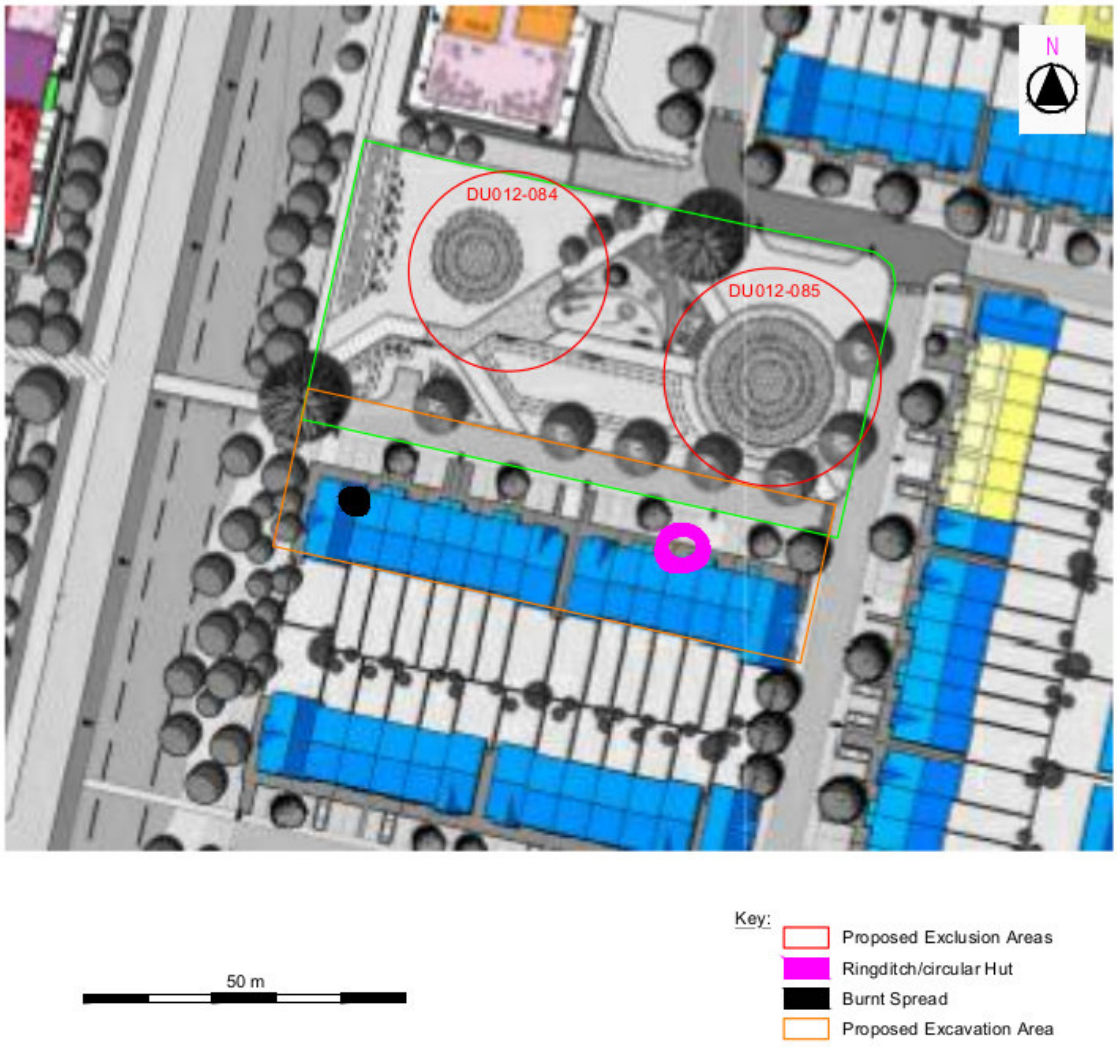
Archaeological Area 1 Preservation Proposal

APPENDIX 4: ARCHAEOLOGICAL AREA 9 CONSERVATION & MANAGEMENT PLAN

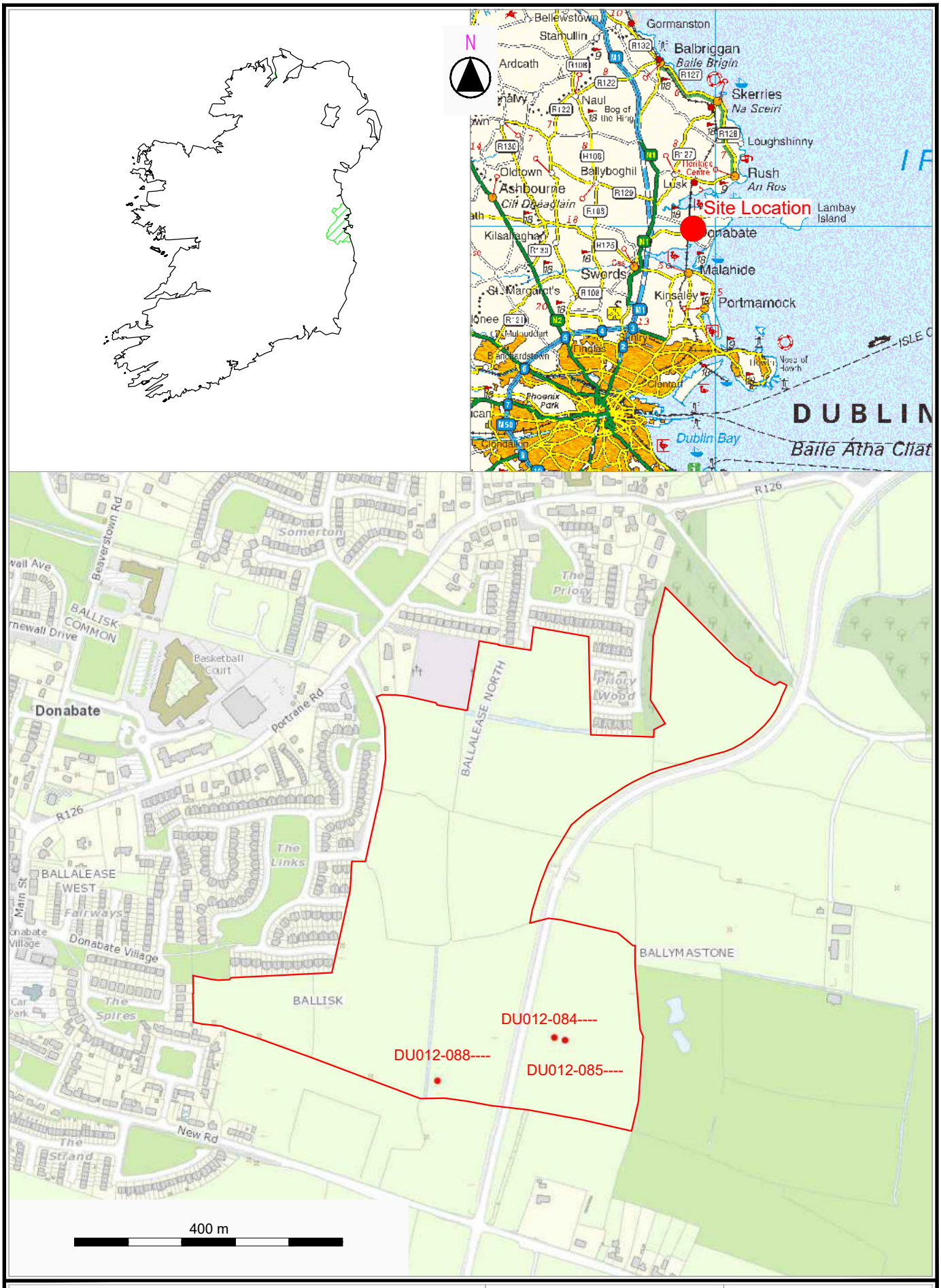
The following measures are proposed to aid in preservation of monuments DU012-084 Circular Hut & DU012-085 Ringditch:

1. An exclusion zone of 10m will be established from the outer edge of DU012-084 Circular Hut & DU012-085 Ringditch. This exclusion zone will be established by GPS using ITM data generated from previous archaeological assessment and will incorporate the earth-cut enclosure ditch
2. Following establishment of the exclusion zone, it shall be fenced off from the wider construction site by erection of a temporary post and wire fence. The fence line shall be marked with appropriate 'no entry' signage. No groundworks, materials/soil storage or construction traffic shall be permitted within the exclusion zone for the duration of construction works. All site personnel shall be made aware of the location and significance of the monument.
3. Archaeological monitoring of all construction groundworks has been recommended across the wider construction site. Any future proposed methodology for monitoring shall incorporate provision for supervision of the establishment and maintenance of the exclusion zone. It is noted that should further archaeology be uncovered, a mitigation strategy will be agreed with the Department of Housing, Local Government and Heritage (DHLGH) which may include excavation or preservation in situ.
4. On completion of the overall development, the temporary post and wire fencing and signage may be removed. The area of the exclusion zone should be maintained as grassland or planted with shallow rooting/low impact flowers or shrubs. Any pathways incorporated into the green-space shall be low-impact and no bedding material /excavations shall be undertaken below the level of existing topsoil.
5. A suitable interpretation panel (see example attached) describing the nature and significance of the monument in text and illustration may be erected at an appropriate location near to the monument.
6. With regards to future maintenance needs, it is recommended that no heavy plant machinery (e.g. agricultural tractors) be utilised for grass mowing.

This plan is subject to agreement with the Department of Housing, Local Government and Heritage in advance of the commencement of construction works.



Archaeological Area 9 Preservation Proposal



Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate, Co. Dublin	Scale: 1:8000 A4
			Date: June 2021
		Test Excavation Report	Origin: NMS
			Ref: 2021_43_TER_01

Figure 1: Location of site and surrounding RMP's

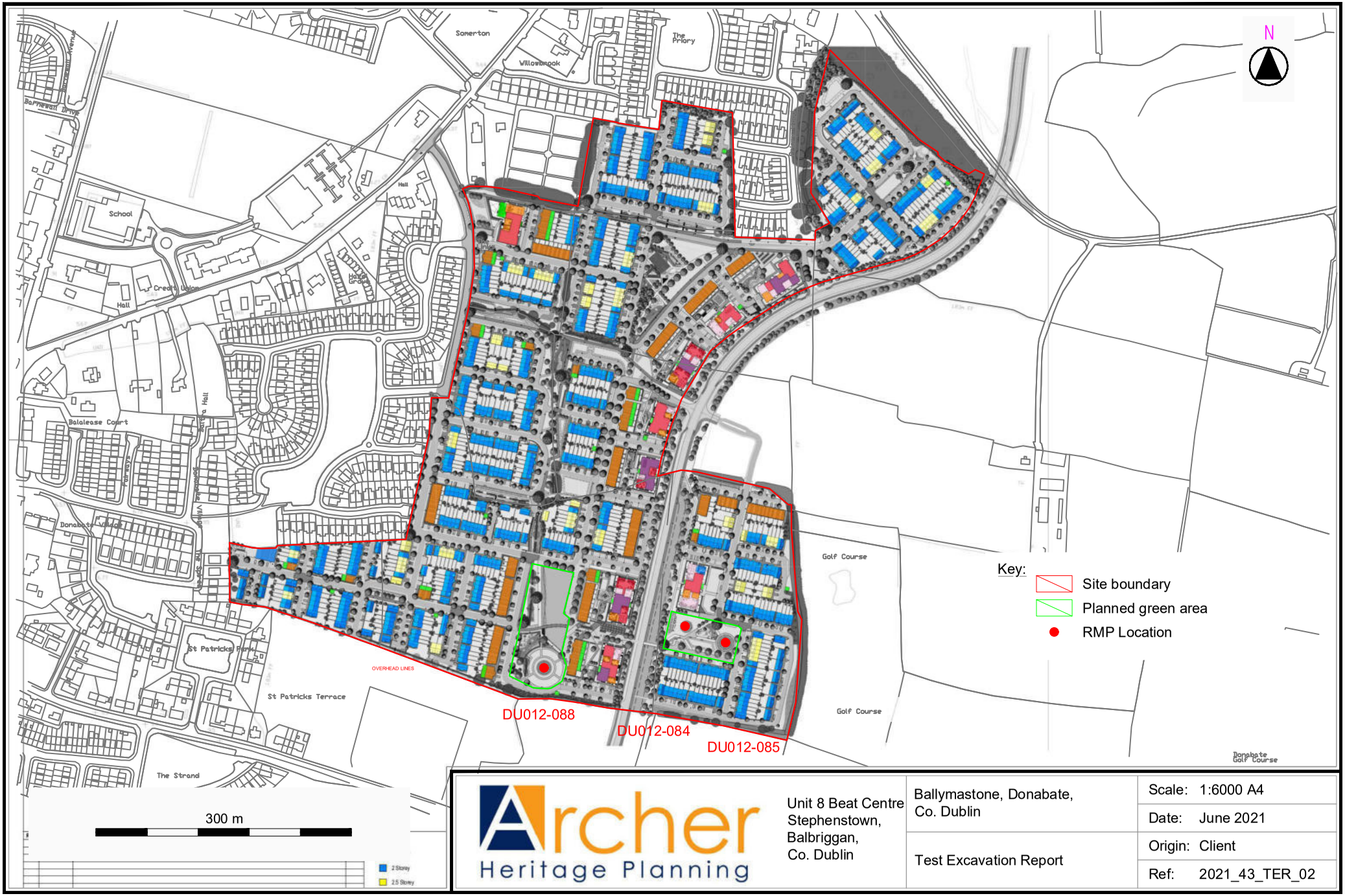
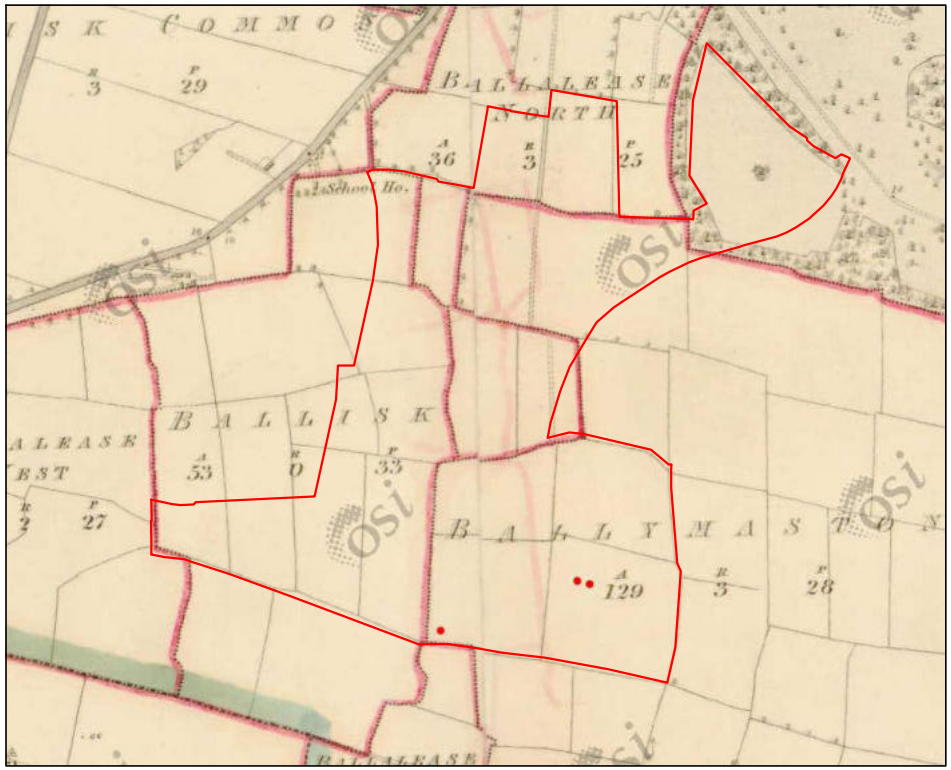


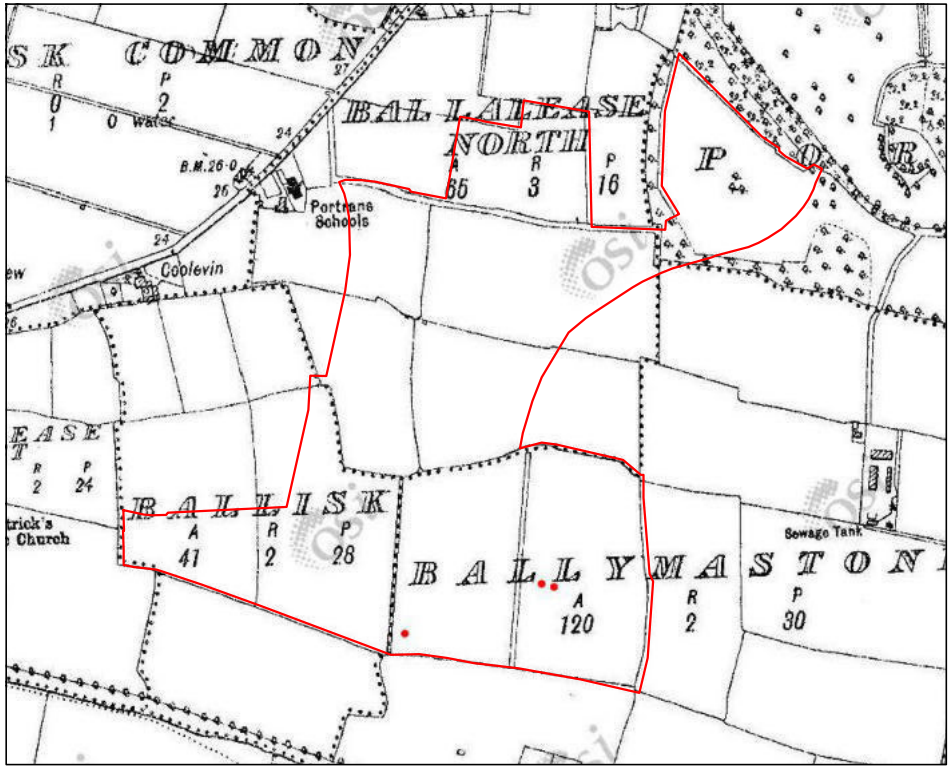
Figure 2: Proposed development layout



Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate, Co. Dublin	Scale: Not to Scale
			Date: July 2021
		Test Excavation Report	Origin: Down Survey (1656)
			Ref: 2021_43_TER_03

Figure 3: Extracts from Historical Mapping (i)





(l) 1st edition OS - 1844

(r) Cassini - 1906-9

Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate, Co. Dublin	Scale: Not to scale
			Date: June 2021
		Test Excavation Report	Origin: NMS
			Ref: 2021_43_TER_04

Figure 4: Extracts from historical maps (ii)



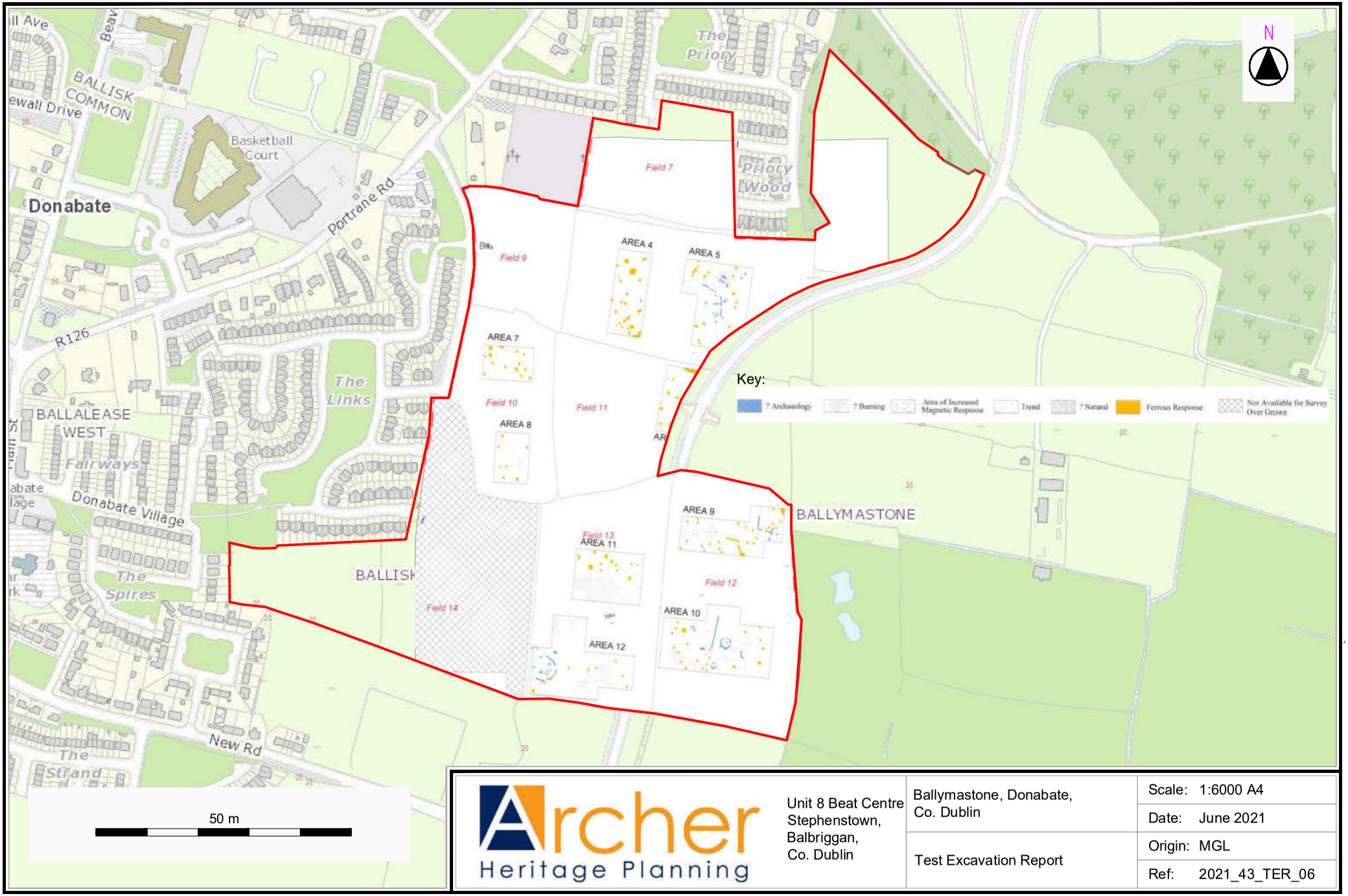


(l) 1995

(r) 2013-18

Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate, Co. Dublin	Scale: Not to scale
			Date: June 2021
		Test Excavation Licence	Origin: geohive.ie
			Ref: 2021_43_TER_05

Figure 5: Extracts from aerial photography



Archer Heritage Planning

Unit 8 Beat Centre
Stephenstown,
Balbriggan,
Co. Dublin

Ballymastone, Donabate,
Co. Dublin

Test Excavation Report

Scale: 1:6000 A4
Date: June 2021
Origin: MGL
Ref: 2021_43_TER_06

Figure 6: Results of Geophysical Survey

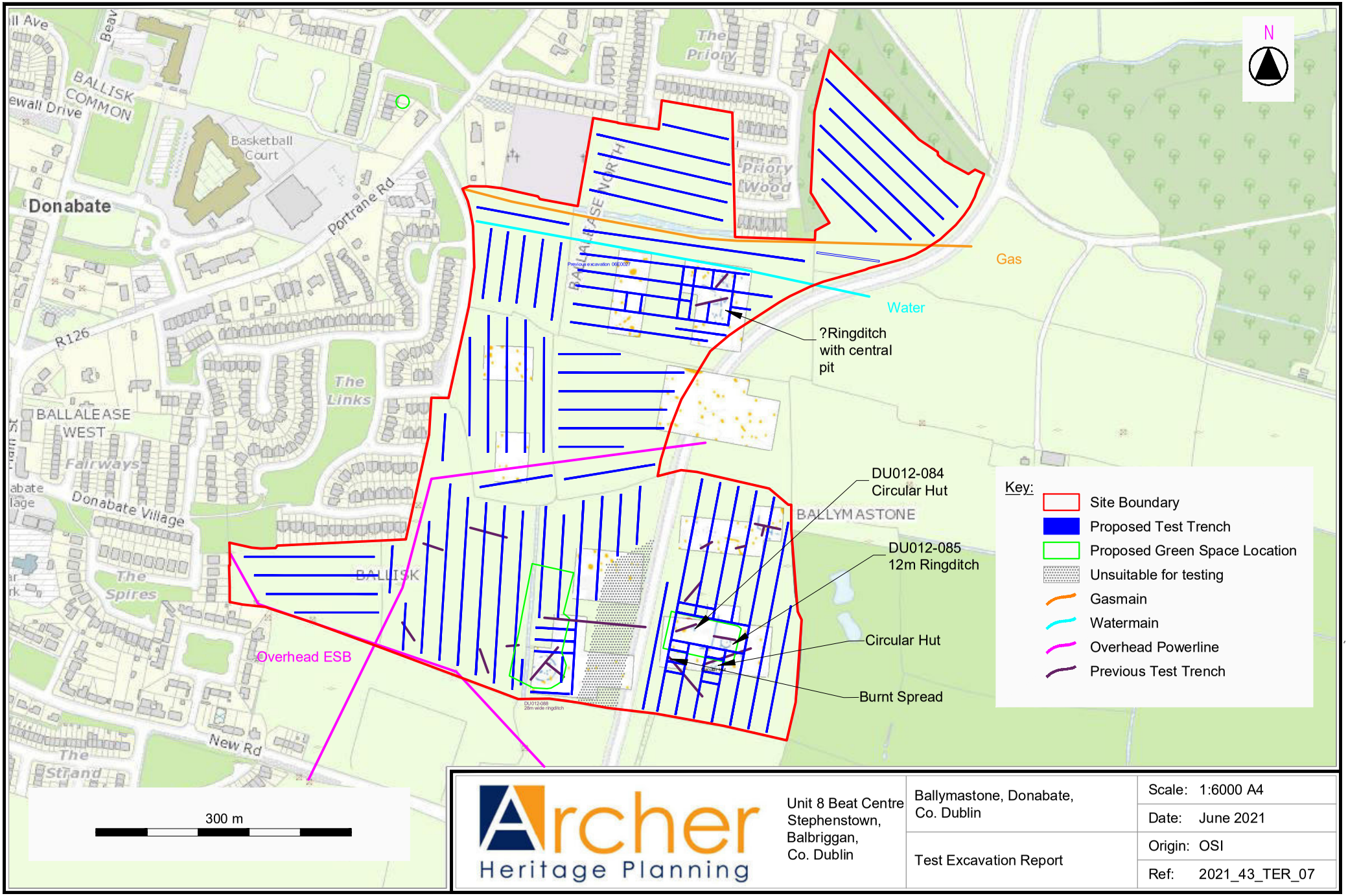
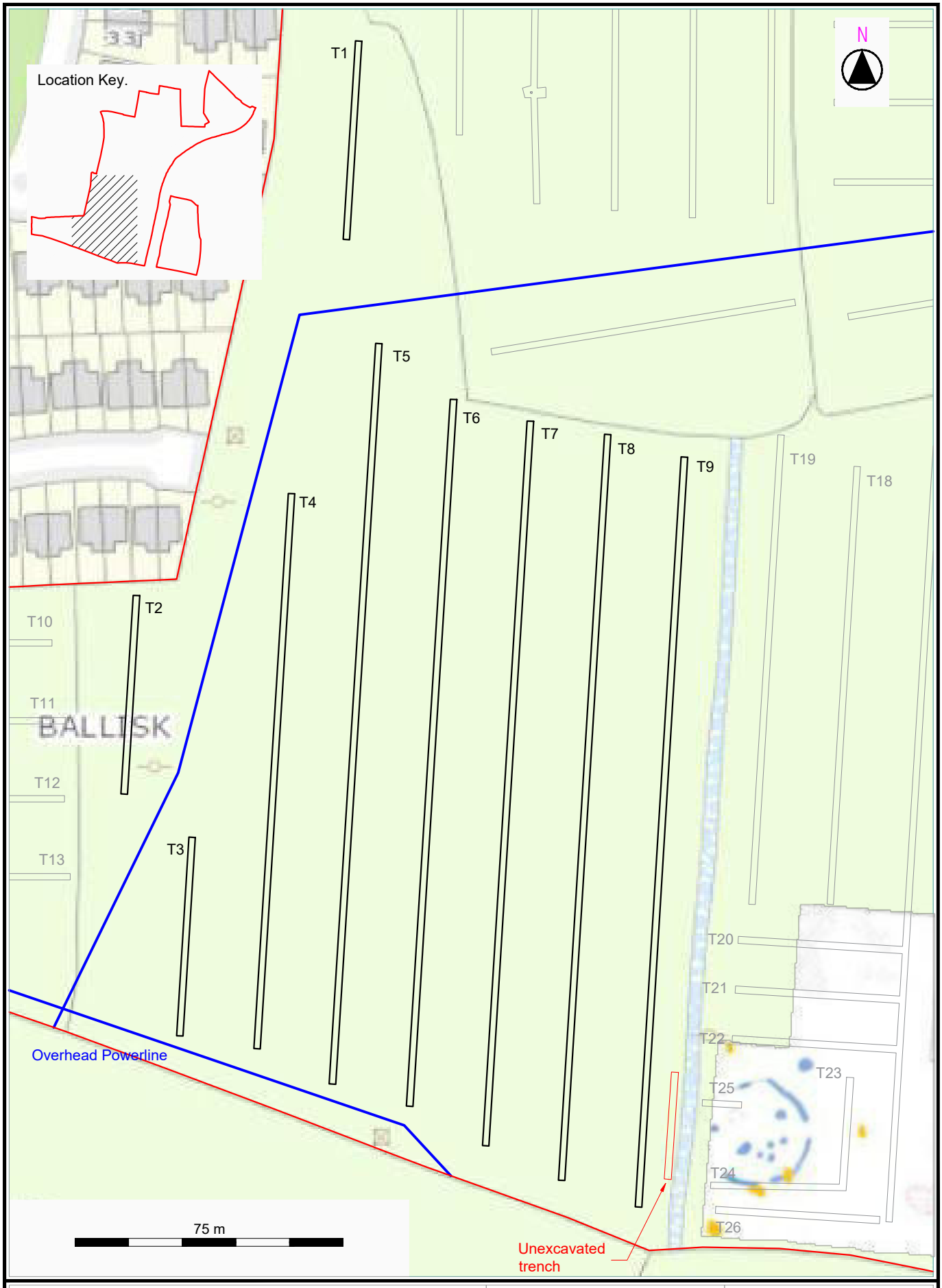
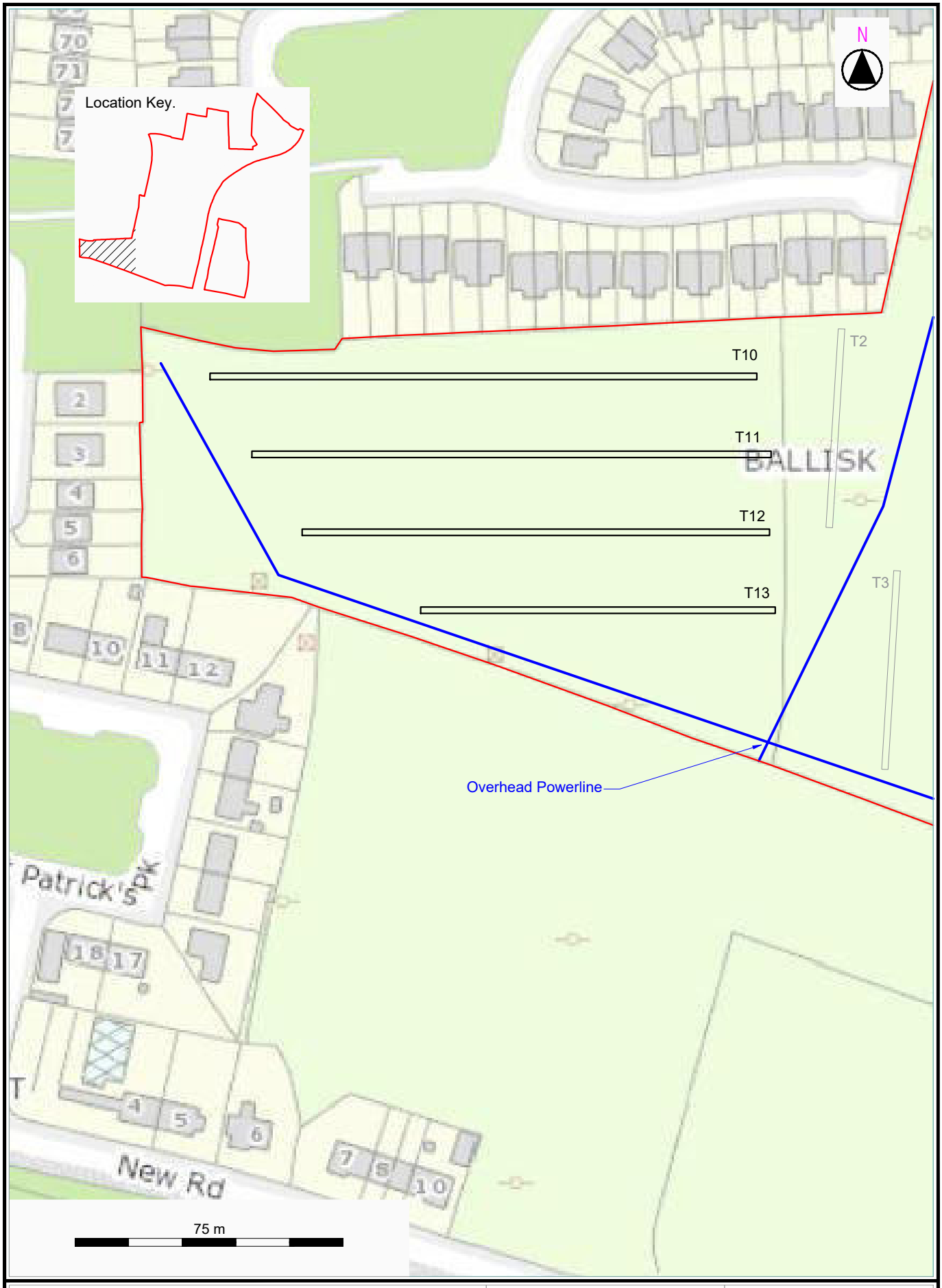


Figure 7: Test Trench Layout



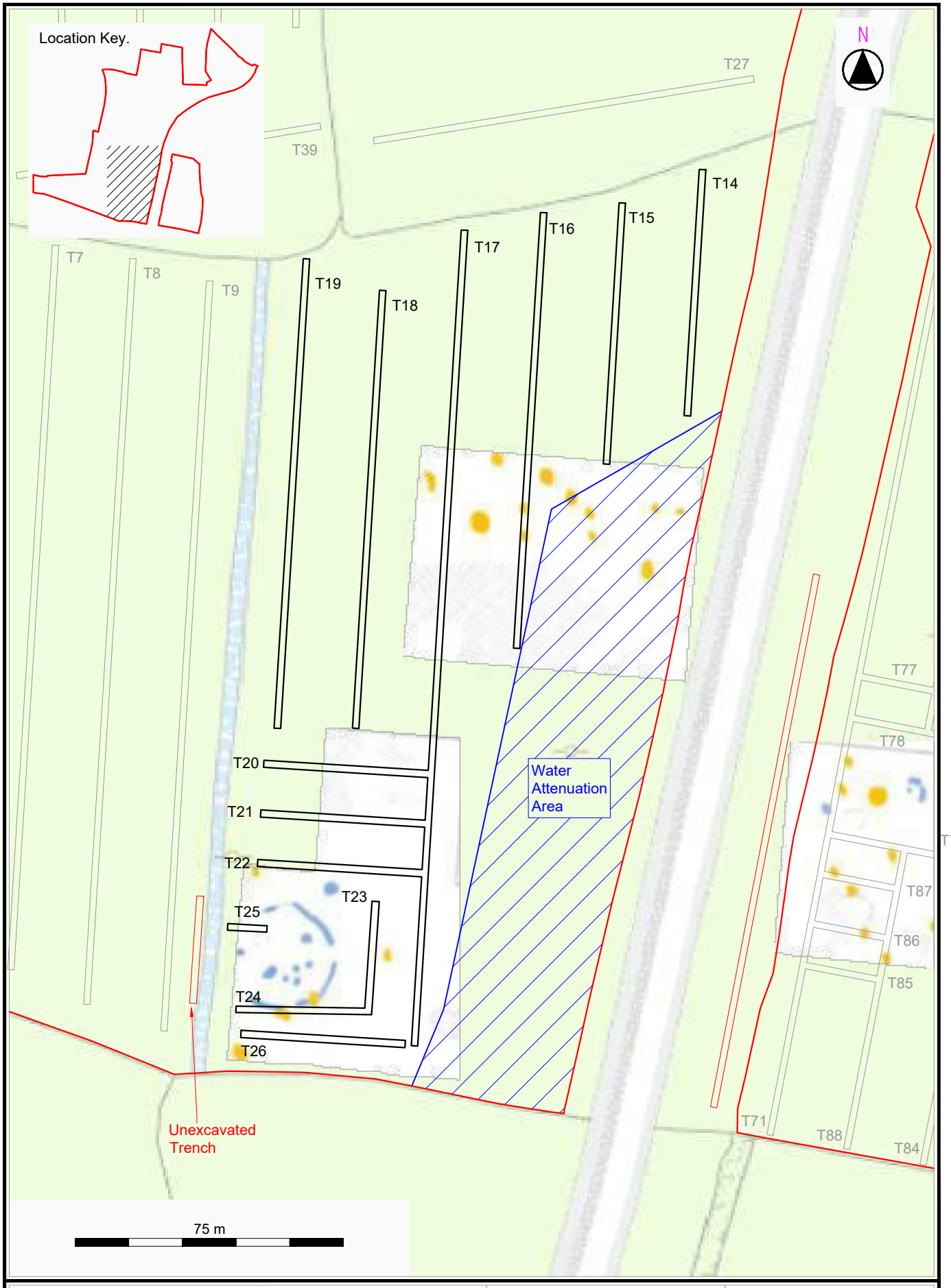
Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate Test Trenching
		Scale: 1:1500 A4 Date: August 2021 Origin: MGL & OSI Ref: 2021_43_Ass_08

Figure 8: Testing Results (i)



Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate	Scale: 1:1500 A4
			Date: August 2021
		Test Trenching	Origin: MGL & OSI
			Ref: 2021_43_Ass_09

Figure 9: Testing Results (ii)



Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate	Scale: 1:1500 A4
			Date: August 2021
		Test Trenching	Origin: MGL & OSI
			Ref: 2021_43_Ass_10

Figure 10: Testing Results (iii)

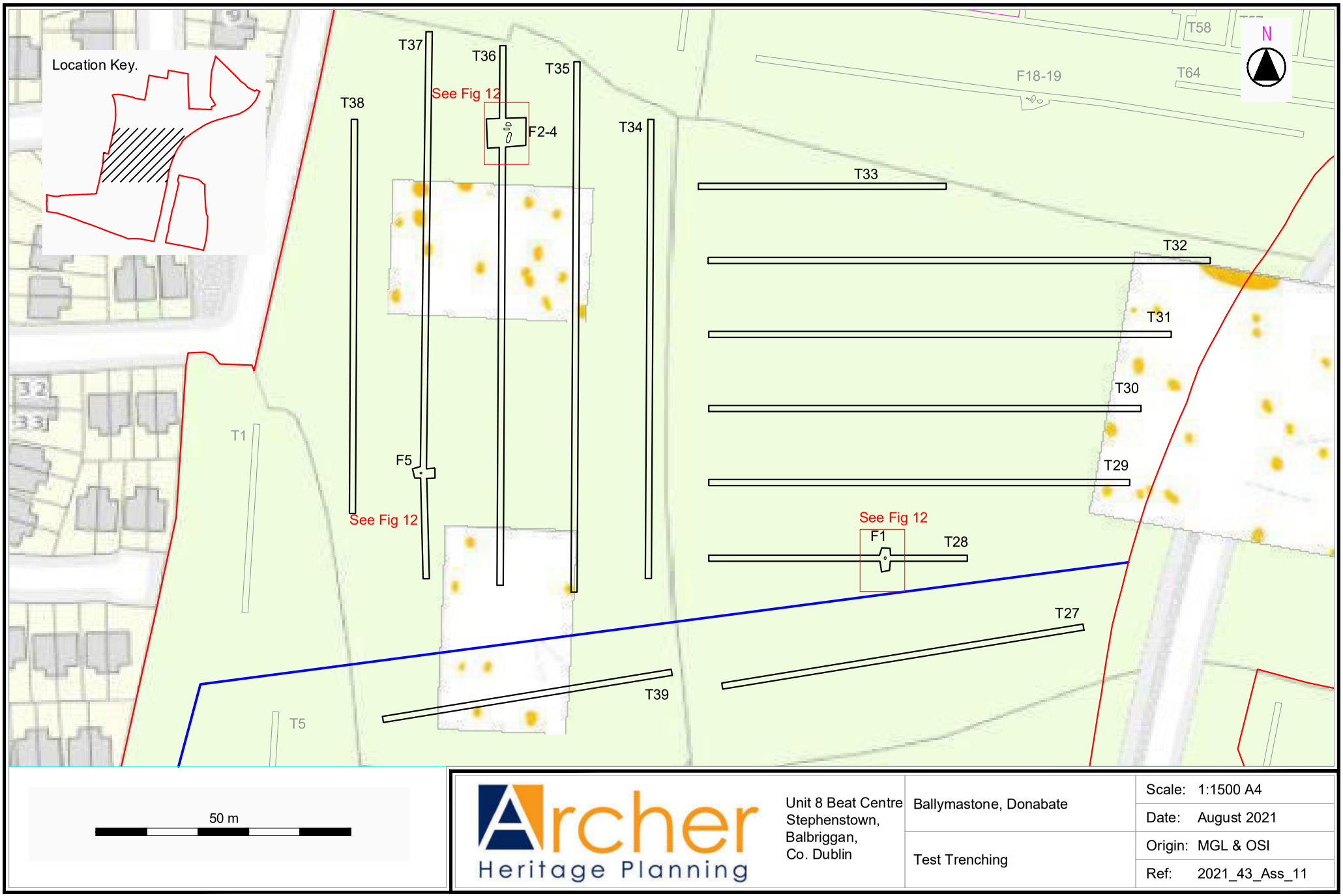


Figure 11: Testing Results (iv)

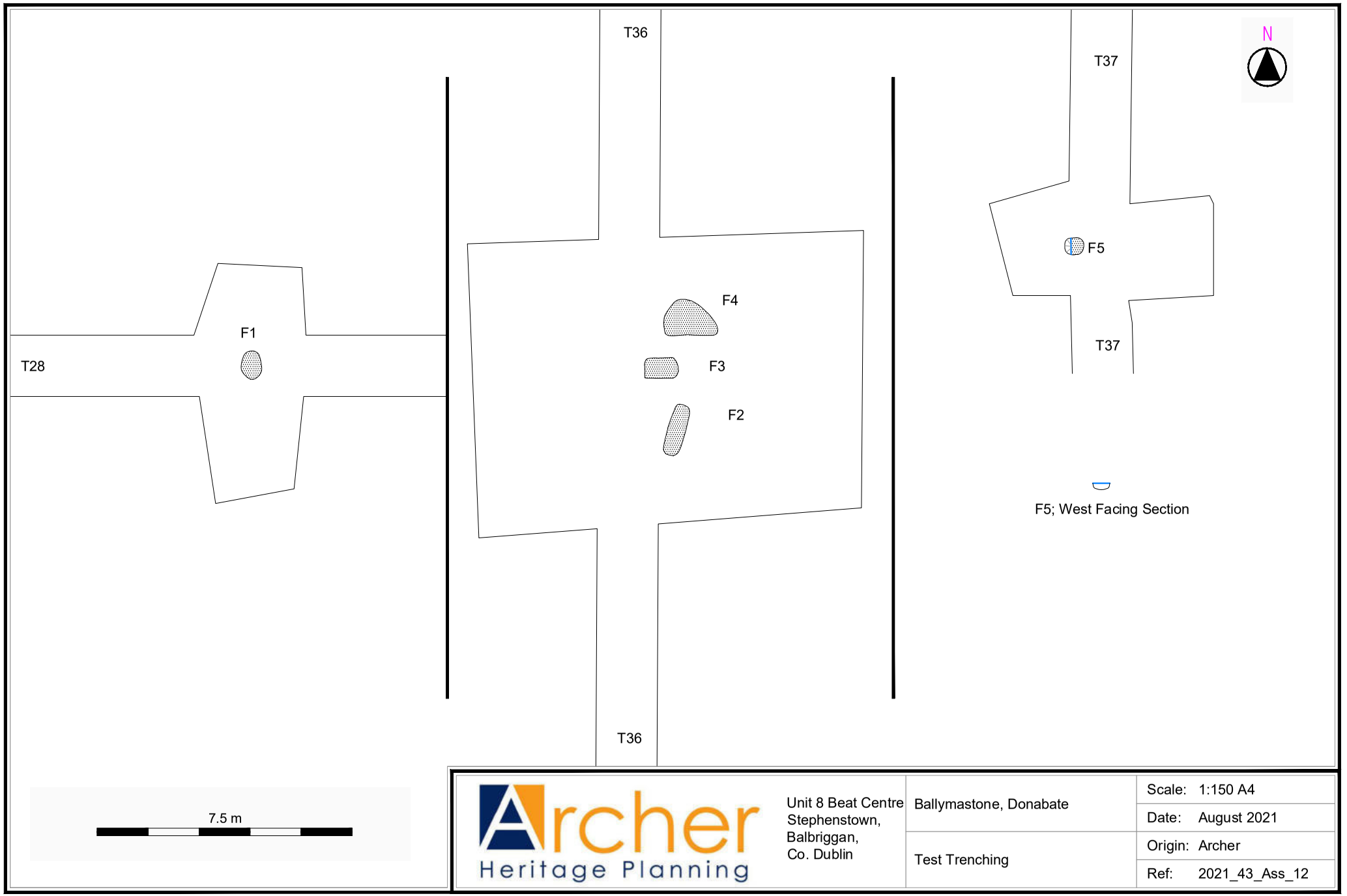


Figure 12: Testing Results (v)

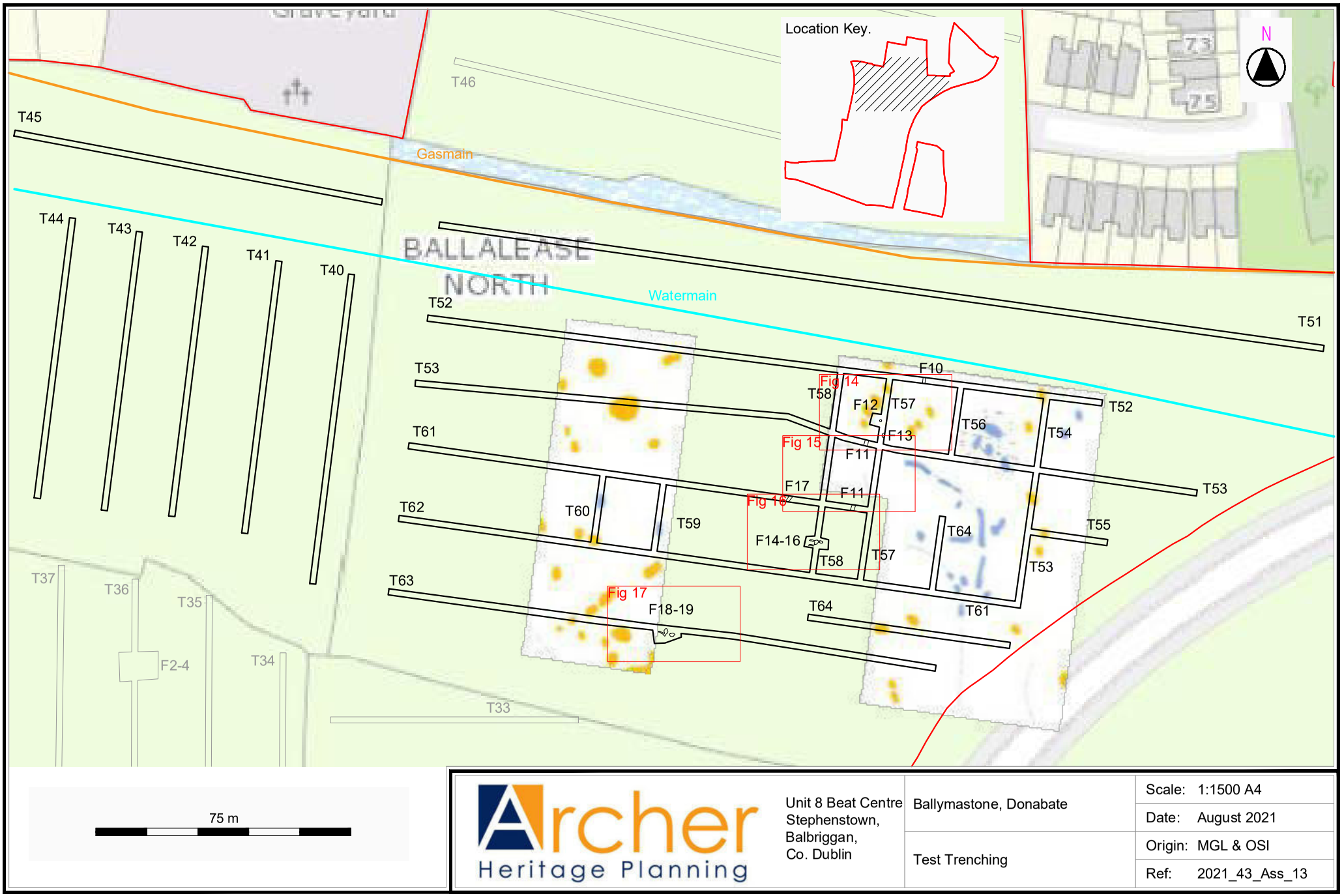


Figure 13: Testing Results (vi)

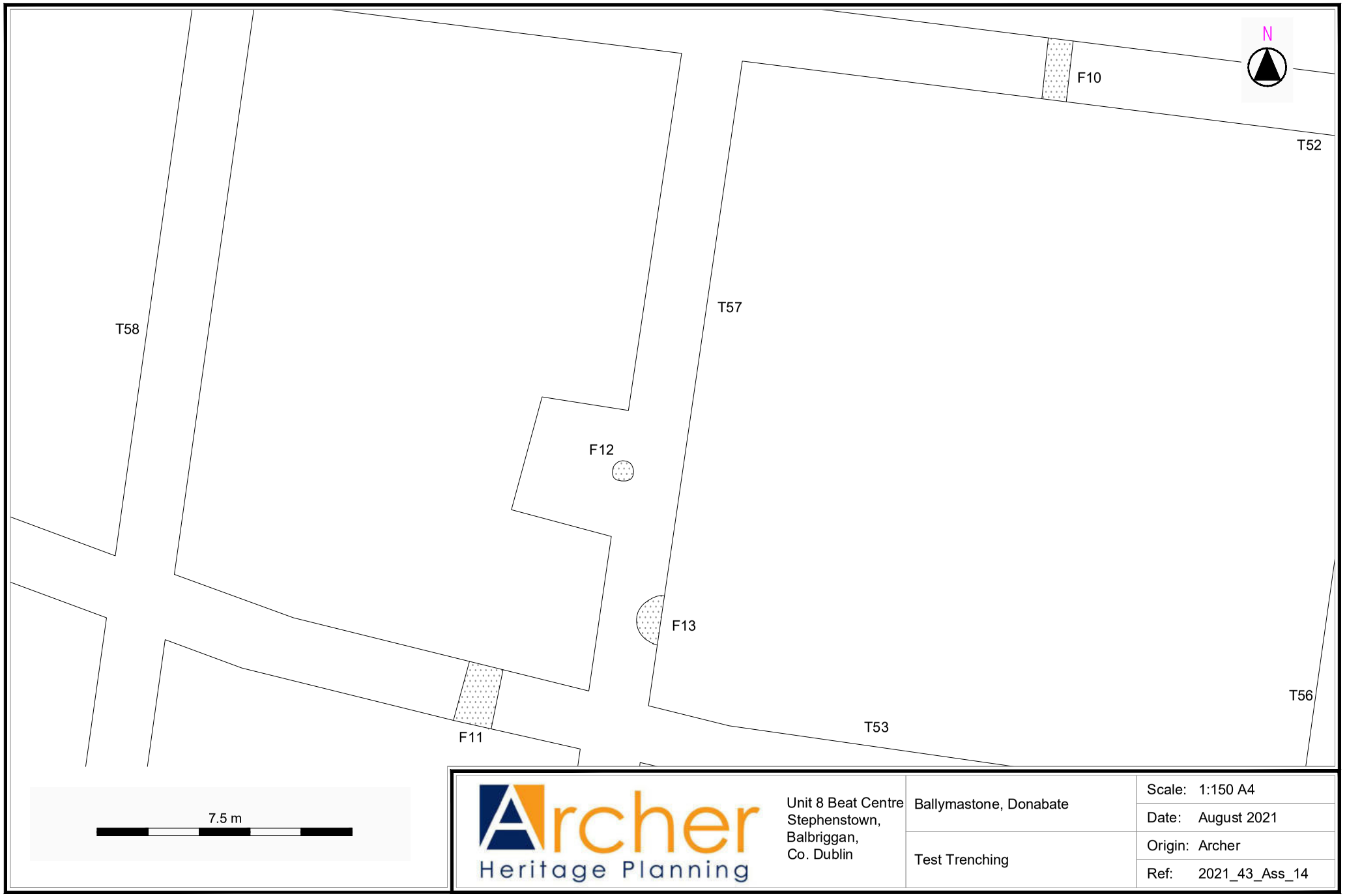


Figure 14: Testing Results (vii)

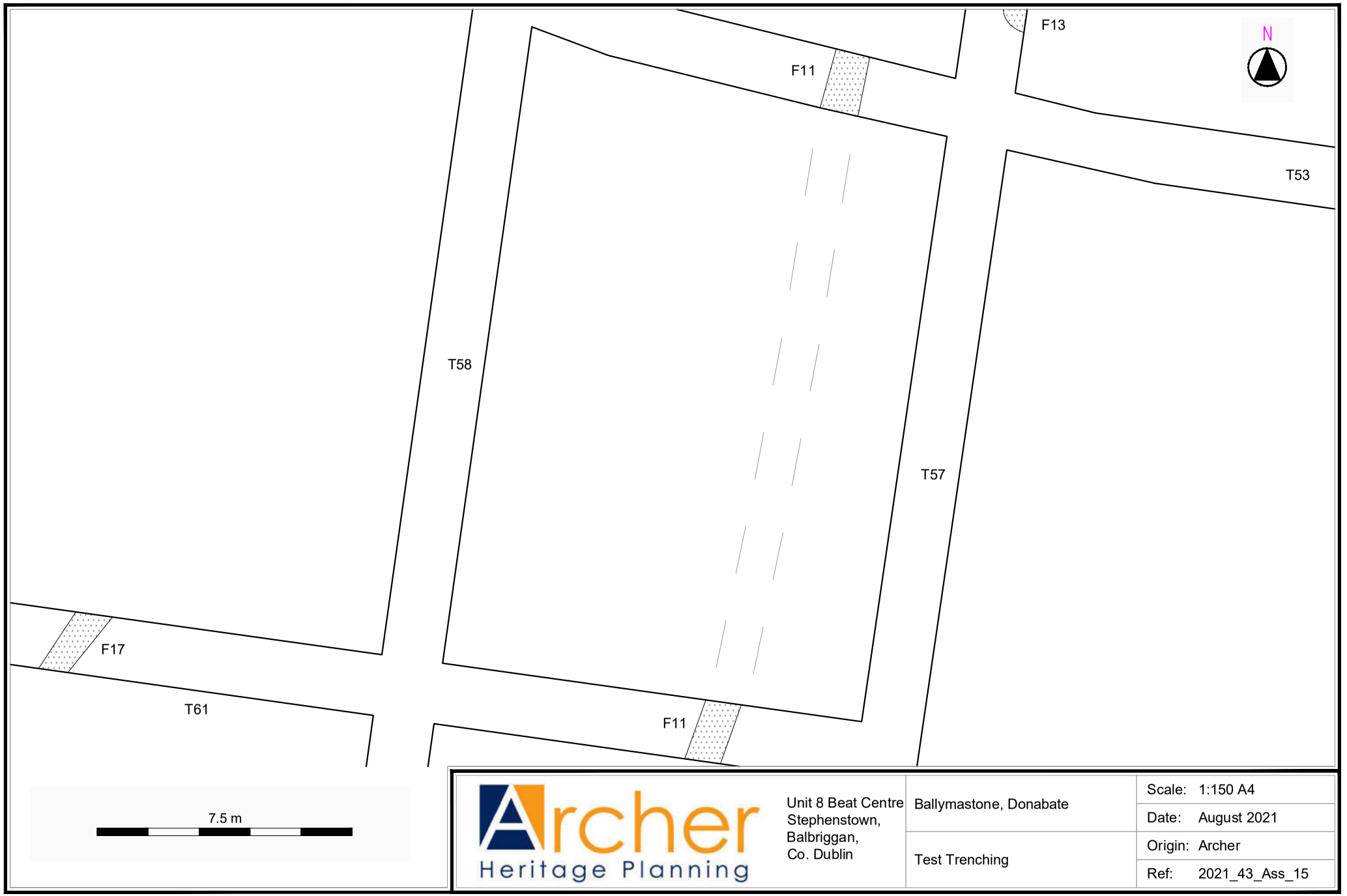


Figure 15: Testing Results (viii)

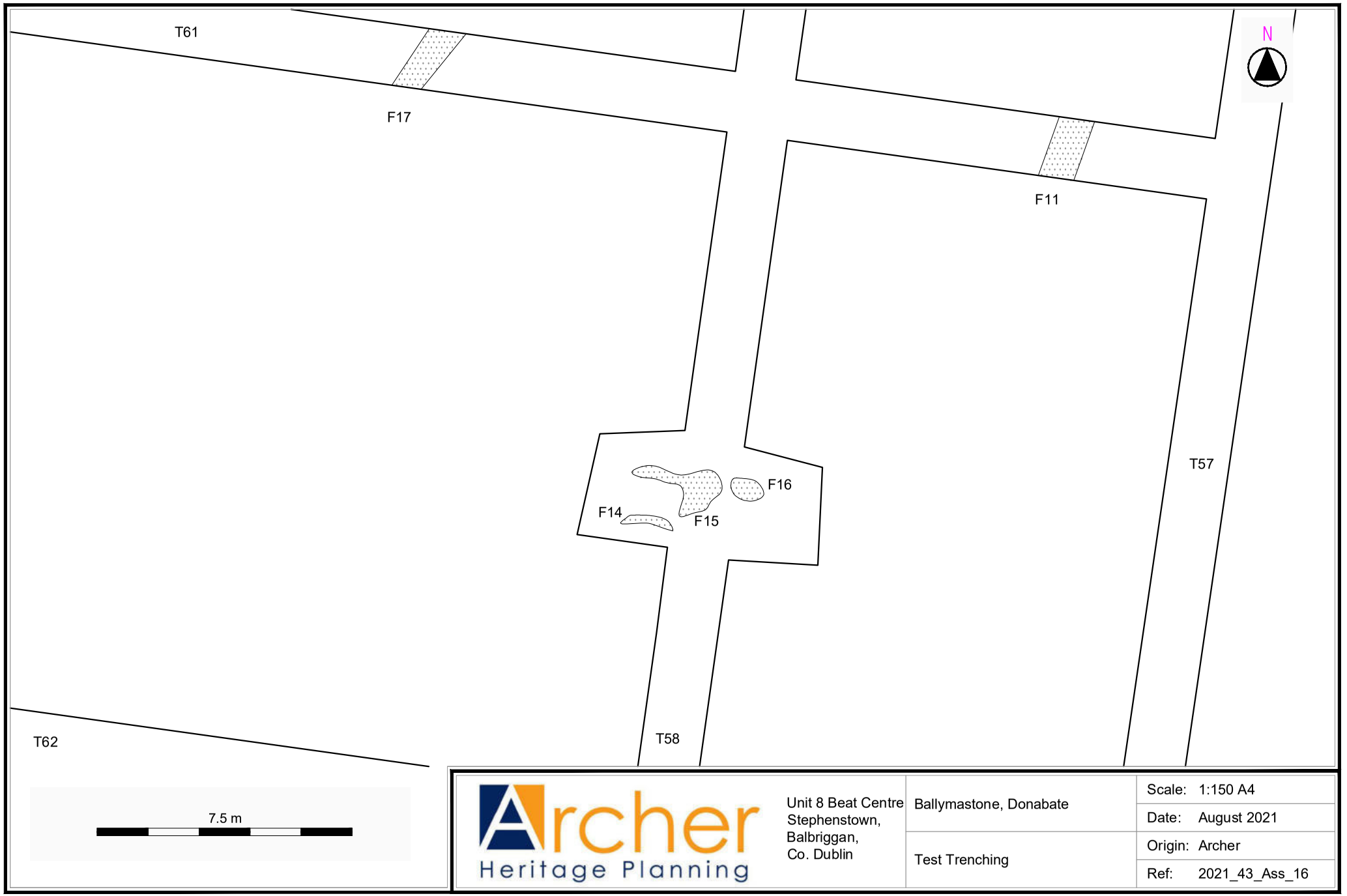


Figure 16: Testing Results (ix)

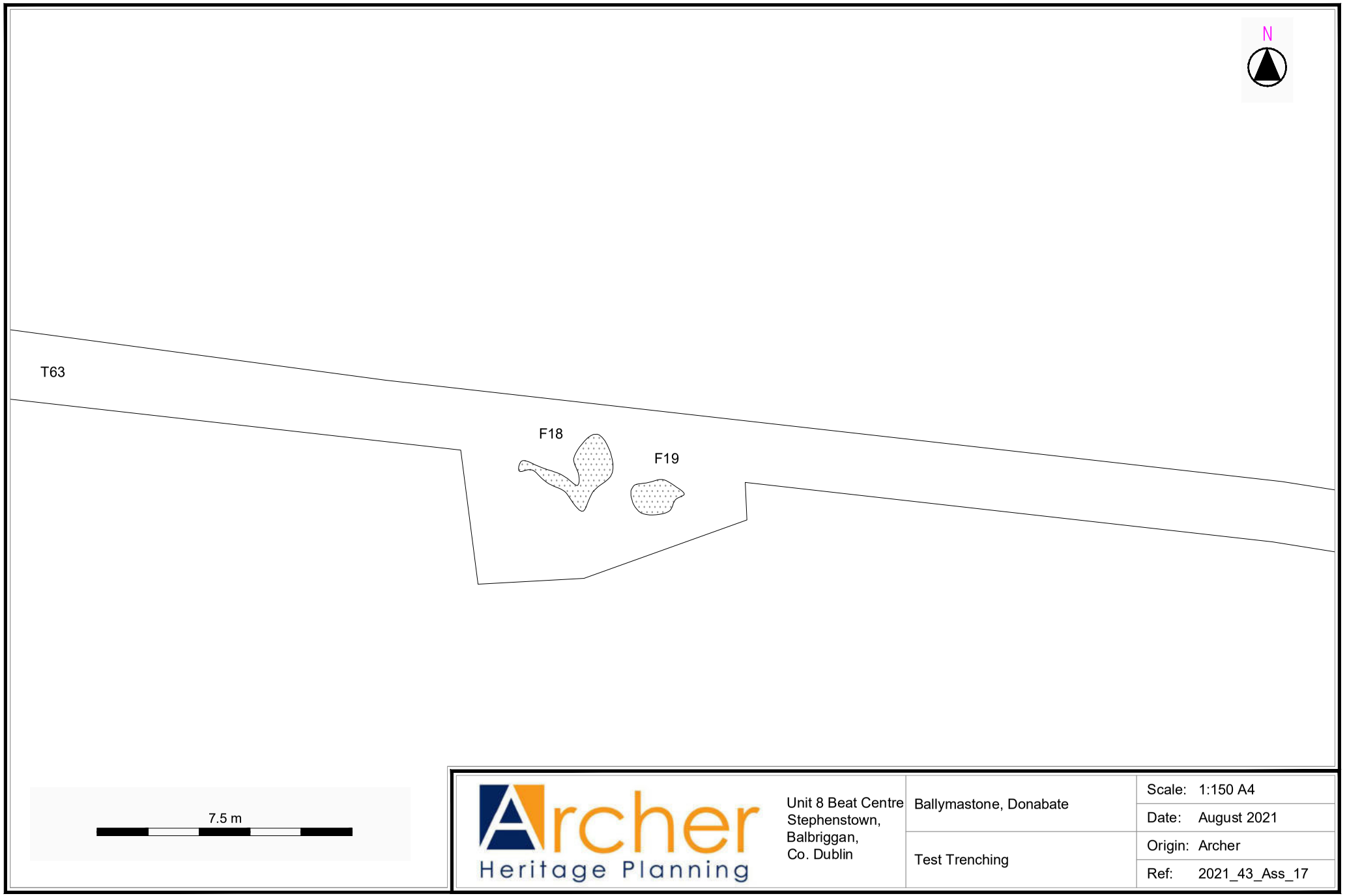


Figure 17: Testing Results (x)

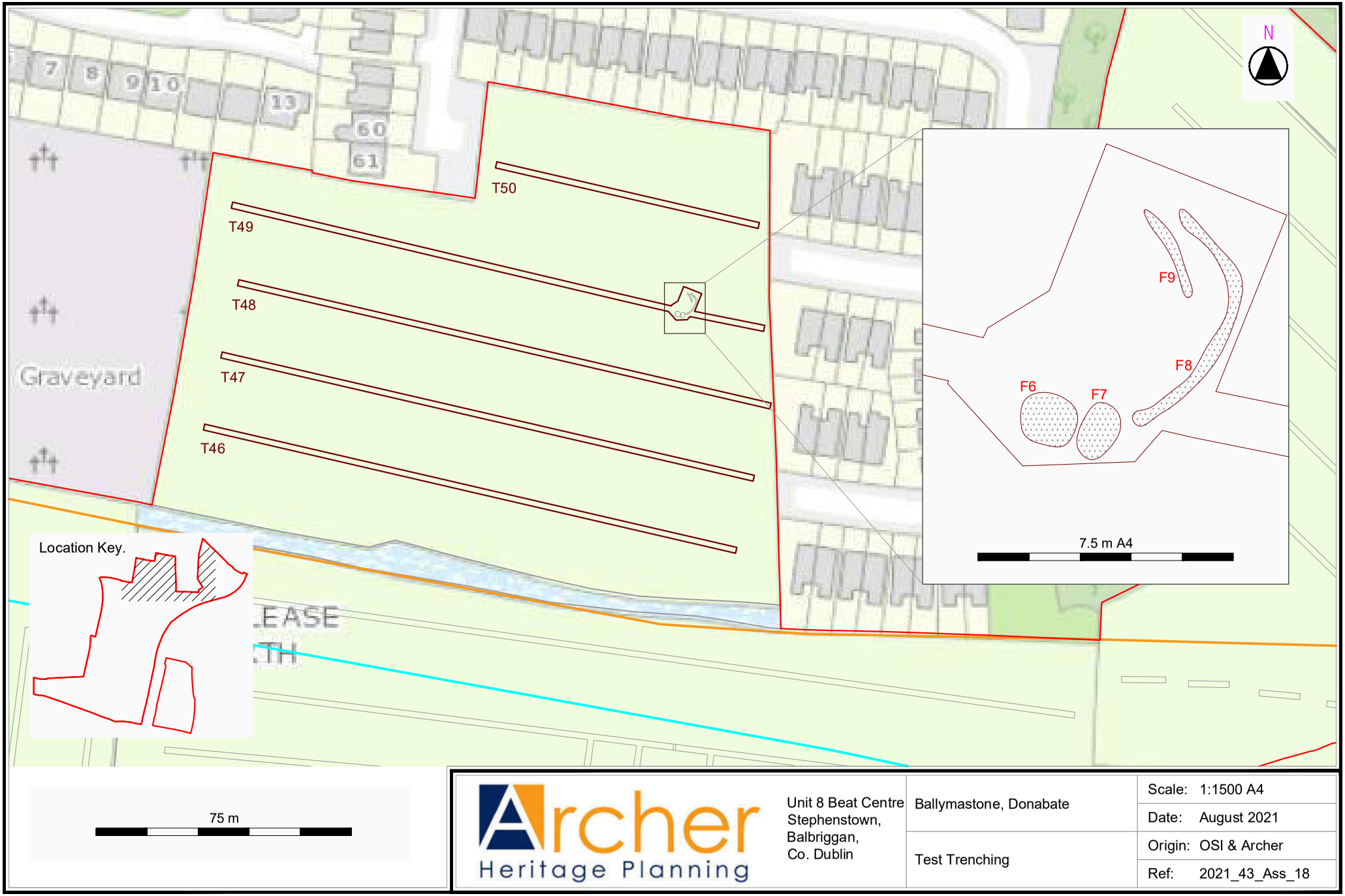


Figure 18: Testing Results (xi)



Figure 19: Testing Results (xii)

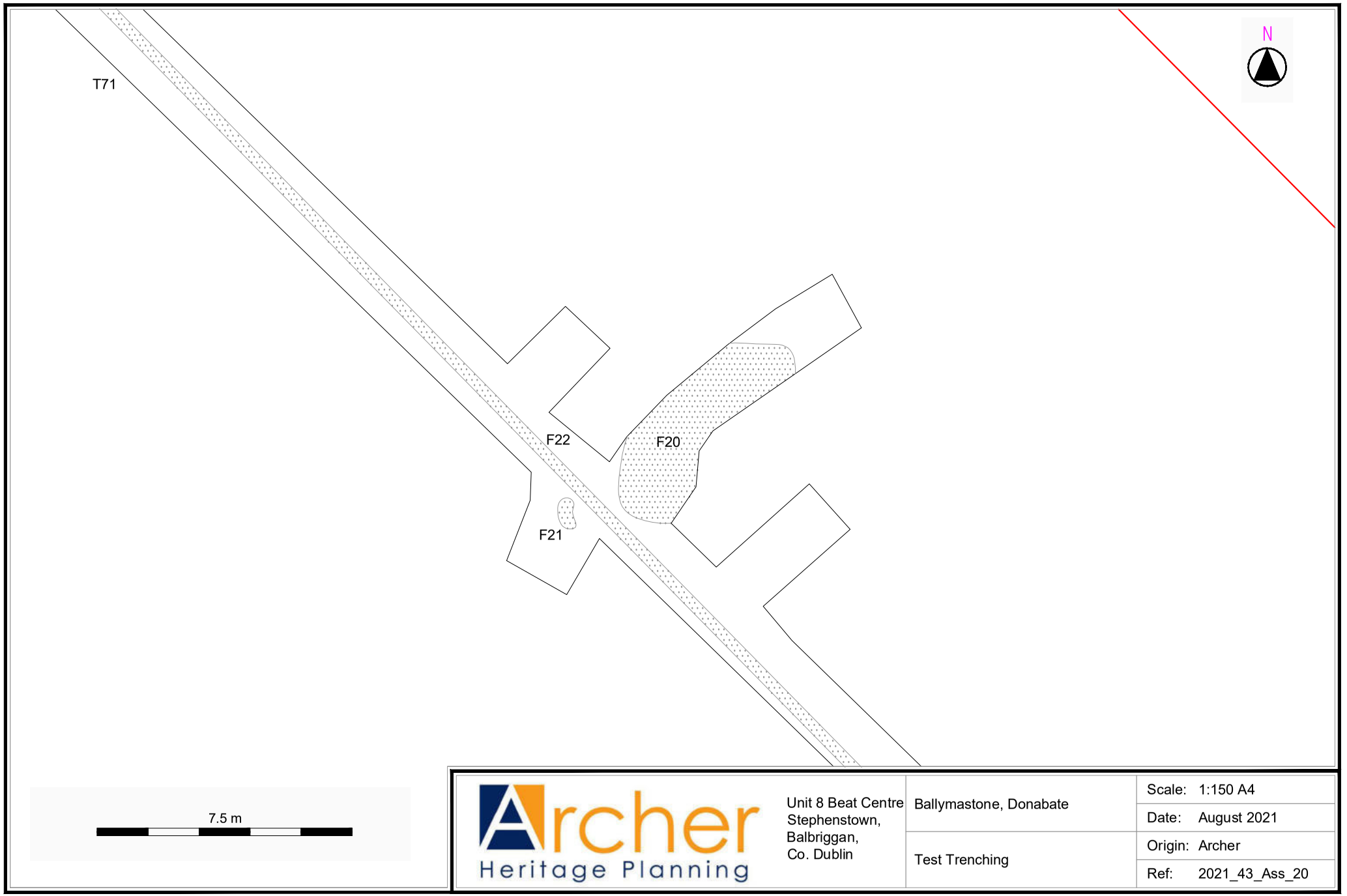
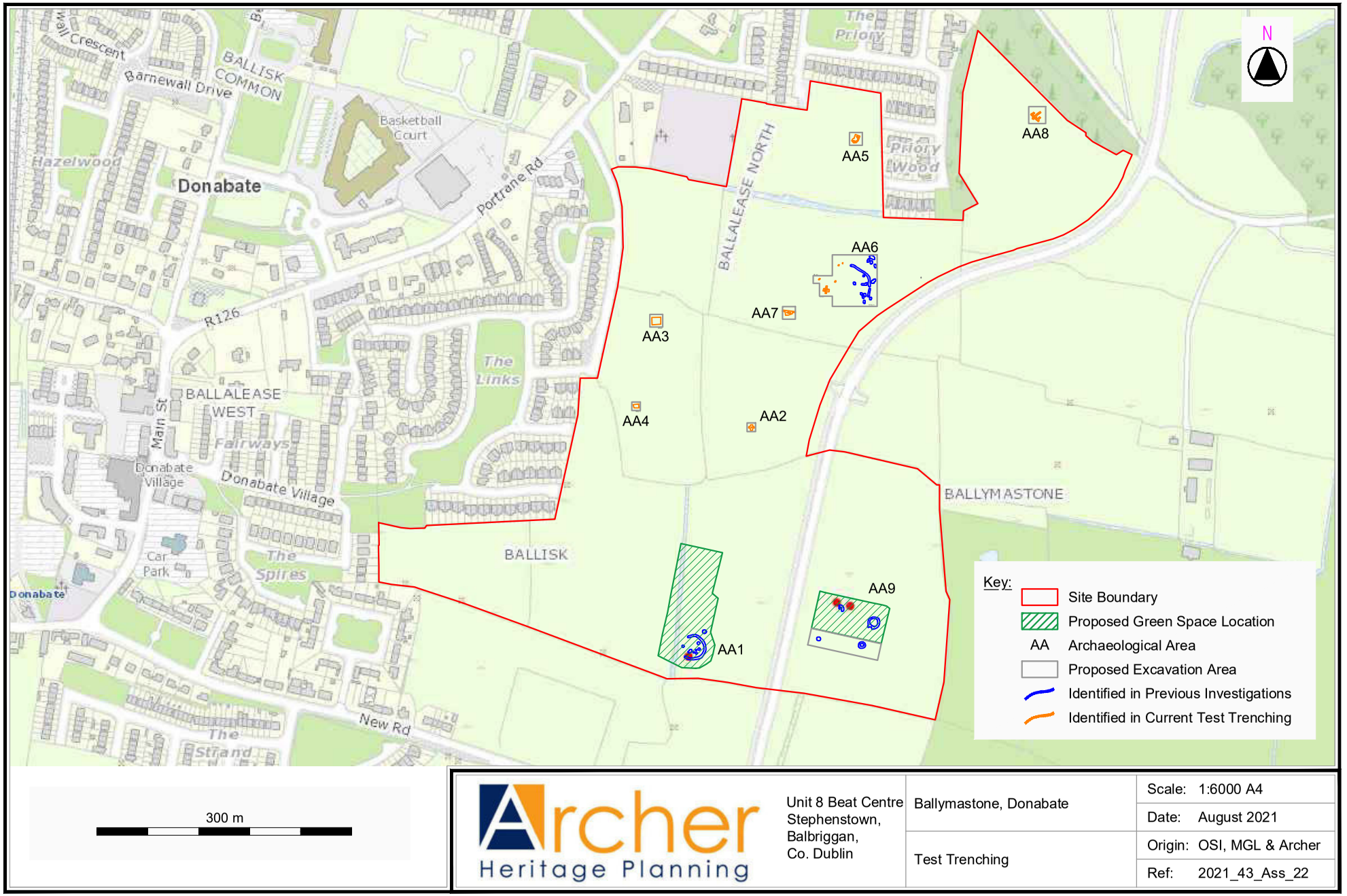


Figure 20: Testing Results (xii)



Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballymastone, Donabate	Scale: 1:1500 A4
			Date: August 2021
		Test Trenching	Origin: MGL & OSI
			Ref: 2021_43_Ass_21

Figure 21: Testing Results (xiv)



Archer Heritage Planning

Unit 8 Beat Centre
Stephenstown,
Balbriggan,
Co. Dublin

Ballymastone, Donabate

Test Trenching

Scale: 1:6000 A4
Date: August 2021
Origin: OSI, MGL & Archer
Ref: 2021_43_Ass_22

Figure 22: Proposed Mitigations


Plate 1: Working shot of test trenching


Plate 2: Aerial view of test trenches at Archaeological Area 1


Plate 3: Trench 28; F1; Archaeological Area 2 from S


Plate 4: Trench 36; F2-F4; Archaeological Area 3 from W


Plate 5: Trench 37; F5; Archaeological Area 4; west Facing Section


Plate 6: Trench 49; F6-F9; Archaeological Area 5 from NE


Plate 7: Aerial view of test trenching at Archaeological Area 6 from E


Plate 8: Trench 52 F10 South Facing Section


Plate 9: Trench 53 F11 South Facing Section


Plate 10: Trench 57; F12 from W

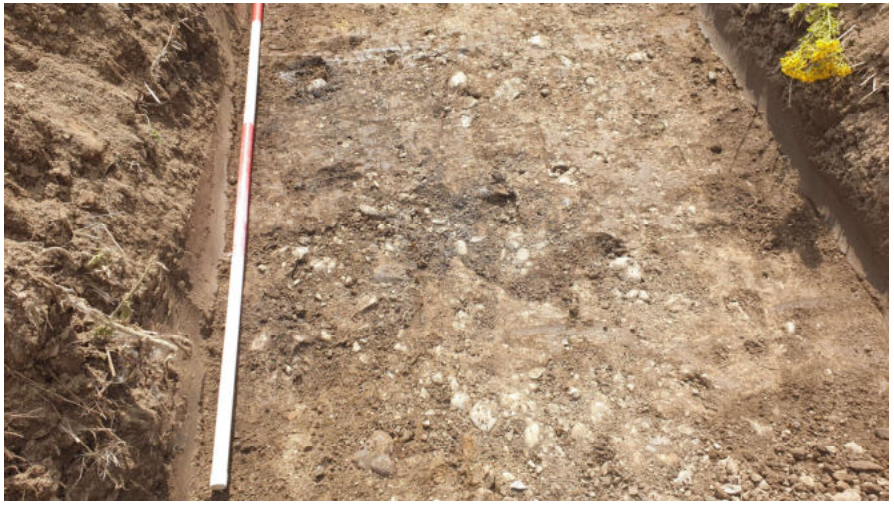

Plate 11: Trench 57; F13 from N


Plate 12: Trench 58; F14-F16 from S


Plate 13: Trench 61; F17 from E


Plate 14: Trench 63; F18-F19; Archaeological Area 7 from N


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Plate 16: Trench 79; F23; Archaeological Area 9 from S


Plate 17: Trench 2 from S


Plate 18: Trench 5 from N


Plate 19: Trench 7 from S


Plate 20: Trench 12 from W


Plate 21: Trench 16 from N


Plate 22: Trench 19 from N


Plate 23: Trench 22 from E


Plate 24: Trench 24 from E


Plate 25: Trench 25 from E


Plate 26: Trench 30 from W


Plate 27: Trench 33 from W


Plate 28: Trench 35 from N


Plate 29: Trench 38 from S


Plate 30: Trench 41 from S


Plate 31: Trench 45 from E


Plate 32: Trench 50 from E


Plate 33: Trench 53 from E


Plate 34: Trench 56 from S


Plate 35: Trench 60 from S


Plate 36: Trench 62 from W


Plate 37: Trench 60 from S


Plate 38: Trench 67 from NW


Plate 39: Trench 71 from SE


Plate 40: Trench 73 from N


Plate 41: Trench 77 from N


Plate 42: Trench 79 from E


Plate 43: Trench 83 from E


Plate 44: Trench 88 from W

Appendix 15.2 AA5 Archaeological Excavation Report

Archer Heritage Planning

Ballalease North, AA5, Donabate, Co. Dublin

Final Excavation Report

Licence no. 21E0670

Client: Glenveagh Living Ltd.

Date of issue: 15th November 2022

Testing | Surveying | Excavating | Analysing | Conserving | Reporting

Ballalease North, AA5, Donabate, Co. Dublin

Archaeological Excavation

SITE NAME	Ballalease North, AA5
CLIENT	Glenveagh Living Ltd.
INVESTIGATION TYPE	Archaeological Excavation
LICENCE NO	21E0670
PLANNING REF	n/a
TOWNLAND	Ballalease North
IRISH TRANSVERSE MERCATOR	723469, 750316 (centre of cutting)
RMP NO	n/a
RPS NO	n/a
ARCHAEOLOGICAL CONSULTANT	Archer Heritage Planning Ltd
ARCHAEOLOGIST	Liam Coen
DATE OF ISSUE	15th November 2022
JOB REF.	2021_43

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SUMMARY

The features excavated at Ballalease North AA5 represent settlement activity from the Early Medieval period (c. 400-1170 AD). Features comprised four pits, one connected to a curvilinear channel and a second short linear channel. Artefacts retrieved from excavation included late medieval pottery from the topsoil and a series of flint artefacts from both features and the clean-back of the site. A fragment of charcoal from one of the larger pits returned a radiocarbon date of 1030-1160 cal. 2δ AD (UBA 48272; 942 +/- 25 BP) likely placing activity here in the latter part of the Early Medieval period. Copious amounts of charred seeds were retrieved from the bulk soil samples taken from the larger pits and connected curvilinear channel. This would suggest that the pits and channel may represent the remains of a cereal-drying kiln or kilns. No *in situ* oxidised soil was identified in the cuts and insufficient material was retrieved from bulk soil samples for a meaningful charcoal analysis and it appears more convincing that the charred seeds accumulated as waste material from nearby kilns.

Revision	Status	Date	Prepared by	Reviewed by	Approved by
1	Final	15.11.22	L Coen ARCHAEOLOGIST	A O'Connell SENIOR ARCHAEOLOGIST	C. Mc Guinness

1. INTRODUCTION

This archaeological excavation report for a site at Ballalease North, Donabate, Co. Dublin has been prepared by Archer Heritage Planning Ltd for Glenveagh Living Ltd. The site was first identified during test excavations under licence no. 21E0453. The excavation took place on 11th-18th October 2021 under licence 21E0670 and the report presents the results with all post-excavation analysis. This excavation is one of eight (AA2-AA9) undertaken in advance of a proposed residential development for the area. Another archaeological site (AA1) will be preserved under green space in the development.

2. SITE DESCRIPTION

The site was located in a relatively flat field to the east of the expanding village of Donabate. The site is part of a wider landholding comprising a series of fields bounded by mature hedgerows previously under tillage though now lying fallow and overgrown with light vegetation. The village is located on a peninsula in the Irish Sea and the area has produced copious archaeological evidence for activity throughout the prehistoric period.

In the early medieval period, Donabate formed part of the kingdom of Brega, initially ruled by a dynastic confederation known as the Laigin, but after the seventh century was under the rule of the Síl nAedo Sláine of the Southern Uí Neill. After the area came under the control of the Anglo-Normans in the late twelfth century, the lands around Donabate came under the control of the Archbishop of Dublin, who had his episcopal manor at Swords, Co. Dublin. Around 1230 AD, Donabate church was granted to the monastery of Grane, Co. Carlow and remained in their possession until the dissolution of the monasteries in 1541 (Bates 2001). In the eighteenth century, an extensive tract of land around Donabate was purchased by Charles Cobbe, later Archbishop of Dublin.

The first portion of the name Donabate (Irish *Domhnach Bat*) most likely originates from the word *Domhnach* meaning church and *Baite* meaning wet or swampy. Alternatively, it may come from '*Dún a' Bháid*' meaning church of the ferry, which is supposed to refer to an ancient church in the townland of Ballymadrough west of Donabate near the Malahide Estuary. The townland name of Ballalease translates from Irish as 'town of the sheds' (*Baile an leas*, www.logainm.ie) and it is noted in the Civil Survey (1654-5) as Bally Ellis while the Down Survey map (1656) displays a parcel of land approximating the current townland's location and outline (from 1st Ed. OS map) as Ballielish Colledge land. The 'colledge land' indicates it was owned by the Archbishop of Dublin. It was also noted on this map that the Donabate townland of 117 acres was forfeited by Anthony Delahide of Lockhumny (probably Loughshinny) to Lord Fitzharding sometime between 1641 and 1670.

3. METHOD STATEMENT

The overall aim of the excavation was to preserve by record any archaeological features in the proposed excavation cutting. The cutting was established following test-excavations (O'Connell 2021, licence no. 21E0435) that first identified the archaeological material.

3.1 General Excavation Methodology

An open area rescue excavation strategy was employed. The recording techniques used are based on a system that best suits a rural environment as outlined in Barker (1977). This was supplemented by the recording system described in the Museum of London Archaeological Service Site Manual (Spence 1990). A single context recording system was used to record the site and multi-context plans were drawn at a scale of 1:20 or 1:50 (plans) & 1:10 or 1:20 (sections) as appropriate. Artefacts were labelled in accordance with NMI guidelines.

The topsoil was removed by mechanical excavation and then the site was hand cleaned to clearly establish the archaeological material. The material was assessed *in-situ* by archaeologist Liam Coen. Archaeological features such as pits were half-sectioned with linear features excavated by regularly spaced box-sections. The resulting section faces were drawn to establish a stratigraphic record. The remaining deposits were removed by hand to produce a post-excavation plan and photo. After deposits were removed from all identified features, hand-held camera photographs were taken as well as aerial post-excavation drone photographs of the site. The principal goals of the excavation were:

- Establish the stratigraphical sequence of the site;
- Determine the various phases of activity;
- Examine the morphology of the various features/structures; and
- Establish the date & function of the features.

3.2 Recording

All archaeological features and deposits encountered during the works were given a unique number in a continuous system recorded in the site archive. Entries were backed up by site-note books, and annotated multi-context drawings at appropriate scales. Site plans showed the location of all features recorded in the course of the excavation. Annotated sections/elevations were drawn at scales of 1:10 or 1:20 as appropriate. Heights of all principal features and levels were calculated relative to Ordnance Datum, correct to two decimal places. Site drawings were scanned and digitised using AutoCAD 2021 and geo-referenced to ITM projection. Digital photographs were taken of all archaeological features and deposits.

3.3 Sampling

Environmental sampling was undertaken in accordance with recent professional guidelines (*e.g.* Environmental Sampling: Guidelines for Archaeologists IAI 2007). Bulk soil samples were selected from secure deposits in order to gather dating material and environmental data.

4. ARCHAEOLOGICAL EXCAVATION RESULTS

A square cutting of roughly 15m x 15m (233 sq. m.) was opened by mechanical excavator under constant archaeological supervision. It was centred on features first identified during test excavations by Aidan O'Connell (2021). The site was cleaned by hand to further define the archaeological features. Two medieval pottery sherds; a fragment of a jug handle (21E0670:01:01) and a piece of a jug base (21E0670:01:02) were retrieved during the clean-back. Dublin-type wares of late 12th to early 13th Century date, it is thought likely that they came from the same vessel. Six flint artefacts were also retrieved during the clean-back; a disc scraper (21E0670:01:06); two end scrapers (21E0670:01:03, 21E0670:01:07); and three flakes (21E0670:01:04, 21E0670:01:05, 21E0670:01:08). It is not thought that the artefacts are related to the activities represented by the subsoil-cut features and are indicative of earlier and later activity on the site.

The archaeological features identified comprised two pits to the south, one of which was connected to a curvilinear channel running to the north. Two shallow pits were located near the northern terminus of the curvilinear channel while a second linear feature paralleled the curvilinear channel for a short stretch. The largest pit, **C11**, measured 2.35m north-west/south-east x 1.40m x 0.38m in depth. It contained two fills; a dark basal fill, **C12**, containing charcoal, charred seed, ash and burnt clay inclusions and an upper fill, **C13**, similar to redeposited subsoil. A modern furrow, **C14**, truncated the top of the pit. The bulk soil sample from the basal fill of this pit contained over 500 charred seed remains comprised of, in descending order, *cerealia* (*i.e.* indeterminate cereal grain), wild grasses, corn marigolds, oat, wheat, barley, two-rowed barley and several others. The other large pit, **C06**, lay 0.85m to the south-east. Measuring 1.70m north/south x 1.07m x 0.33m in depth it contained four fills with varying degrees of charcoal, ash and burnt clay inclusions. The bulk soil sample from the basal fill of this pit contained over 2000 charred seed remains comprised of, in descending order, *cerealia*, wild grasses, two-row barley, corn marigold, wheat, oat and several others. A fragment of *fraxinus* (ash) charcoal retrieved from the basal fill of pit **C06** returned a radiocarbon date of 1033-1160 cal 2δ AD (UBA 48272; 942 +/- 25 BP). A curvilinear channel, **C03**, ran to the north-east from the eastern side of the pit. Traced for just over 11m metres, it took a dog-leg turn to the north-west halfway along its length and gradually petered out as it progressed north-westwards. Two fills were identified in the channel; a darker basal fill, **C04**, in the

southern and central areas that contained charcoal, charred seed, ash and burnt clay inclusions; and a lighter coloured upper fill, **C05**, that became the only fill as **C04** petered out to the north. The bulk soil sample from the dark basal fill, **C04**, contained, in descending order, *cerealia*, barley, naked wheat, corn marigold, oat, stinking chamomile, two-rowed barley and other smaller numbers. Two small flint flakes (21E0670:04:01 & 02) were also retrieved from this basal fill.

A second linear feature, **C16**, ran alongside **C03,** c. 1m to the east. Like all the other features in the northern half of the cutting, it was quite shallow, <0.05m in maximum depth. It contained a single fill, **C17**, of charcoal flecked silt like many of the other features. Finally, the two pits, **C18** and **C20**, in the northern part of the cutting were both very shallow, <0.05m in depth with occasional charcoal fragments in their fills.

5. ENVIRONMENTAL REMAINS

5.1 Introduction

Bulk samples were taken from stratified, undisturbed deposits only and were selected for the perceived potential to produce dating and other environmental material. Samples were floated off-site in a custom made flotation tank that passed the samples through successive sieves to capture charcoal, small bones, charred seeds *etc*. These samples were dried and sent for analysis. All animal bone from stratified deposits were retained and processed similar to the finds assemblage. Animal bone recovered from bulk samples was also retained for analysis. Unstratified animal bone was not retained. Soil sieving details are presented in the table below.

Sample No.	Volume before processing	Feature No.	Feature Description	Flot weight	Retent weight	Flot Results
1	20	C04	Fill of slot trench C03	9		Rare charcoal, abundant seeds
2	20	C07	Basal fill of pit C06	36	400	Occasional charcoal, abundant seeds
3	20	C12	Basal fill of pit C11	6	743	Rare charcoal, abundant seeds
4	0.25	C04	Fill of slot trench C03	3		Rare seeds (sample collected to retrieve burnt bone)

Table 1: Bulk soil sample sieving details

After assessment of the soil sample flots by the charcoal specialist, Dr. Ellen O'Carroll, it was deemed that there was insufficient charcoal available for a meaningful analysis. The analysis of the non-wood plant macro remains (charred seeds) was undertaken by Dr. David Stone. The full report is reproduced as Appendix 3 while a summary is included in the section below.

5.2 Radiocarbon date

A single sample of charred wood was selected for radiocarbon dating (see Appendix 1). The charred wood sent for dating was extracted from the flot of the bulk soil sample following processing by floatation tank. The wood charcoal was selected and identified by Dr. Ellen O'Carroll prior to getting radiocarbon dated by the laboratory at 14 Chrono Centre at Queens University Belfast. The date quoted in the text has been calibrated to 2δ, 95.4% probability using OxCal v4.4 Bronk Ramsey (2020); r:5 and IntCal20 atmospheric curve (Reimer *et al* 2020) and details are presented below;

- *Fraxinus* (ash) charcoal from C07, sample 2, basal fill of pit C06; UBA 48272; 1033-1160 cal. 2δ AD; 942 +/- 25 BP.

This radiocarbon date lies within the Early Medieval period (c. 400-1170 AD). While it is at odds with the artefactual assemblage, this need not negate the value of the radiocarbon date. Many of the flint artefacts retrieved from the fills of the features were unutilised, abraded flakes and look likely to be residual finds; all three scrapers were topsoil finds and not directly associated with the features while the two medieval pottery sherds were only from the topsoil and again can't be directly associated with the archaeological features.

5.3 Charred seeds analysis

Four samples were analysed from the site with a total of 3766 charred seeds recovered. Three samples were bulk soil samples taken from each of the southern pits, **C11** and **C06**, and the channel leading into pit **C06** while the fourth was just a very small (~0.25L) amount of soil taken to retrieve burnt bone. Wheat, oat and barley were the only crop seeds identified with several varieties of wild or weed seeds also present. Most of the wild/weed seeds were of types typically found with arable conditions. The only fruit type seeds were three unburnt seeds from elderberries that came from the small sample. The most numerous sample came from pit **C06** with over 2000 seeds retrieved and contained in descending order *cerealia* (*i.e.* indeterminate cereal grains), wild grasses, two-row barley, corn marigold, wheat, oat and several others. The sample from the other pit, **C11**, had over 500 seeds and it contained in descending order *cerealia*, wild grasses, corn marigolds, oat, wheat, barley, two-rowed barley and several others. The final sample came from the channel, **C03**, and it contained in descending order *cerealia*, barley, naked wheat, corn marigold, oat, stinking chamomile, two-rowed barley and other smaller numbers. The assemblage can provide insight into agricultural practices and diet during the site's period of use during

the 11th or early 12th century AD. The crops identified, oat, wheat and barley are the most commonly seen during this period. As well as showing the range of crops, many of the weed seeds present suggest that the crops had been processed before deposition in the features. Also, the presence of a particular seed, Stinking mayweed (*Anthemis cotula*), suggests the use of a heavy plough in the cultivation of the crops.

6. ARTEFACTS

A modest range of artefacts were retrieved during the excavation. They were retrieved during the clean-back of the site and during excavation of the features. Details of the finds are presented in the table below. Summaries of the specialist analysis are presented in the following sections with the full Lithic Analysis report by Dr. Conor Brady in Appendix 4.

Context No.	Find No.	Material	Type	Description
C.01	21E0670:01:01	Ceramic	Pottery	Dublin-type ware, strap handle sherd
C.01	21E0670:01:02	Ceramic	Pottery	Dublin-type ware, base sherd
C.01	21E0670:01:03	Stone	Flint	Flint end scraper
C.01	21E0670:01:04	Stone	Flint	Flint flake
C.01	21E0670:01:05	Stone	Flint	Flint flake
C.01	21E0670:01:06	Stone	Flint	Flint disc scraper
C.01	21E0670:01:07	Stone	Flint	Flint end scraper
C.01	21E0670:01:08	Stone	Flint	Flint flake
C.04	21E0670:04:01	Stone	Flint	Flint flakes
C.04	21E0670:04:02	Stone	Flint	Flint flake
C.07	21E0670:07:01	Stone	Flint	Flint flake
C.15	21E0670:15:01	Stone	Flint	Flint flakes
C.15	21E0670:15:02	Stone	Flint	Flint flake

Table 2: Finds register

6.1 Lithic artefacts

Eleven flint artefacts were found at this site; six came from topsoil, **C01**; two from the curvilinear channel, **C04**; one came from the basal fill, **C07**, from pit, **C06**; and two came from the fill, **C15**, of the modern furrow that cut pit **C11**. Two of the topsoil artefacts are end scrapers (21E0670:1:3, 21E0670:1:7) while another is a disc scraper (21E0670:1:6). The remaining artefacts are all flakes, five are complete and three are incomplete. Of the eleven artefacts, three are primary, seven are secondary and one is tertiary. This combined with the small size of most of the artefacts is strongly suggestive of a pebble flint origin for the raw material used to knap these artefacts.

A feature of note from one of the end scrapers (21E0670:1:3) is that it has differential patination. The platform on this piece is patinated while the remaining surfaces are unpatinated suggesting that the scraper blank was knapped from a piece that had already been knapped and discarded for some considerable length of time during which a patina could form. Thus, in addition to raw material being sourced from shingle beaches in the form of pebbles, it is likely that surface scatters of already ancient flint were being used as a source of knapping material.

In terms of the chronology indicated by the artefacts in this assemblage, the convex end scrapers were made throughout the Neolithic period. As noted already, disc scrapers are often found in contexts with Beaker pottery although they are not regarded themselves as being diagnostic of activity during the final Neolithic/Early Bronze Age.

6.2 Medieval pottery

Two medieval pottery sherds were retrieved during clean-back of the site but not associated with any of the features. They were sent to Clare McCutcheon for specialist identification and comment and her note is reproduced below.

A note on the pottery from Ballalease North, Co. Dublin by Clare McCutcheon, MA MIAI

Discussion: Two sherds of pottery were presented for study. These sherds (1:1, 2) are medieval in date and can be identified as Dublin-type ware, dating generally to the 13th century (McCutcheon 2000, 122). The first of these (1:1) is part of a strap handle with two parallel lines surviving. The handle is split along the central line as the handle would have had three parallel incised lines in total. The second sherd (1:2) is a fragment of the base of a jug, with thumbing. These two sherds are most likely from the same jug.

7. DISCUSSION

The features excavated at Ballalease North AA5 represent settlement activity from the Early Medieval period (c. 400-1170 AD). Features comprised four pits, one connected to a curvilinear channel and a second short linear channel. Artefacts retrieved from excavation included late medieval pottery from the topsoil and a series of flint artefacts from both features and the clean-back of the site. A fragment of charcoal from one of the larger pits returned a radiocarbon date of 1030-1160 cal. 2δ AD (UBA 48272; 942 +/- 25 BP) likely placing activity here in the latter part of the Early Medieval period. Copious amounts of charred seeds were retrieved from the bulk soil samples retrieved from the larger pits and connected curvilinear channel. This would suggest that the pits and channel may represent the remains

of a cereal-drying kiln or kilns. However, while this is possible, it is considered unlikely by the author for several reasons.

Cereal-drying kilns were in use in Ireland from the prehistoric period to modern times. The cereal was dried to better help preserve the grain for storage or transport and to aid in grinding or milling. Essentially a kiln consists of a furnace or fire-spot with a flue directing the hot air generated to a drying chamber that contains the cereal grain. They are a feature of north-west coastal Europe with its damper climate (McCormick *et al* 2011 32-3). Though there are some Bronze Age examples (*e.g.* Hackett 2010, McQuade *et al* 2009 33-4), the majority are dated to between the fourth and thirteenth centuries (Monk & Power 2012 38). They were in use in Roman Britain and this is a possible source for the increased frequency of use seen here in the Late Iron Age. There is an increase in their prevalence up to the 6th century followed by a decline before another rise from the 11th to 13th centuries. There have been broadly defined by their shape in plan; keyhole-shaped; figure-of-eight shaped; dumbbell shaped; 'L'- or comma; and pit/irregular shaped though with much overlap (McCormick *et al* 2011 32-33).

The fills of the two pits here contained much charred seeds and other inclusions such as oxidised clay, ash and charcoal. These are also seen in more orthodox examples of cereal-drying kilns. In the case here at Ballalease North AA5, however, there was no oxidisation of the cut of either pit as might occur if a fire-spot was located there. 60 litres of bulk soil samples were taken from the deposits thought likely to produce useful environmental data. After processing by floatation tank and assessment by a charcoal specialist, Dr. Ellen O'Carroll, it was deemed that there was insufficient suitable material for a charcoal analysis. During excavation it was observed that the deposits contained a certain amount of charcoal inclusions. The fact none survived processing (pieces must be >2mm for analysis) indicates the poor quality of the charcoal material. This suggests the charcoal may have been degraded by the process of accumulation in the pit, *i.e.* deposited as waste or washed in from outside rather than produced as the result of an *in situ* fire-spot (see Monk 2000, 74). Also the channel, **C03**, that was connected to pit, **C06**, was traced for approximately 11m, unlikely in practical terms to be a flue for the transit of heated, drying air. In terms of their shapes on plan, perhaps pit **C11** could be placed into the 'comma-shaped' category though with the hint of a flue on its western flank whose remainder and potential fire-spot have been truncated away. Either way, the charred seed-rich inclusions in their fills suggest the workings of cereal-drying kilns but it appears more convincing that they accumulated as waste material from nearby kilns.

If the radiocarbon date can be taken as a reliable indicator of the sites' period of use, then it can be seen that this site is part of widespread Early Medieval settlement on the Donabate peninsula. Ringforts, or Early Medieval enclosed settlements, were the farms or homesteads of early medieval

farmers and their retainers (for general discussion see O'Sullivan *et al* 2010). They are the most common form of early medieval site recorded in the country and there are several examples in the surrounding landscape. An enclosure (RMP no. DU012-100) with a souterrain (DU 012-135) in the interior lies c. 1.3 km to the south-west in Corballis townland. A series of archaeological excavations including geophysical survey (Leigh 2006: Licence no. 07R0257) and test excavations (McLoughlin, 2007; Licence no. 07E0650; O'Connell 2017; Licence no. 17E0608) assessed the remains as an Early Medieval enclosed settlement. Other enclosures, such as DU012-088 in Ballymastone to the south and DU012-089 in Rahillion to the north are currently undated but are most likely to be Early Medieval in date based on morphology and past experience of other crop-mark examples.

The late medieval St. Patrick's Church of Ireland church at Donabate has had several archaeological works undertaken in its immediate vicinity. A substantial ditch, >90m in length, was revealed at the base of the slope from the Church (DU012-082001) that produced a 7th-8th century AD date from animal bone in its fill. Further ditches, amongst other features, were revealed in the field to the immediate north and west during test excavations (Whitaker & Lynch 2019; Licence no. 17E0239) informed by geophysical survey (Leigh 2016; Licence no. 16R0049). These ditches were not definitively dated from the assessment but some are thought to represent Early Medieval activity, one possibly the remains of an enclosure that would have surrounded the early ecclesiastical site on which St. Patrick's Church now lies. A burial ground with seven burials and other disarticulated bone was discovered in Beaverstown (Delany 2020; Licence no. 14E0419ext.) with radiocarbon dates from the 5th to 7th centuries AD. Closer to the current excavation, an undated enclosure (Coen 2022) containing both a pottery sherd likely from the 3rd millennium BC (*i.e*. Grooved or Beaker ware, pers. comm. E. Grogan) and the granite base of a rotary quern that is likely from the first millennium AD had a burial interred in the silted-up enclosure ditch. A fragment from the juvenile skeleton produced a 7th-8th century AD radiocarbon date and indicates a phase of activity at this enigmatic enclosure site just a few centuries prior to the activity at AA5.

The latter stages of the Early Medieval period are not well understood (O'Sullivan & McCormick 2017) but broad trends have emerged that have been illuminated by recent excavations. The move away from enclosed settlement saw few ring-forts built after c. 800 AD though many show evidence for continuing activity. Monastic enclosures also somewhat mirror this with examples of surrounding enclosure ditches deliberately back-filled (*ibid*. 124-5). The emergence of Viking settlements from the ninth century sees an apparent diminution of the cattle-based economy and a potential move towards the production of grain surpluses controlled by the political elite. The current excavation provides evidence for the arable economy in a poorly understood era prior to the arrival of the Anglo-Normans at the end of 12th century.

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Liam Coen

Liam Coen

15th November 2022

Appendix 1: Context Register

Cuts **in bold**

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
1	-	-	All	-	Overall of site; 0.45-0.6 in depth	Friable brown loam	Topsoil	Medieval pottery 21E0670:01:01-02 Flint flakes 21E0670:01:03-08	-
2	-	-	-	All	Under all of site	Limestone till, mixed browns & grey silty clay	Subsoil	-	
3	**-**	**4,5**	**2**	**4**	**11.80 x 0.45 max. x 0.33, shallower in N end**	**Curvilinear in plan; orientated SW/NE in S end then turns to NW in N end; sharp break of slope (b.o.s.) top; steeply sloping or upright straight sides; gradual b.o.s. base; concave to flat, linear base; abuts pit C06 at S end**	**Cut of curvilinear channel running into pit C06**	**-**	**-**
4	3	-	3	5	c. 6.50 x 0.45 max. x 0.33, shallower in N part of cut	Soft dark grey silty clay with charcoal & occ. stone, burnt bone & orange/brown lenses of silt flecked with charcoal	Basal fill of C03 in S & central parts	Flint flakes 21E0670:04:01-02	1,4
5	3	-	4	1	11.80 x 0.35 max. x 0.05-0.12	Light brown friable silt	Upper fill in S & central part & only fill in N part of C03	-	
6	**-**	**7,8,9, 10**	**2**	**7**	**1.70 N/S x 1.07 x 0.33**	**Sub-oval in plan; gradual b.o.s. top; steep upright sides on E side; sloping elsewhere; gradual b.o.s. base, flat/uneven oval base**	**Cut of pit, abuts channel C03 to E**	**-**	**-**
7	6	--	6	8	1.10 N/S x 1.04 x 0.13	Black friable silt with occ. stone inclusions located along E side & base	Basal fill of pit C06	Flint flake 21E0670:07:01	2
8	6	-	7	9	0.5 N/S x 0.23 x 0.07	Yellow grey soft clayey silt, possible ash	Localized middle fill in S part of pit C06	-	-
9	6	-	8	10	1.10 N/S x 1.05 x 0.20	Friable greyish brown with orange & yellow mottling clayey silt with occ. small stone inclusions	Main middle fill of pit C06	-	-

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
10	6	-	9	1	0.50 N/S x 0.43 x 0.10	Friable light yellowish brown clayey silt with occ. small & medium sized stone inclusions	Top fill of pit C06	-	
11	**-**	**12, 13**	**2**	**12**	**2.35 NW/SE x 1.40 x 0.38**	**Oval in plan; gradual b.o.s. top; steeply concave sides on SE half, sloping step on NW half; gradual b.o.s. base; flattish, uneven base**	**Cut of pit**	**-**	**-**
12	11	-	11	13	2.35 NW/SE x 1.40 x 0.15 max.	Friable black with grey & red mottling clayey silt with lenses of ash (grey) & burnt clay inclusions (red)	Basal fill of pit C11	-	3
13	11	-	12	14	1.16 x 0.90 x 0.25	Compact mid-dark brown silt with occ. small & medium sized stone inclusions	Redeposited subsoil middle fill in pit C11	-	
14	**-**	**15**	**13**	**15**	**2.00 + N/S x 0.38 x 0.10**	**Linear in plan; orientated N/S; truncates top fill of pit C11; gradual b.o.s. top; concave sides; gradual b.o.s. base; concave, linear base**	**Cut of modern drain/furrow**	**-**	**-**
15	14	-	14	1	2.00 + N/S x 0.38 x 0.10	Loose brown silty clay with occ. small stone inclusions	Only fill of drain/furrow C14	Flint flakes 21E0670:15:01-02	-
16	**-**	**17**	**2**	**17**	**8.65 N/S x 0.20 x 0.05**	**Linear in plan; orientated N/S; gradual b.o.s. top; concave sides?; gradual b.o.s. base; flat, linear base**	**Cut of shallow linear to W of C03**	**-**	**-**
17	16	-	16	1	8.65 N/S x 0.20 x 0.05	Friable black silt with occ. small stone inclusions	Only fill of shallow linear C16	-	-
18	**-**	**19**	**2**	**19**	**0.60 E/W x 0.25 x 0.05**	**Oval in plan; gradual b.o.s. top; concave sides?; gradual b.o.s. base; flat, oval base**	**Cut of shallow pit**	**-**	**-**
19	18	-	18	1	0.60 E/W x 0.25 x 0.05	Friable dark brown clayey silt with occ. charcoal & small stone inclusions	Only fill of shallow pit C18	-	-
20	**-**	**21**	**2**	**21**	**0.40 N/S x 0.30 x 0.05**	**Oval in plan; gradual b.o.s. top; concave sides?; gradual b.o.s. base; flat, oval base**	**Cut of shallow pit**	**-**	**-**
21	20	-	20	1	**0.40 N/S x 0.30 x 0.05**	Friable dark brown clayey silt with occ. charcoal & small stone inclusions	Only fill of shallow pit C18	-	-

Appendix 2: Radiocarbon date

UBA No.	Sample ID	Material Type	14C Age	±	F14C	±	mg Graphite
UBA-48272	21E0670:S2:C7	Fraxinus	942	25	0.8893	0.0027	0.964

Radiocarbon date certificate

Laboratory Identification: UBA-48272

Date of Measurement: 1st September 2021

Site: Ballalease North, Donabate, Co. Dublin

Material Dated: charcoal, see above

Pre-treatment: AAA

mg Graphite: 0.964

Submitted by: Liam Coen

Fraction corrected using AMS δ 13C

RADIOCARBON CALIBRATION PROGRAM*

CALIB REV8.2

Copyright 1986-2020 M Stuiver and PJ Reimer

*To be used in conjunction with:

Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.

Calibration data set: intcal20.14c # Reimer et al. 2020

UBA-48272	**Radiocarbon Age BP 942 +/- 25**	
% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal AD 1041-1052 1078-1107 1115-1155	0.132 0.354 0.514
95.4 (2 sigma)	cal AD 1033-1160	1.000
Median probability: 1100		

References for calibration datasets:

Reimer P, Austin WEN, Bard E, Bayliss A, Blackwell PG,Bronk Ramsey C, Butzin, M, Edwards RL, Friedrich M, Grootes PM, Guilderson TP, Hajdas I, Heaton TJ, Hogg AG, Kromer B, Manning SW, Muscheler R, Palmer JG, Pearson C, van der Plicht J, Reim Richards DA, Scott EM, Southon JR, Turney CSM,Wacker L, Adolphi F, Bantgen U, Fahrni S, Fogtmann-Schulz A, Friedrich R, Kahjler P, Kudsk S, Miyake F, Olsen J, Sakamoto M, Sookedo A, Talomo S. 2020

The IntCal20Northern Hemisphere radiocarbon calibration curve (0-55 calkB Radiocarbon 62. DOI: 10.1017/RDC.2020.41.

Comments: * This standard deviation (error) includes a lab error multiplier.

** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)

** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2) where ^2 = quantity squared.

[ ] = calibrated range impinges on end of calibration data set 0* represents a "negative" age BP

1955* or 1960* denote influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr

Appendix 3: Analysis of non-wood plant macro-remains

Final Environmental Remains Report (FERR); Licence number: 21E0670

Author: Dr David Stone

Introduction: Four environmental samples collected during excavations at Ballalease North (21E0670), Donabate, Co. Dublin conducted by Archer Heritage Planning were selected for full archaeobotanical analyses. This analysis recovered 3766 carbonised specimens of cereal cultivars, wild/weed, and fruit species providing insights into the agricultural economy, diet, and local conditions at Ballalease North. Cereals recovered consisted of two and six-rowed hulled barley (*Hordeum distichon /vulgare*), naked wheats (*Triticum aestivum/durum/turgidum*) and oat (*Avena* sp.) indicating their cultivation and consumption at the site. Wild/weed species were also common, and largely consisted of arable weeds and those that inhabit cultivated fields of cereal such as corn marigold (*Glebionis segetum*), stinking mayweed (*Anthemis cotula*), wild grasses (*Poaceae* sp.), wild radish (*Raphanus raphanistrum*), corncockle (*Agrostemma githago*), black bindweed (*Fallopia convolvulu*) and bedstraws (*Galium* sp.). These species likely entered the site with harvested grains, surviving the crop processing stages and became carbonised in either kilns or hearths during food preparation, along with the cereal grains. A small quantity of species that for the typical settlement flora or areas of disturbed or waste ground such as nipplewort (*Lapsana communis*), fat hen (*Chenopodium album*), goosefoots/saltbushes (*Chenopodium/Atriplex* sp.) and docks (*Rumex* sp.) were also recovered indicating the local conditions at Ballalease North. Fruit was a minor component of the assemblage with only three uncarbonized seeds of elder (*Sambucus nigra*) identified. A full taxonomic table of species recovered, and their quantities can be found in Appendix 1 below.

Outline of methods used:

Sample collection: A sample collection strategy was employed at the site of Ballalease North to collect environmental samples for analyses. The collection of sufficiently sized samples is paramount to accurate archaeobotanical analysis (Antolín et al., 2015; Hastorf, 1999: 58; Orton, 2000; Pearsall, 2000; van der Veen and Fieller, 1982). Three of the bulk soil samples taken at Ballalease North measured 20 litres in volume, which is deemed the appropriate samples size for the collection of a representative range of plant species present in carbonised or mineralise material (after McClatchie *et al*., 2015) (Table 1). The remaining sample S4 measured 0.25l in volume.

Sample processing: Samples were processed by Archer Heritage Planning prior to analyses using the flotation method. Flotation is one of the most important methodological developments in archaeobotanical research worldwide (Ford 1988; Wagner 1988; Wright 2005). The aim of using the

flotation method is the recovery of seeds, animal bone and other small cultural remains that are overlooked or lost during the normal soil screening processes on archaeological sites. It is a simple, inexpensive procedure, easily implemented and modified to suit specific excavation requirements (Wright 2005, 20). Flots were analysed using a Leica 9SD stereomicroscope with magnification between x6.3 to x50. The archaeobotanical material extracted were initially classified according to gross morphology (shape and size) and then identified by comparison to reference materials of modern seed diaspores and illustrations and pictures from various seed key publications (Anderberg 1994; Berggren 1981; Cappers and Bekker 2013; Clapham *et al*. 1962; Gale and Cutler 2000; Martin and Barkley 1973; Neef *et al*. 2012). All botanical and common names follow the order and nomenclature of Stace's (2010) New Flora of the British Isles (Third edition). Nomenclature for cereals follows Zohary *et al*. 2013.

Preservation of material: To assess the representativeness of plant macro remains discovered on archaeological sites it is necessary to consider the processes that took place during their creation, with taphonomy of fundamental importance to this understanding (Jones 1987; Matthews 2010; Miksicek1987; van der Veen 2007). Almost all material recovered from Ballalease North was preserved by carbonisation (with the exception of three elderberry seeds from sample 4).

Carbonisation: The formation processes of carbonisation are reasonably well understood and charred plant remains can enter the archaeological record through several different routes (van der Veen 2007, 978). These accidental or deliberate events can occur on a daily or infrequent timescale and therefore can produce different assemblage compositions. Several activities or actions have been identified as route-ways to carbonisation. Hubbard and Clapham's (1992) three class system is used to categorise different taphonomic processes which lead to the entry of a charred assemblage into the archaeological record (Jacomet, 2007: 2394).

a) Remains charred within the context from which they were recovered (unambiguous origins).

b) Secondary deposits where assemblages from a single burning event have been moved to the context from which they were excavated (single discrete event).

c) Assemblages formed from the deposition of many successive charring events, possible representing several different activities (multiple different events).

Carbonised assemblages tend to be homogenous with most samples comprising of cereal grains, cereal chaff, weed seeds and to a lesser extent pulses, nut shells and some wild plants (mostly arable weeds) which comprise the highest proportions of carbonised remains in mixed deposits after charcoal (Van-der-Veen, 2007: 977). This bias mainly results from the processing cereals must go through before they are consumed and the differential survival of plant parts during burning. Therefore in a typical charred assemblage a relatively limited range of plant species are represented. The fragility and

differential preservation of plant species and their components is highlighted by the fact that proportional losses after burning have been shown to be great. In experimental firings in hearths between 60% and 80% of cereal grains failed to survive the event with similar and sometimes greater losses for seeds of wild species (Colledge and Conolly, 2014: 194). Archaeological samples after burning are therefore likely to comprise species with more resilient seeds with a low probability that the overall charred assemblage composition bears direct relationship to the original specie proportionality or diversity. Other plants that are likely to be under-represented in the charred plant record which may have been of economic importance during this period are fibre crops, fruits and nuts, legumes, vegetables, herbs, spices and medicinal plants. As a result charred archaeobotanical assemblages possess an aggregate of about 35% of the range of edible plants documented in waterlogged samples (Colledge and Conolly, 2014: 194). Therefore the reconstruction of food consumption and environment, using charred assemblages only, is restricted to a record of the major cereal staples and the arable weed flora and consequently only suited for a reconstruction of agricultural practices.

Overall Results: All samples analysed contained plant macro remains with a total of 3776 carbonised specimens recovered, comprising of cultivars, fruit/nut, and wild/weed species (Appendix 1). Cereal species were the dominant category of plant remains comprising 67.7% of the assemblage. Wild/weed seeds were also common (32.68%) and consisted of species typical of cultivated fields and waste/rough places. Cereal chaff was occasionally recovered and comprised of the rachis internodes of barley and wheat species. Fruit species were a minor component and consisted of three uncarbonized elderberry seeds (Figure 1).

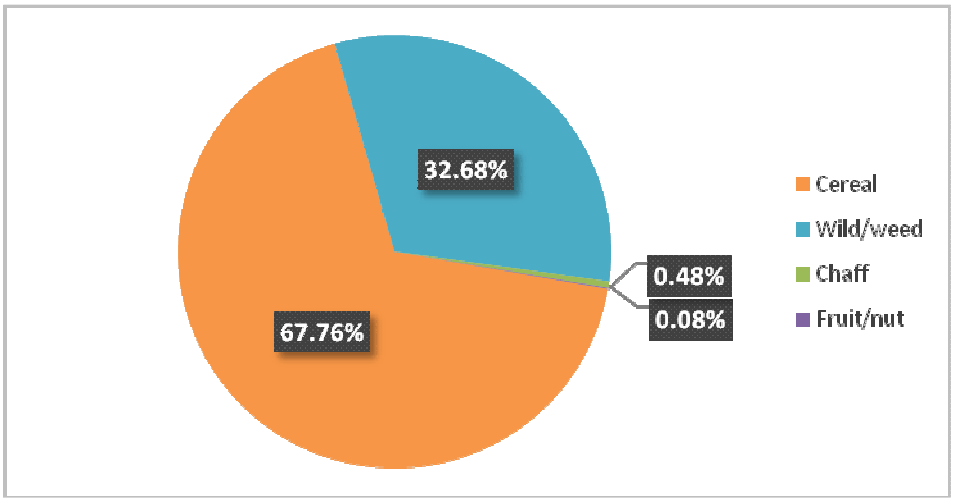


Figure 1: Pie chart of relative frequency of plant categories at Ballalease North.

Results by Sample/Feature:

Samples 1 (Context 4): A total of 420 carbonised specimens were recovered from sample 1, comprising of cultivated and wild/weed species. Hulled barley (*Hordeum* sp.), naked wheat (*Triticum aestivum/durum/turgidum*), and oat (*Avena* sp.) were found in broadly similar proportions. Hulled barley was slightly more prevalent followed by naked wheat and oat and was likely the two-rowed variety (*Hordeum distichon*) due to the 'straight' symmetrical grains identified. Both wild and domestic oat (*Avena fatua* and *Avena sativa*) were recovered, identified by the preservation of their floret bases. A large proportion of cereal grains recovered could not be identified to species level due to excessive fragmentation of distortion and are recorded as 'cerealia' in Appendix 1. Wild/weed species consisted of those typical of arable weeds such as corn marigold (*Glebionis segetum*), fat hen (*Chenopodium album*), stinking mayweed (*Anthemis cotula*), wild grasses (*Poaceae* sp.), wild radish (*Raphanus raphanistrum*), corncockle (*Agrostemma githago*) and bedstraws (*Galium* sp.).

Samples 2 (Context 7): A large quantity of carbonised specimens (2820) was recovered from sample 2, comprising of cultivated and wild/weed species. Cereals species were dominant with barley (*Hordeum* sp.), wheat (*Triticum* sp.) and oat (*Avena* sp.) present. Barley was the dominant grain recovered, followed by wheat and oat. Hulled barley was likely the two-rowed variety (*H. distichon*) due to the 'straight' symmetrical grains identified. Both wild and domestic oat (*A. fatua* and *A. sativa*) were recovered, identified by the preservation of their floret bases. Cereal rachis internodes indicate that bread wheat (*Triticum aestivum*) was one of the naked wheat species present. Wild/weed species largely comprised of wild grasses (*Poaceae* sp.) and corn marigold (*Glebionis segetum*), with smaller quantities of corncockle (*Agrostemma githago*), fat hen (*Chenopodium album*), knotweeds (*Polygonum* sp.), stinking mayweed (*Anthemiscotula*), nipplewort *(Lapsana communis*), wild radish (*Raphanus raphanistrum*), black bindweed (*Fallopia convolvulus*), common knotgrass (*Polygonum aviculare*), dock (*Rumex* sp.) and sunspurge (*Euphorbia helioscopia*). Radiocarbon dating (UBA-48272) of a carbonised piece of ash (*Fraxinus* sp.) returned a date to the late 11th century AD.

Samples 3 (Context 12): A large quantity of carbonised specimens (523) was recovered from sample 3. Cereals were the dominant category recovered comprising of barley (*Hordeum* sp.), wheat (*Triticum* sp.) and oat (*Avena* sp.), all in similar proportions. Oat however was slightly more prevalent, followed by barley and wheat. A small range of wild/weed species were recovered; largely comprising of wild grasses (*Poaceae* sp.) and corn marigold (*Glebionis segetum*); with a small quantity of fat hen (*Chenopodium album*), and stinking mayweed (*Anthemis cotula*) also present.

Samples 4 (Context 4)*:* The entire assemblage from this sample consisted of three uncarbonized elderberry seeds (*Sambucus nigra*).

Discussion: The assemblage at Ballalease North produced a large assemblage which provides insights into the agricultural practices, diet and local environmental conditions at the site in the 11th century.

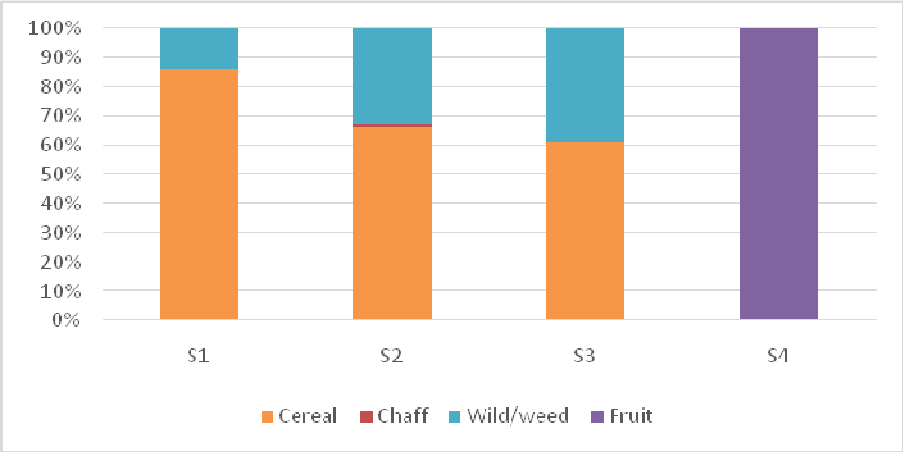


Figure 2: Relative frequencies of plant category by sample at Ballalease North.

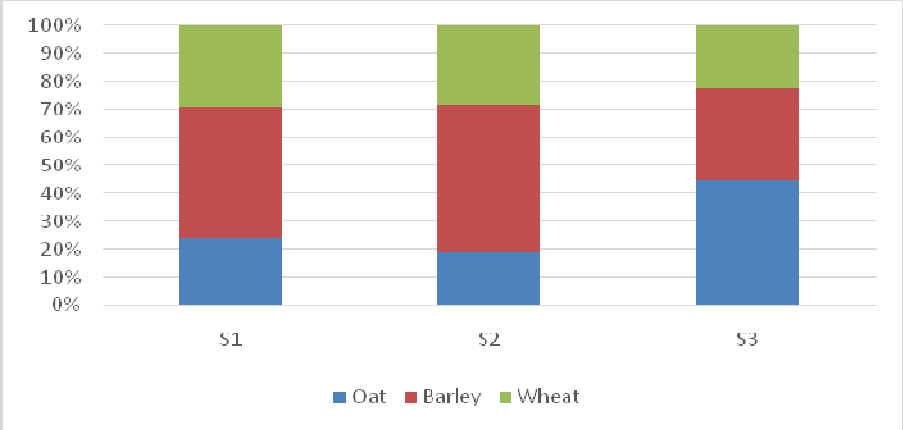


Figure 3: Relative frequencies of cereal species by sample at Ballalease North.

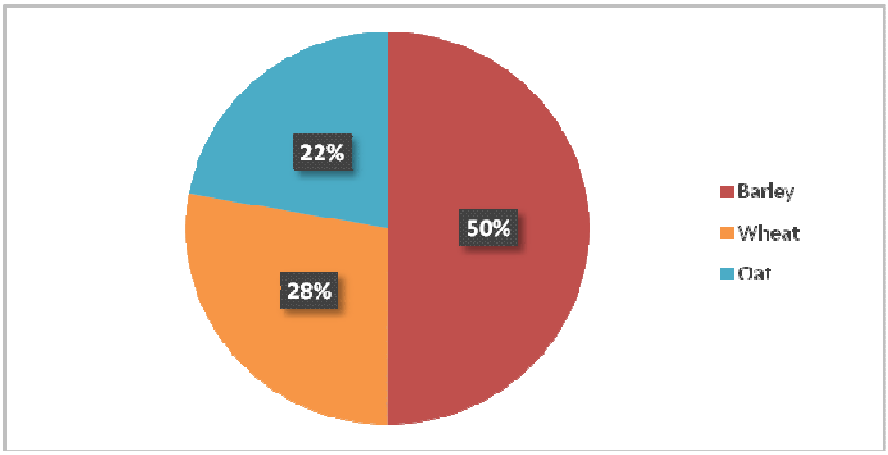


Figure 4: Pie chart of relative frequencies of cereal species recovered at Ballalease North.

Arable economy: The arable economy at Ballalease North revolved around the mixed cultivation of the cereals barley (*Hordeum* sp./*Hordeum vulgare*/*Hordeum distichon*), wheat (*Triticum* sp./*Triticum aestivum/durum/turgidum*), and oat (*Avena* sp./*Avena sativa*). Barley was the dominant grain recovered, comprising 50% of total cereal grains recovered. Wheat (28%) and oat (22%) also comprised a large proportion of the assemblage indicating their importance in the diet also (Figures 3 & 4).

Barley: Barley is the oldest crop species and is one of the best adapted crop plants to a broad diversity of climates and environments, thriving in a greater variety of conditions including drier and colder environments, poorer soils, and more saline sediments (McClatchie 2018; Riehl 2019). In Ireland, barley has been cultivated since the Early Neolithic period and was most commonly grown as a spring-sown crop for both human and animal consumption (Murphy and Potterton 2010). Barley grains can be used to make a wide range of foodstuffs but is mostly used in porridge, gruels, bread production and fermented into beer. Barley flour produces a heavy, dense loaf and is often considered to be 'inferior' to wheaten bread by those of higher status and consumed by lower-status members of society. Barley was also an important cereal particular because of its use in the malting process and was the most frequently used as it produced the best malt (Stone 2006, 13). However, no barley grains recovered at Ballalease North were sprouted grains, used to infer their use in beer making. Preservation of hulled grains was sufficiently good in some cases to differentiate between two/six rowed hulled varieties. While both species overall morphology is quite similar, six-rowed barley (*Hordeum vulgare*) has an a-symmetrical (twisted) grain, while two-rowed barley's (*Hordeum distichon*) is symmetrical (straight), most obviously affecting the ventral groove. Grains with longitudinal dorsal ridges, an angular cross-section or have fragments of lemma still adhered to the grains are identified as hulled barley (*H. vulgare*). The majority of hulled barley identified at Ballalease North was symmetrical and recorded as two-row barley with two grains displaying twisted grain and are likely a six-rowed variety.

Wheat: Wheat can be used in stews, pottages or gruels, but is most often used in the production of bread of superior quality, with a lighter and finer texture than those made of barley or oat. Wheat may have also been used to make other foodstuffs such as ales. Naked wheats (*T. aestivum/durum/turgidum*.) are generally identified by their asymmetrical profile, with a rounded to angular dorsal ridge, concave to flat to rounded-convex ventral surface. However, the identification of wheat species by grain alone is generally unreliable (Hillman et al. 1996). Chaff fragments of wheat species are often much more easily identifiable to species level than the cereal grains (van der Veen 1992, 23). A small quantity of rachis internodes present in the samples confirms the identification of the naked wheat variety bread wheat (*Triticum aestivum)*.

Oat: Oat is also used in many foods including flat breads and biscuits, porridges, gruels, and many other vessel-based preparations, including alcoholic drinks (McClatchie 2018). The grains of common oat (*Avena sativa*) display morphological similarities to a variety of wild and weed oat species, and it is difficult to identify them to species level without well-preserved floret bases (Jacomet 2006, 52). A small quantity of grains at Ballalease North had preservation of floret bases that was sufficiently good enough to identify the different disarticulation scars (Ladizinsky, 2012) of both domesticated common oat (*Avena sativa*) and wild oat (*Avena fatua*). Oat is also grown and harvested for its straw, which can be used in a range of activities, including the roofing of structures or as bedding. Its cultivation for its straw may explain the mix of wild and domestic varieties recovered, as the cereal grain was not the primary product desired.

Wild/weed species: Weed species recovered largely consisted of those that are typically considered arable weeds and largely inhabit cereal fields. These included corn marigold (*Glebionis segetum*), stinking mayweed (*Anthemis cotula*), wild grasses (*Poaceae* sp.), wild radish (*Raphanus raphanistrum*), corncockle (*Agrostemma githago*), black bindweed (*Fallopia convolvulus*) and bedstraws (*Galium* sp.) (Figure 5). These species would have entered settlements with harvested cereals, becoming carbonised in drying kilns, during cereal processing, or in cooking activities, and often disposed of in ditches and pits.



Figure 5: Arable weeds *Raphanus raphanistrum*, *Agrostemma githago*, *Fallopia convolvulus* & *Anthemis cotula* recovered at Ballalease North.

Arable weeds can be used to infer agricultural practices at Ballalease North. For example, the sowing time sowing time of cereal crops, which is subject to a range of social and economic considerations and is crucial to the understanding of past crop husbandry regimes, in particular the reconstruction of scheduling decisions and crop yield can be inferred using weed seeds present in samples (Bogaard *et al*., 2001). However, the data from Ballalease North is not conclusive. While the presence of winter annual weeds such as corn cockle (*Agrostemma githago*) and black bindweed (*F. convolvulus*) suggests that some of the cereal species may have been sown in the autumn, the large proportion of

late or long flowering annual species (used to infer spring sowing) suggests crops at Ballalease North were spring sown. However, wheat and barley species are very pliable and adaptive species which can survive and thrive in a variety of different conditions and can be sown in either autumn or spring, with autumn sowing favouring higher yields (Wilkinson and Stevens, 2008: 190).

Some information on the soil types present can also be inferred agricultural practices. For example, stinking mayweed (*Anthemis cotula*), is a species associated with heavy clays and clay loam soils and its presence is often associated with a shift from 'shallower' ard/light ploughs to the use of 'deep' heavy plough cultivation due to their long seed dormancy and their ability to germinate in disturbed soils (McKerracher, 2019). While this suggests the use of heavy plough in the Ballalease North in the 11th century more archaeobotanical research and data is required to gain more insights into the subject from a weed ecology perspective. When using weed presence in archaeobotanical assemblage to infer agricultural practices however, caution in making assertions about the cultivation strategies needs to be exercised and taphonomic processes such as crop-processing need to be considered.

Crop processing: The archaeobotanical weed assemblage from Ballalease North appears to have been largely affected by cereal crop processing activities. Crop processing is a multi-stage process where a harvested crop is cleaned and prepared for consumption by threshing, winnowing, and sieving the crop to remove straw, chaff, weed seeds and other detritus (Hald 2008) (Figure 6). The identification of crop-processing activities associated with cereals has become an established component of archaeobotanical research (Boardman and Jones 1990; Dennell 1972; Harvey and Fuller 2005; Hillman 1973; 1981; 1984; Jones, G. 1984; 1987; Jones, M. 1985; Knörzer 1971; Körber-Grohne 1981; Lundström-Baudais et al. 2002). These studies have highlighted that crop processing techniques create taphonomic issues that need to be considered when analysing assemblages as they have a major influence on the components recovered in the archaeobotanical record. Each distinct phase of crop processing produces a unique suite of products and by-products that can be differentiated in the archaeobotanical record (Hillman 1981). Each stage alters the composition of the crop assemblage, creating a product for retention and an unwanted by-product. The by-products of these stages have been grouped and classified according to the seeds physical characteristics, such as big-heavy-headed (BHH), big free-heavy (BFH), small headed-heavy (SHH), small-free-heavy (SFH), and small free-light (SFL) (after Jones 1984). Identification of materials from distinct stages allows archaeobotanists to identify to what extent the grain was processed before its deposition in the archaeological record. The identification of the level of processing is extremely important when making inferences of agricultural practices and when using the assemblage to understand social organisation in the past (Jones and Halstead 1995). The majority of arable wild/weed species mentioned above are categorised as SFH, BHH, or BFH, consistent with species usually associated with the late-stage processed cereal grains

(Table 2). For example, corncockle (*Agrostemma githago*) seeds are quite similar in size and weight to cereal grains, so would safely pass through the various crop processing stages and required great effort to handpick them from cereal grains when preparing foods. The lack of small weeds and chaff also suggests that these activities were not undertaken in the areas excavated and occurred elsewhere.

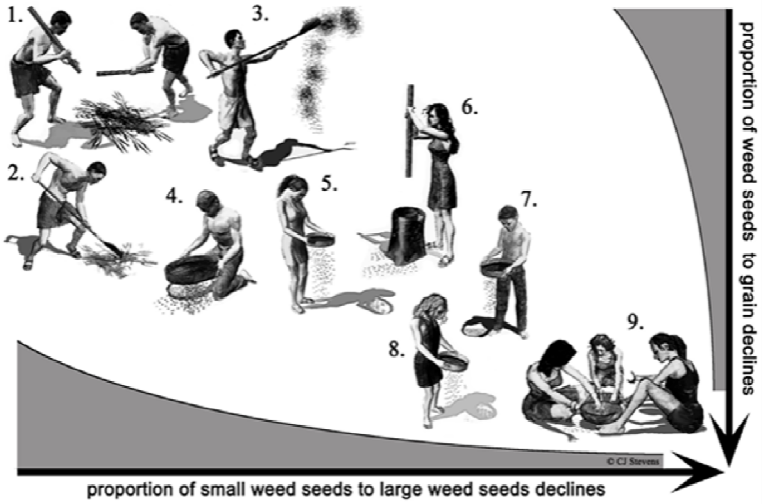


Figure 6: Crop processing stages and its effect on weed flora in archaeological assemblages.

Ruderals/Disturbed or waste ground: The remaining wild/weed species recovered at Ballalease North comprised of small quantities of species typical of settlement types and disturbed and waste grounds. Nipplewort (*Lapsana communis*), fat hen (*Chenopodium album*), goosefoots/saltbushes (*Chenopodium/Atriplex* sp.) and docks (*Rumex* sp.) likely grew in the vicinity of the site and comprise the background flora which typically inhabit disturbed and waste ground.

Gathered species (Fruit and nut): Species from gathered food type plants comprises a minor component of the assemblage at Ballalease North, with the only species recovered being elder (*Sambucus nigra*). Fruit and nut species tend to be underrepresented in carbonised assemblage and the low quantity of fruit or nut species here is likely a result of taphonomy, rather than their absence in the diet of people inhabiting the site. As many fruit and nut species do not need fire to process them for consumption, they are less likely to become carbonised and survive in the archaeological record.

Conclusions: Four archaeobotanical flots collected from excavations at Ballalease North produced a large carbonised assemblage of 3766 carbonised specimens. Cereal was the dominant category of species recovered and consisted of two and six-rowed hulled barley (*Hordeum distichon/vulgare*), naked wheats (*Triticum aestivum/durum/turgidum*) and oat (*Avena* sp.) indicating their cultivation or consumption at the site. Wild/weed species largely consisted of arable weeds and those that inhabit cultivated fields of cereal such as corn marigold (*Glebionis segetum*), stinking mayweed (*Anthemis*

cotula), wild grasses (*Poaceae* sp.), wild radish (*Raphanus raphanistrum*), corncockle (*Agrostemma githago*), black bindweed (*Fallopia convolvulu*) and bedstraws (*Galium* sp.). These species likely entered the site with harvested grains, survived the crop processing stages and were carbonised in either kilns or hearths during food preparation along with the cereal grains. A small quantity of species that for the typical settlement flora or areas of disturbed or waste ground such as nipplewort (*Lapsana communis*), fat hen (*Chenopodium album*), goosefoots/saltbushes (*Chenopodium/Atriplex* sp.) and docks (*Rumex* sp.) were also recovered indicating the local conditions at Ballalease North. Arable weed species present at Ballalease North provided some insights into some agricultural activities at the site, indicating the likely spring-time sowing of cereals, and the cultivation of fields using heavy ploughs. However, the weed assemblage has been highly affected by the actions of crop processing which must be considered when making any inferences. Gathered food species such as those from fruit and nut trees, commonly found on archaeological sites in Ireland, were almost absent at Ballalease North, with only three uncarbonised examples of elder berry (*Sambucus nigra*) recovered. The lack of these gathered species is likely a product of taphonomic processes of carbonisation and not the exclusion of wild foods in the local diet.

Recommendation for retention: It is recommended by the author that the charred plant macro-remains from Ballalease North should be retained.

Reasons for Recommendation: Developments in archaeological science has enabled the ability to carry out stable isotope (carbon and nitrogen) and Scanning Electron Microscopy (SEM) analyses on carbonised assemblages to investigate aspects of agriculture and food in the past including cropping strategies, water regimes, cooking techniques and malting. The retention of the carbonised assemblage at Ballalease North may benefit from the use of the above archaeological techniques in further research and should therefore be retained.

Storage requirements: The charred remains require relatively little storage space. Charred remains are stable and do not usually require additional conservation when stored appropriately. It is suggested that the charred remains are stored in a well-labelled hard-cased vial.

Acknowledgements: Many thanks to Liam Coen for his assistance on this project.

Disclaimer: The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data has been collated, the author accepts no responsibility for omissions and/or

inconsistencies that may result from information becoming available subsequent to the report's completion.

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Appendix 1: Taxonomic table of plant materials recovered from Ballalease North.

		C04	C07	C12	C04	
Binomial Name	**Common name**	**S1**	**S2**	**S3**	**S4**	**Total**
Cultivars (Cereal)						
Avena sativa	Common oat	1	9			**10**
Avena fatua	Common wild oat	1	1			**2**
Avena sp.	Oat	22	126	42		**190**
Hordeum distichon	Two-row barley	8	378	14		**400**
Hordeum vulgare	Hulled barley	1		1		**2**
Hordeum sp.	Barley	37		16		**53**
Triticum aestivum/durum/turgidum	Naked Wheat	29		2		**31**
Triticum sp.	Wheat		202	19		**221**
Cerealia	Indent cereal	262	1156	225		**1643**
Cultivars (Chaff)						
Triticum aestivum	Bread wheat		6			**6**
Hordeum distichon	Two-row barley		12			**12**
Fruit species						
Sambucus nigra	Elder				3	**3**
Wild/weed species						
Poaceae sp.	Wild grass	5	524	108		**629**
Chenopodium album	Fat hen	10	20	11		**41**
Chenopodium/Atriplex sp.	Fat hen			3		**3**
Fallopia convolvulus	Black-bindweed	1	5			**6**
Polygonum aviculare	Knotgrass		2			**2**
Polygonum sp.	Knotweed	1	10			**11**
cf. R. raphanistrum	Wild radish		5			**5**
Glebionis segetum	Corn marigold	27	314	71		**412**
Anthemis cotula	Stinking Chamomile	9	6	11		**26**
Agrostemma githago	Corncockle	1	20			**21**
Lapsana communis	Nipplewort		6			**6**
Rumex sp.	Dock		8			**8**
Euphorbia helioscopia	Sun-spurge		1			**1**
Galium sp.	Bedstraw	1				**1**
Total		**420**	**2820**	**523**	**3**	**3766**

Table 1: Environmental samples detail (Coen 2021)

Sample No.	Volume	Feature No.	Feature Description
1	20	C04	Fill of slot trench C03
2	20	C07	Basal fill of pit C06
3	20	C12	Basal fill of pit C11
4	.25	C04	Fill of slot trench C03

Table 2: Arable weeds at Ballalease North and their characteristics

Species	Physical Characteristic	Associated Crop Processing Stage	Life cycle	Flowering onset
Poaceae sp.	BFH	Late: Coarse sieving	Annual	
Fallopia convolvulus				Late
Polygonum aviculare				Late
Agrostemma githago				early / short
Raphanus raphanistrum	BHH			Late
Anthemis cotula				Late
Chenopodium album	SFH	Late: Fine sieving		Late
Glebionis segetum				Late

Appendix 4: Lithics Report

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September 2022

Donabate area (Archer Ref. 2021_43)

Ballalease North (AA4 21E0669)

Ballalease North (AA5 21E0670)

Ballalease North (AA6 21E0674)

Portraine Demesne (AA8 21E0676)

Ballymastone (AA9 21E0677)

Church Road, Lusk (21E0715)

Introduction

This report details the lithic assemblage recovered during archaeological investigations at a number of sites in the Donabate area undertaken by Archer Heritage Planning Ltd. The sites are as follows:

AA4 21E0669 Ballalease North	1 artefact
AA5 21E0670 Ballalease North	11 artefacts
AA6 21E0674 Ballalease North	14 artefacts
AA8 21E0676 Portrane Demesne	3 artefacts
AA9 21E0677 Ballymastone	2 artefacts
21E0715 Church Road, Lusk	1 artefact

Methodology

Artefacts were measured to the nearest millimetre and weights were recorded for all flint pieces to the nearest 0.1 g. The colour of the flint pieces was recorded objectively using Munsell® Soil Colour Charts where macroscopic assessment was not precluded by cortex, patination or burning. Artefact classifications are based on those of Peterson (1990) for analysing lithics from the Bally Lough project Co. Waterford and later modified and used by Dillon (1997) for her work on the assemblages from excavated contexts at Knowth in the Boyne Valley. Detailed descriptions, particularly of retouched pieces, are based on the system developed by Woodman *et al*. (2006). Edge damage was recorded on a number of artefacts from macroscopic examination. This may have occurred during the use of the artefacts but equally could have happened post deposition. It is possible that further microscopic analysis might reveal further evidence of use.

Abbreviations used in artefact descriptions: L: Length; B: Breadth; Th: Thickness; Wt: Weight; Plat W: Platform Width; Plat D: Platform Depth.

Raw Materials

Of the thirty-two artefacts analysed here, one was quartz, one was mudstone and the remaining thirty finds were flint. Flint occurs naturally in chalk and has a range of colours from grey to black and caramel brown. The cortex or outer skin on a flint pebble or nodule is usually smooth, textured or gritty and indicates an origin in glacial tills or from a shingle beach. The cortex on fresh or chalk flint is usually soft, or chalky and white in colour. During times of glaciation, flint was extracted and transported by ice sheets to non-flint bearing areas where it was deposited as a constituent of the general glacial drift (Jackson 1991, 34; see also Woodman 1987; Woodman et al. 2006: 81-3, fig. 3.4). Once deposited, the colour of the material tends to be altered by the absorption of minerals from the local soil and colours vary widely, ranging from shades of grey to cream through to brown (Dillon 1997, 33). Due to the abrasion and erosion experienced during transportation, any cortex remaining is generally textured or smooth in character rather than being chalky. The size of nodules and pebbles found in glacial drift tends to be much smaller than nodules from in-situ chalk deposits because of the stresses to which the nodules were subject during transportation.

The majority of the flakes and retouched artefacts in these assemblages were small and still retained cortical surfaces indicating a pebble flint origin for the raw material. Pebble flint is widely available along the costs of north county Dublin and the material was collected from shingle beaches and perhaps glacial till soils prior to working and/or transportation inland (Dolan and Cooney 2010). A number of archaeological surface collection surveys have mapped significant if varying densities of both worked and pebble- or nodular flint in the wider area (Guinan 199; Collins 1997; Brady 2016).

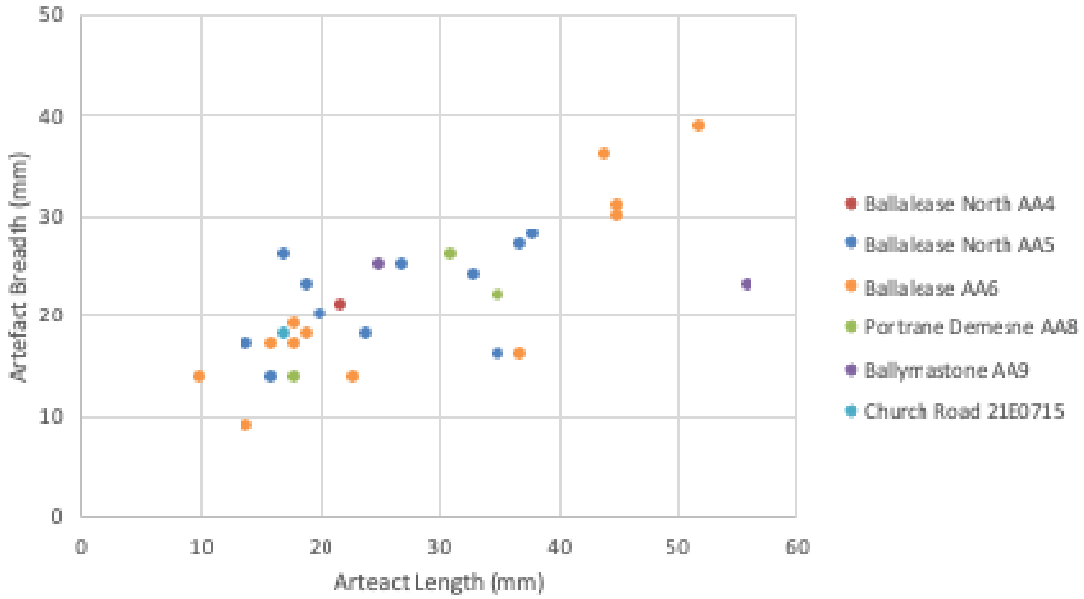


Figure 1: Length x breadth comparison, all flint artefacts.

Figure 1 compares the dimensions of all of the flint artefacts from the six sites. There is a clear tendency for the flakes to be less than 40mm in length. There are only five outliers and these flakes came from Ballalease AA6 and Ballymastone AA9 where flakes measured between 40 mm and 55 mm.

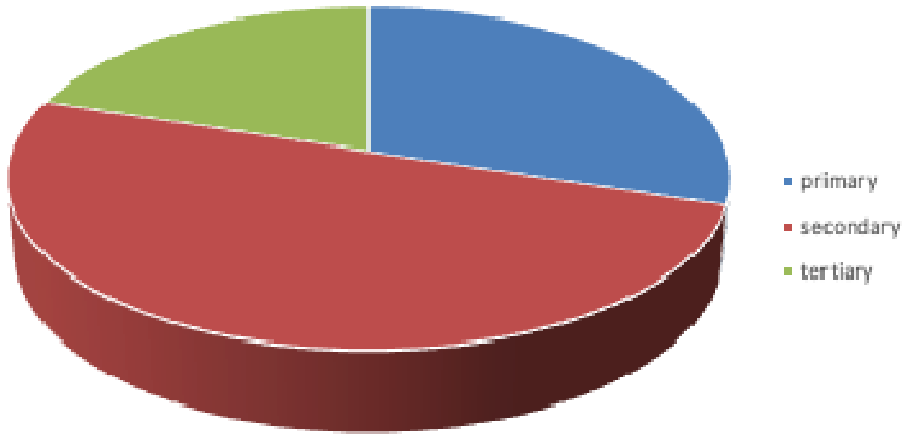


Figure 2: Cortical analysis, all flint artefacts.

There is also a strong tendency for the artefacts to retain some degree of cortical surface. 20% of the artefacts are primary where the dorsal surface of each piece is completely or almost completely cortical and 50% is secondary where there is some cortical surface remaining while just 20% of the flint artefacts are tertiary where there is no cortical surface remaining. This is strongly indicative of the raw material coming from small pebbles. The majority of the cortex surface textures are smooth indicating a beach or glacial till origin for the pebbles. In addition to this major source of raw material, there are indications that some retrieval and recycling of discarded lithic artefacts was taking place as a supplementary source of raw material. This is indicated primarily by the presence of differing levels of patination on single artefacts.

As mentioned above one of the artefacts in the assemblages analysed was quartz (21E0674:1:6) from Ballalease North. The piece is quite small with a maximum length of just 22 mm and it appears to have been struck although there are no particularly sharp or feathered edges remaining. The piece is incomplete and it is also in three separate refitting fragments.

Quartz is widely available across Ireland in the form of vein deposits, and it was used extensively in various features that were created around the perimeters of passage tombs in the Brú na Bóinne area and elsewhere and may have been regarded as having a special meaning or status. Although it is generally coarse grained or ‘sugary’ in texture with an absence of conchoidal fracture, it is occasionally

used for chipped stone tools. Because of the nature of the material, it is often very difficult for archaeologists to recognise and classify quartz artefacts that have been deliberately worked (Driscoll and Warren 2007; Woodman et al. 2006, 84).

Also present in the assemblage was a mudstone hammer stone. This material is only occasionally used for the manufacture of chipped stone artefacts because of its softness relative to other frequently available materials (Woodman et al. 2006, 85). Here it was used in the form of an intact, elongated water-rolled pebble in several ways as a percussive tool, possibly for lithic knapping activities.

There follows a consideration of individual assemblages from each site which includes a description of each find and a brief commentary on the assemblage.

AA4 21E0669 Ballalease North

One artefact was recovered during investigations at Ballalease NorthAA4 (21E0669). It is a primary flint flake which came from context C.01. This is not a diagnostic artefact but it is likely to date broadly to sometime between the Neolithic and Early Bronze Age. It was recovered from topsoil and may be the result of casual discard in antiquity. It is broadly indicative of prehistoric activity in the area during the prehistoric period.

21E0669:1:1

A complete unutilised primary flint flake. It is in abraded condition. The cortex is pale brown and smooth and is 2mm thick. The flint is pink and opaque. It has a plain platform and a feather termination.

L: 22 mm B: 21 mm Th: 3 mm Wt: 2.2 g

Plat W: 5 mm Plat D: 3 mm

Munsell No: 5YR 7/3

AA5 21E0670 Ballalease North

Eleven flint artefacts were found at this site. The artefacts were recovered from four contexts: six came from C.1 which is topsoil, two came from C.04, one came from C.07 and two came from C.15. Two of the artefacts are end scrapers (21E0670:1:3, and 21E0670:1:7). There is also a disc scraper (21E0670:1:6) with a length of 19 mm. These are often found in contexts with Beaker pottery although they are not necessarily diagnostic of Late Neolithic/Early Bronze Age activity (Woodman et al 2006, 159). The remaining artefacts are all flakes, five are complete and three are incomplete. Of the eleven artefacts, three are primary, seven are secondary and one is tertiary. This combined with the small size

of most of the artefacts is strongly suggestive of a pebble flint origin for the raw material used to knap these artefacts.

An additional feature of one of the end scrapers (21E0670:1:3) is that it has differential patination. The platform on this piece is patinated while the remaining surfaces are unpatinated. This suggests that the scraper blank was knapped from a piece that had already been knapped and discarded for some considerable length of time during which a patina could form. Thus, in addition to raw material being sourced from shingle beaches in the form of pebbles, it is likely that surface scatters of already ancient flint was being used as a source of knapping material.

In terms of the chronology indicated by the artefacts in this assemblage, the convex end scrapers were made throughout the Neolithic period. As noted already, disc scrapers are often found in contexts with Beaker pottery although they are not regarded themselves as being diagnostic of activity during the final Neolithic/Early Bronze Age.

21E0670:1:3
A complete secondary flint end scraper. It is in fresh condition. The cortex is pale brown and smooth and it is 1mm thick. The flint is very pale brown and opaque. The platform is patinated. The retouch is direct, abrupt, short in extent with a sub-parallel morphology. The platform is plain.
L: 27 mm B: 25 mm Th: 11 mm Wt: 8.2 g
Plat W: 20 mm Plat D: 9 mm
Munsell No: 10YR 7/4

21E0670:1:4
A complete utilised tertiary flint flake. It is in abraded condition. There is an all-over white patina.
L: 24 mm B: 18 mm Th: 6 mm Wt: 3.6 g

21E0670:1:5
An incomplete unutilised secondary flint flake. It is in abraded condition and the distal end is missing. The cortex is brown and smooth and it is <1mm thick. The flint is yellowish brown and opaque. The platform is cortical and there are two longitudinal dorsal flake scars.
L: 20 mm B: 20 mm Th: 5 mm Wt: 3.1 g
Munsell No: 10YR 5/8

21E0670:1:6

A complete secondary flint disc scraper. It is in fresh condition. The cortex is yellowish brown and smooth and it is 1mm thick. The flint is light yellowish brown and translucent with small inclusions. The retouch is direct, abrupt, short in extent with a parallel morphology. The platform is cortical and there are two crossed dorsal flake scars.

L: 19 mm B: 23 mm Th: 6 mm Wt: 3.4 g

Munsell No: 2.5Y 6/4

21E0670:1:7

A complete secondary flint end scraper. It is in abraded condition. The cortex is red and smooth and it is <1mm thick. The flint is yellowish red and translucent with small inclusions. The retouch is crudely applied; it is direct, abrupt, short in extent with a sub-parallel morphology. The platform is punctiform and there are three multi-directional dorsal flake scars.

L: 33 mm B: 24 mm Th: 10 mm Wt: 7.4 g

Munsell No: 5YR 5/8

21E0670:1:8

A complete unutilised primary flint flake. It is in fresh condition. The cortex is very pale brown and smooth and it is 2mm thick. The flint is strong brown and opaque with small inclusions. The platform is irregular soft and it has a hinge termination.

L: 37 mm B: 27 mm Th: 11 mm Wt: 11.9 g

Munsell No: 7.5YR 5/6

21E0670:4:1

An incomplete unutilised secondary flint flake. It is in fresh condition and the distal end is missing. The cortex is brown and smooth and it is 2mm thick. The flint is strong brown and translucent. The platform is crushed and there is one longitudinal dorsal flake scar.

L: 14 mm B: 17 mm Th: 4 mm Wt: 0.7 g

Munsell No: 7.5YR 5/6

21E0670:4:2

A complete unutilised primary flint flake. It is in fresh condition. The cortex is brown and smooth and it is 1mm thick. The flint is strong brown and opaque. The platform is punctiform and it has a hinge termination.

L: 16 mm B: 14 mm Th: 4 mm Wt: 1 g

Munsell No: 7.5YR 5/6

21E0670:7:1

A complete utilised secondary flint flake. It is in fresh condition and there is wear on both laterals. The flake is triangular in shape, and is wide at the distal end. The cortex is very pale brown and smooth and it is 3mm thick. The flint is reddish yellow and opaque. The platform is punctiform, there are two longitudinal dorsal flake scars and it has a cortical feather termination.

L: 38 mm B: 28 mm Th: 6 mm Wt: 4.4 g

Munsell No: 7.5YR 6/8

21E0670:15:1

A complete unutilised primary flint flake. It is in abraded condition. The cortex is very pale brown and smooth and it is 3mm thick. The flint is yellow and opaque. The platform is cortical and it has a cortical feather termination.

L: 35 mm B: 16 mm Th: 6 mm Wt: 4.3 g

Munsell No: 10YR 7/6

21E0670:15:2

An incomplete utilised secondary flint flake. It is in fresh condition and the proximal end is missing. The cortex is pale brown and smooth and it is <1mm thick. The flint is very pale brown and translucent. There is one longitudinal dorsal flake scar and it has a cortical feather termination.

L: 17 mm B: 26 mm Th: 5 mm Wt: 2.4 g

Munsell No: 10YR 7/4

Ballalease North AA6 21E0674

Fourteen lithic artefacts were recovered during investigations at Ballalease North AA6 (21E0674). They were recovered from six different contexts: six lithics came from C.01, one from C.03, one from C.12, three from C.25, one from C.39 and two from C.70.

Twelve of the lithics were flint, one was quartz and one was mudstone. Four of the flint artefacts were relatively large, each over 40 mm in length. These were two retouched flakes 21E0674:1:1 and 21E0674:1:2, and a utilised flint flake 21E0674:1:3. The largest piece, however, is a retouched spall (21E0674:1:5) which does not appear to have been deliberately knapped as it lacks a platform and point of percussion. The sizes of these pieces are above average and the flakes were all either retouched or utilised. A large proportion of the pieces in the assemblage are cortical – seven out of the twelve flint

artefacts. The cortex surfaces of all seven pieces was smooth indicating a glacial till or beach origin for the raw material from which they were knapped, most likely pebbles and small nodules. There is a variety to the colour of the flint pieces ranging from brown and strong brown to very pale brown, light yellowish brown, pinkish grey and greyish brown. The colours are thus quite mixed and are a further indication of a pebble flint origin for the raw material used.

The condition of the pieces in the assemblage is generally good. Just three pieces were abraded and the rest were fresh. The three abraded pieces were from C.01 which is topsoil so they may have been exposed to pressures and stresses over a long period of time.

All of the artefacts in this assemblage are flakes or flake-based. The most impressive modified or retouched pieces are the possible fabricator (21E0674:39:1). It is a small example and does not have the same robust triangular section of more classic examples. The two ends are missing so there is no sign of the wear that is often found at the ends of these tools but the pattern of retouch along both edges suggests that it was a fabricator. A range of functions has been suggested ranging from tools used to retouch other lithic tools to strike-a-lights (Woodman et al 2006, 173-4). The other notable modified object is an unfinished barbed-and-tanged arrowhead (21E0674:70:1). This has slightly rounded barbs and appears to be an example of a non-fancy Sutton type (Butler 2005, 162-5, figs. 68, 69; Green 1980). Although the tang is well formed and each barb has also been largely formed by invasive retouch, the remainder of the body of the arrowhead and especially the tip, have not been formed. There is no visible reason why the piece should have been abandoned – there are no obvious inclusions or imperfections. The piece is illustrative in that it is an unusual example of a half-finished artefact and gives an insight into the procedure followed by the knapper in making the arrowhead. Two of the large flakes mentioned above were also retouched (21E0674:1:1 and 21E0674:1:2) as well as the spall (21E0674:1:5). In addition to these modified tools, there are four unmodified utilised flakes in the assemblage (21E0674:1:3; 21E0674:1:4; 21E0674:25:2; 21E0674:25:3).

The chronology indicated by the pieces in this assemblage seems to be broadly Neolithic to Early Bronze Age. Some of the individual artefacts suggest a tighter date range, particularly the barbed-and-tanged arrowhead (21E0674:70:1) which is likely to be diagnostic of a Late Neolithic/Beaker period. Similar examples have been recovered from the Beaker levels at Knowth (Dillon 1997, 251) as well as from Site Z and the Late Neolithic pit circles at Newgrange (Brady 2007, fig. 4.19). The other notable artefact, the possible fabricator (21E0674:39:1), is not diagnostic of any particular period on present knowledge.

21E0674:1:1

An incomplete retouched primary flint flake. It is in abraded condition, there are small areas of crude retouch and utilisation along all edges and the proximal end is missing. The cortex is brown and smooth and it is <1mm thick. The flint is strong brown and opaque. It has a yellow all-over patina including the break surface, but there is none on the retouch. The retouch is both direct and indirect, abrupt and short in extent

L: 45 mm B: 30 mm Th: 14 mm Wt: 28.2 g

Munsell No: 7.5YR 5/6

21E0674:1:2

A complete retouched primary flint flake. It is in abraded condition and there is utilisation/chipping along one edge. The cortex is white and smooth/textured and it is <1mm thick. The flint is brown and opaque. It has a white all-over patina. The platform is faceted.

L: 45 mm B: 31 mm Th: 11 mm Wt: 18.5 g

Munsell No: 7.5YR 5/2

21E0674:1:3

A complete utilised tertiary flint flake. It is in abraded condition. It is irregular in shape, there is a concavity on one side with wear, but no retouch. The flint is very pale brown and opaque with large inclusions. It has a heavy white all-over patina. The platform is plain and there are three multi-directional dorsal flake scars.

L: 44 mm B: 36 mm Th: 12 mm Wt: 13 g

Munsell No: 10YR 7/3

21E0674:1:4

An incomplete utilised tertiary flint flake. It is in fresh condition and there is wear on the right lateral and the base of the left lateral and the distal end is missing. The flint is pink and opaque with large inclusions. The platform is plain.

L: 18 mm B: 19 mm Th: 2 mm Wt: 1.4 g

Munsell No: 7.5YR 7/4

21E0674:1:5

A complete retouched tertiary flint spall. It is in fresh condition. The piece is not a flake, as there is no platform or clear point of percussion but there is one oblique flake removal, and a section of retouch on

one edge 20mm long. The flint is greyish brown and opaque with large inclusions. It has a heavy white patina on the dorsal, but none on the flake scar or the retouched edges.

L: 52 mm B: 39 mm Th: 16 mm Wt: 29.8 g

Munsell No: 10YR 5/2

21E0674:1:6

An incomplete unutilised quartz flake. It is in fresh condition and it is in three separate refitting fragments.

L: 22 mm B: 10 mm Th: 3 mm Wt: 0.9 g

21E0674:1:7

A cylindrical, copper alloy tube/ferrule closed at one end. In two pieces.

21E0674:12:1

A complete unutilised primary flint flake. It is in fresh condition. The cortex is pale brown and smooth and it is <1mm thick. The flint is very pale brown and translucent. The platform is punctiform and it has a cortical/feather termination.

L: 14 mm B: 9 mm Th: 3 mm Wt: 0.5 g

Munsell No: 10YR 7/4

21E0674:25:1

An incomplete unutilised secondary flint flake. It is in fresh condition and the distal end is missing. The cortex is pale brown and smooth and it is <1mm thick. The flint is pinkish grey and translucent. The platform is cortical/punctiform and there are two longitudinal dorsal flake scars.

L: 23 mm B: 14 mm Th: 4 mm Wt: 1.4 g

Munsell No: 7.5YR 7/2

21E0674:25:2

A complete utilised secondary flint flake. It is in fresh condition. The cortex is very pale brown and smooth and it is 4mm thick. The flint is pinkish grey and translucent. The platform is cortical, there is one longitudinal dorsal flake scar and it has a hinge/cortical termination.

L: 18 mm B: 17 mm Th: 4 mm Wt: 1.1 g

Munsell No: 7.5YR 7/2

21E0674:25:3

An incomplete utilised secondary flint flake. It is in fresh condition, there is utilisation/crude retouch on the left lateral and the distal end is missing. The cortex is brown and smooth and it is <1mm thick. The flint is light yellowish brown and translucent. The platform is cortical and there is one longitudinal dorsal flake scar.

L: 19 mm B: 18 mm Th: 4 mm Wt: 1.9 g

Munsell No: 10YR 6/4

21E0674:3:1

A mudstone hammerstone. An elongated water-rolled pebble. It is sub-rectangular in section with very rounded corners. There is an area of intense pocking on one face, resulting in a 2-3mm deep scar; there is a similar more slight area of pocking on opposite face 25mm x 15mm, third area of pocking on same face on junction/edge between two facets 16mm x 8mm.

L: 100 mm B: 31 mm Th: 28 mm Wt: 110.3 g

21E0674:39:1

An incomplete tertiary flint fabricator. It is in fresh condition. There is no wear on the proximal end. The break is patinated and both proximal and distal ends are missing. The flint is pinkish grey and translucent. It has a light white patina except on the distal break and retouched edges. The retouch is direct, abrupt, short in extent with a scalar morphology. There are three longitudinal dorsal flake scars

L: 37 mm B: 16 mm Th: 5 mm Wt: 4.6 g

Munsell No: 7.5YR 7/2

21E0674:70:1

A complete retouched secondary flint unfinished barbed and tanged arrowhead. It is in fresh condition. The barbs and tangs are formed but the rest of the flake is unworked. Working is located along the right lateral of the flake. The cortex is brown and smooth and it is <1mm thick. The flint is reddish yellow and translucent. The retouch is bifacial, invasive, short in extent with a parallel morphology. The platform is cortical, there is one crossed dorsal flake scar and it has a hinge/cortical termination.

L: 16 mm B: 17 mm Th: 5 mm Wt: 1.4 g

Munsell No: 7.5YR 7/8

21E0674:70:2

A complete unutilised tertiary flint flake. It is in fresh condition. The flint is pinkish grey and translucent. The platform is punctiform, there is one longitudinal dorsal flake scar and it has a hinge/cortical termination.

L: 10 mm B: 14 mm Th: 3 mm Wt: 0.6 g

Munsell No: 7.5YR 6/2

Portrane Demesne AA8 21E0676

Three lithic artefacts were recovered during investigations at Portrane Demesne AA8 (21E0676). All were retrieved from C.01 and all were flint. All pieces were in good fresh condition and one of them, a utilised flake (21E0676:1:2) was incomplete. The pieces are of average size, the largest, a secondary flake (21E0676:1:3), is 35 mm maximum length. All pieces retain at least some cortex indicating a probable pebble flint origin for the raw material used. The cortex on all pieces is smooth so the raw material was likely collected from a shingle beach or from glacial till soil. The presence of the bipolar core (21E0676:1:1) in this small assemblage is a further indication of the reliance on relatively small raw material. This technique is often used when conventional hand-held knapping is not possible because of the small size of the core. The bipolar core is rested on an anvil stone and then struck with a hard hammer from above creating characteristic flakes with the appearance of having been struck from both ends simultaneously (Woodman et al. 2006, 81).

21E0676:1:1

A complete unutilised primary flint bipolar core. It is in fresh condition. The cortex is very pale brown and smooth and it is 3mm thick. The flint is yellowish brown and translucent with small inclusions. There are two negative flake scars.

L: 31 mm B: 26 mm Th: 11 mm Wt: 9.4g

Munsell No: 10YR 5/6

21E0676:1:2

An incomplete utilised primary flint flake. It is in fresh condition and the distal end is missing. The cortex is brown and smooth/textured and it is <1mm thick. The flint is yellowish brown and translucent. The platform is cortical.

L: 18 mm B: 14 mm Th: 5 mm Wt: 1.8g

Munsell No: 10YR 5/8

21E0676:1:3

A complete unutilised secondary flint bipolar flake. It is in fresh condition. The cortex is brown and smooth and it is <1mm thick. The flint is reddish brown and translucent. The platform is cortical/crushed. There are three opposed dorsal flake scars.

L: 35 mm B: 22 mm Th: 4 mm Wt: 4.4 g

Munsell No: 5YR 5/4

Ballymastone AA9 21E0677

Two lithics were recovered during investigations at Ballymastone AA9 (21E0677). Both are flint. They were recovered from two different contexts, C.08 and C.13. The secondary flake (21E0677:13:1) from C.13 is larger than average with a length of 56 mm and is the largest piece that was recovered across all of the assemblages discussed here. Thus, although there was a clear reliance and effective exploitation of small, relatively poor quality pebble flint, there was also occasional limited access to slightly larger pieces of raw material. Whether this was a chance find of a particularly large nodule in the local region or whether the parent raw material (or the artefact itself) was imported is not known.

21E0677:8:1

An incomplete unutilised secondary flint flake. It is in abraded condition and the distal end is missing. It looks like a failed attempt to create bipolar core. Two edges are crushed/damaged from repeated inadequate blows including the break edge. The cortex is reddish brown and smooth and it is <1mm thick. The flint is light grey and opaque. The platform is punctiform/crushed and there are three multi-dimensional dorsal flake scars.

L: 25 mm B: 25 mm Th: 6 mm Wt: 5 g

Munsell No: 10YR 7/2

21E0677:13:1

A complete utilised secondary flint flake. It is in fresh condition. The cortex is white and heavily textured and it is 2mm thick It has a heavy white all-over patina and there are large inclusions. The platform is cortical, there is one longitudinal dorsal flake scar and it has a feather/cortical termination.

L: 56 mm B: 23 mm Th: 10 mm Wt: 14.4 g

Church Road Lusk 21E0715

This single lithic artefact was recovered from C.81 and is in good fresh condition. It is also complete. This end scraper was manufactured on a relatively small secondary flake indicating the use of relatively small pebble flint as the raw material. It indicates activity broadly during the Neolithic to Early Bronze Age.

21E0715:81:1

A complete secondary flint end scraper. It is in fresh condition. The cortex is pale brown and smooth and is 1mm thick. The flint is yellowish brown and opaque. The retouch is direct, abrupt, short in extent, with a parallel morphology. The platform is cortical and there is one opposed dorsal flake scar.

L: 17 mm B: 18 mm Th: 7 mm Wt: 2.4 g

Munsell No: 10YR 5/6

Recommendations for illustration

AA5 21E0670 Ballalease North

21E0670:1:3 Flint end scraper

21E0670:1:6 Flint end scraper

21E0670:1:7 Flint end scraper

AA6 21E0674 Ballalease North

21E0674:70:1 Flint unfinished barbed-and-tanged arrowhead

21E0674:3:1 Mudstone hammerstone

AA8 21E0676 Portrane Demesne

21E0676:1:1 Flint bipolar core

21E0715 Church Road, Lusk

21E0715:81:1 Flint end scraper

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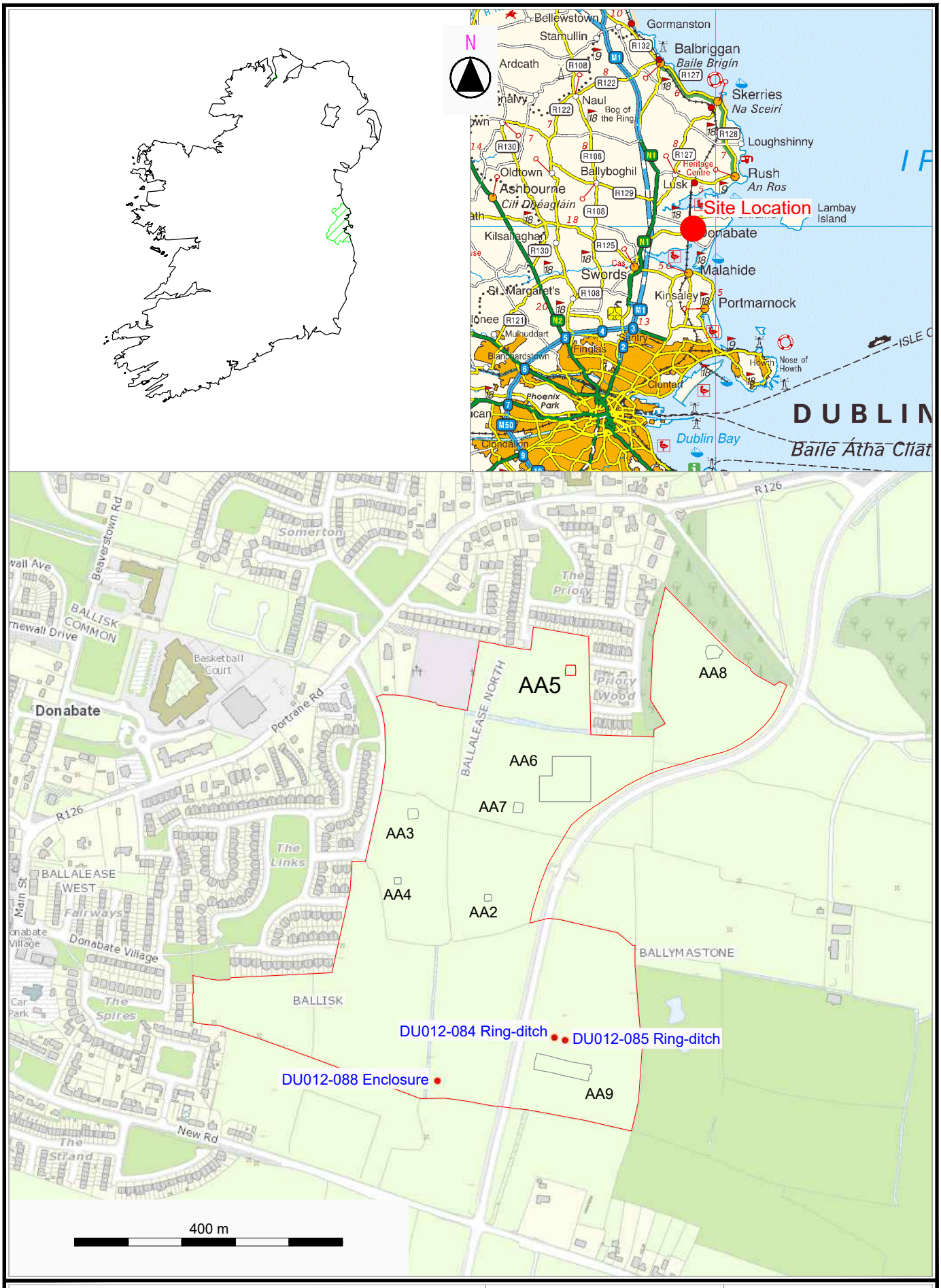
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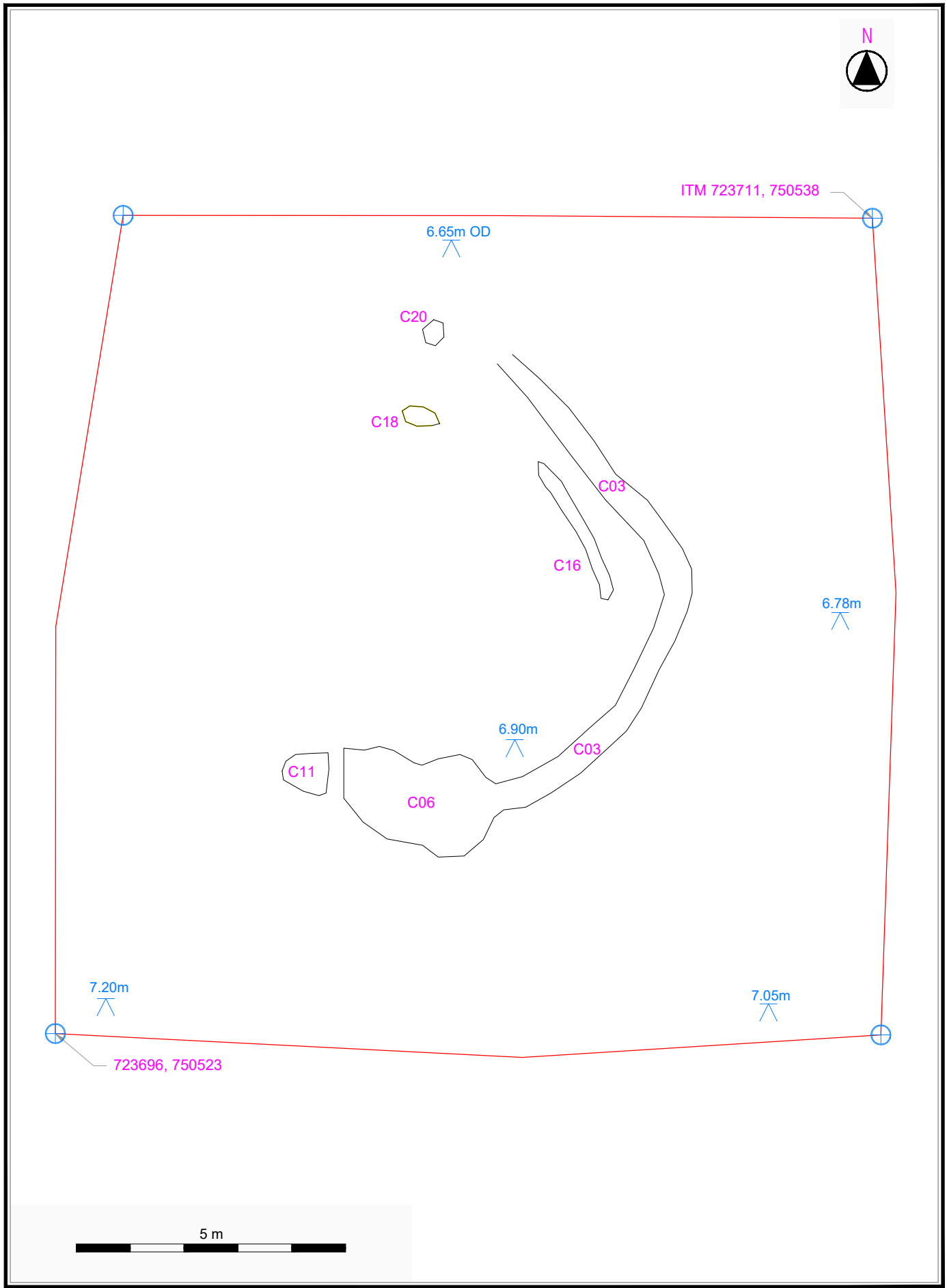
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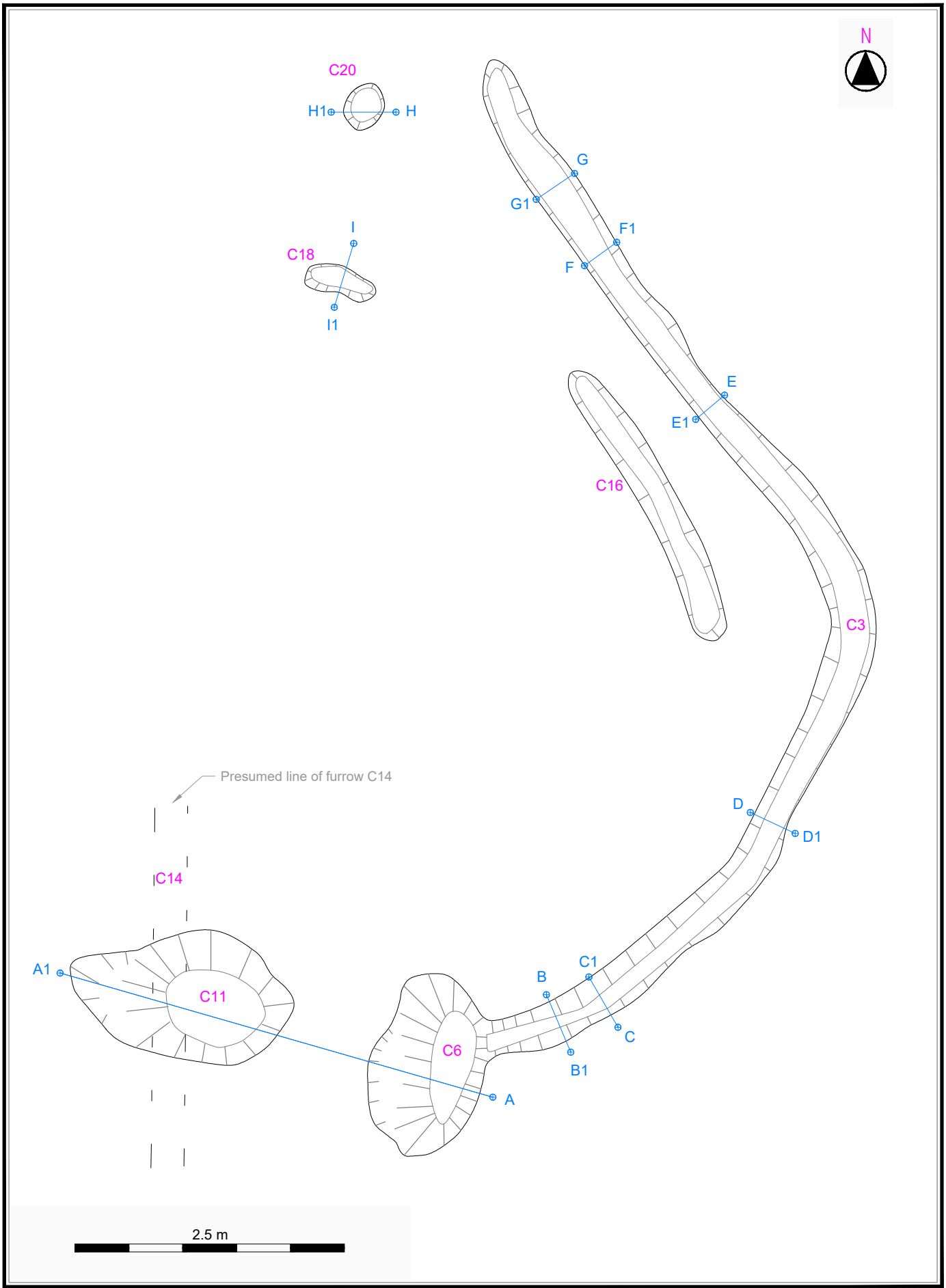
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			Date: January 2022
		Licence no. 21E0670	Origin: NMS
			Ref: 2021_43_EX_01

Figure 1: Site location with surrounding archaeology sites



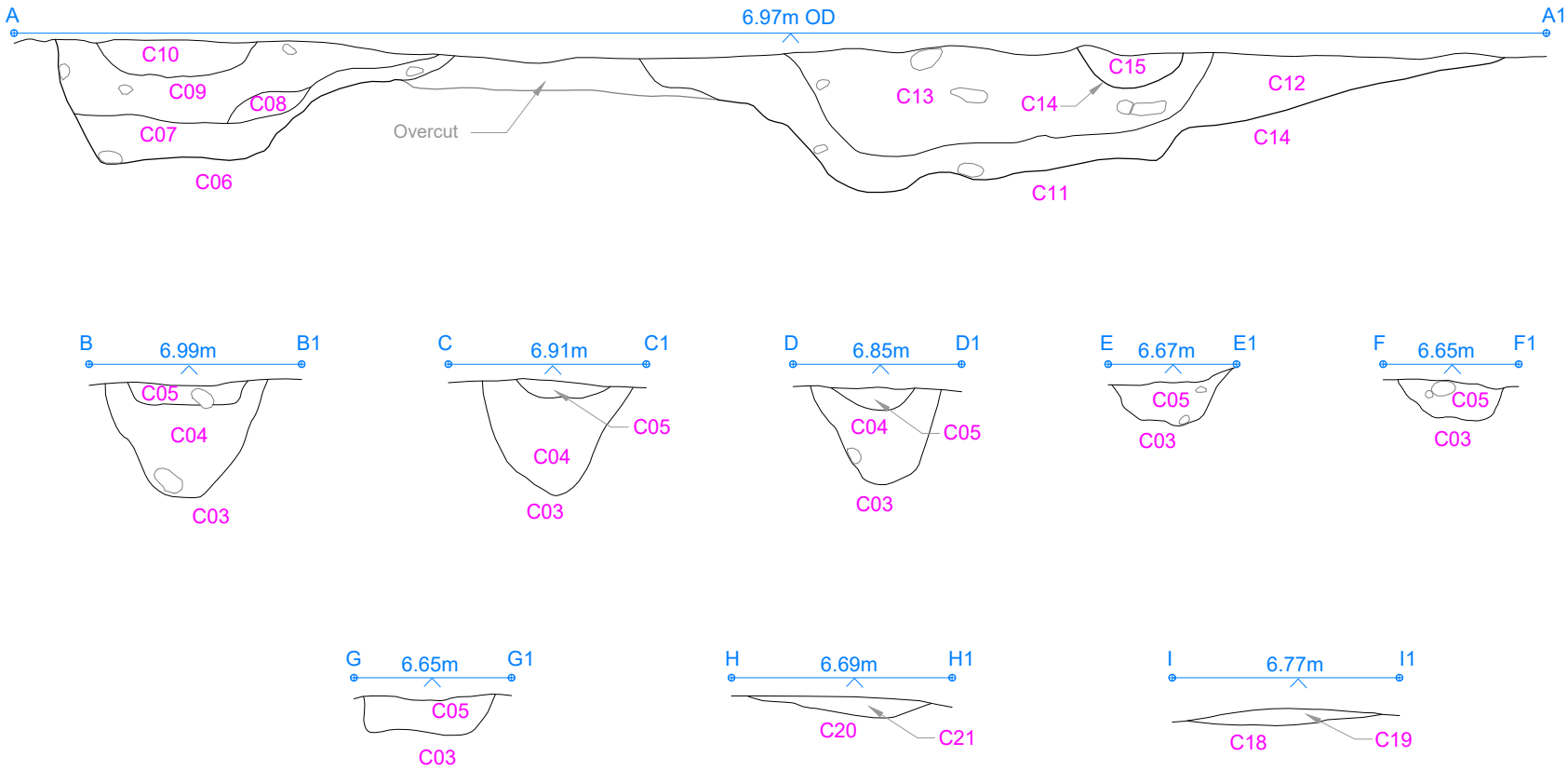
Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballalease North, AA5, Donabate, Co. Dublin	Scale: 1:100 A4
			Date: January 2022
		Licence no. 21E0670	Origin: Archer
			Ref: 2021_43_EX_02

Figure 2: Pre-excavation plan of site



Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballalease North, AA5, Donabate, Co. Dublin	Scale: 1:50 A4
			Date: January 2022
		Licence no. 21E0670	Origin: Archer
			Ref: 2021_43_EX_03

Figure 3: Post-excavation plan of site



Archer Heritage Planning

Unit 8 Beat Centre
Stephenstown,
Balbriggan,
Co. Dublin

Ballalease North, AA5, Donabate, Co. Dublin

Licence no. 21E0670

Scale: 1:20 A4
Date: January 2022
Origin: Archer
Ref: 2021_43_EX_04

Figure 4: Section drawings

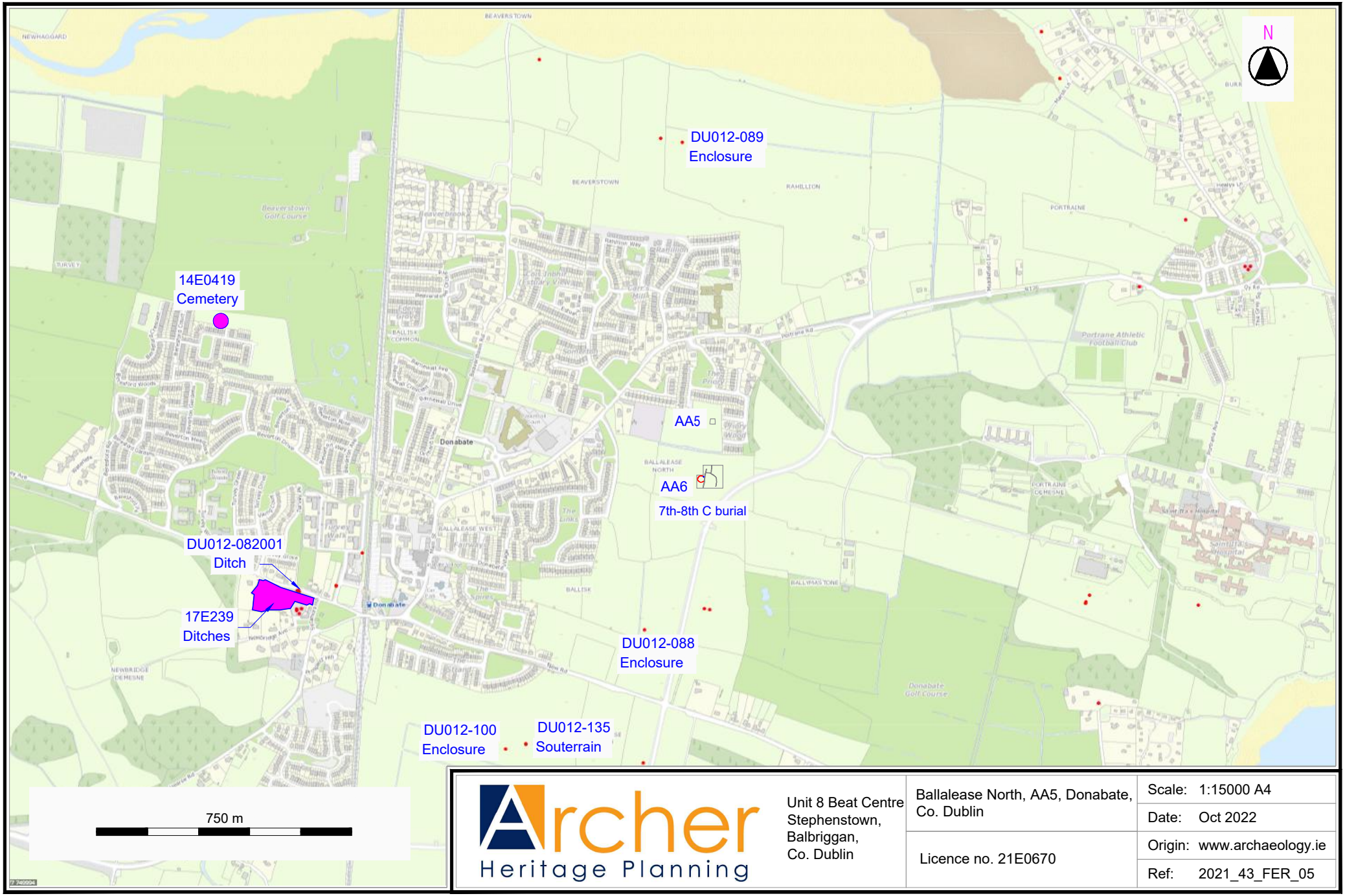


Figure 5: Surrounding Early Medieval sites


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Plate 9: Post-excavation view of pit C11 from north



Plate 10: Post-excavation view of pit C06 from east with junction of C03

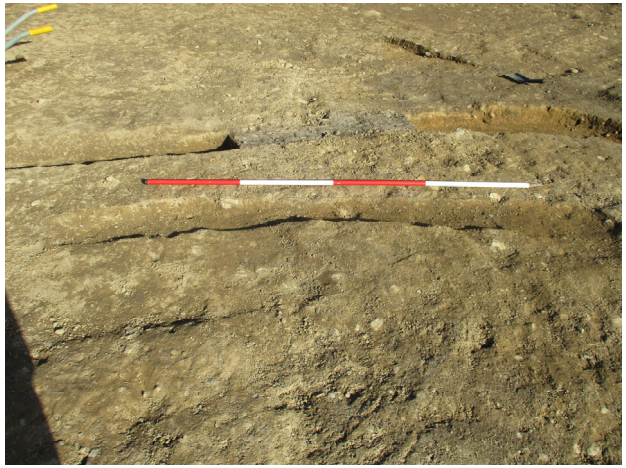

Plate 11: Post-excavation view of linear C16 from west


Plate 12: Post-excavation view of Pit C18 from north



Plate 13: Post-excavation aerial view of site

Appendix 15.3 AA6 Archaeological Excavation Report

Archer Heritage Planning

Ballalease North, AA6, Donabate, Co. Dublin

Final Excavation Report

LICENCE NO.: 21E0674

CLIENT: Glenveagh Living Ltd.

DATE: 15th November 2022

Testing | Surveying | Excavating | Analysing | Conserving | Reporting

Ballalease North AA6, Donabate, Co. Dublin

Archaeological Excavation

SITE NAME	Ballalease North AA6
CLIENT	Glenveagh Living Ltd.
INVESTIGATION TYPE	Archaeological Excavation
LICENCE NO	21E0674
PLANNING REF	n/a
TOWNLAND	Ballalease North
IRISH TRANSVERSE MERCATOR	723700, 750365 (centre of cutting)
RMP NO	n/a
RPS NO	n/a
ARCHAEOLOGICAL CONSULTANT	Archer Heritage Planning Ltd
ARCHAEOLOGIST	Liam Coen
DATE OF ISSUE	15th November 2022
JOB REF.	2021_43

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SUMMARY

Excavations revealed a circular ditched enclosure less than 20m in internal diameter whose eastern arc had been truncated by a ditch that was part of an 18th or early 19th century field system. A juvenile human burial had been interred in the enclosure ditch and was radiocarbon dated to 650-780 cal. 2δ AD (UBA 48273; 1309 +/- 27 BP) in the Early Medieval period. Orientated in the traditional east/west manner, no significant illness or violent trauma could be identified from its skeleton. Two smaller concentric curvilinear features, possible slot trenches for a palisade fence, were traced along the interior of the southern and eastern arcs of the enclosure ditch. Charcoal from one of these possible slot trenches was dated to 1620-1510 cal. 2δ BC (UBA 48274; 3298 +/- 28 BP) in the Middle Bronze Age period. The remaining features from the excavation comprised undated pits and furrows alongside the early modern linear and curvilinear field boundaries. Finds included a residual Grooved ware pottery sherd dating from c. 2800-2500 BC in the enclosure ditch fill alongside a granite rotary disc quern-stone that are generally dated from anytime in the first millennium AD. A number of flint artefacts were retrieved from across the site including a flint fabricator from the enclosure ditch fill and an unfinished barbed-and-tanged arrowhead from an early modern field ditch. A modest faunal assemblage was retrieved from the excavation and the range of animals from the enclosure ditch fills; cattle, sheep/goat, deer, pig, horse and dog indicated food waste and a probable domestic purpose for the enclosure.

Revision	Status	Date	Prepared by	Reviewed by	Approved by
1	Final	15th November 2022	L Coen ARCHAEOLOGIST	A O'Connell SENIOR ARCHAEOLOGIST	C. Mc Guinness

1. INTRODUCTION

This archaeological excavation report for a site at Ballalease North, Donabate, Co. Dublin has been prepared by Archer Heritage Planning Ltd for Glenveagh Living Ltd. The presence of archaeological features on this site was first identified during archaeological investigations (Leigh 2006, Frazer 2008) associated with a Local Area Plan for Donabate in the mid-2000's. More recent test excavations under licence no. 21E0453 identified further features and the current excavation took place under licence 21E0674 on 2nd-30th November 2021. This report presents the results of the excavation with all post-excavation analysis. This excavation is one of eight (AA2-AA9) undertaken in advance of a proposed residential development for the area. Another archaeological site (AA1) will be preserved under green space in the development.

2. SITE DESCRIPTION

The site was located in a relatively flat field to the east of the expanding village of Donabate. The site is part of a wider landholding comprising a series of fields bounded by mature hedgerows previously under tillage though now lying fallow and overgrown with light vegetation. The village of Donabate is located on a peninsula in the Irish Sea and the area has produced copious archaeological evidence for activity throughout the prehistoric and historic periods.

In the early medieval period, Donabate formed part of the kingdom of Brega, initially ruled by a dynastic confederation known as the Laigin, but after the seventh century was under the rule of the Síl nAedo Sláine of the Southern Uí Neill. After the area came under the control of the Anglo-Normans in the late twelfth century, the lands around Donabate came under the control of the Archbishop of Dublin, who had his episcopal manor at Swords, Co. Dublin. Around 1230 AD, Donabate church was granted to the monastery of Grane, Co. Carlow and remained in their possession until the dissolution of the monasteries in 1541 (Bates 2001). In the eighteenth century, an extensive tract of land around Donabate was purchased by Charles Cobbe, later Archbishop of Dublin.

The first portion of the name Donabate (Irish *Domhnach Bat*) most likely originates from the word *Domhnach* meaning church and *Baite* meaning wet or swampy. Alternatively, it may come from '*Dún a' Bháid*' meaning church of the ferry, which is supposed to refer to an ancient church in the townland of Ballymadrough west of Donabate near the Malahide Estuary. The townland name of Ballalease translates from Irish as 'town of the sheds' (*Baile an leas*, www.logainm.ie) and it is noted in the Civil Survey (1654-5) as Bally Ellis while the Down Survey map (1656) displays a parcel of land approximating the current townland's location and outline (from 1st Ed. OS map) as Ballielish Colledge

land. The 'colledge land' indicates it was owned by the Archbishop of Dublin. It was also noted on this map that the Donabate townland of 117 acres was forfeited by Anthony Delahide of Lockhumny (probably Loughshinny) to Lord Fitzharding sometime between 1641 and 1670.

3. METHOD STATEMENT

The overall aim of the excavation was to preserve by record any archaeological features in the proposed excavation cutting. The cutting was established following recent test-excavations (O'Connell 2021, licence no. 21E0435) that investigated an area with known features previously discovered during geophysical survey (Leigh 2006, licence no. 05R124) and test excavations (Frazer 2008, licence no. 06E0227ext.).

3.1 General Excavation Methodology

An open area rescue excavation strategy was employed. The recording techniques used are based on a system that best suits a rural environment as outlined in Barker (1977). This was supplemented by the recording system described in the Museum of London Archaeological Service Site Manual (Spence 1990). A single context recording system was used to record the site and multi-context plans were drawn at a scale of 1:20 or 1:50 (plans) & 1:10 or 1:20 (sections) as appropriate. Artefacts were labelled in accordance with NMI guidelines.

The topsoil was removed by mechanical excavation under constant supervision and then the site was hand cleaned to clearly establish the archaeological material. The material was assessed *in-situ* by archaeologist Liam Coen. Archaeological features such as pits were half-sectioned with linear features excavated with regularly spaced box-sections. The resulting section faces were drawn to establish a stratigraphic record. The remaining deposits were removed by hand to produce a post-excavation plan and photo. After deposits were removed from all identified archaeological features, hand-held camera photographs were taken as well as aerial post-excavation drone photographs of the site. The principal goals of the excavation were:

- Establish the stratigraphical sequence of the site;
- Determine the various phases of activity;
- Examine the morphology of the various features/structures; and
- Establish the date & function of the features.

3.2 Recording

All archaeological features and deposits encountered during the works were given a unique number in a continuous system recorded in the site archive. Entries were backed up by site-note books and annotated multi-context drawings at appropriate scales. Site plans showed the location of all features recorded in the course of the excavation. Annotated sections/elevations were drawn at scales of 1:10 or 1:20 as appropriate. Heights of all principal features and levels were calculated relative to Ordnance Datum, correct to two decimal places. Site drawings were scanned and digitised using AutoCAD 2018 and geo-referenced to ITM projection. Digital photographs were taken of all archaeological features and deposits.

3.3 Sampling

Environmental sampling was undertaken in accordance with recent professional guidelines (*e.g.* Environmental Sampling: Guidelines for Archaeologists IAI 2007). Bulk soil samples were selected from secure deposits in order to gather dating material and environmental data.

4. ARCHAEOLOGICAL EXCAVATION RESULTS

Excavations took place on 2nd-30th November 2021. Topsoil in a cutting of 4543 sq. m. was stripped by mechanical excavator under constant archaeological supervision. The cutting was centred on features identified through earlier geophysical survey (05R124) and test excavations (21E0435 & 06E0227ext). The principal feature was a previously unknown circular ditched monument, **C30**, located in the western portion of the cutting. Measuring roughly 20m in diameter, the roughly V-shaped enclosing ditch was between 0.65-1.30m in width and 0.3-0.7m in depth. The eastern arc of the ditch had been truncated away by a north-north-east/south-south-west running ditch, **C51**. This was one of several post-medieval or early modern ditches that traversed the cutting, e.g. **C04**, **C14, C45** and **C69**. They are likely related to an earlier field system that had been back-filled by the time of the 1st edition OS maps in the 1840's. While an unfinished barbed-and-tanged arrowhead (21E0674:70:01) dating to the Late Neolithic or Chalcolithic period and a flint flake (21E0674:70:02) were retrieved from one of the ditches, they were thought to be residual artefacts. The other finds from these linear features comprised a series of probable 18th and 19th century pottery sherds and ferrous and glass fragments of the early modern period. None were retained as these were of low archaeological significance beyond dating the features. Other undated features that truncated the circular ditch included a stone-filled drain **C45**, furrow **C59**, ditch **C53** and irregular features **C43** and **C73**. While other undated short linear features or furrows identified in the cutting are likely to relate to the early modern field system, e.g. **C71**, **C75**, some may have an archaeological origin.

The fill of the ditched monument was relatively homogenous throughout the cut. An upper, dark brown/grey silty clay, **C31**, was present throughout with some other lighter coloured primary fills identified at points along the ditch, e.g. **C41** and **C42** along the northern arc; **C39** and **C32** along the south-western arc. It appears that the fills naturally accumulated in the ditch. A moderate amount of animal bone was retrieved from the fills of the ditch with identified species including cattle, sheep/goat, pig, deer and horse. Butchery marks were identified on some of the bones and it is thought the much of the assemblage likely accumulated as food waste. The presence of horse bones from the fills of the ditch suggests a date no earlier than the Chalcolithic period (McCormick 2007) for the construction and use of the enclosure and indicates that a Grooved ware pottery sherd (21E0674:31:01) from the upper fill of the ditch is a residual find. Other finds from the ditch fills comprised a granite rotary disc quern-stone (21E0674:31:02) and a flint fabricator (21E0674:39:01). A human juvenile inhumation burial was interred in the upper fill of the ditch along the northern arc. A fragment of bone from the skeleton returned a radiocarbon date of 650-780 cal. 2δ AD (UBA 48273; 1309 +/- 27 BP) giving a *terminus ante quem* for the in-filling of the ditch. The burial was roughly orientated in the traditional Christian east/west manner. No signs of illness or violent trauma could be established from the skeletal bone analysis. The burial was almost entirely within the fill of the enclosure ditch and suggests that some surface expression of the ditch may have existed when the burial took place.

Two concentric curvilinear features, **C33** and **C55** were located just inside the larger enclosure ditch **C30**. They were recorded for c. 20m, with a c. 2.8m gap, along the interior of the southern and eastern arcs of the larger enclosure ditch. While the southern section petered out, the northern section was truncated away by the presence of the modern ditch **C51**.The curvilinear features were between 0.27-0.55m in width and 0.15-0.30m in depth. A fragment of oak charcoal retrieved from the eastern curvilinear feature, **C55**, returned a radiocarbon date of 1620-1510 cal. 2δ BC (UBA 48274; 3298 +/- 28 BP) indicating a Middle Bronze Age (c. 1700-1200 BC) date. The form and dimensions of the features are suggestive of a slot trench, possibly for a fence or palisade-type enclosing structure with a potential entrance gap to the south-east. Another curvilinear feature, **C57**, crossed **C55** but due to the similarities of their fills, it was not possible to discern a stratigraphic relationship. This other curvilinear feature was not obviously aligned with any other features.

A cluster of three post-holes, **C05**, **C06** and **C07**, were located near the eastern margin of the site. The circular cuts had dark grey fills, with possible packing stones in two of them. A basal or packing fill, **C25**, from post-hole **C05** produced three flint flakes (21E0674:25:01-03) while **C07** contained a single flint flake (21E0674:12:01). The post-holes indicated some type of structure but no further features were

identified nearby that may allow a fuller interpretation. There were four pits identified in the excavation cutting, **C16**, **C18**, **C26** and **C35** with the first two containing dark charcoal stained fills while **C26** had frequent loose oxidised soil in its fill. Located 1.5m from shallow ditch **C04,** that also contained lenses of oxidised soil; this shared characteristic suggests these features may be associated. The pit **C35** was cut through the fills of the enclosure ditch, **C30**, and internal curvilinear feature, **C33**. It contained a dumped deposit, **C37**, of marine shells, likely food waste and seen in smaller concentrations elsewhere. While the pit's position may be coincidental, its excavation within the bounds of the two adjacent features hint that some surface expression of the features may have been visible when the pit was dug.

Finally, a large irregularly shaped deposit, **C87**, with a maximum depth of 0.2m, comprised a loose brown sandy silt containing sea-shell, animal bone and occasional small and medium sized stone inclusions and was located to the east of the ditched enclosure. Two test slots were excavated in the feature but the presence of modern iron and pottery finds in the fill indicated the feature may be of geological origin, perhaps a topographical depression that naturally accumulated silt and had waste dumped in it.

5. ENVIRONMENTAL REMAINS

Bulk samples were taken from stratified, undisturbed deposits only and were selected for the perceived potential to produce dating and other environmental material. Samples were floated off-site in a custom-made flotation tank that passed the samples through successive sieves to capture charcoal, small bones, charred seeds *etc*. These samples were dried and sent for analysis. All animal bone from stratified deposits were retained and processed similar to the finds assemblage. Animal bone recovered from bulk samples was also retained for analysis. Unstratified animal bone was not retained. Soil sieving details are presented in the table below.

Sample No.	Volume before processing	Feature No.	Feature Description	Flot weight	Retent weight	Flot Results
1	20L	C09	Fill of post-hole C06	1g	289g	Rare charcoal
2	20L	C31	Upper fill of curvilinear ditch C30	1g	1170g	Rare charcoal, 9g of bone fragments
3	20L	C32	Basal fill of curvilinear ditch C30	<1g	1451g	Negligible flot

Sample No.	Volume before processing	Feature No.	Feature Description	Flot weight	Retent weight	Flot Results
4	20L	C38	Basal fill of pit C35	1g	971g	Rare charcoal, 13g of bone fragments
5	20L	C34	Only fill of internal curvilinear C33	2g	895g	Rare charcoal, 9g of bone fragments
6	16L	C56	Only fill of internal curvilinear C55	7g	1452g	Rare charcoal, 11g of bone fragments
7	8L	C58	Only fill of curvilinear C57	<1g	759g	4g of bone fragments
8	4L	C27	Upper fill of pit C26	<1g	471g	Negligible flot, burnt clay in retent
9	8L	C28	Basal fill of pit C26	<1g	1199g	Negligible flot, burnt clay in retent
10	20L	C03	Main fill of ditch C04	4g	1523g	Rare charcoal, 5g of small bone fragments
11	5L	C82	Soil sample around hand of skeleton	<1g	453g	1g of small bone fragments
12	5L	C82	Soil sample around pelvis of skeleton	<1g	427g	2g of small bone fragments

Table 1: Bulk soil sample sieving details

After processing by floatation tank, the resulting flots were assessed by charcoal specialist Dr. Ellen O'Carroll and it was deemed that there was insufficient material available for a meaningful charcoal analysis.

5.1 Radiocarbon date

Two samples were selected for radiocarbon dating (see Appendix 2); a fragment of charred wood and a fragment of human bone. The charred wood sent for dating was extracted from the flot of the bulk soil sample following processing by floatation tank. The wood charcoal was selected and identified by Dr. Ellen O'Carroll prior to getting radiocarbon dated by the laboratory at 14 Chrono Centre at Queens University Belfast. The fragment of human bone was selected by osteologist Maeve McCormick, MSc. The dates quoted in the text have been calibrated to 2δ, 95.4% probability using OxCal v4.4 Bronk Ramsey (2020); r:5 and IntCal20 atmospheric curve (Reimer *et al* 2020) and details are presented below;

- Human radial fragment from Sk1, burial in back-filled enclosure ditch; UBA 48273; 650-780 cal. 2δ AD; 1309 +/- 27 BP.
- *Quercus* (oak) charcoal from C56, sample 6, fill of curvilinear slot trench C55; UBA 48274; 1620-1510 cal. 2δ BC; 3298 +/- 28 BP.

The radiocarbon date of the skeleton from the Early Medieval period can be paralleled in other cases. While most people from this period were being interred in cemeteries, often within settlements, it was increasingly occurring in the modern pattern of burial within and around Churches and traditional graveyards. Isolated burials from this period encountered in settlement enclosures have been surveyed (Seaver 2011) with a variety of contexts for 'deviant' burial identified. In this case, the remains of this Bronze Age enclosure may have contained some ritual significance for the community of the medieval period and so appeared as a suitable place for the burial.

The radiocarbon date for the internal concentric feature, C55, possible slot trench of the enclosure concurs with dates seen elsewhere from sites of this type. The Middle Bronze Age period (c. 1700-1200 BC) sees the emergence of domestic enclosures with both palisade trenches and larger ditched enclosures identified (Ginn 2012 195-200).

5.2 Osteological analysis of human remains

The following summary is taken from the osteological analysis of the skeleton, the full report is included as appendix 5. A single skeleton was recovered from a shallow grave cut (C81) which was located largely in the northern arc of the enclosure ditch (C30). The remains were those of a juvenile aged between 6 and 8 years of age with a likely age of 7 years of age. The age range was gathered by examination of epiphyseal fusion and the likely age taken from dental eruption.

The dentition displayed slight to moderate calculus on most of the teeth. There was no caries recorded. Enamel hypoplasia in the form of lines and pitting was noted on all permanent teeth. The hypoplasia was formed before the individual was three years of age. The age of hypoplasia formation is indicative of '*weaning stress'* suggesting they were weaned onto a nutritionally substandard diet.

The individual was laid with a W/E alignment with head to the west as is traditional of Christian burials suggesting the remains may be Christian in date. They were in an extended and prone (face down) position. This is an unusual (but not unheard of) burial position and so the burial is classified as a '*deviant burial*'. Often deviant burials were those of slaughtered enemies or those who died of an infectious disease. As there is no evidence of trauma on this individual it is possible the deviant burial was a result of the community response to the acute infection or illness which was the cause of death.

5.3 Osteological analysis of faunal remains

The following summary is taken from the osteoarchaeological analysis of the faunal remains retrieved from the excavation. The full report is included as appendix 6. A total number of 1441 bone fragments weighing 19.5kg were analysed from the Ballalease North AA6 assemblage. These were retrieved from 20 separate contexts across the site. The animal bone assemblage was, for the most part, recovered by hand-collection during excavation with a smaller amount retrieved after processing of soil samples. The remains represented the most common domesticated animals: cattle, deer, dog, horse, pig and sheep/goat, with cattle being the most highly represented animal. There was evidence of butchery on many bones but little evidence for cooking. The bones were collected from all features, archaeological and modern, across the site.

Cow, deer, pig, sheep/goat and horse were retrieved from the fills of the enclosure ditch, C30. A similar range of animals were identified from the concentric internal curvilinear features, C33 and C55 with cow, deer, pig, sheep/goat, horse and dog.

Within the overall assemblage, sheep/goat was the most common identified animal and was kept for both meat and wool. They raised cattle which they used for both dairy and meat and possibly traction though without any skeletal markers present for such a purpose. They also likely kept pigs for meat and breeding though hunting of wild boar can't be discounted. Deer remains suggest hunting of wild deer to supplement their diet and there were a few bones for badger and fox. Horse was also identified in small amounts.

6. ARTEFACTS

6.1 Introduction

A modest range of artefacts were retrieved during the excavation. They were retrieved during the clean-back of the site and during excavation of the features. The list of finds is detailed in the table below. They are all likely date from the prehistoric period with the exception of a rotary quern-stone whose period of use spans the entire first millennium AD. A summary of the specialist analysis is presented in the following sections.

Context No.	Find No.	Material	Type	Description
C01	21E0674:01:01	Stone	Flint	Flint flake
C01	21E0674:01:02	Stone	Flint	Flint flake
C01	21E0674:01:03	Stone	Flint	Flint flake
C01	21E0674:01:04	Stone	Flint	Flint flake
C01	21E0674:01:05	Stone	Flint	Spall
C01	21E0674:01:06	Stone	Quartz	Quartz flake
C03	21E0674:03:01	Stone	Mudstone	Hammerstone
C12	21E0674:12:01	Stone	Flint	Flint debitage
C25	21E0674:25:01	Stone	Flint	Flint flake
C25	21E0674:25:02	Stone	Flint	Flint flake
C25	21E0674:25:03	Stone	Flint	Flint flake
C31	21E0674:31:01	Ceramic	Pottery	Grooved ware base-sherd
C31	21E0674:31:02	Stone	Granite	Base of rotary quern-stone
C39	21E0674:39:01	Stone	Flint	Flint fabricator
C70	21E0674:70:01	Stone	Flint	Unfinished barbed-and-tanged arrowhead
C70	21E0674:70:02	Stone	Flint	Flint flake

Table 2: Finds register

6.1 Lithic artefacts

The assemblage of lithic artefacts was sent to Dr. Conor Brady for specialist analysis. The following is a synopsis with his full report (containing all lithics from this and related excavations in the area) included as Appendix 3.

Fourteen lithic artefacts from this excavation were sent for analysis and were recovered from six different contexts: six came from the topsoil or clean-back (C01); three from the fills of modern linears (C03 & C70); four from post-holes (C12 & C.25); and one from a fill (C39) of the enclosure ditch (C30).

Twelve of the lithics were flint, one was quartz and one was mudstone. One of the lithics from the topsoil was a spall (naturally cracked from a pebble) while the presence of smooth cortex on seven of the others and the general mix of colours indicates the use of flint from a glacial till or a beach origin. Two of the artefacts were modified, a flint fabricator (21E0674:39:01) from the fill of the enclosure ditch and a half-finished barbed-and-tanged arrowhead (21E0674:70:01). The fabricator is of uncertain function, possibly as a strike-a-light or to retouch other flint artefacts while the arrowhead was a residual find with no obvious defects that may explain why it remained unfinished. The quartz flake is difficult to assess whether it was knapped or natural.

6.2 Prehistoric pottery

A single base-sherd of Grooved ware pottery was retrieved from the main fill of the enclosure ditch. Full analysis is included as Appendix 4. Dating to c. 2800-2500 BC, few other examples of this pottery have been identified in the surrounding area. Grooved ware originated in the Orkneys off the northern coast of Scotland and spread southwards in the following centuries while the nearest comparable example comprised a series of sherds from a pit in Lusk, c. 5km to the north-west that was interpreted as a ritual deposit with cremated bone.

6.3 Quern-stone

A fragment of a granite quern-stone (21E0674:31:02) was retrieved from the upper fill, C31, of the enclosure ditch, C30, in its northern arc. Quern-stones were used in a pair with an upper stone rotated over a base stone to grind, or mill, grain. The stone would have rotated around a wooden spindle inserted in the central aperture and rotated with the use of a handle located in the top stone. Disc quern-stones are categorized based on the location of the handle, e.g. top or circumference. The example here had broken roughly in half across the central aperture. Without any obvious scorching, the crumbly nature of the granite hinted at possible heat damage or possibly long-standing weathering. It was smoothly dressed on its upper surface with two raised decorative bands around its central aperture. The central aperture was 2.5cm in diameter on the upper surface, widening to 3.5cm in diameter at the lower surface. The two raised concentric bands comprised a substantial band 1cm in width running 3cm from the central aperture and a second fainter band 6cm from the aperture. The surviving radius of the quern-stone varied between 14cm and 20.5cm though it is not absolutely certain the full original diameter survived as the edges are weathered/damaged. The thickness of the stone varied from 5.4cm at the outer edge to 7.5cm at its thickest point at the central aperture. The lower surface of the stone was coarse and uneven though whether from use or weathering is unsure. As no evidence for a handle socket was identified the stone cannot be categorized using Caulfield's system (Caulfield in Eogan 2005, 508-512). Rotary disc quern-stones first emerged in Ireland during the final centuries BC before becoming more widespread in the first millennium AD.

7. DISCUSSION

Excavations revealed a circular ditched enclosure, C30, less than 20m in internal diameter whose eastern arc had been truncated by a ditch, C51, that was part of an 18th or early 19th century field system. A human burial had been interred in the enclosure ditch and was dated to the Early Medieval period. Two smaller curvilinear features, C33 and C55, possible slot trenches for a palisade fence, were

traced along the interior of the southern and eastern arcs. Charcoal from one of these possible slot trenches was dated to the Middle Bronze Age period. The remaining features from the excavation comprised undated pits and furrows alongside the early modern linear and curvilinear field boundaries.

The presence of the burial provides a *terminus ante quem* for the in-filling of the ditch. No suitable charcoal or charred seeds were retrieved to get a radiocarbon date for the ditch. The artefacts from the ditch fills are not helpful for assigning a date to the enclosure. They comprise a rotary disc quern-stone, a type used throughout the first millennium AD, a Grooved-ware pottery sherd from c. 2800-2500 BC and an undiagnostic flint fabricator. A moderate faunal assemblage was retrieved from the ditch fills comprising cattle, sheep/goat, pig, deer, dog and horse. They are likely food waste and suggest the enclosure may have been used for domestic purposes. The presence of horse bones in the ditch fills indicates a date no earlier than the Chalcolithic (Beaker) period for the construction and use of the enclosure as horses haven't been recorded in Ireland prior to this (McCormick 2007). The radiocarbon date in the Middle Bronze Age for the internal concentric feature, C55, along the eastern arc of the enclosure ditch, C30, is the strongest dating evidence available. Whether the larger enclosure ditch was either contemporary with the putative fence represented by the concentric features, preceded or superseded it, cannot be determined. However, their spatial relationship suggests that whatever the sequence, both the ditch and fence were constructed to establish an enclosing element.

Settlement enclosures from the Bronze Age can be seen to emerge in the Middle Bronze Age (Ginn 2012 195-200). Enclosures take the form of both ditches and fences. Ditched enclosures from the Middle Bronze Age include an example at Chancellorsland A, Co. Tipperary (Doody 2008, 626-631) that also contained an inner palisade. The oval enclosure measured 60m x 50m and several houses were identified in the enclosure with a range of flint artefacts and pottery sherds. A similar range in the faunal assemblage was identified in the excavation as at Ballalease North, primarily cattle, sheep/goat, and pig and lesser amounts of deer, dog, cat and hare. Another Middle Bronze Age site at Ballybrowney Lower 1, Co. Cork (Hanley et al. 2013, 90-104) revealed a cluster of enclosures with some similar dimensions (Enclosures1 and 3; c. 20m & 22m in diameter) to what was identified in Ballalease North. Enclosure 1, excavated in its entirety, contained a central house and the enclosure was defined by a palisade, likely comprised of upright planks supported by packing stones. Enclosure 3 also had a similar slot trench defining the enclosure while Enclosure 2 had two phases of enclosing ditches with an estimated 35m diameter. It had evidence of internal structures, hearths and metalled surfaces amongst other features. Unenclosed houses were also identified on-site thought to be roughly contemporary so revealing a nucleated settlement of this period. The absence of any structural features in the interior of the enclosure at Ballalease North and supporting artefactual evidence beyond the fabricator may be

explained by the truncation of features by later activity. It also may be that the enclosure was constructed for a purpose that excluded habitation though the activities here included food consumption or preparation.

Other circular ditched monuments from the Bronze Age include ring-ditches and a variety of barrows. Constructed from the Neolithic onwards, a majority (Grogan & Cooney, 1999, 131) were constructed during the Middle Bronze Age period (*c.* 1700-1200 BC). Waddell has noted that many of the monuments classified as ring-ditches may once have been ring-barrows where the mound has subsequently being removed by ploughing (Waddell, 1998, 365). A classification for Irish barrows has been proposed (Newman 1997; 155-7) and while such classifications provide a structured way of thinking about the monuments, they may sometimes obscure differences and variations between monument form and function. These classes include:

- Ring-ditch: an annular or penannular enclosing ditch.
- Embanked ring-ditch: same features as a ring ditch but with an external bank.
- Ring barrow: same features as a ring ditch but with a low mound at its centre.
- Bowl barrow: Large prominent mound surrounded by a ditch and outer bank.
- Stepped barrow: a barrow supported on a larger platform giving an appearance of a berm surrounding the barrow; and
- Enclosure barrow: A raised circular area enclosed by a bank and sometimes an external ditch.

All these varieties include a ditch, as encountered in Ballalease North but the dimensions here would be larger than usually seen in these ritual/burial sites: 6-15m in diameter (*ibid*. 157). While above surface mounds or banks may have been ploughed away over time, the absence of any prehistoric burial evidence such as cremated bone, no significant charcoal in the ditches coupled with the presence of the food waste and inner concentric features suggests the enclosure is more likely to be domestic than ritual or burial.

The main element of ritual activity lies in the human burial of the Early Medieval period. While most burials from this period are encountered in organized cemeteries, either familial or those associated with ecclesiastical centres, there is extensive evidence for isolated or anomalous burials (Seaver 2011) on settlement enclosures of the period as well as lingering pagan practices that were becoming increasingly Christianized (O'Brien 1992). The presence of the grave-cut largely in the fill of the enclosure ditch strongly suggests that some surface expression of the enclosure existed at the time of the burial. The relatively small size of the enclosure and its association with the Bronze Age dated concentric features would largely discount it as an Early Medieval settlement enclosure, *i.e.* ring-fort or

rath, though it may have been re-used during this period for another activity. Examples are recorded in circular mounded enclosures known as *ferta,* and roughly contemporary historical references at the time (Bhreathnach 2010) document the variety of burial customs that occurred during these centuries. *Ferta* had several meanings but usually referred to burial mounds with ancestral links. Though it appears that the site here at Ballalease North AA6 had its origins as a domestic Middle Bronze Age enclosure, perhaps over the course of the centuries, it developed a ritual value that made it a suitable location for the burial.

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Liam Coen

Appendix 1: Context Register

Cuts **in bold**

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
1	-	-	All	-	Over all of site; 0.45-0.6 in depth	Friable brown loam	Topsoil	Flint flakes x 5 Quartz flake Cu-alloy tube	-
2	-	-	-	All	Under all of site	Limestone till, mixed browns & grey silty clay	Subsoil	-	
3	4	-	10	11, 83	21.60 x 1.00 x 0.30	Friable dark brown & black silty clay with small stone, animal bone & occasional charcoal inclusions	Main fill of ditch C04	Whet/Hammerstone 21E0674:03:01	10
4	**-**	**3, 10, 11, 83**	**2**	**10**	**21.60 x 0.6-1.40 x 0.18-0.30**	**Linear in plan; orientated N/S; gradual break of slope (b.o.s.) top; shallow sloping or concave sides; gradual b.o.s. base; concave to irregular, linear base**	**Cut of ditch, probable continuation of C14 to N**	**-**	**-**
5	**-**	**8, 25**	**2**	**25**	**0.41 NW/SE x 0.32 x 0.13**	**Oval in plan; sharp b.o.s. top; straight upright sides; gradual b.o.s. base; flat, oval base**	**Cut of post-hole**	**-**	**-**
6	**-**	**9**	**2**	**9**	**0.45 NW/SE x 0.41 x 0.15**	**Oval in plan; sharp b.o.s. top; straight upright sides; gradual b.o.s. base; flat, oval base**	**Cut of post-hole**	**-**	**-**
7	**-**	**12**	**2**	**12**	**0.31 in diam. x 0.18 in depth**	**Circular in plan; sharp b.o.s. top; straight inward sloping sides; gradual b.o.s. base; flat, circular base**	**Cut of post-hole**	**-**	**-**
8	5	-	25	1	0.13 in diam. x 0.13 in depth	Friable dark brown/grey silty clay with occ. charcoal & small stone inclusions	Upper fill of post-hole C05, possible post-pipe	-	-
9	6	-	6	1	0.45 NW/SE x 0.41 x 0.15	Friable dark brown/grey silty clay with occ. charcoal & medium sized (packing?) stone inclusions	Only fill of post-hole C06	-	1
10	4	-	4	3	21.60 N/S x 1.40 x 0.10	Friable light greyish brown silty clay with freq. small stone inclusions	Basal fill of ditch C04	-	-

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
11	4	-	3	1	c. 8.00 x 0.30 x 0.10	Friable reddish orange (heat-affected?) silty clay with occ. small stone inclusions	Localized upper fill of ditch C04 in N area, similar to C13	-	-
12	7	-	7	1	0.31 in diam. x 0.18 in depth	Friable dark brown/grey silty clay with occ. charcoal & medium sized (packing?) stone inclusions	Only fill of post-hole C07	Flint flake 21E0674:12:01	-
13	4	-	3	1	c. 5.00 x 0.30 x 0.10	Friable reddish orange (heat-affected?) silty clay with occ. small stone inclusions	Localized upper fill of ditch C04 in S area, similar to C11	-	-
14	**-**	**15**	**2**	**15**	**19.90 x 0.5-1.40 x 0.18-0.40**	**Curvilinear in plan; gradual b.o.s. top; sloping or concave sides; gradual b.o.s. base; flat or uneven linear base**	**Cut of ditch , probable continuation of C04 to S**	**-**	
15	14	-	14	1	19.90 x 0.5-1.40 x 0.18-0.40	Friable greyish brown silty clay with occ. small & medium sized stone inclusions	Only fill of ditch C14	-	-
16	**-**	**17**	**2**	**17**	**1.41 N/S x 0.90 x 0.21**	**Oval in plan; gradual b.o.s. top; steeply sloping sides to N, shallow slope elsewhere; gradual to imperceptible b.o.s. base; uneven base**	**Cut of irregular pit**	**-**	**-**
17						Friable dark grey with black mottling silty clay with stone & occ. charcoal inclusions	Only fill of pit C16	-	-
18	**-**	**19**	**2**	**19**	**0.60 in diam. x 0.05 in depth**	**Circular in plan; gradual b.o.s. top on NW &SE arcs, sharp elsewhere; shallow sloping on NW & SE sides, steeply sloping elsewhere; gradual b.o.s. base; concave circular base**	**Cut of pit**	**-**	**-**
19	18	-	18	1	0.60 in diam. x 0.05 in depth	Loose dark grey/black sandy silt with freq. charcoal & occ. small stone inclusions	Only fill of pit C18	-	-
20	**-**	**21**	**15**	**21**	**4.80 NW/SE x 0.45 x 0.12**	**Linear in plan; orientated NW/SE; truncates C14; gradual b.o.s. top; concave sides; gradual b.o.s. base; concave linear base**	**Cut of furrow that truncates ditch C14**	**-**	

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
21	20	-	20	1	4.80 NW/SE x 0.45 x 0.12	Friable greyish brown silty clay with freq. small stone inclusions	Only fill of furrow C20	-	-
22	**-**	**23, 24**	**03**	**24**	**>3.90 NW/SE x 0.23-0.50 x 0.10-0.32**	**Curvilinear in plan; gradual b.o.s. top; sloping sides; gradual b.o.s. base; concave linear base**	**Cut of furrow that truncates C04**	**-**	**-**
23	22	-	24	1	**>3.90 NW/SE x 0.30 max x 0.12 max.**	Friable dark brown silty clay with occ. small stone inclusions	Upper fill of furrow C22	-	-
24	22	-	22	23	>3.90 NW/SE x 0.50 x 0.20	Friable light greyish brown stoney (~20%) silty clay	Basal fill of furrow	-	-
25	5	-	5	8	0.41 NW/SE x 0.32 x 0.13	Friable greyish brown silty clay with occ. charcoal & small & medium sized (packing?) stone inclusions	Basal (packing) fill of post-hole C08	Flint flakes x 3 21E0674:25:01-03	-
26	**-**	**27, 28, 29**	**2**	**29**	**0.77 NW/SE x 0.66 x 0.32**	**Oval in plan; gradual b.o.s. top; moderately sloping sides at N, steep elsewhere; gradual b.o.s. base; concave circular base**	**Cut of pit, possible hearth or furnace**	**-**	**-**
27	26	-	28	1	0.55 NW/SE x 0.30 x 0.08	Friable dark greyish brown silty clay with occ. small stone inclusions	Upper fill of pit C26	-	8
28	26	-	29	27	0.77 NW/SE x 0.66 x 0.14	Friable orange brown silty clay with freq. small stone & solid heat affected lumps of material	Middle fill of pit C26	-	9
29	26	-	26	28	0.78 NW/SE x 0.66 x 0.08	Soft light yellowish brown clayey silt with occ. small stone inclusions	Basal fill of pit C26	-	-
30	**-**	**31, 32, 39, 40, 41, 42, 50, 84**	**2**	**32, 41, 42, 50, 84**	**52.00 m in circumference; truncated by ditch C51 on E side; 19.93 N/S x >20.37 external, 17.82 N/S internal; 0.65-1.40 in width at top; 0.30-0.70 in depth**	**Circular in plan; truncated on E side by C51 ditch; gradual b.o.s. top; straight sloping or concave sides; gradual b.o.s. base, flat or concave curvilinear base**	**Cut of circular ditch**	**-**	**-**

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
31	30	-	32, 39	43, 45, 51, 53, 59, 81	47.80 x 0.55-1.23 x 0.17-0.35	Friable dark brown silty clay with small & medium sized stone & occ. animal bone & charcoal inclusions	Upper fill of curvilinear ditch C30	Pottery 21E0674:31:01; Quern-stone 21E0674:31:02	2
32	30	-	41, 42, 50, 84	39, 31	40.50 x 0.43-0.98 x 0.08-0.24	Friable greyish brown silty clay with freq. small & medium sized stone & animal bone inclusions	Basal fill of ditch C30	-	3
33		**49, 34**	**2**	**49**	**10.05 x 0.27-0.65 x 0.23**	**Curvilinear in plan along S internal arc of C30; sharp b.o.s. top; gentle at base; steeply sloped sides; U shaped/ undulating base; truncated by pit C35**	**Cut of curvilinear ditch, possible slot trench, along internal S arc of C30, probable continuation of C55**	**-**	**-**
34	33		49	35	10.05 x 0.27-0.65 x 0.23	Friable dark greyish brown silty sandy clay with small & medium sized stone & occ. animal bone inclusions	Upper fill of curvilinear C33 in E end, only fill elsewhere	-	5
35	**-**	**36, 37, 38**	**31, 33**	**38**	**1.40 N/S x 1.10 x 0.25**	**Oval in plan; gradual b.o.s. top; concave sides; gradual b.o.s. base; flattish base**	**Cut of pit truncating ditches C30 & C33**	**-**	**-**
36	35	-	37	1	1.04 N/S x 0.85 x 0.20	Friable brown silty clay with occ. small & medium sized stone inclusions	Upper fill of pit C35	-	-
37	35	-	38	36	0.92 N/S x 0.70 x 0.10	Marine shells in a friable brown sandy silt with occ. animal bone inclusions, accumulated from N side	Middle fill of pit C35	-	-
38	35	-	35	37	1.40 N/S x 1.10 x 0.12	Friable dark greyish brown clayey silt with occ. medium sized stone inclusions	Basal fill of pit C35	-	4
39	30	-	32	31	c. 5.00 x 0.77 x 0.16	Friable light greyish brown silty clay with occ. small & medium sized stone inclusions	Localized middle fill of ditch C30 in SW arc	Flint fabricator 21E0674:39:01	-
40	30	-				Same as C31	Upper fill of ditch in N arc, same as C31	-	-

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
41	30	-	30	40/31	c. 10.00 x 0.55 x 0.38	Friable light yellowish brown silty clay with small & medium sized stone & occ. charcoal & animal bone inclusions, accumulated from S (interior)	Primary fill of ditch C30 on interior of N arc	-	-
42	30	-	30	40/31	c. 10.00 x 0.12 x 0.36	Friable greyish brown silty clay with small & medium sized stone & occ. charcoal & animal bone inclusions, accumulated from N (exterior)	Primary fill of ditch C30 on exterior of N arc	-	-
43	**-**	**44**	**31**	**44**	**2.64 E/W x 0.55-1.55 x 0.22**	**Irregular in plan; orientated E/W; narrow to W; wider to E; gradual b.o.s. at top; sloping or concave sides, steeper to E; gradual b.o.s. base; irregular linear base; extends out of cutting to W, truncates ditch C30 to E**	**Cut of pit or possible linear truncating ditch C30 in W arc**	**-**	**-**
44	43	-	43	1	2.64 E/W x 0.55-1.55 x 0.22	Friable dark brown sandy silt with freq. small & medium sized stone inclusions	Only fill of C43	-	-
45	**-**	**46**	**31**	**46**	**15.18 E/W x 1.00-1.34 x 0.27-0.37**	**Linear in plan, orientated E/W; sharp b.o.s. top; gradual at base; steeply sloped sides; concave/undulating linear base; truncates ditch C30 in NW arc, extends out of cutting to W**	**Cut of modern drainage ditch**	**-**	**-**
46	45		45	1	15.18 E/W x 1.00-1.34 x 0.27-0.37	Friable dark brown silty clay with cluster of medium sized stone inclusions in lower part of deposit	Single fill of ditch C45	-	
47	**-**	**48**	**31**	**48**	**1.35m L x 0.45m W x 0.13m D**	**Linear in plan, aligned E/W; gradual b.o.s. top and base, concave sides & base; truncates ditch C30 in NW arc**	**Cut of furrow**	**-**	
48	47	-	47	1	1.35m L x 0.45m W x 0.13m D	Friable dark brown silty clay	Only fill of furrow C47	-	
49	33	-	33	34	c. 2.00 x 0.60 x 0.20	Friable yellowish brown silty clay with small stone inclusions	Basal fill of curvilinear C33 in E end	-	-
50	30	-	30	32	c. 5.00 x 0.34 x 0.20	Friable light yellowish brown silty clay with small & medium sized stone inclusions, accumulated from N (interior)	Localized primary fill of ditch C30 on interior of S arc	-	

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
51	**-**	**52, 85**	**57, 31**	**85**	**> 68.00 x 1.50-2.50 x 0.27-0.55**	**Linear in plan, orientated NNE/SSW, extends out of cutting to N & S; gradual b.o.s. top & base; varied sloping or concave sides; flattish linear base; truncates curvilinear ditches C30 & C55**	**Cut of modern but pre-1st ed. OS map field boundary**	**-**	**-**
52	51	-	85	01	>68.00 x 1.50-2.50 x 0.27-0.55	Friable dark brown silty clay with animal bone & small & medium sized & occ. large sized stone inclusions	Upper fill of ditch C51	Modern pottery sherds, glass & iron fragments	-
53	**-**	**54**	**31**	**54**	**2.10 NE/SW x 1.20 x 0.20**	**Linear in plan; orientated NE/SW; gradual b.o.s. top; concave sides; gradual b.o.s. base; flattish linear base; truncates ditch C30, extends out of cutting to N**	**Cut of ditch**	**-**	**-**
54	53	-	53	01	**2.10 NE/SW x 1.20 x 0.20**	Friable dark brown silty clay with animal bone & small & medium sized stone inclusions	Only fill of ditch C53	-	-
55		**56**	**2**	**56**	**7.70 x 0.4-0.50 x 0.15-0.35**	**Curvilinear in plan along E internal arc of C30; sharp b.o.s. top; gentle at base; steeply sloped sides; U shaped/ undulating base; truncated by C51 and C57 (uncertain)**	**Cut of curvilinear ditch, possible slot trench, along internal E arc of C30, probable continuation of C33**	**-**	
56	55	-	55	51, 57?	7.70 x 0.4-0.50 x 0.15-0.35	Friable dark greyish brown silty clay with animal bone, small & medium sized stone & occ. charcoal inclusions	Single fill of ditch C55	-	6
57	**-**	**58**	**56?, 31?**	**58**	**6.35 x 0.50 max. x 0.30 max.**	**Curvilinear in plan; orientated N/S; gradual b.o.s. at top and base; moderately sloped sides; V shaped linear base; truncated by C55 and C51?**	**Cut of curvilinear ditch, possible slot trench**	**-**	**-**
58	57		57	01	6.70m L x 0.72m W x 0.21m D	Friable greyish brown silty clay with occ. small & medium sized stone inclusions	Only fill of curvilinear ditch C57	-	7

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
59		**60**	**2**	**31, 54**	**8.20 NNW/SSE x 0.60-0.79 x 0.15-0.27**	**Linear in plan; orientated NNW/SSE; gradual b.o.s. at top and base, steeply sloped sides with a concave base; truncates C30, C53, possibly C45**	**Cut of linear ditch/furrow**	**-**	**-**
60	59		59	01	8.20 NNW/SSE x 0.60-0.79 x 0.15-0.27	Friable dark brown silty clay with occ. animal bone & small stone inclusions	Single fill of ditch/furrow C59	-	-
61						Cancelled, continuation of C59			
62	**-**	**63**	**02**	**63**	**8.90 NE/SW x 0.80 x 0.25**	**Linear in plan; orientated NE/SW; gradual b.o.s. at top and base, steeply sloped sides with a concave base; truncates C30, possibly C59, abuts C45**	**Cut of ditch/furrow**	**-**	**-**
63	62	-	62	01	8.90 NE/SW x 0.80 x 0.25	Friable dark brown silty clay with occ. animal bone & small stone inclusions	Single fill of ditch/furrow C62	-	-
64						**Continuation of C59**			
65						Same as C60			
66	**-**	**67**	**2**	**67**	**2.40 N/S x 0.58 x 0.20**	**Linear in plan; orientated N/S; gradual b.o.s. at top and base, steeply sloped sides with a concave base;**	**Cut of short linear ditch/furrow, possible continuation of C59**	**-**	**-**
67	66	-	66	01	2.40 N/S x 0.58 x 0.20	Friable dark brown silty clay with occ. animal bone & small stone inclusions	Single fill of linear C66	-	-
68						Same as C54	-	-	

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
69		**70**	**2**	**70**	**>22.13 N/S x 0.85-1.35 x 0.20-0.30**	**Linear in plan; orientated N/S; gradual b.o.s. at top; steeply sloped to concave sides; gradual b.o.s. at base; flattish, undulating linear base, extends out of cutting to N**	**Cut of linear ditch/field boundary**		
70	69		69	1	>22.13 N/S x 0.85-1.35 x 0.20-0.30	Friable dark brown silty clay with stone, animal bone & occ. charcoal inclusions	Single fill of linear ditch C69	21E0674:70:01 flint arrowhead	-
71	**-**	**72**	**2**	**72**	**6.41 WNW/ESE x 0.67 x 0.32**	**Linear in plan; orientated WNW/ESE; gradual b.o.s. at top; steeply sloping sides; gradual b.o.s. base; concave, linear base**	**Cut of ditch/furrow**	**-**	**-**
72	71	-	71	1	6.41 WNW/ESE x 0.67 x 0.32	Friable dark brown silty clay with stone, animal bone & occ. charcoal inclusions	Only fill of ditch/furrow C71	-	-
73	**-**	**74**	**?**	**?**	**3.15 E/W x 1.20 x 0.23 max.**	**Irregular in plan; orientated E/W; gradual b.o.s. top; concave or sloping sides; gradual b.o.s. base, flattish base; possibly truncated by ditches C30, C55**	**Irregular cut, similarities in fills means interpretation uncertain**	**-**	**-**
74	73	-	?	?	3.15 E/W x 1.20 x 0.23 max.	Friable dark brown silty clay with stone inclusions	Only fill of C73	-	-
75	**-**	**76**	**2**	**76**	**3.36 WNW/ESE; x 0.37 x 0.1-0.2**	**Linear in plan; orientated WNW/ESE; gradual b.o.s. at top; steeply sloping sides; gradual b.o.s. base; concave, linear base**	**Cut of ditch/furrow**	**-**	**-**
76	75		76	01	3.36 WNW/ESE; x 0.37 x 0.1-0.2	Friable dark brown silty clay with stone inclusions	Only fill of ditch/furrow C75	-	-
77	**-**	**78**	**2**	**78**	**13.5 x 0.47-0.76 x 0.10-0.20**	**Curvilinear in plan; orientated NW/SE; gradual b.o.s. at top; steeply sloping sides; gradual b.o.s. base; concave, linear base; indeterminate relationship with ditch/furrow C79**	**Cut of ditch/furrow**	**-**	**-**
78	77	-	77	01	13.5 x 0.47-0.76 x 0.10-0.20	Friable greyish brown silty clay with stone & occ. charcoal & animal bone inclusions	Only fill of ditch/furrow C77	-	-

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
79	**-**	**80**	**02**	**80**	**1.95 NW/SE x 0.37 x 0.15**	**Linear in plan; orientated NW/SE; gradual b.o.s. at top; steeply sloping sides; gradual b.o.s. base; concave, linear base; indeterminate relationship with ditch/furrow C77**	**Cut of furrow**	**-**	**-**
80	79	-	79	01	1.95 NW/SE x 0.37 x 0.15	Greyish brown, friable silty clay with frequent small stone inclusions.	Only fill of furrow	-	-
81	**-**	**82**	**31**	**82**	**1.28 NE/SE x 0.60 x 0.15**	**Oval in plan; orientated NE/SW; gradual b.o.s. top; sloping sides; gradual b.o.s. base; uneven flattish base**	**Cut of grave containing skeleton Sk1**	**-**	**-**
82	81	-	81	01	1.28 NE/SE x 0.60 x 0.15	Dark brown, friable silty clay with frequent small stone inclusions.	Fill of grave containing skeleton Sk1	-	11, 12
83	4	-	3	1	c. 8.00 x 0.30 x 0.10	Friable reddish orange (heat-affected?) silty clay with occ. small stone inclusions	Localized upper fill of ditch C04 in N area	-	-
84	30	-	30	31	c. 5.00 x 0.38 x 0.07	Friable light yellowish brown silty clay with small & medium sized stone inclusions, accumulated from S (exterior)	Localized primary fill of ditch C30 in S arc	-	
85	51	-	51	52	>9.00 N/S x 1.25 x 0.32	Friable brownish grey silty clay with freq. small & medium sized & occ. large (>0.2m) stone inclusions	Lower fill of ditch C51	-	
86	-	-	02	87	14.00 WNW/ESE x 8.2 x 0.01	Irregular in plan; gradual b.o.s. on W end, imperceptible elsewhere, shallow sloping sides; flat base	Natural? depression	-	-
87	-	-	86	01	14.00 E/W x 11.2 x 0.10-0.25	Loose dark brown sandy silt with occ. small stone & animal bone inclusions	Fill of natural depression	-	-

Appendix 2: Radiocarbon date

UBA No.	Sample ID	Material Type	14C Age	±	F14C	±	mg Graphite
UBA-48273	21E0674:Sk1	Human radius fragment	1309	27	0.8497	0.0029	0.792

Radiocarbon date certificate

Laboratory Identification: UBA-48273
Date of Measurement: 9th August 2022
Site: Ballalease North, Donabate, Co. Dublin
Material Dated: bone, antler or tooth root
Pre-treatment: AAA
mg Graphite: 0.792
Submitted by: Liam Coen
Conventional 14C Age: 1309+/-27BP
Fraction corrected using AMS δ 13C

Stable isotope result for human bone sample UBA-48273

UBNo	Sample ID	$\delta^{13}C$	$\delta_{15}N$	C:N ratio	Pretreatment	Yield
48273	21E0674:Sk1	-21.0	11.1	3.23	Collagen	1.40

C:N values are one indication of the degree of preservation of bone protein ("collagen") and/or contamination by soil organic substances. The recommended values for C:N atomic values reported here are between 2.9-3.5. (1,2).

1. van Klinken, G.J., Journal of Archaeological Science, 1999. 26(6): p. 687-695.

2. Ramsey, C.B., et al., Radiocarbon, 2004. 46(1): p. 155- 163.

RADIOCARBON CALIBRATION PROGRAM*

CALIB REV8.2

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*To be used in conjunction with:

Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.

Calibration data set: intcal20.14c # Reimer et al. 2020

UBA-48273	**Radiocarbon Age BP**	**1309 +/- 27**
% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal BC 665-687 699-701 742-772	0.391 0.042 0.567
95.4 (2 sigma)	cal BC 657-708 722-774	0.495 0.505
Median probability: 716		

UBA No.	Sample ID	Material Type	14C Age	±	F14C	±	mg Graphite
UBA-48274	21E0674:S6:C56	Quercus	3298	28	0.6633	0.0023	0.952

Radiocarbon date certificate

Laboratory Identification: UBA-48274
Date of Measurement: 1st September 2022
Site: Ballalease North, Donabate, Co. Dublin
Material Dated: charcoal
Pre-treatment: AAA
mg Graphite: 0.952
Submitted by: Liam Coen
Conventional 14C Age: 3298+/-28BP
Fraction corrected using AMS δ 13C

RADIOCARBON CALIBRATION PROGRAM*

CALIB REV8.2

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*To be used in conjunction with:

Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.

Calibration data set: intcal20.14c # Reimer et al. 2020

UBA-48274	**Radiocarbon Age BP 3298 +/- 28**	
% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal BC 1611-1574	0.534
	1564-1552	0.149
	1548-1531	0.251
	1525-1519	0.066
95.4 (2 sigma)	cal BC 1620-1506	1.000
Median probability: -1566		

References for calibration datasets:

Reimer P, Austin WEN, Bard E, Bayliss A, Blackwell PG,Bronk Ramsey C, Butzin, M, Edwards RL, Friedrich M, Grootes PM, Guilderson TP, Hajdas I, Heaton TJ, Hogg AG, Kromer B, Manning SW, Muscheler R, Palmer JG, Pearson C, van der Plicht J, Reim Richards DA, Scott EM, Southon JR, Turney CSM,Wacker L, Adolphi F, Bantgen U, Fahrni S, Fogtmann-Schulz A, Friedrich R, Kahjler P, Kudsk S, Miyake F, Olsen J, Sakamoto M, Sookedo A, Talomo S. 2020

The IntCal20Northern Hemisphere radiocarbon calibration curve(0-55 calkB Radiocarbon 62. DOI: 10.1017/RDC.2020.41.

Comments: * This standard deviation (error) includes a lab error multiplier.

** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)

** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2) where ^2 = quantity squared.

[ ] = calibrated range impinges on end of calibration data set 0* represents a "negative" age BP

1955* or 1960* denote influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr

Appendix 3: Lithics Report

By Conor Brady Ph.D. M.I.A.I.

September 2022

Donabate area (Archer Ref. 2021_43)

Ballalease North (AA4 21E0669)

Ballalease North (AA5 21E0670)

Ballalease North (AA6 21E0674)

Portraine Demesne (AA8 21E0676)

Ballymastone (AA9 21E0677)

Church Road, Lusk (21E0715)

Introduction

This report details the lithic assemblage recovered during archaeological investigations at a number of sites in the Donabate area undertaken by Archer Heritage Planning Ltd. The sites are as follows:

AA4 21E0669 Ballalease North	1 artefact
AA5 21E0670 Ballalease North	11 artefacts
AA6 21E0674 Ballalease North	14 artefacts
AA8 21E0676 Portrane Demesne	3 artefacts
AA9 21E0677 Ballymastone	2 artefacts
21E0715 Church Road, Lusk	1 artefact

Methodology

Artefacts were measured to the nearest millimetre and weights were recorded for all flint pieces to the nearest 0.1 g. The colour of the flint pieces was recorded objectively using Munsell® Soil Colour Charts where macroscopic assessment was not precluded by cortex, patination or burning. Artefact classifications are based on those of Peterson (1990) for analysing lithics from the Bally Lough project Co. Waterford and later modified and used by Dillon (1997) for her work on the assemblages from excavated contexts at Knowth in the Boyne Valley. Detailed descriptions, particularly of retouched pieces, are based on the system developed by Woodman *et al*. (2006). Edge damage was recorded on a number of artefacts from macroscopic examination. This may have occurred during the use of the artefacts but equally could have happened post deposition. It is possible that further microscopic analysis might reveal further evidence of use.

Abbreviations used in artefact descriptions: L: Length; B: Breadth; Th: Thickness; Wt: Weight; Plat W: Platform Width; Plat D: Platform Depth.

Raw Materials

Of the thirty-two artefacts analysed here, one was quartz, one was mudstone and the remaining thirty finds were flint. Flint occurs naturally in chalk and has a range of colours from grey to black and caramel brown. The cortex or outer skin on a flint pebble or nodule is usually smooth, textured or gritty and indicates an origin in glacial tills or from a shingle beach. The cortex on fresh or chalk flint is usually soft, or chalky and white in colour. During times of glaciation, flint was extracted and transported by ice sheets to non-flint bearing areas where it was deposited as a constituent of the general glacial drift (Jackson 1991, 34; see also Woodman 1987; Woodman et al. 2006: 81-3, fig. 3.4). Once deposited, the colour of the material tends to be altered by the absorption of minerals from the local soil and colours vary widely, ranging from shades of grey to cream through to brown (Dillon 1997, 33). Due to the abrasion and erosion experienced during transportation, any cortex remaining is generally textured or smooth in character rather than being chalky. The size of nodules and pebbles found in glacial drift tends to be much smaller than nodules from in-situ chalk deposits because of the stresses to which the nodules were subject during transportation.

The majority of the flakes and retouched artefacts in these assemblages were small and still retained cortical surfaces indicating a pebble flint origin for the raw material. Pebble flint is widely available along the costs of north county Dublin and the material was collected from shingle beaches and perhaps glacial till soils prior to working and/or transportation inland (Dolan and Cooney 2010). A number of archaeological surface collection surveys have mapped significant if varying densities of both worked and pebble- or nodular flint in the wider area (Guinan 1992; Collins 1997; Brady 2016).

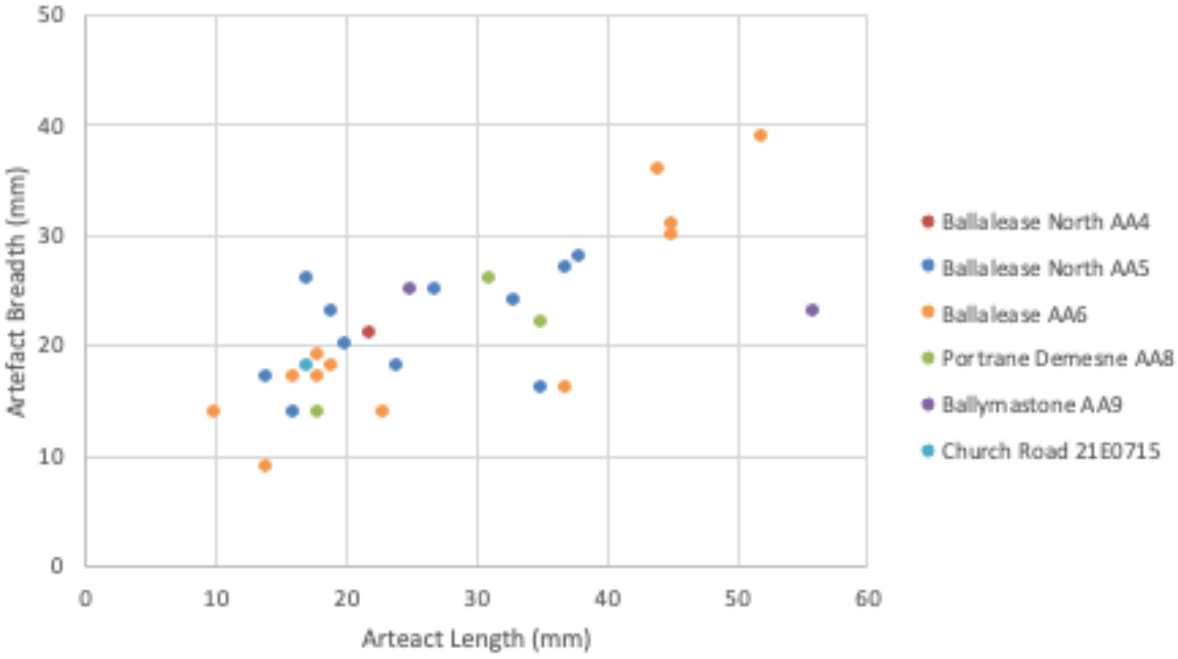


Figure 1: Length x breadth comparison, all flint artefacts.

Figure 1 compares the dimensions of all of the flint artefacts from the six sites. There is a clear tendency for the flakes to be less than 40mm in length. There are only five outliers and these flakes came from Ballalease AA6 and Ballymastone AA9 where flakes measured between 40 mm and 55 mm.

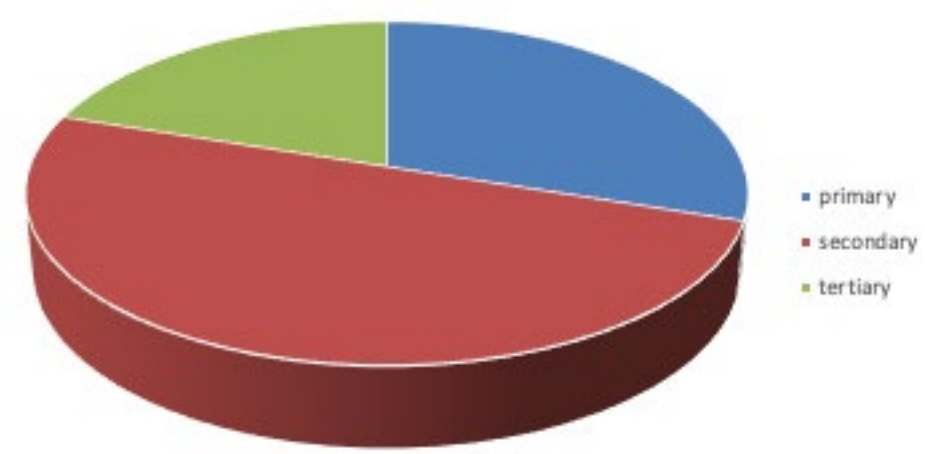


Figure 2: Cortical analysis, all flint artefacts.

There is also a strong tendency for the artefacts to retain some degree of cortical surface. 20% of the artefacts are primary where the dorsal surface of each piece is completely or almost completely cortical and 50% is secondary where there is some cortical surface remaining while just 20% of the flint artefacts are tertiary where there is no cortical surface remaining. This is strongly indicative of the raw material coming from small pebbles. The majority of the cortex surface textures are smooth indicating a beach or glacial till origin for the pebbles. In addition to this major source of raw material, there are indications that some retrieval and recycling of discarded lithic artefacts was taking place as a supplementary source of raw material. This is indicated primarily by the presence of differing levels of patination on single artefacts.

As mentioned above one of the artefacts in the assemblages analysed was quartz (21E0674:1:6) from Ballalease North. The piece is quite small with a maximum length of just 22 mm and it appears to have been struck although there are no particularly sharp or feathered edges remaining. The piece is incomplete and it is also in three separate refitting fragments.

Quartz is widely available across Ireland in the form of vein deposits, and it was used extensively in various features that were created around the perimeters of passage tombs in the Brú na Bóinne area and elsewhere and may have been regarded as having a special meaning or status. Although it is generally coarse grained or ‘sugary’ in texture with an absence of conchoidal fracture, it is occasionally

used for chipped stone tools. Because of the nature of the material, it is often very difficult for archaeologists to recognise and classify quartz artefacts that have been deliberately worked (Driscoll and Warren 2007; Woodman et al. 2006, 84).

Also present in the assemblage was a mudstone hammer stone. This material is only occasionally used for the manufacture of chipped stone artefacts because of its softness relative to other frequently available materials (Woodman et al. 2006, 85). Here it was used in the form of an intact, elongated water-rolled pebble in several ways as a percussive tool, possibly for lithic knapping activities.

There follows a consideration of individual assemblages from each site which includes a description of each find and a brief commentary on the assemblage.

AA4 21E0669 Ballalease North

One artefact was recovered during investigations at Ballalease NorthAA4 (21E0669). It is a primary flint flake which came from context C.01. This is not a diagnostic artefact but it is likely to date broadly to sometime between the Neolithic and Early Bronze Age. It was recovered from topsoil and may be the result of casual discard in antiquity. It is broadly indicative of prehistoric activity in the area during the prehistoric period.

21E0669:1:1

A complete unutilised primary flint flake. It is in abraded condition. The cortex is pale brown and smooth and is 2mm thick. The flint is pink and opaque. It has a plain platform and a feather termination.

L: 22 mm B: 21 mm Th: 3 mm Wt: 2.2 g

Plat W: 5 mm Plat D: 3 mm

Munsell No: 5YR 7/3

AA5 21E0670 Ballalease North

Eleven flint artefacts were found at this site. The artefacts were recovered from four contexts: six came from C.1 which is topsoil, two came from C.04, one came from C.07 and two came from C.15. Two of the artefacts are end scrapers (21E0670:1:3, and 21E0670:1:7). There is also a disc scraper (21E0670:1:6) with a length of 19 mm. These are often found in contexts with Beaker pottery although they are not necessarily diagnostic of Late Neolithic/Early Bronze Age activity (Woodman et al 2006, 159). The remaining artefacts are all flakes, five are complete and three are incomplete. Of the eleven artefacts, three are primary, seven are secondary and one is tertiary. This combined with the small size

of most of the artefacts is strongly suggestive of a pebble flint origin for the raw material used to knap these artefacts.

An additional feature of one of the end scrapers (21E0670:1:3) is that it has differential patination. The platform on this piece is patinated while the remaining surfaces are unpatinated. This suggests that the scraper blank was knapped from a piece that had already been knapped and discarded for some considerable length of time during which a patina could form. Thus, in addition to raw material being sourced from shingle beaches in the form of pebbles, it is likely that surface scatters of already ancient flint was being used as a source of knapping material.

In terms of the chronology indicated by the artefacts in this assemblage, the convex end scrapers were made throughout the Neolithic period. As noted already, disc scrapers are often found in contexts with Beaker pottery although they are not regarded themselves as being diagnostic of activity during the final Neolithic/Early Bronze Age.

21E0670:1:3
A complete secondary flint end scraper. It is in fresh condition. The cortex is pale brown and smooth and it is 1mm thick. The flint is very pale brown and opaque. The platform is patinated. The retouch is direct, abrupt, short in extent with a sub-parallel morphology. The platform is plain.
L: 27 mm B: 25 mm Th: 11 mm Wt: 8.2 g
Plat W: 20 mm Plat D: 9 mm
Munsell No: 10YR 7/4

21E0670:1:4
A complete utilised tertiary flint flake. It is in abraded condition. There is an all-over white patina.
L: 24 mm B: 18 mm Th: 6 mm Wt: 3.6 g

21E0670:1:5
An incomplete unutilised secondary flint flake. It is in abraded condition and the distal end is missing. The cortex is brown and smooth and it is <1mm thick. The flint is yellowish brown and opaque. The platform is cortical and there are two longitudinal dorsal flake scars.
L: 20 mm B: 20 mm Th: 5 mm Wt: 3.1 g
Munsell No: 10YR 5/8

21E0670:1:6

A complete secondary flint disc scraper. It is in fresh condition. The cortex is yellowish brown and smooth and it is 1mm thick. The flint is light yellowish brown and translucent with small inclusions. The retouch is direct, abrupt, short in extent with a parallel morphology. The platform is cortical and there are two crossed dorsal flake scars.

L: 19 mm B: 23 mm Th: 6 mm Wt: 3.4 g

Munsell No: 2.5Y 6/4

21E0670:1:7

A complete secondary flint end scraper. It is in abraded condition. The cortex is red and smooth and it is <1mm thick. The flint is yellowish red and translucent with small inclusions. The retouch is crudely applied; it is direct, abrupt, short in extent with a sub-parallel morphology. The platform is punctiform and there are three multi-directional dorsal flake scars.

L: 33 mm B: 24 mm Th: 10 mm Wt: 7.4 g

Munsell No: 5YR 5/8

21E0670:1:8

A complete unutilised primary flint flake. It is in fresh condition. The cortex is very pale brown and smooth and it is 2mm thick. The flint is strong brown and opaque with small inclusions. The platform is irregular soft and it has a hinge termination.

L: 37 mm B: 27 mm Th: 11 mm Wt: 11.9 g

Munsell No: 7.5YR 5/6

21E0670:4:1

An incomplete unutilised secondary flint flake. It is in fresh condition and the distal end is missing. The cortex is brown and smooth and it is 2mm thick. The flint is strong brown and translucent. The platform is crushed and there is one longitudinal dorsal flake scar.

L: 14 mm B: 17 mm Th: 4 mm Wt: 0.7 g

Munsell No: 7.5YR 5/6

21E0670:4:2

A complete unutilised primary flint flake. It is in fresh condition. The cortex is brown and smooth and it is 1mm thick. The flint is strong brown and opaque. The platform is punctiform and it has a hinge termination.

L: 16 mm B: 14 mm Th: 4 mm Wt: 1 g

Munsell No: 7.5YR 5/6

21E0670:7:1

A complete utilised secondary flint flake. It is in fresh condition and there is wear on both laterals. The flake is triangular in shape, and is wide at the distal end. The cortex is very pale brown and smooth and it is 3mm thick. The flint is reddish yellow and opaque. The platform is punctiform, there are two longitudinal dorsal flake scars and it has a cortical feather termination.

L: 38 mm B: 28 mm Th: 6 mm Wt: 4.4 g

Munsell No: 7.5YR 6/8

21E0670:15:1

A complete unutilised primary flint flake. It is in abraded condition. The cortex is very pale brown and smooth and it is 3mm thick. The flint is yellow and opaque. The platform is cortical and it has a cortical feather termination.

L: 35 mm B: 16 mm Th: 6 mm Wt: 4.3 g

Munsell No: 10YR 7/6

21E0670:15:2

An incomplete utilised secondary flint flake. It is in fresh condition and the proximal end is missing. The cortex is pale brown and smooth and it is <1mm thick. The flint is very pale brown and translucent. There is one longitudinal dorsal flake scar and it has a cortical feather termination.

L: 17 mm B: 26 mm Th: 5 mm Wt: 2.4 g

Munsell No: 10YR 7/4

Ballalease North AA6 21E0674

Fourteen lithic artefacts were recovered during investigations at Ballalease North AA6 (21E0674). They were recovered from six different contexts: six lithics came from C.01, one from C.03, one from C.12, three from C.25, one from C.39 and two from C.70.

Twelve of the lithics were flint, one was quartz and one was mudstone. Four of the flint artefacts were relatively large, each over 40 mm in length. These were two retouched flakes 21E0674:1:1 and 21E0674:1:2, and a utilised flint flake 21E0674:1:3. The largest piece, however, is a retouched spall (21E0674:1:5) which does not appear to have been deliberately knapped as it lacks a platform and point of percussion. The sizes of these pieces are above average and the flakes were all either retouched or utilised. A large proportion of the pieces in the assemblage are cortical – seven out of the twelve flint

artefacts. The cortex surfaces of all seven pieces was smooth indicating a glacial till or beach origin for the raw material from which they were knapped, most likely pebbles and small nodules. There is a variety to the colour of the flint pieces ranging from brown and strong brown to very pale brown, light yellowish brown, pinkish grey and greyish brown. The colours are thus quite mixed and are a further indication of a pebble flint origin for the raw material used.

The condition of the pieces in the assemblage is generally good. Just three pieces were abraded and the rest were fresh. The three abraded pieces were from C.01 which is topsoil so they may have been exposed to pressures and stresses over a long period of time.

All of the artefacts in this assemblage are flakes or flake-based. The most impressive modified or retouched pieces are the possible fabricator (21E0674:39:1). It is a small example and does not have the same robust triangular section of more classic examples. The two ends are missing so there is no sign of the wear that is often found at the ends of these tools but the pattern of retouch along both edges suggests that it was a fabricator. A range of functions has been suggested ranging from tools used to retouch other lithic tools to strike-a-lights (Woodman et al 2006, 173-4). The other notable modified object is an unfinished barbed-and-tanged arrowhead (21E0674:70:1). This has slightly rounded barbs and appears to be an example of a non-fancy Sutton type (Butler 2005, 162-5, figs. 68, 69; Green 1980). Although the tang is well formed and each barb has also been largely formed by invasive retouch, the remainder of the body of the arrowhead and especially the tip, have not been formed. There is no visible reason why the piece should have been abandoned – there are no obvious inclusions or imperfections. The piece is illustrative in that it is an unusual example of a half-finished artefact and gives an insight into the procedure followed by the knapper in making the arrowhead. Two of the large flakes mentioned above were also retouched (21E0674:1:1 and 21E0674:1:2) as well as the spall (21E0674:1:5). In addition to these modified tools, there are four unmodified utilised flakes in the assemblage (21E0674:1:3; 21E0674:1:4; 21E0674:25:2; 21E0674:25:3).

The chronology indicated by the pieces in this assemblage seems to be broadly Neolithic to Early Bronze Age. Some of the individual artefacts suggest a tighter date range, particularly the barbed-and-tanged arrowhead (21E0674:70:1) which is likely to be diagnostic of a Late Neolithic/Beaker period. Similar examples have been recovered from the Beaker levels at Knowth (Dillon 1997, 251) as well as from Site Z and the Late Neolithic pit circles at Newgrange (Brady 2007, fig. 4.19). The other notable artefact, the possible fabricator (21E0674:39:1), is not diagnostic of any particular period on present knowledge.

21E0674:1:1

An incomplete retouched primary flint flake. It is in abraded condition, there are small areas of crude retouch and utilisation along all edges and the proximal end is missing. The cortex is brown and smooth and it is <1mm thick. The flint is strong brown and opaque. It has a yellow all-over patina including the break surface, but there is none on the retouch. The retouch is both direct and indirect, abrupt and short in extent

L: 45 mm B: 30 mm Th: 14 mm Wt: 28.2 g

Munsell No: 7.5YR 5/6

21E0674:1:2

A complete retouched primary flint flake. It is in abraded condition and there is utilisation/chipping along one edge. The cortex is white and smooth/textured and it is <1mm thick. The flint is brown and opaque. It has a white all-over patina. The platform is faceted.

L: 45 mm B: 31 mm Th: 11 mm Wt: 18.5 g

Munsell No: 7.5YR 5/2

21E0674:1:3

A complete utilised tertiary flint flake. It is in abraded condition. It is irregular in shape, there is a concavity on one side with wear, but no retouch. The flint is very pale brown and opaque with large inclusions. It has a heavy white all-over patina. The platform is plain and there are three multi-directional dorsal flake scars.

L: 44 mm B: 36 mm Th: 12 mm Wt: 13 g

Munsell No: 10YR 7/3

21E0674:1:4

An incomplete utilised tertiary flint flake. It is in fresh condition and there is wear on the right lateral and the base of the left lateral and the distal end is missing. The flint is pink and opaque with large inclusions. The platform is plain.

L: 18 mm B: 19 mm Th: 2 mm Wt: 1.4 g

Munsell No: 7.5YR 7/4

21E0674:1:5

A complete retouched tertiary flint spall. It is in fresh condition. The piece is not a flake, as there is no platform or clear point of percussion but there is one oblique flake removal, and a section of retouch on

one edge 20mm long. The flint is greyish brown and opaque with large inclusions. It has a heavy white patina on the dorsal, but none on the flake scar or the retouched edges.

L: 52 mm B: 39 mm Th: 16 mm Wt: 29.8 g

Munsell No: 10YR 5/2

21E0674:1:6

An incomplete unutilised quartz flake. It is in fresh condition and it is in three separate refitting fragments.

L: 22 mm B: 10 mm Th: 3 mm Wt: 0.9 g

21E0674:3:1

A mudstone hammerstone. An elongated water-rolled pebble. It is sub-rectangular in section with very rounded corners. There is an area of intense pocking on one face, resulting in a 2-3mm deep scar; there is a similar more slight area of pocking on opposite face 25mm x 15mm, third area of pocking on same face on junction/edge between two facets 16mm x 8mm.

L: 100 mm B: 31 mm Th: 28 mm Wt: 110.3 g

21E0674:12:1

A complete unutilised primary flint flake. It is in fresh condition. The cortex is pale brown and smooth and it is <1mm thick. The flint is very pale brown and translucent. The platform is punctiform and it has a cortical/feather termination.

L: 14 mm B: 9 mm Th: 3 mm Wt: 0.5 g

Munsell No: 10YR 7/4

21E0674:25:1

An incomplete unutilised secondary flint flake. It is in fresh condition and the distal end is missing. The cortex is pale brown and smooth and it is <1mm thick. The flint is pinkish grey and translucent. The platform is cortical/punctiform and there are two longitudinal dorsal flake scars.

L: 23 mm B: 14 mm Th: 4 mm Wt: 1.4 g

Munsell No: 7.5YR 7/2

21E0674:25:2

A complete utilised secondary flint flake. It is in fresh condition. The cortex is very pale brown and smooth and it is 4mm thick. The flint is pinkish grey and translucent. The platform is cortical, there is one longitudinal dorsal flake scar and it has a hinge/cortical termination.

L: 18 mm B: 17 mm Th: 4 mm Wt: 1.1 g

Munsell No: 7.5YR 7/2

21E0674:25:3

An incomplete utilised secondary flint flake. It is in fresh condition, there is utilisation/crude retouch on the left lateral and the distal end is missing. The cortex is brown and smooth and it is <1mm thick. The flint is light yellowish brown and translucent. The platform is cortical and there is one longitudinal dorsal flake scar.

L: 19 mm B: 18 mm Th: 4 mm Wt: 1.9 g

Munsell No: 10YR 6/4

21E0674:39:1

An incomplete tertiary flint fabricator. It is in fresh condition. There is no wear on the proximal end. The break is patinated and both proximal and distal ends are missing. The flint is pinkish grey and translucent. It has a light white patina except on the distal break and retouched edges. The retouch is direct, abrupt, short in extent with a scalar morphology. There are three longitudinal dorsal flake scars

L: 37 mm B: 16 mm Th: 5 mm Wt: 4.6 g

Munsell No: 7.5YR 7/2

21E0674:70:1

A complete retouched secondary flint unfinished barbed and tanged arrowhead. It is in fresh condition. The barbs and tangs are formed but the rest of the flake is unworked. Working is located along the right lateral of the flake. The cortex is brown and smooth and it is <1mm thick. The flint is reddish yellow and translucent. The retouch is bifacial, invasive, short in extent with a parallel morphology. The platform is cortical, there is one crossed dorsal flake scar and it has a hinge/cortical termination.

L: 16 mm B: 17 mm Th: 5 mm Wt: 1.4 g

Munsell No: 7.5YR 7/8

21E0674:70:2

A complete unutilised tertiary flint flake. It is in fresh condition. The flint is pinkish grey and translucent. The platform is punctiform, there is one longitudinal dorsal flake scar and it has a hinge/cortical termination.

L: 10 mm B: 14 mm Th: 3 mm Wt: 0.6 g

Munsell No: 7.5YR 6/2

Portrane Demesne AA8 21E0676

Three lithic artefacts were recovered during investigations at Portrane Demesne AA8 (21E0676). All were retrieved from C.01 and all were flint. All pieces were in good fresh condition and one of them, a utilised flake (21E0676:1:2) was incomplete. The pieces are of average size, the largest, a secondary flake (21E0676:1:3), is 35 mm maximum length. All pieces retain at least some cortex indicating a probable pebble flint origin for the raw material used. The cortex on all pieces is smooth so the raw material was likely collected from a shingle beach or from glacial till soil. The presence of the bipolar core (21E0676:1:1) in this small assemblage is a further indication of the reliance on relatively small raw material. This technique is often used when conventional hand-held knapping is not possible because of the small size of the core. The bipolar core is rested on an anvil stone and then struck with a hard hammer from above creating characteristic flakes with the appearance of having been struck from both ends simultaneously (Woodman et al. 2006, 81).

21E0676:1:1

A complete unutilised primary flint bipolar core. It is in fresh condition. The cortex is very pale brown and smooth and it is 3mm thick. The flint is yellowish brown and translucent with small inclusions. There are two negative flake scars.

L: 31 mm B: 26 mm Th: 11 mm Wt: 9.4g

Munsell No: 10YR 5/6

21E0676:1:2

An incomplete utilised primary flint flake. It is in fresh condition and the distal end is missing. The cortex is brown and smooth/textured and it is <1mm thick. The flint is yellowish brown and translucent. The platform is cortical.

L: 18 mm B: 14 mm Th: 5 mm Wt: 1.8g

Munsell No: 10YR 5/8

21E0676:1:3

A complete unutilised secondary flint bipolar flake. It is in fresh condition. The cortex is brown and smooth and it is <1mm thick. The flint is reddish brown and translucent. The platform is cortical/crushed. There are three opposed dorsal flake scars.

L: 35 mm B: 22 mm Th: 4 mm Wt: 4.4 g

Munsell No: 5YR 5/4

Ballymastone AA9 21E0677

Two lithics were recovered during investigations at Ballymastone AA9 (21E0677). Both are flint. They were recovered from two different contexts, C.08 and C.13. The secondary flake (21E0677:13:1) from C.13 is larger than average with a length of 56 mm and is the largest piece that was recovered across all of the assemblages discussed here. Thus, although there was a clear reliance and effective exploitation of small, relatively poor quality pebble flint, there was also occasional limited access to slightly larger pieces of raw material. Whether this was a chance find of a particularly large nodule in the local region or whether the parent raw material (or the artefact itself) was imported is not known.

21E0677:8:1

An incomplete unutilised secondary flint flake. It is in abraded condition and the distal end is missing. It looks like a failed attempt to create bipolar core. Two edges are crushed/damaged from repeated inadequate blows including the break edge. The cortex is reddish brown and smooth and it is <1mm thick. The flint is light grey and opaque. The platform is punctiform/crushed and there are three multi-dimensional dorsal flake scars.

L: 25 mm B: 25 mm Th: 6 mm Wt: 5 g

Munsell No: 10YR 7/2

21E0677:13:1

A complete utilised secondary flint flake. It is in fresh condition. The cortex is white and heavily textured and it is 2mm thick It has a heavy white all-over patina and there are large inclusions. The platform is cortical, there is one longitudinal dorsal flake scar and it has a feather/cortical termination.

L: 56 mm B: 23 mm Th: 10 mm Wt: 14.4 g

Church Road Lusk 21E0715

This single lithic artefact was recovered from C.81 and is in good fresh condition. It is also complete. This end scraper was manufactured on a relatively small secondary flake indicating the use of relatively small pebble flint as the raw material. It indicates activity broadly during the Neolithic to Early Bronze Age.

21E0715:81:1

A complete secondary flint end scraper. It is in fresh condition. The cortex is pale brown and smooth and is 1mm thick. The flint is yellowish brown and opaque. The retouch is direct, abrupt, short in extent, with a parallel morphology. The platform is cortical and there is one opposed dorsal flake scar.

L: 17 mm B: 18 mm Th: 7 mm Wt: 2.4 g

Munsell No: 10YR 5/6

Recommendations for illustration

AA5 21E0670 Ballalease North

21E0670:1:3 Flint end scraper

21E0670:1:6 Flint end scraper

21E0670:1:7 Flint end scraper

AA6 21E0674 Ballalease North

21E0674:70:1 Flint unfinished barbed-and-tanged arrowhead

21E0674:3:1 Mudstone hammerstone

AA8 21E0676 Portrane Demesne

21E0676:1:1 Flint bipolar core

21E0715 Church Road, Lusk

21E0715:81:1 Flint end scraper

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Appendix 4: Prehistoric pottery analysis

The prehistoric pottery from Ballalease North, Donabate, Co. Dublin (21E0674)

Eoin Grogan and Helen Roche

The site at Ballalease North produced a single sherd of fine prehistoric pottery. The fabric, form and decoration indicate this is from the flat base of a late Neolithic Grooved Ware pot. As ceramic material from this period is rare in this area this is an important discovery extending the known extent of contemporary settlement.

The pottery

The base-sherd (body thickness: 8.49mm; base: 7.69–11.44mm; weight: 32g) is of hard, very well-fired cream-buff fabric with a dark grey inner core and surface. There is a low content of fine, crushed quartzite inclusions and both surfaces are smooth and carefully finished. While the base is flat with a simple sharp connection with the lower body wall the junction still retains a very slight lip where the wall and base were pinched together. The base has a domed profile, thickening noticeably towards the centre. Sharp, unworn, edge breaks indicate breakage shortly before deposition. A patchy, blackened accretion adheres to the inner surface and indicates domestic use

Very distinctive, and unusual, decoration occurs on the flat internal base surface. This consists of a low, broad (5.17mm wide) circumferential ridge with, immediately inside, a narrower (*c*. 2.80mm) shallow groove.

Comment

This is from a flat-bottomed, probably bucket-shaped pot with a maximum external base diameter of *c*. 100mm. While the fabric (including the use of quartzite inclusions), shape and quality of firing can be broadly paralleled in the Chalcolithic Beaker tradition other features suggest it is more probably from a late Neolithic Grooved Ware vessel. These include the two-tone cross-section (buff externally with a dark grey interior) as opposed to the 'sandwich' profile (buff/grey/buff) of good quality Beaker, the hard, almost brittle, firing, and the very distinctive decoration. While dolerite is the most common inclusion in Grooved Ware quartzite is not unusual. The Ballalease North pot dates to *c*. 2800–2500 BC.

Grooved Ware has only rarely been reported from the area. However, sherds of very similar fabric to that from Ballalease—possibly associated with a cremation—came from pit at Lusk, Co. Dublin, less than 5km to the northwest (Grogan and Roche 2009; McCabe 2004).

Recommendations

The sherd is clean, dry and stable and requires no further treatment.

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Appendix 5: Osteoarchaeological report on human remains

Ballalease North (AA6), Donabate, Co Dublin. Licence Number: 21E0674

By Maeve McCormick, MSc, June 2022

SUMMARY

This report presents the results of an osteoarchaeological analysis of human remains from excavations on an enclosure, as yet undated, undertaken at Ballalease North (AA6), Donabate, Co. Dublin. Excavation of this site was carried out by Liam Coen of Archer Heritage Planning Ltd under licence (21E0674) from the Department of the Culture, Heritage and the Gaeltacht (DCHG) in consultation with the National Museum of Ireland (NMI) from 2nd and 30th of November 2021.

A single skeleton (SK1) was recovered from a shallow grave cut (C81) which truncated the NE arc of the enclosure ditch (C30). The remains were those of a juvenile aged between 6 and 8 years of age with a likely age of 7 years of age. The age range was gathered by examination of epiphyseal fusion and the likely age taken from dental eruption.

The dentition displayed slight to moderate calculus on most of the teeth. There was no caries recorded. Enamel hypoplasia in the form of lines and pitting was noted on all permanent teeth. The hypoplasia was formed before the individual was three years of age. The age of hypoplasia formation is indicative of '*weaning stress'* suggesting they were weaned onto a nutritionally substandard diet.

The individual was laid with a W/E alignment with head to the west as is traditional of Christian burials suggesting the remains may be Christian in date. They were in an extended and prone (face down) position. This is an unusual (but not unheard of) burial position and so the burial is classified as a '*deviant burial*'. Often deviant burials were those of slaughtered enemies or those who died of an infectious disease. As there is no evidence of trauma on this individual it is possible the deviant burial was a result of the community response to the acute infection or illness which was the cause of death.

Osteological Terms Used

Frequently used osteological terms are outlined below. The definitions are taken from White and Folkens(1991, 28-35) and Bass (1995, 319-321). (See Plate 1 below)

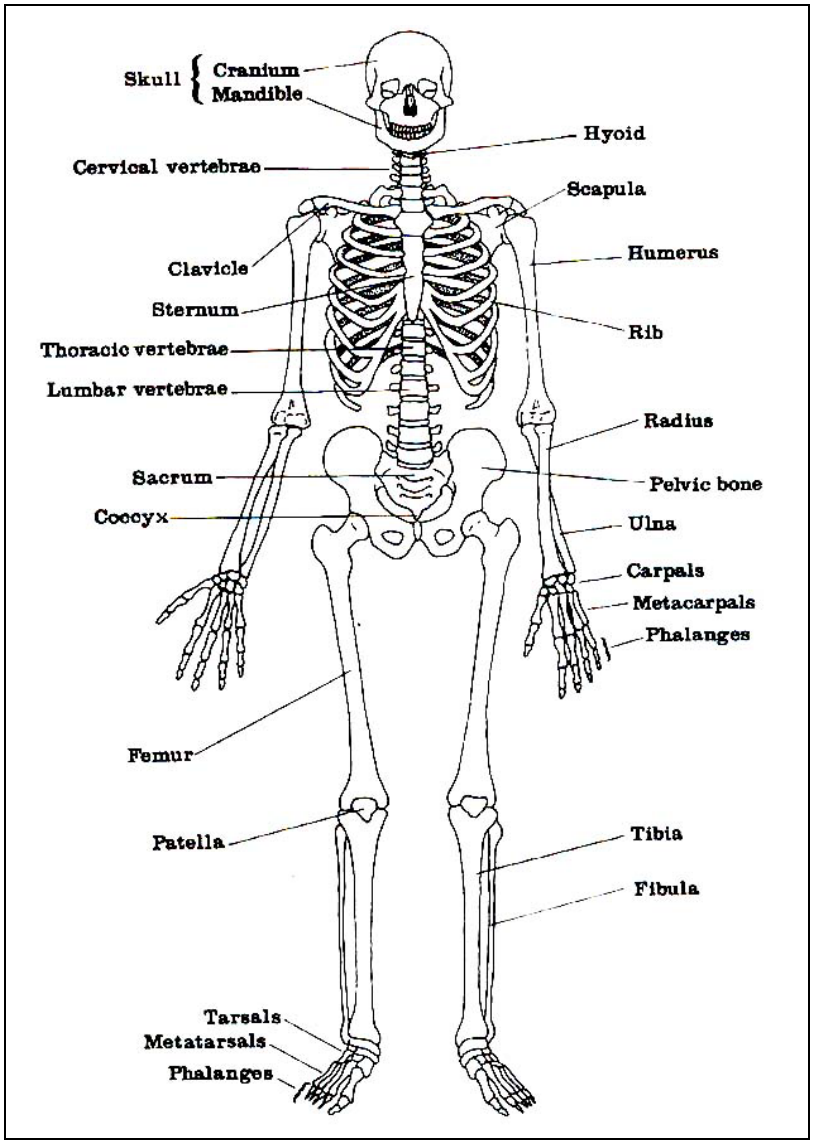


Plate 1: Annotated diagram showing main skeletal elements (after Mays 1998)

Directions - General

Superior	toward the head of the body.
Inferior	opposite of superior, body parts away from the head.
Anterior	toward the front of the body.
Posterior	opposite of anterior, toward the back of the individual.
Medial	toward the midline of the body.
Lateral	opposite of medial, away from the midline of the body.
Proximal	nearest the axial skeleton, usually used for long bones.
Distal	opposite of proximal, furthest from the axial skeleton.
Palmar	relating to the hand, the palm side
Plantar	relating to the foot, towards the sole of the foot
Dorsal	relating to the hand/foot, back of the hand, top side of the foot
External	outer.
Internal	opposite of external, inside.
Endocranial	inner surface of the cranial vault.
Ectocranial	outer surface of the cranial vault.

Directions - Teeth

Mesial	toward the point on the midline where the central incisors meet.
Distal	opposite of mesial.
Lingual -	toward the tongue.
Labial	opposite of lingual, toward the lips.
Buccal	opposite of lingual, toward the cheeks.

Incisal	the biting surface of the tooth.
Occlusal	the chewing surface of the tooth.

General bone features/terms

Process	a bony eminence.
Eminence	a bony projection, usually not as prominent as a process.
Spine	generally a long, thinner, sharper process than an eminence.
Tuberosity	a large, usually roughened eminence of variable shape, often the site of a ligament attachment.
Tubercle	a small, usually roughened eminence, often a site of a ligament attachment.
Trochanters	two large, prominent, blunt, rugose processes found on the distal femur.
Malleolus	a rounded protuberance adjacent to the ankle joint.
Articulation	an area in which adjacent bones are in contact at a joint.
Condyle	a rounded articular process.
Epicondyle	a non-articular projection adjacent to a condyle.
Head	a large, rounded, usually articular end of a bone.
Shaft/diaphysis	the long, straight section between the ends of a long bone.
Epiphysis	usually the end portion or extremity of a long bone which is expanded for articulation.
Neck	the section of a bone between the head and the shaft.
Torus -	a bony thickening.
Ridge	a linear bony elevation, often roughened.
Crest	a prominent, usually sharp and thin ridge of bone.
Line	a raised linear surface, not as thick as a torus or as sharp as a crest.
Facet	a small articular surface, or tooth contact.
Metaphysis	a line of junction between epiphysis and diaphysis.
Osteoblastic	process of bone formation
Osteoclastic	process of bone resorption

Other osteological terms/abbreviations

C7	cervical vertebrae (neck) numbered from 1-7.
CEJ	cement-enamel junction, junction of crown of tooth and root.
DJD	degenerative joint disease.
T1-T12	thoracic vertebrae (torso) numbered 1-12.
TMJ	tempromandibular joint, joint of lower jaw.
L1-L5	lumbar vertebrae (lower back) numbered 1-5.
S1-S5	sacral vertebrae (in between left and right pelvis) numbered 1-5.
MC-	metacarpal (bones of the palm of the hand).
MT	metatarsal (bones of the arch of the foot).
IAM	Internal Auditory Meatus in temporal bone of cranium.
EAM	External Auditory Meatus in temporal bone of cranium.
MNI	Minimum Number of Individuals.
CPR	Crude Prevalence Rate. ***C1-***
TPR	True Prevalence Rate.
SN/s	Schmorl's nodes, depression defects in the vertebral bodies, associated with herniation of intervertebral disk.

1 Introduction

1.1 Background to Project

Archaeological excavations were undertaken on a green field site at Ballalease North (AA6), Donabate, Co. Dublin by Archer Heritage Planning under License no 21E0674 held by Liam Coen. The presence of archaeological features on the site was first identified during archaeological investigations (Leigh 2006, Frazer 2008) associated with a Local Area Plan for Donabate in the mid-2000's. More recent test excavations under licence no. 21E0453 identified further features and the current excavation took place under licence 21E0674 on 2nd-30th November 2021.

A single skeleton (SK1) was unexpectedly uncovered during excavation of an, as yet undated, enclosure ditch (C30), at a depth ranging between 0.10 and 0.20m. It is a legal obligation under the National Monuments Act 1930-2014 to halt excavations upon discovery of unexpected human remains

and to contact the National Monument Services, the National Museum of Ireland and the Gardaí. This protocol was followed immediately upon discovery of the skeleton and excavation work halted on the 15th of November 2021. After inspection and consultation with the aforementioned bodies the excavation was permitted to continue on the 29th of November 2021with the addition of an osteoarchaeologist (author) on site to excavate the human remains and a revised method statement.

The skeleton was within grave cut C81. Cut C81 was oval in plan, aligned W/E, with gently sloping sides and a concave base. It truncated the inner bank of the NE arc of enclosure C30. There were no other human remains recovered from this site. The Author was present during excavation of the skeleton and strict supervision was undertaken during the processing phase. Analysis, cataloguing, and report writing was undertaken by the author in late May/ Early June 2022. The site is, as yet, undated.

The skeleton database is provided as an additional electronic file. It will be held by the author and Archer Heritage Planning Ltd for viewing upon request.

1.2 Materials

There was one single individual burial (Sk1) uncovered within this site. The skeleton was *in situ,* moderately complete and in moderate preservation. The lower legs had been truncated during discovery. The remains were processed, both the skeleton and the samples (washed/floated, dried and rebagged) under strict supervision by the author in post-excavation and were clean and dry when examined by the author. The skeleton was bagged as recommended (Buckley et al. 1999).

1.3 Methods

The methods used in the determination of the age-at-death of juvenile individuals are more accurate and specific and are assessed on the basis of the known rates of growth and development of parts of the skeleton. The most reliable method is to assess the calcification and eruption of teeth (Moorrees et al. 1963a; 1963b; Smith 1991, Ubelaker 1979). The lengths of the long bones may also be used to determine the age-at-death (Maresh 1970; Scheuer and Black 2000). However, long bone growth is highly influenced by nutritional factors and dental remains are considered to be the more reliable indicators of age-at-death. The methods utilised to determine the age-at-death of this individual is provided in **Section 6.1**. It is not possible to accurately determine the sex of juvenile individuals as the sex-specific changes do not develop clearly until puberty.

Permanent teeth were recorded using the following chart:

M3	M2	M1	PM2	PM1	C	I2	I1	I1	I2	C	PM1	PM2	M1	M2	M3
18	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
48	**47**	**46**	**45**	**44**	**43**	**42**	**41**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
M3	M2	M1	PM2	PM1	C	I2	I1	I1	I2	C	PM1	PM2	M1	M2	M3

right *left*

The upper row represents the maxilla and the lower row represents the mandible. These are further sub-divided into left and right quadrants. Each permanent tooth (1-8) is prefixed by the number of the quadrant it belongs to (1-4).

Deciduous ('milk') teeth were recorded using the chart below:

m2	m1	c	i2	i1	i1	i2	c	m1	m2
55	**54**	**53**	**52**	**51**	**61**	**62**	**63**	**64**	**65**
85	**84**	**83**	**82**	**81**	**71**	**72**	**73**	**74**	**75**
m2	m1	c	i2	i1	i1	i2	c	m1	m2

right *left*

Again, the upper row represents the maxilla while the lower row represents the mandible and is subdivided into left and right quadrants. Each deciduous tooth (1-5) is prefixed by the number of the quadrant it belongs to (5-8). In this instance, a combination of the two charts was used.

The dentition was assessed for dental diseases such as calculus, caries, abscesses, enamel hypoplastic defects, as well as any other anomalies. Where present, these were recorded (**Section 3.2.3**).

No pathological conditions were observed in analysis of the bone.

A summary of the skeleton is provided in **Section 6.1** (standardised for all articulated assemblages examined by the writer).It details suggested age-at-death (including the methods of determination). It also summarises the level of preservation, the *in situ* position and orientation of the burial. It details what bones and teeth have survived. Basic metrics were taken where possible and are detailed in the database, available upon request from Archer Heritage Ltd or the Author. Archer Heritage Planning Ltd furnished the writer with all available excavation records prior to the onset of the project.

A Microsoft Excel database of all bones present has been created. This is available, on request, from the author, and will be provided to the client with this report. Most individual bones were given a sequential unique identification number (ID) to facilitate the osteological analysis. This enables total

bone counts to be slightly more accurate, and helps in matching bone fragments together. There were some exceptions in the cataloguing where, for example, a heavily fragmented long bone, numerous cranial vault fragments or numerous small unidentifiable bones were given one single ID number. These exceptions are clearly stated within the catalogue. **In total there were 111 individual entries listed in the catalogue which represented 725 bone fragments.**

All of the raw osteological data on the human skeletal remains excavated from Ballalease North (AA6) (17E0674) is held by the writer. The skeletal remains have been returned to Archer Heritage Ltd, and the curation will be determined by the National Museum of Ireland.

2 Demographic Profile

2.1 Age

It was noted that all long bones were juvenile in size, gracile and unfused with an average suggested age based on growth and fusion of 6 years. The dens of the axis (C2) was easily recognisable but partially damaged. However, it was possible to see that the intradental sulcus was partially filled in, this gave an age range of 3-12 years with a likely age of death of 6 years (Plate 2). The bone length of both the complete and unfused right radius (GL:135) and right ulna (GL:154) gave a likely age of death of 6 years (Maresh, 1970). Finally, the length of the unfused right femur (GL 267) gave an age range of 6 to 8 years with a likely age of death of 6 years.

The dentition comprised a mix of deciduous and permanent teeth suggesting an age of death closer to 7 years of age. Both lower incisors are erupted, however the second incisors are not fully erupted. The permanent canine is unerupted within the crypt and the deciduous canine, although now loose, was originally still *in situ* (Plate 3). The deciduous second molar was present in the socket alongside the fully erupted permanent first molar. The permanent second molar was unerupted, in the crypt and comprised the crown only (Plate 4).

It is known that long bone growth is highly influenced by nutritional factors and dental remains are considered to be the more reliable indicators of age-at-death, as such, it is likely these remains represent an individual who was 7 years of age at time of death.



Plate 2: Dens of the axis (C2). Note Intradental sulcus only partially filled in



Plate 3: Fragment of anterior mandible containing erupted I1, erupting I2 and unerupted canine. Note calculus on incisors.



Plate 4: Fragment of right mandible containing deciduous first molar (dm1), permanent first molar (M1) and unerupted first premolar (PM1), Note faint line of hypoplasia on M1 lingual surface.

2.2 Sex

It is not possible to accurately determine the sex of juvenile individuals as the sex-specific changes do not develop clearly until puberty.

3 Analysis

3.1 Morphological Variations

Every person is different, for example, some have stronger muscles than others and that would leave a trace on the skeleton in the shape of larger bones and more pronounced muscle attachment. Others may have undertaken a particular repetitive task which would be represented by pronounced muscle attachments in one particular area. Finally, some non-metric traits are genetic and may prove familial links within the cemetery population.

There were no cranial, post cranial or dental non metric traits on this particular individual.

3.2 Pathology

3.2.1 Cranial and post cranial skeleton

There were no pathological lesions identified on this skeleton. However, it must be noted that the cranium was heavily fragmented. The cranium is where the most commonly observed pathological lesions such as porotic hyperostosis and thickened diploë alongside some less common lesions which may indicate childhood malnutrition and adult illness can be noted.

3.2.2 Trauma

There were no markers of trauma noted on this skeleton.

3.2.3 Dental Analysis

A total of 28 teeth (22 permanent and 6 deciduous) were recovered with this skeleton (Bone ID10-51). All maxillar teeth were loose due to the heavily fragmented cranium, while 8 teeth were recorded as *in situ* within the fragmented mandible. The remaining mandibular teeth could be retrofitted into the mandible fragments.

Periodontal disease is very common and is said to affect 50-90% of the population in its mildest form-gingivitis. The inflammation caused by periodontal disease may result in the destruction of the alveolar bone (maxilla and mandible) and may lead to teeth loss. Periodontal disease can be recognised by bone porosity and bone loss surrounding the tooth root. Periodontal disease was not recorded in this instance.

Dental calculus is mineralised plaque made up of calcium phosphate. Slight calculus was noted on most teeth from this skeleton. It was moderate to severe on the lower lingual incisors and deciduous canines. Slight to moderate calculus on the lower molars was accidentally removed during the processing stage.



Plate 5: Lower right deciduous canine, note severe calculus on buccal surface

As teeth develop the enamel is laid down in layers. Disturbances in the formation of enamel are common and can be seen as defects upon the tooth. The defects take the form of pits, furrows or large areas of missing enamel. The defects are referred to as enamel hypoplasia. Causes for this interruption include birth trauma, low birth weight, malnutrition (including weaning stress) and systemic illnesses. In this instance linear enamel hypoplasia and pitting was recorded on 9 permanent teeth; the upper right permanent first molar (RM1), upper right permanent canine (RC), upper left permanent first incisor (LI1), upper left permanent canine (LC), upper left permanent second premolar (LPM2), upper left permanent first molar (LM1), lower right permanent first molar (RM1), lower right permanent second incisor (RI2) and lower left permanent canine (LC).

The dentition displayed hypoplasia in such a location upon the tooth so as to suggest it occurred at a time when the particular individual was being weaned which, in the archaeological record, could be up to 4 years of age. This defect occurs when the child was weaned onto a nutritionally substandard diet and exposed to bacteria and parasites, this would have led to illness or malnutrition at the time and is known as 'weaning stress'. In this instance it was estimated the hypoplasia developed between the ages of 1 and 3 years of age. The child was also within the age range to suggest weaning stress.



Plate 6: Upper right permanent first molar (M1) note linear and pitting hypoplasia and open roots

The enamel on the occlusal surface of teeth is worn down over time as a result of grit etc within food. In this particular case, attrition was noted on the un-shed deciduous teeth. It is not possible to use attrition as an age estimation for juvenile individuals.

3.3 Cause of death

Despite signs of malnutrition in the early years, this individual appeared to have been in good health at time of death suggesting an acute illness or infection as cause of death. Acute illnesses and infection kill quickly and do not have time to leave evidence on the skeleton.

4. Synthesis

4.1 Summary of Analysis

A single skeleton (SK1) was identified and excavated from a grave cut C81, which truncated the NE arc of enclosure ditch C30 at Ballalease North (AA6), Donabate, Co Dublin (21E0674). The remains were those of a juvenile, aged between 6-8 years with a likely age of 7 years based on dental eruption. Epiphyseal fusion suggests an age of 6 years but due to evidence of malnutrition in early infancy (weaning stress noted in enamel hypoplasia) it is possible the individual was small for their age. There was no evidence of porotic hyperostosis on the skull or any other pathology suggestive of continuous malnutrition although it must be noted the skull was heavily fragmented. The individual appeared to have been in good health at time of death suggesting an acute illness or infection as cause of death. Stature and Sex could not be determined due to age.

The skeleton was placed in grave cut with an E/W alignment, their head to the west, as is traditional for Christian burials suggesting the remains may be Christian in date. However, the individual was placed in an extended and prone (face down) position which is unusual. This is often referred to as a deviant burial.

Almost all bones showed signs of fresh breaks as a result of its fragile to moderate state not surviving excavation. All bones showed signs of root etching, likely as a result of the grave cut being so shallow.

There were no cranial, post cranial or dental non metric traits noted. There were no markers of illness, trauma or injury noted on this skeleton.

A total of 28 teeth (22 permanent and 6 deciduous) were recovered with this skeleton. All maxillar teeth were loose due to the heavily fragmented cranium, while 8 teeth were recorded as *in situ* within the fragmented mandible. The remaining mandibular teeth could be retrofitted into the mandible fragments. Periodontal disease was not recorded in this instance. Slight calculus was noted on most teeth from this skeleton. It was moderate to severe on the lower lingual incisors and deciduous canines. Slight to moderate calculus on the lower molars was accidentally removed during the processing stage. Linear enamel hypoplasia and pitting was recorded on 9 permanent teeth. In this instance it was estimated the

hypoplasia developed between the ages of 1 and 3 years; within the age range to suggest weaning stress. Attrition was noted on the occlusal surface of the deciduous teeth.

4.2 Discussion

The recent discovery of a human burial (SK1) in Ballalease North, AA6 (21E0674) was unexpected as there had previously been no known inhumations on this land. Archaeological features on the site were first identified during archaeological investigations (Leigh 2006, Frazer 2008) associated with a Local Area Plan for Donabate in the mid-2000's. More recent test excavations under licence no. 21E0453 identified further features and the current excavation took place under licence 21E0674 on 2nd-30th November 2021.

Excavation confirmed the presence of a previously unknown circular enclosure (C30) measuring 18m diameter with a depth of 0.30-0.70m. This feature is, as yet, undated. One single skeleton (SK1) was uncovered within a shallow grave cut (C81) which truncated the NE arc of this enclosure (C30). Grave cut C81 was oval in plan, aligned W/E, with gently sloping sides and a concave base. It measured 1.28m E/W x 0.58m N/S x 0.10-0.20m deep. It was filled with a dark brown, friable silty clay with frequent small stone inclusions (C82).

The individual was laid with a W/E alignment with head to the west as is traditional of Christian burials suggesting the remains may be Christian in date. The skeleton was lying in an extended, prone (on their front) position which is unusual, but not unheard of in Irish archaeology (Sprague 2005, 107). Both arms were straight with the hands resting beside the pelvis. The legs were extended straight. There was no evidence of a coffin. It can be assumed due to the position of the arms and legs that it was a shroud burial. The cranium was heavily fragmented during the discovery.

This burial location and prone position is unusual and therefore categorised as a '*deviant burial*' (Tsaliki 2008). Other sites, all medieval in date, across Ireland have had human remains recovered from within enclosure ditches. Of note are four settlement sites: Loughbown, Co. Galway, Dowdstown, Co. Meath, and Gortmakellis and Hughes-Lot in County Tipperary, where, similar to Ballalease North (AA6), the remains within the ditch were the only excavated burials recorded on site (Seaver 2011). Unlike in Ballalease North whose grave cut only partially truncated the enclosure, the other ditch burials were overwhelmingly associated with the middle to upper enclosure ditch deposits of a medieval ringfort. Of interest is that many of the ditch burials, unlike this one, were aligned with the orientation of the ditch (Seaver, 2011).

In most cases '*deviant*' burials are interpreted as being a result of an illness or 'bad death' (executions, outcast, etc) which prevented a 'normal' burial (Buckley 2010, 45–8).The use of body position and association with ditches, entrances, etc., is noted across north-western Europe and in these cases, youthful death is often a reason for burying someone in an unusual location (Seaver, 2011). The lack of obvious trauma upon this individual suggests they were not an executed enemy or criminal and the lack of pathology suggests cause of death was not a chronic, long-term illness. The individual appears to have been healthy at time of death suggesting that the cause of death was a quick, acute illness or infection. It is possible a contagious illness was the reason for the '*deviant*' burial, however this is mere speculation.

The pathology recorded upon the dentition was not unusual. Calculus is common in archaeological samples and is linked with poor oral hygiene. Linear enamel hypoplasia is an indication that the individual suffered stress in the form of illness or malnutrition during the formation of the tooth in childhood. In this skeleton the hypoplasia was in such a location upon the tooth so as to suggest it occurred at a time when the child was being weaned, which could be up to 4 years of age. As the child was weaned they were exposed to increasing numbers of bacteria and parasites, it is also likely they were weaned onto a nutritionally sub-standard diet. These factors would have led to illnesses such as acute diarrhoea or malnutrition at the time and is known as '*weaning stress'* (Waldron 2009).



Plate 7: SK1 mid excavation, within grave cut C81, note damage to lower legs caused by unexpected discovery. Also note the posterior scapulae (shoulder blades) and pelvis are facing up proving the skeleton is face down.

The pathology recorded upon the dentition was not unusual. Calculus is common in archaeological samples and is linked with poor oral hygiene. Linear enamel hypoplasia is an indication that the individual suffered stress in the form of illness or malnutrition during the formation of the tooth in childhood. In this skeleton the hypoplasia was in such a location upon the tooth so as to suggest it occurred at a time when the child was being weaned, between the ages of 1 and 3 years (Waldron 2009).

There were no earmuffs or pillow stones recorded during excavation. There were no finds associated with this skeleton. There were no other human remains recovered during the excavation.

4.3 Conclusions

The single skeleton (SK1) recovered from Ballalease North (AA6) was located within grave cut (C81), which truncated the NE arc of enclosure ditch (C30). The remains were those of a juvenile child aged between 6to 8 years with a likely age of 7 years at time of death. They were laid within the grave cut, aligned E/W with head to west in an extended and prone (face down) position. This prone position is not common and is often interpreted as a sign of disrespect. It is suggested that this type of '*deviant burial'* is often associated with someone who had a notable illness or a 'bad death'. Perhaps the infection which killed this individual placed the rest of the community at risk. It is suggested that placing their remains within the ditch brings additional importance and significance to the enclosure and to the ditch itself, perhaps warding off the illness. The juvenile did not appear to suffer any trauma or injury at time-of-death and so is less likely to be an execution or enemy burial which would be more common in the case of prone burials. Linear enamel hypoplasia suggests childhood illness or malnutrition particularly prior to 3 years of age. This could be linked to weaning stress which was common in pre-industrial Ireland.

There is very little societal information that can be gleaned from a single isolated skeleton. However, it is likely their community suffered from overcrowded conditions as this individual contracted an acute infectious disease which flourishes in those situations. Evidence of weaning stress suggests a community who could not provide adequate nutrition for their babies, whether due to poverty or scarcity. The burial respected the Christian belief of keeping the W/E alignment with head to the west. However, the prone position is unusual. This '*deviant burial'* may represent additional pagan or superstitious beliefs which coincided with the widespread Christian religious beliefs.

4.4 Recommendations

It is recommended that the human remains excavated from Ballalease North (AA6) under licence no 21E0674 be retained by the National Museum of Ireland for future research and study.



Plate 8: Raster image of skeleton, mid ex

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6. Appendix

6.1 Summary

The following section consists of a detailed biological summary of the skeleton from Ballalease North (AA6). The location, orientation, position and condition of the skeleton during excavation is noted along with details of age, sex, dentition and pathologies which were determined during post excavation analysis

The age ranges utilised are as follows: 'Perinate' (Full term baby, 40 weeks +/- 2 weeks), 'Infant' (<1 year), 'Juvenile (1)' (1-6 years), 'Juvenile (2)' (7-11 years), and 'Adolescent' (12-17 years), 'Young Adult (18-25 years), 'Middle Adult' (25-45 years), 'Older Adult' (45 years and above).

Permanent teeth were recorded using the following chart:

M3	M2	M1	PM2	PM1	C	I2	I1	I1	I2	C	PM1	PM2	M1	M2	M3
18	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
48	**47**	**46**	**45**	**44**	**43**	**42**	**41**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
M3	M2	M1	PM2	PM1	C	I2	I1	I1	I2	C	PM1	PM2	M1	M2	M3

right *left*

The upper row represents the maxilla and the lower row represents the mandible. These are further sub-divided into left and right quadrants. Each permanent tooth (1-8) is prefixed by the number of the quadrant it belongs to (1-4).

Deciduous ('milk') teeth were recorded using the chart below:

m2	m1	c	i2	i1	i1	i2	c	m1	m2
55	**54**	**53**	**52**	**51**	**61**	**62**	**63**	**64**	**65**
85	**84**	**83**	**82**	**81**	**71**	**72**	**73**	**74**	**75**
m2	m1	c	i2	i1	i1	i2	c	m1	m2

right *left*

The key used to describe the dentition within the charts are as follows:

PO: Tooth present in socket	**PU**: Present, Unerupted
PM: Postmortem Tooth loss	**PE**: Present- Erupting
AM: Ante Mortem Tooth Loss	**P**: Present but not in socket
PU: Present, Unerupted	'Blank': no tooth and no mandible/maxilla

The detailed skeletal catalogue and disarticulated human remains databases are available upon request from Archer Heritage Ltd and the author.

SK1, C81,

Location: Within grave cut C81 which truncates the NE arc of enclosure C30,

Grave Cut C81: Oval in plan, aligned W/E, with gently sloping sides and a concave base, measuring 1.28m E/W x 0.58m N/S x 0.10-0.20m deep. Filled with a dark brown, friable silty clay with frequent small stone inclusions (C82).

Truncation*:* Grave cut truncates NE arc of enclosure C30

Skeletal Preservation: moderate condition and moderately complete

Skeletal Position: Prone

Skeletal Attitude*:* Extended.

Orientation: E/W, head to west

Associated Skeletons: n/a

Associated Finds: n/a

Bones Present: Incomplete cranium, complete mandible. All long bones present, proximal and distal ends damaged or epiphyses missing. Incomplete carpals, metacarpals, tarsals, metatarsals and phalanges. Heavily fragmented and incomplete ribs, vertebrae and pelvis.

Demographic Profile

Age: Juvenile1-Juvenile 2, aged between 6 and 8 years, likely 7 years) Age range based on epiphyseal fusion, likely age based on dental eruption.

Sex: n/a

Stature*:* n/a

Dentition

28 teeth were present, 12 of which were deciduous.

Permanent teeth were recorded using the following chart:

	P	P	P	P	P	P	P	P	P	P	P	P	P	P	
18	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
48	**47**	**46**	**45**	**44**	**43**	**42**	**41**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**
	P	PO			PU	PO	PO	PO	PO	P					

right *left*

Deciduous ('milk') teeth were recorded using the chart below:

P	P	P					P	P	P
55	**54**	**53**	**52**	**51**	**61**	**62**	**63**	**64**	**65**
85	**84**	**83**	**82**	**81**	**71**	**72**	**73**	**74**	**75**
PO	P	P					P	P	PO

right *left*

Dental Pathology

Calculus: Slight calculus was noted on most teeth from this skeleton. It was moderate to severe on the lower lingual incisors and deciduous canines. Slight to moderate calculus on the lower molars was accidentally removed during the processing stage.

Caries: n/a

Hypoplastic defects: 9/28, All permanent dentition indicating an age of < 3 years

Periodontal disease: n/a

Attrition: All remaining deciduous teeth showed signs of attrition

Morphological Variations

Cranial: n/a

Dental: n/a

Post-cranial:n/a

Skeletal Pathology

Joint disease: n/a

Infectious disease: n/a

Metabolic disease: n/a

Trauma: n/a

Anomalies: n/a

Comments: One of the three fragments of the left radius shaft (6g in weight measuring 40mm long) removed for RC dating by MMC on 7/6/22. Shaft fragment, fresh breaks either end. Bone ID no 84.

Associated Disarticulated Bones: n/a

6.2 Metrics

All Metric data of the Ballalease North skeleton is available within the Ballalease North (AA6) (21E0674) digital catalogue which is available upon request from Archer Heritage Ltd and/or the author Maeve McCormick

Appendix 6: Osteological report on faunal remains

1. Introduction

This report presents the results of an osteoarchaeological analysis of faunal remains from excavations on a multi-period site at Ballalease North, AA6, Donabate, Co. Dublin. Excavation of this site was carried out by Liam Coen of Archer Heritage Planning Ltd under licence (21E0674) from the Department of Housing, Local Government and Heritage (DHLGH) in consultation with the National Museum of Ireland (NMI) from 2nd-30th November 2021.

The principal feature was a previously unknown circular ditched monument, **C30**, located in the western portion of the cutting. Measuring roughly 20m in diameter, the roughly V-shaped enclosing ditch was between 0.65-1.30m in width and 0.3-0.7m in depth. A granite rotary disc quern-stone and fragment of Grooved ware pottery were retrieved from the upper ditch fill. A relatively large amount of animal bone was retrieved from the ditch fill and the presence of animal bone was a feature of most of the fills of the archaeological features. A burial was identified in the back-filled enclosure ditch. The skeleton was of a juvenile human and dated to the Early Medieval period. An internal curvilinear feature, a possible slot trench, was recorded along the eastern and southern arcs of the enclosure ditch and charcoal returned a radiocarbon date from the Middle Bronze Age.

A total number of 1441 bone fragments weighing 19.5kg were analysed from the Ballalease North AA6 assemblage. These were retrieved from 20 separate contexts across the site. The animal bone assemblage was, for the most part, recovered by hand-collection during excavation. A small percentage was also recovered during processing of soil samples. The remains represented the most common domesticated animals: cattle, deer, dog, horse, pig and sheep/goat, with cattle being the most highly represented animal. There was evidence of butchery on many bones but little evidence for cooking. The bones were collected from all features, archaeological and modern, across the site.

2. Methodology

During the analysis each specimen was identified and recorded according to species, skeletal element, age and sex where possible. Identification was aided by reference to von den Driesch (1976) and France (2009). Age was determined by using bone fusion, dental eruption and tooth wear as noted in Reitz and Wing (2008).

The categories “large mammal” and “medium mammal” were used for specimens (mainly ribs, vertebrae, skull and long bone shaft fragments) which were recognisable but could not be assigned to a species. The specimens categorised as large mammals are likely to belong to cattle, horse or red deer.

Medium mammal specimens are most likely to consist of sheep/goat or pig bones: however, the presence of fallow deer, dog and native wild fauna (fox, badger) is possible.The category “small mammal” includes mammal bones from cat, hare, rabbit and other native fauna such as birds, amphibians, lizards or fish.

Bones marked as ‘unidentified’ were too fragmented or in too poor a condition to identify or to assign to either large, medium or small mammal. These fragments were counted and weighed so a percentage of unidentified to identified bone could be gathered in both aspects. Identifiable bones were each given a unique Bone ID number. A collection of unidentifiable bones from a single context were counted and weighed and then given a single Bone ID number.

Measurements were only taken on an identifiable bone which could be confidently assigned to species using digital callipers or a bone board to the nearest millimetre following von den Driesch (1976).During the analysis pathological changes, carnivore and rodent gnawing, signs of burning and butchery marks were recorded where present.

All data was initially recorded using the Faunal Analysis York coding system and transferred to Microsoft Office Excel format for analysis. One large database containing all bone (identified and unidentified) was created with columns containing all the information mentioned above for each individual bone.

Both the Author and Archer Heritage Planning Ltd have copies of the raw data available if required.

3. Results

A total number of 1441 bone fragments weighing 19.5kgwere analysed from the Ballalease North AA6 assemblage. See Table 1 below.

Species	Fragments		Weight (g)		Butchery	Burning	Pathology
	No	%	grams	%			
Cow	68	4.7	3584	18.4	14	-	1
Deer	15	1.0	1249	6.4	4	1	-
Dog	3	0.2	38	0.2	-	-	-
Horse	5	0.3	759	3.9	-	-	-
Pig	32	2.2	528	2.7	2	1	-
Sheep/Goat	55	3.8	583	3.0	6	1	-
Medium Mammal	74	5.1	520	2.7	16	1	-

Species	Fragments		Weight (g)		Butchery	Burning	Pathology
	No	%	grams	%			
Large Mammal	356	24.5	8416	43.1	170	5	-
Unidentified	833	57.4	3846	19.7	33	19	-
Total	**1441**	**100**	**19522**	**100**	**245**	**28**	**1**

Table 1: Number of fragments by species

The animals represented within this assemblage were cow/ cattle (*Bos Taurus*), deer (*cervus elaphus*), dog (*canis lupus familiaris*), horse (*equis caballus*), pig (*sus*) and sheep/goat (*ovisaries/caprahircus*). Sheep and goat are extremely similar and in most cases cannot be confidently separated. For the purposes of this report they will be referred to as one category.

There were 833 unidentifiable fragments within this assemblage which represents 57.4% of the total fragment count. However, as most of these fragments were small (less than 50mm in length), it is perhaps more representative to note that the weight of unidentified material was 3.8kg which only amounted to 19% of the total weight.

3.1 Number of Identifiable Specimens (NISP)

Only 362 bone fragments (25% of total fragment count) were identifiable and could be assigned to species (NISP: 362) (See Table 2 below). Although this number seems small in relation to the large assemblage (1441 fragments in total) it is in fact equivalent to 11.2kg which equals 57% of total weight. Many bones (184 fragments, 12.7% of total fragments and 4.4kg, 22.5% of total bone weight) could only be assigned to medium or large mammal.

The assemblage consisted of varying sized fragments of animal bone, with a high percentage of fragments displaying fresh/recent breaks most likely caused during excavation or processing(1277 fragments / 88% of total fragments).

All major skeletal elements were noted at least once within the assemblage. The most common bone noted which could be assigned to species was the mandible with 33 individual mandible fragments counted, 11 of which came from cattle. The least common bone noted was the axis, with only one noted from a Large Mammal. The species with the largest number of identifiable bones was cattle with 68bones. The species with the lowest number was dog with only three bones. The large mammal category displayed the most identifiable bones of all with 164 fragments. See Table 2 below for details.

Element	Cattle	Deer	Dog	Horse	Pig	Sheep/goat	MM	LM	Total
Astragalus	1	1						1	**3**
Axis								1	**1**
Calcaneous	1			1	1			1	**4**
Femur	3							2	**5**
Horn Core	2					4			**6**
Humerus		1				1		2	**4**
Isolated teeth	29			1	5	23		23	**81**
Metacarpal	7	1		1		2		4	**15**
metatarsal		3			1	1			**5**
Mandible	11	2			4	4		12	**33**
Maxilla	3		1		2	1		1	**8**
Pelvis					1		2	4	**7**
Phalanges	2					1		4	**7**
Radius	4	2		1		8		2	**17**
Ribs	3						16	53	**72**
Scapula	1	1	1		1	3	1	8	**16**
Skull Fragments					15			20	**35**
Tibia	1	3	1	1		7		1	**14**
Ulna		1			2		1	1	**5**
Vertebrae								24	**24**
Total	**68**	**15**	**3**	**5**	**32**	**55**	**20**	**164**	**362**

Table 2:No. Identifiable Skeletal elements fragments by species (NISP and Medium & Large Mammal)

It is worth noting that the 'Unidentifiable' category recorded in Table 1 refers solely to completely unidentifiable bone. The Medium Mammal and Large Mammal categories contain both identifiable bone which could not be assigned to species and unidentifiable bone which was medium or large in size. There were 74 bone fragments within the Medium Mammal category, 20 of these (27%) could be identified to skeletal element. Similarly, there were 356 bone fragments in the Large Mammal category, 164 fragments (46%) of which could be identified to skeletal element (Table 1 & Table 2).

3.2 Minimum Number of Individuals (MNI)

Minimum Number of Individuals (MNI) is defined as the smallest number of individuals needed to account for all the skeletal elements of a particular species found on site (Reitz & Wing, 1999).

Species	Element	side	Ages	MNI	Total MNI
Cattle	astragalus	left	Sub-Adult	1	
	Radius	left	Adult	2	3
Deer	Mandible	left	Sub-Adult	1	
	Tibia	left	Adult	2	3
Dog	Tibia	left	Adult	1	1
Horse	Calcaneous	right	Adult	1	1
Pig	Ulna	Right	Neonatal	1	
	mandible	left	Sub-Adult	1	
	mandible	left	adult	1	3
Sheep/Goat	Radius	Left	adult	3	
	mandible	left	Sub-Adult	2	
	Metacarpal		Neonatal	1	6
Total					17

Table 3: Minimum Number of Individuals (MNI)

Despite cattle being represented by 68 identifiable bone fragments it is only possible to determine an MNI of 3 individual Cattle: 2 adult and 1 sub-adult. Sheep had the second largest NISP with 61 identifiable bones; it also had the largest MNI determined in this assemblage with 6 sheep: 3 adults, 2 sub-adults and 1 neonate. Pig bones represented an NMI of 3 individuals; 1 adult,1 sub adult and 1 neonate. Deer bones also represented an NMI of 3 individuals: 2 adult and 1 sub adult. Finally, analysis of Dog and Horse remains could only determine one animal of each species. In total the assemblage had an NMI of 17 individual animals. See Table 3 above for details.

3.2.1 Soil sample assemblage

In total there were 12 soil samples taken over the course of the Ballalease North (AA6) excavation. Out of these, 7 samples produced animal bone during processing. In total, the samples produced 109 bone fragments (7.5% of total fragment assemblage) amounting to 52.7g in weight (0.3% of total assemblage weight).

Of these, 104 fragments equalling 42.7g weight (95% of sample fragments, 81% of sample weight) could not be assigned to species. With regards to the NISP within the sample assemblage there were: two Cattle teeth (MNI of 1) and three sheep/goat teeth (MNI of 2; 1 adult and 1 sub-adult). The high fragment count to low weight ratio suggests a heavily fragmented assemblage emerged from the samples. This is most likely as a result of the larger and more recognisable bones having been removed from the context during excavation, prior to sampling.

3.3 NISP and MNI in relation to the archaeological features

Animal bone was recovered from 20 separate contexts. See Table 4 to 8 below for further details.

Context	Description	Bone fragments	Bone weight (g)
3	Main fill of ditch C04,Linear in plan; orientated N/S;	225	2412
15	Only fill of ditch C14, Curvilinear in plan possibly continuation of C04	225	2014
31	Upper fill of curvilinear /circular ditch C30	278	4965
32	Basal fill of curvilinear /circular ditch C30	28	935
34	Upper fill of curvilinear C33 in E end, only fill elsewhere, located at south of C30	117	1293
36	Upper fill of pit C35	13	433
38	Basal fill of pit C35	34	149
39	Localized middle fill of ditch C30 in SW arc	80	1942
44	Only fill of C43; pit or possible linear located to west of C30	17	419
46	Single fill of ditch C45, modern drainage ditch	49	433
48	Only fill of furrow C47	3	193
52	Upper fill of ditch C51, early modern field boundary ditch	138	1370
54	Only fill of linear ditch C53	53	1245
56	Single fill of curvilinear ditch C55	85	920
58	Only fill of curvilinear ditch C57	13	56
60	Single fill of ditch/furrow C59	28	216
63	Single fill of ditch/furrow C62	30	142
67	Single fill of linear C66	14	17
72	Only fill of ditch/furrow C71	6	192
82	Fill of grave containing skeleton Sk1	12	178

Table 4: Contexts containing animal bone

3.3.1 Curvilinear C4 and probable continuation C14

A short gap measuring c.0.35m separated C04 and C14. It is likely they are related and continuations of each other. These features are likely early modern (18th/19th C) and contained a hammerstone and iron fragment alongside some occasional pottery sherds (e.g. stoneware, black glazed earthenware). These features contained 451 bone fragments with an MNI of 2 cattle (1 adult and 1 sub-adult), 2 deer (1 adult and 1 sub-adult), 1 dog (adult), 1 horse (adult), 2 pigs (1 adult and 1 sub-adult) and 2 adult sheep/goat. Butchery was noted on 57 of the 451 fragments (12%). Burning was recorded on 20 bones; 7 fragments were calcined while 13 fragments displayed charring. Root etching and/or carnivore gnawing was recorded on 312 (69%) of the fragments.

3.3.2 Curvilinear/ Circular ditch C30 and associated features

Three fills of circular ditch C30 produced animal bones; upper fill C31, localised middle fill C39 and basal fill C32. The upper fill C31 contained a Grooved-ware pottery sherd and a rotary disc quern-stone. A burial was interred in the top fill of the ditch and dated to the Early Medieval period. This gives a *terminus ante quem* for the in-filling of the ditch. The top fill contained 280 bone fragments with an MNI of 2 cattle (1 sub adult and 1 adult), 3 deer (1 sub adult and 2 adult), 1 adult horse, 3 pigs (1 neonate, 1 sub-adult and 1 adult) and4 sheep (1 neonate, 1 sub adult and 2 adults). Butchery was evident on 63 of the 280 bones (22.5%). For the most part the bones were in good condition. Burning was recorded in the form of 4 charred bones, 2 of which came from a sample (S2). Root etching and/ or carnivore gnawing was noted on 152 of the 280 bones (54%).

The middle fill C39 was localised to the south-western arc of the circular ditch. It contained 80 fragments with an MNI of 2 cows (1 adult, 1 sub-adult), 1 sub- adult deer, 1 pig, 1 adult sheep/goat. Butchery was evident on 42 of the 80 fragments (53%). Root etching and carnivore gnawing was noted on 42 of the 80 fragments (65%).

Finally, the basal fill C32 contained 29 bones with an MNI of 1 adult cow and1 adult horse. 5 of the bones from this contact show signs of butchery (17%). There was no evidence of burning from this context. Root etching and carnivore gnawing was visible on 19 fragments (66%).

In total circular ditch C30 produced 65 identifiable fragments weighing 3239g. See Table 5 & 6 below.

Species	Fragments		Weight	
	Fragment count	Percentage	Weight (g)	Percentage
Cow	29	44.6	1522	47.0
Deer	7	10.8	713	22.0
Dog	0	0.0	0	0.0
Horse	4	6.2	654	20.2
Pig	7	10.8	197	6.1
Sheep	18	27.7	153	4.7
Total	**65**		**3239**	

Table 5: Identified fragments from C30 ditch fills

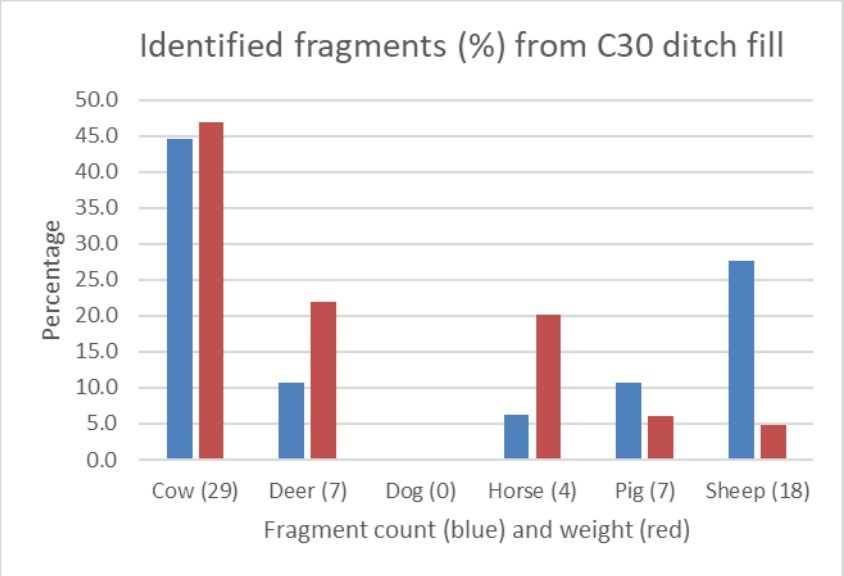


Table 6: Chart displaying identifiable fragments both fragment count and weight (%) from C30 ditch fills

3.3.2.1 Curvilinear feature C33

Curvilinear feature C33 was located at the southern end of circular ditch C30. The upper fill C34 contained 117 bones with and MNI of 1 adult cow, 1 adult deer, 1 adult horse and 2 sheep (1 adult and 1 sub-adult). Butchery was evident on 34 of the 117 fragments (29%). Root etching was visible on 59 fragments (50%). Burning was recorded in the form of a single calcined bone retrieved from samples (S5). For details see section 3.3.2.4 below.

3.3.2.2 Pit C35

Pit C35 truncated both C30 and C33. Its upper fill C36 contained 13 bone fragments with an MNI of 1 adult cow and 1 adult sheep. Butchery was only visible on one sheep bone. Root etching was recorded on 12 of the 13 fragments (92%). The basal fill C38 contained 34 bone fragments with an MNI of 1 adult cow. Root etching was recorded on 5 fragments. Burning was recorded in the form of one calcined fragment retrieved from samples (S4).

3.3.2.3 Pit or linear C43

Pit C43 is located to the west of and truncated by C30. Its single fill C44 contained 17 fragments of bone with an MNI of 1 adult pig and 1 adult sheep. Butchery was evident on 11 fragments (65%). Root etching was evident on all bones. Only one fragment displayed charring.

3.3.2.4 Curvilinear ditch C55

Curvilinear ditch C55 was located to the east of C30. Its single fill C56 contained 85 fragments with an MNI of 1 adult cow, 1 adult deer, 1 adult dog, 1 adult pig and 1 adult sheep. Butchery was evident on 13 of the 85 fragments (15%). Root etching and carnivore gnawing was visible on 35 fragments (41%).

In total 31 identifiable fragments weighing 518g were recovered from the fill of the two internal ditches C33 and C55. See tables 7 & 8

Species	Fragments		Weight	
	Fragment count	Percentage	Weight (g)	Percentage
Cow	4	12.9	150	28.9
Deer	3	9.6	110	21.2
Dog	1	3.2	21	4.1
Horse	1	3.2	48	9.3
Pig	16	51.6	147	28.4
sheep	6	19.3	42	8.1
Total	**31**		**518**	

Table 7: Identified fragments from C33 & C55 ditch fills

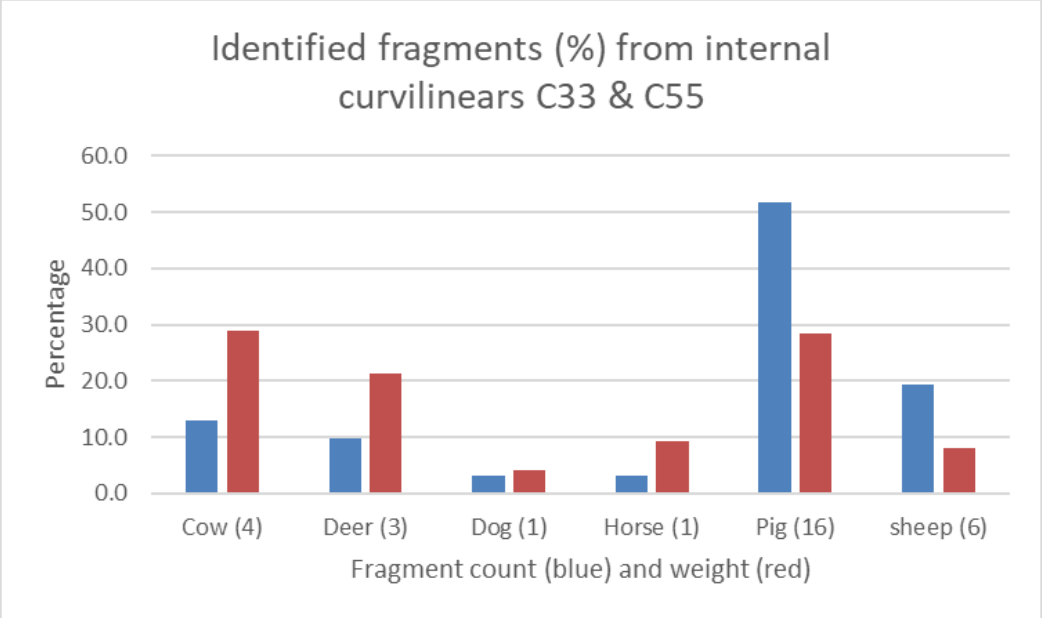


Table 8: Chart displaying identifiable fragments both fragment count and weight (%) from C33 & C55 ditch fills

3.3.2.5 Curvilinear ditch C57

Curvilinear ditch C57 was located to the east of C30. Its single fill C58 contained 13 fragments with an MNI of 1 cow. Butchery was evident on 3 fragments. Root etching was visible on 6 fragments.

3.3.2.6 Fill of grave containing skeleton Sk1

Grave cut C81 contained a skeleton SK1 and a single fill C82. The single fill also contained 12 animal bone fragments with an MNI of 1 sub adult cow. Carnivore gnawing was only visible on one bone.

3.3.3 Early modern and Modern features.

The remaining animal bones came from early modern and modern features such as furrows C47, C59, C62 & C71 and linear ditches C45, C51, C53 &C66. These features combined contained 321 animal bone fragments with an MNI of 1 adult cow, 1 adult pig, 1 sub adult and 1 adult sheep. Butchery was recorded on 18 of the 321 fragments (5%). Root etching and carnivore gnawing was recorded on 195 fragments (61%).

3.4 Age

Methods for assessing the age-at-death of the Ballalease North AA6 assemblage included analysis of tooth wear, tooth eruption and epiphyseal fusion. Tooth wear and eruption were recorded for cattle, sheep/goat, deer and pig. Epiphyseal fusion was recorded for all identifiable species if the epiphyses were intact. Sheep/goat specimens were assumed to be sheep for ageing purposes. Focus for the analysis of age-at-death was solely on cattle, sheep/goat and pig.

Of the 133 bones within the Ballalease North AA6 assemblage which could be assigned an age, 95 fragments (71%) were adult, 35 fragments (26%) were sub adult, 1 fragment (0.7%) was juvenile and 2 fragments (1.4%) were neonatal.

3.4.1 Tooth wear

Tooth wear (Grant 1982) was assessed by recording teeth which were still articulated within its mandible. Loose teeth were not considered. This section specifically focused on the top three domesticated animals; cattle, pig and sheep/goat. Out of the 21 mandibles available 8 were cattle, 3 were from pigs and 3 from sheep/goat. See table 9 for more details.

	Cattle	Pig	Sheep/Goat
Adult	6	1	0
Sub-Adult	2	2	3
Juvenile	0	0	0
Total	8	3	3

Table 9: Top three domestic animals age-at-death based on mandibular dental wear

3.4.2 Epiphyseal Fusion

Long bones such as the humerus, femur, radius and tibia from the three most common domesticated animals; cattle, pigs and sheep/goat, were assessed for proximal and distal epiphyseal fusion. A specimen was deemed adult when both ends were fully fused. A specimen was deemed sub-adult if an epiphysis was fusing or the fuse line was visible. Finally, a specimen was deemed juvenile if both ends were unfused or if one half was fused and the other unfused.

	Cattle	Pig	Sheep/Goat
Adult	2 (L. Radius)	1 (R. Ulna)	3 (R tibia)
Sub-Adult			
Juvenile			
Neonatal		1 (R. ulna)	
Total	2	2	3

Table 10: Top three domestic animals age-at-death based on epiphyseal fusion

One adult dog (left tibia), one adult horse (right tibia) and three deer; two adult (left tibia) and one sub-adult (right radius) was recorded in the assemblage

3.4.3 Age-at-death

This section specifically focused on the results of the dental wear and epiphyseal fusion from the three main domesticated animals, cattle, pigs and sheep/goat as shown in Table 9 and Table 10above. It is difficult with such small numbers to provide a conclusive age-at-death/slaughter pattern. The trend, visible in both the long bones and mandibles, suggests that within this society cattle were more likely to reach adulthood. This would imply the younger male cattle were sold or moved elsewhere for fattening as they are normally slaughtered for meat in sub-adulthood (around 2 years of age). The lack of younger specimens may be due to an economy that could not support as many young (McCormick and Murray 2007, 54). Older specimens may have been females used for breeding and/or males used for traction (ibid). The results would also suggest a stronger dependence on dairy than beef within this society.

Pigs give birth to large litters of piglets, sometimes up to ten in one litter, and if the animal is well fed and cared for it may even produce two litters a year. As a result it would be expected that there would be more juvenile and sub-adult pig remains within the assemblage than adults. Within this society and similar to the cattle demography there were more adult pigs. It is possible the majority of the piglets were sold to be raised and fattened elsewhere, while the adults were kept for breeding and eventual butchery.

The sheep/goat results showed the highest MNI of all the domesticated animals. There were equal adult and sub adults. This would suggest that, for the most part, the Ballalease North (AA6) society kept sheep/goats into adulthood for breeding, butchery, and secondary resources such as wool and leather.

3.5 Metric data

Metrics were recorded using the measurements of von den Driesch (1976).Measurements were recorded for fused bones and fused bone fragments, where appropriate. The following Table 11 presents the estimated sex and shoulder height of the single cow which measurements could be taken from the metacarpal. The sex is estimated by the following calculation: Proximal Breadth / Greatest length x 100. The shoulder height was calculated by multiplying the greatest length with standard measurements taken from Badenhorsta & Magoma (2019).

Bone ID	Context	Species	Element	Bp (mm)	GL (mm)	Index (Bp/GL x100)	Sex	Shoulder height (m) (from Badenhorse and Magoma 2019)
171	48	Cattle	m/c	51.2	175	29.5	Male	1.23-1.29m

Table 11: Estimated sex and shoulder height

The estimated shoulder height of female cattle ranged from 1.10-1.21m while the male measured 1.23-1.29m (Foster 2009). It was not possible to estimate the sex or shoulder height of any further specimens.

3.6 Marks

Root etching was recorded on 804 of the 1452 bone fragments (55%).

Carnivore gnawing was recorded on 301 fragments (21%). Finally, 30 fragments displayed rodent gnawing (2%). In total, 864 fragments (60%) displayed the marks of root etching, carnivore gnawing and/or rodent gnawing.

Root etching is often taken as an indication that the context remained open and exposed or that it was shallow enough that the roots grew around the bones. Carnivore and rodent gnawing are often taken as indirect evidence of animals such as dogs, rats and mice etc living within the community. As there are so few dogs and no rodents represented within the assemblage the gnawing marks can be used to assume that a higher number of the animals were present than the assemblage alone would suggest.
Fresh breaks were noted 1277 fragments of bone (87%). These would have been caused during excavation or post excavation processing.

3.7 Butchery

Butchery was evident on246 bone fragments which equates to 17% of the assemblage, only 92 of these were identifiable bones. See Table 12below for more detail (unidentifiable bones with butchery marks not included in table).

Element	Cattle	Deer	Pig	Sheep/goat	Medium Mammal	Large Mammal	Total
Axis						1	1
Humerus						1	1
Mandible	6	1				6	13
Maxilla	1						1
metacarpal	4	1				2	7
Metatarsal		1	1	1			3
Pelvis			1			3	4
Radius	2			1			3
Rib						41	41
Scapula	1			2	1	6	10
Skull fragments						1	1
Tibia		1		3			4
Ulna						1	1
Vertebrae						2	2
Total	14	4	2	7	1	64	92

Table 12: Bones displaying butchery marks which could be both identified to element and assigned to species

The 'Large Mammal' category displayed the most butchery marks with marks on 64 fragments identifiable to element. This represented 26% of the identifiable butchered bone. Cattle were the most dominant identifiable species represented with 14 fragments displaying marks; this equates to 6% of the butchered collection. These butchery marks would indicate a heavy dependence on cattle and their by-products e.g. dairy, meat, bone and leather etc. within this community.

Sheep/Goat was the most dominant identifiable Medium Mammal represented in the butchery record with 7 fragments, equating to 3% of butchered bone. There were 4 deer, 3 pig and 1 identifiable medium mammal bone fragments which also displayed butchery.

The cattle, large mammal, medium mammal, pig, horse, sheep/ goat and deer bones which displayed butchery were, for the most part, hind or foreleg bones, mandibles, or (in fewer numbers) ribs, scapulae and vertebrae. The marks identified were cuts, slices and chops. In many cases a long bone was broken mid shaft in an effort to access marrow. These types of butchery marks and the skeletal elements represented are more indicative of secondary 'kitchen waste' rather than primary butchery and skinning waste.

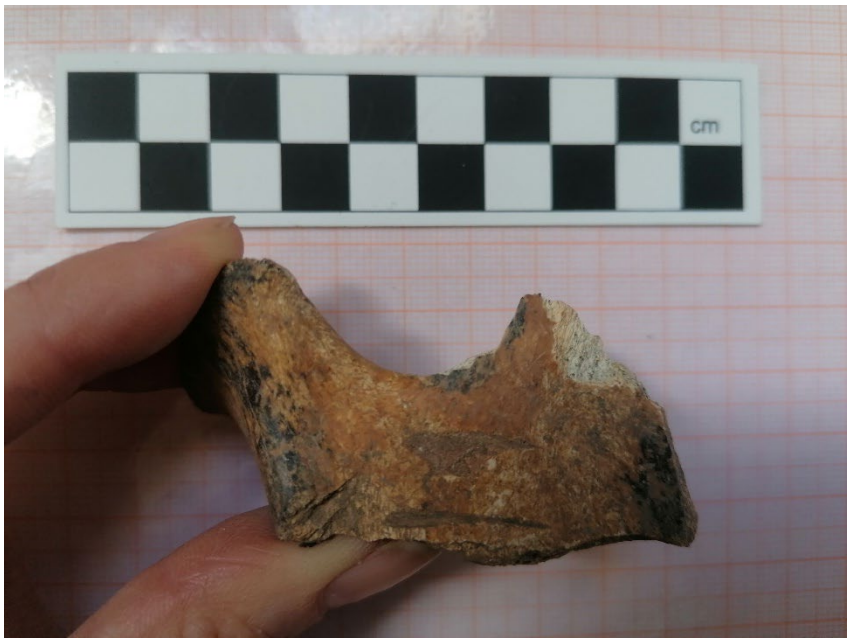


Plate 9: Bone ID92, Left cow mandible fragment, condyle region only. Removed from mandibular body by butchery chop and slice. Cut marks along ramus

There were only 29 fragments of burnt bone within the whole assemblage (2%). From the 22 fragments, 25 were small and unidentifiable. Nine fragments were retrieved from soil samples. A fragment of one deer metatarsal, one pig mandible, one large mammal mandible, and a large mammal tooth all showed charring. A single loose sheep tooth was calcined. This would indicate it had been burnt at a temperature, higher than 600 degrees Celsius.

3.8 Pathology

In general the animals within this sample appear to have been healthy as there was very little evidence of illness or bone breaks. There was, however, one bone which displayed pathology. One right femur (Bone ID73) showed evidence of pathology on the proximal epiphysis. The posterior femoral head displayed a patch of polish and porosity alongside lipping around the femoral head. It is possible this is indicative of injury and or arthritis. It suggests either an older animal or an animal that was utilised for traction, thus injuring the joints with pressure and wear on the joints.



Plate 10: Polish and porosity on a left femoral head

3.8 Species present

It was possible to identify six different species within the Ballalease North (AA6) assemblage. These were cattle, deer, dog, horse, pig and sheep/goat. Each will be discussed below in further detail.

3.8.1 Cattle

Cattle were one of the top domesticated animals recovered within this assemblage. There were 68 cattle bones recovered from 16 different contexts. In total there was an MNI of three, 1 sub-adult and 2 adults. Cattle also displayed the highest number (14) of bones displaying signs of butchery. Tooth wear and epiphyseal fusion analysis provided an adult age at death for most cattle.

All this suggests that Cattle played a very important role in the Ballalease North (AA6)society. The low numbers of juvenile and sub-adult bones would imply the herd were mainly kept into adulthood for breeding and dairying. In this case the males would have been removed or sold for fattening elsewhere.

3.8.2 Deer

There were 15 deer bones recovered from 5 contexts across the site. These represented a total MNI of three individual deer from the site, one sub-adult and two adults. For the most part, the deer remains consisted of fore and hind leg bones, with the exception of one mandible. This would suggest that, on average, the deer were butchered elsewhere and the joints of meat transported to Ballalease North (AA6). It is most likely they are the remains of red deer as the bones are 'Large Mammal' in size as opposed to Roe deer which would be 'Medium Mammal' in size.

Deer remains suggest the people of Ballalease North (AA6) hunted to supplement their diet.

3.8.3 Dog

There were three dog bones from three separate contexts. This equated to an MNI of one dog. The bones retrieved comprised a left maxilla fragment containing premolars and molars; a left distal tibia; and the glenoid fossa of a right scapula. All bones were too damaged with both archaeological and fresh breaks to take measurements which would help determine size and species. The bones were closer to 'Medium Mammal' than 'Small Mammal' in size. It is unlikely to have been the size of a small terrier and more likely to have been the size of a spaniel or Labrador. The bones and dentition suggest the dog was adult in age when it died. The three dog bones were spread across the site in different contexts, so despite having an MNI of one dog, the three bones are likely to represent more.

Carnivore gnawing was recorded on 301 fragments (21%).Carnivore gnawing is often taken as indirect evidence of animals such as dogs living within the community. As there are so few dogs represented within the assemblage the carnivore gnawing can be used to assume that a higher number of the animals were present than the assemblage alone would suggest.

3.8.4 Horse

There were 5 horse bones recovered from four different contexts all of which were in or associated with circular ditch C30. There was an MNI of one adult horse across the site. These bones came from separate contexts and so despite the MNI, are likely to represent more than one horse. All bones were fully fused and adult in size. There were no signs of butchery, burning or cooking on any of the bones

3.8.5 Pig

There were 32 pig bones retrieved from 8 different contexts giving an MNI of three; one neonatal, one sub-adult and one adult. Pig is present within many contexts across the site from archaeological to modern.

There were 2 pig bones that displayed butchery; a metatarsal and a pelvic fragment while burning was only visible on one bone; a left pig mandible. Tooth wear and epiphyseal fusion analysis provided an adult age at death for 6 pig bones, a sub-adult age for 4 bones and a neonatal age for one pig ulna. Assuming the pig remains to be of domesticated pigs, the low numbers of juvenile and sub-adult bones would imply the pig litters were, for the most part, sold for fattening elsewhere.

Unfortunately, there is no way to determine if the remains were those of domestic pigs or hunted wild boars.

3.8.6 Sheep/Goat

Sheep/goats were the top domesticated animal recovered within this assemblage. There were 55 bones from 13 separate contexts representing an MNI of six (three adults, two sub- adults, one neonate). Sheep/goats were present across the site in both archaeological and modern features.

Only six bones displayed signs of butchery, all of which attest to joints of meat (Scapula, radius, tibia and metatarsals). There was no evidence of cooking or burning with the exception of a single calcined tooth. Tooth wear and epiphyseal fusion analysis provided an adult age at death for most sheep/goats. The low numbers of juvenile and sub-adult bones would imply the herd were mainly kept into adulthood for breeding and/or secondary resources such as wool and meat.

4 Discussion

A total number of 1441 bone fragments weighing 19.5kg were analysed from the Ballalease North AA6 assemblage. There were 833 unidentifiable fragments weighing 3.6kg within this assemblage (57.3% of the total fragment count, 18.4% of the total weight). It was possible to identify six different species within the assemblage. These were cattle, deer, dog, horse, pig, sheep/goat. The largest MNI were cattle (3), sheep/goat (6), pig (3) and deer (3). Root etching and gnaw marks were common (60%) while fresh breaks were noted upon almost 87% of the assemblage. These were retrieved from 20 separate contexts across the site. The animal bone assemblage was, for the most part, recovered by hand-collection during excavation. A small percentage was also recovered during processing of soil samples

Butchery was noted on 247 bones (17% of the assemblage) only 92 of these bones were identifiable. The majority of these were within the 'Large' mammal category (64). Cattle showed the highest number of identifiable butchered bone (14) followed by Sheep/Goat with 7 fragments. There were 4 deer, 3 pig and 1 identifiable medium mammal bone fragments which also displayed butchery. The marks identified were cuts, slices and chops. In many cases a long bone was broken mid shaft in an effort to access marrow. These types of butchery marks and the skeletal elements represented are more indicative of secondary 'kitchen waste' rather than primary butchery and skinning waste.

There were only 29 fragments of burnt bone within the whole assemblage (2%). From the 22 fragments, 25 were small and unidentifiable. A single loose sheep tooth was calcined. This would indicate it had been burnt at a temperature, higher than 600 degrees Celsius.

In general, the animals within this sample appear to have been healthy as there was very little evidence of illness or bone breaks. One right femur (Bone ID73) showed evidence of pathology on the proximal epiphysis. The posterior femoral head displayed a patch of polish and porosity alongside lipping around the femoral head indicative of injury and or arthritis. It suggests either an older animal or an animal that was utilised for traction, thus injuring the joints with pressure and wear on the joints.

The species present can reveal a lot about the Ballalease North (AA6) society and farming practices. Cattle dominated the assemblage and keeping the cattle would have dominated the lives of the inhabitants. The larger number of adult cattle suggests a dairying herd which were also used for breeding and possibly for traction. The numbers also suggest that the Ballalease North (AA6) settlement owned or had access to a large amount of land outside of the enclosure which could support such a herd year round.

The low numbers of juvenile and sub adult bones suggest the young male cattle were sent elsewhere or sold for fattening (McCormick, 1983).

The dominance of adult pig bones also suggest the young were sent elsewhere or sold for fattening with only a small few kept for breeding and slaughter. Similarly the low numbers of juvenile and sub adult sheep/goats suggest they were kept for reasons other than meat such as wool and skin etc.

Deer remains indicate hunting of wild deer was practiced by the community. The deer remains present within this assemblage suggest that the butchery took place elsewhere and only the joints of meat were brought back to the settlement. It must also be noted that there is no way to tell by this assemblage if

the pig remains were those of domestic or wild boars. It is possible they were also hunted alongside the deer.

Rodent gnawing on some of the bones gives indirect evidence of mice and rats within the settlement despite their bones being absent from the assemblage.

5 Conclusion

The assemblage allows us to build a clearer picture of the farming practices of the inhabitants of the enclosure. They raised cattle which they used for both dairy and meat. It is possible the cattle were also used as traction animals but no evidence in the form of pathology on the bones was discovered during analysis. The community also farmed sheep, which they kept for both meat and wool.

They also likely kept pigs for meat and breeding, sending away or selling most of each litter for fattening. On a smaller scale this community kept horses and working dogs.

Deer remains suggest hunting of wild deer to supplement their diet. It is also possible wild boar was hunted at the same time.

Wild animals such as birds, badger and fox were represented within the assemblage with the badger and fox recovered from a ditch located to the north of the enclosure. Their presence in this ditch suggests that it was left open after the abandonment of the settlement.

Butchery was evident on multiple bones. The type of butchery marks and the skeletal elements represented are, for the most part, more indicative of secondary 'kitchen waste' rather than primary butchery and skinning waste suggesting the slaughtering of animals took place elsewhere.

6 Storage Recommendations

The Ballalease North (AA6) faunal remains have been thoroughly analysed. The assemblage, in general, was highly fragmented and in good condition. The bones were weighed and measured where possible, photographed if necessary and a detailed database has been assembled which is held by both the author and Archer Heritage Ltd. It is available upon request.

The final decision on the permanent storage of the assemblage should be made by the NMI following discussion with the excavation license holder. Accepted material should be stored in museum approved low-acid boxes and be left for collection by the museum.

It is recommended by the author that the faunal remains should not be retained by the National Museum of Ireland.

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Appendix 15.4 AA7 Archaeological Excavation Report

Archer Heritage Planning

Ballalease North, AA7, Donabate, Co. Dublin

Final Excavation Report

LICENCE NO.: 21E0675

CLIENT: Glenveagh Living Ltd.

DATE: 15th November 2022

Testing | Surveying | Excavating | Analysing | Conserving | Reporting

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SUMMARY

A rectangular cutting of roughly 13m x 14m (182 sq. m.) was opened by mechanical excavator under constant archaeological supervision. It was centred on features first identified during test excavations. The site contained the degraded remains of a burnt mound/*fulacht fia*, prehistoric sites where hot/boiling water is produced in pits or troughs with the use of heated stones. The features identified comprised two probable troughs; **C03** and **C07**, a shallow pit, **C05**, a short linear feature **C09** abutting the shallow pit and one modern drainage ditch **C11**. The archaeological features were filled with typical burnt mound material comprising heat-affected stone in a dark charcoal rich/stained soil. A fragment of hazel charcoal from trough **C03** returned a radiocarbon date of 2200-1980 cal. 2ð BC (UBA 48275; 3720 +/- 31 BP) placing activity here in the Early Bronze Age period and accords well with dates from other sites of this type. No artefacts, animal bones or charred seeds were retrieved during the excavation while analysis of the bulk soil samples identified a modest range of charcoal; ash, hazel and cherry/blackthorn, that likely represent the use of fuelwood and the make-up of the surrounding woods.

Revision	Status	Date	Prepared by	Reviewed by	Approved by
1	Final	15th November 2022	L Coen ARCHAEOLOGIST	A O'Connell SENIOR ARCHAEOLOGIST	C. Mc Guinness

1. INTRODUCTION

This archaeological excavation report for a site at Ballalease North, Donabate, Co. Dublin has been prepared by Archer Heritage Planning Ltd for Glenveagh Living Ltd. The site was first identified during test excavations under licence no. 21E0453. The excavation took place on 11th to 15th October 2021 under licence 21E0675 and the report presents the results with all post-excavation analysis. This excavation is one of eight (AA2-AA9) undertaken in advance of a proposed residential development for the area. Another archaeological site (AA1) will be preserved under green space in the development.

2. SITE DESCRIPTION

The site was located in a relatively flat field to the east of the expanding village of Donabate. The site is part of a wider landholding comprising a series of fields bounded by mature hedgerows previously under tillage though now lying fallow and overgrown with light vegetation. The village is located on a peninsula in the Irish Sea and the area has produced copious archaeological evidence for activity throughout the prehistoric period.

In the early medieval period, Donabate formed part of the kingdom of Brega, initially ruled by a dynastic confederation known as the Laigin, but after the seventh century was under the rule of the Síl nAedo Sláine of the Southern Uí Neill. After the area came under the control of the Anglo-Normans in the late twelfth century, the lands around Donabate came under the control of the Archbishop of Dublin, who had his episcopal manor at Swords, Co. Dublin. Around 1230 AD, Donabate church was granted to the monastery of Grane, Co. Carlow and remained in their possession until the dissolution of the monasteries in 1541 (Bates 2001). In the eighteenth century, an extensive tract of land around Donabate was purchased by Charles Cobbe, later Archbishop of Dublin.

The first portion of the name Donabate (Irish *Domhnach Bat*) most likely originates from the word *Domhnach* meaning church and *Baite* meaning wet or swampy. Alternatively, it may come from '*Dún a' Bháid*' meaning church of the ferry, which is supposed to refer to an ancient church in the townland of Ballymadrough west of Donabate near the Malahide Estuary. The townland name of Ballalease translates from Irish as 'town of the sheds' (*Baile an leas*, www.logainm.ie) and it is noted in the Civil Survey (1654-5) as Bally Ellis while the Down Survey map (1656) displays a parcel of land approximating the current townland's location and outline (from 1st Ed. OS map) as Ballielish Colledge land. The 'colledge land' indicates it was owned by the Archbishop of Dublin. It was also noted on this map that the Donabate townland of 117 acres was forfeited by Anthony Delahide of Lockhumny (probably Loughshinny) to Lord Fitzharding sometime between 1641 and 1670.

3. METHOD STATEMENT

The overall aim of the excavation was to preserve by record any archaeological features in the proposed excavation cutting. The cutting was established following test-excavations (O'Connell 2021, licence no. 21E0435) that first identified the archaeological material.

3.1 General Excavation Methodology

An open area rescue excavation strategy was employed. The recording techniques used are based on a system that best suits a rural environment as outlined in Barker (1977). This was supplemented by the recording system described in the Museum of London Archaeological Service Site Manual (Spence 1990). A single context recording system was used to record the site and multi-context plans were drawn at a scale of 1:20 or 1:50 (plans) & 1:10 or 1:20 (sections) as appropriate. Artefacts were labelled in accordance with NMI guidelines.

The topsoil was removed by mechanical excavation and then the site was hand cleaned to clearly establish the archaeological material. The material was assessed *in-situ* by archaeologist Liam Coen. Archaeological features such as pits were half-sectioned with linear features excavated by regularly spaced box-sections. The resulting section faces were drawn to establish a stratigraphic record. The remaining deposits were removed by hand to produce a post-excavation plan and photo. After deposits were removed from all identified features, hand-held camera photographs were taken as well as aerial post-excavation drone photographs of the site. The principal goals of the excavation were:

- Establish the stratigraphical sequence of the site;
- Determine the various phases of activity;
- Examine the morphology of the various features/structures; and
- Establish the date & function of the features.

3.2 Recording

All archaeological features and deposits encountered during the works were given a unique number in a continuous system recorded in the site archive. Entries were backed up by site-note books, and annotated multi-context drawings at appropriate scales. Site plans showed the location of all features recorded in the course of the excavation. Annotated sections/elevations were drawn at scales of 1:10 or 1:20 as appropriate. Heights of all principal features and levels were calculated relative to Ordnance Datum, correct to two decimal places. Site drawings were scanned and digitised using AutoCAD 2018 and geo-referenced to ITM projection. Digital photographs were taken of all archaeological features and deposits.

3.3 Sampling

Environmental sampling was undertaken in accordance with recent professional guidelines (*e.g.* Environmental Sampling: Guidelines for Archaeologists IAI 2007). Bulk soil samples were selected from secure deposits in order to gather dating material and environmental data.

4. ARCHAEOLOGICAL EXCAVATION RESULTS

A rectangular cutting of roughly 13m x 14m (182 sq. m.) was opened by mechanical excavator under constant archaeological supervision. It was centred on features first identified during test excavations by Aidan O'Connell (2021). The site was cleaned by hand to further define the archaeological features. The site contained the degraded remains of a burnt mound/*fulacht fia*, prehistoric sites where hot/boiling water is produced in pits or troughs with the use of heated stones. The features identified comprised three pits; **C03, C05** and **C07**, one linear feature **C09** and one modern drainage ditch **C11**.

Pit **C03** was located in the centre of the trench. It was oval in plan with steeply sloped sides and a concave base. It measured 1.53m north/south x 1.19m x 0.38m in depth. It contained a single fill, **C04**, a dark black/brown silty clay with frequent heat-cracked stone and charcoal inclusions. This fill was typical burnt mound/*fulacht fia* material; i.e. heat-affected stone in a dark charcoal-rich soil matrix. The size and shape of the pit coupled with the intensity of heat-affected stone and charcoal suggests the pit may have functioned as a trough for the water-heating process.

Pit **C05** was located 0.28m south of **C03.** It was also oval in plan, aligned north/south with gently sloped sides and a concave base. It measured 1.01m north/south x 0.85m x 0.10m in depth and had a single fill, **C06**, of typical burnt mound material; a friable dark black/ brown silty-clay with frequent heat cracked stone and charcoal inclusions.

Pit **C07** was located 0.70m south-east of pit **C03**. It was also oval in plan, aligned east/west with gently sloping sides and a concave base. It measured 1.73m east/west x 1.17m x 0.36m in depth and contained a single fill **C08**. This fill again comprised typical burnt mound/*fulacht fia* material; a compacted, dark grey/ black silty clay with frequent heat cracked stone (<20cm diameter) and charcoal inclusions. It is possible that pit **C07** could also be the remains of a trough.

Linear feature or elongated pit **C09** was located 0.29m south-west of pit **C03**. Linear in plan and aligned north-west/south-east, it had steeply sloped sides and a concave linear base. It was truncated on the south-east end by pit **C05**. Measuring 2.03m north-west/south-east x 0.67m x 0.23m in depth, it had a

single fill, **C10,** which comprised a dark black/ brown silty clay with frequent heat cracked stone and charcoal inclusions.

Finally, modern drainage ditch **C11** was located in the centre of the site, aligned north/south. It was linear in plan with gently sloped sides and a curved base. It measured 14m north/south x 0.30m x 0.10m in depth and truncated **C09** at the centre and **C05** on its western edge. It contained one single stoney fill containing rounded stones <10cm diameter, within a light brown clayey silt matrix. This was a modern drainage feature.

No artefacts or animal bones were recovered during the excavation.

5. ENVIRONMENTAL REMAINS

5.1 Introduction

Bulk samples were taken from stratified, undisturbed deposits only and were selected for the perceived potential to produce dating and other environmental material. Samples were floated off-site in a custom made flotation tank that passed the samples through successive sieves to capture charcoal, small bones, charred seeds *etc*. These samples were dried and sent for analysis. All animal bone from stratified deposits were retained and processed similar to the finds assemblage. Animal bone recovered from bulk samples was also retained for analysis. Unstratified animal bone was not retained. Soil sieving details are presented in the table below.

Sample No.	Volume before processing	Feature No.	Feature Description	Flot weight	Retent weight	Flot Results
1	20	C04	Only fill of pit C03	7	1152	Occasional charcoal
2	20	C08	Only fill of pit C07	4	1168	Occasional charcoal

Table 1: Bulk soil sample sieving results

5.2 Radiocarbon date

A single sample of charred wood was selected for radiocarbon dating (see Appendix 2). The charred wood sent for dating was extracted from the flot of the bulk soil sample following processing by floatation tank. The wood charcoal was selected and identified by Dr. Ellen O'Carroll prior to getting radiocarbon dated by the laboratory at 14 Chrono Centre at Queens University Belfast. The date quoted

in the text has been calibrated to 2δ, 95.4% probability using OxCal v4.4 Bronk Ramsey (2020); r:5 and IntCal20 atmospheric curve (Reimer *et al* 2020) and details are presented below;

- *Corylus avellana* (hazel) charcoal from C04, sample 1, fill of pit C03; UBA 48275; 2200-1980 cal. 2δ BC; 3720 +/- 31 BP.

This places activity here in the Early Bronze Age period (c. 2200-1700) and accords well with examples seen elsewhere. In a comprehensive analysis of 1014 dates from over 800 Irish *fulachtaí fiadh,* Hawkes (2018, 115-53) demonstrated their use from the Early Neolithic onwards with the highest frequency occurring during the Early to Middle Bronze Age (*c.* 2200-1200 BC).

5.3 Charcoal analysis

Both bulk soil samples taken during the excavation provided sufficient material suitable for charcoal analysis after processing. The samples came from pits that were thought likely to represent troughs. Thirty-eight fragments were identified, and blackthorn/cherry was the most common wood type followed by hazel and then ash. It is thought the charcoal represents use as fuelwood rather than from anything structural.

6. DISCUSSION

The excavation at Ballalease North AA7 revealed the disturbed remains of a burnt mound (or *fulacht fiadh*). These generally comprise mounds or spreads of fire-cracked stones and charcoal associated with sunken pits/troughs and hearths though any mounds rarely survive in agriculturally improved areas. They are the most common class of prehistoric archaeological site in the country and are generally located near or adjacent to a water supply, such as a stream or spring, or in wet marshy areas (Waddell 1998, 174-7). Several thousand are known to exist nationally from entries to the online Archaeological Survey of Ireland (www.archaeology.ie) with over 100 entries for Co. Dublin under the related categories of *fulachtaí fiadh*/burnt mounds/burnt spreads. As in this case, they have been frequently identified and excavated ahead of infrastructure, construction, or agriculture-related projects in recent years. Some prefer to use the term burnt mound or spread where no trough has been identified and use the traditional *fulacht fiadh* where the complete suite of features is present.

It is generally agreed that the principal function of these sites is the provision of heated/boiling water, which could then be used for any possible number of domestic, industrial or ritual purposes. One of the most enduring interpretations of their purpose is as cooking places, based largely on ethnographical comparisons and references in Early Irish literature (O'Drisceoil 1990). O' Kelly's (1954, 122) experimental work at a site at Ballyvourney 1, Co. Cork demonstrated joints of meat could be effectively

cooked in a short time, while more recent experiments (*e.g.,* Lawless 1990, Hawkes 2018) have corroborated how these sites could have been efficiently used for cooking, while providing a plausible explanation for the association of a trough with a build-up of shattered stones. However, a general absence of associated food waste and artefacts is often used to argue for alternative functions, such as bathing or saunas (Lucas 1965; Barfield & Hodder 1987; O'Drisceoil 1990; Eogan 2007), brewing (Quinn & Moore 2009), fulling of textiles, leather working and metallurgy (Barfield & Hodder 1987, 371). While these potential purposes have varying degrees of merit in the archaeological record, a wide-ranging recent study (Hawkes 2018) deemed cooking to be the most likely activity (though not necessarily the only one) at these sites (*ibid.* 156). The available evidence allows for a spectrum of interpretations and their description as a prehistoric 'kitchen sink' seems apt. However, the lack of either animal bone or accompanying artefacts provides little supporting evidence for the type or range of activities which may have occurred here. It is possible that soil conditions may not have been suitable for the survival of bone in the deposits of the features.

The radiocarbon date of 2200-1980 cal. 2δ BC (UBA 48275; 3720 +/-31 BP) places activity here in the Early Bronze Age period and accords well with dates from other sites of this type. In an analysis of 1014 dates from over 800 Irish *fulachtaí fiadh,* Hawkes (*ibid*, 115-53) demonstrated their use from the Early Neolithic onwards with the highest frequency occurring during the Early to Middle Bronze Age (*c.* 2200-1200 BC). While the use of heated stone to boil water continued into later prehistory, it didn't attain the same importance as *fulachtaí fiadh* in the Bronze Age period. Though there are a number of sites which provide medieval dates an assessment of the samples used to provide the dating material showed none came from optimal secure contexts (Hawkes 2011) and their use seems highly unlikely to have extended into the historic period.

Other burnt mound or *fulachtaí fiadh* sites in the area included another Early Bronze Age dated site at Ballalease North AA3, c. 140m to the west (Coen 2022a) and a Chalcolithic or Early Bronze age dated site AA8, c. 350m to the north-east in Portraine Demesne (Coen 2022b). Isolated pits containing the distinctive burnt mound material were excavated at Ballalease North AA2 (Coen 2022c) and AA4 (Coen 2022d), c. 130m to the south and c. 200m to the south-west respectively. The large townland of Corballis along the southern part of the Donabate peninsula also produced several other burnt mound/*fulacht fia* sites. Three of these sites, Corballis 2, 8 and 11 produced radiocarbon dates that overlap somewhat with the 2δ range seen here in Ballalease North AA7.

The recent discovery and excavation of the various sites on the Donabate peninsula highlights both the popularity of this burnt mound activity over the centuries and the long-standing prehistoric settlement in the area.

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Liam Coen

Liam Coen

Appendix 1: Context Register

Cuts **in bold**

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
1	-	-	All	-	Overall of site; 0.45-0.6 in depth	mid-brown loam between 0.45-0.60m in depth.	Topsoil	-	-
2	-	-	-	All	Under all of site	compact light brown and grey clay	Subsoil	-	
3	**-**	**4**	**2**	**1**	**1.53m N/S, 1.19m E/W x 0.38m D**	**Oval in plan, gentle break of slope at top and base, steeply sloped sides, concave base**	**Oval pit, possible fulacht trough?**	**-**	**-**
4	3	-	3	1	1.53m N/S, 1.19m E/W x 0.38m D	Dark black/ brown silty clay with frequent heat cracked stones and charcoal inclusions, Fulacht material	Single fill of oval pit C3; fulacht material	-	-
5	**-**	**6**	**2**	**6, 9**	**1.01m N/S, x 0.85m E/W x 0.10m D**	**Cut of shallow pit, gentle break of slope at top and base, gently sloped sides and concave base**	**Cut of shallow pit**	**-**	**-**
6	5	-	5	1	1.01m N/S, x 0.85m E/W x 0.10m D	Dark black/ brown silty clay with frequent heat cracked stones and charcoal inclusions, Fulacht material	Single fill of shallow pit C5	-	-
7	**-**	**8**	**2**	**8**	**1.73m E/W x 1.17m N/S x 0.36m D**	**Cut of oval pit, aligned E/W, sharp break of slope on east side, gradual elsewhere, gradual at base, gently sloping sides, concave base, aligned N/S. Filled with C8, fulacht material**	**Cut of circular pit,**	**-**	**-**
8	7	-	7	1	1.73m L x 1.17m W x 0.36m D	Firm, compact, dark grey/ black silty clay, frequent heat cracked stone (<20cm diameter) and charcoal inclusions.	Single fill of circular pit C7, fulacht material	-	-
9	**-**	**10**	**1, 5**	**10, 11**	**2.03m NW/SE x 0.67m NE/SW x 0.23m D**	**Cut of Linear, aligned NW/SE, sharp break of slope at top, gentle and base, steeply sloped sides and curved base,**	**Cut of linear**	**-**	**-**

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
10	9	-	9	1	2.03m L x 0.67m W x 0.23m D	Dark black/ brown silty clay with frequent heat cracked stones and charcoal inclusions, Fulacht material	Single fill of linear C9	-	-
11	**-**	**12**	**2, 9,**	**12**	**14m N/S x 0.30m W x 0.10m D**	**Cut of modern drainage ditch, linear in plan, aligned N/S, gently sloped sides, curved base, truncates C5 & C9**	**Cut of modern drainage ditch**	**-**	**-**
12	11	-	11	1	14m N/S x 0.30m W x 0.10m D	Stoney fill, rounded stones <10cm diameter, within a light brown clayey silt matrix,	Single fill of modern drain	-	-

Appendix 2: Radiocarbon date

UBA No.	Sample ID	Material Type	14C Age	±	F14C	±	mg Graphite
UBA-48275	21E0675:S1:C4	Corylus avellana wood	3720	31	0.6293	0.0024	0.964

Radiocarbon date certificate

Laboratory Identification: UBA-48275

Date of Measurement: 1st September 2022

Site: Ballalease North, Donabate, Co. Dublin

Material Dated: charcoal

Pre-treatment: AAA

mg Graphite: 0.964

Submitted by: Liam Coen

Conventional 14C Age: 3720+/-31BP

Fraction corrected using AMS δ 13C

RADIOCARBON CALIBRATION PROGRAM*

CALIB REV8.2

Copyright 1986-2020 M Stuiver and PJ Reimer

*To be used in conjunction with:

Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.

Calibration data set: intcal20.14c # Reimer et al. 2020

UBA-48275	**Radiocarbon Age BP 3720 +/- 31**	
% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal BC 2195-2174	0.201
	2145-2122	0.215
	2094-2039	0.584
95.4 (2 sigma)	cal BC 2203-2027	0.994
	1991-1985	0.006
Median probability: -2106		

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The IntCal20Northern Hemisphere radiocarbon calibration curve(0-55 calkB Radiocarbon 62. DOI: 10.1017/RDC.2020.41.

Comments: * This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2) where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set 0* represents a "negative" age BP
1955* or 1960* denote influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr

Appendix 3: Charcoal analysis report

Ballalease North, AA7, Donabate, Co. Dublin

21E0675

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Background and Introduction

Two charcoal samples were analyzed from a *fulacht fiadh* site at Ballalease North, site AA7, Co. Dublin. The excavation revealed three pits and a linear feature or elongated pit that were all filled with deposits typical of burnt mounds/*fulachtaí fia*, *i.e.* heat-affected stone in a charcoal-rich soil (Coen 2022). The samples were extracted from the single fill of a pit **C04** as well as the fill of a second pit **C08** and both associated with burnt mound material. Hazel charcoal from **C04** produced an Early Bronze Age date of 2203 – 1985BC (UBA- 48275).

Wood and its by-product, charcoal, was a vital and widely used material from prehistoric to medieval times, although its importance is rarely reflected in the analysis of archaeological assemblages mainly due to its perishable nature. It is important to note that people in prehistoric, Early Christian and medieval communities were mainly dependent on woodland resources for the construction of buildings, for the manufacture of most implements and for fuel for wood-burning and metalworking activities. The woods in a surrounding catchment area were exploited and often managed to provide an essential raw material for the community. A study of the range of species on an archaeological site offers an indication of the composition of local woodland in its period of use and any selection policies for particular species at any given time and place.

The analysis presented here concentrates on species identification, species selection and the composition of the local woodland during the Early Bronze Age period in Donabate.

Methodology

The process for identifying wood, whether it is charred, dried or waterlogged is carried out by comparing the anatomical structure of wood samples with known comparative material or keys (Schweingruber 1990). A wood reference collection from the Botanical Gardens in Glasnevin, Dublin was also used.

The soil samples were processed at the offices of Archer Heritage. The flots were sieved through a 250 micron or a 1mm sieve, while the retent was put through a 2mm or 4mm sieve. All the charcoal remains from the soil samples were then bagged and labeled.

The identification of charcoal material involves breaking the charcoal piece along its three sections (transverse, tangential and radial) so clean sections of the wood pieces can be obtained. This charcoal is then identified to species under a universal compound microscope reflected and transmitted light sources at magnifications x 10-400. By close examination of the microanatomical features of the samples, the charcoal species are determined.

The purpose of the identifications were two-fold. In some cases, the identifications were carried out prior to ^{14}C dating to select specific species for dating. In other cases, the charcoal was analyzed to determine fuel selection policies and selection of wood types for structural use. Each species was identified, bagged together and then weighed. The smaller sample amounts with less than 50 fragments were all identified while between 30 and 50 fragments were identified from the larger samples.

Results& Analysis

Two charcoal samples were analyzed after all the samples extracted from the excavation were assessed for suitability. Fragment count was low to moderate from all samples assessed and identified (**Table 1 and Figure 1**). Blackthorn/cherry was the most common wood type identified followed by hazel and then ash.

Charcoal diameters were on average small to moderate and measured between 1 and 9 mm and contained between 2 to12 annual tree rings.

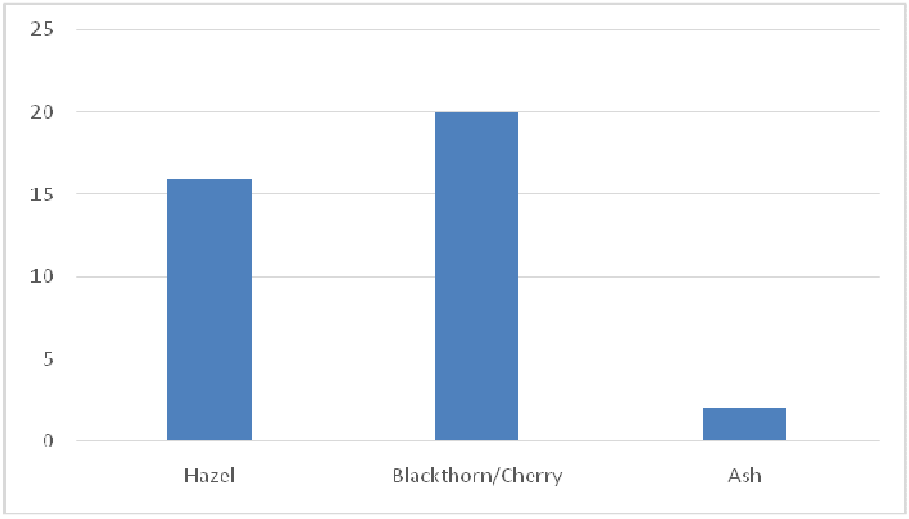


Figure 1 All taxa identified from the charcoal (fragment count)

Sample No.	Context No.	Feature type & Date	Time period	Identification	Amount of fragments	Weight of fragments	Size of fragments	Annual tree rings present	Comment
1	4	Fill of Pit C3	Early Bronze Age (2203 – 1985BC)	*Corylus avellana* (hazel)	15	1.2	3 - 9mm	2 - 6 rings	
				Prunus spp (blackthorn or cherry)	2	0.1	2-6mm	3 - 5 rings	
2	8	Basal fill of pit C7	Early Bronze Age	*Fraxinus excelsior* (ash)	2	0.1	2-4mm	2 rings	All identifiable fragments identified
				Corylus avellana (hazel)	1	0.1	3mm	2 years	
				Prunus spp (blackthorn or cherry)	18	0.8	1-4mm	2 - 12 rings	

Table 1 Wood taxa present and details on fragments in the charcoal assemblage

Discussion of the charcoal assemblage

Woodland resource usage

The charcoal identified from the pits has been dated to the Early Bronze Age period and the charcoal identified most likely relates to firewood use at the burnt mound site during this period. The wood types present suggest collection of wood from scrub (blackthorn/cherry and hazel) and possibly clear-felled and/or primary woodland areas (ash). These trees must have been present, accessible and utilised during the Early Bronze period at Donabate.

Hazel may have been specifically collected for use at the burnt mound and pit as it has a high calorific value and burns quickly (Rackham 1980). It is a native species and was very common up to the end of the 17th century. McCracken (1971, 19) points out that 'it was once widespread to a degree that is hard to imagine today'. With the introduction of brick, steel and slate the crafts associated with hazel became obsolete and today the woods that supplied hazel have diminished rapidly. Because of its flexible nature, hazel wood has been used for making furniture, fencing and wickerwork. It is normally only about 3-5m in height and is often found as an understory tree in broadleaf woods dominated by oak. It also occurs as pure copses on shallow soils over limestone, as seen today in The Burren in Co. Clare and survives for 30 to 50 years. Its main advantage is seen in the production of long flexible straight rods through the process known as coppicing and these coppiced trees can then be harvested for fuel or structural features such as wattle walls or fences.

The ash may indicate an opening up of the landscape prior to the use phase of Donabate, Site AA7. Ash has been shown to replace certain woodlands cleared by the first farmers in the Neolithic periods (Caseldine and Hatton 1996). Ash curves in many pollen diagrams are more pronounced from the later Neolithic period through to the late Bronze Age. It was also in these clearings, created by their Neolithic predecessors, that the Bronze Age peoples invariably occupied and built their *fulacht fiadh*.

It is difficult to identify between blackthorn and cherry. The sloe bush, as blackthorn is also known as, is a very durable wood and strong as oak. It is a thorny shrub found in woodland and scrub, on all soil types. In a woodland situation blackthorn and cherries are more likely to occur in clearings and at the woodland edges, where it forms dense thickets. Blackthorn is a slow burning wood with much heat and little smoke and therefore makes good fuel (Rackham 1980).

Blackthorn/cherry and ash was also identified from an Early Bronze Age dated burnt mound site excavated at Portraine Demesne, AA8 (O'Carroll 2022). Thus, results from both these Early Bronze Age dated sites reflect selection of wood from a more open and scrubland type environment.

Summary and conclusions on the charcoal assemblage

Two charcoal samples were identified from two pits associated with a burnt mound and dated to the Early Bronze Age. A restricted range of taxa were identified from the samples which included blackthorn/cherry, hazel and ash in order of representation.

Wood selection may have been from a more scrubland type environment with possible hazel coppice woodland. Ash may have been collected from a previously clear-felled area. The blackthorn/cherry would have grown as scrub nearby to the site.

Statement of significance and Recommendations for retention

The charcoal samples are significant on a local as well as a regional level. A database of results and charcoal samples from across the whole of Ireland can be cross compared to provide valuable information on Irelands Woodland history and how it changed throughout time. It is recommended that the two samples be retained by the National Museum of Ireland for any future research or dating that may be required from the area.

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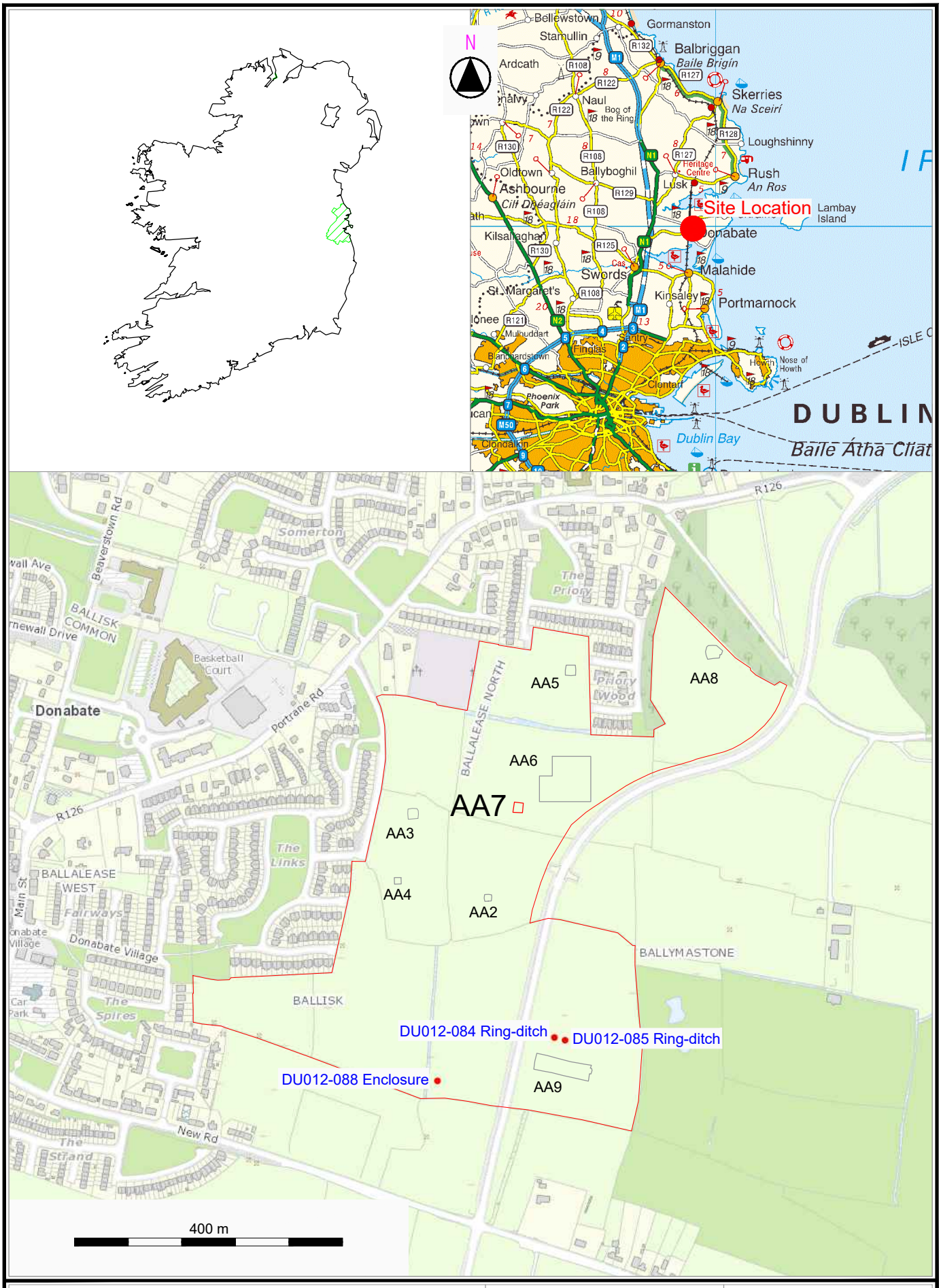
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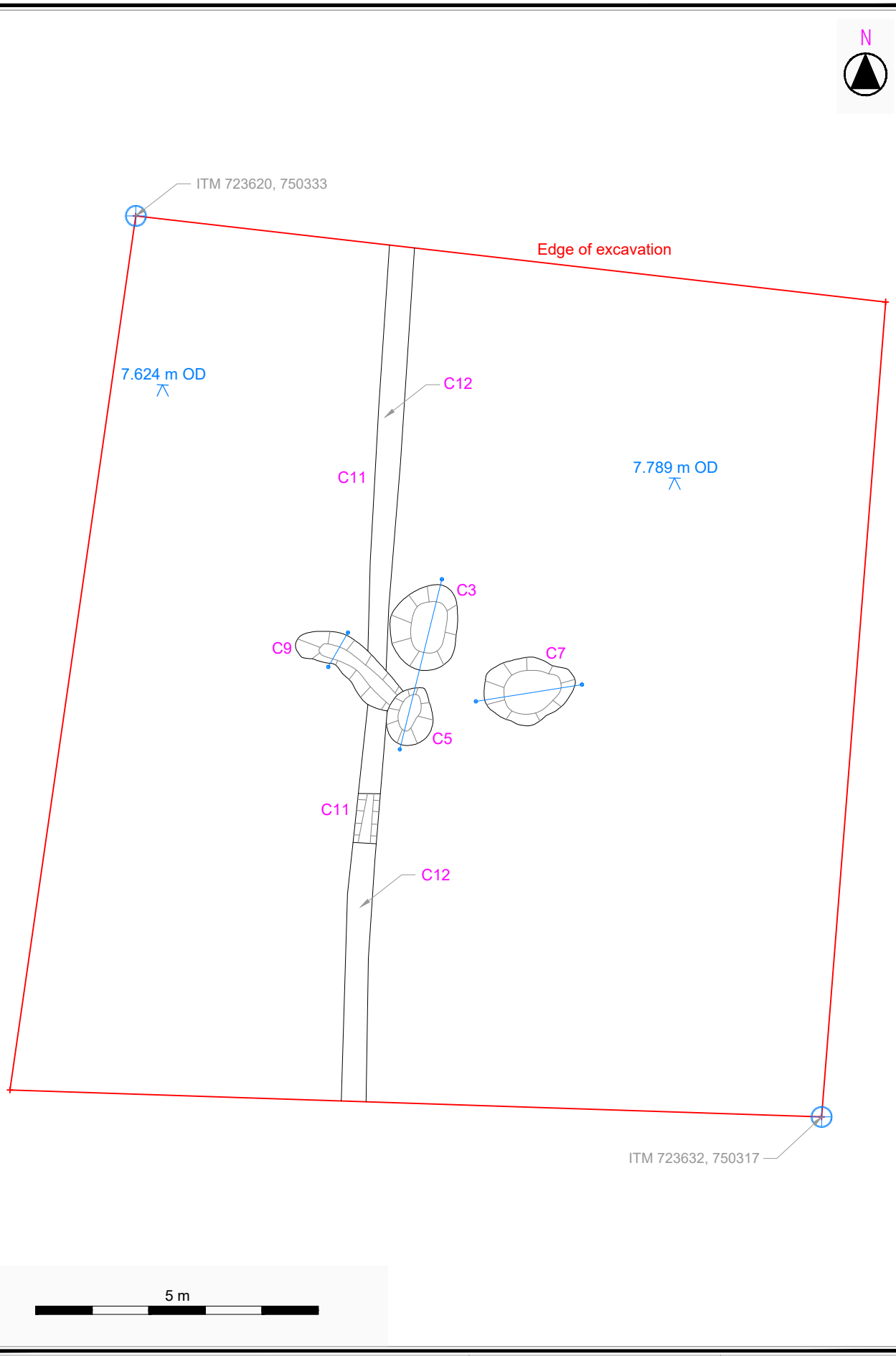
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Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballalease North, AA7, Donabate, Co Dublin	Scale: 1:8000 A4
			Date: June 2022
		Licence no. 21E0675	Origin: NMS
			Ref: 2021_43_EX_01

Figure 1: Site location with surrounding archaeology sites



Archer Heritage Planning	Unit 8 Beat Centre Stephenstown, Balbriggan, Co. Dublin	Ballalease North, AA7, Donabate, Co Dublin.	Scale: 1:100 A4
			Date: June 2022
		Licence No 21E0675	Origin: Archer Heritage
			Ref: 2021_43_EX_02

Figure 2: Post-excavation plan of site

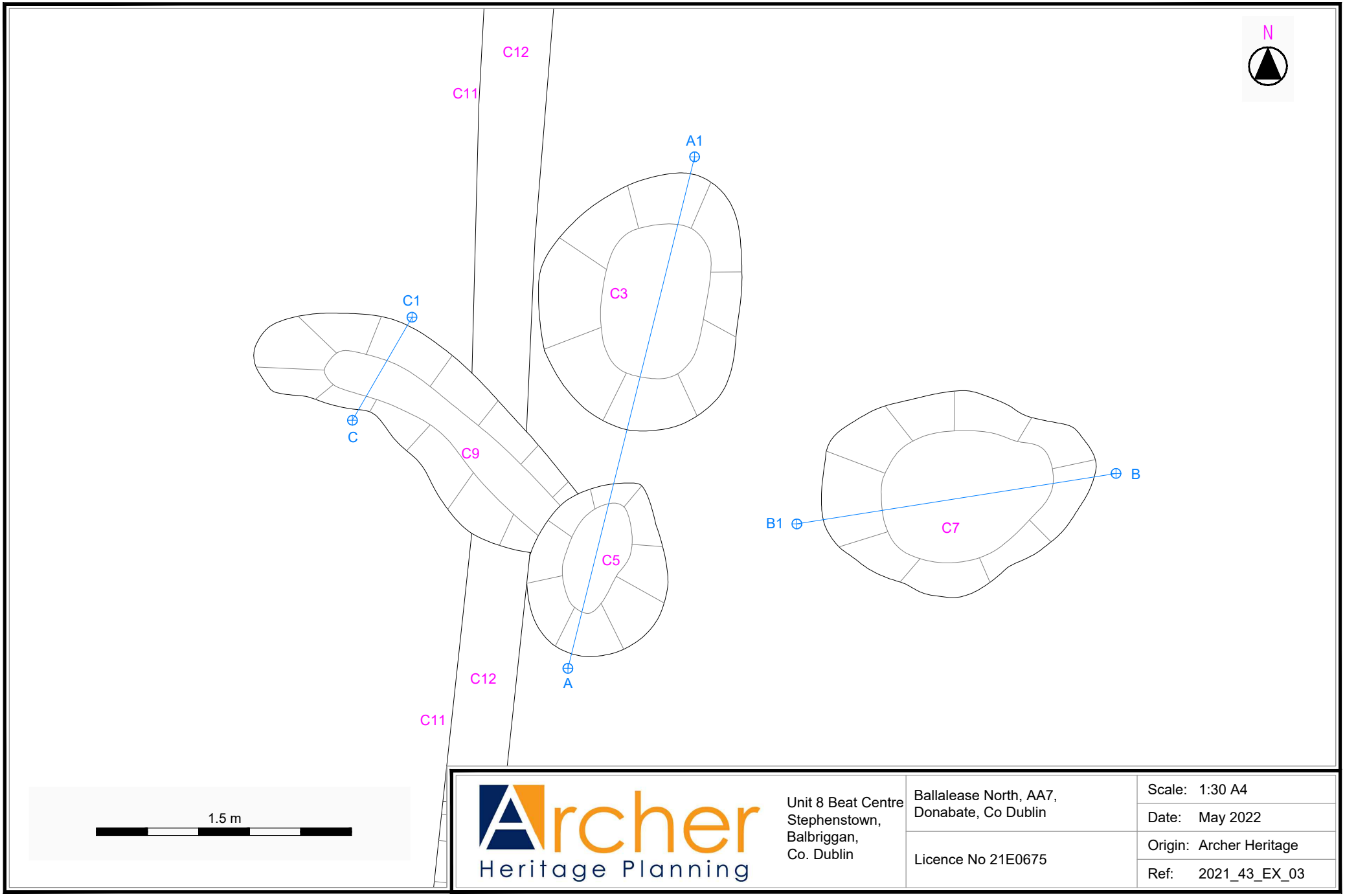
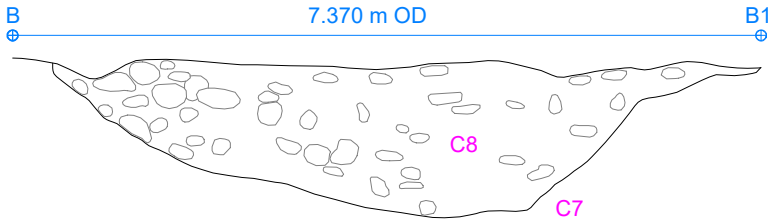
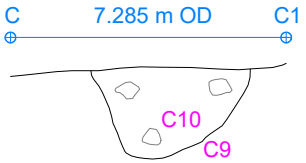
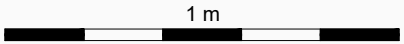


Figure 3 Detailed post-excavation plan of features









Archer Heritage Planning

Unit 8 Beat Centre
Stephenstown,
Balbriggan,
Co. Dublin

Ballalease North, AA7,
Donabate, Co Dublin

Licence No 21E0675

Scale: 1:10 A4
Date: May 2022
Origin: Archer Heritage
Ref: 2021_43_EX_04

Figure 4 Section Drawings


Plate 1: East-facing section A-A1 of pit C03


Plate 2: East-facing section A-A1 of pit C05


Plate 3: North-west facing section B-B1 of pit C07

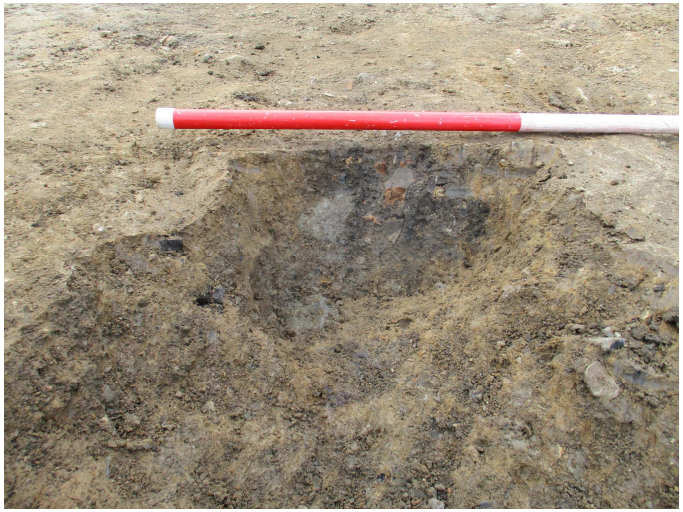

Plate 4: South-east facing section C-C1 of linear feature C09


Plate 5: Mid-excavation view of drain C11 with stoney fill C12


Plate 6: Post-excavation view of pits C03 & C05 & linear feature C09, facing north-west


Plate 7: Post-excavation view of pit C07 in foreground, facing west


Plate 8: Post-excavation aerial view of features from overhead

Appendix 15.5 AA8 Archaeological Excavation Report

Archer Heritage Planning

Portraine Demesne, AA8, Donabate, Co. Dublin

Final Excavation Report

LICENCE NO.: 21E0676
CLIENT: Glenveagh Living Ltd.
DATE: 15th November 2022

Testing | Surveying | Excavating | Analysing | Conserving | Reporting

Portraine Demesne, AA8, Donabate, Co. Dublin

Archaeological Excavation

SITE NAME	Portraine Demesne AA8
CLIENT	Glenveagh Living Ltd.
INVESTIGATION TYPE	Archaeological Excavation
LICENCE NO	21E0678
PLANNING REF	n/a
TOWNLAND	Portraine Demesne
IRISH TRANSVERSE MERCATOR	723918, 750558 (centre of cutting)
RMP NO	n/a
RPS NO	n/a
ARCHAEOLOGICAL CONSULTANT	Archer Heritage Planning Ltd
ARCHAEOLOGIST	Liam Coen
DATE OF ISSUE	15th November 2022
JOB REF.	2021_43

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Plate 4: W-facing section C-C1 of pit C07
Plate 5: SW-facing section F-F1 of pit C14
Plate 6: NW-facing section D-D1 of pit C18
Plate 7: Post-excavation view of pit C3 with post-holes C9, C10, C11 & C12 looking NE
Plate 8: NW-facing section G-G1 of pit/well C19
Plate 9: Mid-excavation view of deepest point of pit/well C19
Plate 10: Working shot showing excavation of pit/well C19
Plate 11: Post-excavation view of Cutting looking south
Plate 12: Post-excavation view of Cutting looking north-north-east

SUMMARY

A cutting of c. 405 sq. m. contained the degraded remains of a burnt mound, a type of site that used heated stone to heat/boil water for one or a variety of domestic, industrial or ritual purposes. The site comprised six subsoil-cut pits filled with varying amounts of typical burnt mound material, i.e. heat-affected stone in a dark, charcoal-rich soil matrix. The largest pit was stepped on one side and had a deeper section that breached the water table, deemed likely to have functioned as a well or water source for the burnt mound process. A shallow oval/rectangular shaped pit contained four post-holes in or near each corner suggesting supports for the use of a lining for the pit. While shallow it is likely highly truncated but still deemed to be most likely to have functioned as a trough for the burnt mound process. The other pits were small and irregular and of uncertain function. A fragment of ash (fraxinus) charcoal from the basal fill of one of these irregular pits returned a radiocarbon date of 2460-2140 cal. 2δ BC (UBA 48276; 3882+/- 39BP) placing activity here in the Chalcolithic (c. 2500-2200 BC) or Early Bronze Age (c. 2200-1700 BC) periods. Two flint flakes and a bipolar flint core were retrieved during the clean-back of the site. An extremely limited number of charcoal fragments were retrieved from the bulk soil samples with ash dominating, followed by cherry/blackthorn. The dominance of ash was seen in a similarly dated burnt mound in neighbouring Corballis townland. No animal bone or further artefacts were retrieved that might provide supporting evidence for what activities may have taken place in the site.

Revision	Status	Date	Prepared by	Reviewed by	Approved by
1	Final	15th November 2022	L Coen ARCHAEOLOGIST	A O'Connell SENIOR ARCHAEOLOGIST	C. Mc Guinness

1. INTRODUCTION

This archaeological excavation report for a site at Portraine Demesne, Donabate, Co. Dublin has been prepared by Archer Heritage Planning Ltd for Glenveagh Living Ltd. The site was first identified during test excavations under licence no. 21E0453. The excavation took place on 18th October - 5th November 2021 under licence 21E0676 and the report presents the results with all post-excavation analysis. This excavation is one of eight (AA2-AA9) undertaken in advance of a proposed residential development for the area. Another archaeological site (AA1) will be preserved under green space in the development.

2. SITE DESCRIPTION

The site was located in a relatively flat field to the east of the expanding village of Donabate. The site is part of a wider landholding comprising a series of fields bounded by mature hedgerows previously under tillage though now lying fallow and overgrown with light vegetation. The village is located on a peninsula in the Irish Sea and the area has produced copious archaeological evidence for activity throughout the prehistoric period.

In the early medieval period, Donabate formed part of the kingdom of Brega, initially ruled by a dynastic confederation known as the Laigin, but after the seventh century was under the rule of the Síl nAedo Sláine of the Southern Uí Neill. After the area came under the control of the Anglo-Normans in the late twelfth century, the lands around Donabate came under the control of the Archbishop of Dublin, who had his episcopal manor at Swords, Co. Dublin. Around 1230 AD, Donabate church was granted to the monastery of Grane, Co. Carlow and remained in their possession until the dissolution of the monasteries in 1541 (Bates 2001). In the eighteenth century, an extensive tract of land around Donabate was purchased by Charles Cobbe, later Archbishop of Dublin.

The first portion of the name Donabate (Irish *Domhnach Bat*) most likely originates from the word *Domhnach* meaning church and *Baite* meaning wet or swampy. Alternatively, it may come from '*Dún a' Bháid*' meaning church of the ferry, which is supposed to refer to an ancient church in the townland of Ballymadrough west of Donabate near the Malahide Estuary. The townland name of Ballalease translates from Irish as 'town of the sheds' (*Baile an leas*, www.logainm.ie) and it is noted in the Civil Survey (1654-5) as Bally Ellis while the Down Survey map (1656) displays a parcel of land approximating the current townland's location and outline (from 1st Ed. OS map) as Ballielish Colledge land. The 'colledge land' indicates it was owned by the Archbishop of Dublin. It was also noted on this map that the Donabate townland of 117 acres was forfeited by Anthony Delahide of Lockhumny (probably Loughshinny) to Lord Fitzharding sometime between 1641 and 1670.

3. METHOD STATEMENT

The overall aim of the excavation was to preserve by record any archaeological features in the proposed excavation cutting. The cutting was established following test-excavations (O'Connell 2021, licence no. 21E0435) that first identified the archaeological material.

3.1 General Excavation Methodology

An open area rescue excavation strategy was employed. The recording techniques used are based on a system that best suits a rural environment as outlined in Barker (1977). This was supplemented by the recording system described in the Museum of London Archaeological Service Site Manual (Spence 1990). A single context recording system was used to record the site and multi-context plans were drawn at a scale of 1:20 or 1:50 (plans) & 1:10 or 1:20 (sections) as appropriate. Artefacts were labelled in accordance with NMI guidelines.

The topsoil was removed by mechanical excavation and then the site was hand cleaned to clearly establish the archaeological material. The material was assessed *in-situ* by archaeologist Liam Coen. Archaeological features such as pits were half-sectioned with linear features excavated by regularly spaced box-sections. The resulting section faces were drawn to establish a stratigraphic record. The remaining deposits were removed by hand to produce a post-excavation plan and photo. After deposits were removed from all identified features, hand-held camera photographs were taken as well as aerial post-excavation drone photographs of the site. The principal goals of the excavation were:

- Establish the stratigraphical sequence of the site;
- Determine the various phases of activity;
- Examine the morphology of the various features/structures; and
- Establish the date & function of the features.

3.2 Recording

All archaeological features and deposits encountered during the works were given a unique number in a continuous system recorded in the site archive. Entries were backed up by site-note books, and annotated multi-context drawings at appropriate scales. Site plans showed the location of all features recorded in the course of the excavation. Annotated sections/elevations were drawn at scales of 1:10 or 1:20 as appropriate. Heights of all principal features and levels were calculated relative to Ordnance Datum, correct to two decimal places. Site drawings were scanned and digitised using AutoCAD 2018 and geo-referenced to ITM projection. Digital photographs were taken of all archaeological features and deposits.

3.3 Sampling

Environmental sampling was undertaken in accordance with recent professional guidelines (*e.g*. Environmental Sampling: Guidelines for Archaeologists IAI 2007). Bulk soil samples were selected from secure deposits in order to gather dating material and environmental data.

4. ARCHAEOLOGICAL EXCAVATION RESULTS

An irregularly shaped cutting of roughly 25m x 19m (c. 405 sq. m.) was opened by mechanical excavator under constant archaeological supervision. It was centred on features first identified during test excavations by Aidan O'Connell (2021). The site was cleaned by hand to further define the archaeological features. The features identified comprised six pits; **C03, C05, C07, C14, C18** & **C19**, one of which, **C19,** was very large. Another of the pits, **C03,** was associated with four post-holes (**C09, C10, C12** and **C11**) that may represent potential supports for a pit lining.

The largest pit, **C19**, was located in the centre of the cutting. It was an elongated oval in plan, aligned north-east/south-west, with a sloping step along its south-western arc but steeper sloping sides elsewhere. The deepest point of the pit lay in the northern quadrant of the pit and had a circular, concave base that quickly became inundated upon excavation. The pit measured 6.83m north-east/south-west x 5.09m x 1.36m at its deepest. It had four fills. The upper three fills, **C20, C21** and **C22,** were essentially silts with declining amounts of burnt mound materials as they descended. Basal fill **C23** comprised of more typical burnt mound material; i.e. a dark greyish brown, friable, charcoal rich, stoney silty clay, measuring 0.58m in maximum depth. Approximately 40% of the deposit was stone, much of it heat-affected. It contained occasional inclusions of wood due to waterlogged conditions but none were worked and it is thought were just debris. The fact that the base of the pit breached the water table and the step along its south-western arc to facilitate access suggested the pit functioned as a well or water source for the burnt mound process.

Pit **C03**, was located 1.94m to the south-east of large pit/well **C19**. Sub-rectangular/ to oval in plan and orientated north-east/south-west, it measured 2.48m x 1.80m x 0.12m deep. It had a single fill, **C04**, comprising a friable, dark grey/black silty clay with frequent stone and charcoal inclusions. The cuts for four post-holes, **C09**, **C10**, **C11** and **C12** lay within or just outside the 'corners' of the pit and seem to indicate supports for a possible lining. The cuts for the post-holes were all around 0.1m in diameter and between 0.12-0.19m in depth. A similar pattern of cuts, *i.e.* shallow pit with four corner post-holes, was seen during the excavation of a burnt mound at Corballis 3 (< 1.5km to south) that was dated to the Middle Bronze age (c. 1700-1200 BC). Despite its shallow surviving nature, pit **C03** may have

functioned as the trough for the burnt mound process. The surviving remains are likely highly truncated and troughs with wooden linings, possibly sealed with impervious clays or mosses, have been identified on several other sites.

Pit **C05** was located 4.22m to the east-south-east of pit **C19** close-by to pit **C03**. It was a shallow, irregularly shaped pit with gently sloped sides and concave base measuring 0.84m east/west x 0.76m x 0.12m deep. It had a single fill, **C06**, comprising a friable black and grey clayey silt with charcoal and occasional small heat-affected stone inclusions.

Pit **C07** was located 4.64m to the east of pit **C19**. Pit **C07** was a shallow, roughly circular in plan, with gently sloped sides along its southern edge, more steeply sloped elsewhere and an undulating base. It measured 1.75m x 1.75m x 0.15m deep and contained a single fill, **C08**. The single fill was a friable dark grey clayey silt flecked with charcoal and occasional burnt stone inclusions.

Pit **C14** was located 6.27m to the north-east of pit **C19**. It was aligned north-west/south-east and extended beyond the north-eastern margin of the cutting. Pit **C14** was oval in plan with moderately sloped sides and a concave base and measured 2.00m wide x 0.52m deep. It contained three fills. The basal fill, **C17,** comprised compact black/grey silty clay with small stone and frequent charcoal inclusions with a depth of 0.20m. A fragment of ash (*fraxinus*) charcoal from this basal fill returned a radiocarbon date of 2460-2140 cal. 2δ BC (UBA 48276; 3882+/- 39BP) placing activity here in the Chalcolithic (c. 2500-2200 BC) or Early Bronze Age (c. 2200-1700 BC) periods. The middle fill, **C16**, comprised a friable black sandy silt with stone and frequent charcoal inclusions with a depth of 0.15m. Finally, the upper fill, **C15**, comprised a compact dark brown silty-clay with stone inclusions and a maximum depth of 0.19m.

Finally, pit **C18** was located 3.56m north-east of pit **C19**. It was a short linear/ elongated oval in plan aligned north-west/south-east with gently sloped sides and a concave base. It had a depth of 0.17m and contained a single fill, **C13**, a compact, dark greyish brown to black, silty-sandy-clay with frequent heat cracked angular and sub-angular stones.

5. ENVIRONMENTAL REMAINS

5.1 Introduction

Bulk samples were taken from stratified, undisturbed deposits only and were selected for the perceived potential to produce dating and other environmental material. Samples were floated off-site in a custom

made flotation tank that passed the samples through successive sieves to capture charcoal, small bones, charred seeds *etc*. These samples were dried and sent for analysis. All animal bone from stratified deposits were retained and processed similar to the finds assemblage. Animal bone recovered from bulk samples was also retained for analysis. Unstratified animal bone was not retained. Soil sieving details are presented in the table below.

Sample No.	Volume before processing	Feature No.	Feature Description	Flot weight	Retent weight	Flot Results
1	20	C17	Basal fill of pit C14	2	539	Rare charcoal
2	25	C23	Basal fill of C19	3	1929	Rare charcoal

Table 1: Bulk soil sample sieving details

5.2 Radiocarbon date

A single sample of charred wood was selected for radiocarbon dating (see Appendix 2). The charred wood sent for dating was extracted from the flot of the bulk soil sample following processing by floatation tank. The wood charcoal was selected and identified by Dr. Ellen O'Carroll prior to getting radiocarbon dated by the laboratory at 14 Chrono Centre at Queens University Belfast. The date quoted in the text has been calibrated to 2δ, 95.4% probability using OxCal v4.4 Bronk Ramsey (2020); r:5 and IntCal20 atmospheric curve (Reimer *et al* 2020) and details are presented below;

- *Fraxinus* (ash) charcoal from C17, sample 1, fill of pit C14; UBA 48276; 2460-2140 cal. 2δ BC; 3882 +/- 39 BP.

This places activity here in the Chalcolithic (c. 2500-2200 BC) or, less likely, the Early Bronze Age (c. 2200-1700 BC) periods. This accords well with dating from other similar sites. In an analysis of 1014 dates from over 800 Irish *fulachtaí fiadh,* Hawkes (2018, 115-53) demonstrated their use from the Early Neolithic onwards with the highest frequency occurring during the Early to Middle Bronze Age (*c.* 2200-1200 BC).

5.3 Charcoal analysis

Two bulk soil samples were taken during the course of the excavation, one from the basal fill of a pit near the northern margin and another from a basal fill of a possible well. A limited amount, seven fragments, of charcoal was identified, ash (*fraxinus*) from the basal fill of the marginal pit and blackthorn/cherry (*Prunus*) and ash from the fill of the possible well. Due to the limited identifiable fragments, only tentative conclusions could be reached. The charcoal is likely to have derived from

firewood rather than as anything structural. The tree types are likely to have been in the immediate area and indicate scrubland (*prunus*) and possibly clear-felled and/or primary woodland areas (*fraxinus*). A similarly dated burnt mound site on the Donabate peninsula, Corballis 2, located 1.2 km to the south also produced a limited range of charcoal taxa (from 2 samples with over 80 fragments identified); ash dominating followed by hazel. The primacy of ash charcoal mirrors the analysis here and reinforces the conclusions from this site.

6. ARTEFACTS

A limited range of artefacts were retrieved during the excavation. They were retrieved during the clean-back of the site. The list of finds is detailed in the table below. The results of the specialist lithic analysis undertaken by Dr. Conor Brady are reproduced in the section below.

Context No.	Find No.	Material	Type	Description
C01	21E0674:01:01	Stone	Flint	Flint bipolar core
C01	21E0670:01:02	Stone	Flint	Flint flake
C01	21E0670:01:03	Stone	Flint	Flint flake

Table 2: Finds register

6.1 Lithic artefacts analysis

Three lithic artefacts were recovered during investigations at Portrane Demesne AA8 (21E0676). All were retrieved from C01 (Topsoil) and all were flint. All pieces were in good fresh condition and one of them, a utilised flake (21E0676:1:2) was incomplete. The pieces are of average size, the largest, a secondary flake (21E0676:1:3), is 35 mm maximum length. All pieces retain at least some cortex indicating a probable pebble flint origin for the raw material used. The cortex on all pieces is smooth so the raw material was likely collected from a shingle beach or from glacial till soil. The presence of the bipolar core (21E0676:1:1) in this small assemblage is a further indication of the reliance on relatively small raw material. This technique is often used when conventional hand-held knapping is not possible because of the small size of the core. The bipolar core is rested on an anvil stone and then struck with a hard hammer from above creating characteristic flakes with the appearance of having been struck from both ends simultaneously (Woodman et al. 2006, 81).

21E0676:1:1

A complete unutilised primary flint bipolar core. It is in fresh condition. The cortex is very pale brown and smooth and it is 3mm thick. The flint is yellowish brown and translucent with small inclusions. There are two negative flake scars.

L: 31 mm B: 26 mm Th: 11 mm Wt: 9.4g

Munsell No: 10YR 5/6

21E0676:1:2

An incomplete utilised primary flint flake. It is in fresh condition and the distal end is missing. The cortex is brown and smooth/textured and it is <1mm thick. The flint is yellowish brown and translucent. The platform is cortical.

L: 18 mm B: 14 mm Th: 5 mm Wt: 1.8g

Munsell No: 10YR 5/8

21E0676:1:3

A complete unutilised secondary flint bipolar flake. It is in fresh condition. The cortex is brown and smooth and it is <1mm thick. The flint is reddish brown and translucent. The platform is cortical/crushed. There are three opposed dorsal flake scars.

L: 35 mm B: 22 mm Th: 4 mm Wt: 4.4 g

Munsell No: 5YR 5/4

7. DISCUSSION

The excavation at Portraine Demesne revealed the disturbed remains of a burnt mound (or *fulacht fia*). These generally comprise mounds or spreads of fire-cracked stones and charcoal associated with sunken pits/troughs and hearths. They are the most common class of prehistoric archaeological site in the country and are generally located near or adjacent to a water supply, such as a stream or spring, or in wet marshy areas (Waddell 1998, 174-7). Several thousand are known to exist nationally from entries to the online Sites and Monuments Record (SMR) with over 100 entries for Co. Dublin under the related categories of *fulachta fiadh*/burnt mounds/burnt spreads. As in this case, they have been frequently identified and excavated ahead of infrastructure, construction, or agriculture-related projects in recent years. Some prefer to use the term burnt mound or spread where no trough has been identified and use the traditional *fulacht fia* where the complete suite of features is present.

It is generally agreed that the principal function of these sites is the provision of heated/boiling water, which could then be used for any possible number of domestic, industrial or ritual purposes. One of the

most enduring explanations for function was as cooking places, based largely on ethnographical comparisons and references in Early Irish literature (O'Drisceoil 1990). O' Kelly's (1954, 122) experimental work at a site at Ballyvourney 1, Co. Cork demonstrated joints of meat could be effectively cooked in a short time, while more recent experiments (*e.g.,* Lawless 1990, Hawkes 2018) have corroborated how these sites could have been efficiently used for cooking, while providing a plausible explanation for the association of a trough with a build-up of shattered stones. However, a general absence of associated food waste and artefacts is often used to argue for alternative functions, such as bathing or saunas (Lucas 1965; Barfield & Hodder 1987; O'Drisceoil 1990; Eogan 2007), brewing (Quinn & Moore 2009), fulling of textiles, leather working and metallurgy (Barfield & Hodder 1987, 371). While these potential purposes have varying degrees of merit in the archaeological record, a wide-ranging recent study (Hawkes 2018) deemed cooking to be the most likely to have occurred (though not exclusively) at these sites (*ibid.* 156). The available evidence allows for a spectrum of interpretations and their description as a prehistoric 'kitchen sink' seems apt. Unfortunately, the lack of either animal bone or accompanying artefacts provides little supporting evidence for the type (or range) of activities which may have occurred at Portraine Demesne during the use of the site.

The radiocarbon date of 2460-2140 cal. 2δ BC (UBA 48276; 3882+/- 39BP) placing activity here in the Chalcolithic (c. 2500-2200 BC) or Early Bronze Age (c. 2200-1700 BC) periods accords well with dating from other burnt mound sites. In an analysis of 1014 dates from over 800 Irish *fulachtaí fiadh,* Hawkes (2018, 115-53) demonstrated their use from the Early Neolithic onwards with a concentration of use during the Early to Middle Bronze Age (*c.* 2200-1200 BC). While the use of heated stone to boil water continued into later prehistory, it didn't attain the same importance as *fulachtaí fiadh* in the Bronze Age period. Though there are a number of sites which provide medieval dates an assessment of the samples used to provide the dating material showed none came from optimal secure contexts (Hawkes 2011) and their use seems highly unlikely to have extended into the historic period.

The site at Portraine Demesne AA8 is one of several others on the Donabate peninsula that produced similar radiocarbon dates (Figure 7). Burnt mound sites at Ballalease North AA7 (Coen 2022a), c. 350m to the south-west and Corballis 2 (Coen 2019), c. 1.2 km to the south produced overlapping radiocarbon dates, either from the Chalcolithic or Early Bronze Age periods. Slightly later dates from the Early Bronze Age were returned from an isolated pit containing typical burnt mound material in Ballalease North AA2 (Coen 2022b), c. 500m to the south-west and a burnt mound at Corballis 8 (O'Connell 2020), c. 1.5 km to the south-west. The connection between burnt mounds and contemporary habitation sites is a matter of debate (see Hawkes 2018, 188-195) but a multi-period site was identified near the centre of the modern village of Donabate that contained a phase of Beaker (or Chalcolithic) use that may

represent domestic settlement (Hagen 2004, Licence no. 03E1634). Beaker pottery was retrieved from several features like post-holes though no clear outline of a structure could be discerned. Domestic Beaker habitation evidence in the form of structures etc. is rare and often unclear (Carlin 2018, 47-63). While somewhat speculative, the site at Beaverstown may indicate a settlement whose inhabitants may have used the burnt mound sites. The discovery and excavation of all these sites highlights both the popularity of burnt mound activity over the centuries and Chalcolithic and Early Bronze Age settlement in the Donabate peninsula.

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Liam Coen

Appendix 1: Context Register

Cuts **in bold**

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
1	-	-	All	-	Overall of site; 0.45-0.6 in depth	Mid-brown loam between 0.45-0.60m in depth.	Topsoil	2 x flint flakes; 1 x flint bipolar core	-
2	-	-	-	All	Under all of site	Compact light brown and grey clay	Subsoil	-	
3	**-**	**4**	**2**	**4, 9, 10, 12**	**2.48m NE/SW x 1.80m NW/SE x 0.12m D**	**Oval in plan; gradual break of slope (b.o.s.) at top and base, gently sloped sides and flat base, aligned NE/SW, Truncated by C9, C10 and C12**	**Oval Pit, possible roasting pit**	**-**	**-**
4	3	-	3	1, 9, 10, 12	2.48m NE/SW x 1.80m NW/SE x 0.12m D	Loose, dark grey/black silty clay with frequent stone and charcoal.	Charcoal rich fill of possible roasting pit C3	-	-
5	**-**	**6**	**2**	**5**	**0.84m E/W x 0.76m N/S x 0.12m d**	**Cut of shallow pit, gentle b.o.s. at top and base, gently sloped sides and concave base**	**Cut of shallow pit**	**-**	**-**
6	5	-	5	1	0.84m E/W x 0.76m N/S x 0.12m d	Black and grey clayey silt with moderate flecks of charcoal	Single fill of shallow pit C5	-	-
7	**-**	**8**	**2**	**8**	**1.75m W x 0.15m D**	**Cut of shallow pit located towards north of trench. Roughly circular in plan, gently sloped sides on southern edge, steeply sloped on northern side, undulating base. Single fill C8**	**Cut of Shallow pit**	**-**	**-**
8	7	-	7	1	1.75m W x 0.15m D	Blackish/grey clayey silt flecked with burnt stone	Single fill of shallow pit C7	-	-
9	**-**	**24**	**3**	**24**	**0.10m in diam. x 0.18m D**	**Circular in plan; sharp b.o.s. at top and base, steep vertical sides, concave base. Located in eastern corner of pit C03**	**Cut of Post-hole**	**-**	**-**
10	**-**	**25**	**3**	**25**	**0.11m in diam. x 0.17m D**	**Circular posthole, sharp b.o.s. at top and base, steep vertical sides, concave base. Located in southern corner of pit C03.**	**Cut of Post-hole**	**-**	**-**

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
11	**-**	**26**	**3**	**26**	**0.10m in diam. x 0.12m D**	**Circular in plan; sharp b.o.s. at top and base; steep vertical sides, concave base. Located near western corner of pit C03.**	**Cut of Post-hole**	**-**	**-**
12		**27**	**3**	**27**	**0.10m in diam. x 0.19m D**	**Circular in plan; sharp b.o.s.at top and base, steep vertical sides, concave base. Located near northern corner of pit C03**	**Cut of Post-hole**	**-**	**-**
13	18	-	18	1	1.15m L x 0.50m W x 0.17m D	Loosely compact, dark greyish brown to black, silty sandy clay, frequent heat cracked angular and sub angular stones	Single fill of pit C18	-	-
14	**-**	**15, 16, 17**	**2**	**15**	**2.00m W x 0.52m D**	**Oval in plan, runs into the NE corner of trench, gradual break of slope at top and base, moderately sloped sides, concave base, aligned NW/SE**	**Cut of pit**	**-**	**-**
15	14	-	14, 16	1	2.00m W x 0.19m D	Compact Dark Brown silty clay, moderate stone inclusions	Upper fill of C14	-	-
16	14	-	14, 17	15	1.58m W x 0.15m D	Friable black sandy silt with moderate stone and frequent charcoal flecks	Middle fill of C14	-	-
17	14	-	14	16	1.14m W x 0.20m D	Compact Black/grey silty clay with moderate stones and frequent charcoal inclusions	Basal fill of C14	-	1
18	**-**	**13**	**2**	**13**	**1.15m L x 0.50m W x 0.17m D**	**Cut of short linear/ elongated pit, sharp break of slope at top, gradual at base, gently sloped sides with concave base. Aligned E/W**	**Cut of elongated pit**	**-**	**-**
19	**-**	**20, 21, 22, 23**	**2**	**23**	**6.83m NE/SW x 5.09 NW/SE x 1.36m D**	**Elongated oval in plan, gradual break of slope at top and base, moderately steep sides, concave base, aligned NE/SW**	**Cut of large oval pit, likely used as well**	**-**	**-**
20	19	-	21	1	4.52m L x 0.26m D	Compact light brown/grey clayey silt, no inclusions, deposit centred in middle of feature	Upper fill of trough pit C19	-	-
21	19	-	22	20	6.00m L x 0.19m D	Compact brownish grey clayey silt, fine silt particles, this deposit is also centred in the middle of feature	Middle fill of trough pit C19	-	-

C#	Fill of	Filled with	Strat above	Strat below	Dimensions (LxBxD; meters)	Description	Interpretation	Finds	Sample no.
22	19	-	23	21	6.22m L x 0.53m D	Friable grey silty clay with occasional heat cracked and non heat cracked stone inclusions.	Middle fill of trough pit C19	-	-
23	19	-	19	22	6.77m L x 0.58m D	Compact charcoal rich silty clay, V dark brown/black in colour. Frequent heat cracked stone inclusions, moderate waterlogged wood inclusions (possible trough remains?)	Basal fill of trough pit C19	-	2
24	9	-	9	1	0.10m W x 0.18m D	Dark brown silty clay	Single fill of post-hole C9	-	-
25	10	-	10	1	0.11m W x 0.17m D	Dark brown silty clay	Single fill of post-hole C10	-	-
26	11	-	11	1	0.10m W x 0.12m D	Dark brown silty clay	Single fill of post-hole C11	-	-
27	12	-	12	1	0.10m W x 0.19m D	Dark brown silty clay	Single fill of post-hole C12	-	-

Appendix 2: Radiocarbon date

UBA No.	Sample ID	Material Type	14C Age	±	F14C	±	mg Graphite
UBA-48276	21E0676:S1:C17	Fraxinus wood	3822	39	0.6214	0.0030	0.957

Radiocarbon date certificate

Laboratory Identification: UBA-48276

Date of Measurement: 1st September 2022

Site: Portraine Demesne, Donabate, Co. Dublin

Material Dated: charcoal

Pre-treatment: AAA

mg Graphite: 0.957

Submitted by: Liam Coen

Conventional 14C Age: 3822 +/-39BP

Fraction corrected using AMS δ 13C

RADIOCARBON CALIBRATION PROGRAM*

CALIB REV8.2

Copyright 1986-2020 M Stuiver and PJ Reimer

*To be used in conjunction with:

Stuiver, M., and Reimer, P.J., 1993, Radiocarbon, 35, 215-230.

Calibration data set: intcal20.14c # Reimer et al. 2020

UBA-48276	**Radiocarbon Age BP 3882 +/- 39**	
% area enclosed	cal AD age ranges	relative area under probability distribution
68.3 (1 sigma)	cal BC 2341-2316	0.146
	2309-2200	0.840
	2158-2154	0.014
95.4 (2 sigma)	cal BC 2455-2418	0.057
	2408-2372	0.077
	2366-2193	0.779
	2179-2143	0.087
Median probability: -2269		

References for calibration datasets:
Reimer P, Austin WEN, Bard E, Bayliss A, Blackwell PG,Bronk Ramsey C, Butzin, M, Edwards RL, Friedrich M, Grootes PM, Guilderson TP, Hajdas I, Heaton TJ, Hogg AG, Kromer B, Manning SW, Muscheler R, Palmer JG, Pearson C, van der Plicht J, Reim Richards DA, Scott EM, Southon JR, Turney CSM,Wacker L, Adolphi F, Bantgen U, Fahrni S, Fogtmann-Schulz A, Friedrich R, Kahjler P, Kudsk S, Miyake F, Olsen J, Sakamoto M, Sookedo A, Talomo S. 2020
The IntCal20Northern Hemisphere radiocarbon calibration curve(0-55 calkB Radiocarbon 62. DOI: 10.1017/RDC.2020.41.

Comments: * This standard deviation (error) includes a lab error multiplier.
** 1 sigma = square root of (sample std. dev.^2 + curve std. dev.^2)
** 2 sigma = 2 x square root of (sample std. dev.^2 + curve std. dev.^2) where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set 0* represents a "negative" age BP
1955* or 1960* denote influence of nuclear testing C-14

NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr

Appendix 3: Charcoal analysis report

CHARCOAL REPORT, Portraine Demesne, AA8, Donabate, Co. Dublin

Licence no. 21E0676

By Dr. Ellen OCarroll MA DIP. EIA MGT

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1. Background and Introduction

Two charcoal samples were analyzed from a *fulacht fiadh* site at Portraine Demesne, site AA8, Co. Dublin. The excavation revealed a series of pits, one containing post-holes in each corner while the deepest had a stepped side and a water-logged base and may have functioned as a well. Typical burnt mound material, i.e., heat-affected stone in a charcoal-rich soil, was encountered in all of the features (Coen 2022). The samples were extracted from the basal fill of a pit **C17** associated with burnt mound material as well as the basal fill of the aforementioned pit/well **C23**. Ash charcoal from **C17** produced an Early Bronze Age date of 2455 – 2143BC (UBA- 48276).

Wood and its by-product, charcoal, was a vital and widely used material from prehistoric to medieval times, although its importance is rarely reflected in the analysis of archaeological assemblages mainly due to its perishable nature. It is important to note that people in prehistoric, Early Christian and medieval communities were mainly dependent on woodland resources for the construction of buildings, for the manufacture of most implements and for fuel for wood-burning and metalworking activities. The woods in a surrounding catchment area were exploited and often managed to provide an essential raw material for the community. A study of the range of species on an archaeological site offers an indication of the composition of local woodland in its period of use and any selection policies for particular species at any given time and place.

The analysis presented here concentrates on species identification, species selection and the composition of the local woodland during the Early Bronze period in Donabate.

2. Methodology

The process for identifying wood, whether it is charred, dried or waterlogged is carried out by comparing the anatomical structure of wood samples with known comparative material or keys (Schweingruber 1990). A wood reference collection from the Botanical Gardens in Glasnevin, Dublin was also used.

The soil samples were processed at the offices of Archer Heritage. The flots were sieved through a 250 micron or a 1mm sieve, while the retent was put through a 2mm or 4mm sieve. All of the charcoal remains from the soil samples were then bagged and labeled.

The identification of charcoal material involves breaking the charcoal piece along its three sections (transverse, tangential and radial) so clean sections of the wood pieces can be obtained. This charcoal is then identified to species under a universal compound microscope reflected and transmitted light sources at magnifications x 10-400. By close examination of the microanatomical features of the samples, the charcoal species are determined.

The purpose of the identifications were two-fold. In some cases the identifications were carried out prior to ^{14}C dating in order to select specific species for dating. In other cases the charcoal was analysed to determine fuel selection policies and selection of wood types for structural use. Each species was identified, bagged together and then weighed. The smaller sample amounts with less than 50 fragments were all identified while between 30 and 50 fragments were identified from the larger samples.

3. Results& Analysis

Two charcoal samples were analyzed after all of the samples extracted from the excavation were assessed for suitability. Fragment count was low from all samples assessed and identified (**Table 1 and Figure 1**). Ash wood was present in the two samples from the pits as well as a couple of fragments of blackthorn/cherry.

Charcoal diameters were on average small and measured between 2 and 6 mm and contained between 2 and 5 annual tree rings.

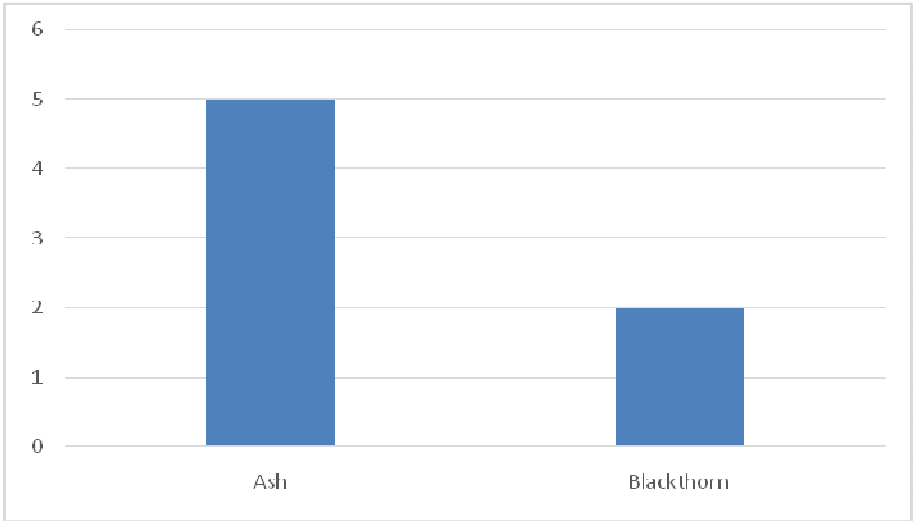


Figure 1 All taxa identified from the charcoal

Sample No.	Context No.	Feature type & Date	Time period	Identification	Amount of fragments	Weight of fragments	Size of fragments	Annual tree rings present	Comment
1	17	Basal fill of pit	Early Bronze Age (2455 – 2143BC)	*Fraxinus excelsior* (ash)	2	0.1	3-5mm	2- 3 rings	
2	23	Basal fill of pit	Early Bronze Age	*Prunus* spp (blackthorn or cherry)	2	0.1	4 - 6mm	3 - 5rings	All identifiable fragments identified.
				Fraxinus excelsior (ash)	3	0.2	2-4mm	2 - 3 rings	

Table 1 Wood taxa present and details on fragments in the charcoal assemblage

4. Discussion of the charcoal assemblage

Woodland resource usage

Very few fragments of charcoal were present and identified from the sample assemblage therefore any conclusions drawn from the analysis is tentative. The charcoal identified from the burnt mound has been dated to the Early Bronze Age period and charcoal identified most likely relates to firewood use at the burnt mound site during this period. The wood types present suggest collection of wood from scrub (blackthorn/cherry) and possibly clear-felled and/or primary woodland areas (ash). These trees must have been present, accessible and utilised during the Early Bronze period at Donabate.

The ash may indicate an opening up of the landscape prior to the use phase of Donabate, Site AA8. Ash has been shown to replace certain woodlands cleared by the first farmers in the Neolithic periods (Caseldine and Hatton 1996). Ash curves in many pollen diagrams are more pronounced from the later Neolithic period through to the late Bronze Age. It was also in these clearings, created by their Neolithic predecessors, that the Bronze Age peoples invariably occupied and built their *fulacht fiadh*.

It is difficult to identify between blackthorn and cherry. The sloe bush, as blackthorn is also known as, is a very durable wood and strong as oak. It is a thorny shrub found in woodland and scrub, on all soil types. In a woodland situation blackthorn and cherries are more likely to occur in clearings and at the woodland edges, where it forms dense thickets. Blackthorn is a slow burning wood with much heat and little smoke and therefore makes good fuel (Rackham 1980).

Blackthorn/cherry and ash was also identified from an Early Bronze Age dated burnt mound site excavated at Ballalease North, AA7 (O'Carroll 2022). Although hazel was also present at Ballalease North the identifications from both sites (Portraine Demesne and Ballalease North) reflect selection of wood from a more open and scrubland environment.

5. Summary and conclusions on the charcoal assemblage

Two charcoal samples were identified from a pit and a possible pit/well. A narrow range of taxa were identified from all samples which included ash and blackthorn/cherry in order of representation.

Wood selection may have been from a more open and previously clear-felled area where ash was common. The blackthorn/cherry would have grown as scrub nearby to the site.

6. Statement of significance and Recommendations for retention

The charcoal samples are significant on a local as well as a regional level. A database of results and charcoal samples from across the whole of Ireland can be cross compared to provide valuable information on Irelands Woodland history and how it changed throughout time. It is recommended that the two samples be retained by the National Museum of Ireland for any future research or dating that may be required from the area.

7. References

Coen, L., 2022, Preliminary excavation report for Portraine Demesne, Site AA8 (21E0676), Donabate, Technical report for Archer Heritage and Glenveagh Living Ltd.

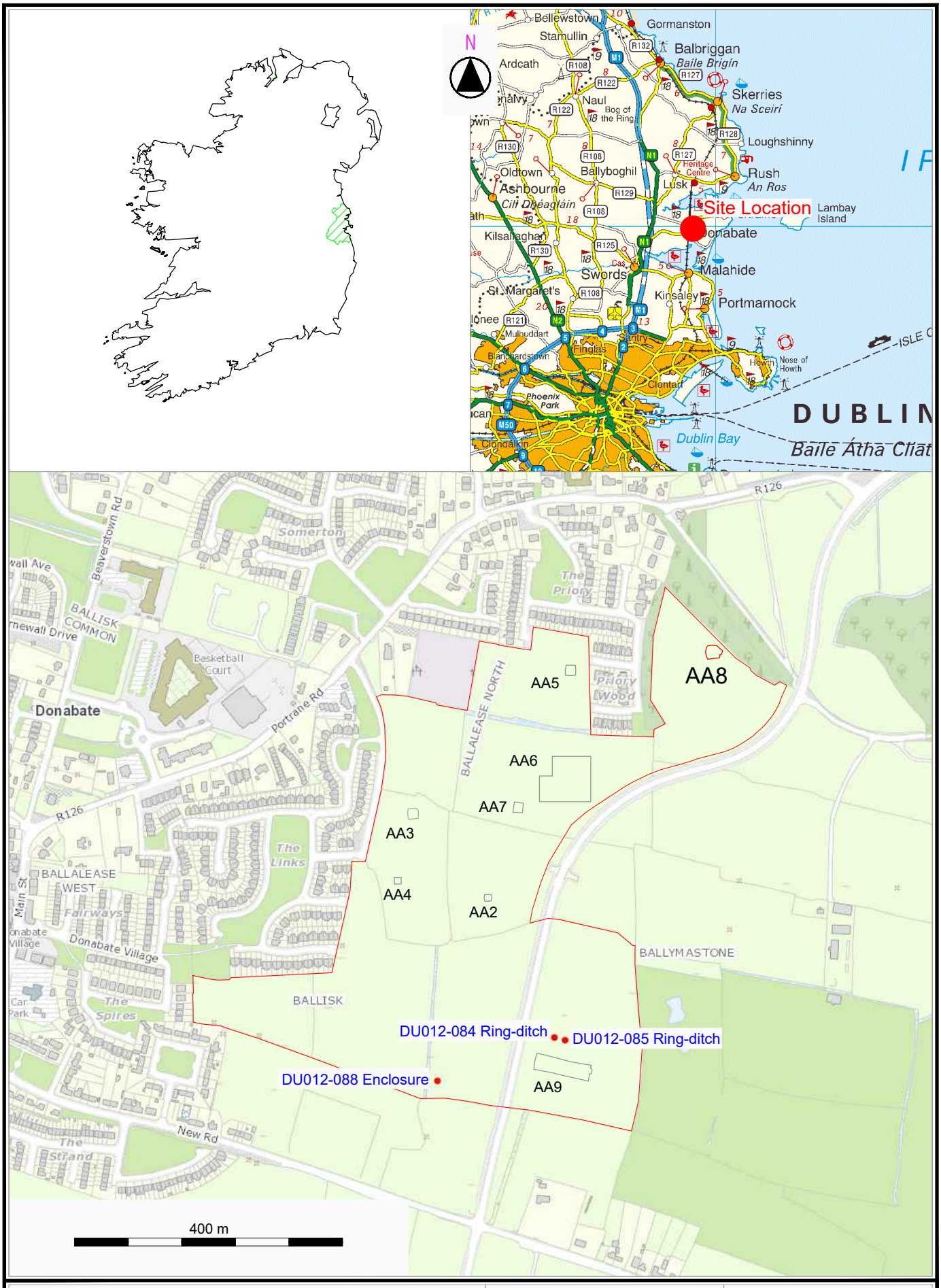
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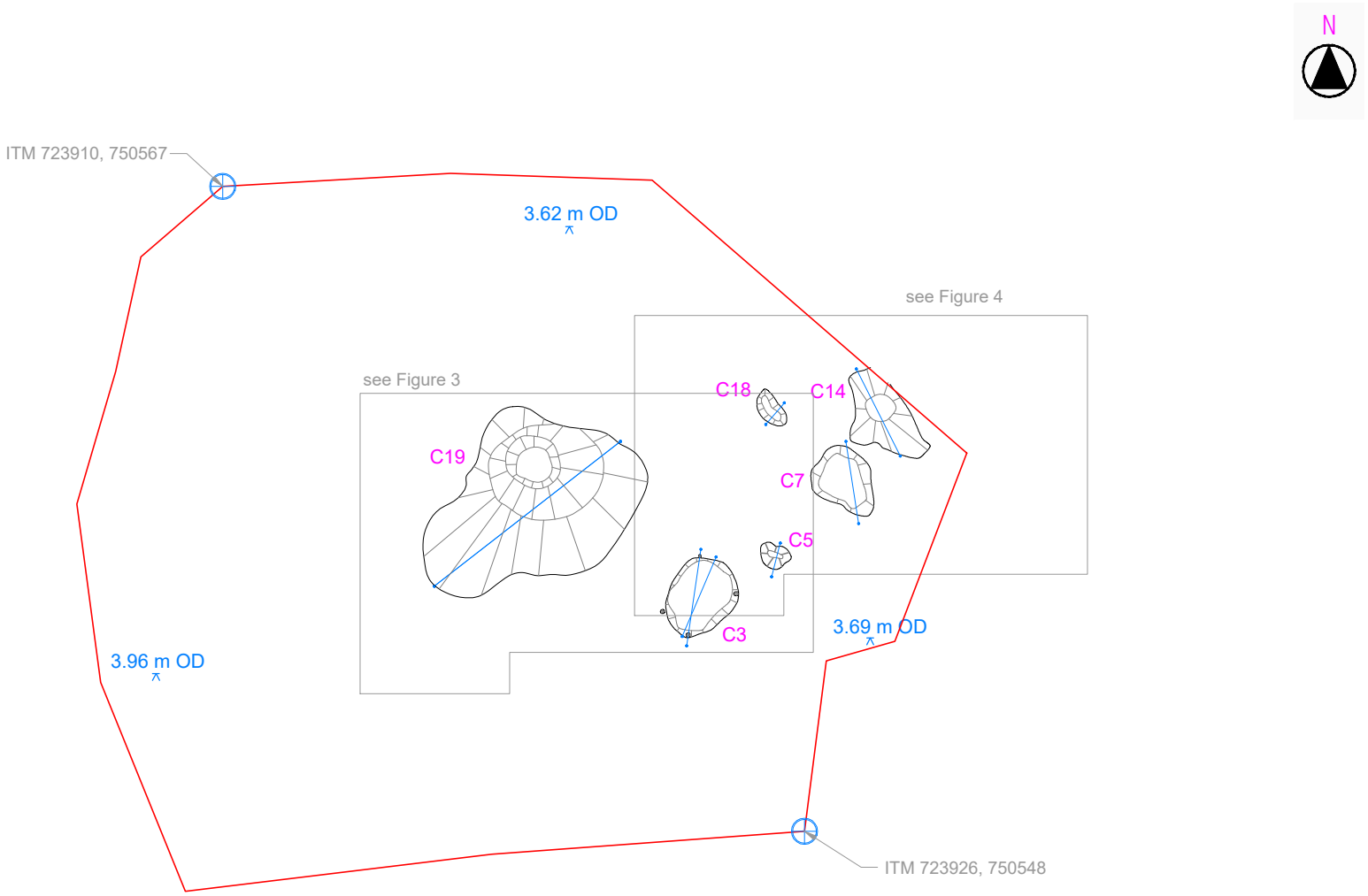
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			Date: January 2022
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			Ref: 2021_43_EX_01

Figure 1: Site location with surrounding archaeology sites



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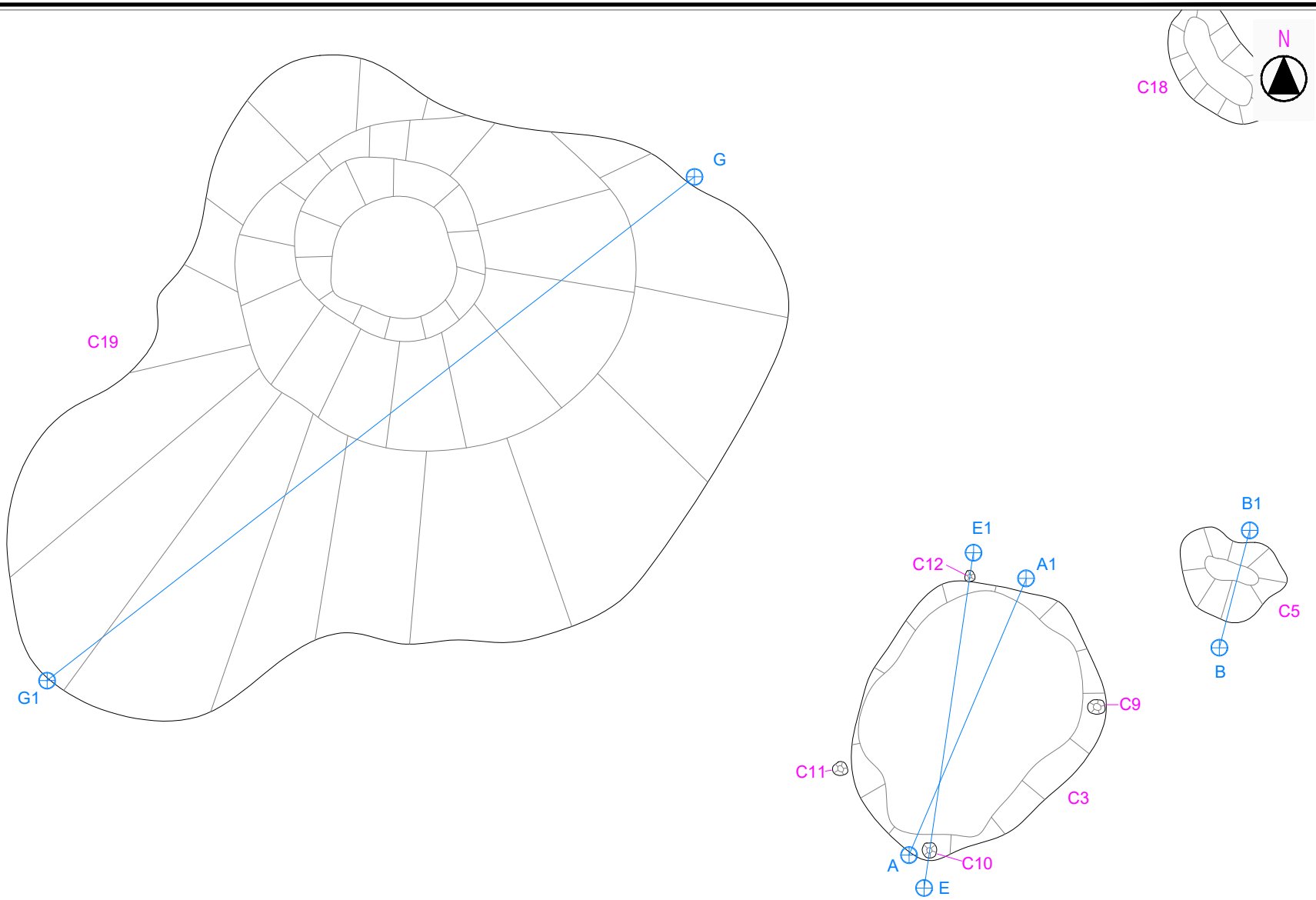
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Figure 2: Post Ex Plan of AA8



2.5

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Figure 3: Detail of features in central area of cuttting

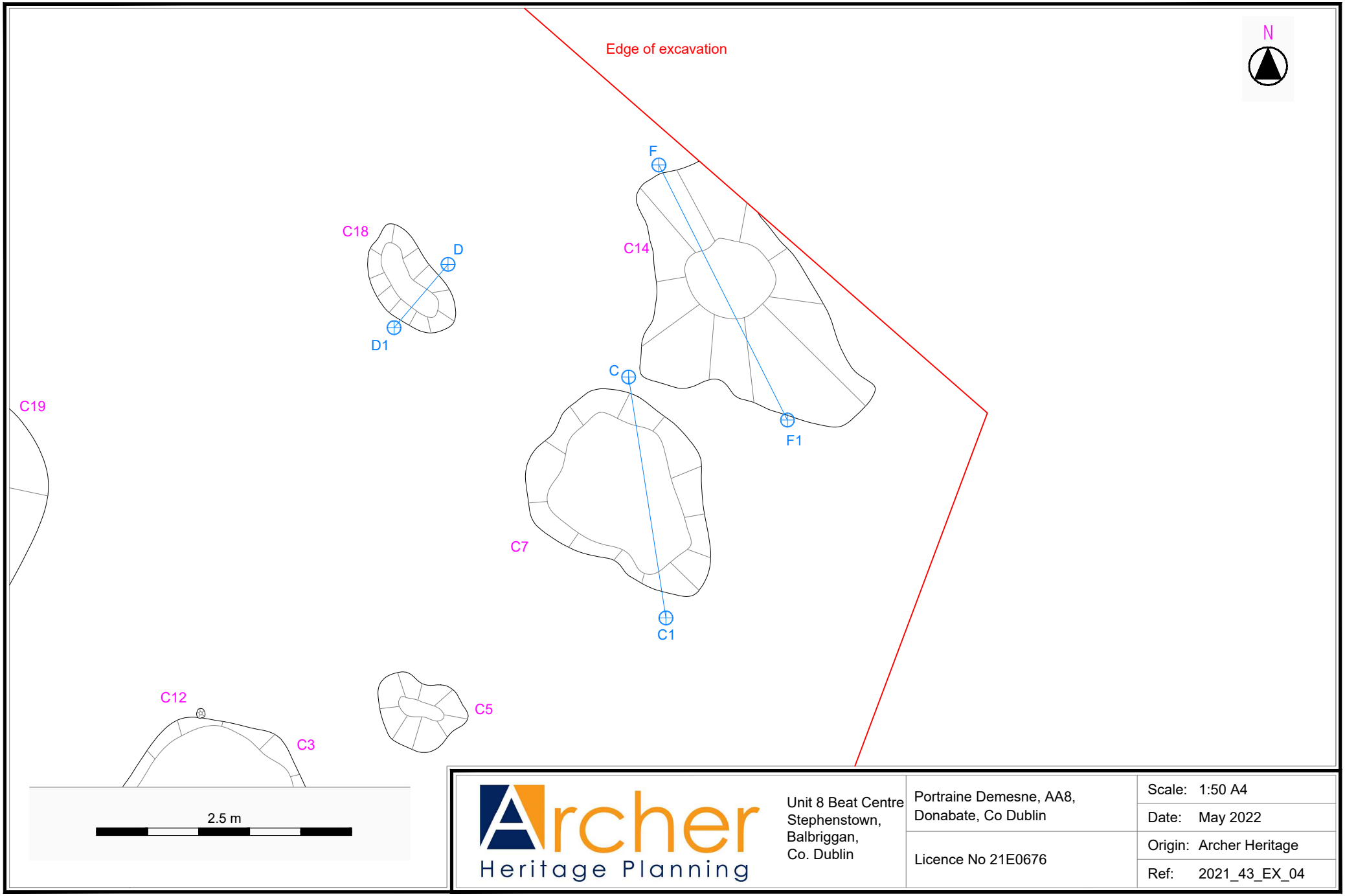
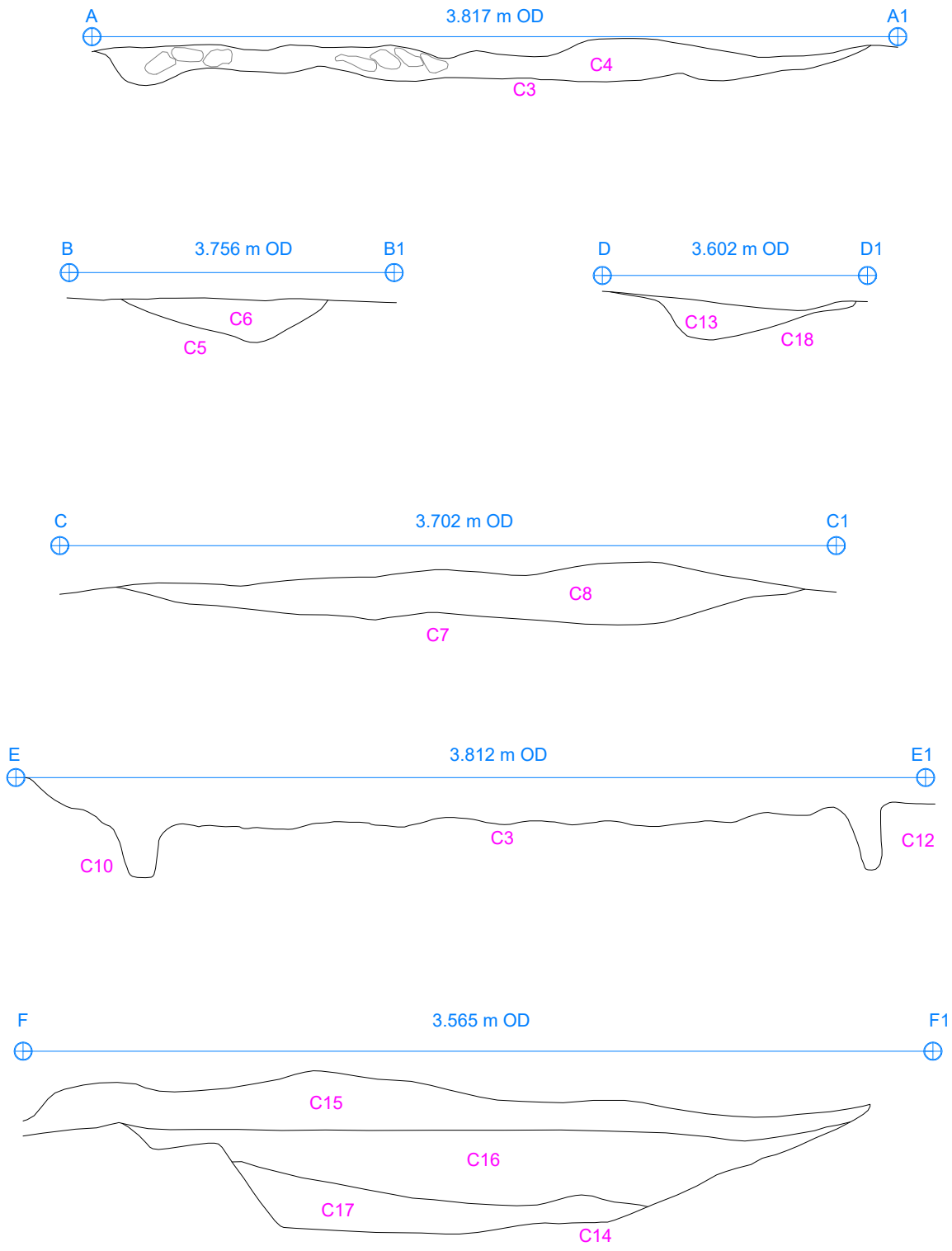
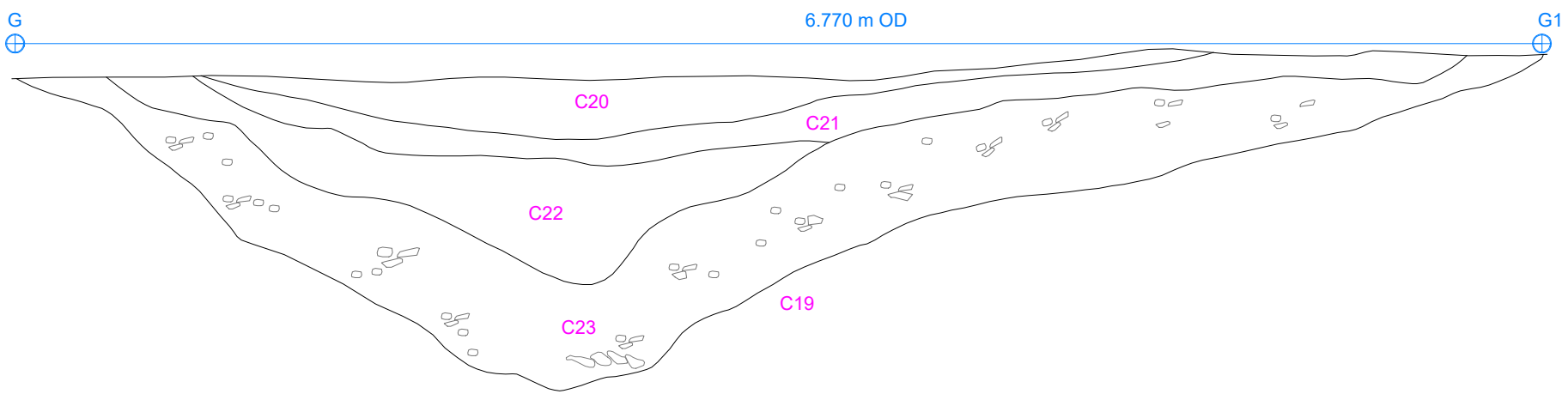


Figure 4: Detail of features in eastern area of cutting



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Figure 5: Section drawings (i)



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Figure 6: Section drawings (ii)

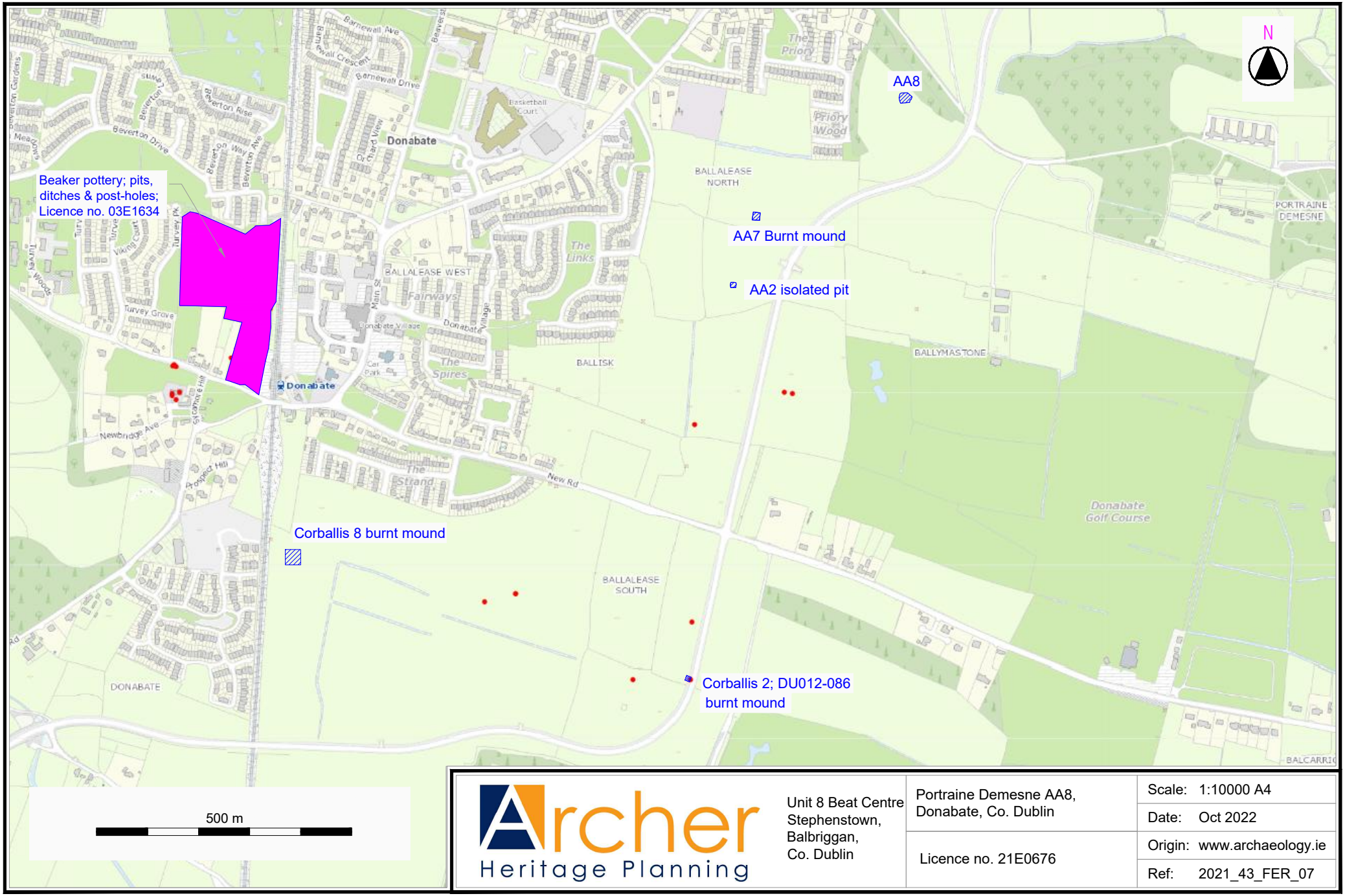
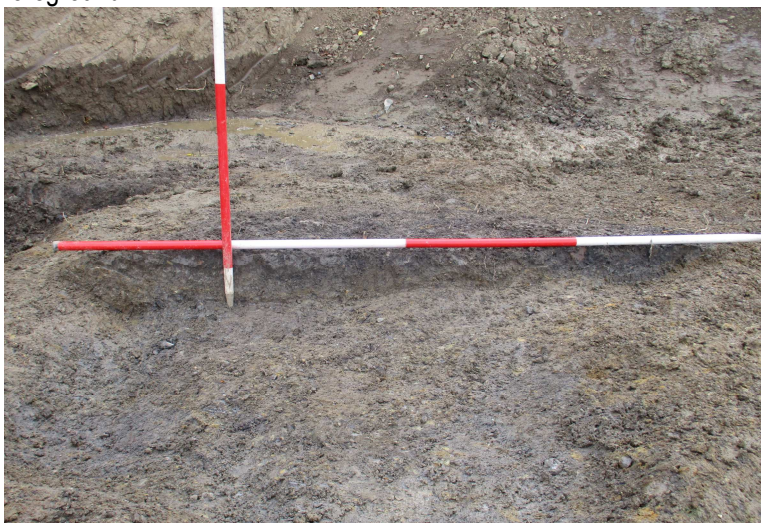


Figure 7: Surrounding Chalcolithic & Early Bronze Age sites


Plate 1: Pre-excavation aerial view of site


Plate 2: SE-facing section A-A1 of pit C03, note corner post-holes in foreground


Plate 3: E-facing section B-B1of pit C05


Plate 4: W-facing section C-C1 of pit C07

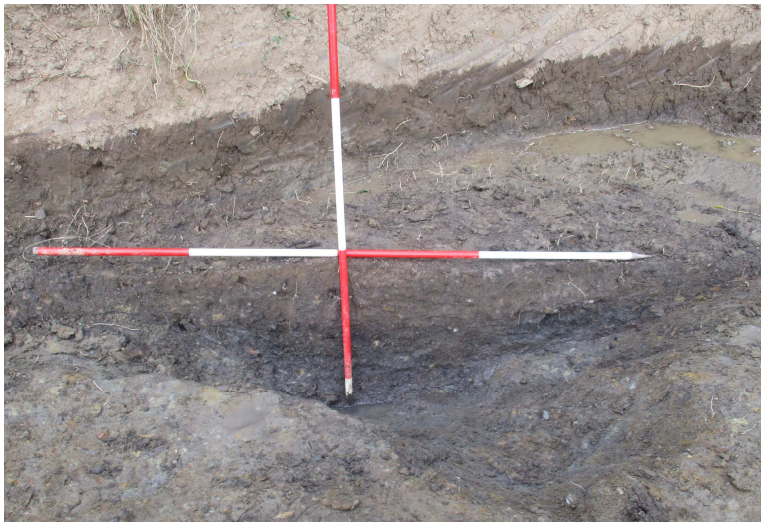

Plate 5: SW-facing section F-F1 of pit C14


Plate 6: NW-facing section D-D1 of pit C18


Plate 7: Post-excavation view of pit C3 with post-holes C9, C10, C11 & C12 looking NE


Plate 8: NW-facing section G-G1 of pit/well C19


Plate 9: Mid-excavation view of deepest point of pit/well C19


Plate 10: Working shot showing excavation of pit/well C19


Plate 11: Post-excavation view of Cutting looking south


Plate 12: Post-excavation view of Cutting looking north-north-east

Appendix 19.1 Resource & Waste Management Plan (RWMP)



Resource & Waste Management Plan

Project Title: Ballymastone Phase 3 Large-Scale Residential Development

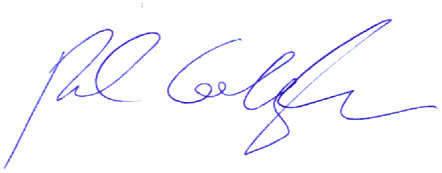
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Glenveagh Living Limited	247501.0318WMR01	07/10/2025

AWN Consulting Ltd, The Tecpro Building, IDA Business & Technology Park, Clonshaugh, Dublin 17, D17 XD90

DOCUMENT CONTROL SHEET

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Original Issue Date	07/10/2025
Client:	Glenveagh Living Limited

Revision	Revision Date	Description

Details	Written by	Approved by
Signature		
Name	Chonaill Bradley	Dr Fergal Callaghan
Title	Associate	Director
Date	07/10/2025	07/10/2025

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This report considers the specific instructions and requirements of our client. It is not intended for third-party use or reliance, and no responsibility is accepted for any third party. The provisions in this report apply solely to this project and should not be assumed applicable to other developments without review and modification.

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1. INTRODUCTION

AWN Consulting, a Trinity Consultants Company, has prepared this Construction and Demolition (C&D) Resource & Waste Management Plan (RWMP) on behalf of Glenveagh Living Limited. The proposed development will consist of the construction of a residential development, which represents Phase 3 of the wider development of the Ballymastone Lands, to accommodate 398 no. residential dwellings, a crèche, community space and public open space. The site will accommodate 316 total no. car parking spaces, 1,619 total no. bicycle parking spaces, new pedestrian/cycle links, road improvements, storage, services and plant areas.

This plan provides information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3],the National Waste Management Plan for a Circular Economy 2024 - 2030 (NWMPCE) (2024) [4]. In particular, this plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also provides appropriate measures in relation to the collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and prescribes measures for the management of different waste streams. The RWMP should be viewed as a live document and will be regularly revisited throughout the project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible.

2. OVERVIEW OF WASTE MANAGEMENT IN IRELAND

National level

The Irish Government issued a policy statement in September 1998, *Changing Our Ways* [5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2018).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, *'A Waste Action Plan for a Circular Economy'* [7] (WAPCE), replaces the previous national waste management plan, *"A Resource Opportunity"* (2012), and was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less'* (2021) [8] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years. There has been not update released at the time of the authoring of this RWMP.

The *Circular Economy and Miscellaneous Provisions Act 2022* [9] was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will work to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

The Environmental Protection Agency (EPA) of Ireland issued 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' in November 2021 [10]. These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006 [11]. The guidelines provide a practical approach

which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Design teams roles and approach;
- Relevant EU, national and local waste policy, legislation and guidelines;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for Resource Waste Manager (RM) and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a bespoke RWMP for developments. The guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development, which require a simplified RWMP:

- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.
- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m^2; and
- Demolition projects generating in total less than 100m^3 in volume of C&D waste.

A development which exceeds one or more of these thresholds is classed as Tier-2 development.

This development requires a RWMP as a Tier 3 development as it is above following criterion:

- New residential development of less than 10 dwellings.

The Department of Housing, Local Government and Heritage authored *Sustainable Residential Development and Compact Settlements - Guidelines for Planning Authorities (2024)* [12]. *Suggest the below thresholds at which the need for supplemental information such as the RWMP should be considered.*

- 30 or more residential units,

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [13], published by FÁS and the Construction Industry Federation in 2002 and the previous guidelines, 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

Regional Level

The proposed development is located in the Local Authority area of Fingal County Council (FCC).

The Eastern Midlands Region (EMR) Waste Management Plan 2015 – 2021, which previously governed waste management policy in the FCC area, has been superseded as of March 2024 by the NWMPCE 2024 – 2030, the national waste management plan for Ireland.

The NWMPCE does not dissolve the three regional waste areas. The NWCPCE sets the ambition of the plan to have a 0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector.

This Plan seeks to influence sustainable consumption and prevent the generation of waste, improve the capture of materials to optimise circularity and enable compliance with policy and legislation.

The national plan sets out the following strategic targets for waste management in the country that are relevant to the development:

National Targets

1B. (Construction Materials) 12% Reduction in Construction & Demolition Waste Generated by 2030.

3B. (Reuse Facilities) Provide for reuse at 10 Civic Amenity Sites, minimum

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €140 - €160 per tonne of waste which includes an €85 per tonne landfill levy introduced under the *Waste Management (Landfill Levy) (Amendment) Regulations 2015 (as amended)* [14]*. The Circular Economy (Waste Recovery Levy) Regulations 2024* [15] will also incur a levy of €10 per tonne for waste accepted for recovery. This will include backfilling at authorised recovery sites and at municipal waste landfills.

The *Fingal Development Plan 2023 – 2029* [16] (2023) sets out a number of objectives for the Fingal region in line with the objectives of the national waste management plan, including the following:

- *Objective **DMSO241** - Construction and Demolition Waste Management Plan - Require that Construction Waste Management Plans be submitted as part of any planning application for projects in excess of any of the following thresholds:*
  - *New residential development of 10 units or more.*
  - *New developments other than above, including institutional, educational, health and other public facilities, with an aggregate floor area in excess of 1,250 sqm.*
  - *Renovation / refurbishment projects generating in excess of 100m3 in volume of construction waste.*
  - *Civil engineering projects in excess of 500m3 of waste materials used for development of works on the site.*

Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the development are:

- *Waste Management Act 1996 as amended;*
- *Environmental Protection Agency Act 1992 as amended;*
- *Litter Pollution Act 1997 as amended;*
- *Planning and Development Act 2000 as amended* [17]*;*
- *Circular Economy and Miscellaneous Provisions Act 2022.*

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996* as amended and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the Developer ensures that the waste contractors engaged by demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 as amended* or a Waste Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site

3. DESIGN APPROACH

The client and the design team have integrated the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality, buildability, second life and management post demolition and construction. Further details on these design principals can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials. The below sections have been the focal point of the design process and material selections and will continued to be analysed and investigated throughout the design process and when selecting material.

As noted in the EPA guidelines, the approaches presented are based on international principles of optimizing resources and reducing waste on construction projects through:

- *Prevention;*
- *Reuse;*
- *Recycling;*
- *Green Procurement Principles;*
- *Off-Site Construction;*
- *Materials Optimisation; and*
- *Flexibility and Deconstruction.*

Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the Client and Design Team considered:

- Establishing the potential for any reusable site assets (buildings, structures, equipment, materials, soils, etc.);
- The potential for refurbishment and refit of existing structures or buildings rather than demolition and new build;
- Assessing any existing buildings on the site that can be refurbished either in part or wholly to meet the Client requirements; and
- Enabling the optimum recovery of assets on site.

Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The Design Team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. They will also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as 'Just-in-Time' delivery and use ordering procedures that avoid excessive waste. The Green procurement extends from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.;
  - Modular buildings are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.;
- The use of prefabricated composite panels for walls and roofing to reduce residual volumes of insulation and plasterboards;
- Using pre-cast hollow-core flooring instead of in-situ ready mix flooring or timber flooring to reduce the residual volumes of concrete/formwork and wood/packaging, respectively; and
- Designing for the preferential use of offsite modular units.

Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite as outlined in section 3.1, structures should be designed with the intent of designing out waste. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture.

Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including buildings) only contain materials that can be recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4. DESCRIPTION OF THE DEVELOPMENT

Location, Size and Scale of the Development

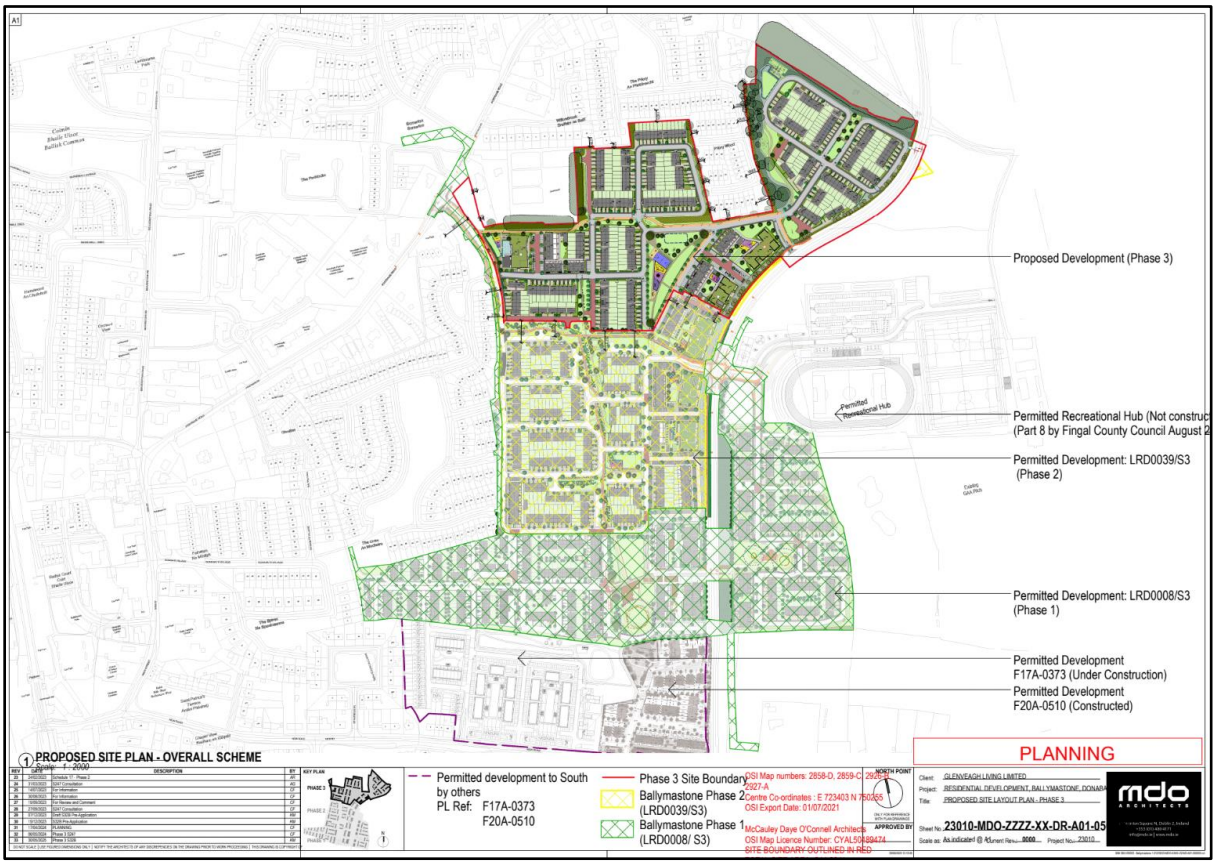
Glenveagh Living Limited, intend to apply for permission for a Large-Scale Residential Development (LRD) at this site at Ballymastone, Donabate, County Dublin. The application site, of c. 11.28ha, is bounded by existing residential developments of Willowbrook, The Priory and Priory Wood, and Donabate Burial Ground to the north/northwest, the Donabate Distributor Road (DDR) to the east, permitted Ballymastone Phase 2 (FCC. Ref. LRD0039/S3 & ABP Ref. 320885) to the south, and the Links Road to the west. A portion of the subject site is within the St. Ita's Hospital Complex Architectural Conservation Area (ACA).

The proposed development will consist of the construction of a residential development, which is a continuation of permitted Ballymastone Phase 1 lands (FCC Ref. LRD0008/S3 & ABP Ref. 315288) and Phase 2 lands (FCC. Ref. LRD0039/S3 & ABP Ref. 320885) and represents Phase 3 of the wider development of the Ballymastone Lands (as identified in the Donabate Local Area Plan 2016 (as extended)), ranging in height from 2- to 6-storeys to accommodate 398 no. residential dwellings (227 no. houses, 47 no. duplex units and 124 no. apartments) and public open space. The site will accommodate 316 total no. car parking spaces, 1,619 total no. cycle parking spaces, pedestrian / cycle links, road connectivity enhancements, storage, services and plant areas. Landscaping will include significant public open space provision and communal amenity areas. The proposed development consists of:

- The construction of 398 no. new residential dwellings consisting of 227 no. houses, 47 no. duplex units and 124 no. apartment units set out follows:
  - Construction of 227 no. 2-storey houses (81 no. 2-beds, 134 no. 3-beds, 12 no. 4-beds).
  - Construction of 47 no. 2- to 3-storey duplex units (2 no. 1-beds, 24 no. 2-beds, 21 no. 3-beds), with balconies on rear elevations.
  - Construction of 3 no. apartment blocks, ranging from 3- to 6-storeys in height, with balconies on all elevations, green roofs, and external communal amenity spaces, providing a total of 124 no. apartment units (47 no. 1-beds, 68 no. 2-beds, 9 no. 3-beds);

- Provision of a crèche (c. 646 sq.m) and a community space (c. 100 sq.m) located within the footprint of proposed apartment block to the west of the site;
- Provision of c. 15.3% public open space of the net site area, comprising 3 no. small parks and 4 no. pocket parks which total c. 17,287 sq.m. These parks are generally located centrally within the site providing a series of north-south linear spaces linking to the permitted Ballymastone Phase 2 (FCC Reg. Ref. LRD0039/S3 & ABP Reg. Ref. 320885) with onward connection to the permitted Ballymastone Phase 1 (FCC Reg. Ref. LRD0008/S3 and ABP Reg. Ref. 315288) to the south;
- Provision of a total of 316 no. car parking spaces are provided (combination of in-curtilage and on-street and communal car parking areas);
- Delivery of a total of 1,619 no. cycle spaces (comprising 1,513 no. long-stay/resident spaces and 106 no. short-stay/visitor spaces);
- Provision of vehicular access from The Links road to the west of the site and the Donabate Distributor Road (DDR) to the east of the site;
- Provision of an east-west pedestrian/cycle route is proposed within the site connecting the existing Links Road to the west and DDR to the east, in addition to a connection to the permitted east/west pedestrian/cycle route which forms part of the permitted Ballymastone Phase 2 (FCC. Ref. LRD0039/S3 & ABP Ref. 320885);

- The proposed application includes all site enabling and site development works, infrastructure and utilities, landscaping works and boundary treatments (including at the permitted foul pump station as per FCC Reg. Ref. LRD0039/S3 & ABP Reg. Ref. 320885), solar PV panels, bin and bicycle stores, plant, ESB unit substations, lighting, servicing, signage, surface water attenuation features and all site development works above and below ground.



4.1 Proposed Site Layout (23010-MDO-ZZZZ-XX-DR-A01-050000)



4.2 Proposed Site Layout Planning Zone 4 (23010-MDO-ZZZZ-XX-DR-A01-050004)



4.3 Proposed Site Layout Planning Zone 5 (23010-MDO-ZZZZ-XX-DR-A01-050005)

Details of the Non-Hazardous Wastes to be Produced

There will be no waste materials generated from the demolition as there is no demolition associated with the proposed development.

There will be soil, stones and clay excavated to facilitate construction of new foundations, underground services, and the installation of the proposed basements. The development engineers (DBFL) have estimated that c. 85,700m^3 of material will need to be excavated to do so. It is currently envisaged that all the excavated material will be able to be retained and reused onsite for landscaping and fill. If any material is deemed to be unsuitable for reuse onsite, it will need to be removed offsite for appropriate offsite reuse, recovery, recycling and / or disposal.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals and tiles generated. There may also be excess concrete during construction which will need to be disposed of. Plastic and cardboard waste from packaging and supply of materials will also be generated. The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on site during the construction phase. Waste printer / toner cartridges, waste

electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

Potential Hazardous Wastes Arising

Contaminated Soil

Site investigations and environmental soil testing were undertaken by Ground Investigations Ireland (GII) in February and August 2022.

A number of samples were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as hazardous or non-hazardous. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.

The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.

A site waste classification report was prepared by GII in July 2022.

In total, one hundred (100 No.) samples were assessed using the HazWasteOnLine™ Tool. All samples were classified as being non-hazardous. The complete HazWasteOnLine™ report for all samples is included in Appendix 4 of the waste classification report.

If any potentially contaminated material is encountered, it will need to be segregated from clean / inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [17] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [18], which establishes the criteria for the acceptance of waste at landfills.

In accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [18] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [19], which establishes the criteria for the acceptance of waste at landfills.

Asbestos fibres were not detected in the samples. The laboratory did not identify asbestos containing materials (ACMs) in the samples.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010 and the Best Practice Guidance for Handling Asbestos (2023)* [20]. All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify FCC and provide a Hazardous / Contaminated Soil

Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel / oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel / oil waste generated at the site.

Invasive Plant Species

An invasive species survey including a site walkover of the entire site, and around part of the outside perimeter to search for any invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) was carried out by the project ecologist (Brady Shipman Martan) in April 2024 and September 2025.

Plant species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended), such as Japanese knotweed (Reynoutria japonica), giant hogweed (Heracleum mantegazzianum), Himalayan balsam (Impatiens glandulifera) or three-cornered leek (Allium triquetrum), were not recorded during the field surveys, including in 2025.

Asbestos

As there is no demolition associated with the development it is unlikely that there will be asbestos or ACMs located onsite. In the unlikely event that asbestos or ACMs are located onsite, removal will be carried out by a suitably qualified contractor and ACMs will only be removed from site by a suitably permitted / licenced waste contractor, in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010 and the Best Practice Guidance for Handling Asbestos (2023).* All material will be taken to a suitably licensed or permitted facility.

Other Known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner / cartridges, batteries (Lead, Ni-Cd or Mercury) and / or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5. ROLES AND RESPONSIBILITIES

The *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* promotes that a suitably qualified Resource Manager (RM) with expertise in waste and resource management to implement the RWMP should be appointed. The RM may be performed by number of different individuals over the life-cycle of the Project, however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction and demolition methodology that is designed to facilitate maximum reuse and/or recycling of waste.

Role of the Client

The Client are the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of this RWMP as part of the design and planning submission;
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process;
- The Client will ensure that the RWMP is agreed on and submitted to the local authority and their agreement obtained prior to commencement of works on site;
- The Client will request the end-of-project RWMP from the Contractor.

Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This will also include data on waste types (e.g. waste characterisation data, contaminated land assessments, site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;
- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development, in a similar fashion to how the safety file is handed over to the Contractor;
- Working with the Contractor as required to meet the performance targets for the project.

Future Role of the Contractor

The future construction Contractors have not yet been decided upon for this RWMP. However, once select they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the RWMP throughout the excavation and construction phases (including the management of all suppliers and sub-contractors) as per the requirements of the EPA guidelines;
- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP;
- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site;
- Implementing waste management policies whereby waste materials generated on site are to be segregated as far as practicable;
- Renting and operating a mobile-crusher to crush concrete for temporary reuse onsite during construction and reduce the amount of HGV loads required to remove material from site;
- Applying for the appropriate waste permit to crush concrete onsite;
- Identifying all destinations for resources taken off-site. As above, any resource that is legally classified as a 'waste' must only be transported to an authorised waste facility;
- End-of-waste and by-product notifications addressed with the EPA where required;
- Clarification of any other statutory waste management obligations, which could include on-site processing;
- Full records of all resources (both wastes and other resources) will be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

6. KEY MATERIALS & QUANTITIES

Project Resource Targets

Project specific resource and waste management targets for the site have not yet been set and this information will be updated for these targets once these targets have been confirmed by the client. However, it is expected for projects of this nature that a minimum of 70% of waste is fully re-used, recycled or recovered. Target setting will inform the setting of project-specific benchmarks to track target progress. Typical Key Performance Indicators (KPIs) that will be used to set targets include (as per guidelines):

- Weight (tonnes) or Volume (m3) of waste generated per construction value;
- Weight (tonnes) or Volume (m3) of waste generated per construction floor area (m2);
- Fraction of resource reused on site;
- Fraction of resource notified as by-product;
- Fraction of waste segregated at source before being sent off-site for recycling/recovery; and
- Fraction of waste recovered, fraction of waste recycled, or fraction of waste disposed.

Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in **Error! Reference source not found.**. The L ist of Waste (LoW) code (2018) for each waste stream is also shown.

Table 6.1 Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)

Waste Material	LoW Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

* Individual waste type may contain hazardous substances

Demolition Waste Generation

There is no demolition associated with the proposed development and as such there is no demolition waste to be produced as part of the proposed development.

Construction Waste Generation

Table 6.2 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports* [21] *and the joint EPA & GMIT study* [22].

Table 6.2 Waste materials generated on a typical Irish construction site

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	100

Table 6.3, below, shows the estimated construction waste generation for the proposed Project based on the gross floor area of construction and other information available to date, along with indicative targets for management of the waste streams. The estimated amounts for the main waste types (with the exception of soils and stones) are based on an average large-scale development waste generation rate per m^2, using the waste breakdown rates shown in Table 6.2. These have been calculated from the schedule of development areas provided by the architect.

Table 6.3 Predicted on and off-site reuse, recycle and disposal rates for construction waste

Waste Type	Tonnes	Reuse		Recycle / Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	834.6	10	83.5	80	667.6	10	83.5
Timber	708.1	40	283.2	55	389.5	5	35.4
Plasterboard	252.9	30	75.9	60	151.7	10	25.3
Metals	202.3	5	10.1	90	182.1	5	10.1
Concrete	75.9	30	22.8	65	49.3	5	3.8
Other	379.3	20	75.9	60	227.6	20	75.9
Total	**2453.1**		**551.3**		**1667.8**		**233.9**

In addition to the waste streams in Table 6.4 There will be soil, stones and clay excavated to facilitate construction of new foundations, underground services, and the installation of the proposed basements. The development engineers (DBFL) have estimated that c. 85,700m^3 of material will need to be excavated to do so. It is currently envisaged that all the excavated material will be able to be retained and reused onsite for landscaping and fill. If any material is deemed to be unsuitable for reuse onsite, it will need to be removed offsite for appropriate offsite reuse, recovery, recycling and / or disposal.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

Proposed Resource and Waste Management Options

Waste materials generated will be segregated on-site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source, where feasible. All waste receptacles leaving the site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the Dublin region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

National End-of-Waste Decision EoW-N001/2023 (Regulation 28) published by the EPA in September 2023, establishes criteria determining when recycled aggregate resulting from a recovery operation ceases to be waste. Material from this proposed development will be investigated to see if it can cease to be a waste under the requirements of the National End of Waste Criteria for Aggregates.

During construction, some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (per Article 30 (1) (b) of the Waste Collection Permit Regulations 2007, as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste off-site in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s), detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR / permit / licence for the receiving waste facility for all waste removed off-site for appropriate reuse, recycling, recovery and / or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, chemicals, if required.

The anticipated management of the main waste streams is outlined as follows:

Soil, Stone and Clay

The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

If material is removed off-site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Regulation 27 of the European Communities (Waste Directive) Regulations 2011, as amended, which requires that certain conditions are met and that

by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Regulation 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Regulation 27. Regulation 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the Waste Framework Directive (Directive 2008/98/EC), the *Waste Management Act 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock

While it is not envisaged that bedrock will be encountered, if bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off-site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from FCC.

Silt & Sludge

During the construction phase, silt and petrochemical interception will be carried out on run-off and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed off-site.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and will be recycled, where possible. If concrete is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from FCC.

Hard Plastic

As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber

Timber that is uncontaminated, i.e. free from paints, preservatives, glues, etc., will be disposed of in a separate skip and recycled off-site.

Metal

Metals will be segregated, where practical, and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard

There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the construction phases will be stored in a separate skip, pending collection for recycling. The site Manager will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass

Glass materials will be segregated for recycling, where possible.

Waste Electrical & Electronic Equipment (WEEE)

Any WEEE will be stored in dedicated covered cages / receptacles / pallets pending collection for recycling.

Other Recyclables

Where any other recyclable wastes, such as cardboard and soft plastic, are generated, these will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste

C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip / receptacle will be examined by a member of the waste team (see Section 8) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Asbestos Containing Materials

Any asbestos or ACM found on-site will be removed by a suitably competent contractor and disposed of as asbestos waste before the demolition works begin. All asbestos removal work or encapsulation work must be carried out in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.*

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and / or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

On-Site Crushing

It is currently not envisaged that the crushing of waste materials will occur on-site. However, if the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained

from FCC and the destination of the accepting waste facility or if an application under regulation 28 will be made using National End-of-Waste Decision EoW-N001/2023, will be supplied to the FCC waste unit.

It should be noted that until a construction contractor is appointed it is not possible to provide information on the specific destinations of each construction waste stream. Prior to commencement of construction and removal of any waste offsite, details of the proposed destination of each waste stream will be provided to FCC by the project team.

Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by a weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project RM (see Section 8).

All movement of waste and the use of waste contractors will be undertaken in accordance with the Waste Framework Directive (Directive 2008/98/EC), the *Waste Management Act 1996* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project RM (see Section 8) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR / permit or EPA Waste Licence for that site will be provided to the nominated project Waste Manager (see Section 8). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from DCC (as the relevant authority on behalf of all Local Authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences, etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on-site.

7. ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is outlined below. The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

Reuse

By reusing materials on site, there will be a reduction in the transport and recycle / recovery / disposal costs associated with the requirement for a waste contractor to take the material off-site. Clean and inert soils, gravel, stones, etc., which cannot be reused on-site may be used as access roads or capping material for landfill sites, etc. This material is often taken free of charge or at a reduced fee for such purposes, reducing final waste disposal costs.

Recycling

Salvageable metals will earn a rebate, which can be offset against the costs of collection and transportation of the skips.

Clean, uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber, from a site than mixed waste.

Disposal

Landfill charges are currently at around €140 - €160 per tonne which includes a €85 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015* as amended. In addition to disposal costs, waste contractors will also charge a collection fee for skips. *The Circular Economy (Waste Recovery Levy) Regulations 2024* will also incur a levy of €10 per tonne for waste accepted for recovery. This will include backfilling at authorised recovery sites and at municipal waste landfills.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc., is also used as fill / capping material, wherever possible.

8. TRAINING PROVISIONS

A member of the construction team will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the C&D phases of the development.

Resource Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The RM will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this RWMP.

Site Crew Training

Training of site crew in relation to waste is the responsibility of the RM and, as such, a waste training program will be organised. A basic awareness course will be held for all site crew to outline the RWMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

9. TRACKING AND TRACING / RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

A waste tracking log will be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver will stop at the site office and sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel will complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- LoW
- Weight/Quantity
- Receiving waste site COR/Permit/License number

The waste vehicle will be checked by security personal or the RM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the RM on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the FCC Waste Regulation Unit when requested.

Each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required. These subcontractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times and will be periodically reviewed by the RM. Subcontractors who have engaged their own waste contractors, will provide the main contractor with a copy of the waste collection permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

10. OUTLINE WASTE AUDIT PROCEDURE

Responsibility for Waste Audit

The appointed RM will be responsible for conducting a waste audit at the site during the C&D phase of the proposed Project. Contact details for the nominated RM will be provided to the FCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site will be undertaken mid-way through the construction phase of the proposed Project.

If waste movements are not accounted for, the reasons for this will be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. 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.

Upon completion of the C&D 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.

11. CONSULTATION WITH RELEVANT BODIES

Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the FCC Waste Regulation Unit.

FCC will also be consulted, as required, excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off-site, and the recycling / reclamation process each material will undergo off-site.

12. SUMMARY AND CONCLUSION

Adherence to this plan will also ensure that waste management during the construction phase at the proposed development is carried out in accordance with the requirements in the EPA's Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects and the FCC Waste Bye-Laws and the NWMPCE.

13. REFERENCES

1. Waste Management Act 1996 as amended,
2. Environmental Protection Agency Act 1992 as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Regional Waste Management Planning Offices, *The National Waste Management Plan for a Circular Economy 2024 – 2030 (2024).*
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
7. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept 2020).
8. DCCAE, *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less'* (2021)
9. Circular Economy and Miscellaneous Provisions Act 2022.
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11. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
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13. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and site Managers* (2002).
14. Waste Management (Landfill Levy) Regulations 2015 (as amended)
15. Circular Economy (Waste Recovery Levy) Regulations 2024
16. Fingal County Council (FCC), *Fingal County Development Plan 2023 – 2029* (2023).
17. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
18. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2018)
19. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
20. Local Government Ireland, *Best practice guidance for handling asbestos (2023)*
21. Environmental Protection Agency (EPA), National Waste Database Reports 1998 – 2020 and the Circular Economy and National Waste Database Report 2021 – 2022 (2024)
22. EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015).

WASTE FACILITIES IN THE DUBLIN AREA

A full list of currently licensed waste facilities that can potentially be used for this development can be found on the National Waste Collection Permit Office Website - https://facilityregister.nwcpo.ie/.

Authorisation Reference	Name	Trading As	Address
WFP-DC-20-0054-01	Shanowen Plant Hire Ltd - Mobile Plant		Various Sites Various Sites Various Sites
WFP-DC-20-0053-01	Loftus Demolition & Recycling Ltd - Mobile PLant		Various Sites Various Sites Various Sites Various Sites
WFP-DC-20-0055-01	Padraig Thornton Waste Disposal Ltd	Thornton's Recycling	Unit S3A Henry Road Park West Business Park Dublin 12
WFP-DC-09-0015-03	Chevron Environmental Ltd	Electronic Recycling	Unit 20 Jamestown Business Park Jamestown Road Finglas D11 X2HN
WFP-DC-11-0023-03	Padraig Thornton Waste Disposal Ltd (PTWDL)	Thornton's Recycling	Unit 6 S3B Henry Road Park West Business Park D12 KT91
COR-DC-21-0010-01	Fridge Spares Wholesale Ltd		Unit 15, Blackwater Road Dublin Industrial Estate Glasnevin Dublin 11 D11 YK26
WFP-DC-11-0022-03	Dawnlane Limited	Mullen Scrap	31 & 32 Upper Clanbrassil Street Dublin 8 D08 XY92
WFP-DC-11-0025-03	Rehab Enterprises Limited	Rehab Recycle	The Rehab Building Kylemore Road Ballyfermot Dublin 10 D10 Y443
WFP-DC-11-0027-03	Tom Murphy Recovery & Towing Services Ltd		Block 4, Unit 24 Port Tunnel Business Park Clonshaugh Industrial Estate Dublin 17
WFP-DC-22-0059-01	Derek Beahan Limited	Derek Beahan Recovery	Unit 7 Concorde Industrial Estate Naas Road Dublin 12 D12 YD30
COR-DC-22-0011-01	Soaktech Limited		Unit 16, Butterly Business Park Kilmore Road Artane Dublin 5, D05 X079

Authorisation Reference	Name	Trading As	Address
WFP-DC-22-0060-01	Edward O'Reilly	E.O'Reilly Recycling	92E Fairview Strand Ballybough Dublin 3
WFP-DC-10-0021-04	Padraig Thornton Waste Disposal Ltd	Thornton's Recycling	Unit 51 Henry Road Park West Business Park Dublin 12 D12 FH68
WFP-DC-11-0028-03	Mitchell Taylor (Exports) Limited	MT oils	The Old Brewery Newmarket Dublin 8 D08 FPF6
WFP-DC-18-0045-02	J. Ryan Haulage Limited - Mobile Plant		Former Bailey Gibson Site 326-328 South Circular Road Dublin 8 D08 N8X6
WFP-DC-10-0018-03	Summerhill Spares Limited		Unit 3 Newtown Industrial Estate Malahide Road Coolock Dublin 17 D17 VY80
WFP-DC-10-0020-03	Everyday Waste & Skiphire	All Away Recycling	84E Pigeon House Road Ringsend Dublin 4 D04 R7N0
WFP-DC-23-0061-01	Wills Bros Limited		Terminal 4 North Lands, Dublin Port (bounded by Bond Road, Tolka Quay Road & Promenade Road) Dublin 1
WFP-DC-24-0062-01	Tinnelly Group	John Tinnelly & Sons Ireland Limited	Unit 5B, Unit 5H Fingal Bay Business Park Co. Dublin K32 NY57
WFP-DC-24-0063-01	Micks Recycling Limited	Micks Skips	Unit 3a Ballyboggan Business Centre Glasnevin Dublin 11
WFP-DC-19-0048-02	Sunflower Recycling Company (Limited by Guarantee)		Shamrock Terrace Five Lamps, North Strand Dublin 1 D01 DX67
WFP-DC-08-0002-04	G & T McGoverns Ltd		2-4, 9 & 12 Prices Lane Rear 31 Ranelagh Road Ranelagh Dublin 6
WFP-DC-22-0056-01 (T)	Dembachel Ltd.		Kylemore Business Park 2 Kylemore Way Inchicore Dublin 8
WFP-DC-25-0064-01	Martin Services (Industrial) Ltd		Unit 10/11 Bluebell Business Park Bluebell, Old Naas Road Dublin 12 D12 W995

Appendix 19.2 Operational Waste Management Plan (OWMP)

REPORT



Trinity Consultants

awnconsulting

Operational Waste Management Plan

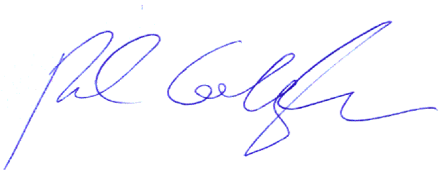
Project Title: Ballymastone Phase 3 Large-Scale Residential Development

CLIENT	DOCUMENT REFERENCE	DATE
Glenveagh Living Limited	247501.0318WR02	15/10/2025

DOCUMENT CONTROL

Document Control Sheet	
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Revision	Revision Date	Description

Details	Written by	Approved by
Signature		
Name	Chonaill Bradley	Dr Fergal Callaghan
Title	Associate	Director
Date	15/10/2025	15/10/2025

Disclaimer
This report considers the specific instructions and requirements of our client. It is not intended for third-party use or reliance, and no responsibility is accepted for any third party. The provisions in this report apply solely to this project and should not be assumed applicable to other developments without review and modification.

ENVIRONMENT I.S. EN ISO 14001:2015 NSAI Certified | HEALTH & SAFETY I.S. ISO 45001:2018 NSAI Certified | QUALITY I.S. EN ISO 9001:2015 NSAI Certified

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1. INTRODUCTION

AWN Consulting, a Trinity Consultants Team, has prepared this Operational Waste Management Plan (RWMP) on behalf of Glenveagh Living Limited. The proposed development will consist of the construction of a residential development, which represents Phase 3 of the wider development of the Ballymastone Lands, to accommodate 398 no. residential dwellings, a crèche, community space, and public open space. The site will accommodate 316 total no. car parking spaces, 1,619 total no. bicycle parking spaces, new pedestrian/cycle links, road improvements, storage, services and plant areas.

This OWMP has been prepared to ensure that the management of waste during the operational phase of the proposed Development is undertaken in accordance with the current legal and industry standards including, the Waste Management Act 1996 as amended and associated Regulations [1], Environmental Protection Agency Act 1992 as amended [2], Litter Pollution Act 1997 as amended [3], *the* National Waste Management Plan for a Circular Economy 2024 - 2030 (NWMPCE) (2024) [4] and Fingal County Council (FCC) Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws' 2020 [5]. In particular, this OWMP aims to provide a robust strategy for the storage, handling, collection and transport of the wastes generated at Site.

This OWMP aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. The OWMP also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources). The plan estimates the type and quantity of waste to be generated from the proposed Development during the operational phase and provides a strategy for managing the different waste streams.

At present, there are no specific national guidelines in Ireland for the preparation of OWMPs. Therefore, in preparing this document, consideration has been given to the requirements of national and regional waste policy, legislation and other guidelines.

2. OVERVIEW OF WASTE MANAGEMENT IN IRELAND

2.1 National level

The Irish Government issued a policy statement in September 1998 entitled 'Changing Our Ways' [6], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Amongst other things, Changing Our Ways stated a target of at least 35% recycling of municipal (i.e. household, commercial and non-process industrial) waste.

A further policy document, 'Preventing and Recycling Waste – Delivering Change' was published in 2002 [7]. This document proposed a number of programmes to increase recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority.

This view was also supported by a review of sustainable development policy in Ireland and achievements to date, which was conducted in 2002, entitled 'Making Irelands Development Sustainable – Review, Assessment and Future Action' [8]. This document also stressed the need to decouple economic growth and waste generation, again through waste minimisation and reuse of discarded material.

In order to establish the progress of the Government policy document Changing Our Ways, a review document was published in April 2004 entitled 'Taking Stock and *Moving Forward'* [9]. Covering the period 1998 – 2003, the aim of this document was to assess progress to date with regard to waste management in Ireland, to consider developments since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives outlined in *Changing Our Ways*.

In particular, *Taking Stock and Moving Forward* noted a significant increase in the amount of waste being brought to local authority landfills. The report noted that one of the significant challenges in the coming years was the extension of the dry recyclable collection services.

In September 2020, the Irish Government published a new policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan *'A Waste Action Plan for a Circular Economy'* [10] (WAPCE), was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to a new economy, where climate and environmental challenges are turned into opportunities, replacing the previous national waste management plan *"A Resource Opportunity"* (2012).

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less'* (2021) [8] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years. However, at the date of authoring of this report there has been no update released.

The Circular Economy and Miscellaneous Provisions Act 2022 [12] was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of

production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

The Department of Housing, Local Government and Heritage authored Sustainable Residential Development and Compact Settlements - Guidelines for Planning Authorities (2024) [13], suggests the below thresholds at which the need for the supplemental information such as the OWMP should be considered.

- 30 or more residential units.

Since 1998, the Environmental Protection Agency (EPA) has produced periodic 'National Waste (Database) Reports' which as of 2023 have been renamed Circular Economy and Waste Statistics Highlight Reports [14] detailing, among other things, estimates for household and commercial (municipal) waste generation in Ireland and the level of recycling, recovery and disposal of these materials. The 2024 National Circular Economy and Waste Statistics web resource, which is the most recent study published, along with the national waste statistics web resource (2024) reported the following key statistics for 2022:

- *Generated – Ireland produced 3,190,000 t of municipal waste in 2022. This is a slight increase since 2021. Of this, 55% came from households and 45% came from commercial and public service sources.*
- *Managed –In 2022, a total of 1.76 million Household waste collected and treated by the waste industry.*
- *Unmanaged – An estimated 36,970 tonnes of household waste was unmanaged waste i.e., not disposed of in the correct manner in 2022.*
- *Recovered – A rounded 1.3 million tonnes of Ireland's municipal waste went for incineration with energy recovery in 2022. This tonnage is 43% of municipal waste managed and a marginal increase on the 42% achieved in 2021.*
- *Recycled –Some 1.3 million tonnes of municipal waste generated in Ireland was recycled in 2022, resulting in a recycling rate of 41% . This indicates that we face significant challenges to meet the upcoming EU recycling targets for 2025 to 2035*
- *Of the municipal waste recycled in 2022, over 825,000 tonnes went for material recycling (approximately the same as 2021) and over 480,000 tonnes were treated by composting/anaerobic digestion (approximately the same as 2021 but up 37% on 2020). The large increase of composted/anaerobically digested biowaste from 2020 is mainly due to a change in our way of estimating home composting.*
- *Disposed – Ireland's landfill rate for municipal waste managed was 15% in 2022. This is a 1% decrease from 2021's rate of 16%.*
- *Reuse – 54,800 tonnes of second-hand products we estimated by the EPA to have been reused in Ireland in 2021. The average annual Reuse rate per person in Ireland is 10.6 kg per person.*

2.2 Regional Level

The proposed Development is located in the Local Authority administrative area of Fingal County Council (FCC).

The Eastern Midlands Region (EMR) Waste Management Plan 2015 – 2021, which previously governed waste management policy in the FCC area, has been superseded as of March 2024 by the National Waste Management Plan for a Circular Economy (NWMPCE) 2024 – 2030, the national waste management plan for Ireland.

The NWMPCE does not dissolve the three regional waste areas. The NWCPCE sets the ambition of the plan to have a 0% total waste growth per person over the life of the Plan with an emphasis on non-household wastes including waste from commercial activities and the construction and demolition sector. This Plan seeks to influence sustainable consumption and prevent the generation of waste, improve the capture of materials to optimise circularity and enable compliance with policy and legislation.

The national plan sets out the following strategic targets for waste management in the country that are relevant to the development:

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National Targets

1A. (Residual Municipal Waste) 6% Reduction in Residual Municipal Waste per person by 2030

2A. (Contamination of Materials) 90% of Material in Compliance in the Dry Recycling Bin

2B. (Material Compliance Residual) 10% per annum increase in Material Compliance in the residual bin. (90% by the end of 2030)

3A. (Reuse of Materials) 20kg Per person / year – Reuse of materials like cloths or furniture to prevent waste.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €140-160 per tonne of waste, which includes a €85 per tonne landfill levy introduced under the Waste Management (Landfill Levy) (Amendment) Regulations 2015. *The Circular Economy (Waste Recovery Levy) Regulations 2024* [15] will also incur a levy of €10 per tonne for waste accepted for recovery. This will include backfilling at authorised recovery sites and at municipal waste landfills.

The *Fingal Development Plan 2023 – 2029* [16] sets out a number of objectives for the Fingal region in line with the objectives of the regional waste management plan, including the following:

- *Objective **IUO34** – Waste Management in New Developments -*
  Require the provision of appropriate, well designed, accessible space to support the storage, separation and collection of as many waste and recycling streams as possible in all new commercial and residential developments within the County.
- *Objective **DMSO234** – Provision of Public Bring Banks - Ensure the provision of public bring banks in all large retail developments, unless there are existing facilities within a 1 km radius. Bring bank facilities will generally be required at appropriate locations in the following development types:*

  - *In conjunction with significant new commercial developments, or extensions to existing developments.*
  - *In conjunction with new waste infrastructure facilities, proposals should include bring facilities for the acceptance of non-hazardous and hazardous wastes from members of the public and small businesses.*

- *In conjunction with medium and large scale residential and mixed-use developments providing in excess of 10 residential units, proposals should provide recycling and bring bank facilities to serve residents and in some appropriate locations, the wider community.*
- *In conjunction with all large retail developments provide space for reverse vending machines to promote the circular economy.*

- *Objective **DMSO235** – Communal Refuse Storage Provision - In the case of communal refuse storage provision, the collection point for refuse should be accessible both to the external collector and to the resident and be secured against illegal dumping by non-residents. In the case of individual houses, the applicant shall clearly show within a planning application the proposed location and design of bin storage to serve each dwelling and having regard to the number of individual bins required to serve each dwelling at the time of the application and any possible future requirements for refuse storage/collection. The following criteria will be considered in the assessment of the design and siting of waste facilities and bring facilities:*

  - *The location and design of any refuse storage or recycling facility should ensure that it is easily accessible both for residents and/or public and for bin collection, be insect and vermin proofed, will not present an odour problem, and will not significantly detract from the residential amenities of adjacent property or future occupants.*
  - *Provision for the storage and collection of waste materials shall be in accordance with the guidelines for waste storage facilities in the relevant Regional Waste Management Plan and the design considerations contained in Section 4.8 and 4.9 of the Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities, DHLGH (2020).*
  - *Refuse storage for houses should be externally located, concealed / covered and adequate to cater for the size and number of bins normally allocated to a household. For terraced houses, the most appropriate area for bins to be stored is to the front of the house, which should be located in well-designed enclosures that do not to detract from visual amenity.*
  - *All applications shall clearly identify the waste storage and collection points and detail the anticipated waste collection schedule having regard to the impact on road users both within the development and the surrounding area.*
  - *Access to private waste storage in residential schemes should be restricted to residents only.*

- *Objective **DMSO236** – Segregation and Collection of Waste - Ensure all new large-scale residential and mixed-use developments include appropriate facilities for source segregation and collection of waste.*
- *Objective **DMSO237** – Distance from Front Door to Communal Bin Area - Ensure all new residential schemes include appropriate design measures for refuse storage areas, details of which should be clearly shown at pre-planning and planning application stage. Ensure refuse storage areas are not situated immediately adjacent to the front door or ground floor window, unless adequate screened alcoves or other such mitigation measures are provided.*
- *Objective **DMSO239** – Refuse storage areas - Ensure all new residential schemes include appropriate design measures for refuse storage areas, details of which should be clearly shown at pre-planning and planning application stage. Ensure refuse storage areas are not situated immediately adjacent to the front door or ground floor window, unless adequate screened or other such mitigation measures are provided.*
- *Objective **DMSO240** – Distance to Communal Bin Areas - Ensure the maximum distance between the front door to a communal bin area does not exceed 50 metres.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the proposed Development are:

- *Waste Management Act 1996 as amended;*
- *Environmental Protection Agency Act 1992 as amended;*
- *Litter Pollution Act 1997 as amended;*
- *Planning and Development Act 2000 as amended* [17]*;*
- *Circular Economy and Miscellaneous Provisions Act 2022.*

These Acts and subordinate Regulations transpose the relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the Waste Management Act 1996 as amended and subsequent Irish legislation, is the principle of "Duty of Care". This implies that the waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final disposal area, waste contractors will be employed to physically transport waste to the final waste disposal site.

It is, therefore, imperative that the residents, crèche tenant, community space tenants and the proposed facilities management company undertake on-site management of waste in accordance with all legal requirements and that the facilities management company employ suitably permitted / licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contactor handle, transport and reuse / recover / recycle / dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the Waste Management (Facility Permit & Registration) Regulations 2007, as amended, or a Waste Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and / or disposed of at the specified site.

2.3.1 Fingal County Council Waste Management Bye-Laws

The FCC *"Segregation, Storage and Presentation of Household and Commercial Waste Bye-Laws 2020"* came into effect in March 2020. The Bye-Laws set a number of enforceable requirements on waste holders and collectors with regard to storage, separation, presentation and collection of waste within the FCC functional area. Key requirements under these *Waste Bye-Laws* are:

- *Kerbside waste presented for collection shall not be presented for collection earlier than 6:00pm on the day immediately preceding the designated waste collection day;*
- *All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 9:00am on the day following the designated waste collection day;*
- *Neither recyclable household kerbside waste nor food waste arising from households shall be contaminated with any other type of waste before or after it has been segregated; and*
- *A management company, or another person if there is no such company, who exercises control and supervision of residential and/or commercial activities in multi-unit developments, mixed-use developments, flats or apartment blocks, combined living/working spaces or other similar complexes shall ensure that:*
  - *Separate receptacles of adequate size and number are provided for the proper segregation, storage and collection of recyclable household kerbside waste and residual household kerbside waste;*

- *Additional receptacles are provided for the segregation, storage and collection of food waste where this practice is a requirement of the national legislation on food waste;*
- *The receptacles referred to in paragraphs (a) and (b) are located both within any individual apartment and at the place where waste is stored prior to its collection;*
- *Any place where waste is to be stored prior to collection is secure, accessible at all times by tenants and other occupiers and is not accessible by any other person other than an authorised waste collector,*
- *Written information is provided to each tenant or other occupier about the arrangements for waste separation, segregation, storage and presentation prior to collection;*
- *An authorised waste collector is engaged to service the receptacles referred to in this section of these bye-laws, with documentary evidence, such as receipts, statements or other proof of payment, demonstrating the existence of this engagement being retained for a period of no less than two years. Such evidence shall be presented to an authorised person within a time specified in a written request from either that person or from another authorised person employed by Fingal County Council;*
- *Receptacles for kerbside waste are presented for collection on the designated waste collection day; and*
- *Adequate access and egress onto and from the premises by waste collection vehicles is maintained.*

The full text of the Waste Bye-Laws is available from the FCC website.

2.4 Regional Waste Management Service Providers and Facilities

Various contractors offer waste collection services for the residential sector in the FCC region. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO.

As outlined in the regional waste management plan, there is a decreasing number of landfills available in the region. Only three municipal solid waste landfills remain operational and all are operated by the private sector. There are a number of other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second in Poolbeg in Dublin.

There is Estuary Recycling Centre at Greenfields, Swords, Dublin, located c. 7.9 km to the south west of the Development Site, which can be utilised by the residents of the proposed Development for other household waste streams while a bottle bank can be found c. 800 m to the west at Donabate Portrane Community Centre.

A copy of all CORs and waste permits issued by the Local Authorities are available from the NWCPO website and all Waste Licenses issued are available from the EPA.

3. DESCRIPTION OF THE DEVELOPMENT

3.1 Location, Size and Scale of the Development

Glenveagh Living Limited, intend to apply for permission for a Large-Scale Residential Development (LRD) at this site at Ballymastone, Donabate, County Dublin. The application site, of c. 11.28ha, is bounded by existing residential developments of Willowbrook, The Priory and Priory Wood, and Donabate Burial Ground to the north/northwest, the Donabate Distributor Road (DDR) to the east, permitted Ballymastone Phase 2 (FCC. Ref. LRD0039/S3 & ABP Ref. 320885) to the south, and the Links Road to the west. A portion of the subject site is within the St. Ita's Hospital Complex Architectural Conservation Area (ACA).

The proposed development will consist of the construction of a residential development, which is a continuation of permitted Ballymastone Phase 1 lands (FCC Ref. LRD0008/S3 & ABP Ref. 315288) and Phase 2 lands (FCC. Ref. LRD0039/S3 & ABP Ref. 320885) and represents Phase 3 of the wider development of the Ballymastone Lands (as identified in the Donabate Local Area Plan 2016 (as extended)), ranging in height from 2- to 6-storeys to accommodate 398 no. residential dwellings (227 no. houses, 47 no. duplex units and 124 no. apartments) and public open space. The site will accommodate 316 total no. car parking spaces, 1,619 total no. cycle parking spaces, pedestrian / cycle links, road connectivity enhancements, storage, services and plant areas. Landscaping will include significant public open space provision and communal amenity areas. The proposed development consists of:

- The construction of 398 no. new residential dwellings consisting of 227 no. houses, 47 no. duplex units and 124 no. apartment units set out follows:
  - Construction of 227 no. 2-storey houses (81 no. 2-beds, 134 no. 3-beds, 12 no. 4-beds).
  - Construction of 47 no. 2- to 3-storey duplex units (2 no. 1-beds, 24 no. 2-beds, 21 no. 3-beds), with balconies on rear elevations.
  - Construction of 3 no. apartment blocks, ranging from 3- to 6-storeys in height, with balconies on all elevations, green roofs, and external communal amenity spaces, providing a total of 124 no. apartment units (47 no. 1-beds, 68 no. 2-beds, 9 no. 3-beds);

- Provision of a crèche (c. 646 sq.m) and a community space (c. 100 sq.m) located within the footprint of proposed apartment block to the west of the site;
- Provision of c. 15.3% public open space of the net site area, comprising 3 no. small parks and 4 no. pocket parks which total c. 17,287 sq.m. These parks are generally located centrally within the site providing a series of north-south linear spaces linking to the permitted Ballymastone Phase 2 (FCC Reg. Ref. LRD0039/S3 & ABP Reg. Ref. 320885) with onward connection to the permitted Ballymastone Phase 1 (FCC Reg. Ref. LRD0008/S3 and ABP Reg. Ref. 315288) to the south;
- Provision of a total of 316 no. car parking spaces are provided (combination of in-curtilage and on-street and communal car parking areas);
- Delivery of a total of 1,619 no. cycle spaces (comprising 1,513 no. long-stay/resident spaces and 106 no. short-stay/visitor spaces);
- Provision of vehicular access from The Links road to the west of the site and the Donabate Distributor Road (DDR) to the east of the site;
- Provision of an east-west pedestrian/cycle route is proposed within the site connecting the existing Links Road to the west and DDR to the east, in addition to a connection to the permitted east/west pedestrian/cycle route which forms part of the permitted Ballymastone Phase 2 (FCC. Ref. LRD0039/S3 & ABP Ref. 320885);
- The proposed application includes all site enabling and site development works, infrastructure and utilities, landscaping works and boundary treatments (including at the permitted foul pump station as per FCC Reg. Ref. LRD0039/S3 & ABP Reg. Ref. 320885), solar PV panels, bin and bicycle stores,

plant, ESB unit substations, lighting, servicing, signage, surface water attenuation features and all site development works above and below ground.

3.2 Typical Waste Categories

The typical non-hazardous and hazardous wastes that will be generated at the proposed Development will include the following:

- Dry Mixed Recyclables (DMR) - includes waste paper (including newspapers, magazines, brochures, catalogues, leaflets), cardboard and plastic packaging, metal cans, plastic bottles, aluminium cans, tins and Tetra Pak cartons;
- Organic waste – food waste and green waste generated from internal plants / flowers;
- Glass; and
- Mixed Non-Recyclable (MNR)/General Waste.

In addition to the typical waste materials that will be generated at the development on a daily basis, there will be some additional waste types generated less frequently / in smaller quantities which will need to be managed separately including:

- Drink Cans and Bottles (Deposit Return Scheme)
- Green / garden waste may be generated from external landscaping;
- Batteries (both hazardous and non-hazardous);
- Waste electrical and electronic equipment (WEEE) (both hazardous and non-hazardous);
- Printer cartridges / toners;
- Chemicals (paints, adhesives, resins, detergents, etc.);
- Light bulbs;
- Textiles;
- Waste cooking oil (if any generated by the residents and/or creche tenant);
- Furniture (and, from time to time, other bulky wastes); and
- Abandoned bicycles.

Wastes will be segregated into the above waste types to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

3.3 List of Waste Codes

In 1994, the *European Waste Catalogue* [18] and *Hazardous Waste List* [19] were published by the European Commission. In 2002, the EPA published a document titled the *European Waste Catalogue and Hazardous Waste List* [20], which was a condensed version of the original two documents and their subsequent amendments. This document has recently been replaced by the EPA '*Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous*' [20] 2018. This waste classification system applies across the EU and is the basis for all national and international waste reporting, such as those associated with waste collection permits, COR's, permits and licences and EPA National Waste Database.

Under the classification system, different types of wastes are fully defined by a code. The List of Waste (LoW) code for typical waste materials expected to be generated during the operation of the proposed development are provided in Table 3.1 below.

Table 3.1 Typical Waste Types Generated and LoW Codes

Waste Material	LoW Code

Paper and Cardboard	20 01 01
Plastics	20 01 39
Metals	20 01 40
Mixed Non-Recyclable Waste	20 03 01
Glass	20 01 02
Biodegradable Kitchen Waste	20 01 08
Oils and Fats	20 01 25
Textiles	20 01 11
Batteries and Accumulators*	20 01 33* - 34
Printer Toner/Cartridges*	20 01 27* - 28
Green Waste	20 02 01
WEEE*	20 01 35*-36
Chemicals (solvents, pesticides, paints & adhesives, detergents, etc.) *	20 01 13*/19*/27*/28/29*30
Fluorescent tubes and other mercury containing waste*	20 01 21*
Bulky Wastes	20 03 07

** Individual waste type may contain hazardous materials*

4. ESTIMATED WASTE ARISING

A waste generation model (WGM) developed by AWN has been used to predict waste types, weights and volumes expected to arise from operations within the proposed Development. The WGM incorporates building area and use and combines these with other data, including Irish and US EPA waste generation rates.

The estimated quantum / volume of waste that will be generated from the residential units has been determined based on the predicted occupancy of the units. The residential waste figures include the waste generated in communal areas. While the floor area usage (m^2) has been used to estimate the waste arising from the crèche.

The estimated waste generation for the proposed Development for the main waste types is presented in Tables 4.1 – 4.3.

Table 4.1 Estimated Waste Generation for Residential Units

Waste Type	Waste Volume (m^3 / week)			
	2 Bed – Units (Individual)	3 Bed – Units (Individual)	4 Bed – Units (Individual)	Apartment Block BA07 (Shared)
Organic Waste	0.02	0.02	0.02	0.58
Mixed Dry Recyclables	0.11	0.13	0.18	4.10
Glass	0.01	0.01	0.01	0.11
Mixed Municipal Waste	0.07	0.08	0.09	2.15
Total	**0.21**	**0.24**	**0.30**	**6.94**

Table 4.2 Estimated Waste Generation for Residential Units

Waste Type	Waste Volume (m^3 / week)			
	Apartment Block BA08 (Shared)	Apartment Block BA09 (Shared)	Duplex Block BZ04 & BZ25 (Shared)	Duplex Block BZ10 (Shared)
Organic Waste	0.79	0.50	0.17	0.05
Mixed Dry Recyclables	5.59	3.56	1.18	0.36
Glass	0.15	0.10	0.03	0.01
Mixed Municipal Waste	2.94	1.87	0.62	0.19
Total	**9.47**	**6.03**	**2.01**	**0.60**

Table 4.3 Estimated Waste Generation for Residential and Crèche Units

Waste Type	Waste Volume (m^3 / week)			
	Duplex Block BZ16 (Shared)	Crèche (Individual)	Community Space (Individual)	
Organic Waste	0.07	0.04	0.01	
Mixed Dry Recyclables	0.51	1.50	0.17	
Glass	0.01	0.01	0.01	
Mixed Municipal Waste	0.27	0.82	0.07	

Total	**0.86**	**2.36**	**0.26**	

BS5906:2005 Waste Management in Buildings – Code of Practice [21] has been considered in the calculations of waste estimates. AWN's modelling methodology is based on recently published data and data from numerous other similar developments in Ireland and is based on AWN's experience, it provides a more representative estimate of the likely waste arisings from the proposed Development.

5. WASTE STORAGE AND COLLECTION

This section provides information on how waste generated within the site will be stored and collected. This has been prepared with due consideration of the proposed Site layout as well as best practice standards, local and national waste management requirements, including those of FCC. In particular, consideration has been given to the following documents:

- BS 5906:2005 Waste Management in Buildings – Code of Practice,
- The NWMPCE (2024);
- FCC Fingal County Council Development Plan 2023-2029 (2023);
- FCC Segregation, Storage and Presentation of Household and Commercial Waste Bye-Laws (2020); and
- DoHLGH, Design Standards for Apartments, Guidelines for Planning Authorities (2025) [22].

Waste Storage Areas
Locations of all Waste Storage Areas (WSAs) can be viewed on the drawings submitted with the planning application under separate cover and appendix a of this report.

Individual Waste Storage Areas

Residents in houses and some duplex units will have their own individual WSA allocated in their rear garden where external access is available. Where external access to the rear yard is not available a shielded bin store will be allocated at the front of the house.

Duplex Blocks **BZ04, BZ10, BZ16** and **BZ25** have a mix of units that require a shared WSA and units with individual waste storage areas.

Shared Waste Storage areas

Apartment Block BA07
One (1 no.) shared communal WSA has been allocated within the development design for residential apartment Block BA07. This has been strategically located internally at ground floor level.

Residential Block BA08
One (1 no.) shared communal WSA has been allocated within the development design for residential apartment Block BA08. This has been strategically located internally at ground floor level.

Residential Block BA09
One (1 no.) shared communal WSA has been allocated within the development design for residential apartment Block BA09. This has been strategically located internally at ground floor level.

Shared Residential Duplex Block Units
Six (6 no.) shared WSAs have been allocated within the development design for the residential Duplex blocks. These have been strategically located on the ground floor level, in external locations.

Commercial Waste Storage areas

Crèche and Community Space
One (1 no.) WSA has been allocated within the development design for the creche and community space. This has been strategically located at ground floor level, within the creche building (BA09).

The temporary staging areas are such that it will not obstruct traffic or pedestrians (allowing a footway path of at least 1.8m, the space needed for two wheelchairs to pass each other) as is recommended in the *Design Manual for Urban Roads and Streets* (2019) [23].

Using the estimated waste generation volumes in Tables 4.1 – 4.3, above, the waste receptacle requirements for MNR, DMR, organic waste and glass have been established for the WSA's. It is envisaged all waste will be collected on a weekly basis.

Waste Storage Requirements

Estimated waste storage requirements for the operational phase of the proposed Development are detailed in Table 5.1, below.

Table 5.1 Waste storage requirements for the proposed development

Area/Use	Bins Required			
	MNR[1]	DMR[2]	Glass	Organic
Apartment Block BA07	2 x 1100L	4 x 1100L	1 x 240L	3 x 240L
Apartment Block BA08	3 x 1100L	5 x 1100L	1 x 240L	4 x 240L
Apartment Block BA09	2 x 1100L	3 x 1100L 1 x 240L	1 x 240L	2 x 240L
Duplex Block BZ04 & BZ25 (Shared)	1 x 1100L	1 x 1100L 1 x 240L	1 x 240L	1 x 240L
Duplex Block BZ10 (Shared)	1 x 240L	2 x 240L	1 x 120L	1 x 240L
Duplex Block BZ16 (Shared)	2 x 240L	1 x 1100L	1 x 120L	1 x 240L
Individual Unit	1 x 240L	1 x 240L	Bottle Bank	1 x 240L
Creche and Community Space	1 x 1100L 1 x 240L	2 x 1100L 1 x 240L	1 x 120L	1 x 120L

Note: [1] *= Mixed Non-Recyclables*
[2] *= Dry Mixed Recyclables*

The waste receptacle requirements have been established from distribution of the total weekly waste generation estimate into the holding capacity of each receptacle type.

Waste storage receptacles as per Table 5.1 above (or similar appropriate approved containers) will be provided by the facilities management company in the WSA's.

The types of bins used will vary in size, design and colour dependent on the appointed waste contractor. However, examples of typical receptacles to be provided in the WSA's are shown in Figure 5.1. All waste receptacles used will comply with the SIST EN 840-1:2020 and SIST EN 840-2:2020 as the standards for performance requirements of mobile waste containers, where appropriate.

Figure 5-1. Typical waste receptacles of varying size (240L and 1100L)



Receptacles for organic, mixed dry recyclable, glass and mixed non-recyclable waste will be provided in the WSAs prior to first occupation of the development i.e. prior to the first residential unit or crèche unit being occupied.

Residents in houses will be required to supply their own waste receptacles. Bins for the apartment block and creche unit WSA's will be supplied by the facilities management company.

This Plan will be provided to each resident and tenant from first occupation of the development i.e. once the first residential unit or crèche unit is occupied. This Plan will be supplemented, as required, by the property management company with any new information on waste segregation, storage, reuse and recycling initiatives that are subsequently introduced.

5.1 Operational Phase Waste Storage – Residential Units

Residents will be required to segregate waste into the following main waste streams:

- DMR;
- MNR;
- Glass; and
- Organic waste.

Residents with shared WSAs listed in Table 5.1 have been allocated communal WSAs on ground level. Residents in houses and duplex units with their own WSAs will have their own individual WSAs allocated in their rear garden where external access is available. Where external access to the rear yard is not available a shielded bin store will be allocated at the front of the house.

Provision will be made in all residential units to accommodate 3 no. bin types to facilitate waste segregation at source. An example of a potential 3 bin storage system is provided in Figure 5.3 below.

Figure 5.3 Example three bin storage system to be provided within the unit design



Graphical signage will be erected by facilities management in shared bin stores, above or on the bins to show exactly which wastes can be put in each. Bins/containers will also be colour coded to avoid cross contamination of the different waste streams.

Access to the shared WSA's will be restricted to authorised residents, facilities management and waste contractors by means of a key or electronic fob access.

Other waste materials such as drink cans, textiles, batteries, printer toner/cartridges, cooking oil and WEEE may be generated infrequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.4.

5.2 Waste Storage – Crèche & Community Space

The crèche tenant and community space tenants will be required to segregate waste within their own unit into the following main waste types:

- DMR;
- MNR;
- Glass; and
- Organic waste.

The tenants will be required to take their segregated waste materials to their designated WSA and deposit their segregated waste into the appropriate bins. The location of the WSA is illustrated in the drawings submitted with the planning application under separate cover and in appendix A of this report.

Suppliers for the tenants will be requested by the tenant to make deliveries in reusable containers, minimize packaging or remove any packaging after delivery, where possible, to reduce waste generated by the proposed development.

If a kitchen is allocated in the crèche this will contribute a significant portion of the volume of waste generated on a daily basis, and as such it is important that adequate provision is made for the storage and transfer of waste from these areas to the WSA.

If a kitchen is required it is anticipated that waste will be generated the kitchen throughout the day, primarily at the following locations:

- Food Storage Areas (i.e. cold stores, dry store, freezer stores and stores for decanting of deliveries);
- Meat Preparation Area;
- Vegetable Preparation Area;
- Cooking Area;
- Dish-wash Area;

Small bins will be placed adjacent to each of these areas for temporary storage of waste generated during the day. Waste will then be transferred from each of these areas to the appropriate waste store within their unit.

All bins / containers in the tenants' areas and WSAs will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which wastes can be put in each.

Other waste materials such as drink cans, textiles, batteries, lightbulbs, WEEE, cooking oil and printer toner / cartridges will be generated less frequently. The tenant will be required to store these waste types within their own unit and arrange collection with an appropriately licensed waste contractor. Facilties management may arrange collection, depending on the agreement. Further details on additional waste types can be found in Section 5.4.

5.3 Waste Collection

There are numerous private contractors that provide waste collection services in the FCC area. All waste contractors servicing the development must hold a valid waste collection permit for the specific waste types collected. All waste collected must be transported to registered / permitted / licensed facilities only.

Bins from the shared WSA's will be brought their allocated temporary staging / collection areas by the waste contractor or facilities management, depending on agreement, prior to collection. Bins will be returned to the shared WSA's immediately following collection in line with the FCC waste byelaws. Crèche staff and residents with individual WSAs will be responsible for relocating their bins to and from the curb on designated collection days. A road sweep analysis of the development can be found in appendix B of this report.

Suitable access and egress have been provided to enable the bins to be moved easily from the temporary staging area's to the waste collection vehicles on the appropriate days. Waste will be collected at agreed days and times by the nominated waste contractors.

All waste receptacles will be clearly identified as required by waste legislation and the requirements of the FCC *Waste Bye-Laws*. Waste will be presented for collection in a manner that will not endanger health, create a risk to traffic, harm the environment or create a nuisance through odours or litter.

It is recommended that bin collection times are staggered to reduce the number of bins required to be emptied at once and the time the waste vehicle is on-Site. This will be determined during the process of appointment of a waste contractor.

5.4 Additional Waste Materials

In addition to the typical waste materials that are generated on a daily basis, there will be some additional waste types generated from time to time that will need to be managed separately. A non-exhaustive list is presented below.

Deposit Return Scheme
Most drinks containers can be recycled via the deposit return scheme, such as bottles, cans and tins made from plastic, aluminium or steel can be returned once they are between 150ml and 3 litres in size and have the Re-turn logo on them.

At the shops you can either return the containers:

- Using a Reverse Vending Machine (RVM)
- Manually in the shop

If a shop does not have a RVM but they sell containers with the Re-turn logo, the shop may allow you to manually return containers in store, unless they have a take back exemption.

Locations of RVM machines can be found via the Re-turn website (www.re-turn.ie)

Green Waste
Green waste may be generated from gardens, external landscaping and internal plants / flowers. Green waste generated from landscaping of external areas will be removed by external landscape contractors. Green waste generated from gardens internal plants / flowers can be placed in the organic waste bins.

Batteries
A take-back service for waste batteries and accumulators (e.g. rechargeable batteries) is in place in order to comply with the S.I. No. 283/2014 - European Union (Batteries and Accumulators) Regulations 2014, as amended. In accordance with these regulations, consumers are able to bring their waste batteries to their local civic amenity centre or can return them free of charge to retailers which supply the equivalent type of battery, regardless of whether or not the batteries were purchased at the retail outlet and regardless of whether or not the person depositing the waste battery purchases any product or products from the retail outlet.

The crèche and community space tenants (commercial tenants) cannot use the civic amenity centre. They must segregate their waste batteries and either avail of the take-back service provided by retailers or arrange for recycling / recovery of their waste batteries by a suitably permited / licenced contractor. Facilties management may arrange collection, depending on the agreement.

Waste Electrical and Electronic Equipment (WEEE)
The WEEE Directive (Directive 2002/96/EC) and associated Waste Management (WEEE) Regulations have been enacted to ensure a high level of recycling of electronic and electrical equipment. In accordance with the regulations, consumers can bring their waste electrical and electronic equipment to their local recycling centre. In addition, consumers can bring back WEEE within 15 days to retailers when they purchase new equipment on a like for like basis. Retailers are also obliged to collect WEEE within 15 days of delivery of a new item, provided the item is disconnected from all mains, does not pose a health and safety risk and is readily available for collection.

As noted above, the tenants cannot use the civic amenity centre. They must segregate their WEEE and either avail of the take-back / collection service provided by retailers or arrange for recycling / recovery of their WEEE by a suitably permited / licenced contractor. Facilties management may arrange collection, depending on the agreement.

Printer Cartridge / Toners
It is recommended that a printer cartridge / toner bin is provided in the commercial tenants, where appropriate. The tenants will be required to store this waste within their unit and arrange for return to retailers or collection by an authorised waste contractor, as required.

Waste printer cartridge / toners generated by residents can usually be returned to the supplier free of charge or can be brought to a civic amenity centre.

Chemicals
Chemicals (such as solvents, paints, adhesives, resins, detergents, etc) are largely generated from building maintenance works. Such works are usually completed by external contractors who are responsible for the off-site removal and appropriate recovery / recycling / disposal of any waste materials generated.

Any waste cleaning products or waste packaging from cleaning products generated in the commercial tenants that are classed as hazardous (if they arise) will be appropriately stored within the tenants' own space. Facilties management may arrange collection, depending on the agreement.

Any waste cleaning products or waste packaging from cleaning products that are classed as hazardous (if they arise) generated by the residents should be brought to a civic amenity centre.

Light Bulbs
Waste light bulbs (fluorescent, incandescent and LED) may be generated by lighting at the commercial tenants. It is anticipated that tenants will be responsible for the off-site removal and appropriate recovery / disposal of these wastes. Facilties management may arrange collection, depending on the agreement.

Light bulbs generated by residents should be taken to the nearest civic amenity centre for appropriate storage and recovery / disposal.

Textiles
Where possible, waste textiles will be recycled or donated to a charity organisation for reuse. Commercial tenants and residents will be responsible for disposing of waste textiles appropriately.

Waste Cooking Oil
If the commercial tenants use cooking oil, waste cooking oil will need to be stored within the unit on a bunded area or spill pallet and regular collections by a dedicated waste contractor will need to be organized as required. Under sink grease traps will be installed in any cooking space.

If the residents generate waste cooking oil, this can be brought to a civic amenity centre.

Furniture & Other Bulky Waste Items
Furniture and other bulky waste items (such as carpet, etc.) may occasionally be generated by the commercial tenants. The collection of bulky waste will be arranged, as required by the commercial tenants. If residents wish to dispose of furniture, this can be brought a civic amenity centre.

Abandoned Bicycles
Bicycle parking areas are planned for the development. As happens in other developments, residents sometimes abandon faulty or unused bicycles, and it can be difficult to determine their ownership. Abandoned bicycles should be donated to charity if they arise or Facilties management willmay arrange collection by a licensed waste contractor.

5.5 Waste Storage Area Design

The shared residential and commercial tenants WSAs will be designed and fitted-out to meet the requirements of relevant design Standards, including:

- Be fitted with a non-slip floor surface;

- Provide ventilation to reduce the potential for generation of odours with a recommended 6-10 air changes per hour for a mechanical system for internal WSAs;
- Provide suitable lighting – a minimum Lux rating of 400 is recommended;
- Be easily accessible for people with limited mobility;
- Be restricted to access by nominated personnel only;
- Be supplied with hot or cold water for disinfection and washing of bins;
- Be fitted with suitable power supply for power washers;
- Have a sloped floor to a central foul drain for bins washing run-off;
- Have appropriate signage placed above and on bins indicating correct use;
- Have access for potential control of vermin, if required; and
- Be fitted with CCTV for monitoring.

The facilities management company, crèche tenant, community space and residents will be required to maintain the resident bins and storage areas in good condition as required by the FCC Waste Bye-Laws.

5.6 Facility Management Responsibilities

It shall be the responsibility of the Facilities Management Company to ensure that all domestic waste generated by residents & tenants is managed to ensure correct storage prior to collection by an appropriately permitted waste management company.

Facilities Management will provide the following items:

- Provision of a Waste Management Plan document, prepared by the Facilities Management Company to all residential units and the tenants, which shall clearly state the methods of source waste segregation, storage, reuse and recycling initiatives that shall apply to the management of the development;
- Provision and maintenance of appropriate graphical signage to inform residents of their obligation to reduce waste, segregate waste and in the correct bin;
- Preparation of an annual waste management report for all residential units the commercial tenants;
- Designation of access routes to common waste storage areas to ensure safe access from the apartment units by mobility impaired persons;
- Provision of an appropriately qualified and experienced staff member, who will be responsible for all aspects of waste management at the development;
- Frequent inspection of waste storage areas and signing of a daily check list, which shall be displayed within the area; and
- Maintenance of a register, detailing the quantities and breakdown of wastes collected from the development and provision of supporting documentation by the waste collector to allow tracking of waste recycling rates.

5.7 Pest Management

A pest control operator will be appointed as required to manage pests onsite during the operational phase of this development. All waste generated within the development will be stored in closed waste receptacles both within units and within the WSAs. Any waste receptacles will be carefully managed to prevent leaks, odours and pest problems.

All WSAs will have access for potential control of vermin, if required, be supplied with hot or cold water, drainage point and will be regularly inspected by facilities management to deter pests.

6. SUMMARY AND CONCLUSION

In summary, this OWMP presents a waste strategy that addresses all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the proposed Development.

Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus contributing to the targets set out in *the NWMPCE*.

Adherence to this plan will also ensure that waste management at the development is carried out in accordance with the requirements of the *FCC Waste Bye-Laws.*

The waste strategy presented in this document will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy.

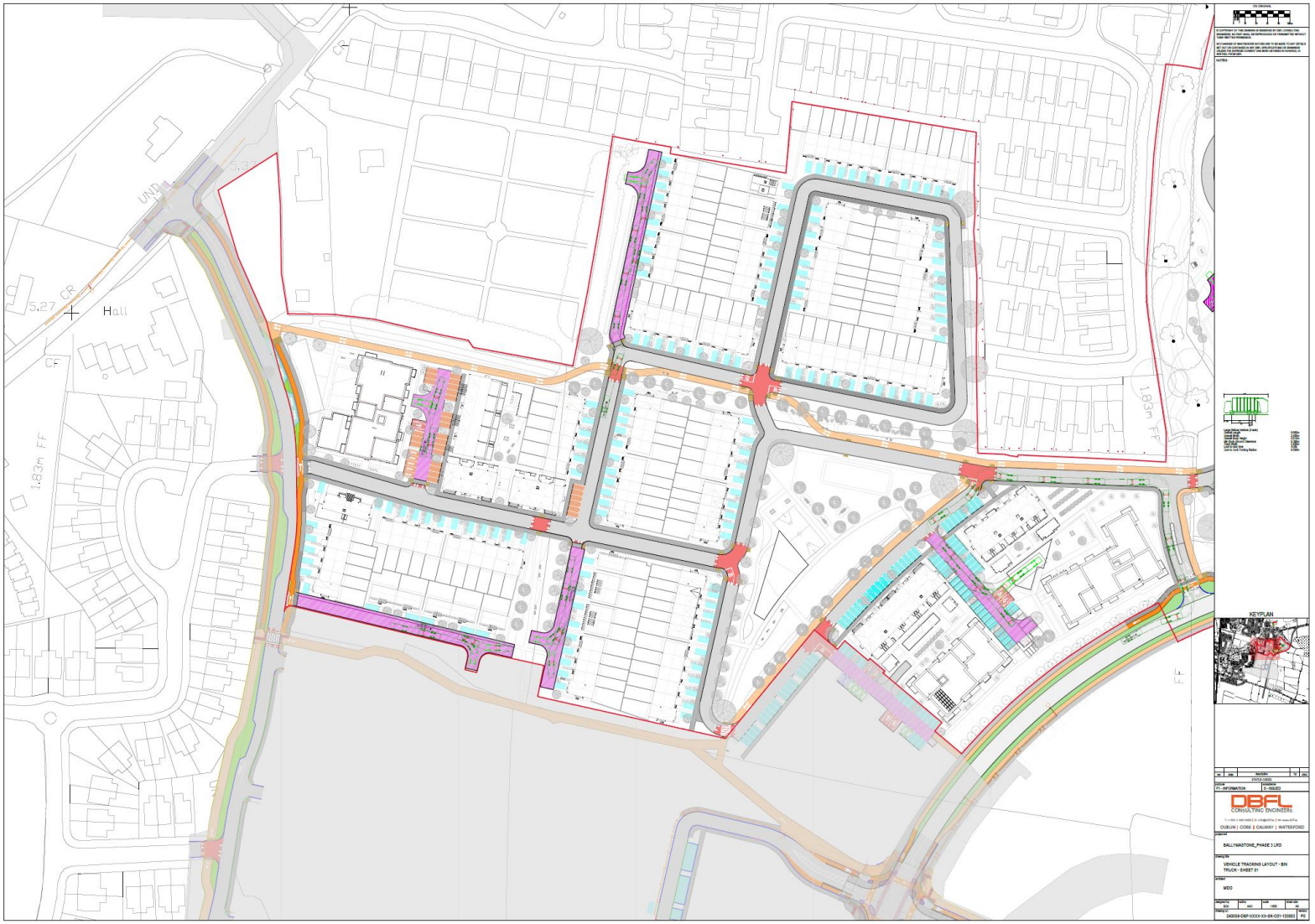
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APPENDIX A. WASTE STORAGE AREA LOCATION



APPENDIX B. ROAD SWEEP ANALYSIS REFUSE VEHCILE




183m FF
183m FF
183m FF
FF
KEYPLAN
DBFL
CONSULTING ENGINEERS
DUBLIN | CORK | GALWAY | WATERFORD
BALLYMASTONE_PHASE 3 LRD
VEHICLE TRACKING LAYOUT - BIN TRUCK - SHEET 02
MDO

Brady Shipman Martin

DUBLIN
Mountpleasant Business Centre
Mountpleasant Avenue Upper
Ranelagh
Dublin 6

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