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12.1 Field Inspection (Rubicon Heritage, 2023)

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Archaeological Assessment (Test Trenching) at Mullagharlin Road, Haynestown, Co. Louth

Licence No.: 23E0452

ITM: 704120, 802977

RMP No.: LH012-102----

Donald Murphy

30 August 2023

Report Status: Final

ACSU Ref.: 2303

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PROJECT DETAILS

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EXECUTIVE SUMMARY

This final report details the results of archaeological test trenching carried out Mullagharlin Road, Haynestown, Co. Louth (ITM 704120, 802977). The testing was carried out at the request of the client to assess the archaeological potential of the site following a geophysical survey carried out by Donald Murphy in May 2021 under licence number 23R0044. The test trenching was conducted by Donald Murphy of Archaeological Consultancy Services Unit Ltd. (ACSU) between the 31st July to 8th August 2023 (licence no. 23E0452) issued by the Department of Housing, Local Government and Heritage in consultation with the National Museum of Ireland.

The site is located in the townland of Haynestown, Co. Louth. It lies to the east of, and is accessed from, Mullagharlin Road. It is within the southwest portion of a recently developed biopharmaceutical facility and remains within an archaeological exclusion zone that is currently fenced off. The site is located within a highly sensitive archaeological landscape with archaeological monuments recorded and identified as a result of recent archaeological investigations (under licence 19E0061).

A total of 14 test trenches were excavated across the site. Each trench measured 1.8 m in width, and in total, 997m of linear trenches were excavated, targeting anomalies identified during the geophysical survey (23R0044).

Archaeological test trenching succeeded in identifying the remains of at least 31 individual features. These were dominated by pits and linear ditches. A total of 15 pits were found (C8, C10, C13, C15, C16, C17, C19, C21, C25, C27, C28, C38, C42, C45 and C55). While some of these pits were isolated, there were areas where some irregular clustering could be found such as the northeast end of Trenches 2-3 & 12-14. Ten linear ditches were identified throughout the site (C24, C29, C30, C31, C33, C34, C36, C47 and C50/51). Half of these were orientated east-west and most likely represent linear field systems. At least four of the ditches are continuations of features identified in previous excavations in the surrounding area. Other features include two possible postholes (C23 & C39), a spread (C40), a hearth (C4), agricultural furrows (C36) and a metaled surface (C32).

Portions of the site were unavailable for testing and some trenches were moved or realigned to compensate. This was mainly done in the southern area of the site where underground services and two spoil mounds were identified and avoided. At the far north end, a modern manhole was found which reduced the length of Trench 11. Additionally, Trenches 4-6 were split into north and south sections due to a tree lined field boundary. The complete length of Trench 5 had evidence of modern ground disturbance. This disturbance would have removed all traces of any archaeological features.

It is recommended that all archaeological features identified are stripped of topsoil under archaeological supervision and preserved by record (archaeological excavation) in advance of construction. Furthermore, it is recommended that archaeological monitoring of all topsoil stripping and enabling works is conducted, in order to

identify any further potential subsurface archaeological features that may be present and that, where identified, these are also preserved by record (through archaeological excavation).

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This final report details the results of an archaeological assessment (test trenching) of a proposed Waste Water Treatment Plant (an application is being currently lodged to Louth County Council) for a site at Mullagharlin Road, Haynestown, Co. Louth (ITM: 704120, 802977, Figures 1-2).

The test trenching was carried out at the request of the client, in relation to an application currently being lodged for the construction of a Waste Water Treatment Plant and associated infrastructure required for an existing biopharmaceutical facility (WuXi Biologics). An archaeological assessment (testing) was carried out between the 31st July and 8th August 2023 by Donald Murphy of Archaeological Consultancy Services Ltd (ACSU) under licence 22E0689 issued by the Department of Housing, Local Government and Heritage in consultation with the National Museum of Ireland. Test trenches targeted anomalies identified during a geophysical survey conducted in early 2023 under licence 23R0044 (Murphy, 2023).

The site is located within a highly sensitive archaeological landscape with archaeological monuments recorded and identified as a result of recent archaeological investigations (see Section 2.4 for details).

1.2 Site location

The site is located in the townland of Haynestown, Co. Louth (ITM: 704120, 802977, Figures 1-2). The site lies to the east of, and is accessed from, Mullagharlin Road. It is within the southwest portion of a recently developed biopharmaceutical facility and remains within an archaeological exclusion zone that is currently fenced off.

2. NATURAL & CULTURAL HERITAGE LANDSCAPE

2.1 Natural landscape

The area subject to test trenching consists of a portion of grassed field. The site has an elevation of c. 23-25m Ordnance Datum (OD). The underlying geology of the site consists of calcareous red-mica greywacke and is part of the Clontail Formation. This bedrock geology is overlaid by deep, well-drained, mineral soils. (Geological Survey of Ireland).

2.2 Cultural landscape

The site was subject to cartographical examination and a review of aerial photography prior to test trenching. Additionally, a review of available historic mapping for the area was carried out to include the 6-inch 1834 and the 25-inch 1907 editions of the Ordnance Survey maps. Potential archaeological or cultural heritage features are marked on such maps and provide a useful resource in identifying sites particularly if they no longer have any above-ground remains.

Ordnance Survey (OS) maps of the area were examined to identify any possible archaeological features and trace the site's development during the nineteenth and early twentieth centuries. Both maps, 1834 and 1907, show the site located within two agricultural fields adjacent to, and east of, a northwest to southeast aligned road

running within the footprint of the current Mullagharlin Road (Figure 3). No features of archaeological significance are shown. By the time of the 1907 map, the Drogheda to Dundalk railway line was depicted to the west of the site with Haynestown Bridge labelled and shown (Figure 4).

Aerial photographs dating between 1995 and 2013 from the Ordnance Survey of Ireland were also reviewed in addition to Google Map pro imagery dating from 2013-2022 being examined. The site remained unchanged until 2007 when some ground works along the perimeter of the site are visible. By 2017 a Gas Installation (AGI) was constructed in an area adjacent and to southwest of the site, and by 2018 a carpark and what appears to be a perimeter road were added. By 2019 the area adjacent, and to the east, was subject to groundworks with archaeological sites being excavated visible. By the end of 2019, backfilled test trenches at the location of a ring ditch (LH012-101) are visible and excavated archaeological features in the very southwest corner of the current site can also be seen. At this time, a haul road runs through a portion of the site. By 2020 the southwest corner of the current site was used for soil tipping with large mound present.

2.3 Archaeological & Historical background

The site is located within the townland of Haynestown (Baile Héine), in the Barony of Dundalk Upper and the Civil Parish of Haynestown. An examination of the Placenames Database of Ireland (www.logainm.ie) can reveal important information about the natural and cultural heritage of an area. The earlier name of the townland was recorded in 1301 as Felde (field), and derivatives of this name were used until 1494 when the name Fellda al. Haeneston was noted. It was suggested by O'Donovan (1836) that Hayne is a family name. However, the element Héin (e) might have derived from Middle English Haene/hean, meaning poor, wretched (logainm.ie).

The monuments listed in the Record of Monuments and Places (RMP) and the results of investigations carried out in this area clearly demonstrate that the surrounding landscape is made up of a mosaic of different periods of historic and prehistoric activity. The features within the modern landscape serve as reminders and indicators of past land use practices and cultural changes. Each period of history creates and adapts the landscape to suit and reflect its own cultural significance on the landscape.

The nearest archaeological monument is a ring ditch (LH012-101) that was identified as a cropmark on aerial photography take by Dr. Gillian Barrett (GB89.I.22). It is located adjacent and to the north of the site. Monuments known as 'barrows' emerged towards the end of the Neolithic and the beginning of the Bronze Age. These can be defined as earthen or earth/stone construction mounds with a surrounding ditch or ditches, sometimes with a low external bank, typically less than 30 metres in diameter and most commonly associated with cremation burials (O'Sullivan and Downey 2012). In 2002, in advance of the gas pipeline works from North Dublin to Limerick, ring-diches/barrows were excavated at Flemingtown, Co. Meath, Dalystown 1, Co. Westmeath, Knockuregare, Co. Limerick and Rath, Co. Dublin (Grogan et al. 2007). All of these sites had substantial ditches, the largest having an external diameter of 38.75m. The excavations provide evidence for this type of funerary site occurring

throughout the Bronze Age (2450–800 BC) and highlighted the significance of liminal space for death and burial in the form of ceremonial enclosures. McGarry (2009) states that of all the barrows excavated in Ireland, about half of them have produced the remains of a single person, most commonly found under the mound and central to the barrow. Almost all sites, however, produce cremated human remains spread throughout the fill of the barrow ditches; as can be seen at sites such as Ballybeen, Co. Antrim (Mallory 1984) and Ballydribbeen, Co. Kerry (Dunne 2003). Another interesting feature of barrows is the presence or absence of an 'entrance' or break in the ditch, which provides a causeway into the monument. Entrances are present in a number of ring-ditches and ring-barrows and although the entrance may be orientated in any direction there is a clear preference for them facing either east or south-east. It must be noted, however, that there are also many instances were entrances are not present, such as Donacarney, Co. Meath (Stirland 2017).

One of the most frequent field monuments found within this area of County Louth are enclosures and souterrains, the latter features often associated with ringforts. Ditched enclosures are seen in the form of ringforts and non-circular enclosures. The Ringfort, as the name suggests, implies a circular enclosure with a minimum of one ditch and possible accompanying banks. They were generally circular, measuring circa. 24 – 60 metres in diameter. Early Irish laws stated that circularity was a feature of the model ringfort (Stout 1997).

To the south of the site, Enclosure (LH012-0102) and associated souterrain (LH012-055----) are registered; the latter was exposed during ploughing. The southeast portion of this enclosure (recorded as C19) and two associated souterrains exposed within (C811, C805) were excavated under licence 19E0060, and dated to early medieval period. Furthermore, to the east, enclosure C1104 with souterrain C1233 were excavated.

The majority of early medieval ditched enclosures date to the sixth to ninth centuries AD, and such is the case with both C19 and 1104, and we see a significant decline in their use in the tenth century (O'Sullivan & Nicholl 2010). Though a site in Laytown, Co. Meath (McConway, 2002) could have a fourth-century date, other sites such as Ballynacarriga, Co. Cork (Noonan et. al, 2004) and Raystown, Co. Meath (Seaver 2005) were probably occupied from the 5th century well into the 11th century.

Ditched enclosures are generally regarded as enclosed farmsteads, and the defences are thought to have been built in order to protect against cattle raids (Stout 1997). Some have provided little evidence for structures, suggesting the enclosure was used for storing cattle, known as a 'bodun', though the majority provide evidence to suggest they were inhabited settlements, with houses, farmyards, outbuildings and animals (O'Sullivan & Nicholl 2010). Excavated items retrieved from ringforts are of a domestic, craft or agricultural nature (Monk, 1995). Some larger sites, such as Raystown, Co Meath fulfilled many functions; there was evidence for animal husbandry, cereal and grain processing, milling, burial and metallurgy (Seaver, 2016).

Ditched enclosures are one of the most common field monument in Ireland. The majority of ditched enclosures were univallate with one bank and fosse. In many cases, the banks do not survive. There are, however, bivallate enclosures, for example, Cloonaboy, Co. Mayo (Gillespie & Kerrigan, 2010) and multivallate enclosures, such as Garranes, Co. Cork (O'Riordan 1942). While ringforts were generally 24 – 60 metres in diameter, the majority of non-circular enclosures were between 50m and 70 metres in diameter. Ditched enclosures tend to be situated on sloping or well-drained hilly ground with good views (Stout, 1997). Ditched enclosures usually are found in clusters within a townland (Edwards, 1990).

These ditched enclosures usually have an entrance at the southeast. This is to avoid the prevailing cold westerly and northerly winds that the enclosure would be exposed to Stout 1997). The entrance passage at Rath II at Ballypalady, Co. Antrim ranged from 0.76m at the outer end to 1.5m at the inner opening, suggesting it was not intended for keeping large livestock (O'Sullivan & Nicholl, 2010).

Evidence from excavations shows that enclosing ditches were, in some cases, allowed to silt up and had refuse deliberately dumped into them. Layers of slag were dumped into the ditch at Lisleagh, Co. Cork (Monk,1995).

Many sites, like that at Lissachiggel, Co. Louth had either cobbles or paving stones providing a dry passage into the enclosure. These entrances were known in early Irish literature and legal sources as the 'airdrocht' and were to be kept clean (O'Sullivan & Nicholl, 2010). O'Sullivan wrote that it was not unusual to see pathways laid within the interior to steer movement towards a particular direction and "upon entering the site, a person was often persuaded by laid pathways to move directly and immediately to the house doorway" (ibid.). The pathway was meant to be kept clean and dry, and likely, ditches and gullies would function as drainage features to keep the area dry.

Early Medieval houses within ditched enclosures tended to be circular or round, made of stone or post-and -wattle walls. The roofs were thatched with reeds, turf or straw. According to the eight- century law text Críth Gablach, a typical farmer's house was 6-8 metres in diameter. Archaeological evidence shows that the majority were 4 to 5 metres in diameter, and some were significantly larger, at 6 to 10 metres in diameter (ibid). As pointed out by Mc Cormick, Kerr, Mc Clatchie and O'Sullivan, because of the basket-like construction, any recuts or changes to the early medieval houses are rarely seen in the archaeological record (McCormick, Kerr, McClatchie, O'Sullivan 2011). It was likely that the lifespan of a medieval house would have lasted for just a short period of time (20 to 30 years); with good maintenance, a house could have stood for 50 to 60 years (O'Sullivan & Nicholl, 2010).

Associated with the enclosures and often found in its environs are fire pits, storage pits, refuse pits, a cooking pit and cereal-drying kilns. O'Sullivan and Nicholl wrote that pits are "one of the more enigmatic elements to be found within the enclosure…their function…difficult to discern. They would have been used for a variety of purposes; probably reused and cleaned-out many times and countless, no doubt, had multiple functions over their lifetime"

(ibid.). According to Mc Cormick, Kerr, Mc Clatchie and O'Sullivan cereal drying kilns are generally not associated with ditched enclosures, however there are several examples of sites with associated kilns, such as Johnstown 1, Co. Meath, Gortygrigane, Co. Tipperary and Camlin, Co. Tipperary (Cited in McCormick, Kerr, McClatchie & O'Sullivan 2011). Furthermore, a total of 11 cereal drying kilns, 9 figure-of-eight type were excavated at Haggardstown to the east and southeast of the current site. Three kilns were in an excellent state of preservation with their sub-surface stone-lined walls and chambers intact, with the other eight kilns consisting of a simple earth cut kiln with little or no evidence of internal stone structures. Kiln distribution appears to be concentrated closer to enclosure C19.

Associated with the enclosures was a network of field systems defined by a clear pattern of linear ditches, some radiated out from LH012-102 recorded as enclosure C019 and annexes and enclosure C1104, however further analysis suggests some pre-dated the enclosures. Evidence suggests that some of the ditches had origins in the Bronze Age, such as C063, however, it appears that these field systems were adapted and used in the Early Medieval period. Small internal divisions were noted suggesting management of livestock/stocking pens, such as the E-shaped feature recorded to the east of the site in Area 5, while others functioned as water management with changes in height and steps recorded.

2.4 Previous archaeological investigations

The site lies within a larger area that was subject to a geophysical survey in early 2023 (23R0044; Murphy, 2023; Figure 5). The survey recorded the unexcavated northern portion of an enclosure (identified as C19 in previous archaeological investigations under licence 19E0060) and associated linear and curvilinear features. Other linear anomalies present within the area surveyed are in apparent alignment with the previously excavated ditches interpreted as Early Medieval field systems. Bands of magnetic disturbance were also noted; these correspond with areas that were trafficked by machinery visible on aerial imagery. An array of scattered smaller anomalies throughout the survey area could represent spreads, pits, kilns and/or structures. These are likely archaeological in nature due to their location; however, some might represent iron present in the topsoil.

The site was subject to archaeological investigations in 2004, 2007, 2008, 2014 and 2019-2020. The earliest investigations included a geophysical survey in 2004 with fourteen anomalies detected; eight were deemed of archaeological potential. A resistivity survey by Earthsound was carried out in 2007 to determine the extent of the souterrain, with a circular anomaly interpreted as a small enclosure. Test trenching under licence 08E0486 identified no features of archaeological significance. However, only 20 trenches were excavated during a spell of very dry weather (Byrne, M. 2008). In 2014, testing of the above-ground installation within the southwest portion of the site identified a number of pits/post holes representing prehistoric structures; these were later excavated (14E0027). Based on artefactual material, the site was dated to the late Neolithic period; this was supported by radiocarbon dating - a date range of 4093+/-33 BP (UBA 26515), calibrated to 2862-2498 BC (2 sigma) was

obtained for the site. Finds retrieved included small fragments of two undecorated Groove Ware bowls, hammer stones, burnt and unburnt flint, scrapers, blades, and burnt bone recovered, suggesting domestic setting where flint tools were being produced (Licence No. 14E0027, McLoughlin, 2014).

In 2019 geophysical survey (19R0043) and investigation (19E0060), including testing, monitoring and excavation, were undertaken between early 2019 and mid-2020 (Stirland, forthcoming). As a result of these investigations, a complex landscape that contained evidence of prehistoric activity ranging in date from the Middle Neolithic through to the Middle Bronze Age, including cremation burials of Middle Bronze Age and Iron Age date, as well as a later, Early Medieval settlement and its associated field systems, was recorded (Figures 5-6). Monuments identified included a prehistoric enclosure, burials/cremation pits of the Bronze Age and Iron Age and two early medieval enclosures with associated features, including souterrains, kilns, pits, posts, and field systems, as well as causeway/trackway were exposed and excavated.

The location of the ring ditch (LH012-101) was subject to a geophysical survey (Area 1) and test trenching. Test trenches were excavated to a depth of between 0.3-0.64m, and the presence of two concentric ditches C1069 and 1070 was confirmed (Figure 5). Pottery was recovered from the outer ditch and identified as of the middle Bronze Age date. This monument was not excavated, and placed in a protective buffer zone and remains preserved in situ. An Enclosure (LH012-0102) and associated souterrain (LH012-055) are registered within the site; however, the southeast portion of this enclosure (recorded as C19) and two associated souterrains exposed within (C811, C805) were also excavated under licence 19E0060 and are located to the east of the site. It appears that the souterrain (C805) might represent monument LH012-055 based on the description available (SMR file) and the presence of modern agricultural fertiliser bags securing the capstones identified during investigations. Artefactual material recovered from the fills of the enclosure (C19) included souterrain ware, brooch pins, ring pins, stick pins, weaponry, and equestrian and domestic finds, this suggests the main use of the enclosure LH012-0102 was between the six and ninth centuries. Associated with the enclosures and excavated were four annex enclosures, associated field system, cereal drying kilns that dated between 890-1020AD, mostly figure-of-eight type, and other associated features such as linears, pits, post holes, ditch/gullies and metaled surface. The Souterrain C811 was L shaped, measuring 16m in length and 1m in width, while C805 was curving, 22m in length and also 1m in width.

The northwest portion of the enclosure was not excavated and remains in situ, the current site is in an area immediately to the west and southwest of it. Two linear features, C835 and C815, cutting the western portion of C19 were partially excavated, both extend within the current site (Figure 7). A section of C835 excavated in 2019 measured 15m in length, with an average width of between 0.94m and 1.20m recorded. The features appeared concaved with gradual sloping sides and a flattened/rounded base in section and profile. Two clusters of features were located to the north and south of it; these were stakeholes located within sub-circular pit C844 with two

postholes to the north and stakes and postholes/pits to the south of this ditch. A 21m section of a linear ditch C815 aligned roughly east-east was also excavated. The width of 1.25m and a maximum depth of 0.50m was recorded. The southwest portion of the current site was excavated previously (Gas pipeline Area). Here a cobbled mettled surface (C1020) interpreted as a part a trackway was recorded (it had a recorded length of 20m north-south, a width of between 4.50m -6.30m east-west); in addition to it, linear features and cremation pits were also excavated. Furthermore, two parallel linear ditches (C582 and C567 with an internal gap of 9m) appear to continue within the very southern portion of the site (to the east of Gas Installation (AGI). Where excavated, C582 was recorded to measure 0.85m in width and 0.34m in depth while C567 was 0.99m in width and 0.28m in depth.

2.5. Protected Structure and National Inventory of Architectural Heritage (NIAH)

There are no Protected Structures located within the site as listed in the *Louth County Development Plan 2021-2027*. The nearest such monument is Haynestown Stud (RPS No. LHS012-050), also registered in the National Inventory of Architectural Heritage (NIAH Reg. No. 13901217), located c. 265m to the northwest of the site, on the other side of the railway line.

2.6. Recorded Monuments

Two archaeological monuments, an enclosure (LH012-102----) and souterrain (LH012-055----) are registered within the site. However, investigations carried out in 2019 suggest that these are located to the east of the site. The south extent of this enclosure, including two souterrains, one of which (C805) might represent souterrain LH012-055---- were excavated under licence 19E0060 along with other associated features. The north portion of the enclosure remains in situ. The area proposed to be assessed at present lies just to the north of a Habitation site (LH012-116) dating to the late Neolithic period identified as a result of archaeological investigations and since excavated on behalf of Bord Gáis Networks (14E0027 McLoughlin, 2014).

The following is a list of monuments located within the site environs (Figure 2, Table 1). These descriptions are derived from the National Monuments Service Archaeological Survey Database (http://maps.archaeology.ie/historicenvironment/).

Table 1: Recorded Monuments in the environs of the site

LH012-102----	**Enclosure**
Aerial photograph (GB89.I.22) shows cropmark of a curvilinear enclosure which coincides with SMR 55 (souterrain); in close proximity to a ring-ditch.	
LH012-101----	**Souterrain**

Situated on slight rise in arable land. Lintels of drystone-built passage 0.1m below ground surface encountered during ploughing. Structure as yet unopened.	
LH012-101----	**Ring-ditch**
Aerial photograph (GB89.I.22) shows cropmark of a ring-ditch defined by two widely spaced fosses; in close proximity to a cropmark of a curvilinear enclosure.	
LH012-116----	**Habitation site**
Archaeological testing (14E0027) on behalf of Bord Gáis Networks identified habitation material in February 2014, which was further investigated under the same licence by Gill McLoughlin when two groups of pits and two larger outlying pits were recorded. In all eight pits (diam. up to c. 0.8m) were excavated, but further material probably lies outside the excavated area of (dims c. 10m x c. 8m). The lithic and pottery assemblage suggests a late Neolithic date, which is supported by a C14 date of 2862-2498 Cal. BC. (McLoughlin 2014)	

2.7. Stray Finds

The Topographical Files of the National Museum of Ireland list one find consisting of ceramic pottery sherd. The find is registered as retrieved from the surface of the ploughed field close to souterrain (NMI Reg. No. 1978:123) and described as 'Orange fabric with grey-orange core. Everted rim with pinched applied decoration below lip. Worn remains of orange/brown glaze on exterior'. Based on the description, the find appears to represent post-medieval date pottery sherd.

3. ARCHAEOLOGICAL ASSESSMENT

3.5. Methodology

Test excavation was carried out in accordance with the *IAI Code of Conduct for Archaeological Excavation (IAI 2006)*. The test trenches targeted anomalies discovered during geophysical survey and were positioned in order to assess the overall potential of the site. The test trenches were excavated to the natural. A mechanical excavator with 1.8m wide ditching bucket was used to assist in the removal of topsoil and any made ground in horizontal levels of not more than 0.1m in thickness under strict archaeological supervision of the author. Features of archaeological significance were uncovered during testing, where appropriate, a section was excavated by hand to establish their depth, extent and nature. The features were cleaned and recorded (by plan, photographs, levels, feature sheets using Survey 123).

All excavated trenches were recorded using digital photography. Digital photography images were taken using a high-resolution digital camera with a minimum resolution of 10 Megapixels.

3.5.1. Finds retrieval

Soil from excavated trenches was examined for finds both macroscopically and with a Garrett ATX metal detector (Detection Licence No. 23R0256). No finds were recovered.

3.3 Results

A total of 14 test trenches were excavated within the site (Figures 7-11; Plates 1-18). The test trenches targeted anomalies discovered during the geophysical survey (22R0256) and were excavated to assess the overall potential of the site. Each trench measured 1.8m in width, and in total, 996m of linear trench were excavated. Topsoil consisted of a mid-brown clay with occasional agricultural rubbish such as plastic. The natural was an orange/grey clay with variation in stone inclusions. While most areas had significant greywacke/shattered stone, some small areas of clean clay were found. A description of each test trench can be found in Table 2.

Portions of the site were unavailable for testing and some trenches were moved or realigned to compensate. This was mainly done in the southern area of the site where underground services and two spoil mounds were identified and avoided (Plate 20). At the far north end, a modern manhole was found which caused a reduction in the length of Trench 11. Additionally, Trenches 4-6 were split into north and south sections due to a tree lined field boundary. The complete length of Trench 5 had evidence of modern ground disturbance. This disturbance would have removed all traces of any archaeological features.

Archaeological testing identified at least 31 individual features on the site (Figure 12). These were dominated by pits and linear ditches. A total of 15 pits were found (C8, C10, C13, C15, C16, C17, C19, C21, C25, C27, C28, C38, C42, C45 and C55). While some of these pits were isolated, there were areas where some irregular clustering could be found such as the northeast end of Trenches 2-3 & 12-14. Ten linear ditches were identified throughout the site (C24, C29, C30, C31, C33, C34, C36, C47 and C50/51). Half of these were orientated east-west and most likely represent linear field systems. At least four of the ditches are continuations of features identified in previous excavations in the surrounding area. Other features include two possible postholes (C23 & C39), a spread (C40), a hearth (C4), agricultural furrows (C36) and a metaled surface (C32). A summary of all features can be found in Table 3.

Table 2: Description of test trenches at Haynestown, Co. Louth

Trench Number	Length (m)	Trench depth (m)	Description
1	114	0.25-1.0	Northwest to southeast aligned test trench excavated along the eastern boundary of the site (Plate 1). The natural consisted of shattered greywacke in an orange/grey clay. One feature, a NW-SE orientated ditch (C34) was identified in the northwest corner of the trench. A 5m offset running west was excavated in order to find the full extent of the feature.
2	51	0.3-0.6	Northwest to southeast aligned test trench excavated on the eastern side of the site (Plate 2). The natural consisted of an orange/grey clay with fractured stone. Four features were exposed. These comprised of 3 pits (C4, C8, C10) and a possible posthole (C13).

Trench Number	Length (m)	Trench depth (m)	Description
3	55	0.4-0.5	Northwest to southeast aligned test trench in the centre of the site (Plates 3-4). Trench 3 was split into two sections (a north section and a south section) as an existing field boundary running NE-SW cut through the middle. The north section natural was stony grey/brown/orange clay. Two features were identified in the north section, C15 and C16. No archaeological features were found in the south section.
4	55	0.5	Northwest to southeast aligned test trench in the west side of the site (Plates 5-6). Trench 4 was split into two sections (a north section and a south section) as an existing field boundary running NE-SW cut through the middle. The natural comprised of a stony orange/grey clay. No features were identified in the north section. Four features were found in the south section, three pits (C19, C21 & C23) and a shallow east/west linear (C24).
5	48	0.2-0.5	Northwest to southeast aligned test trench in the western side of the site (Plates 7-8). Trench 5 was split into two sections (a north section and a south section) as an existing field boundary running NE-SW cut through the middle. The natural consisted of an orange/grey stony clay with outcropping shattered greywacke or shale. No archaeological features were identified in the north section. In the south section, three large, square modern concrete bases were identified. This area of the trench appears to have been subjected to significant disturbance. No archaeological features were identified in the south section.
6	63	0.25-0.45	Northeast to southwest aligned test trench in the southern end of the site (Plates 9-10). The natural consisted of a stony orange/grey clay. At least seven cultivation furrows (C26) running roughly north/south were visible in the middle section of the trench. A large pit (C25), heavily stained with charcoal, was exposed near east end of trench. A small offset extension of the trench was excavated northwards in order to identify the full extent of the feature. At least three modern boreholes were found within the trench, possibly associated with the concrete bases found in Trench 5.
7	46	0.25-0.45	Northeast to southwest aligned test trench in the southern end of the site (Plate 11). Four features were identified in this trench, two pits (C27 & C28) and two roughly NE to SW aligned linears (C29 and C30). The linears, both found at the west end, appear to cut each other.
8	21	0.3	North-northeast to south-southwest aligned test trench in the southern end of the site (Plate 12). Trench 8 was realigned due to the presence of a previously unknown underground service cable running NW-SE. Three features were identified in this trench, two parallel ditch (C31 & C33) and a metaled surface (C32). These features appear to be a continuation of a metaled trackway identified in previous excavations in 2019 (see Section 2.4).
9	31	0.4	West-northwest to south-southeast aligned test trench in the southern end of the site (Plate 13). The natural consisted of a stony orange/grey boulder clay and shale. Trench 9 was also realigned due to the presence of a previously unknown underground service cable running NW-SE. No archaeological features were identified.

Trench Number	Length (m)	Trench depth (m)	Description
10	30	0.4	Northwest to southeast aligned test trench in the southern end of the site (Plate 14). The natural consisted of a stony orange/grey stony clay. No archaeological features were identified.
11	125	0.4-1.0	Northwest to southeast aligned test trench in the northeast end of the site (Plate 15). The north end was shortened due to a manhole. The natural consisted of an orange/brown to grey boulder clay with abundant stone throughout. A natural hollow or dip was found in the northern half of the trench which was also found in Trenches 12-14. Three east/west linears (C50, C51 & C54) and one large pit (C55) were found in this trench.
12	123	0.4-1.0	Northwest to southeast aligned test trench in the northeast end of the site (Plate 16). The natural consisted of an orange-grey clay with shale and shattered stone. A natural hollow or dip was found in the northern half of the trench which was also found in Trenches 11, 13-14. An east/west orientated linear (C44) was found at the upper level of the slope of the hollow corresponding with the geophysical survey results. This linear was also identified in Trenches 13 & 14. Another east/west orientated ditch (C47) was identified near the south end of the trench and was also found in Trench 13 and corresponded with the Geophysical Survey results. A pit (C46) was also identified between the two linears.
13	118	0.35-0.8	Northwest to southeast aligned test trench in the northwest end of the site (Plates 17-18). The natural consisted of an orange-grey clay with shale and shattered stone. A natural hollow or dip was found in the northern half of the trench, which was also found in Trenches 11-12, 14. An east/west orientated linear (C41) was found at the upper level of the slope of the hollow corresponding with the geophysical survey results. This linear was also identified in Trenches 12 & 14. Another east/west orientated ditch (C43) was identified near the south end of the trench and was also found in Trench 12 and corresponded with the Geophysical Survey results. A pit (C42) was also identified between the two linears.
14	116		Northwest to southeast aligned test trench in the northwest end of the site (Plate 19). The natural consisted of an orange-grey clay with shale and shattered stone. A natural hollow or dip was found in the northern half of the trench, which was also found in Trenches 11-13. Four features were identified in this trench and all were clustered at the north end. An east/west orientated linear (C36) was found at the upper level of the slope of the hollow corresponding with the geophysical survey results. This linear was also identified in Trenches 11-13. Three other features were found just south of the linear. They include (C38), a large pit (possibly representing a kiln), a post hole (C39) and an irregular spread (C40).

Table 3: List of features identified during archaeological testing at Haynestown, Co. Louth

Context	L(m)	W(m)	D(m)	Basic Description
C1				Topsoil
C2				Natural
C3				Unused
C4	1.1	0.75	0.2	Cut of possible oval shaped hearth orientated north/south at the northwest end of Trench 2 (Plates 21-22). It had a gentle break of slope at the top and a gentle break of slope at the base leading to a flat base. It contained three fills, upper fill C5, middle fill C4 and basal fill C7.
C5	1.1	-	0.05	Upper fill of possible hearth C4 in Trench 2. It was a friable mid-grey/brown silty clay found above C6. No finds were recovered.
C6	0.95	-	0.10	Middle fill of possible hearth C4 in Trench 2. It was a friable dark grey/black silty clay found below C5 and above C7. It contained frequent charcoal and occasional burnt bone. No finds were recovered.
C7	0.7	-	0.5	Basal fill of possible hearth C4 in Trench 2. It was a friable mid-red/orange oxidised clay found below C6. No finds were recovered.
C8	0.75	0.75	-	Cut of sub-circular pit at the northwest side of Trench 2 (Plate 23). It had a single fill visible on the surface (C9)
C9	0.75	0.75	-	Fill of pit C8 in Trench 2. C9 was a friable mid-grey/brown silty clay. Frequent small, angular stones were visible within the fill. No finds were recovered.
C10	0.8	0.8	0.4	Cut of sub-circular shaped (possibly modern) pit at the northwest side of Trench 2 (Plates 24-25). It had a sharp break of slope at the top, concave sides, and a gentle break of slope at the base. It contained two fills, upper fill C11 and a lower fill C7.
C11	-	0.8	0.2	Upper fill of pit C10 in Trench 2. It was a friable mid-grey/brown silty clay found above C12. It contained moderate small subangular stone. A single sherd of post-medieval creamware was recovered from this fill suggesting it was modern.
C12	-	0.55	0.2	Lower fill of pit C10 in Trench 2. It was a friable mid-grey/brown silty clay found below C11. It contained frequent medium angular stone. No finds were recovered
C13	0.4	0.3	-	Cut of small oval shaped pit at the southeast side of Trench 2 (Plate 26). It had a single fill visible on the surface (C14)
C14	0.4	0.3	-	Fill of small oval shaped pit C13. The fill was a friable mid-grey/brown silty clay with frequent small subangular stone visible on the surface. No finds were recovered.

Context	L(m)	W(m)	D(m)	Basic Description
C15	2.3	0.9	0.2	Cut of rectangular shaped pit at the northwest end of Trench 3 (Plate 27). It was orientated northwest-southeast. It contained a single fill, C17.
C16	0.9	0.3	-	Cut of 'kidney bean' shaped pit immediately southeast of Pit C15 at the northwest end of Trench 3 (Plate 28). It had a single fill visible on the surface (C18)
C17	2.3	0.9	0.2	Fill of rectangular shaped pit C15. The fill was a friable mid-grey/brown silt with frequent small subangular stone. C17 appeared to be the sole fill of pit C15. No finds were recovered.
C18	0.9	0.3	-	Fill of pit C16. The fill was a friable mid-grey/brown silt with frequent small subangular stone. No finds were recovered.
C19	0.75	0.75	-	Cut of circular pit in the northwest end of the south section of Trench 4 (Plate 29). It was located 1m northwest of pit C21. It had a single fill visible on the surface (C20).
C20	0.75	0.75	-	Fill of pit C19. The fill was a friable mid-grey/brown silty clay with frequent small subangular stone. No finds were recovered.
C21	0.55	0.55	-	Cut of circular pit in the northwest end of the south section of Trench 4 (Plate 30). It was located 1m southeast of pit C19. It had a single fill visible on the surface (C21).
C22	0.55	0.55	-	Fill of pit C21. The fill was a friable mid-grey/brown silty clay with frequent small subangular stone. No finds were recovered.
C23	0.3	0.3	-	Cut of small pit or posthole in the northwest end of the south section of Trench 4 (Plate 31). It was filled by a friable, dark grey/brown silty clay. Frequent small angular stone and occasional charcoal was visible on the on the surface of the fill.
C24	1.8	1.6	0.1	Cut of shallow linear running east/west in Trench 4 (Plate 32). It had a shallow break of slope at top and base, concave sides leading to a flat base. It contained a single fill which was a friable, mid grey/brown silty clay with occasional small subangular stones.
C25	1.6	1.6	-	Cut of a large subcircular pit at the eastern side of Trench 6 (Plate 33). It was filled with a friable mid-brown silty clay with significant charcoal on the west side.
C26	1.8	0.4	-	Cut of a series of agricultural furrows running north/south in the centre of Trench 6 (Plate 10). Seven irregularly spaced furrows were identified spanning c. 9m. Each had an identical fill comprising of a friable mid-brown silty clay.
C27	1.0	0.8	-	Cut of a circular pit at the centre of Trench 7 (Plate 34). It was located immediately east of pit C28. It was filled with a friable mid-brown silty clay.

Context	L(m)	W(m)	D(m)	Basic Description
C28	0.8	0.6	-	Cut of an oval shaped pit at the centre of Trench 7 (Plate 34). It was located immediately west of pit C27. It was filled with a friable mid-brown silty clay.
C29	12.0	0.7	-	Cut of a linear running northwest/southeast at the southwest end of Trench 7 (Plate 35). C29 cuts, or is cut by, another linear (C30) running northeast/southwest. It was filled with a friable mid-brown silty clay.
C30	9.0	1.2	-	Cut of a linear running northeast/southwest at the southwest end of Trench 7 (Plate 35). C30 cuts, or is cut by, another linear (C29) running northwest/southeast. It was filled with a friable light brown-grey/orange silty clay.
C31	1.8	0.4	-	Cut of a linear running southeast/northwest in Trench 8 (Plates 36-37). C31 is the eastern ditch of two parallel ditches between a metaled surface (C32). This trackway is the continuation of a trackway identified in previous excavations (see Section X). It was filled with a friable light brown-grey/orange silty clay.
C32	0.6	1.4	-	Metaled surface located between two parallel linear ditches (C31 & C33) in Trench 8 (Plates 36-38). The surface comprises of small compacted rounded and subrounded stone. C32 is the continuation of the surface of a trackway identified in previous excavations (see Section X).
C33	1.8	c. 0.4	-	Cut of a linear running southeast/northwest in Trench 8 (Plates 36-37). C33 is the western ditch of two parallel ditches between a metaled surface (C32). This trackway is the continuation of a trackway identified in previous excavations (see Section X). Unlike C31, C33 was more ephemeral, and the cut was difficult to discern.
C34	1.8	2.4	0.2	Cut of a north/south linear ditch identified in a westerly extension of the northern end of Trench 1 (Plates 38-40). It had a gradual break of slope on the eastern side and sharper break of slope on the west. It had gently sloping sides leading to a flat base. C34 contained a single fill, C35.
C35	1.8	2.4	0.2	Fill of linear ditch C34. The fill was a friable mid-grey/brown silty clay with frequent small to medium angular and subangular stone. No finds were recovered.
C36	1.8	1.9	0.2-0.25	Cut of a shallow linear ditch running northeast/southwest (Plates 41-42). It was identified at the north end of at least three test trenches, Trenches 12-14. It had a gentle break of slope at the top and at the base, which was flat. It contained a single fill, C37 (based on excavation of a section of the ditch in Trench 14).
C37	1.8	1.9	0.2-0.25	Fill of linear ditch C36. The fill was a friable mid-grey/brown silty clay with occasional small subangular stone. No finds were recovered.

Context	L(m)	W(m)	D(m)	Basic Description
C38	1.1	0.8	-	Cut of oval shaped pit at the north end of Trench 14 (Plate 43). It was located immediately south of spread C40. The feature was only partially exposed by the test trench with the eastern extent unknown. The fill was a dark brown/black silty clay with some areas of reddish clay suggestive of burning.
C39	0.22	0.22	-	Cut of a small circular pit/posthole at the north end of Trench 14 (Plate 44). The fill was a compact mid-brown silty clay.
C40	1.6	1.2	-	Cut of large pit or possible spread at the north end of Trench 14 (Plate 43). It was located immediately north of Pit C38. It was filled with a compact mid-brown silty clay with frequent small angular and subangular stone.
C41	1.8	0.6	-	Cut of a linear ditch running northeast/southwest (Plates 45). It was identified at the north end of Trench 13. However, it is most likely the continuation of C36 identified in Trench 14. It was filled with a compact mid-brown silty clay with frequent small to medium subangular stone.
C42	0.8	0.6	-	Cut of an oval shaped pit at the north end of Trench 13 (Plate 46). It was filled with a loose mid-brown silty clay with frequent small and medium angular and subangular stone.
C43	1.8	0.8	-	Cut of a linear ditch running northeast/southwest (Plate 47). It was identified at the centre of at least three test trenches, Trenches 11-13. It was filled with a compact mid-brown silty clay with frequent small subangular stone.
C44	1.8	0.8	-	Same as C36/C41
C45	0.5+	0.45	-	Cut of possible small pit at the north end of Trench 12 (Plate 48). The feature ran into the western baulk; thus, its true extent is unknown. It was filled with a compact, mid grey/red silty clay with frequent small subangular stones.
C46				Same as C43
C47	1.8	0.6	-	Cut of a linear ditch running northeast/southwest (Plate 49). It was identified at the southeast end of Trench 12. It was filled with a loose mid-brown silty clay with frequent small subangular stone. This feature did not appear to extend into parallel trenches.
C48				Not used
C49				Not used
C50	1.8	0.7-0.95	-	Cut of east/west linear ditch at the very northwest end of Trench 11 (Plate 50). It was located 1.2m north of another parallel ditch C51. C50 (or C51) is the likely continuation of C36 identified in Trenches 12-14. It was filled with C52.

Context	L(m)	W(m)	D(m)	Basic Description
C51	1.8	1.0-1.2	-	Cut of east/west linear ditch at the very northwest end of Trench 11 (Plate 50). It was located 1.2m south of another parallel ditch C55. C51 (or C55) is the likely continuation of C36 identified in Trenches 12-14. It was filled with C53
C52	1.8	0.7-0.95	-	Fill of linear ditch C50. It consisted of a brown fine clay with stone inclusions. A fragment of an animal tooth was found on the surface.
C53	1.8	1.0-1.2	-	Fill of linear ditch C51. It consisted of a brown fine clay with stone inclusions. Several small fragments of cremated bone were found on the surface.
C54				Same as C43
C55	1.4	1.0		Cut of large pit at the southeast end of Trench 11 (Plate 51). The full extent of the feature is unknown as it ran beyond the eastern edge of the trench. It was filled by a loose dark brown clay with frequent charcoal inclusions and occasional small angular stone.

4. MATERIAL CULTURE

4.1 Artefacts

No artefacts were retained during the test trenching programme.

4.2 Palaeoenvironmental samples

No samples were taken during the test trenching programme.

4.3 Animal bone

No animal bone was retained during the test trenching programme. However, animal bone was identified in the fill (C52) of linear C50 in Trench 11 and left *in-situ*.

4.4. Human bone

No human bone was identified during the test trenching programme.

5. DATING

No conclusive dating evidence was recovered such as artefacts.

6. DISCUSSION

Archaeological test trenching at Mullagharlin Road, Haynestown confirmed the presence of archaeological remains identified by geophysical survey 23R0452. The remains of at least 31 individual features were identified. These included 15 pits, 10 linear ditches, 2 possible postholes, a spread, a hearth, agricultural furrows and a metaled surface.

Several features identified during testing are continuations of features excavated in 2019-2020 under Licence 19E0061. This includes a new section of a linear metaled trackway which comprised of two parallel linears (C31 & C33) flanking a metaled surface (C32). These features correspond to features C1044, C1019 & C1020 respectively, from the previous excavations. Previous excavations show that Early Medieval field systems dominate the landscape east of enclosure LH012-102, and the current testing programme has confirmed that these field systems are also present to the west. C36, a linear identified at the northwest end of Trenches 12-14 is the western continuation of C427 from the 2019-2020 excavations. The discovery of other linear ditches such as C24, C43 & C47 suggest that these field systems may be just as extensive as those to the east. While the majority of linear ditches run east-west, C34 in Trench 1 was orientated north-south. It is most likely the southern return of linear C835 from previous excavations and it is predicted to run southeast and join linear C617.

Although mostly dispersed, other features found during testing likely represent a continuation of settlement activity spanning the prehistoric period to the medieval.

7. IMPACT

The proposed development will significantly reduce the ground level of the site which will impact on the archaeological features identified during test trenching. As the footprint of the proposed water treatment plant and associated access road will cover most of the site, mitigation by in-situ preservation is not viable. Thus, mitigation should be by preservation by record (excavation).

8. RECOMMENDATIONS

The archaeological assessment (targeted test trenching informed by geophysical survey) of linear field systems and associated features was carried out at Mullagharlin Road, Haynestown, Co. Louth. It identified the presence of archaeological remains on the site. Features of archaeological significance include pits, linear ditches, and a metaled surface.

As preservation in-situ is not possible, it is recommended that all archaeological features impacted by the proposed development are stripped of topsoil under archaeological supervision and preserved by record (archaeological excavation) in advance of construction. Furthermore, it is recommended that archaeological monitoring of all topsoil stripping and

enabling works is conducted, in order to identify any further potential subsurface archaeological features that may be present and that, where identified, these are also preserved by record (through archaeological excavation). All archaeological monitoring and excavation should be carried out by a licence eligible archaeologist working under licence from the Department of Housing, Local Government and Heritage in consultation with the National Museum of Ireland.

9. POST-EXCAVATION PROGRAMME

The post-excavation work related to this programme of archaeological test trenching is now complete and no further analysis will be necessary.

10. EXCAVATION BULLETIN

Mullagharlin Road, Haynestown, Co. Louth.

23E0452

ITM. 704120, 802977

Testing

30 August 2023

Test Trenching: Mullagharlin Road, Haynestown, Co. Louth

This summary details the results of archaeological test trenching carried out Mullagharlin Road, Haynestown, Co. Louth (ITM 704120, 802977). The testing was carried out at the request of the client to assess the archaeological potential of the site following a geophysical survey carried out by Donald Murphy in May 2021 under licence number 23R0044. The test trenching was conducted by Donald Murphy of Archaeological Consultancy Services Unit Ltd. (ACSU) between the 31st July to 8th August 2023 (licence no. 23E0452) issued by the Department of Housing, Local Government and Heritage in consultation with the National Museum of Ireland.

A total of 14 test trenches were excavated across the site. Each trench measured 1.8 m in width, and in total, 997m of linear trenches were excavated, targeting anomalies identified during the geophysical survey (23R0044).

Archaeological test trenching succeeded in identifying the remains of at least 31 individual features. These were dominated by pits and linear ditches. A total of 15 pits were found (C8, C10, C13, C15, C16, C17, C19, C21, C25, C27, C28, C38, C42, C45 and C55). While some of these pits were isolated, there were areas where some irregular clustering could be found such as the northeast end of Trenches 2-3 & 12-14. Ten linear ditches were identified throughout the site (C24, C29, C30, C31, C33, C34, C36, C47 and C50/51). Half of these were orientated east-west and most likely represent linear field systems. At least four of the ditches are continuations

of features identified in previous excavations in the surrounding area. Other features include two possible postholes (C23 & C39), a spread (C40), a hearth (C4), agricultural furrows (C36) and a metaled surface (C32).

Portions of the site were unavailable for testing and some trenches were moved or realigned to compensate. This was mainly done in the southern area of the site where underground services and two spoil mounds were identified and avoided. At the far north end, a modern manhole was found which reduced the length of Trench 11. Additionally, Trenches 4-6 were split into north and south sections due to a tree lined field boundary. The complete length of Trench 5 had evidence of modern ground disturbance. This disturbance would have removed all traces of any archaeological features.

Donald Murphy, Archaeological Consultancy Services Unit, Unit 21, Boyne Business Park, Greenhills, Drogheda, Co Louth.

11. PUBLICATION PLAN

An account of this archaeological assessment and its results will be published online as an excavation bulletin on www.excavations.ie (see Section 9).

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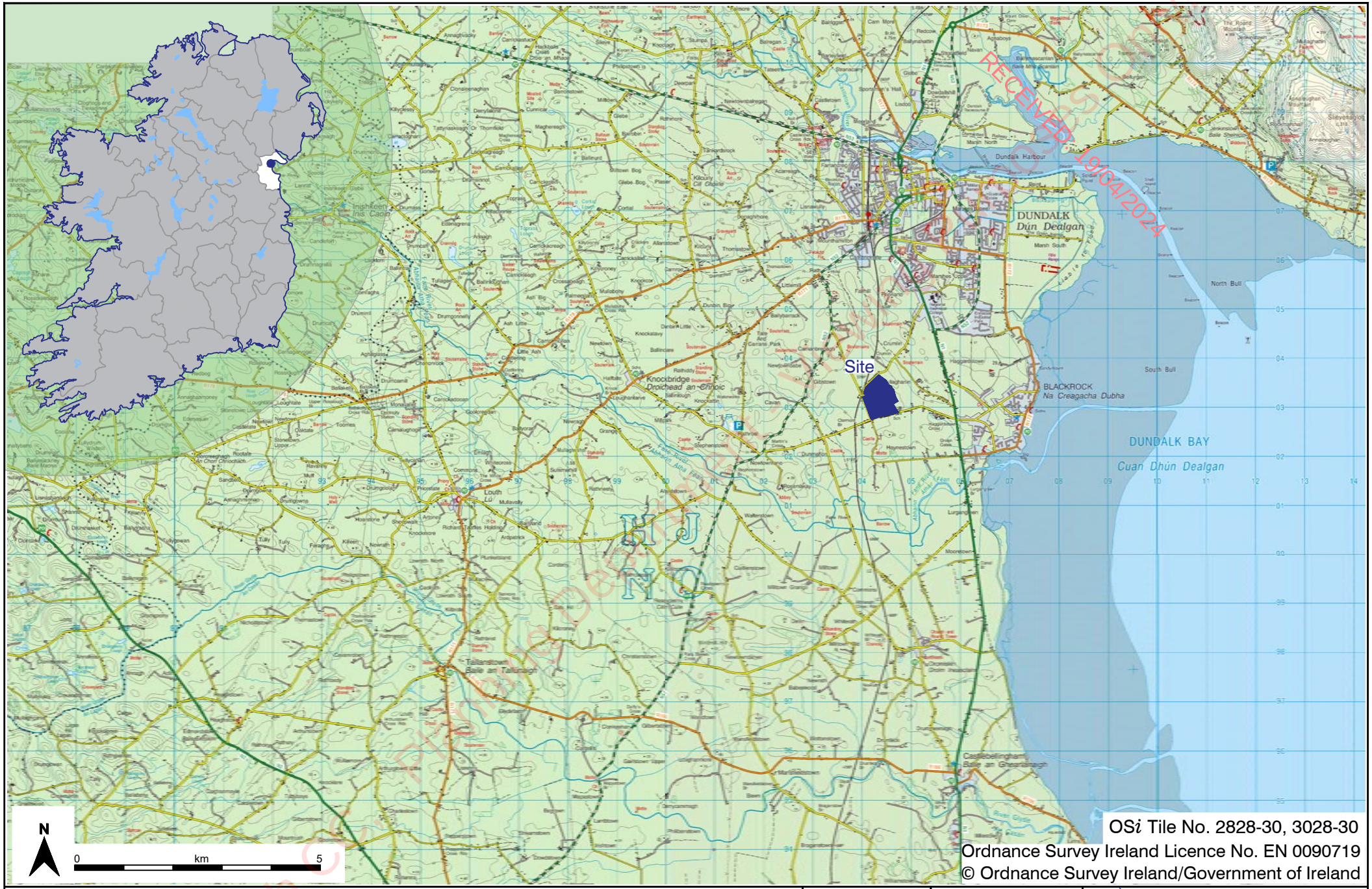

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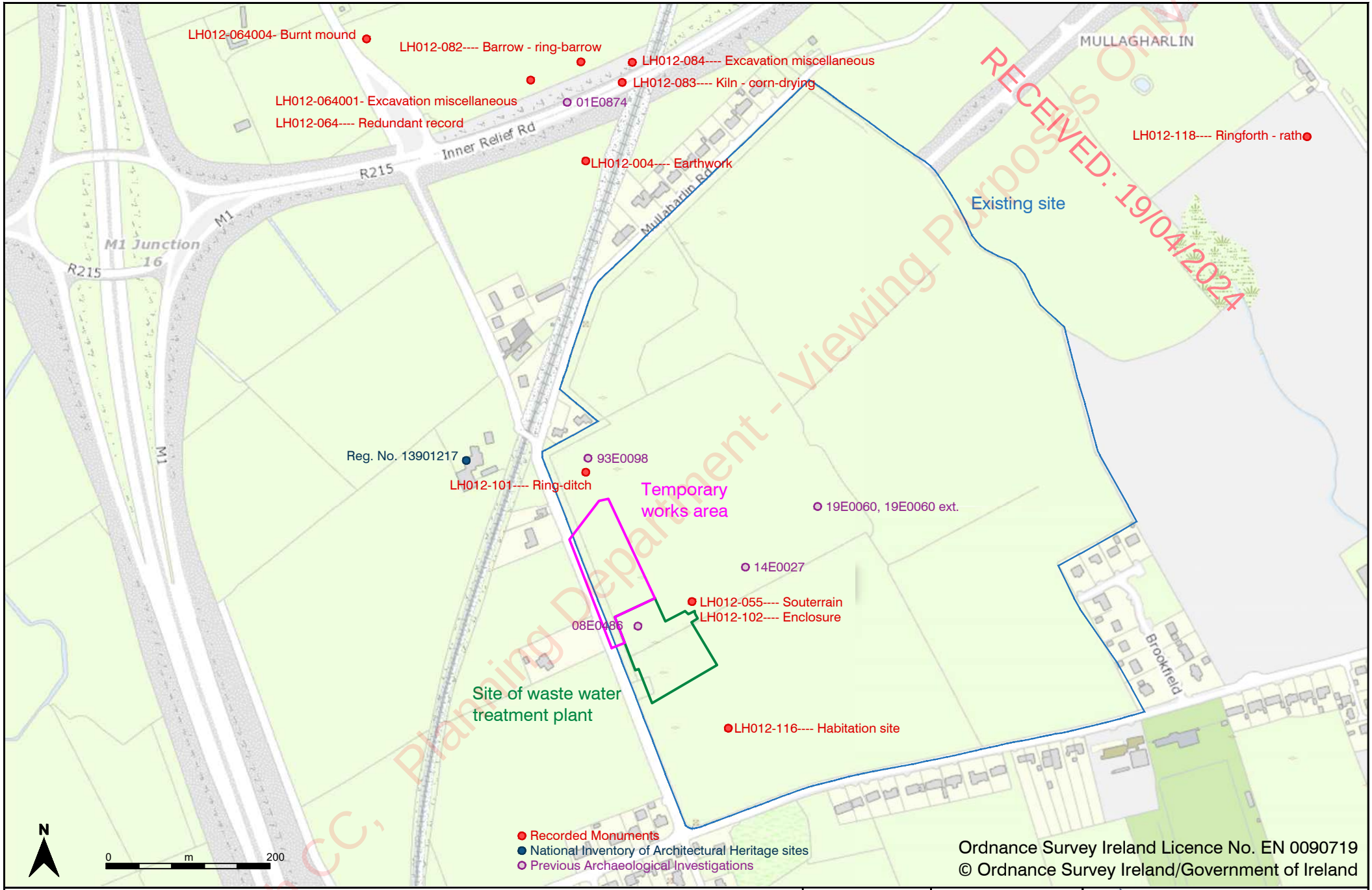
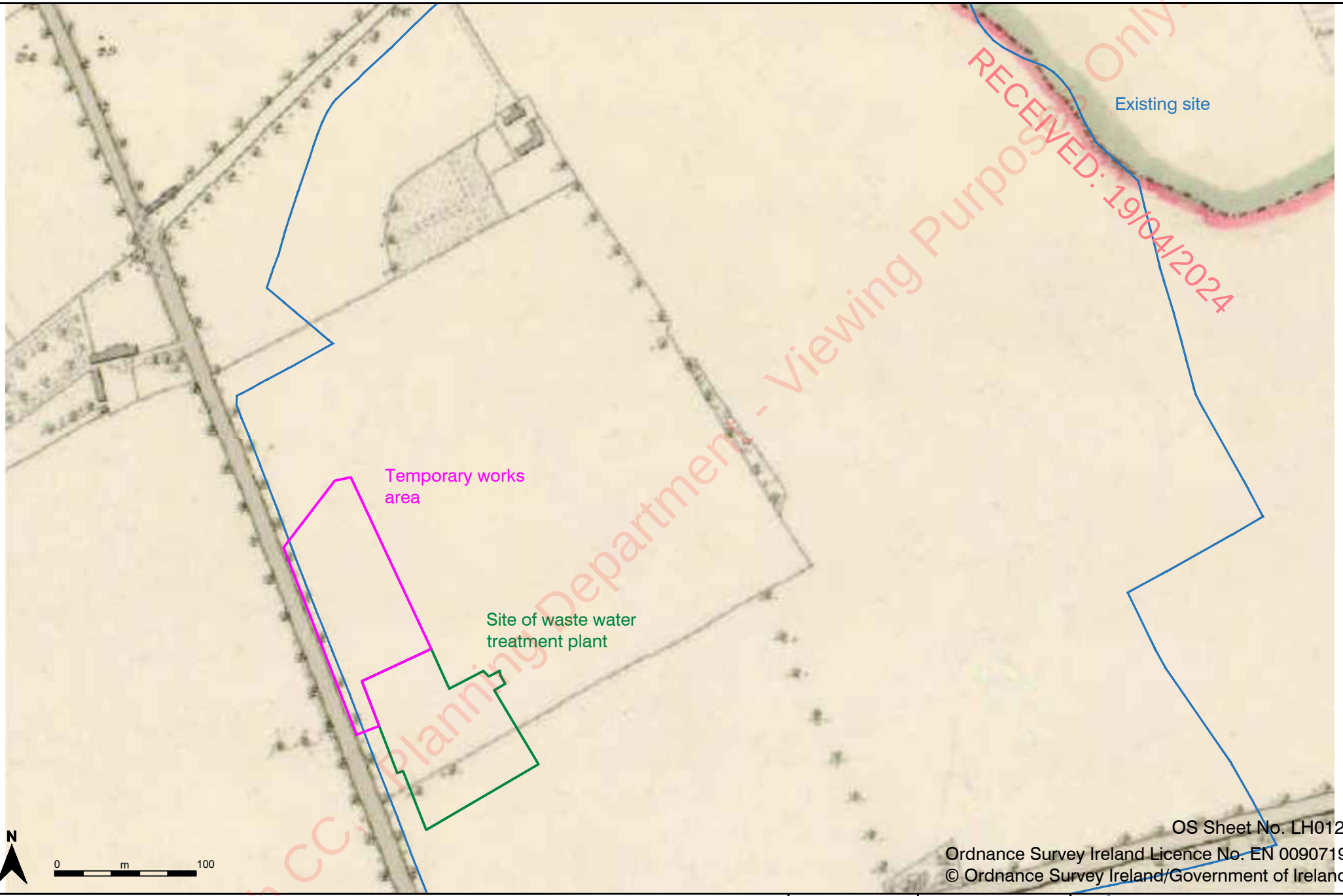
Project Haynestown, Dundalk, Co. Louth	**Date** Septemeber 2023	**Drawing No.** 2303_C1041	ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT
Figure 1 Location of site		**Scale** 1:100,000 @ A4	



Project Haynestown, Dundalk, Co. Louth		**Date** September 2023	**Drawing No.** 2303_C1042
Figure 2 Location of site, previous archaeological investigations and nearby *Sites and Monuments Record* sites			**Scale** 1:6,000 @ A4

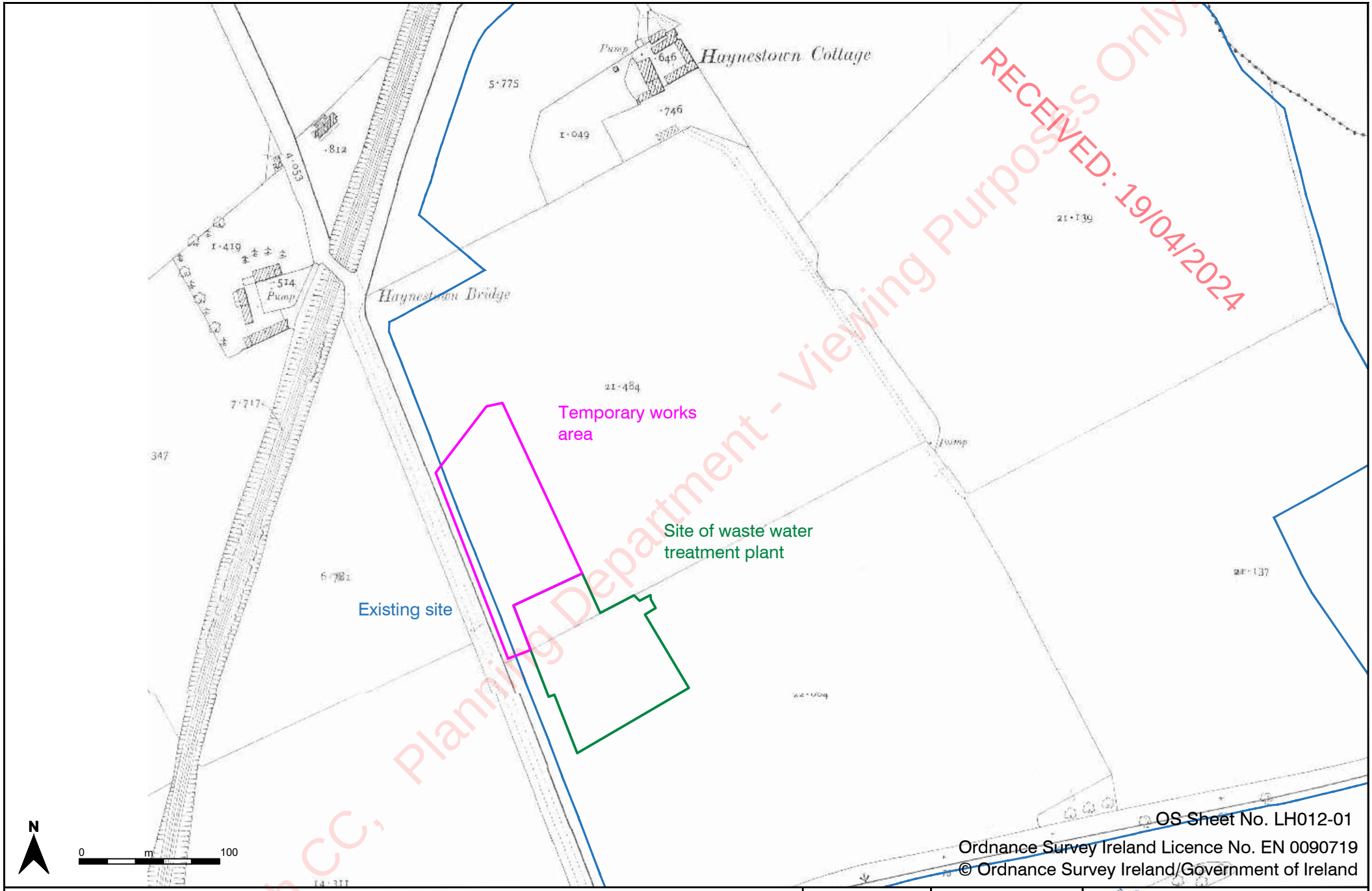
ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT



OS Sheet No. LH012

Project Haynestown, Dundalk, Co. Louth		**Date** September 2023	**Drawing No.** 2303_C1043
Figure 3 Extract from 1st edition Ordnance Survey (OS) 6-inch map (surveyed 1834 - published 1836), showing location of site			**Scale** 1:3,500 @ A4

ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT

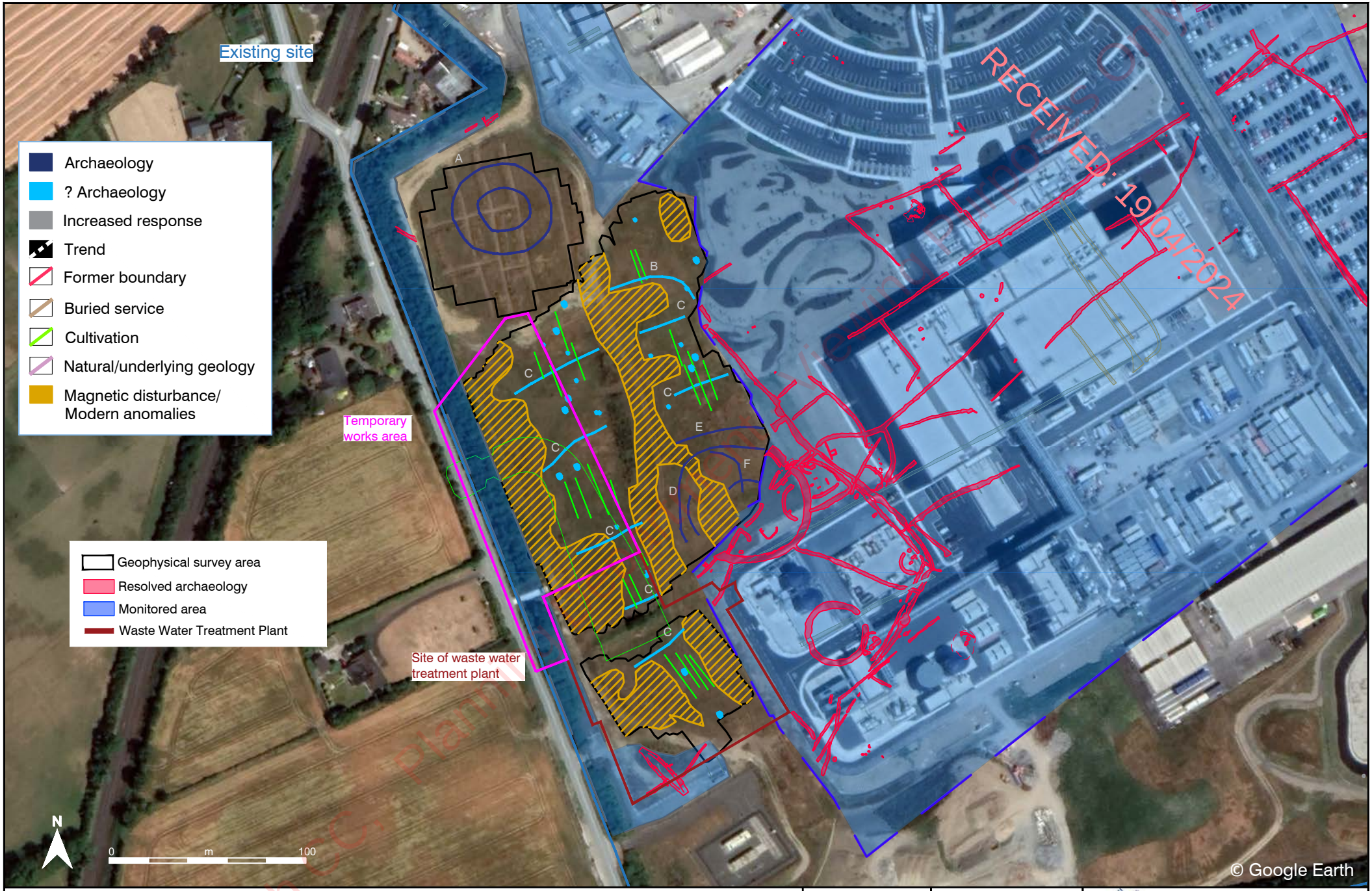


OS Sheet No. LH012-01

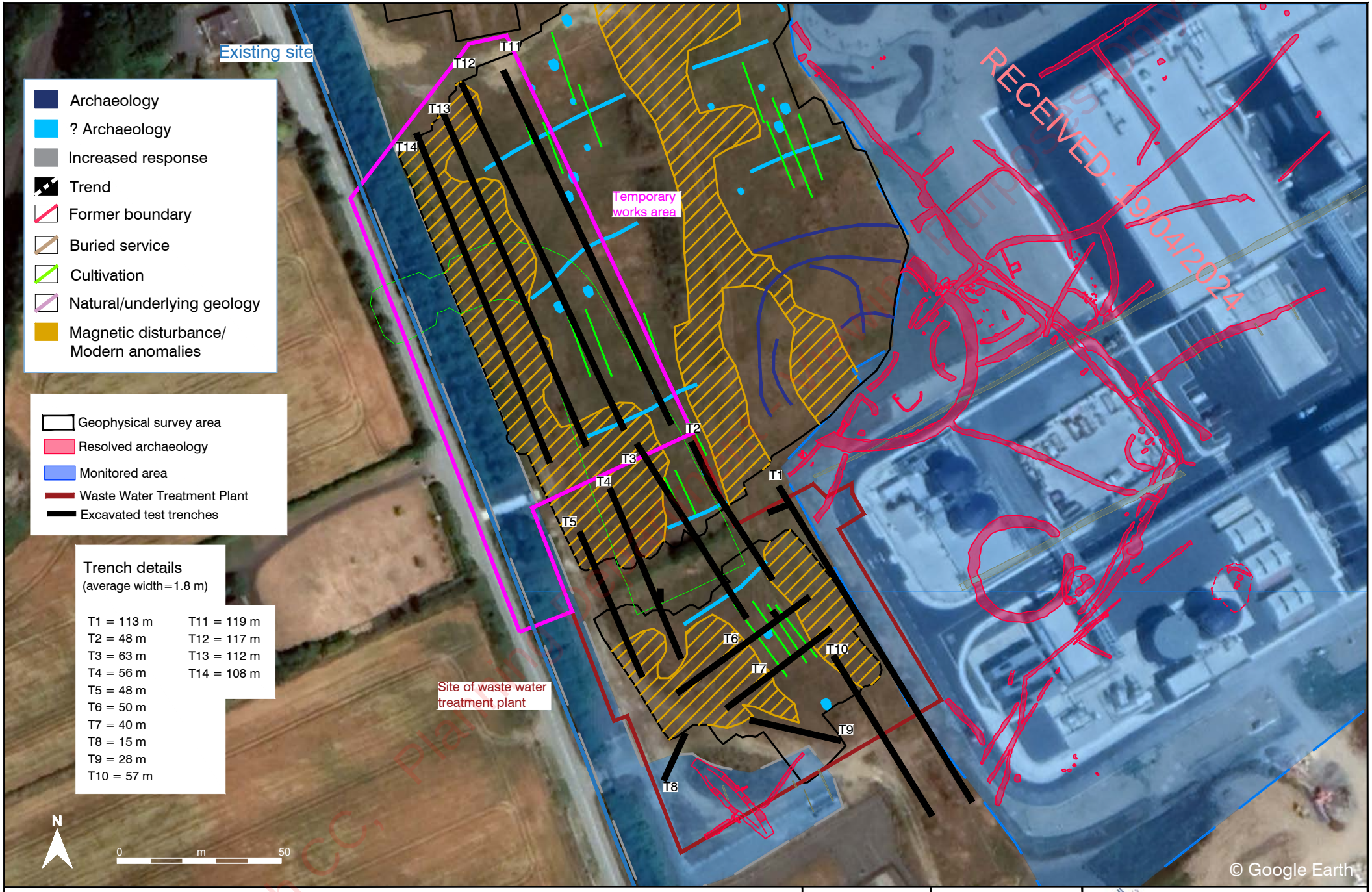
Project Haynestown, Dundalk, Co. Louth		**Date** September 2023	**Drawing No.** 2303_C1044
Figure 4 Extract from 3rd edition Ordnance Survey (OS) 25-inch map (surveyed 1907 - published 1909), showing location of site			**Scale** 1:3,500 @ A4

ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT

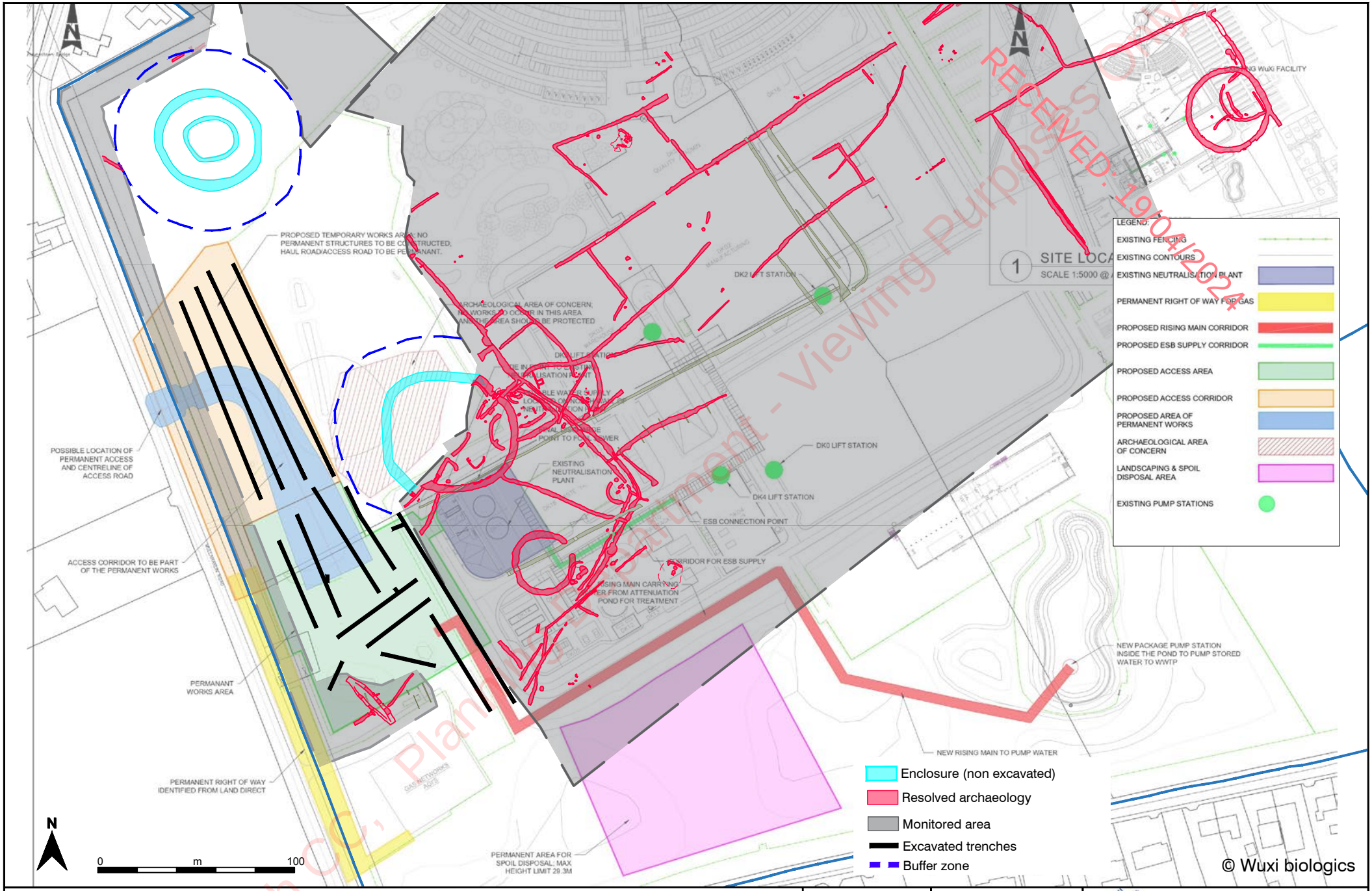
Project Haynestown, Dundalk, Co. Louth	**Date** September 2023	**Drawing No.** 2303_C1045	ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT
Figure 5 Aerial view of site, showing greyscale images from 2019 geophysical survey, resolved archaeology and geophysical survey results (greyscale image)		**Scale** 1:2,500 @ A4	



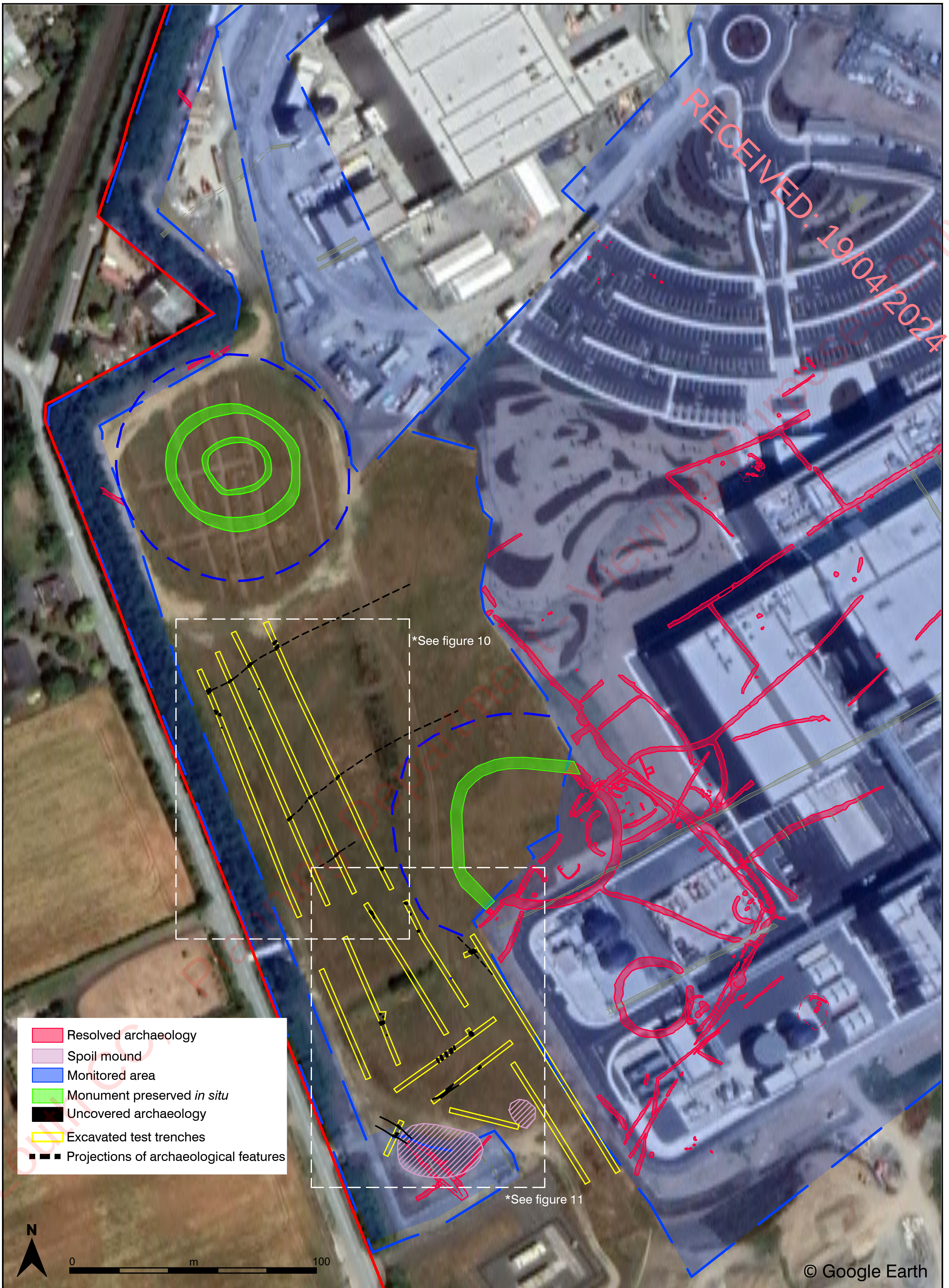
Project Haynestown, Dundalk, Co. Louth	**Date** September 2023	**Drawing No.** 2303_C1046	ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT
Figure 6 Aerial view of site, showing survey interpretation and resolved archaeology		**Scale** 1:2,500 @ A4	



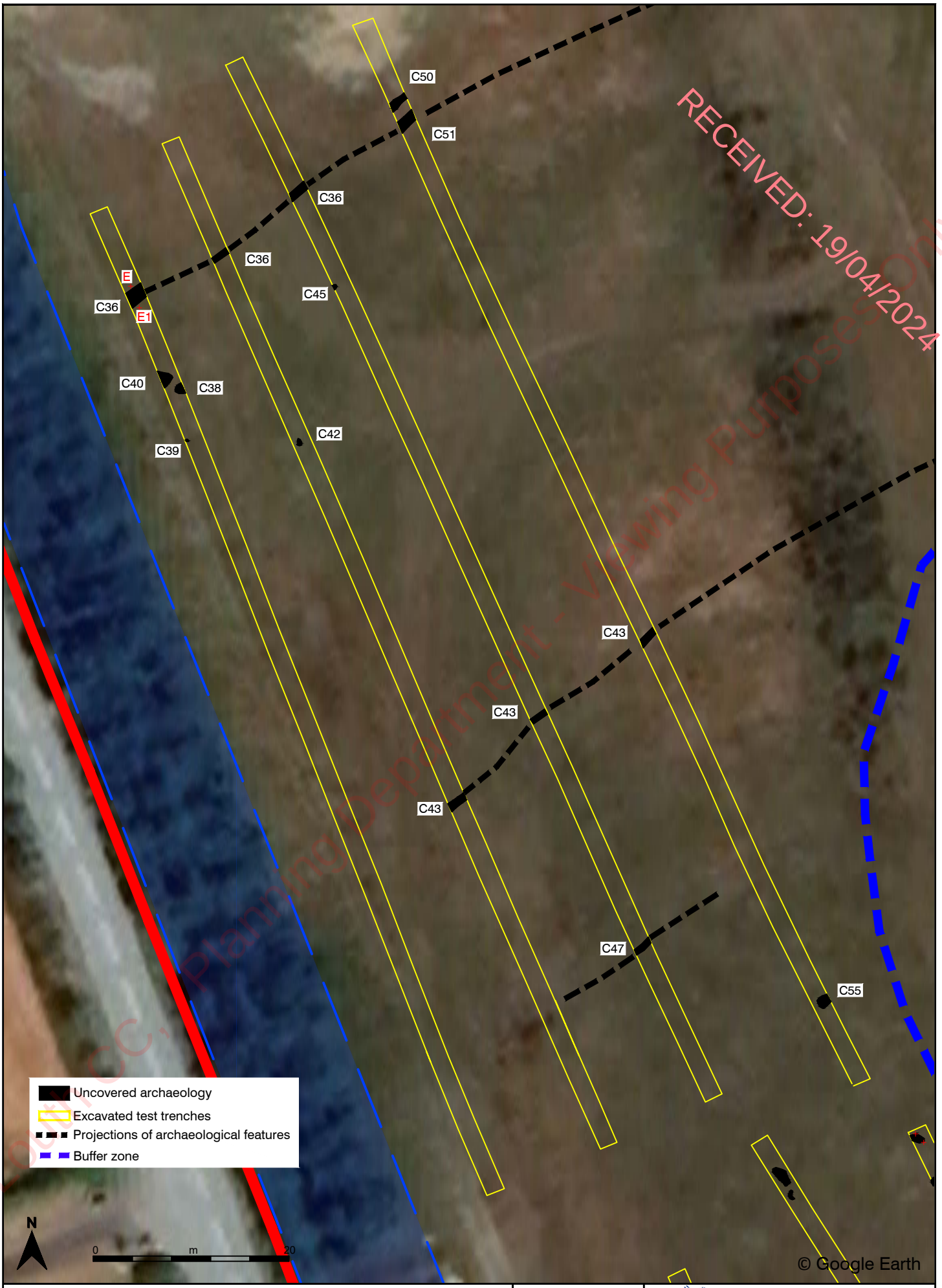
Project Haynestown, Dundalk, Co. Louth	**Date** September 2023	**Drawing No.** 2303_C1047	ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT
Figure 7 Detail of site development, showing survey interpretation, resolved archaeology and proposed trenches		**Scale** 1:1,500 @ A4	



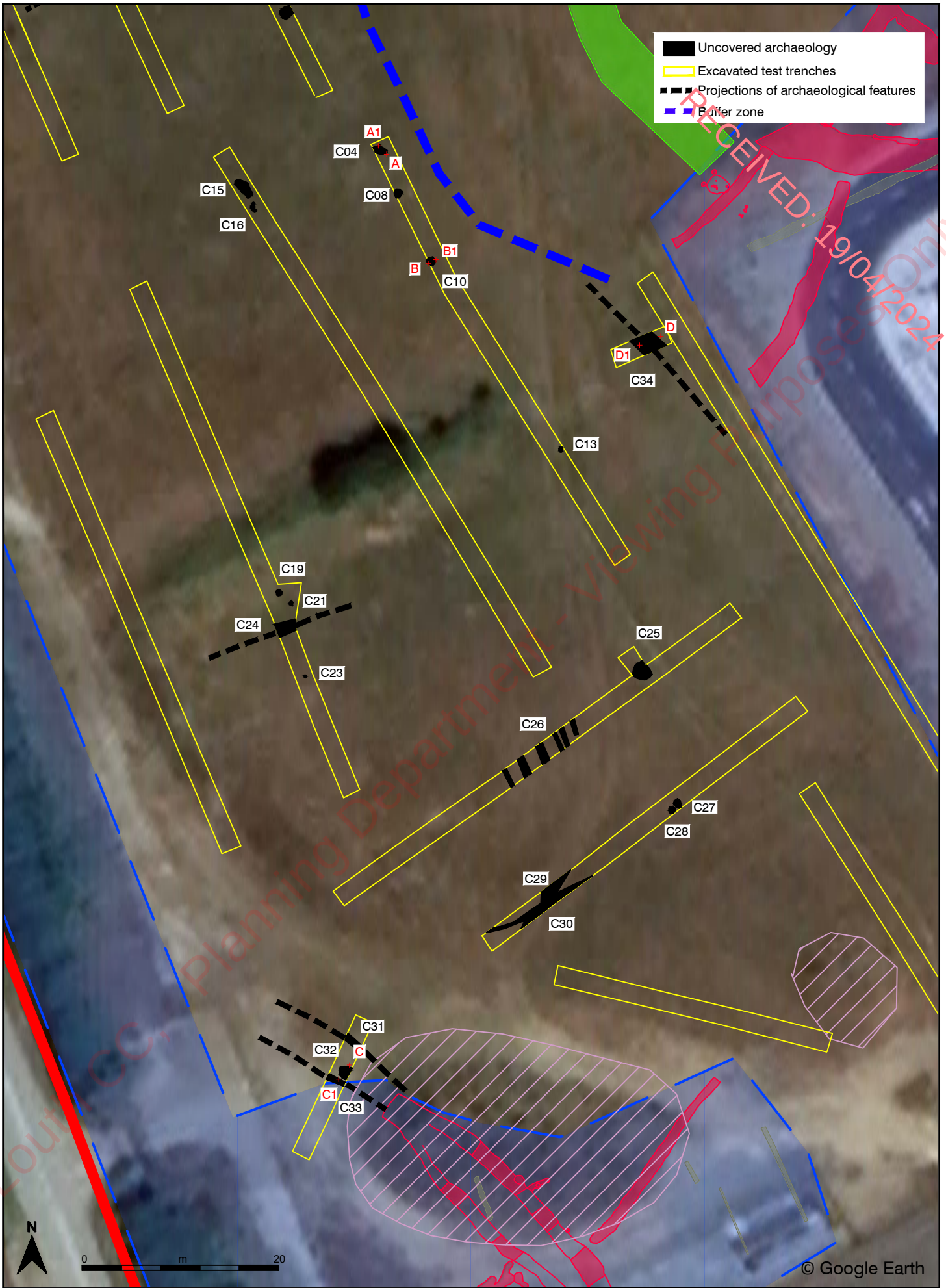
Project Haynestown, Dundalk, Co. Louth	**Date** September 2023	**Drawing No.** 2303_C1048	ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT
Figure 8 Detail of site development, showing location of excavated trenches, enclosures and associated buffer zones		**Scale** 1:2,500 @ A4	



Project Haynestown, Dundalk, Co. Louth	**Date** September 2023	ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT	
Figure 9 Aerial view of site, showing location of excavated test trenches and uncovered archaeological features		**Scale** 1:2,000 @ A4	**Drawing No.** 2303_C1049



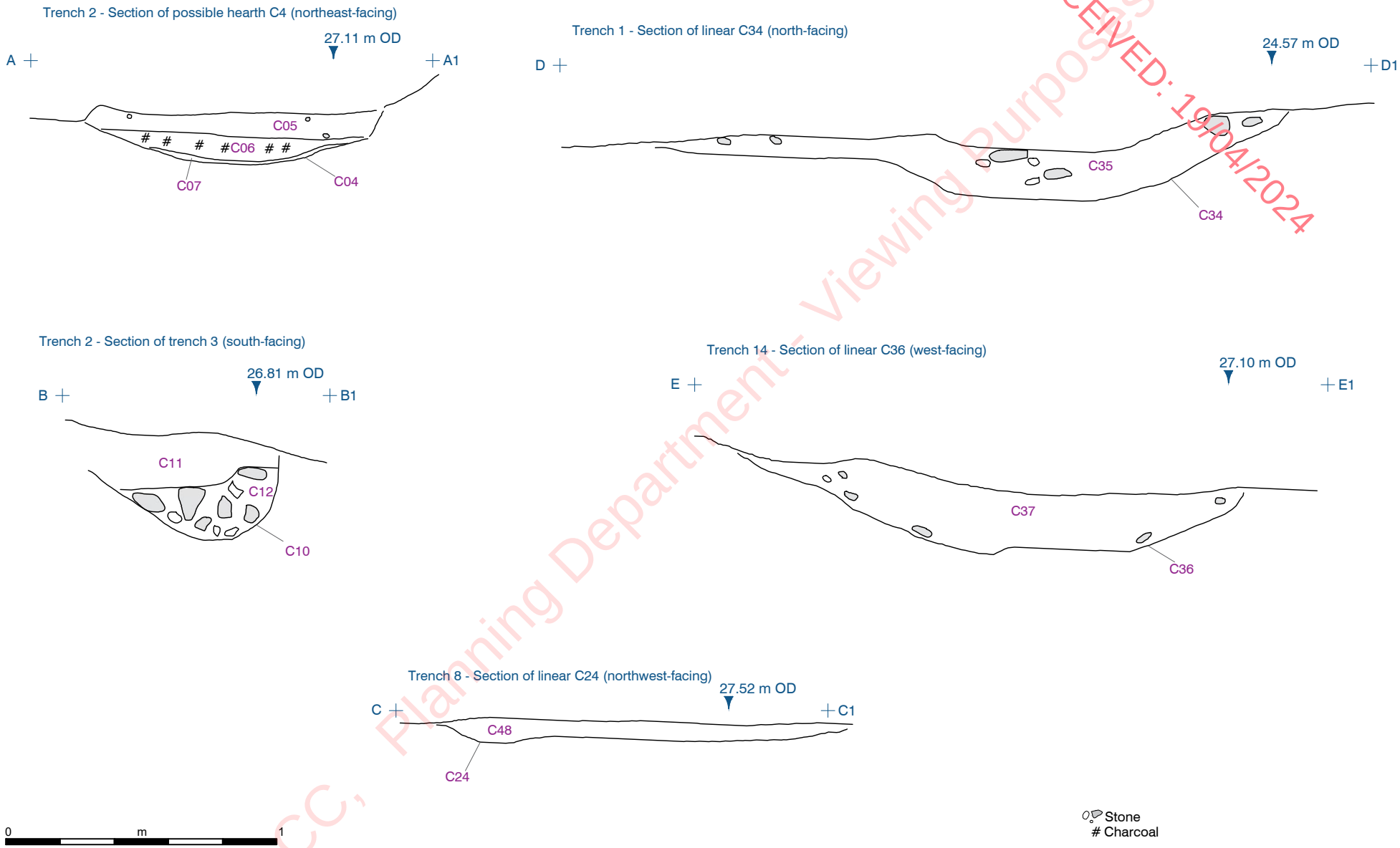
Project Haynestown, Dundalk, Co. Louth		**Date** September 2023	ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT
Figure 10 Aerial view of site, showing details of uncovered archaeological features (north area)		**Scale** 1:500 @ A4	**Drawing No.** 2303_C1050



Project	Haynestown, Dundalk, Co. Louth	**Date**	September 2023
Figure 11	Aerial view of site, showing details of uncovered archaeological features (south area)		

ARCHAEOLOGICAL CONSULTANCY SERVICES UNIT

Scale	1:500 @ A4	**Drawing No.**	2303_C1051



Project Haynestown, Dundalk, Co. Louth		**Date** September 2023	**Drawing No.** 2303_C1052
Figure 12 Detail of excavated sections			**Scale** 1:20 @ A4

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Plate 18: Trench 13, facing northwest.

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Report on Geophysical Survey at Mullagharlin Road, Haynestown, Co. Louth

Detection Device Licence No.: 23R0044

Donald Murphy

11 May 2023

ITM: 704055, 803155

RMP No.: LH012-102----

ACSU Ref.: 2303

HEAD OFFICE
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Boyne Business Park
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PROJECT DETAILS

Project	Geophysical Survey at Mullagharlin Road, Haynestown, Co. Louth
Report Type	Geophysical Survey Report
Licence No.	23R0044
Townland(s)	Haynestown
RMP/SMR No.	LH012-102----
RPS Id.	N/A
ITM Ref.	704055, 803155
Consultant	Archaeological Consultancy Services Unit, 21 Boyne Business Park, Greenhills, Drogheda, County Louth
Archaeologist	Donald Murphy
Report Author	Donald Murphy
Report Status	Final
Report Date	11 May 2023
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Revision	Date	Description	Status	Author	Reviewed	Approved
0	18.04.2023	Geophysical Survey Report	Draft	D.M	M.L	D.M
1	11.05.2023	Geophysical Survey Report	Final	D.M	M.L	D.M

NON-TECHNICAL SUMMARY

This report details the results of a Geophysical Survey carried out at Haynestown, Co. Louth (ITM 704055, 803155). The survey was carried out at the request of the client at a pre-planning stage to support a planning application. The site is grassed and lies in a fenced off archaeological zone within the WuXi biopharmaceutical facility.

The site is located within a highly sensitive archaeological landscape with archaeological monuments recorded and identified as a result of recent archaeological excavations. The northern half of an Enclosure (LH012-0102) identified under licence 19E0060 is located within the survey area. The southern portion of this enclosure was recorded as C19 during excavations carried out by Jon Stirland in 2019 and 2020. Two associated souterrains were exposed within (C811, C805) and excavated. While a souterrain (LH012-055----) is recorded within the survey area, it appears this monument might represent the souterrain (C805) excavated in 2019, as based on the description available (SMR file) and the presence of modern agricultural fertiliser bags securing the capstones identified during excavations (19E0060). Artefactual material recovered from the fills of the enclosure included souterrain ware, brooch pins, ring pins, stick pins, weaponry, as well as equestrian and domestic finds. This suggests the main use of the enclosure (LH012-0102) was between the sixth and ninth centuries; the monument clearly being of early medieval date. Associated with the enclosures and excavated were four annexe enclosures, associated field systems, cereal drying kilns that dated between 890-1020AD, mostly figure-of-eight type, and other associated features such as linear features, pits, post holes, ditch/gullies and metalled surfaces. During the excavation of one of the kilns (C686), twenty silver pennies ranging between the rule of King Aethelstan (AD 924–939) and King Eadgar (AD 959–975) were retrieved.

The geophysical survey was conducted by Donald Murphy, Robert Breen and Jeanne Rochford of Archaeological Consultancy Services Unit Ltd (ACSU), under licence 23R0044 issued by the Department of Housing, Local Government and Heritage. A full detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual-sensor fluxgate gradiometer cart system.

The results of the geophysical survey recorded the unexcavated northern portion of the enclosure (Archaeology) recorded as C19 previously (19E0060) and associated linear and curvilinear features. Other linear anomalies are in apparent alignment with the previously excavated ditches interpreted as Early Medieval field systems. Bands of magnetic disturbance were also noted; these correspond with areas that were trafficked by machinery visible on aerial imagery. An array of scattered smaller anomalies (?Archaeology) throughout the survey area could represent spreads, pits, kilns and/or structures. These are likely archaeological in nature due to their location, however, some might represent iron present in the topsoil.

The geophysical survey confirmed the archaeological monuments and features of archaeological potential extend into the survey area. Consequently, it is recommended that test trenching by an experienced licence-eligible archaeologist working under licence from the Department of Housing, Local Government and Heritage in consultation with the National Museum of Ireland should be carried out. This should be devised well in advance of any development on the site, as this offers a means of employing appropriate mitigation measures. Archaeological material identified in the course of the test trenching will necessitate further mitigation, including preservation in situ/or preservation by record (full excavation) following discussion with the National Monuments Service.

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1. INTRODUCTION

This report details the results of a Geophysical Survey carried out on a site at Mullagharlin Road, Haynestown, Co. Louth (ITM 704055, 803155, Figures 1-2). The site is grassed and lies in a fenced off archaeological zone within the WuXi biopharmaceutical facility, and is bounded by Mullaharlin Road from the west, a Gas Networks Installation to the south and the existing plant to the east and north-east.

A full detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual-sensor fluxgate gradiometer cart system. The geophysical survey was conducted by Donald Murphy, Robert Breen and Jeanne Rochford of Archaeological Consultancy Services Unit Ltd (ACSU), under licence 23R0044 issued by the Department of Housing, Local Government and Heritage.

2. ARCHAEOLOGICAL CONDITION

The geophysical survey was carried out at the request of the client to assess the archaeological potential of the area to be developed, inform a test trenching strategy for the site and support a planning application.

3. METHODOLOGY

A full detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual-sensor fluxgate gradiometer system, mounted on a non-magnetic cart. A detailed survey was conducted with a sample interval of 0.25m and a traverse interval of 1m for all the survey areas within the site of the proposed development with variations in the magnetic field between -100nT to +107.834nT (see also Section 7 and Appendix 1).

4. SURVEY OBJECTIVES

The survey aimed to establish the presence of any archaeological features within the area to be developed and to assist in determining the extent of subsurface archaeological features present on the site that could be associated with monuments LH012-0102, LH012-055---- and LH012-101---- in order to inform a future programme of test trenching.

5. SOILS, GEOLOGY & TOPOGRAPHY

The area subject to geophysical survey consists of a portion of grassed field. The site has an elevation of c. 23-25m Ordnance Datum (OD). The underlying geology of the site consists of calcareous red-mica greywacke and is part of the Clontail Formation. This bedrock geology is overlaid by deep, well-drained, mineral soils. (Geological Survey of Ireland).

6. ARCHAEOLOGICAL ASSESSMENT

6.1 Archaeological & Historical Background

The site is located within the townland of Haynestown (*Baile Héine*), in the Barony of Dundalk Upper and the Civil Parish of Haynestown. An examination of the Placenames Database of Ireland (www.logainm.ie) can reveal important information about the natural and cultural heritage of an area. The earlier name of the townland was recorded in 1301 as Felde (field), and derivatives of this name were used until 1494 when the name Fellda al. Haeneston was noted. It was suggested by O'Donavan (1836) that Hayne is a family name. However, the element Héin (e) might have derived from Middle English Haene/hean, meaning poor, wretched (logainm.ie).

The monuments listed in the Record of Monuments and Places (RMP) and the results of investigations carried out in this area clearly demonstrate that the surrounding landscape is made up of a mosaic of different periods of historic and prehistoric activity, and the features within the modern landscape serve as reminders and indicators of past land use practices and cultural changes. Each period of history creates and adapts the landscape to suit and reflect its own cultural significance and the landscape

The nearest monument to the site is a ring ditch (LH012-101) that was identified as a cropmark on aerial photography (GB89.I.22). Monuments known as 'barrows' emerged towards the end of the Neolithic and the beginning of the Bronze Age. These can be defined as earthen or earth/stone construction mounds with a surrounding ditch or ditches, sometimes with a low external bank, typically less than 30 metres in diameter and most commonly associated with cremation burials (O'Sullivan and Downey 2012). In 2002, in advance of the gas pipeline works from North Dublin to Limerick, ring-diches/barrows were excavated at Flemingtown, Co. Meath, Dalystown 1, Co. Westmeath, Knockuregare, Co. Limerick and Rath, Co. Dublin (Grogan et al. 2007). All of these sites had substantial ditches, the largest having an external diameter of 38.75m. The excavations provide evidence for this type of funerary site occurring throughout the Bronze Age (2450–800 BC) and highlighted the significance of liminal space for death and burial in the form of ceremonial enclosures. McGarry (2009) states that of all the barrows excavated in Ireland, about half of them have produced the remains of a single person, most commonly found under the mound and central to the barrow. Almost all sites, however, produce cremated human remains spread throughout the fill of the barrow ditches; as can be seen at sites such as Ballybeen, Co. Antrim (Mallory 1984) and Ballydribbeen, Co. Kerry (Dunne 2003). Another interesting feature of barrows is the presence or absence of an 'entrance' or break in the ditch, which provides a causeway into the monument. Entrances are present in a number of ring-ditches and ring-barrows and although the entrance may be orientated in any direction there is a clear preference for them facing either east or south-east. It must be noted, however, that there are also many instances were entrances are not present, such as Donacarney, Co. Meath (Stirland 2017). The ring-ditch in Haynestown was tested (19E0060; Stirland, forthcoming), as a result, the remains of two concentric ditches were identified, and middle Bronze Age pottery was recovered. Another prehistoric monument exposed on site included a middle neolithic enclosure (C584) that was excavated to the south of the current site (19E0060; Stirland forthcoming), with chalcolithic/early bronze age upper fills sealing it. The internal space was featureless; this might be due to modern agricultural activity but could also suggest no domestic activity

took place here. Prehistoric activity on site included cremation burials that dated to Bronze Age, with one (C017) that returned an Iron Age date (BC99-AD25).

One of the most frequent field monuments found within this area of County Louth are enclosures and souterrains, the latter features often associated with ringforts. Ditched enclosures are seen in the form of ringforts and non-circular enclosures. The Ringfort, as the name suggests, implies a circular enclosure with a minimum of one ditch and possible accompanying banks. They were generally circular, measuring circa. 24 – 60 metres in diameter. Early Irish laws stated that circularity was a feature of the model ringfort (Stout 1997).

To the south of the site, Enclosure (LH012-0102) and associated souterrain (LH012-055----) are registered; the latter was exposed during ploughing. The southeast portion of this enclosure (recorded as C19) and two associated souterrains exposed within (C811, C805) were excavated under licence 19E0060, and dated to early medieval period. Furthermore, to the east, enclosure C1104 with souterrain C1233 were excavated.

The majority of early medieval ditched enclosures date to the sixth to ninth centuries AD, and such is the case with both C19 and 1104, and we see a significant decline in their use in the tenth century (O'Sullivan, Nicholl 2010). Though a site in Laytown, Co. Meath (McConway, 2002) could have a fourth-century date, other sites such as Ballynacarriga, Co. Cork (Noonan, 2004) and Raystown, Co. Meath (Seaver 2005) were probably occupied from the 5th century well into the 11th century.

Ditched enclosures are generally regarded as enclosed farmsteads, and the defences are thought to have been built in order to protect against cattle raids (Stout 1997). Some have provided little evidence for structures, suggesting the enclosure was used for storing cattle, known as a 'bodun', though the majority provide evidence to suggest they were inhabited settlements, with houses, farmyards, outbuildings and animals (O'Sullivan, Nicholl 2010) . Excavated items retrieved from ringforts are of a domestic, craft or agricultural nature (Monk, 1995). Some larger sites, such as Raystown, Co Meath fulfilled many functions; there was evidence for animal husbandry, cereal and grain processing, milling, burial and metallurgy (Seaver, 2016).

Ditched enclosures are the commonest field monument in Ireland. The majority of ditched enclosures were univallate with one bank and fosse. In many cases, the banks do not survive. There are, however, bivallate enclosures, for example, Cloonaboy, Co. Mayo (Gillespie & Kerrigan, 2010) and multivallate enclosures, such as Garranes, Co. Cork (O'Riordan 1942). While ringforts were generally 24 – 60 metres in diameter, the majority of non-circular enclosures were between 50m and 70 metres in diameter. Ditched enclosures tend to be situated on sloping or well-drained hilly ground with good views (Stout, 1997). Ditched enclosures usually are found in clusters within a townland (Edwards, 1990).

Ditched enclosures usually have an entrance at the southeast. This is to avoid the prevailing cold westerly and northerly winds that the enclosure would be exposed to Stout 1997). The entrance passage at Rath II at Ballypalady, Co. Antrim ranged from 0.76m at the outer end to 1.5m at the inner opening, suggesting it was not intended for keeping large livestock (O'Sullivan, Nicholl, 2010).

Evidence from excavations shows that enclosing ditches were, in some cases, allowed to silt up and had refuse deliberately dumped into them. Layers of slag were dumped into the ditch at Lisleagh, Co. Cork (Monk,1995).

Many sites, like that at Lissachiggel, Co. Louth had either cobbles or paving stones providing a dry passage into the enclosure. These entrances were known in early Irish literature and legal sources as the 'airdrocht' and were to be kept clean (O'Sullivan, Nicholl, 2010). O'Sullivan wrote that it was not unusual to see pathways laid within the interior to steer movement towards a particular direction and "upon entering the site, a person was often persuaded by laid pathways to move directly and immediately to the house doorway" (ibid.). The pathway was meant to be kept clean and dry, and likely, ditches and gullies would function as drainage features to keep the area dry.

Early Medieval houses within ditched enclosures tended to be circular or round, made of stone or post-and -wattle walls. The roofs were thatched with reeds, turf or straw. According to the eight- century law text Críth Gablach, a typical farmer's house was 6-8 metres in diameter. Archaeological evidence shows that the majority were 4 to 5 metres in diameter, and some were significantly larger, at 6 to 10 metres in diameter (ibid). As pointed out by Mc Cormick, Kerr, Mc Clatchie and O'Sullivan, because of the basket-like construction, any recuts or changes to the early medieval houses are rarely seen in the archaeological record (McCormick, Kerr, McClatchie, O'Sullivan 2011). It was likely that the lifespan of a medieval house would have lasted for just a short period of time (20 to 30 years); with good maintenance, a house could have stood for 50 to 60 years (O'Sullivan, Nicholl, 2010).

Associated with the enclosures and often found in its environs are fire pits, storage pits, refuse pits, a cooking pit and cereal-drying kilns. O'Sullivan and Nicholls wrote that pits are "one of the more enigmatic elements to be found within the enclosure…their function…difficult to discern. They would have been used for a variety of purposes; probably reused and cleaned-out many times and countless, no doubt, had multiple functions over their lifetime" (ibid). According to Mc Cormick, Kerr, Mc Clatchie and O'Sullivan cereal drying kilns are generally not associated with ditched enclosures, however there are several examples of sites with associated kilns, such as Johnstown 1, Co. Meath, Gortygrigane, Co. Tipperary and Camlin, Co. Tipperary (Cited in McCormick, Kerr, McClatchie & O'Sullivan 2011). Furthermore, a total of 11 cereal drying kilns, 9 figure-of-eight type were excavated at Haggardstown to the east and southeast of the current site. Three kilns were in an excellent state of preservation with their sub-surface stone-lined walls and chambers intact, with the other eight kilns consisting a simple earth cut kiln with little or no evidence of internal stone structures. Kiln distribution appears to be concentrated closer to enclosure C19.

Associated with the enclosures was a network of field systems defined by a clear pattern of linear ditches, some radiated out from LH012-102 recorded as enclosure C019 and annexes and enclosure C1104, however further analysis suggests some pre-dated the enclosures. Evidence suggests that some of the ditches had origins in the Bronze Age, such as C063, however, it appears that these field systems were adapted and used in the Early Medieval period. Small internal divisions were noted suggesting management of livestock/stocking pens, such as the E-shaped feature recorded to the east of the site in Area 5, while others functioned as water management with changes in height and steps recorded.

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6.2 Previous Archaeological Investigations

The site was subject to archaeological investigations before in 2004, 2007, 2008, 2014 and 2019-2020. The earliest investigations included a geophysical survey in 2004 with fourteen anomalies detected; eight were deemed of archaeological potential. A resistivity survey by Earthsound was carried out in 2007 to determine the extent of the souterrain, with a circular anomaly interpreted as a small enclosure. Test trenching under licence 08E0486 identified no features of archaeological significance. However, only 20 trenches were excavated during a spell of very dry weather (Licence No. 08E0486, Byrne, M. 2008). In 2014 testing of the above-ground installation within the southwest portion of the site identified a number of pits/post holes representing prehistoric structures; these were later excavated (14E0027). Based on artefactual material, the site was dated to the late Neolithic period; this was supported by radiocarbon dating - a date range of 4093+/-33 BP (UBA 26515), calibrated to 2862-2498 BC (2 sigma) was obtained for the site. Finds retrieved included small fragments of two undecorated Grove Ware bowls, hammer stones, burnt and unburnt flint, scrapers, blades, and burnt bone recovered, suggesting domestic setting where flint tools were being produced (Licence No. 14E0027, McLoughlin, 2014).

In 2019 geophysical survey (19R0043) and investigation (19E0060), including testing, monitoring and excavation, were undertaken between early 2019 and mid-2020 (Stirland, forthcoming). As a result of these investigations, a complex landscape that contained evidence of prehistoric activity ranging in date from the Middle Neolithic through to the Middle Bronze Age, including cremation burials of Middle Bronze Age and Iron Age date, as well as a later, Early Medieval settlement and its associated field systems, was recorded. Monuments identified included a prehistoric enclosure, burials/cremation pits of the Bronze Age and Iron Age and two early medieval enclosures with associated features, including souterrains, kilns, pits, posts, and field systems, as well as causeway/trackway were exposed and excavated. No groundworks associated with the development took place to the south of ring ditch LH012-101, where currently the turbine is proposed. However, the location of the ring ditch (LH012-101) was subject to a geophysical survey (Area 1) and test trenching. Test trenches were excavated to a depth of between 0.3-0.64m, and the presence of two concentric ditches C1069 and 1070 was confirmed (Figure 5). Pottery was recovered from the outer ditch and identified as of the middle Bronze Age date. This monument was not excavated, and placed in a protective buffer zone and remains preserved in situ. An Enclosure (LH012-0102) and associated souterrain (LH012-055----) are registered within the site; however, the southeast portion of this enclosure (recorded as C19) and two associated souterrains exposed within (C811, C805) were also excavated under licence 19E0060. It appears that the souterrain (C805) might represent monument LH012-055---- based on the description available (SMR file) and the presence of modern agricultural fertiliser bags securing the capstones identified during investigations. Artefactual material recovered from the fills of the enclosure (C19) included souterrain ware, brooch pins, ring pins, stick pins, weaponry, and equestrian and domestic finds, this suggests the main use of the enclosure LH012-0102 was between six and ninth century. Associated with the enclosures and excavated were four annexed enclosures, associated field system, cereal drying kilns that dated between 890-1020AD, mostly figure-of-eight type, and other associated features such as linear features, pits, post holes, ditch/gullies and metaled surface. The Souterrain C811 was L shaped, measuring 16m in length and 1m in width, while C805 was curving, 22m in length and also 1m in width. The northwest portion of the enclosure was not excavated, remains in situ and lies within the area to be subject to the current test trenching programme. Furthermore, the excavation of an area adjacent to and east of the site to be assessed at present,

exposed a northwest to southeast aligned ditch (C130) associated with the Iron Age phase that was later used as a part of the medieval field system. This linear was recorded extending to the north of the enclosure and east of the current site. Other features that included possible extension ditch (C427), linear features (C429 and C431), spreads (C439, C440), charcoal pits (C423, C441, C443) as well as an early medieval northeast to southwest linear (C427) were also excavated, the latter might extend within the current site.

6.3 Recorded Monuments

The site contains an archaeological monument, the north portion of an enclosure (LH012-102----). The southern extent of this enclosure, including two souterrains, one of which (C805) might represent souterrain LH012-055---- were excavated under licence 19E0060 along with other associated features. The north portion of the enclosure remains in situ. The area assessed lies just to the south of ring-ditch LH012-101---- that was subject to previous geophysical survey and test trenching with the presence of two concentric enclosure ditches confirmed; this monument also remains preserved in situ. In addition, a Habitation site (LH012-116) dating to the late Neolithic period is recorded to the south of the site.

The following is a list of the monuments located within the site (Figure 2, Table 1) and in the immediate environs listed in the National Monuments Service Archaeological Survey Database (http://maps.archaeology.ie/historicenvironment/).

Table 1: Recorded Monuments in the environs of the site

LH012-102----	**Enclosure**
Aerial photograph (GB89.I.22) shows cropmark of a curvilinear enclosure which coincides with SMR 55 (souterrain); in close proximity to a ring-ditch.	
LH012-101----	**Souterrain**
Situated on slight rise in arable land. Lintels of drystone-built passage 0.1m below ground surface encountered during ploughing. Structure as yet unopened.	
LH012-101----	**Ring-ditch**
Aerial photograph (GB89.I.22) shows cropmark of a ring-ditch defined by two widely spaced fosses; in close proximity to a cropmark of a curvilinear enclosure.	
LH012-116----	**Habitation site**
Archaeological testing (14E0027) on behalf of Bord Gáis Networks identified habitation material in February 2014, which was further investigated under the same licence by Gill McLoughlin when two groups of pits and two larger outlying pits were recorded. In all eight pits (diam. up to c. 0.8m) were excavated, but further material probably lies outside the excavated area of (dims c. 10m x c. 8m). The lithic and pottery assemblage suggests a late Neolithic date, which is supported by a C14 date of 2862-2498 Cal. BC. (McLoughlin 2014)	

6.4 Protected Structures and National Inventory of Architectural Heritage

There are no Protected Structures located within the site as listed in the *Louth County Development Plan* 2021-2027. The nearest such monument is Haynestown Stud (RPS No. LHS012-050), also registered in the National Inventory of

Architectural Heritage (NIAH Reg. No. 13901217), located c. 137m to the northwest of the site, on the other side of the railway line.

6.5 Finds listed within the Topographical Files of the National Museum of Ireland

The Topographical Files of the National Museum of Ireland list one find consisting of a ceramic pottery sherd. The find is registered as retrieved from the surface of the ploughed field close to the souterrain (NMI Reg. No. 1978:123) and described as 'Orange fabric with grey-orange core. Everted rim with pinched applied decoration below lip. Worn remains of orange/brown glaze on exterior'. Based on the description, the find appears to represent a post-medieval date pottery sherd.

6.6 Cartographical evidence

A review of available historic mapping for the area was carried out to include the 6-inch 1836 and the 25-inch 1907 editions of the Ordnance Survey maps. Potential archaeological or cultural heritage features are marked on such maps and provide a useful resource in identifying sites particularly if they no longer have any above-ground remains.

Ordnance Survey (OS) maps of the area were examined to identify any possible archaeological features and trace the site's development during the nineteenth and early twentieth centuries. Both maps, 1836 and 1907, show the site located within an agricultural field adjacent to and east of north to south aligned road running within the footprint of current Mullaharlin Road, with no features of archaeological significance depicted. By the time of the 1907 map, Drogheda to Dundalk railway line was depicted to the west of the site with Haynestown Bridge labelled and shown.

6.7 Aerial photography

Aerial photographs dating between 1995 and 2013 from the Ordnance Survey of Ireland were also reviewed in addition to google map pro imagery dating from 2013-2022 being examined.

The site remains unchanged, and an agricultural field until 2007, when some ground works along the perimeter of the site are visible. By 2017 a Gas Installation (AGI) was constructed within the southwest corner of the site, and by 2019 a large portion of the site was subject to groundworks, with archaeological sites being excavated visible, and by the end of 2019 test trenches at the location of ring ditch (LH012-101) and excavation at the very southern portion of Phase 2 area/Gas pipe Area are visible. No groundworks took place within the southwest portion of the site since, and the area is currently under wild grass.

7. METHOD OF DATA INTERPRETATION

The gradiometer survey was conducted with a Bartington GRAD 601-2 dual-sensor fluxgate gradiometer system. A detailed survey was conducted with a sample interval of 0.25m and a traverse interval of 1m for all the survey areas. This allows the detection of potential archaeological responses. Data was collected using a GPS based non-magnetic cart system with four mounted sensors.

The Bartington GRAD 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.01nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions. The survey is geo-referenced with a Trimble R10 unit accurate to within 1cm. Interpretation of the results was made by examination of the raw data as greyscale images, XY trace, relief, and data plots (see Appendix 1). Archived raw data is presented in Figure 6 and an interpretation is presented in Figure 7.

8. SURVEY RESULTS

The geophysical survey was conducted by Donald Murphy, Robert Breen and Jeanne Rochford of Archaeological Consultancy Services Unit Ltd (ACSU) under licence 23R0044 (Figures 6-7). The site comprises an Archaeological Exclusion zone which is currently fenced off from the main plant and is under grass which was recently cut.

The anomalies identified are listed in Table 2 below:

Table 2: Geophysical survey results

Form/Nature of Anomaly	Possible Source(s) of Anomaly	Description
Archaeology	Enclosure ditches (A)	Two concentric ditches associated with recorded monument LH012-101---- located in the northwest portion of the site representing a Bronze Age Ring Ditch Monument. Geophysical survey of this monument was carried out in 2019.
?Archaeology	Curving Ditch (B)	A curving ditch near the north end of the survey area may be a continuation of a north-south aligned linear anomaly identified during previous excavations just to the immediate east of the survey area.
Archaeology	Enclosure ditches (D)	The northern extent of enclosure ditch LH012-102---- recorded during previous excavations to the south as C19 (19E0060) with associated curvilinear features within which may be suggestive of internal subdivision.
Archaeology	Curving Ditch (E)	Curving ditch that may be continuation of linear ditch from excavations carried out immediately east of survey area.
Archaeology	Circular Ditch (F)	Curving ditch inside enclosure LH012-102 that may be continuation of curving ditch to south that was excavated previously.

Form/Nature of Anomaly	Possible Source(s) of Anomaly	Description
?Archaeology	Large pits/spreads or natural geology	Large positive anomalies that might indicate large pits/spreads. The possibility that these are of natural origin cannot be excluded.
?Archaeology	Pits, postholes, cut features or natural geology/iron in topsoil	Scatter of positive anomalies that may represent cut features of archaeological significance such as pits and postholes. Could alternatively represent modern iron objects within the topsoil or natural underlying geological features.
?Archaeology	Linear features, historic field systems (C)	Several Linear anomalies mostly aligned east – west representing historic field systems. These appear to correspond with and are on the same alignment as ditches excavated previously (19E0060).
Modern anomalies/Magnetic interference/increased magnetism	Recent ground works/made up ground and reinstatement	Large bands of magnetic interference associated with groundworks that are visible on aerial imagery.

9. CONCLUSIONS & RECOMMENDATIONS

The geophysical survey at Mullagharlin Road, Haynestown, Co. Louth was carried out in order to assess the archaeological potential of the site and the extent of the archaeological monuments present (.LH012-102----).

The results of the geophysical survey recorded the unexcavated northern portion of the enclosure (Archaeology) recorded as C19 previously (19E0060) and associated linear features and curvilinear features. Other linear anomalies are in apparent alignment with the previously excavated ditches interpreted as Early Medieval field systems. Bands of magnetic disturbance were also noted; these correspond with areas that were trafficked by machinery visible on aerial imagery. An array of scattered smaller anomalies (?Archaeology) throughout the survey area could represent spreads, pits, kilns and/or structures. These are likely archaeological in nature due to their location, however, some might represent iron present in the topsoil.

The geophysical survey confirmed the archaeological monuments and features of archaeological potential extend into the survey area. Consequently, it is recommended that test trenching by an experienced licence-eligible archaeologist working under licence from the Department of Housing, Local Government and Heritage in consultation with the National Museum of Ireland should be carried out. This should be devised well in advance of any development on the site, as this offers a means of employing appropriate mitigation measures. Archaeological material identified in the course of the test trenching will necessitate further mitigation, including preservation in situ/or preservation by record (full excavation) following discussion with the National Monuments Service.

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Louth County Development Plan Record of Protected Structures 2021-2027

Summary Accounts of Archaeological Excavations in Ireland (www.excavations.ie)

Appendix 1 - Summary Technical Information & Glossary of Terms

Fluxgate Gradiometer Survey is a non-intrusive method of archaeological prospection that is most often used in Irish Archaeology. This method allows for rapidly mapping archaeological objects, structures, deposits and other features, including geological anomalies, that survive beneath the ground. It allows the most rapid ground coverage and records a variety of anomalies caused by human activity and changes in the natural subsoil. The results are presented as a greyscale map of anomalies detected that are interpreted by an experienced archaeologist.

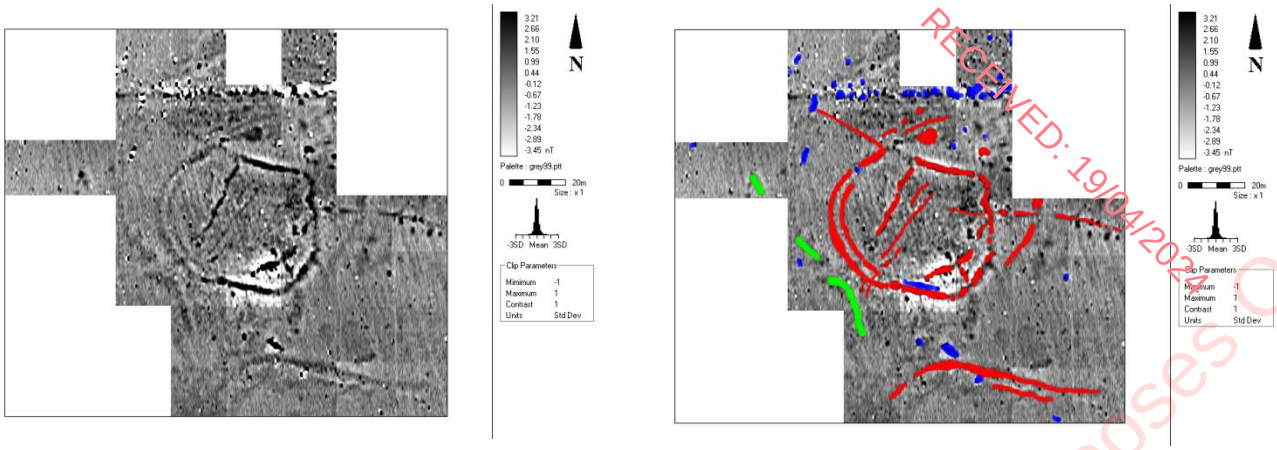
Surveys are undertaken using GPS based lightweight Bartington Grad 601-2 mounted on the Bartington Cart system. Ground cover has to be 0.30m or less. The instrument used is operated by an experienced, skilled geophysical survey technician. The data is collected by hand wheeling the cart over the survey area in evenly spaced parallel transects. The equipment was specifically designed for archaeological prospection. It includes sensors that are highly stable, minimising requirements for excess data processing. The instrument has a vertical 1 m sensor separation permitting finite resolution of buried archaeological features. Surveys can be undertaken in scan or detailed (zig-zag traverse) modes for reconnaissance or high-density mapping. The fluxgate enables reliable flexibility during fieldwork. Frequent realignment of the instruments and zero drift correction ensure a constant high quality of data. These extremely sensitive instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

The instrument can be employed in both commercial and research-based investigations allowing for the completion of projects within short timescales. Regular grid sample densities from standard 1600 readings to 12800 readings per 20m by 20m grid are permitted. A constant high quality of data is assured by experienced field staff operating in accordance with E*AC Guidelines for the use of Geophysics in Archaeology* (Schmidt et al. 2015) and English Heritage's *Geophysical Survey In Archaeological Field Evaluation* (David et al. 2008).

Bartington Grad 601-2 mounted on Bartington Cart

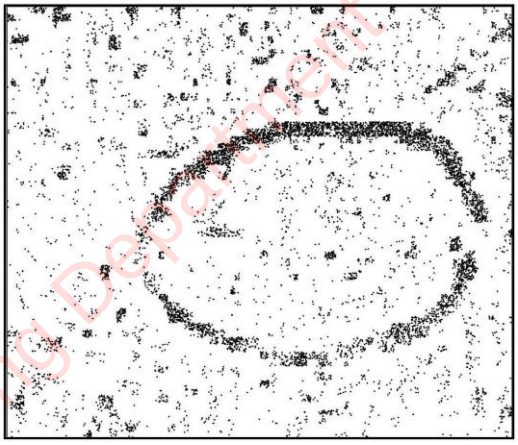
Data Display Format

Greyscale: The greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at very fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection.



Early medieval enclosure greyscale

Dot Density Plot : Each datum is assigned a cell in which the intensity or number of dots displayed is proportional to the magnitude of the individual response. The visibility or presentation of responses within a given survey area is governed by numeric parameters specific to both soil morphological and archaeological conditions observed on site. Typically, the range of weak to strong responses is manifested by a low to high level of dot density. The format is useful for displaying gradiometer and resistance data particularly for identifying low-level responses.



Dot Density plot of oval-shaped enclosure