ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME III TECHNICAL APPENDICES A-D

PROPOSED RESIDENTIAL, RETAIL, SPORTS HALL & COMMUNITY CENTRE DEVELOPMENT

AT

Athlumney, Navan, Co. Meath

Prepared by

JSA John Spain Associates
Planning & Development Consultants
Chartered Town Planners

In Conjunction with

HRA Consulting Engineers/Enviroguide/Byrne Environmental/CSR/ACSU Archaeology

May 2024

LIST OF APPENDICES

DOCUMENT CONTROL SHEET

Client:	**Albert Developments Ltd.**
Project Title:	**Boyne Village EIAR**
Document Title:	**Environmental Impact Assessment Report Volume III Appendices**
Document No:	**18231EIARVolII**

Rev.	Status	Author(s)	Reviewed By	Approved By	Issue Date
DV1	Draft	EIAR TEAM	RK	RK	28-4-2024
Final	Final	EIAR TEAM	RK	RK	28-5-2024

APPENDIX A – CULTURAL HERITAGE

Appendix A - Geophysical Survey Report

past | present | future

ACS

Report on Geophysical Survey at Ferganstown & Ballymacon and Athlumney, Navan, Co. Meath.

ARCHAEOLOGICAL
CONSULTANCY
SERVICES UNIT

Excavation Licence No.: 20R0115

Planning Reference No: N/A

ITM: 688806, 768139

RMP No.: N/A

Donald Murphy and Robert Breen

22nd August 2020

Report Status: Final

ACSU Ref.: 1984

HEAD OFFICE
Unit 21
Boyne Business Park
Greenhills, Drogheda
Co. Louth
Tel: 041 9883396
Tel: 041 9835422
Fax: 041 2130310
info@acsu.ie
www.acsu.ie

PROJECT DETAILS

Project	Geophysical Survey of a site at Ferganstown & Ballymacon and Athlumney, Navan, Co. Meath
Licence No.	20R0115
Townland(s)	Ferganstown & Ballymacon and Athlumney
Report Type	Geophysical Survey
RMP No.	N/A
ITM Ref.	688806, 768139
Consultant	Archaeological Consultancy Services Unit, 21 Boyne Business Park, Greenhills, Drogheda, County Louth
Archaeologist	Donald Murphy
Report Authors	Donald Murphy and Robert Breen
Report Status	Final
Report Date	22nd August 2020
ACSU Ref.	1984

Part A: Archaeological information

NON-TECHNICAL SUMMARY

This report details the results of a geophysical survey carried on a site at Ferganstown & Ballymacon and Athlumney, Navan, Co. Meath (ITM 688806, 768139).

The survey was carried out to assess the archaeological potential of the site. It was carried out on lands to the south of the Boyne Rd (L1600) and the River Boyne, adjacent to and north of Old Rd, c.1.7km to the east of Navan town centre.

An Environmental Impact Assessment of an area, that the current development is a part of, was prepared by Jon Stirland of ACS Ltd in 2005. This identified the presence of two possible archaeological features - a curving field boundary indicating the possibility of an enclosure or earlier field systems and a semi-circular crop mark that might represent an enclosure.

The site does not contain any Recorded Monuments listed within the Record of Monuments and Places (RMP) or Sites and Monuments Record (SMR). The nearest such monument is an enclosure (ME025-053) which is located 0.6 km to the northwest of the site. The site is located c. 1.8 km east of the edge of the zone of archaeological potential for Navan town (ME025-044). It contains no Protected Structures as listed in the Meath County Development Plan 2013-2019, and no structures listed within the National Inventory of Architectural Heritage (NIAH). The site of the no longer standing Ferganstown House (Site ID 5759) is located c. 0.7 km to the northeast of the site.

An area adjacent to and east of the site was subjected to an archaeological assessment in 2018 under licence number 18E0308. This did not reveal any features of archaeological interest. A complex multi-phase occupation site consisting of an early medieval settlement to a post-medieval burial ground (containing a total of 38 burials) was however located c.1 km to the southwest. This was excavated in 2017 (16E0449) and would suggest potential for archaeological remains in the wider area.

In January 2020 an Archaeological Impact Assessment of a proposed development at Ferganstown & Ballymacon and Athlumney, Navan, Co. Meath was prepared by Magda Lyne of ACSU Ltd. It was recommended that a geophysical survey be undertaken in order to assess the nature of the possible monuments located within the site and to assess the archaeological potential of the site.

The geophysical survey was conducted by Donald Murphy and Robert Breen of Archaeological Consultancy Services Unit Ltd. (ACSU) between the 16th – 30th June 2020 under licence 20R0115 issued by the Department of Culture, Heritage and the Gaeltacht in consultation with the National Museum of Ireland. The site consists of 4 open fields of varying proportions, which are currently under agricultural pasture, crop, or left fallow.

The two potential archaeological monuments noted in the 2005 and 2020 assessments were not identified in this survey. However, early historic field divisions or drainage features were observed in Fields 1, 2, 3 and 4. Faint linear anomalies identified in Fields 2 and 4 are likely the remnants of the agricultural use of the land. Such linear anomalies may represent internal field drains, or ridge and furrow activity associated with ploughing. A number of positive anomalies were identified throughout the site. Such anomalies might represent cut features of archaeological significance or they may be natural in origin and represent stone sockets or animal burrows.

No clear indications of archaeological activity were identified. It is recommended however that a targeted archaeological assessment in the form of test trenching be carried out in order to fully assess the site, particularly the identified field divisions and linear anomalies in order to fully assess their depths, age and composition.

Contents

List of Tables

List of Figures

1. INTRODUCTION

This report details the results of a Geophysical Survey carried on a site at Ferganstown & Ballymacon and Athlumney townlands in Navan, Co. Meath (ITM 688806, 768139). The survey was carried out to assess the archaeological potential of the site. The site does not contain and is not in close proximity to any Recorded Monuments or Protected Structures.

The geophysical survey was conducted by Donald Murphy and Robert Breen of Archaeological Consultancy Services Unit Ltd. (ACSU) between 16th – 30th June 2020 under licence 20R0115 issued by the Department of Culture, Heritage and the Gaeltacht in consultation with the National Museum of Ireland.

2. METHODOLOGY

A full detailed gradiometer survey was undertaken throughout the application area using a Bartington GRAD 601-2 dual sensor fluxgate gradiometer system. A d etailed 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).

3. SURVEY OBJECTIVES

The aim of the survey was to establish the presence of any archaeological features within this site, and to inform a program of test trenching to be carried out across the site.

4. SOILS, GEOLOGY & TOPOGRAPHY

The site at Ferganstown & Ballymacon and Athlumney townlands consist of mostly flat agricultural land and has an elevation of c. 50m OD. The site is a greenfield site consisting of four fields of varying proportion, which are currently under agricultural pasture, tillage or left fallow.

The underlying geology consists of dark limestone and shale ('calp). It forms part of Lucan Formation that comprises of dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar. The underlying dark limestone and shale is covered by deep well drained mineral soils (Geological Survey of Ireland).

5. ARCHAEOLOGICAL ASSESSMENT

5.1 Archaeological & Historical Background

The site is located c. 1.7km east of the town centre of Navan, on lands to the south of Boyne Rd (L1600) and to the south of the River Boyne. The site is adjacent to and north of Old Rd, just off Kentstown Rd (R153), and is located in the townlands of Ferganstown & Ballymacon and Athlumney, in Navan, in the civil parish of Athlumney and the barony of Skreen in Co. Meath. It is located within two townlands; the northern extent of the site is within Ferganstown & Ballymacon townland, with the townland boundary between it and Athlumney running roughly in the east-west direction within the development site. The site is located to the south of the Oldcastle-Drogheda railway line which was constructed in the 1850s and later became a part of the Great Northern railway (See Figure 2).

An examination of the Placenames Database of Ireland (www.logainm.ie) can reveal important information about the natural and cultural heritage of an area. For example, Athlumney (*Áth Luimnigh*) can be translated as the ford of the expanse of water and was first mentioned in 1302 as '*Athlumpny'*. The townland is located adjacent to and south and west of the River Boyne. Clear evidence for human activity in the environs of the site can be seen from the Bronze Age, including within this townland. Wilde (1850) identified a mound or tumulus (ME025-029) and a cist (ME025-028) located within the townland of Ferganstown & Ballymacon. O'Brien (2003) described a Barrow – Unclassified (ME025-029) as a 'Mound Burial' and lists it alongside monuments discovered in Ninch Co. Meath, Pollacorragune, Tuam, Co. Galway and Muckduff, Co. Sligo.

The first known historical references to the townland of Ferganstown & Ballymacon is from The Down Survey map of County Meath (1654-56). It depicts Athlumny Parish as well as Ballimuchan and Fargnstown. Within the wider area several mills along the River Boyne are depicted as well as a number of buildings close to the River Boyne near Navan, likely representing Athlumney tower house and house off-set and perhaps castle-motte. The buildings depicted on the Down Survey Map are without crosses, suggesting the early 14th century Athlumney Church is not one of these buildings. To the northeast of the site, Ardmulchan Church is depicted. Taylor and Skinner's map (1777) was also inspected, however it does not offer any relevant detail.

Ordnance Survey maps give a glimpse into the busy landscape of the environs of the site. With no buildings depicted within the area of the site on either the 1st Edition Ordnance Survey (OS) 6-inch map of 1835 (Figure 3) or on the OS 25-inch map of 1909–11 (Figure 4). It appears however that the boundaries remained mostly unchanged since the 1st Edition Ordnance Survey Map, likely due to the presence of a wet ditch in part of the site. Outside of the site but in close proximity to the south of it, running northwest – southeast, a road connecting with the Boyne Rd is depicted leading to fields. It likely represents a former way to Killagrin settlement. This road outline is still visible today in the form of a boundary, however a building, possibly a farm surrounded by a plot which is visible on the 1835 map, is no longer present by the time of the 1909-1911 map. What appears to be an 18th century 'Model Village' project is depicted on the 1835 map. It is labelled Factory, and a School House and a Mill Dam are also shown. These are located at the end of a narrow lane connecting it to Boyne Rd that now runs under the Drogheda-Navan railway, which was opened in the 1850s. By the time of the 25-inch map of 1907–11, the railway is depicted as well as a number of mill races running along the water channel. The mill building is now demolished and has been replaced with modern sheds. The field system remained largely unchanged in the area, with relatively few adjustments. The Little Furze settlement located to the south-southwest, as well as Killagrin settlement to the south-southeast of the proposed development are depicted on both OS maps. Located c. 0.5km to the northwest of the site, along the south side of the River Boyne, on the north side of Boyne Rd, Flax, Corn and Flour Mills are depicted at the time of the 1835 map, suggesting that the wider area was relatively wealthy. Lewis (1837) mentions flax-mills and a very extensive flour-mills property of Mr Delany. One of these was called the New Mill. It was fitted with machinery and ten pairs of stones, six for grinding wheat and four for oats. These were run by a steam engine of 30 power. To the south of Boyne Rd but north of the Oldcastle Branch railway track, St Mary's cemetery is located. It was not depicted on the 1835 map, but on the 1909-1911 map its boundaries are already establish with hedgerow or trees.

To the southeast of the site, parts of an old routeway are visible on the OS mapping, also mentioned by Roycroft (2017). This routeway ran from Kilcarn, curving northwards, via Alexander Reid Cross Roads and on to Kilagrin. The road very likely continued north along the boundary, through Farrell's Lodge and along the River Boyne and towards Babes Bridge to Donaghmore and likely connects with the route now replaced by the N51. Babe's Bridge is a protected structure that represents the oldest surviving authenticated bridge arch in Ireland (O'Sullivan, Downey 2015). The bridge in question survived the great flood of 1330 but was neglected since the mid-15th century and fell in to ruin. It is likely that the route went out of use during the 17-18th century, surviving only in parts. Both maps also illustrate the townland boundary between Ferganstown & Ballmacoon and the townland of Athlumney and this boundary is located within the current site.

A recorded monument, an enclosure (ME025-053) is also noted 0.6 km to the north of the site. The townlands contain a number of other Recorded Monuments which are outlined in section below.

Navan Town

Navan is situated at the confluence of the Boyne and Blackwater on the main routeway between Dublin and Kells. The medieval town hugged the top of a triangular ridge overlooking the river junction. The ground drops steeply along Watergate Street, on the north, and Ludlow Street, on the south, but westwards along Trimgate Street and Brews Hill the drop is much more gradual. The placename is derived from An Uaimh, 'the cave'. The proximity of the Boyne River would have provided an ideal location for Mesolithic activity. The Boyne Valley was an ideal environment for these early communities. According to Stout (2002) water proximity in coastal, lakeside or riverine setting is a locational feature of 75% of Mesolithic sites in Ireland. The small group of prehistoric objects known from the town suggests that it was frequented during the Neolithic and Bronze Age, perhaps because of its suitability as a fording point (Bradley, 1985). The nature of this prehistoric activity remains unknown but there is nothing to suggest that there was a settlement here at any time. Perhaps the most significant archaeological discovery from the town is the rich Viking burial discovered in 1848 (Wilde, 1850). Burials are usually indicators of settlement and this find suggests that further work may uncover remains of the Viking period, perhaps a rural settlement site. Navan is traditionally identified with Nuachongbail, where an early monastery was reputedly established by St Fechín (Gwynn and Hadcock, 1970). Although no reference to the monastery occurs in contemporary sources, the likelihood of its existence is supported by the foundation of a house for Augustinian Canons prior to the Norman conquest of the late 12th century AD (Bradley, 1985). This monastery appears to have been subsequently patronised by Jocelin de Angulo, to whom Hugh de Lacy granted Navan and Ardbraccan before 1186 (Orpen, 1911–20, 84). De Angulo built a motte on an esker ridge south of the Blackwater and he or his son William was probably responsible for the foundation of the town. Nothing is known of the early development of the Anglo-Norman town of Navan and the first clear documentary indication of it as a corporate borough is in 1462 (Berry, 1914). Corporate charters were granted in 1494, 1605 and 1679 (Cogan, 1862). A charter of James II made in 1689, like his other Corporation charters, did not come into force after the Battle of the Boyne. In the Later Middle Ages the town was on the frontier of the Pale and in 1539 it was plundered by O'Neill and O'Donnell. Exposure to attack was so great that the parliament of 1542–3 enacted a charge of 3s 4d on every ploughland in Meath and Westmeath in order to build the walls of Navan. The street pattern of the medieval town was essentially Y-shaped and consisted of Trimgate Street, Ludlow Street and Watergate Street. New Bridge and the street leading to it from Market Square are additions of more recent times. In the 16th century Cannon Row was built up and the Civil Survey makes it clear that by the mid-17th century streets were established outside the gates on the north, west and south giving the street plan the characteristically linear form which it has retained. The area of the medieval town is characterised by a largely intact burgage plot pattern. The plots are almost all of the long burgage variety with the house fronting onto the street and the property extending to the town wall at the rear. The town charters of 1605 and 1679 refer to markets and fairs and there is little doubt that the importance of the town in the medieval period rested on its function as the market place for its hinterland. The medieval market place was located at the junction of the medieval streets in what was later known as Market Square. It was of triangular form like those at Thurles and Fethard, Co. Tipperary. The remnants of a market cross of c. 1585 are now preserved in the National Museum of Ireland (No. X1639).

The tradition that Hugh de Lacy walled the town may be dismissed on the grounds that de Lacy was dead before the town was established. The earliest references to murage occur in the mid-15th century. In 1462 the Irish Parliament ordained that Navan could continue to collect the murage customs which had been levied during the reign of Henry VI (1422–61). After the sack of the town in

1539 monies were raised to refortify the walls. This would not appear to have been substantial, however, because in 1598 Navan was grouped with Duleek among the market towns as opposed to the walled towns of Meath. As with other Irish towns the 18th century was the period that witnessed the removal of the gates and the demolition of much of the wall. Dublin Gate was widened in 1786 and Watergate in 1788. The walled town enclosed an oval area measuring 320m by 275m covering an area of about 5.2 hectares (13 acres) with a circumference of about 800m (Bradley, 1985).

5.2 Recorded Monuments

There are no recorded monuments listed within the Record of Monuments and Places (RMP) or the Sites and Monuments Record (SMR) located within the site or in its immediate environs (Figure 2). There are four recorded monuments located within c. 1 km of the site. The nearest monument to the site is an enclosure (ME025-053) and it is located c. 0.6 km to the northwest of the site. The study area is located c. 1.8 km east- of the zone of archaeological potential for Navan town (ME025-044).

The following is a list of the nearest Recorded Monuments located within the surrounding area (Table 2). Where available, these descriptions are derived from the published Archaeological Inventory of County Meath (Moore 1987) but in some instances have been revised and updated on the National Monuments Service Archaeological Survey Database (www.webgis.archaeology.ie/historicenvironment/) or are awaiting updating.

Table 1: Recorded Monuments in the environs of the site

RMP No./SMR No.	Class/Site Type	Townland	Description
ME025-053	Enclosure	FERGANSTOWN and BALLYMACON	No information available.
ME025-028	Cist	FERGANSTOWN and BALLYMACON	Wilde (1850, 163) records the discovery of small cists with sepulchral urns at a place called 'Cnoc a Reamuin'.
ME025-029	Barrow - unclassified	FERGANSTOWN and BALLYMACON	Circular mound (diam. c. 14m, H c 1m) with long cist and inhumation at centre. Destroyed during building in 1976 (RMAHS 1977, 65-7)
ME025-052	Souterrain	ALEXANDER REID	No information available.

5.3 Protected Structures and National Inventory of Architectural Heritage (NIAH)

The site contains no Protected Structures as listed in the Meath County Development Plan 2013-2019, nor any structures listed within the National Inventory of Architectural Heritage (NIAH). The site of the no longer standing Ferganstown House (Site ID 5759) is located c. 0.7 km to the northeast of the site and Athlumney Road Railway Bridge (NIAH Reg. No. 14010061) is located c. 1.2 km to the west south-west (Figure 2).

Two Protected Structures located in the environs of the site include; Rowleys Lock (RPS No. MH025-112) which is a late 18th century lock bridge and house; and Babe's Bridge (RPS NO. MH025-113) a 14th century bridge on the River Boyne, with one arch surviving today on the south side of the river. These are located on or near the River Boyne.

The following is a description of these structures, as listed within the National Inventory of Architectural Heritage (NIAH) and the Meath County Development Plan 2013-2019.

Table 2: Protected Structures and National Inventory of Architectural Heritage (NIAH) structures in the environs of the site

Name	Townland	NIAH Reg No	RPS ID	Description
Athlumney Road Railway Bridge	Athlumney	14010061	N/A	Single arch railway bridge over road, c.1849, with rusticated limestone buttressed piers, voussoirs, imposts and parapet. Rusticated limestone with drafted margins to abutments, parapet and retaining walls to embankments, ashlar coping to parapet and ashlar string courses at springing and track levels. Segmental arch with rusticated voussoirs with drafted margins.
Rowleys Lock	Ferganstown	N/A	MH025-112	A lock c.1790, with ashlar limestone walls to channel. Lock gates replaced by concrete walls. A Ruinous Five-bay, single storey stone lock-keepers house and above one of the lock gates is a single arch stone bridge with a plaque.
Babe's Bridge	Ferganstown	N/A	MH025-113	Fourteenth century bridge. One arch survives on S bank of Boyne

5.4 Previous Archaeological Investigations

There were a number of archaeological investigations that took place previously in the environs of the site. The nearest excavation to the study area is located adjacent to the eastern boundary of the field (18E0308), providing the current site with a road access. This investigation did not reveal any features of archaeological interest.

Listed below are excavations located in the environs of the proposed development that further demonstrate the overall archaeological potential of the site under study and its surrounding townlands. The details of these investigations derive from the Summary Accounts of Archaeological Excavation in Ireland (www.excavation.ie) are outlined below.

Table 3: Previous excavations in the environs of the site

Site	Licence No.	RMP No./ SMR No	Director(s)	Site Type	Site Type
R153 Ferganstown and Ballymacon, Alexander Reid, Bailis	18E0308	N/A	Liam Coen	Testing, no archaeology found	Archaeological test trenching
ATHLUMNEY/ LIMEKILNHILL/ BALREASK OLD	03E0613	SMR 25:49	Emer Dennehy	No archaeological significance	Archaeological monitoring
FERGANSTOWN/ BALLYMACKON	98E602	N/A	Clare Mullins	Cut features	Archaeological monitoring

Site	Licence No.	RMP No./ SMR No	Director(s)	Site Type	Site Type
FERGANSTOWN/ BALLYMACKON	99E0011	SMR 25:029	Clare Mullins	Environs of 'Mound Site'	Archaeological test trenching
FERGANSTOWN/ BALLYMACKON	1976:28	N/A	E. Kelly	Cist Burial	Rescue excavation
FERGANSTOWN AND BALLYMACKON	99E0178	N/A	Ken Hanley	Souterrain	Limited archaeological excavation
Navan AC Watermains	06E0165	ME025–029, ME025–044	Shane Delaney	No archaeological significance	Archaeological monitoring
ATHLUMNEY	11E240	N/A	Fintan Walsh	Enclosure and post-medieval farm plot	Archaeological test trenching
Athlumney	16E0268	N/A	Padraig Clancy	Enclosure and 2 burials / early to post-medieval	Archaeological monitoring
Alexander Reid and Bailis, Navan	16E0449	N/A	Steven McGlade	Ringfort, burials	Archaeological test trenching

Six archaeological assessments took place in the environs of the proposed development in the townlands of Ferganstown & Ballymacon and Athlumney. An area located adjacent to the eastern extent of the site was tested under licence 18E0308. The testing program was informed by a geophysical survey. A total of 25 trenches were excavated with the topsoil ranging in depth from 0.3-0.5m over the entire area. It was discovered that a crop mark identified during the impact assessment was a backfilled quarry pit. The subsoil across the proposed development comprised an orange-brown stony clay. No archaeological material was encountered in any of the excavated trenches.

Two archaeological monitoring assessments were undertaken North to north-west of the current site. The first one was located on the ATHLUMNEY/LIMEKILNHILL/BALREASK OLD and was excavated under licence number 03E0613 and took place over a four-day period in June/July 2004. Topsoil was mechanically removed to an average depth of 0.4m. The underlying subsoil was predominantly composed of a yellow/brown silty clay with occasional pockets of sand. Larger deposits of sand occurred at Chainages 1470-1510 and 1560-1580, supporting the presence of sand quarring in the area. The topsoil on the east wall of the River Boyne valley survived to an average depth of just 0.1m. In this area the underlying subsoil was a leached yellow/blue clay. No artefacts or stratigraphy of an archaeological nature were identified during the course of monitoring of ground disturbance works.

Monitoring was carried out under licence number 98E602 along part of Navan to Donore road and took place in January 1999. This site was located on a low earthen bank where charcoal filled features were identified and ash and animal bone were found contained within their fills. This site does not appear to be related to SMR 25:28 which was a Bronze Age cemetery recorded by Wilde in 1850. A sample of charcoal from one of the features produced a radiocarbon date of AD 585-675. In January 1999, a souterrain passage was exposed, and limited excavation took place in April, under licence 99E0178. The souterrain was largely intact and consisted of a single drystone passage, leading roughly west into a simple beehive chamber. Four trenches were excavated, in order to examine the areas of the site to be affected by the proposed development. The passage walls were constructed from roughly shaped limestone rocks. The walls slanted inwards and were crowned by seven large lintels. The passageway was 3.3m long by 1m high and angled down towards the beehive chamber, which measured 2.65m (north-south) x 2.22m x 1.7m high. The chamber was constructed using both flat and rounded rocks and was sealed by a large capping stone. There was sufficient evidence to suggest that there may have been an entrance passage or drop-hole feature leading north from the exposed end of the existing passageway. A series of four (mostly linear) parallel cut features were exposed and these were identified as cultivation furrows. Two shallow pits were also exposed. A curved, ditch-like feature and a circular structure were also identified. The shallow circular structure may have been a hut site, however, no associated stake- or post-holes were identified. This feature was outside the arc of the ditch-like trench. Additional archaeological test trenching took place under licence 99E0011, as part of the Navan Sewerage Augmentation Scheme. Located relatively close to the assessment was a mound site, partially destroyed. It contained a long cist and inhumation. Archaeological features had been recorded in the pipeline trench. The National Museum of Ireland excavated a cist burial just to the north of the proposed development in 1976. A long stone cist contained the skeleton of an adult female which was orientated W to E. Originally covered by a low mound approximately 14m in diameter and 1m in maximum height, this had been removed and the cist was disturbed before excavation. No accompanying finds were recovered. The cist measured approximately 1.8m in length and 0.60m in width.

To the south of the site, on the south side of Kentstown Road R153 two assessments informed by a geophysical survey took place. The testing assessment was undertaken under licence 11E240, following a desktop assessment and informed by geophysical survey (11R049). Four areas of archaeological potential were identified and included, a possible rectangular enclosure, possible archaeological activity in the form of parallel linear ditches and pits in the northern parts of the area and field boundaries or ditches. As a result, 17 test trenches were excavated identifying a post medieval farm plot and an enclosure. The enclosure ditch was investigated and found to be 2.5m in width and 0.8m in depth. The outer enclosure ditch was hand dug and found to be 1.5m wide and 0.5m. Subsequently the area where the enclosure was found was subject to monitoring following a further testing program. Monitoring was carried out under licence 16E0268 and confirmed the presence of the enclosure. During monitoring the remains of two burials were exposed and stripping of the central part of the enclosure was halted. Two hand dug test trenches were excavated under licence 16E0449. Five shallow juvenile and infant burials were identified, resting on the underlying bedrock or in shallow cuts. The burials post dated the early medieval enclosure. Further monitoring did not encounter any further features of archaeological significance. Excavation of the area took place under the same licence and identified a multi-phase occupation of the site from an early medieval settlement to a post-medieval burial ground (containing a total of 38 burials). The early medieval sub-circular settlement enclosure measured 29m by 26m in diameter encircling the low hillock. Number of enclosed spaced to the east, south and west were identified. A number of features with the early medieval phase of activity were identified and consisted of 11 kilns (figure of eight and keyhole shaped), a metalworking area, storage and processing pits.

Metalworking, cereal production, weaving and animal husbandry would indicate a self-sufficient community. A number of phases of evolution of this early medieval settlement were identified. Initial examination of artefacts suggests a possible 7th to 8th century date.

The settlement was possibly abandoned as a result of fire. In the 17th century a burial ground and possible chapel were established on the remains of the former enclosure. Styluses found on site might suggest an ecclesiastic community. A chapel building might be represented by the sunken structure that measured 3.6m by 3m and was identified west of the burial ground. In the 18th century the land returned to agricultural use and further levelling in the mid-19th century in relation to Sion House took place.

5.5 Cartographic Evidence

Examination of pre-Ordnance Survey mapping included The Down Survey map of County Meath (1654-56) and Taylor and Skinner's map (1777). On the Down Survey map of County Meath 'Athlumny' Parish' as well as 'Ballimuchan' and 'Fargnstown' are depicted. Within the wider area several mills along the River Boyne are shown as well as a number of buildings at the bend of the River Boyne, likely representing Athlumney tower house and perhaps Castle-motte. The buildings depicted on the Down Survey Map are without crosses, suggesting that the 14th century Athlumney Church is not one of these buildings. To the northeast of the proposed development, Ardmulchan Church is depicted. Taylor and Skinner's map (1777) was also inspected, however it does not offer any relevant detail.

Ordnance Survey maps of the area were examined in order to identify any possible archaeological features and to trace the development of the site during the nineteenth and early twentieth centuries (Figures 3-4). No buildings are depicted within the site on either the first edition Ordnance Survey (OS) 6-inch map of 1835 (Figure 3) or on the Ordnance Survey OS 25-inch map of 1907–11 (Figure 4). It appears that the field system remained mostly unchanged since the time of the 1st Edition Ordnance Survey map, likely due to the presence of a wet ditch, with relatively few adjustments.

A roadway is also illustrated leading into the fields from the nearby Boyne Road and is likely to represent the former access road to Killagrin settlement. The outline of this road is still visible today in the form of a field boundary, however a building, possibly a farm, surrounded by a plot visible on the 1835 map, is no longer present by the time of the 1909-1911 map. On the 1835 map '*The Factory', 'School House'* and a '*Mill Dam'* are also all shown. By the time of the 25-inch map of 1907–11, the railway, which opened in the 1850s, is depicted as well as a number of mill races running along the water channel. The Little Furze settlement, located to the south-southwest, as well as Killagrin settlement to the south-southeast of the site are depicted on both the 1835 and 1907-11 OS maps. Along the south side of the River Boyne, on the north side of Boyne Rd, Flax, Corn and Flour Mills are depicted on the 1835 map, suggesting the wider area was relatively wealthy at the time.

Both maps also illustrate the townland boundary between Ferganstown & Ballmacon and the townland of Athlumney, which crosses the site.

6. 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 detection of potential archaeological responses. Data is collected in grids that measured 40m x 40m and data is displayed accordingly.

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 Geo 7X 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. Archived raw data is presented in Figures 5, 6 and an interpretation is presented in Figure 7,8.

7. SURVEY RESULTS

The geophysical survey was conducted by Donald Murphy and Robert Breen of Archaeological Consultancy Services Unit Ltd (ACSU) between the 16th – 30th June 2020 under licence 20R0115 (Figures 5 and 6). A full detailed gradiometer survey was undertaken throughout the application area using 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 within the site of the proposed development with variations in the magnetic field between (-100nT to +107.834nT). The site is a greenfield site consisting of four fields of varying proportion, which are currently under agricultural pasture, tillage or left fallow. The survey areas consist of large open fields serving as pasture lands.

Field 1 (Figure 5, 7)

Field 1 consisted of a large rectangular field to the west of the site that has been left fallow. A historic field boundary (A) aligned north-south, has been identified along the western portion of this survey area and evident on the historic OS 6-inch map of 1835.

A number of large modern dipolar anomalies were identified also (B). These are most likely modern in nature and may be a result of ferrous materials in the topsoil. It may also be possible however that these anomalies represent thermo-remnant features, where heat application has occurred in-situ from features such as furnaces, or kilns.

A number of positive anomalies (K) were identified scattered throughout the northern portion of the field. These may represent cut features of archaeological potential such as pits and postholes or may be natural in origin resulting from tree throws, stone sockets or natural depressions in the subsoil.

The historic field boundary, dipolar anomalies, and the number of potential cut features should be targeted during the testing stage of the development in order to ascertain their age, depths and archaeological significance.

No clear indications of archaeological activity were identified within Field 1.

Field 2 (Figure 5, 7)

Field 2 consisted of an open field aligned east-west. A historic field boundary (B) evident on all historic OS map editions has been identified aligned north south and in a form of modern anomalies within the east part of Field 2. This field boundary is still present as an upstanding fence.

A number of faint linear anomalies were identified in the eastern portion of Field 2. The east-west aligned linear (C1) likely represents a historic field system or field drain that predates that of (C2). A number of linear trends aligned north-northwest – south-southeast (D) were identified as running perpendicular to the linear (C1) on its southern side. Together, these anomalies likely represent historic internal field divisions and their associated agricultural land use such as ridge and furrow activity or land drainage.

A number of positive cut anomalies were identified throughout the survey area (K). These may represent cut features of archaeological potential such as pits and postholes or may be natural in origin resulting from tree throws, stone sockets or natural depressions in the subsoil. A number of larger dipolar anomalies were also identified and are likely the result of modern interferences such as ferrous material in the subsoil.

The south-eastern portion of Field 2 was situated in close proximity to the upstanding barnyard structure and so was found to be heavily disturbed. A large band of magnetic disturbance was identified along the eastern field boundary which consists of a metallic fence and posts. An area of disturbed ground was identified to the west, likely the result of ground disturbance associated with the construction of the barn structure and yard.

The linear anomalies identified in the eastern portion of the field as well as a number of the potential cut features should be targeted during the testing phase of the development in order to fully access their age and form.

No clear indications of archaeological activity were identified.

Field 3 (Figure 6, 8)

Field 3 consisted of the east part of a large arable land of irregular shape located within the central western part of the site, adjacent to and west of the modern shed. Within the southeast part of the field two linear anomalies were identified (J, H). These were visible running perpendicular to one another along the south and east field boundary and can represent historic field boundaries or perhaps drainage features associated with land use. Two parallel anomalies aligned roughly north-south (J) were noted located within the south eastern part of the site. These may also represent historic boundaries or drainage features.

A number of possible cut anomalies (K) were also identified throughout the survey area. These may represent cut features of archaeological potential such as pits and postholes or may be natural in origin resulting from tree throws, stone sockets or natural depressions in the subsoil.

No clear indications of archaeological activity were identified.

Field 4 (Figure 6, 8)

Field 4 consisted of a large rectangular field to the south of the development area. A west-northwest - east-southeast aligned field boundary (F) was identified towards the southern end of field. It is likely a continuation of the field boundary evident further east in the adjacent field. A number of faint linear anomalies (E1, E2, E3) aligned north-south may be the result of internal field drains, or ridge and furrow activity.

A series of tightly bound roughly east-west aligned linear features (G) were identified towards the northern portion of the field. This anomaly may represent a second field division or further evidence of agricultural activity.

A number of possible cut anomalies (K) were also identified throughout the survey area. These may represent cut features of archaeological potential such as pits and postholes or may be natural in origin resulting from tree throws, stone sockets or natural depressions in the subsoil.

No clear indications of archaeological activity were identified.

8. CONCLUSIONS & RECOMMENDATIONS

The geophysical survey of a site at Ferganstown & Ballymacon and Athlumney was carried out in order to assess the archaeological potential of the site. This survey identified the remains of a number of historic field divisions in Fields 1, 2, 3 and 4. It also identified segments of early field systems and smaller features of potential archaeological significance. Weak linear trends identified throughout the survey area may also be associated with such field systems and associated agricultural activities. Such faint linear anomalies may represent former field boundaries and drainage features.

A number of weak magnetic anomalies were seen throughout the surveyed area, however these are likely to represent modern agricultural features and natural geology and are unlikely to be of archaeological significance.

A number of the magnetic anomalies scattered throughout the remainder of the site may be the result of smaller features such as kilns, refuse pits or areas of burning. Isolated ferrous anomalies identified throughout the survey area may represent smaller features of archaeological significance or more modern agricultural debris such as iron objects dispersed throughout and within the subsoil.

No clear indications of archaeological activity were identified. It is however recommended that archaeological assessment in the form of test trenching be carried out in order to fully assess the development area, particularly the identified field divisions and linear anomalies in order to fully assess their depths, age and composition.

9. REFERENCES

Berry, H. F. (ed.) 1914, Statute Rolls of the Parliament of Ireland, 1–12 Edward IV. Dublin.

Bradley, J. 1985, Urban Archaeology Survey of Ireland: Part 2, County Meath. Unpublished report prepared for the Office of Public Works.

Bradley, J. (1988/9) 'The medieval towns of Co. Meath' in Ríocht na Mídhe, Vol. VIII, 31–49.

Cogan, A. 1862, The Diocese of Meath, Ancient and Modern, Vol.1. John Fowler. Dublin.

Gwynn, A. & Hadcock, R. N. 1970, Medieval Religious Houses: Ireland. Irish Academic Press. Dublin.

Moore, M. 1987, Archaeological Inventory of County Meath. Stationery Office. Dublin

Murphy, D. (2018) Archaeological Assessment of Proposed Housing Development at Fitzherbert Wood, Navan, Co. Meath. Unpublished report.

O'Brien, E. 2003. Burial practices in Ireland: first to seventh centuries A.D. In J. Downes and A. Ritchie (eds), Sea change: Orkney and northern Europe in the later Iron Age, AD 300–800, 63–72. Pinkfoot Press, Balgavies

O'Sullivan, M., & Downey, L. (2015). HISTORICAL BRIDGES. Archaeology Ireland, 29(4), 37-40

Orpen, G. H. 1911-20, Ireland Under the Normans 1169–1333. 4 vols. Oxford.

Roycroft, N. (2017) Archaeological Desk Based Assessment, LDR6 / RT8 Distributor Road between Kentstown Road (R153) and Boyne Road, Navan, 'Ferganstown and Ballymacon', 'Alexander Reid' and 'Bailis' Townlands, Co. Meath, Unpublished report

Stirland, J. (2005) Archaeological Impact Assessment: Ferganstown, Ballymacon. Unpublished report.

Stout, D. L. (2002) Newgrange and the Bend of the Boyne. Cork University Press.

Wilde, W. 1850, The Beauties of the Boyne and its Tributary the Blackwater. Republished 1978.

Other Sources

National Inventory of Architectural Heritage (http://www.buildingsofireland.ie/).

Record of Monuments and Places (RMP), the Heritage Service, 7 Ely Place, Dublin 2.

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

Topographical Files of the National Museum of Ireland, Kildare Street, Dublin 2.

Index to the Townlands and Towns, Parishes and Baronies of Ireland https://www.logainm.ie/en/

Variation no. 3 of the Navan Development Plan 2009 – 2015, adopted in 2019 Meath County Development Plan (2013-2019) http://www.navanhistory.ie/index.php?page=babes-bridge (Accessed on 8 January 2020)

Cartographic Sources

Down Survey map of County Meath, Barony of Skreen (1654-56),

1st Edition Ordnance Survey (OS) 6-inch map (1835-37)

3rd edition Ordnance Survey (OS) 25-inch map (1909-11),

Ordnance Survey Ortho (aerial photography) series, 1995, 2000, 2005, 2012

Report Status:	Final
Issue/Revision:	0
Issue/Revision Date:	22nd August 2019
Prepared by:	Donald Murphy and Robert Breen
Signed:	Donald Murphy
Approved by:	Magda Lyne
Signed:	Magda Lyne

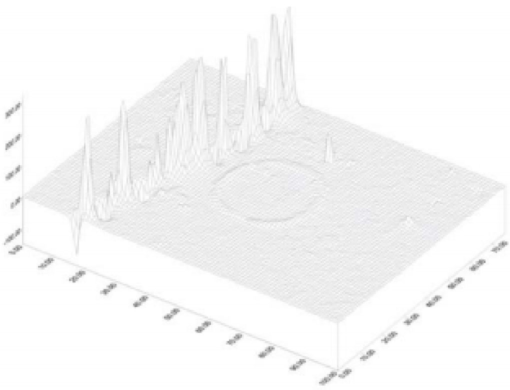
Appendix 1 - Summary Technical Information & Glossary of Terms

Fluxgate Gradiometer Survey: Surveys are undertaken using the Bartington Grad 601-2 survey instrument which was specifically designed for archaeological prospection. It includes sensors that are highly stable, minimizing 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. Extremely sensitive, these 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 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 English Heritage Research & Professional Guidelines No. 1, *Geophysical Survey In Archaeological Field Evaluation* (David 1995).

Bartington Grad 601-single axis dual sensor gradiometer.

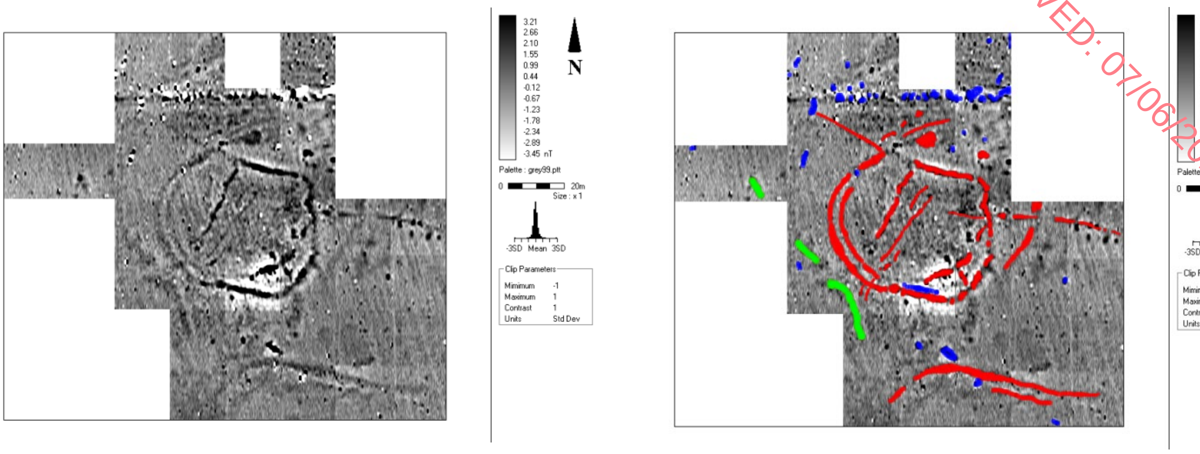
Data Display Formats

XY Trace: The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.



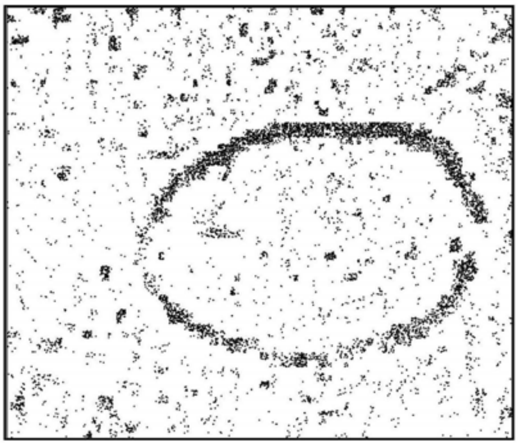
XY Trace of enclosure site

Greyscale: As with dot density plots, 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

Glossary of Interpretation Terms

Archaeology: This category refers to responses usually supported by comparative archaeological evidence (i.e., photographic transcriptions, excavation, etc.). The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, storage pits and associated features.

Archaeology ?:This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

Industrial: Such anomalies generally possess a strong magnetic response and may equate with archaeological features such as kilns, furnaces, concentrations of fired debris and associated industrial debris.

Area of Increased Magnetic Response: These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

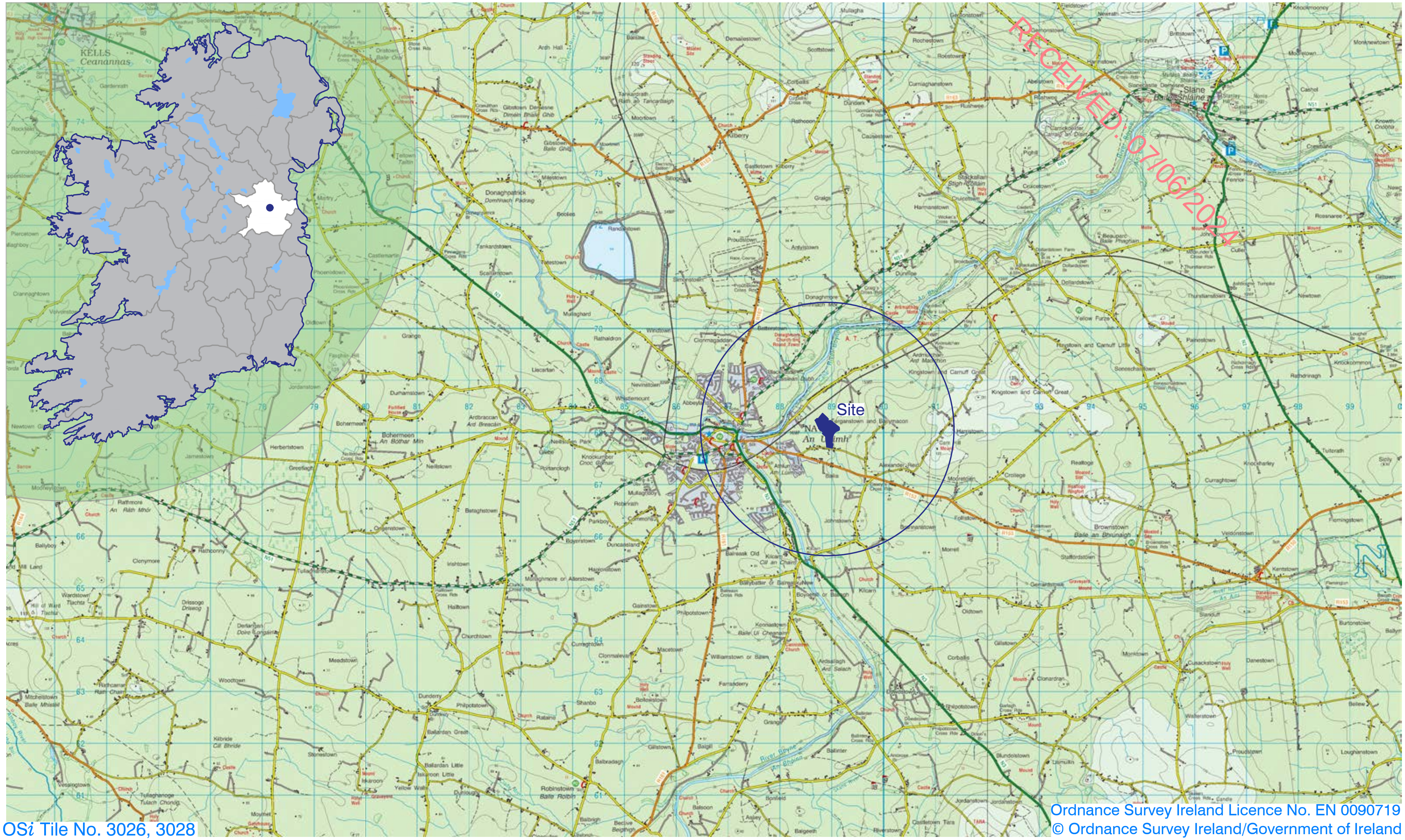
Trend :This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

Ploughing/Ridge & Furrow : Visible as a series of linear responses, these anomalies equate with recent cultivation trends.

Natural?: Resulting from localised natural variations in the magnetic background of the subsoil, these responses are often recorded in areas of low-lying land prone to flooding.

Ferrous : These anomalies exhibit a typically strong magnetic response, often referred to as 'iron spikes,' and are the result of modern metal debris located within the topsoil.

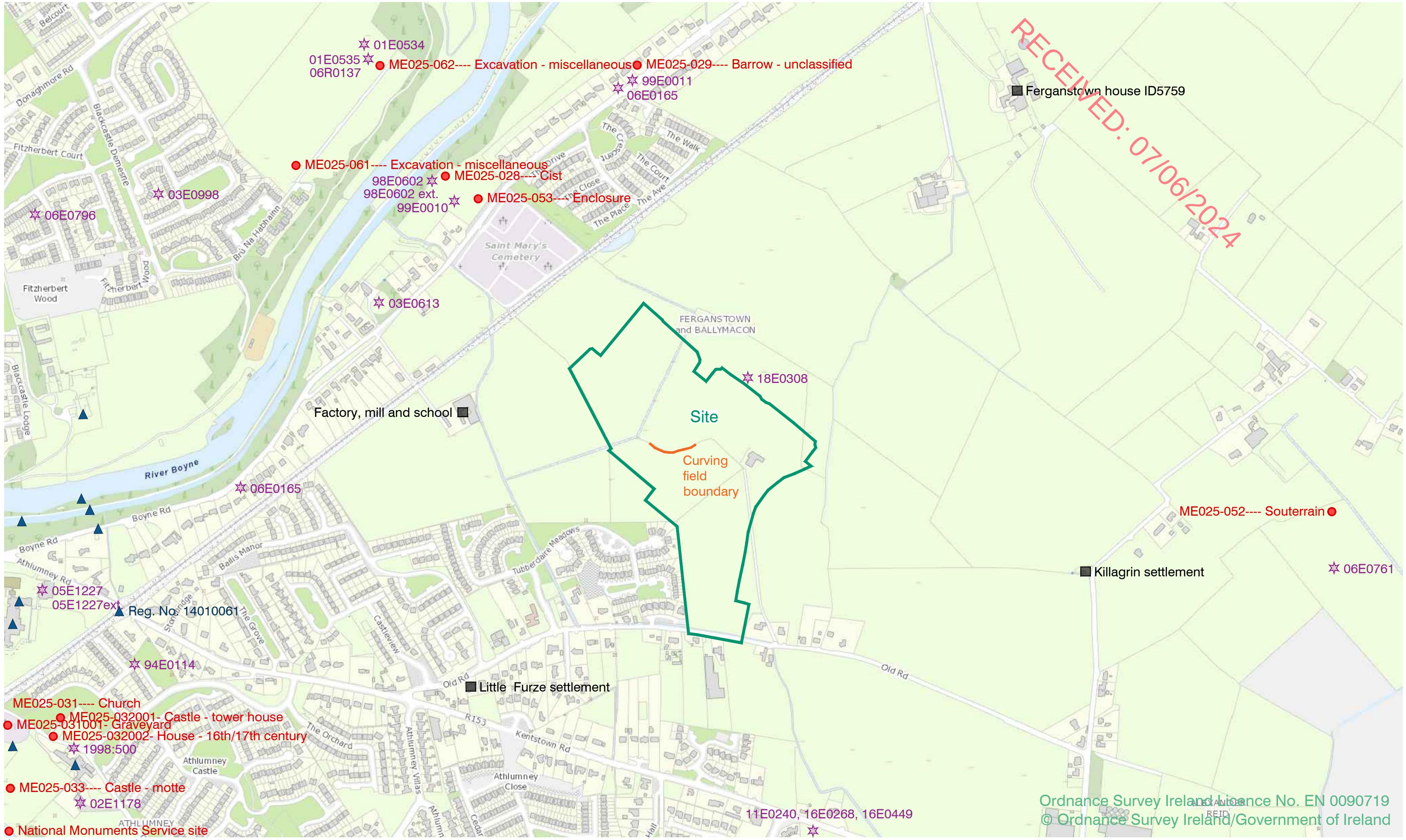
Area of Strong Magnetic Disturbance: This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.



Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part A	
Drawing number: 1984_C1001	
Date: August 2020	Scale: 1:100,000 @A4

Figure 1: Location of site



- National Monuments Service site
- National Inventory of Architectural Heritage site
- Previous Archaeological Investigations
- Protected structures

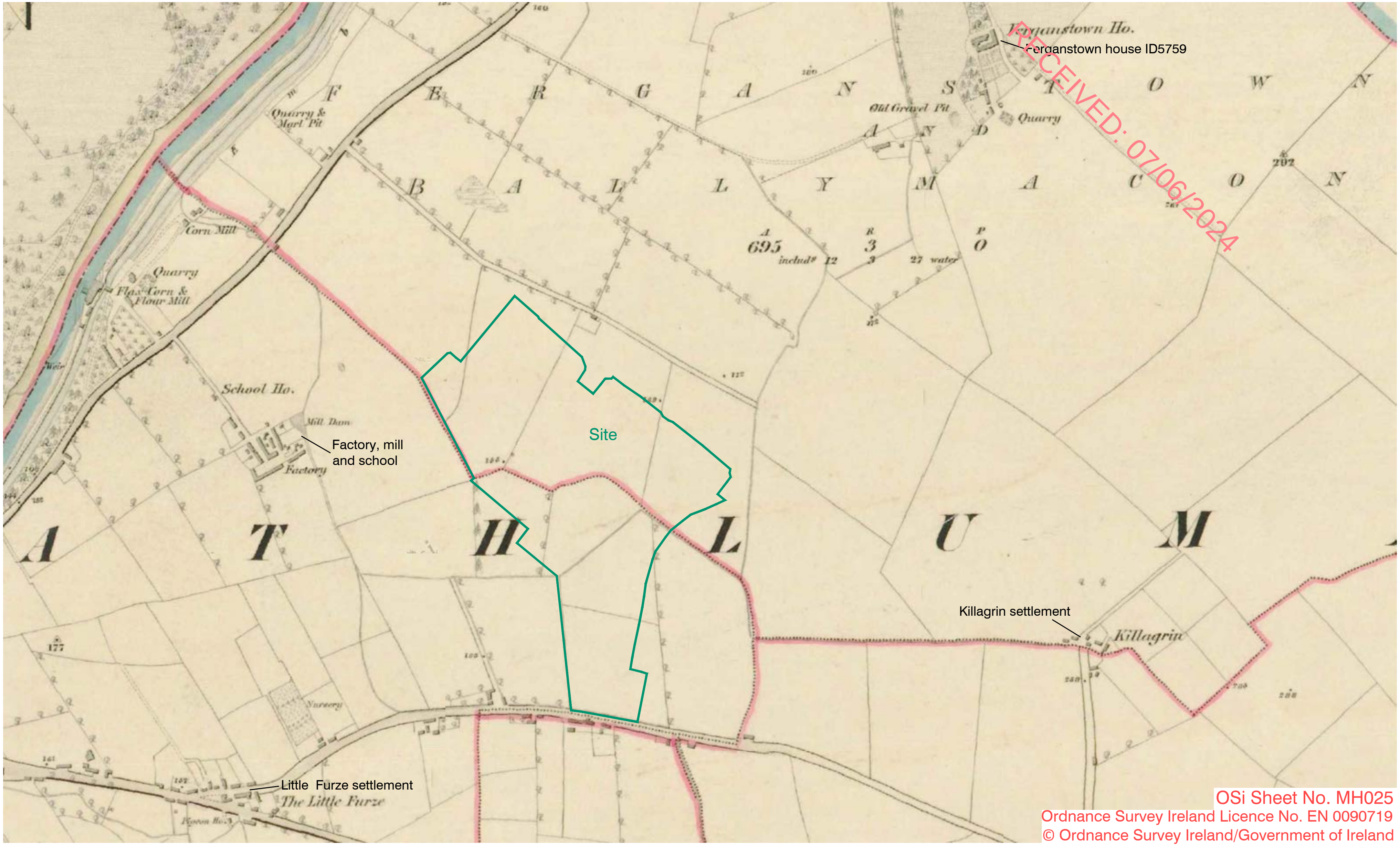
500 m

N

Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part A	
Drawing number: 1984_C1002	
Date: August 2020	Scale: 1:10,000 @A4

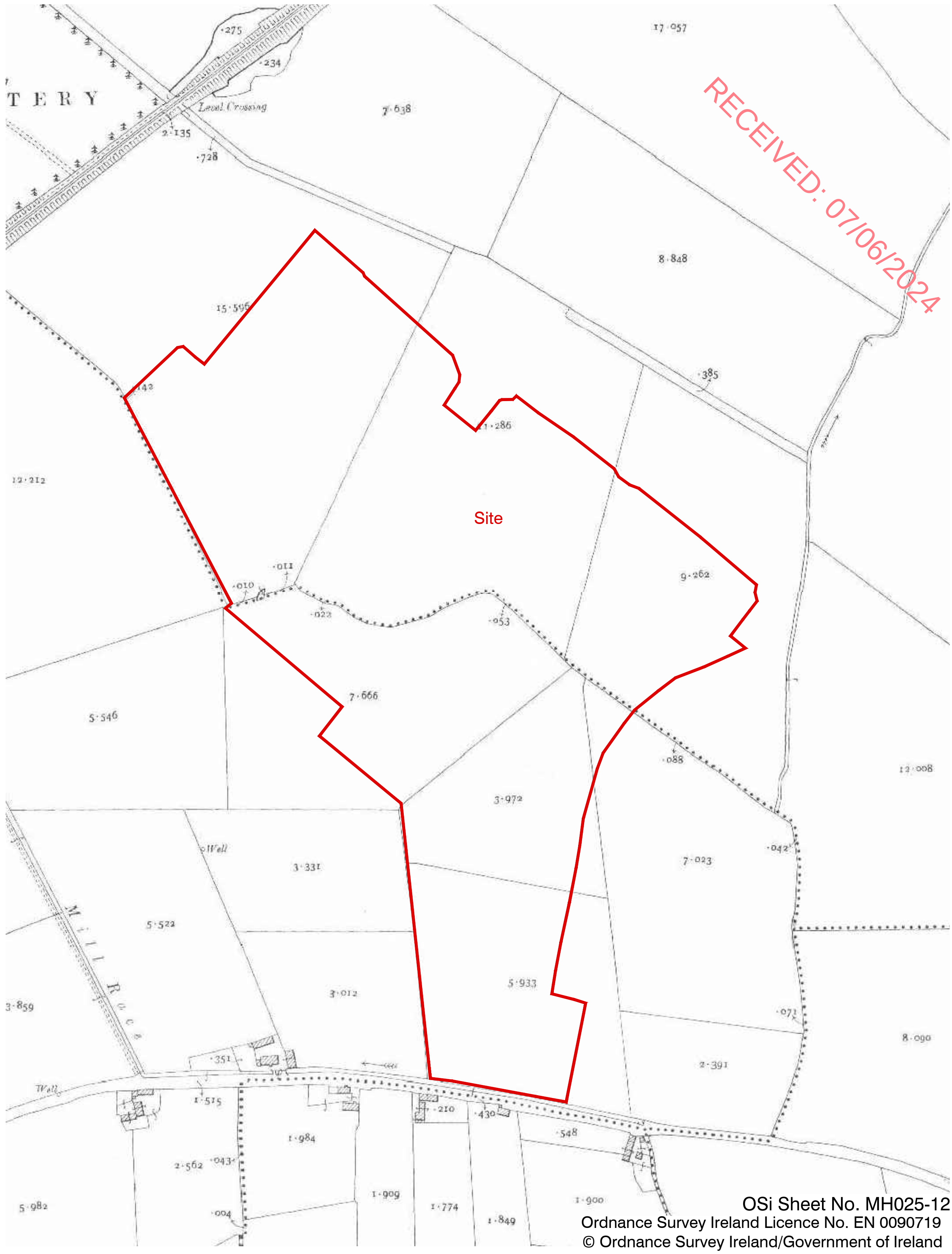
Figure 2: Location of site, previous investigations and nearby *Sites and Monuments Record* sites



Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part A	
Drawing number: 1984_C0003	
Date: August 2020	Scale: 1:8,000 @A4

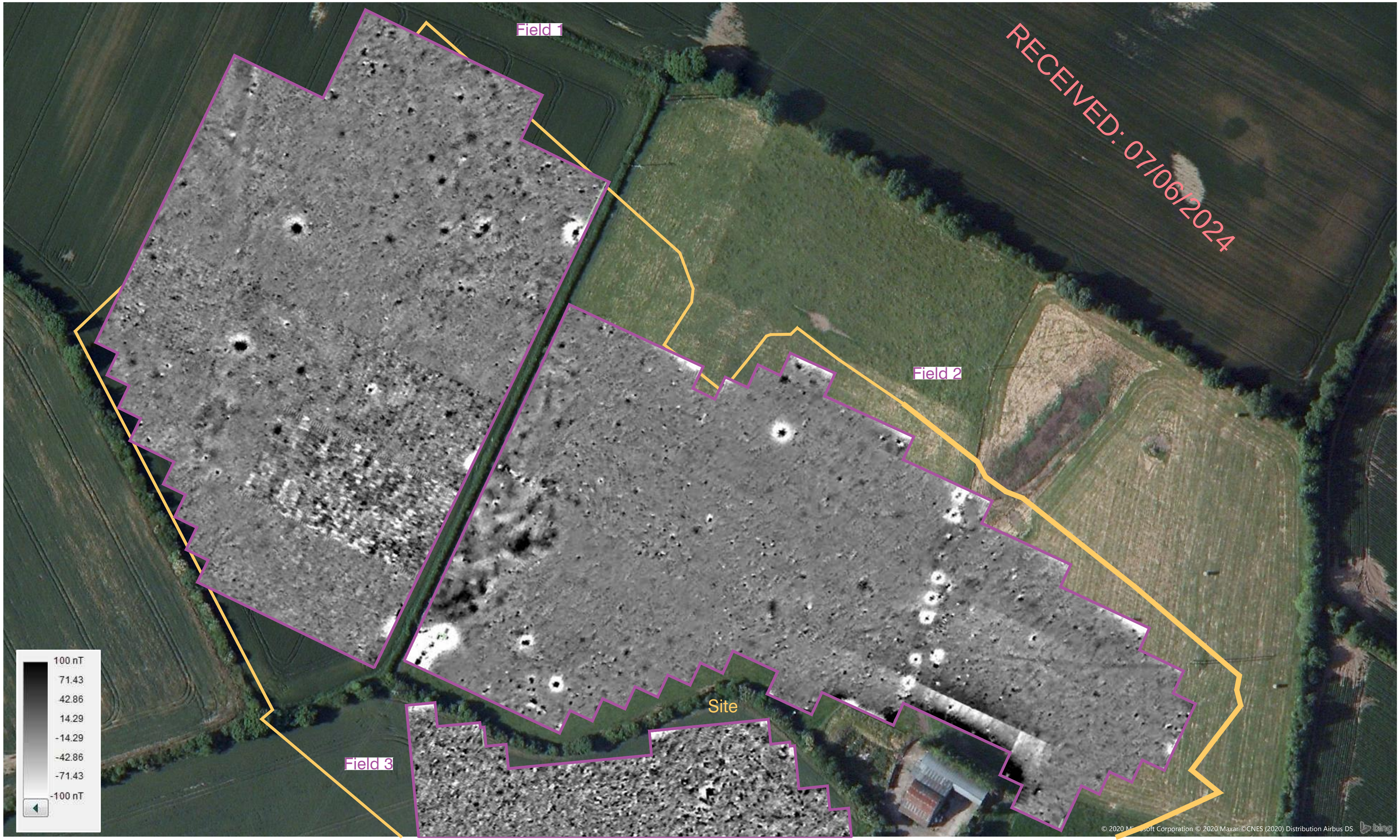
Figure 3: Extract from 1st edition Ordnance Survey (OS) 6-inch map (surveyed 1835 - published 1837), showing location of site and known settlement in proximity of site



Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part A	
Drawing number: 1984_C0004	
Date: August 2020	Scale: 1:4,000 @A4

Figure 4: Extract from 3rd edition Ordnance Survey (OS) 25-inch map (surveyed 1909 - published 1911), showing location of site



Geophysical survey areas

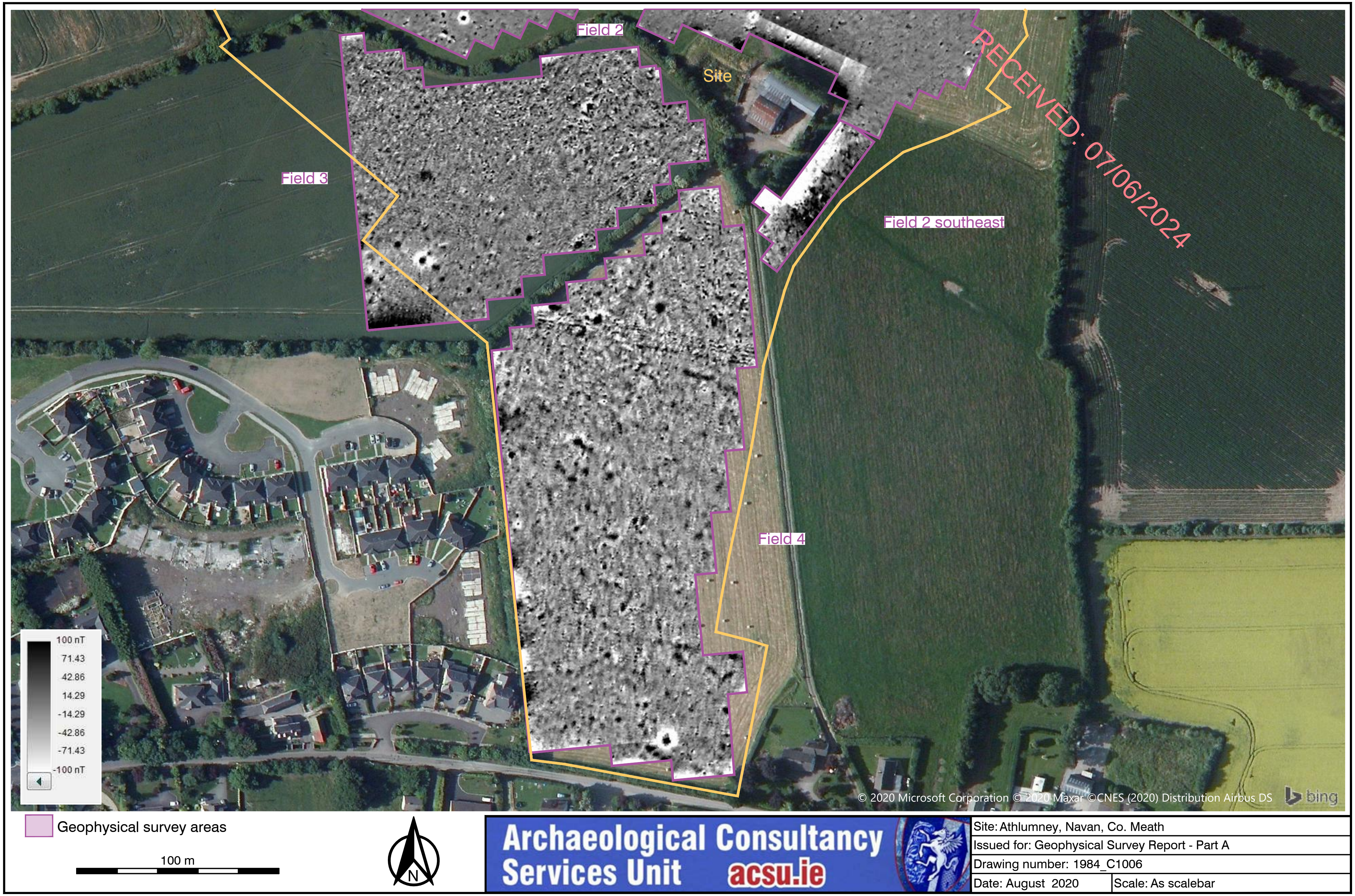
100 m

N

Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part A	
Drawing number: 1984_C1005	
Date: August 2020	Scale: As scalebar

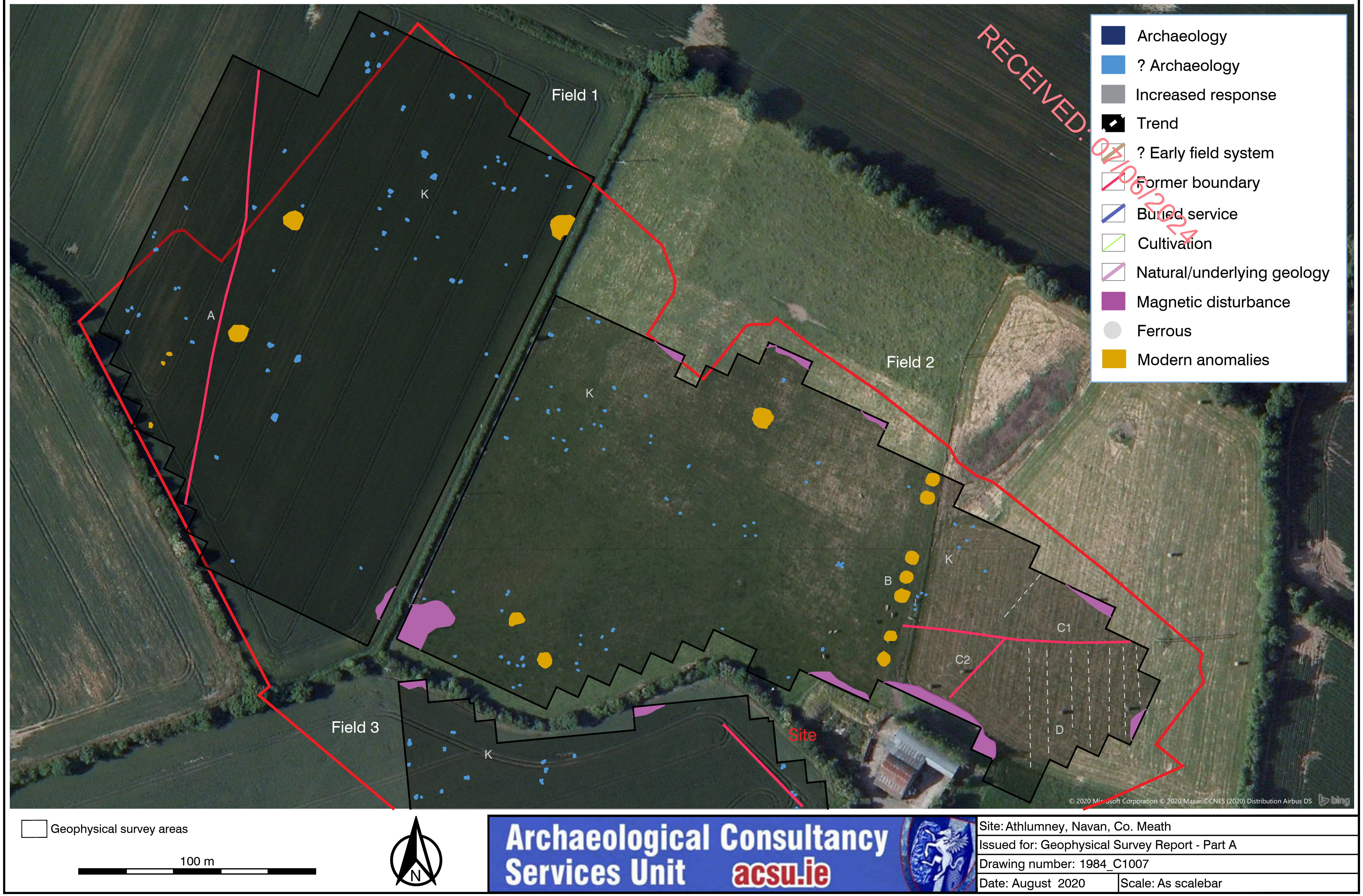
Figure 5: Geophysical survey result (greyscale image) of fields 1 and 2



Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part A	
Drawing number: 1984_C1006	
Date: August 2020	Scale: As scalebar

Figure 6: Geophysical survey result (greyscale image) of fields 2 southeast, 3 and 4



Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part A	
Drawing number: 1984_C1007	
Date: August 2020	Scale: As scalebar

Figure 7: Interpretation of geophysical survey, fields 1 and 2

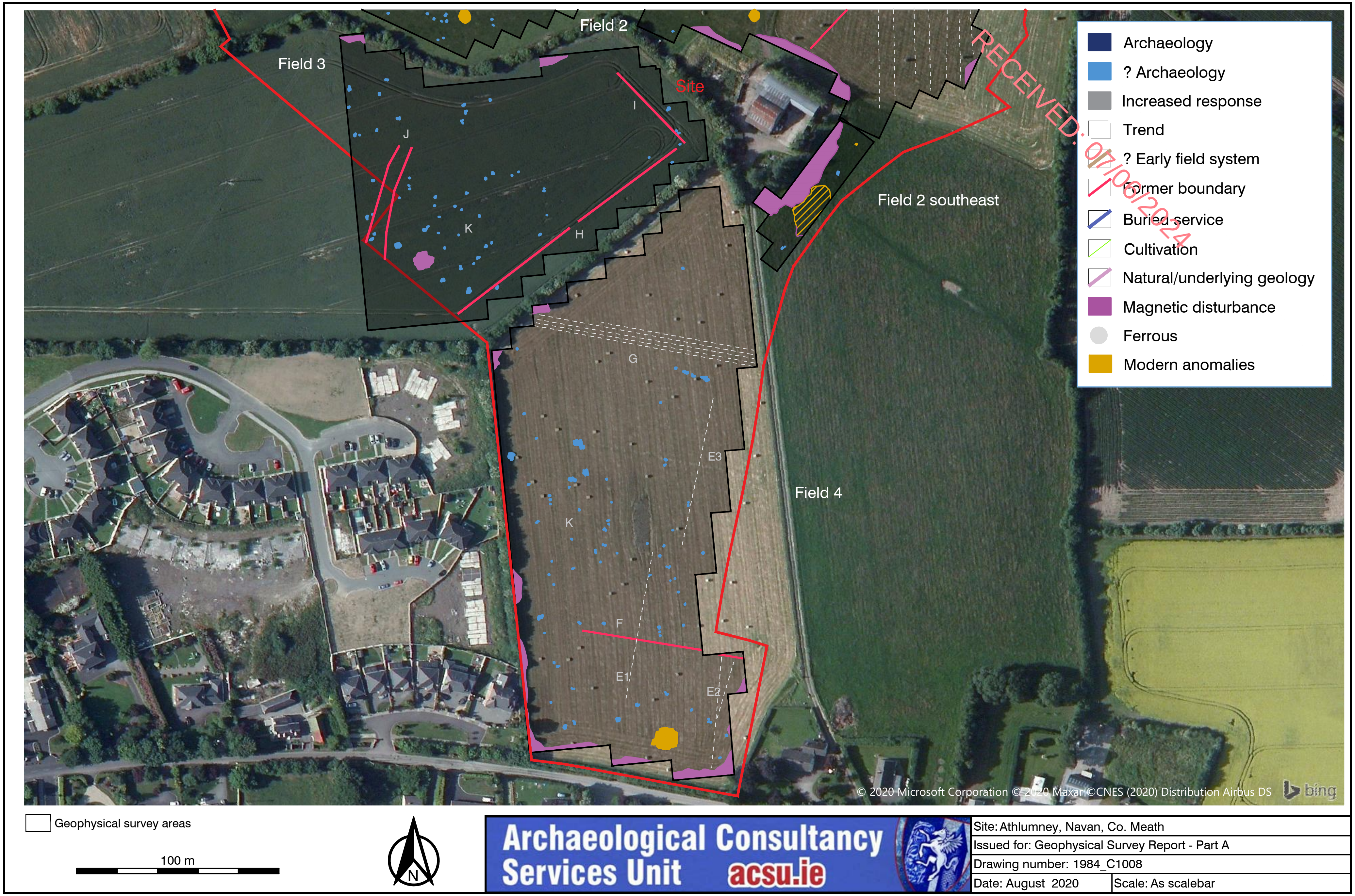


Figure 8: Interpretation of geophysical survey, field 2 southeast, field 2 and field 4

PART B – NON-ARCHAEOLOGICAL INFORMATION

An Roinn Cultúir, Oidhreachta agus Gaeltachta
Department of Culture, Heritage and the Gaeltacht

2	0	R	0	1	1	5	X

Site Owner:	Office IT Ltd, T/A Albert Building Services,
Address:	Belmoral, Kells Rd., Navan, Co. Meath
Planning Authority:	N/A
Planning Reg. No.:	N/A
Excavation Type:	Geophysical Survey
Contractor/Developer:	As above
Address:	As above

1. Background to excavation

This survey was carried out under licence 20R0115 at pre-planning stage on a site of a proposed SHD housing development at Ferganstown and Ballymacon & Athlumney, Navan, Co. Meath. The survey was carried out at the request of the client and was recommended in the Archaeological Assessment of a proposed development at Ferganstown and Ballymacon & Athlumney, Navan, Co. Meath carried out in January 2020, following the identification of a curving field boundary that was thought to represent the remains of a possible enclosure and a cropmark located roughly northwest of the shed.

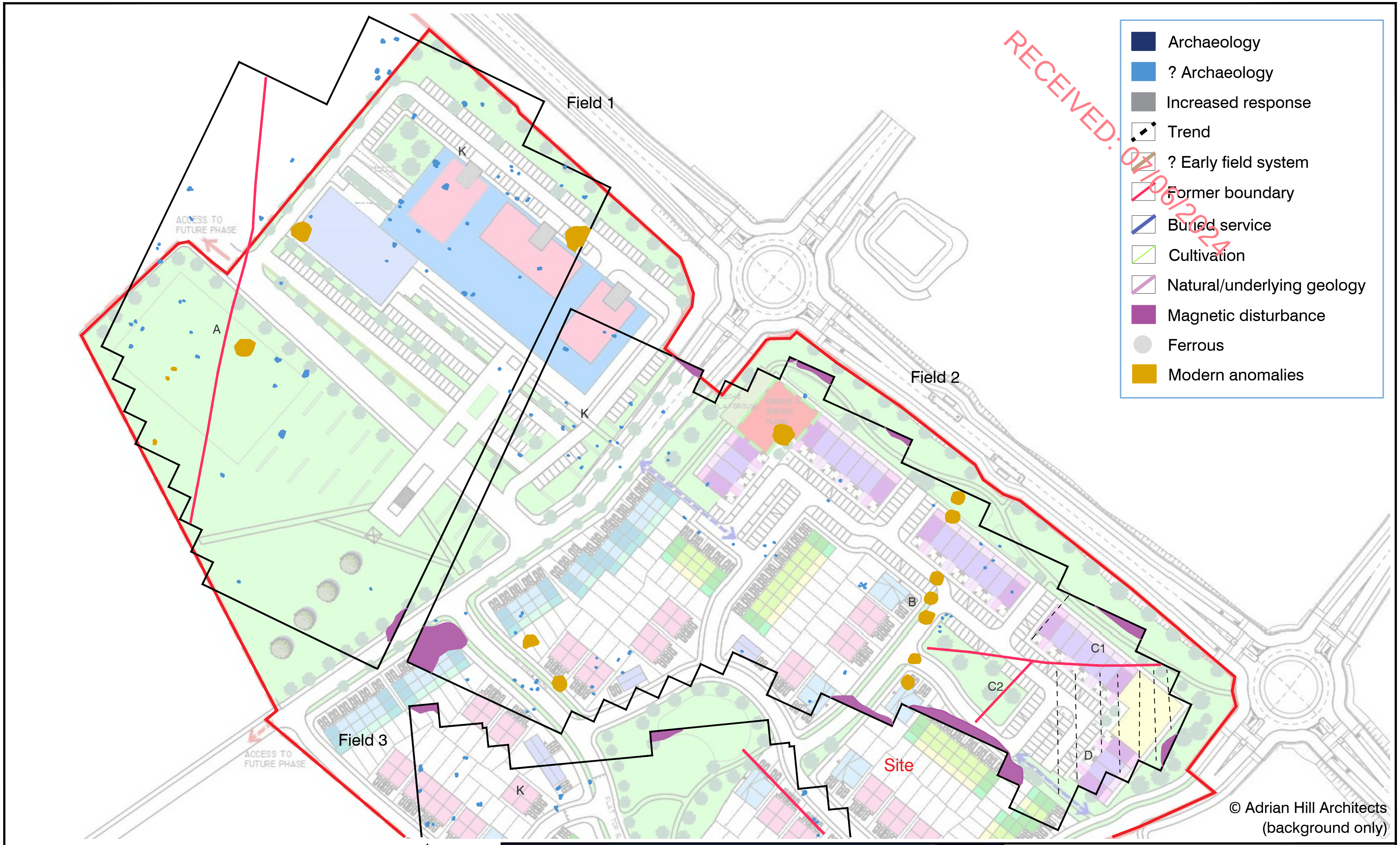
2. Description of Proposed Development

The geophysical survey was carried out at pre-planning stage to accompany Strategic Housing Development (SHD) application for the site at Ferganstown and Ballymacon & Athlumney, Navan, Co. Meath (see Figure 1, 2).

3. Impact Statement

The geophysical survey was carried out on site (refer to Part A), did not reveal any archaeological feature that would correspond with the curving field boundary or with the circular anomaly visible on the aerial imagery, and no clear indications of archaeological activity were identified. A number of anomalies were identified that may represent features of archaeological significance. It is therefore recommended that targeted archaeological assessment in the form of test trenching be carried out in order to assess the nature and extent of these possible features to ascertain their archaeological significance.

Signed:	**Date:** 22 August 2020



Archaeological Consultancy Services Unit acsu.ie

Site: Athlumney, Navan, Co. Meath	
Issued for: Geophysical Survey Report - Part B	
Drawing number: 1984_C1009	
Date: August 2020	Scale: As scalebar

Figure 1: Interpretation of geophysical survey (fields 1 and 2), overlaying site development plan

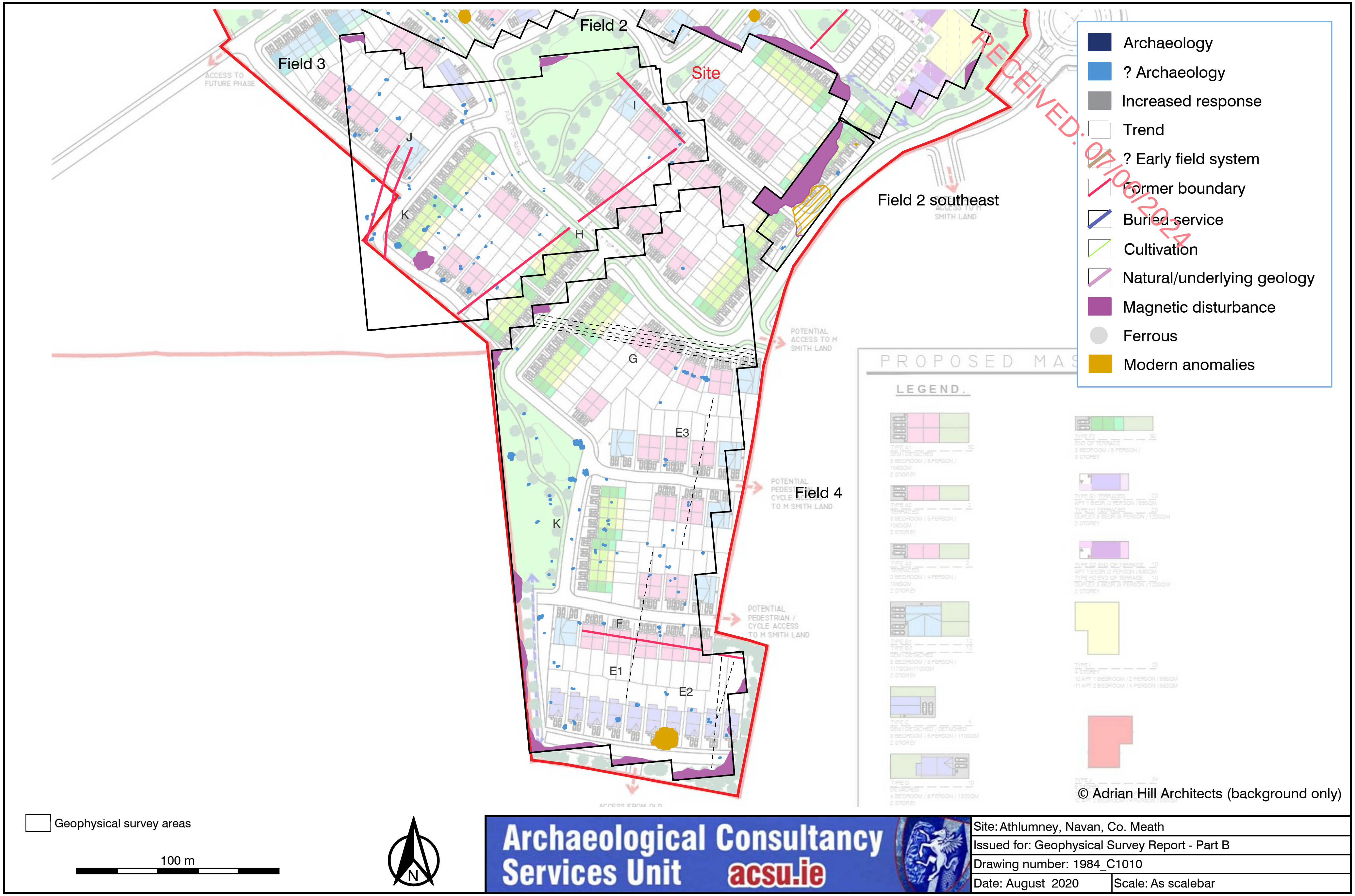


Figure 2: Interpretation of geophysical survey (field 2 southeast, field 3 and field 4), overlaying site development plan

APPENDIX B – INTRODUCTION

Appendix B1 - Other Relevant Assessments Considered

Relevant Legislation	Nature of Assessment	Relevant Assessment
Directive 92/43/EEC, the Habitats Directive	Appropriate assessment comes from the Habitats Directive (92/43/EEC), which seeks to safeguard the long-term survival of Europe's most valuable and threatened species and habitats. The geographical areas of particular importance to these species and habitats have been selected as Special Areas of Conservation (SAC) and Special Protection Areas (SPA) which are collectively referred to (in Ireland) as European sites. Together, these sites comprise the pan-European Natura 2000 network of protected areas. One of the measures which protects these areas is the requirement that every project must undergo an assessment of its implications for any European site before consent for the project is given. Consent for the project can only be given after determining that it will not adversely affect the integrity of the site(s) concerned in view of the conservation objectives of that site.1 In order to determine if an appropriate assessment is required, a screening process must be carried out for all applications for planning permission. The Habitats Directive (92/43/EEC) and the associated Birds Directive (2009/147/EC) are transposed into Irish legislation by Part XAB of the 2000 Act and the Birds and Natural Habitats Regulations 2011. The legislative provisions for appropriate assessment screening for planning applications are set out in Section 177U of the 2000 Act.	An Appropriate Assessment Screening Report and NIS accompany the current LRD application. The AA Screening Report concludes that Stage 2 appropriate assessment is required in relation to the proposed development, Meath County Council, as the competent authority, will carry out an Appropriate Assessment of the proposed development.
Directive 2000/60/EC, The Water Framework Directive	The Water Framework Directive (WFD) (Directive 2000/60/EC) and The Groundwater Directive (Directive 2006/118/EC) requires all Member States to protect and improve water quality in all waters.	The EIAR includes a detailed chapter addressing Water, prepared by Hendrick Ryan Associates.

	The WFD is one of the key overarching instruments in the protection of waters and includes subordinate directives or water-related legislation that complement or have been developed in response to, or coherent with, the requirements of the Water Framework Directive. The WFD requires 'Good Water Status' for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. 'Good status' means both 'Good Ecological Status' and 'Good Chemical Status'. The WFD does not require site specific assessments to be undertaken by a developer. It lays down standards for the quality of designated waters ("guide" values as well as "imperative" values) and requires Member States to monitor the quality of designated waters and to take measures to ensure that they comply with the minimum standards1.	Chapter 8 states the following: The proposed development site lies within the Liffey and Dublin Bay Catchment (Hydrometric Area 09) and River Liffey sub-catchment (WFD name: Liffey_SC_090, Id 09_15) (EPA, 2022). The Environmental Protection Agency (EPA, 2022) on-line mapping presents the available water quality status information for water bodies in Ireland. The Cornerpark Stream belongs to the Liffey_170 WFD surface waterbody which has a 'Moderate' Status (EPA, 2022) and its WFD risk score is 'At risk of not achieving good status'. The Coastal Waterbody Dublin Bay has a WFD status (2013 – 2018) of 'Good' and a WFD risk score of 'Not at risk'. The ecological status (which comprises biological and chemical status) of transitional and coastal water bodies during 2013-2018 for Dublin Bay is classed as 'Good'. Subject to the mitigation set out within the EIAR, it was determined that the development would not give rise to any significant impact on water or affect the status of any watercourse under the Water Framework Directive.
Directive 2001/42/EC, The SEA Directive	The Strategic Environmental Assessment (SEA) Directive 2001/42/EC, on the assessment of the effects of certain plans and programmes on the environment requires that an environmental assessment is carried out of certain plans and programmes which are likely to have significant effects on the environment. Public plans and programmes that are likely to have significant effects on the environment must have a Strategic Environmental Assessment (SEA). The SEA Directive (2001/42/EC) is implemented in Ireland by the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (SI 435/2004) and the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (SI	The SEA for the relevant County Development Plan incorporates mitigation to minimise the impact of the plans on the environment. The policies of the plan were formulated with regard to the SEA processes undertaken. The subject site was designated for the nature and form of development proposed under the relevant plan, which has been subject to SEA. This is addressed in further detail in the context of the assessment of alternatives within Chapter 2 of this EIAR.

	436/ 2004), as amended. There are no specific assessments required by the developer under the SEA Directive in respect of the current LRD application on site. SEA has been undertaken by the relevant authority in respect of the South Dublin County Development Plan 2022-2028.	
Directive 2002/49/EC, regarding environmental noise	The Environmental Noise Directive 2002/49/EC relates to the assessment and management of environmental noise; this is the main EU instrument to identify noise pollution levels and to trigger the necessary action both at Member State and at EU level. The Directive requires Member States to prepare and publish, every 5 years, noise maps and noise management action plans for: agglomerations with more than 100,000 inhabitants major roads (more than 3 million vehicles a year) major railways (more than 30.000 trains a year) major airports (more than 50.000 movements a year, including small aircrafts and helicopters) When developing noise management action plans, Member States' authorities are required to consult the concerned public. Relevant bodies develop noise action plans that we consider as appropriate.	Chapter 8 of this EIAR for the current LRD application comprises an assessment of noise and vibration impacts associated with the development. The noise assessment undertaken as part of the EIAR, has regard to the relevant provisions of Directive 2002,49/EC.
Seveso Directive (Directive 82/501/EEC, Directive 96/82/EC, Directive 2012/18/EU)	The Seveso Directive (Directive 82/501/EEC, Directive 96/82/EC, Directive 2012/18/EU) was developed by the EU after a series of catastrophic accidents involving major industrial sites and dangerous substances. Such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident.	The subject lands are not proximate to any Seveso/COMAH designated sites. Furthermore, there are no substances to be stored as part of the proposed development that would be controlled under Seveso Directive of COMAH Regulations.

	The Chemicals Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (the "COMAH Regulations"), implements the latest Seveso III Directive (2012/18/EU). The purpose of the COMAH Regulations is to transpose the Seveso Directive into Irish law and lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents, with the overall objective of providing a high level of protection in a consistent and effective manner.	
Directive 2008/50/EC, the clean air for Europe directive	The Clean Air for Europe (CAFE) Directive 2008/50/EC is the prevailing legislation to improve the quality of air in Europe and limit exposure to air pollution. The CAFE Directive set rules including how to monitor, assess, and manage ambient air quality. Overall, the main objective of the CAFE Directive is to reduce human and environmental exposure to air pollutants and ensure that the limits of values and thresholds are not exceeded. The CAFE Directive was transposed into Irish legislation by S.I. No. 180/2011 - Air Quality Standards Regulations 2011. The CAFÉ Directive mandates the location and quantity of air monitoring stations that Environmental Protection Agency (EPA) should undertake ambient air monitoring. If there is an exceedance of the ambient limit value an Air Quality Action Plan must be developed by Local Authorities in conjunction with the EPA.	Due to the nature of the proposed development, there are no specific assessments required by the applicant under the CAFE Directive for the Proposed Development. The air quality and climate assessment undertaken as part of the EIAR, which had regard to the relevant provisions of Directive 2008/50/EC, concluded that no significant impacts would arise subject to mitigation

	Chapter 9 of this EIAR includes an assessment of air quality and climate impacts associated with the development. The analysis and findings within that chapter of the EIAR were made with regard to the provisions of Directive 2008/50/EC.	
Directive 2007/60/EC, regarding the assessment and management of flood risks	The Floods Directive (Directive 2007/60/EC) establishes a framework for the assessment and management of flood risks, with the aim to reduce the adverse consequences on human health, the environment and material assets. The Floods Directive requires Member States to assess if all water courses and coast lines are at risk from flooding, to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce this flood risk. The Floods Directive also reinforces the rights of the public to access this information and to have a say in the planning process. The Floods Directive must be implemented in tandem with the WFD. In Ireland, the OPW is the national authority assigned with the implementation of the Floods Directive, which was transposed into Irish law by the EU (Assessment and Management of Flood Risks) Regulations SI 122 of 2010.	Meath County Council undertook a Strategic Flood Risk Assessment as part of the Development Plan preparation process, which zoned the subject site for the nature of development proposed. The application is accompanied by a detailed Site Specific Flood Risk Assessment Report prepared by JBA Consulting Engineers. All proposed residential and commercial development within the subject site is located within Flood Zone C, and there is low to very low residual risk of flooding of any sort on site.

APPENDIX C – AIR QUALITY CLIMATE

APPENDIX 7.1 - AMBIENT AIR QUALITY STANDARDS

APPENDIX 7.2 – DUST MANAGEMENT PLAN

APPENDIX 7.1 - AMBIENT AIR QUALITY STANDARDS

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time which was the issue of acid rain. As a result of this sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002), and has set limit values which came into operation on 17th June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM10, 40% for the hourly and annual limit value for NO2 and 26% for hourly SO2 limit values. The margin of tolerance commenced from June 2002, and started to reduce from 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, has published limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08 which has been transposed into Irish Law as S.I. 180 of 2011. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. Provisions were also made for the inclusion of new ambient limit values relating to PM2.5. The margins of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for PM2.5 are included in Directive 2008/50/EC. The approach for PM2.5 was to establish a target value of 25 µg/m3, as an annual average (to be attained everywhere by 2010) and a limit value of 25 µg/m3, as an annual average (to be attained everywhere by 2015), coupled with a target to reduce human exposure generally to PM2.5 between 2010 and 2020. This exposure reduction target will range from 0% (for PM2.5 concentrations of less than 8.5 µg/m3 to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 µg/m3). Where the AEI is currently greater than 22 µg/m3 all appropriate measures should be employed to reduce this level to 18 µg/m3 by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008 - 2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 µg/m3 was set to be complied with by 2015 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as "a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both NOX (NO and NO2) is applicable for the protection of vegetation in highly rural areas away from major sources of NOX such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NOX limit for the protection of vegetation should be carried out distances greater than:

5 km from the nearest motorway or dual carriageway

5 km from the nearest major industrial installation

20 km from a major urban conurbation

As a guideline, a monitoring station should be indicative of approximately 1000 km2 of surrounding area.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

APPENDIX 7.2 - DUST MANAGEMENT PLAN

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997). The following measures have been incorporated into the Outline Construction & Demolition Management Plan (OC&DMP) prepared for the site.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.2 for the windrose for Dublin Airport). As the prevailing wind is predominantly south-westerly to south-easterly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2 mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7 m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;

During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;

The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;

It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;

A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;

It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;

At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK ODPM, 2002).

A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
Access gates to the site shall be located at least 10m from sensitive receptors where possible;
Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK ODPM, 2002).
Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
The development of a documented system for managing site practices with regard to dust control;
The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
The specification of effective measures to deal with any complaints received.

APPENDIX D – LAND AND SOILS

Appendix D 1 Site investigations undertaken by Ground Investigations Ireland Ltd.

Appendix D 2 OCMP

Appendix D1 Site Investigations undertaken by Ground Investigations Ireland Ltd.

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

Ground Investigations Ireland

Athlumney Navan Stage 1

Hendrick Ryan

Ground Investigation Report

January 2024

Directors: Fergal McNamara (MD), Conor Finnerty, Aisling McDonnell, Barry Sexton & Stephen Kealy
Ground Investigations Ireland Limited | Registered in Ireland Company Registration No.: 405726

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

GROUND INVESTIGATIONS IRELAND

Geotechnical & Environmental

DOCUMENT CONTROL SHEET

Project Title	Athlumney Navan Stage 1
Client	Hendrick Ryan
Project No	13292-10-23
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	A Mann	E Byrne	A McDonnell	Dublin	13 February 2024

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

CONTENTS

APPENDICES

1.0 Preamble

On the instructions of Hendrick Ryan Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., during November 2023 at the site of the proposed residential development in Navan, Co. Meath.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. The site is currently greenfield. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 11 No. Trial Pits to a maximum depth of 3.5m BGL
- Carry out 9 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a 8T tracked excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by an Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and generally comprised;

- Topsoil
- Granular Deposits
- Cohesive Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.50m BGL.

GRANULAR DEPOSITS: Granular deposits were encountered below the Topsoil deposits and were typically described as *grey clayey gravelly fine to coarse SAND with occasional cobbles and boulders*, overlying *grey clayey sandy subangular to subrounded fine to coarse GRAVEL with frequent cobbles and boulders*. The secondary gravel, sand and clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs. It should be noted that many of the trial pits where granular deposits or groundwater were encountered, experienced instability. This was described either as side wall spalling or as side wall collapse in the remarks section at the base of the trial pit logs.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and the Granular Deposits and were typically described as *grey to brown slightly sandy slightly gravelly CLAY with frequent cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth.

The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff below 1.50m BGL in the majority of the exploratory holes.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

An allowable bearing capacity of 100 kN/m^2 is recommended for conventional strip or pad foundations on the stiff cohesive deposits at a depth of between 1.00 – 2.60m BGL.

Where a shallower founding depth is required, dynamic probes are recommended to determine the density of the granular materials.

5.3. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations. Generally, where significant excavations are required in water bearing granular deposits a cut-off wall may be more cost effective than extensive dewatering. An assessment by a specialist dewatering contractor is recommended to determine the most cost effective approach to the proposed excavation.

Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

5.4. Soakaway Design

Infiltration rates of between f=8.34 x 10^{-6} m/s and 2.53 x 10^{-5} m/s were calculated for the soakaway locations tested. At the locations of fails the water level dropped too slowly to allow calculation of 'f' the soil infiltration rate.

The selection of a SOIL Index to determine the greenfield runoff rate for the site was requested to be addressed in this report. The selection of the SOIL Index is usually completed taking into account a number of factors, some of which can be difficult to directly attribute based on ground conditions alone. The selection of a drainage group, depth to impermeable layer and permeability group can vary over the depth of a single trial pit in some variable sites. Similarly, significant variation may be present in ground conditions and topography at different locations within a large site. The TII Publication "Drainage of Runoff from Natural Catchments (including Amendment No. 1 dated June 2015)" advocates the use of the Table 5/1 based on the Agricultural Development and Advisory Service, ADAS in the UK where the Flood Studies Mapping don't accurately reflect the characteristics of a particular site.

At the locations of the trial pits completed as part of this report, there lies under the topsoil in the majority of trial pits, a relatively impermeable layer of clayey SAND or occasionally sandy CLAY. Taking this layer into account, and that the depth to this layer is between 0.2 and 0.5m BGL the SOIL value of 4 is considered a reasonable value for the Winter Rain acceptance value, subject to review and confirmation by the Consulting Engineer designing the proposed scheme.

Where significant variation in ground conditions occurs within the overall site, consideration may be given to splitting the site into a number of smaller areas with differing SOIL Index values to determine an overall greenfield runoff rate for the entire site.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

Client:	HENDRICKRYAN Consulting Engineers
Project Title:	Athlumney Navan Stage 1
Drawing Title:	Figure 1 Site Location
GII Project Reference:	13292-10-23
Drawn By:	AM
Date:	15/01/2024

Legend: Trial Pit

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd www.gii.ie	Site: Athlumney Navan Stage 1	Trial Pit Number: TP01

Machine : Kubota 080-4	Dimensions	Ground Level (mOD)	Client	Job Number
Method : Trial Pit	3.9 x 0.90 x 3.0	45.02	Hendrick Ryan	13292-10-23
	Location	Dates	Engineer	Sheet
	688748.6 E 768307.7 N	16/11/2023		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown sandy clayey TOPSOIL		
				44.62	0.40	Brown mottled grey mottled orange slightly clayey fine to medium SAND		
					(0.30)			
				44.32	0.70	Brown mottled grey mottled black very gravelly fine to coarse SAND with cobbles and boulders		
1.00	B1		Slow seepage(1) at 1.00m.		(0.80)			1
				43.52	1.50	Black sandy angular to subrounded fine to coarse GRAVEL with many cobbles and boulders		
					(0.70)			
2.00	B2		Fast ingress(2) at 2.00m.					2
				42.82	2.20	Stiff grey mottled brown slightly sandy slightly gravelly CLAY with many cobbles and boulders		
					(0.80)			
				42.02	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 1.00m BGL and 2.00m BGL
Trial pit terminated at 3.00m BGL due to pit collapsing
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP04

Ground Investigations Ireland Ltd www.gii.ie			**Site** Athlumney Navan Stage 1	**Trial Pit Number** TP02
Machine : Kubota 080-4 **Method :** Trial Pit	**Dimensions** 3.8 x 0.90 x 3.2	**Ground Level (mOD)** 44.94	**Client** Hendrick Ryan	**Job Number** 13292-10-23
	Location 688792.8 E 768283.1 N	**Dates** 16/11/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown sandy clayey TOPSOIL with rootlets		
				44.64	0.30	Grey mottled brown slightly clayey fine to medium SAND		
					(0.40)			
				44.24	0.70	Dark grey clayey gravelly fine to coarse SAND with cobbles		
			Slow seepage(1) at 0.80m.					1
					(0.50)			
1.00	B1							
				43.74	1.20	Dark grey sandy angular to subrounded fine to coarse GRAVEL with cobbles and boulders		
1.50	B2							
					(0.90)			
				42.84	2.10	Stiff brown mottled dark grey slightly sandy slightly gravelly CLAY with many cobbles and boulders		
			Fast ingress(2) at 2.20m.					2
2.50	B3							
					(1.10)			
				41.74	3.20	Complete at 3.20m		

Plan

Remarks

Groundwater encountered at 0.80m BGL and 2.20m BGL
Trial pit terminated at 3.20m BGL due to pit collapsing
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP02

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Kubota 080-4 **Method :** Trial Pit	**Dimensions** 3.8 x 0.90 x 2.6	**Ground Level (mOD)** 44.85	**Client** Hendrick Ryan	**Job Number** 13292-10-23
	Location 688754.9 E 768227.7 N	**Dates** 16/11/2023	**Engineer**	**Sheet** 1/1

Site: Athlumney Navan Stage 1

Trial Pit Number: TP03

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown sandy clayey TOPSOIL		
				44.45	0.40 (0.30)	Grey slightly clayey fine to medium SAND		
				44.15	0.70 (0.40)	Dark grey clayey fine to coarse SAND		
1.00	B1							
			Medium ingress(1) at 1.60m.	43.75	1.10 (0.90)	Dark grey sandy subangular to subrounded fine to coarse GRAVEL with cobbles and boulders		1
			Medium ingress(2) at 2.00m.	42.85	2.00 (0.60)	Stiff dark grey gravelly sandy CLAY with many cobbles and boulders		2
2.50	B2							
				42.25	2.60	Complete at 2.60m		

Plan

Remarks

Groundwater encountered at 1.60m BGL and 2.00m BGL
Trial pit terminated at 2.60m BGL due to large boulder
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP03

Ground Investigations Ireland Ltd
www.gii.ie

Site	Athlumney Navan Stage 1		**Trial Pit Number**	TP04
Machine : Kubota 080-4 **Method :** Trial Pit	**Dimensions** 3.9 x 0.90 x 3.0	**Ground Level (mOD)** 44.71	**Client** Hendrick Ryan	**Job Number** 13292-10-23
	Location 688772.3 E 768192.3 N	**Dates** 16/11/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown sandy clayey TOPSOIL		
				44.41	0.30	Grey slightly clayey fine to medium SAND		
0.50	B1				(0.50)			
				43.91	0.80	Dark grey clayey fine to coarse SAND		
					(0.40)			
				43.51	1.20	Dark grey sandy subangular to subrounded fine to coarse GRAVEL with cobbles and boulders		
1.30	B2		Slow seepage(1) at 1.40m.		(0.50)			1
				43.01	1.70	Greyish brown slightly clayey slightly sandy angular to subrounded fine to coarse GRAVEL with many cobbles and boulders		
			Fast ingress(2) at 1.95m.		(0.90)			2
				42.11	2.60	Stiff brown sandy gravelly CLAY with many cobbles and boulders		
					(0.40)			
				41.71	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 1.40m BGL and 1.95m BGL
Trial pit terminated at 3.00m BGL due to pit collapsing
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP04

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Kubota 080-4 **Method :** Trial Pit	**Dimensions** 3.6 x 0.90 x 2.5	**Ground Level (mOD)** 44.69	**Site** Athlumney Navan Stage 1 **Client** Hendrick Ryan	**Trial Pit Number** **TP05** **Job Number** 13292-10-23
	Location 688728.6 E 768144.8 N	**Dates** 16/11/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown sandy clayey TOPSOIL		
				44.29	0.40	Grey very clayey fine to medium SAND		
0.50	B1				(0.30)			
				43.99	0.70	Dark grey very clayey fine to coarse SAND		
					(0.70)			
				43.29	1.40	Dark grey to black silty slightly gravelly fine to coarse SAND with cobbles and boulders		1
1.50	B2		Slow seepage(1) at 1.50m.		(0.60)			
				42.69	2.00	Stiff black slightly gravelly CLAY with cobbles and boulders		
					(0.50)			
				42.19	2.50	Complete at 2.50m		

Plan

Remarks

Groundwater encountered at 1.50m BGL
Trial pit collapsing from 2.00m BGL
Trial pit terminated at 2.50m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP05

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Kubota 080-4 **Method :** Trial Pit	**Dimensions** 3.1 x 0.90 x 2.0	**Ground Level (mOD)** 46.31	**Client** Hendrick Ryan	**Job Number** 13292-10-23
	Location 688867.8 E 768112.3 N	**Dates** 16/11/2023	**Engineer**	**Sheet** 1/1

Site: Athlumney Navan Stage 1

Trial Pit Number: TP06

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				46.11	(0.20) 0.20	Brown sandy clayey TOPSOIL		
				45.71	(0.40) 0.60	Soft to firm brown sandy CLAY		
				45.21	(0.50) 1.10	Firm grey sandy slightly gravelly CLAY with cobbles		
			Fast ingress(1) at 1.45m.	44.31	(0.90) 2.00	Greyish brown clayey sandy subangular to subrounded fine to coarse GRAVEL with cobbles		1
						Complete at 2.00m		

Plan

Remarks

Groundwater encountered at 1.45m BGL
Trial pit collapsing from 1.90m BGL
Trial pit terminated at 2.00m BGL
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP06

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Kubota 080-4 **Method :** Trial Pit	**Dimensions** 3.7 x 0.90 x 3.3	**Ground Level (mOD)** 46.74	**Site** Athlumney Navan Stage 1	**Trial Pit Number** **TP07**
	Location 688828.4 E 768072.6 N	**Dates** 16/11/2023	**Client** Hendrick Ryan	**Job Number** 13292-10-23
			Engineer	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown sandy clayey TOPSOIL with rootlets		
				46.34	0.40	Brown slightly clayey slightly gravelly fine to medium SAND		
0.70	B1				(0.70)			
				45.64	1.10	Brown slightly clayey slightly gravelly fine to coarse SAND with cobbles		
					(0.40)			
				45.24	1.50	Stiff dark grey mottled black slightly sandy slightly gravelly CLAY with many cobbles and boulders		
					(1.80)			
2.50	B2							
			Slow ingress(1) at 2.90m.					1
				43.44	3.30	Complete at 3.30m		

Plan

Remarks

Groundwater encountered at 2.90m BGL
Trial pit terminated at 3.30m BGL due to large boulder
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP09

Ground Investigations Ireland Ltd www.gii.ie	Site: Athlumney Navan Stage 1	Trial Pit Number: TP08

Machine : Kubota 080-4	Dimensions: 3.7 x 0.90 x 2.3	Ground Level (mOD): 44.83	Client: Hendrick Ryan	Job Number: 13292-10-23
Method : Trial Pit	Location: 688704.9 E 768020.3 N	Dates: 16/11/2023	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown sandy clayey TOPSOIL		
				44.53	0.30 (0.50)	Brown mottled grey slightly clayey slightly gravelly fine to medium SAND		
				44.03	0.80 (0.40)	Grey mottled brown slightly clayey gravelly fine to coarse SAND with cobbles		
				43.63	1.20 (1.10)	Stiff dark grey mottled black slightly sandy slightly gravelly CLAY with many cobbles and boulders		
				42.53	2.30	Complete at 2.30m		

Plan

Remarks

No groundwater encountered
Trial pit terminated at 2.30m BGL due to large boulder
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP08

Ground Investigations Ireland Ltd www.gii.ie		Site: Athlumney Navan Stage 1	Trial Pit Number: TP09
Machine : Kubota 080-4 / Method : Trial Pit	Dimensions: 3.7 x 0.90 x 3.5	Ground Level (mOD): 47.16	Client: Hendrick Ryan	Job Number: 13292-10-23
	Location: 688760.5 E 767957.2 N	Dates: 16/11/2023	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Brown sandy clayey TOPSOIL		
				46.66	0.50 (0.30)	Grey slightly clayey fine to medium SAND		
				46.36	0.80 (0.20)	Brown mottled grey slightly sandy slightly clayey subangular to subrounded fine to coarse GRAVEL with many cobbles and boulders		
1.00	B1			46.16	1.00 (1.30)	Stiff brown mottled grey slightly sandy slightly gravelly CLAY with many cobbles and boulders		
2.50	B2			44.86	2.30 (1.20)	Stiff dark grey mottled black slightly sandy slightly gravelly CLAY with cobbles.		
				43.66	3.50	Complete at 3.50m		

Plan

Remarks

No groundwater encountered
Trial pit terminated at 3.50m BGL due to pit collapsing
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP09

Ground Investigations Ireland Ltd www.gii.ie			Site: Athlumney Navan Stage 1	Trial Pit Number: TP10
Machine : Kubota 080-4 Method : Trial Pit	Dimensions: 4.0 x 0.90 x 2.3	Ground Level (mOD): 48.99	Client: Hendrick Ryan	Job Number: 13292-10-23
	Location: 688826.8 E 767861.5 N	Dates: 16/11/2023	Engineer	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Brown sandy clayey TOPSOIL		
				48.49	0.50	Greyish brown slightly clayey very gravelly fine to coarse SAND with cobbles		
1.00	B1				(1.00)			
				47.49	1.50	Dark grey gravelly fine to coarse SAND with many cobbles and boulders		
			Very fast ingress(1) at 2.00m.		(0.80)			1
				46.69	2.30	Complete at 2.30m		

Plan

Remarks

Groundwater encountered at 2.00m BGL
Trial pit terminated at 2.30m BGL due to too much water in pit
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP10

Ground Investigations Ireland Ltd www.gii.ie	Site: Athlumney Navan Stage 1	Trial Pit Number: TP11

Machine : Kubota 080-4	Dimensions: 3.9 x 0.90 x 2.4	Ground Level (mOD): 44.30	Client: Hendrick Ryan	Job Number: 13292-10-23
Method : Trial Pit	Location: 688662.8 E 768072.4 N	Dates: 16/11/2023	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				43.90	(0.40) 0.40	Brown sandy clayey TOPSOIL with rootlets		
				43.40	(0.50) 0.90	Grey slightly clayey fine to medium SAND		
1.00	B1			42.50	(0.90) 1.80	Grey slightly clayey fine to coarse SAND with cobbles and boulders		
			Fast ingress(1) at 1.90m.	41.90	(0.60) 2.40	Stiff dark grey slightly sandy slightly gravelly CLAY with many cobbles and boulders		1
						Complete at 2.40m		

Plan

Remarks

Groundwater encountered at 0.80m BGL and 2.20m BGL
Trial pit terminated at 3.20m BGL due to pit collapsing
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	LF	13292-10-23.TP11

Athlumney Navan Stage 1 – Trial Pit Photographs

TP01

TP01

Athlumney Navan Stage 1 – Trial Pit Photographs

TP01

TP01

Athlumney Navan Stage 1 – Trial Pit Photographs

TP02

TP02

Athlumney Navan Stage 1 – Trial Pit Photographs

TP02

TP02

Athlumney Navan Stage 1 – Trial Pit Photographs

TP02

Athlumney Navan Stage 1 – Trial Pit Photographs

TP03

TP03

Athlumney Navan Stage 1 – Trial Pit Photographs

TP03

TP03

Athlumney Navan Stage 1 – Trial Pit Photographs

TP03

Athlumney Navan Stage 1 – Trial Pit Photographs

TP04

TP04

Athlumney Navan Stage 1 – Trial Pit Photographs

TP04

TP04

Athlumney Navan Stage 1 – Trial Pit Photographs

TP05

TP05

Athlumney Navan Stage 1 – Trial Pit Photographs

TP05

TP05

Athlumney Navan Stage 1 – Trial Pit Photographs

TP05

Athlumney Navan Stage 1 – Trial Pit Photographs

TP06

TP06

Athlumney Navan Stage 1 – Trial Pit Photographs

TP07

TP07

Athlumney Navan Stage 1 – Trial Pit Photographs

TP07

TP07

Athlumney Navan Stage 1 – Trial Pit Photographs

TP07

Athlumney Navan Stage 1 – Trial Pit Photographs

TP08

TP08

Athlumney Navan Stage 1 – Trial Pit Photographs

TP08

TP08

Athlumney Navan Stage 1 – Trial Pit Photographs

TP09

TP09

Athlumney Navan Stage 1 – Trial Pit Photographs

TP10

TP10

Athlumney Navan Stage 1 – Trial Pit Photographs

TP10

TP10

Athlumney Navan Stage 1 – Trial Pit Photographs

TP11

TP11

APPENDIX 3 – Soakaways Report

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

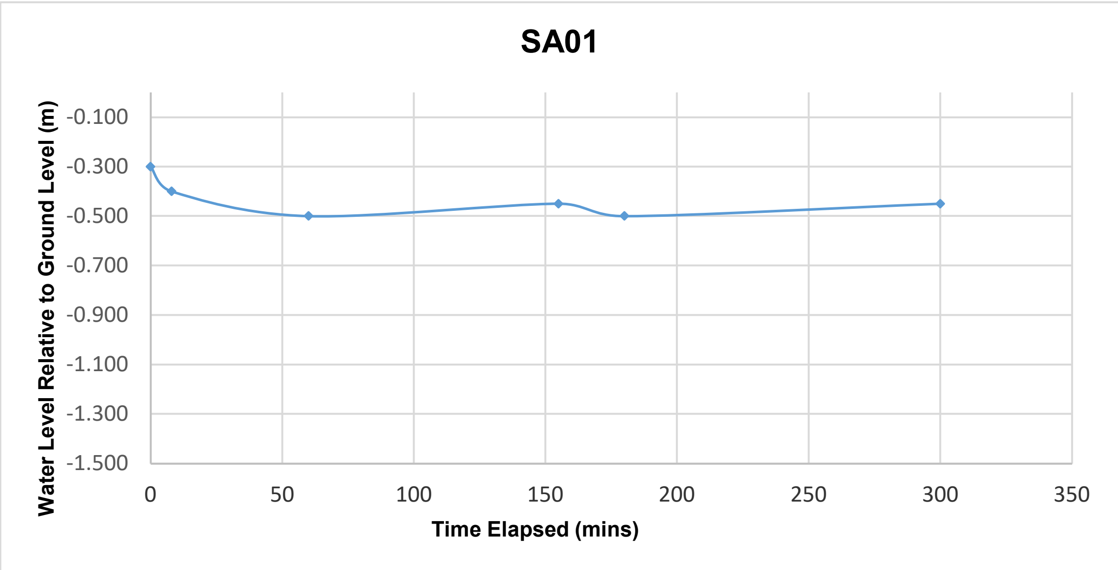
RECEIVED: 07/06/2024

SA01
Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.50m x 0.50m x 1.10m (L x W x D)

Date	Time	Water level (m bgl)
17/11/2023	0	-0.300
17/11/2023	8	-0.400
17/11/2023	60	-0.500
17/11/2023	155	-0.450
17/11/2023	180	-0.500
17/11/2023	300	-0.450

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.100	0.800	0.5	0.9



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

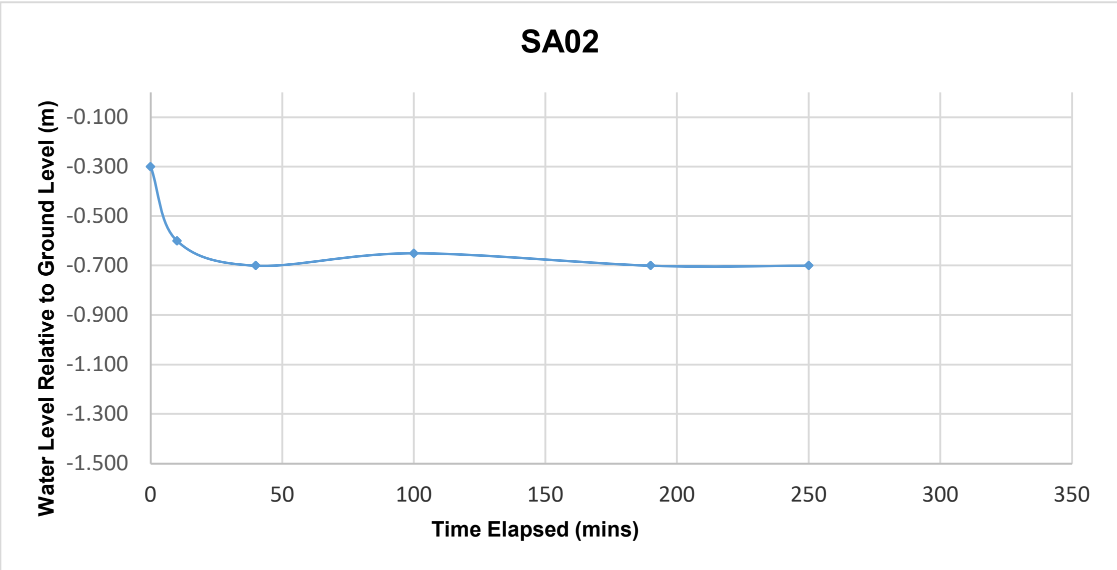
SA02

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.50m x 0.50m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
17/11/2023	0	-0.300
17/11/2023	10	-0.600
17/11/2023	40	-0.700
17/11/2023	100	-0.650
17/11/2023	190	-0.700
17/11/2023	250	-0.700

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.500	1.200	0.6	1.2



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

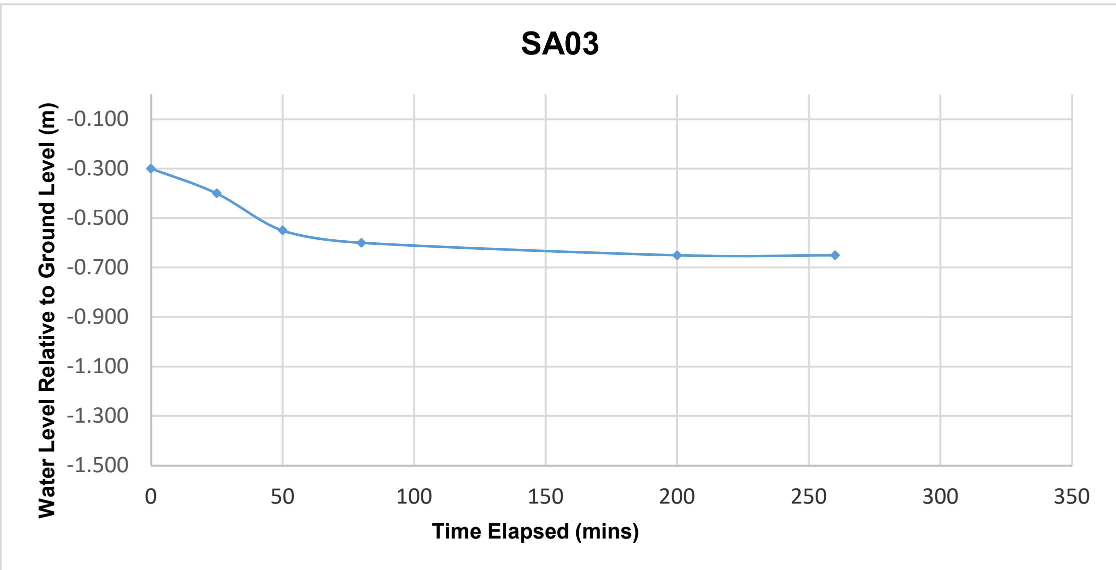
SA03

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.70m x 0.50m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
17/11/2023	0	-0.300
17/11/2023	25	-0.400
17/11/2023	50	-0.550
17/11/2023	80	-0.600
17/11/2023	200	-0.650
17/11/2023	260	-0.650

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.500	1.200	0.6	1.2



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

SA04

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.40m x 0.50m x 1.30m (L x W x D)

Date	Time	Water level (m bgl)
17/11/2023	0	-0.300
17/11/2023	5	-0.400
17/11/2023	15	-0.650
17/11/2023	30	-0.800
17/11/2023	40	-0.900
17/11/2023	80	-1.000
17/11/2023	110	-1.100
17/11/2023	140	-1.050
17/11/2023	170	-1.100
17/11/2023	230	-1.200

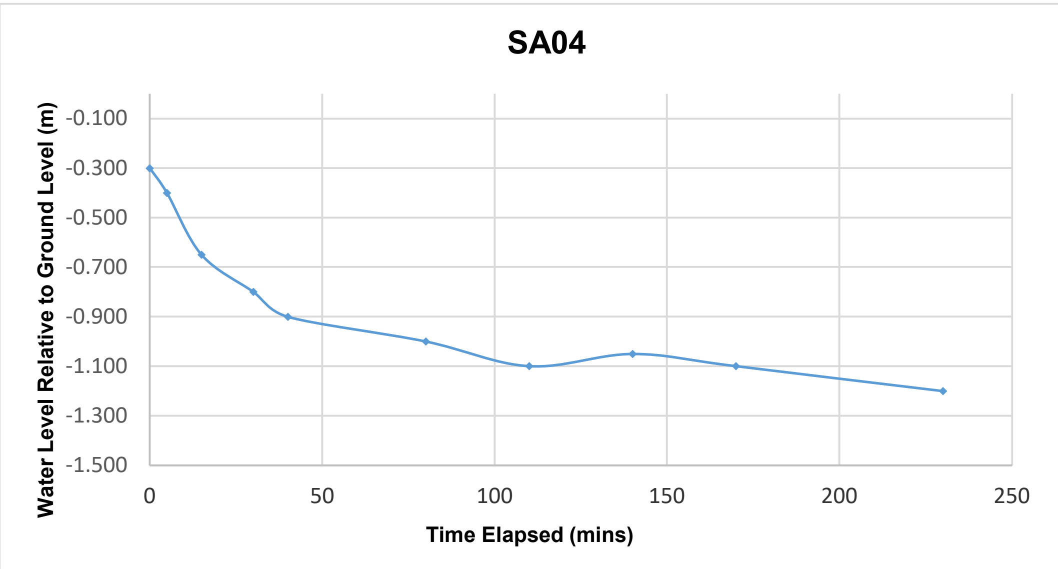
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**1.300**	**1.000**	**0.55**	**1.05**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.400	0.500	0.500	0.35

Tp75-25 (from graph) (s) **7800**

50% Eff Depth	ap50 (m2)
0.500	2.6

f = 1.726E-05 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

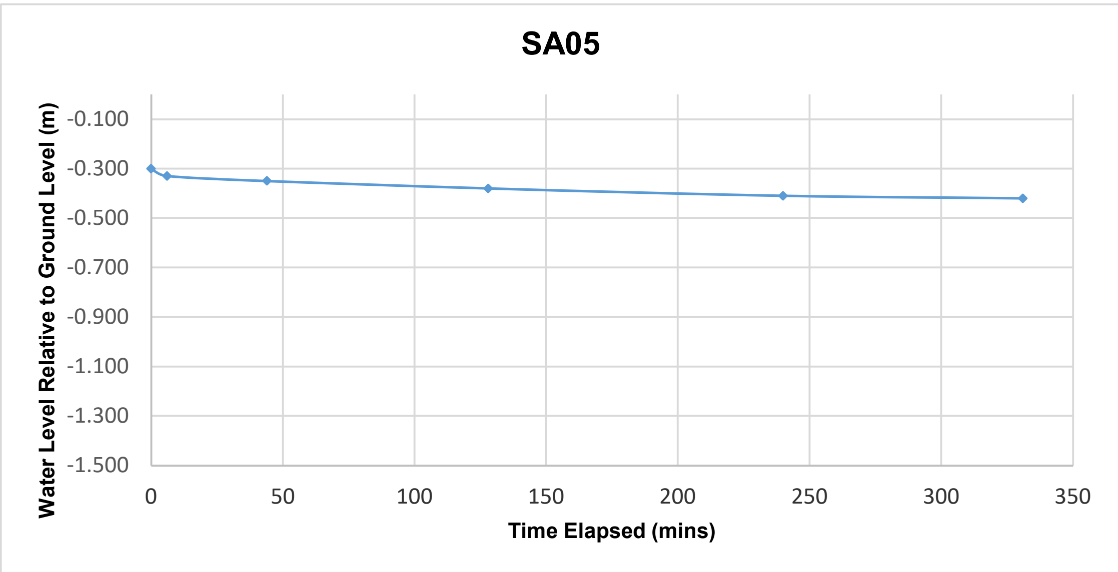
SA05

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.60m x 0.50m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
17/11/2023	0	-0.300
17/11/2023	6	-0.330
17/11/2023	44	-0.350
17/11/2023	128	-0.380
17/11/2023	240	-0.410
17/11/2023	331	-0.420

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.500	1.200	0.6	1.2



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

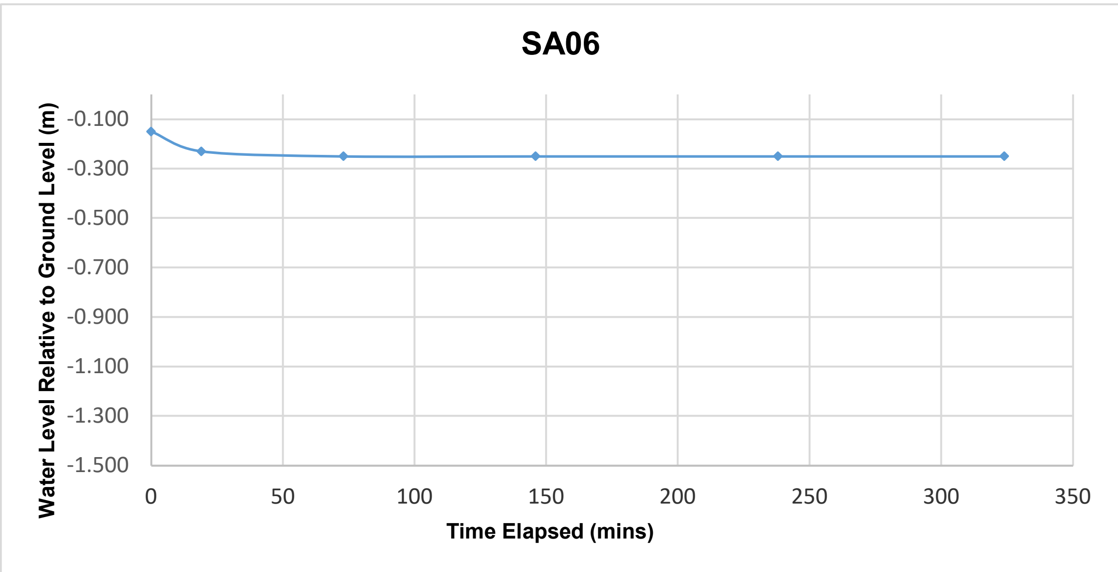
SA06

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.60m x 0.50m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
17/11/2023	0	-0.150
17/11/2023	19	-0.230
17/11/2023	73	-0.250
17/11/2023	146	-0.250
17/11/2023	238	-0.250
17/11/2023	324	-0.250

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.15	1.500	1.350	0.4875	1.1625



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Cathorinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA07 (1)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.40m x 0.50m x 1.00m (L x W x D)

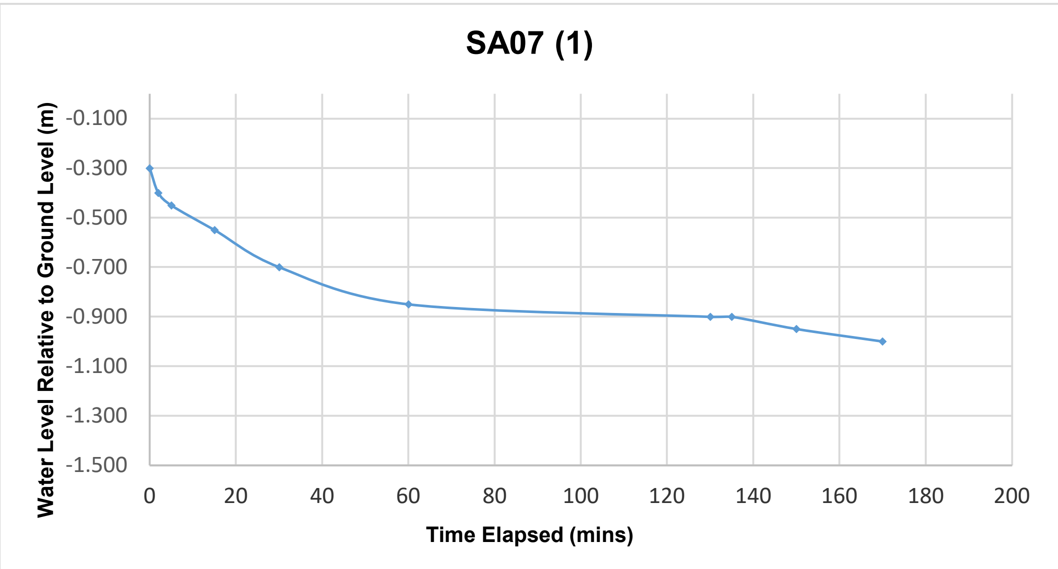
Date	Time	Water level (m bgl)
20/11/2023	0	-0.300
20/11/2023	2	-0.400
20/11/2023	5	-0.450
20/11/2023	15	-0.550
20/11/2023	30	-0.700
20/11/2023	60	-0.850
20/11/2023	130	-0.900
20/11/2023	135	-0.900
20/11/2023	150	-0.950
20/11/2023	170	-1.000

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**1.000**	**0.700**	**0.475**	**0.825**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.400	0.500	0.350	0.25

Tp75-25 (from graph) (s)		50% Eff Depth	ap50 (m2)
	2880	0.350	2.03

f = 4.191E-05 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA07 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.40m x 0.50m x 1.00m (L x W x D)

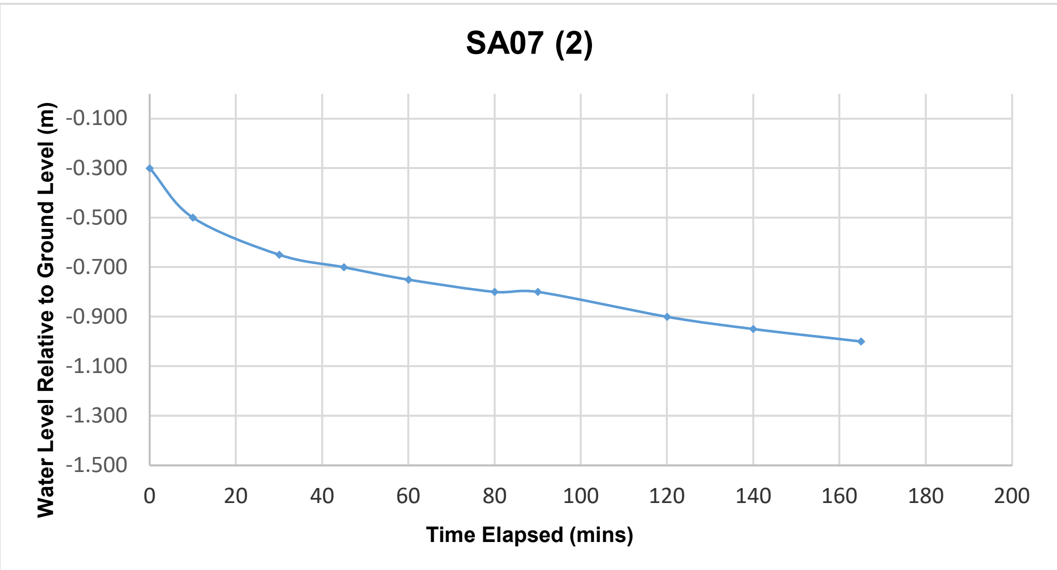
Date	Time	Water level (m bgl)
20/11/2023	0	-0.300
20/11/2023	10	-0.500
20/11/2023	30	-0.650
20/11/2023	45	-0.700
20/11/2023	60	-0.750
20/11/2023	80	-0.800
20/11/2023	90	-0.800
20/11/2023	120	-0.900
20/11/2023	140	-0.950
20/11/2023	165	-1.000

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**1.000**	**0.700**	**0.475**	**0.825**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.400	0.500	0.350	0.25

Tp75-25 (from graph) (s)	**5220**	50% Eff Depth	ap50 (m2)
		0.350	2.03

f = 2.312E-05 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA10 (1)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.70m x 0.50m x 1.20m (L x W x D)

Date	Time	Water level (m bgl)
17/11/2023	0	-0.250
17/11/2023	2	-0.300
17/11/2023	7	-0.400
17/11/2023	19	-0.600
17/11/2023	26	-0.640
17/11/2023	36	-0.700
17/11/2023	71	-0.850

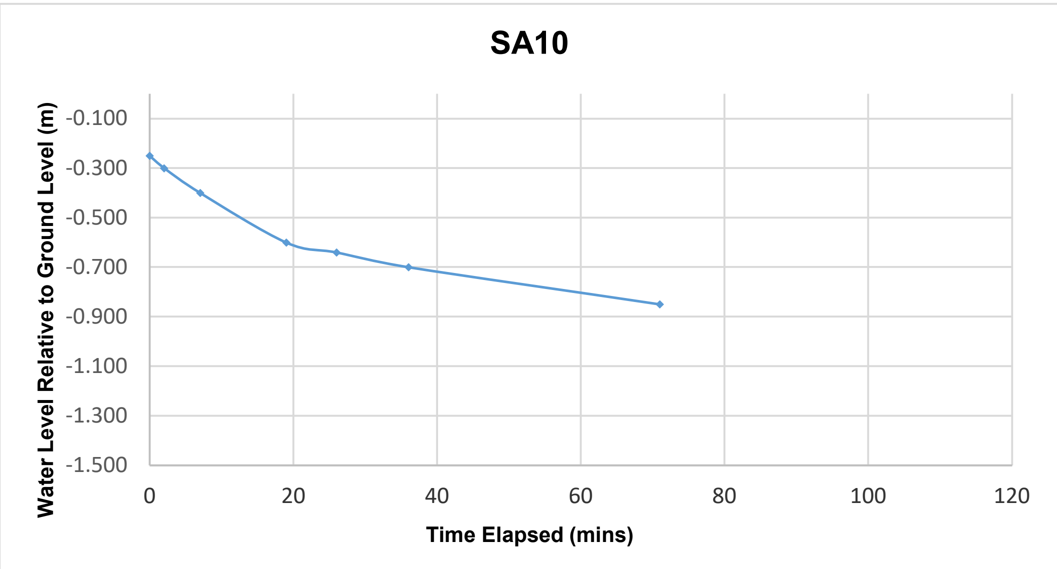
Start depth	Depth of Pit	Diff	75% full	25%full
0.50	**1.200**	**0.700**	**0.675**	**1.025**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.700	0.500	0.350	0.30

Tp75-25 (from graph) (s) **4200**

50% Eff Depth	ap50 (m2)
0.350	2.39

f = 2.964E-05 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA10 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.70m x 0.50m x 1.20m (L x W x D)

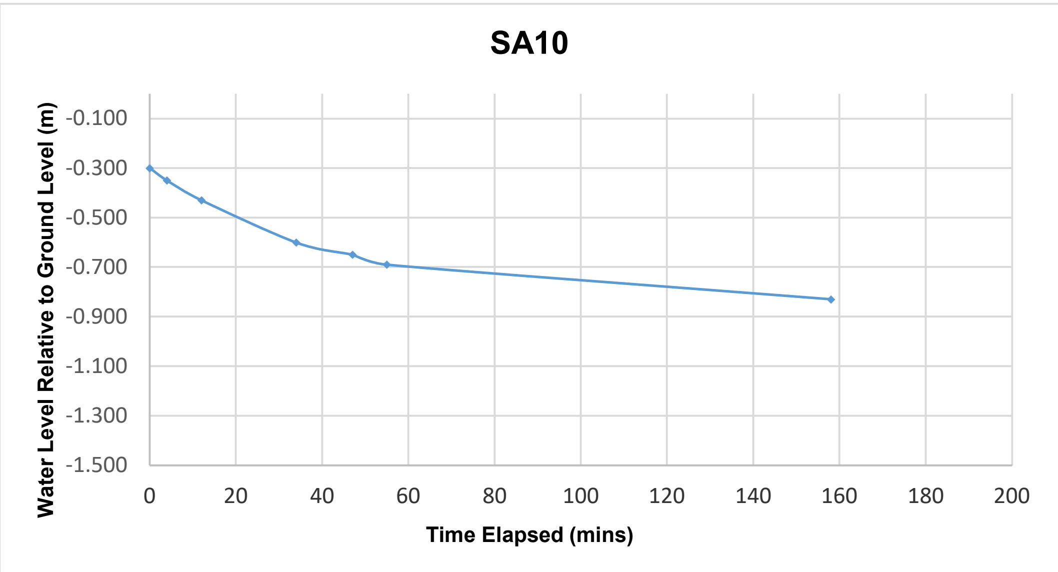
Date	Time	Water level (m bgl)
17/11/2023	0	-0.300
17/11/2023	4	-0.350
17/11/2023	12	-0.430
17/11/2023	34	-0.600
17/11/2023	47	-0.650
17/11/2023	55	-0.690
17/11/2023	158	-0.830

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**1.200**	**0.900**	**0.525**	**0.975**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.700	0.500	0.450	0.38

Tp75-25 (from graph) (s)	**16200**	50% Eff Depth	ap50 (m2)
		0.450	2.83

f = 8.343E-06 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA11 (1)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.30m x 0.50m x 1.20m (L x W x D)

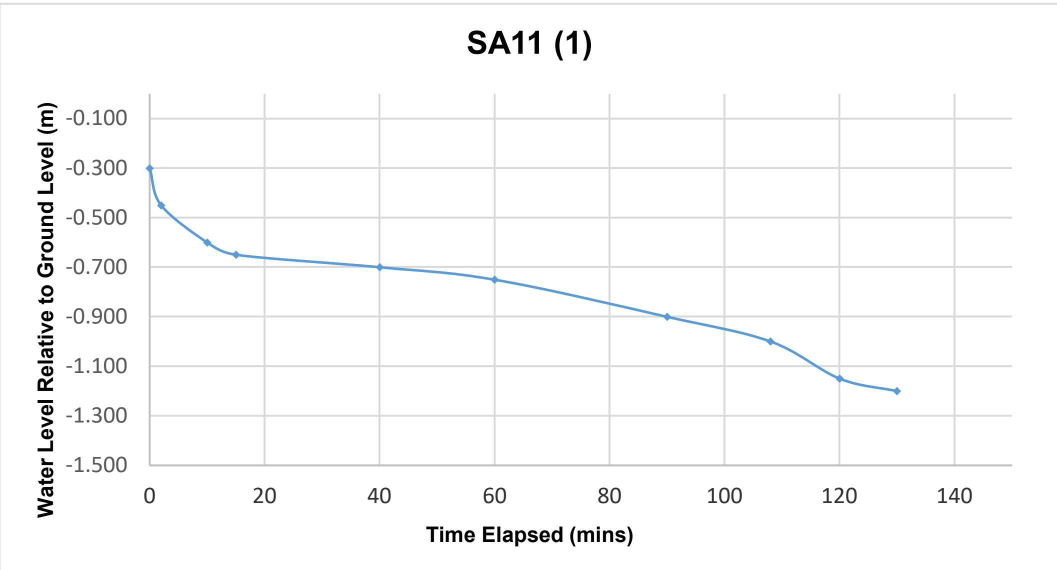
Date	Time	Water level (m bgl)
20/11/2023	0	-0.300
20/11/2023	2	-0.450
20/11/2023	10	-0.600
20/11/2023	15	-0.650
20/11/2023	40	-0.700
20/11/2023	60	-0.750
20/11/2023	90	-0.900
20/11/2023	108	-1.000
20/11/2023	120	-1.150
20/11/2023	130	-1.200

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**1.200**	**0.900**	**0.525**	**0.975**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.300	0.500	0.450	0.29

Tp75-25 (from graph) (s)	**6000**	50% Eff Depth	ap50 (m2)
		0.450	2.27

f = 2.148E-05 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin,
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA11 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.30m x 0.50m x 1.20m (L x W x D)

Date	Time	Water level (m bgl)
20/11/2023	0	-0.300
20/11/2023	5	-0.450
20/11/2023	15	-0.550
20/11/2023	25	-0.650
20/11/2023	45	-0.750
20/11/2023	65	-0.850
20/11/2023	85	-0.900
20/11/2023	105	-1.050
20/11/2023	130	-1.150
20/11/2023	140	-1.200

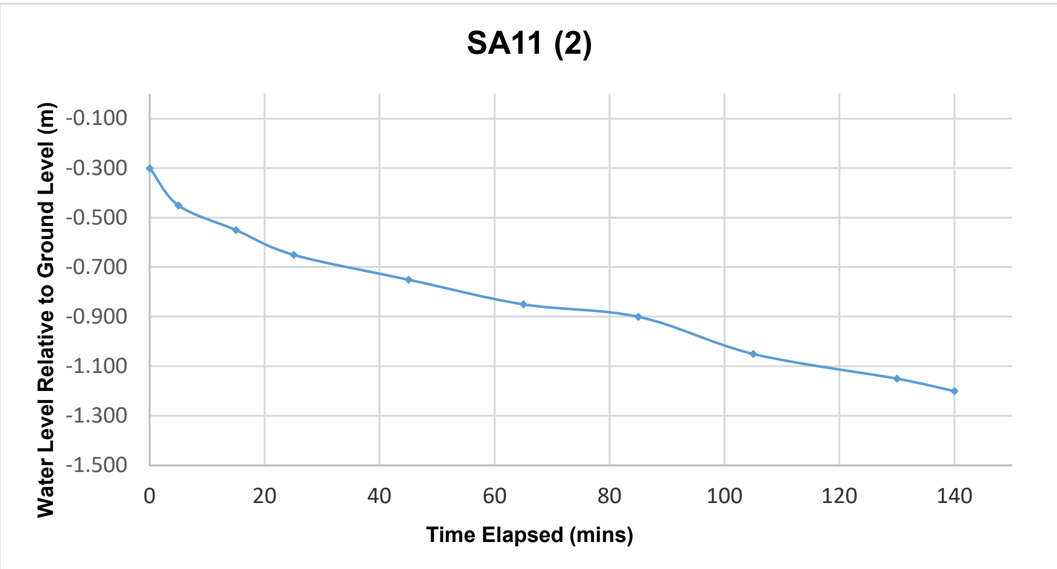
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.200	0.900	0.525	0.975

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.300	0.500	0.450	0.29

Tp75-25 (from graph) (s) **5100**

50% Eff Depth	ap50 (m2)
0.450	2.27

f = 2.527E-05 m/s



RECEIVED: 07/06/2024

[redacted]

RECEIVED: 07/06/2024

[redacted]

1.0 Preamble

On the instructions of Hendrick Ryan Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., during February and March 2023 at the site of the proposed residential development in Athlumney. Navan, Co. Meath.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. The site is currently greenfield. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 12 No. Trial Pits to a maximum depth of 1.70m BGL
- Carry out 12 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 10 No. Window Sample Boreholes to recover soil samples
- Carry out 10 No. Dynamic Probes to determine soil strength/density characteristics
- Carry out 5 No. Cable Percussion boreholes to a maximum depth of 3.50m BGL.
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by an Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 2 of this Report.

3.4. Window Sampling

The window sampling was carried out at the locations shown in the location plan in Appendix 1 using a Tecopsa SPT Tec 10 percussion drilling rig. The window sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 50kg weight falling a height of 500mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by an Engineering Geologist. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging. The window sample records are provided in Appendix 3 of this Report.

3.5. Dynamic Probing (DPH)

The dynamic probe tests (DPH) were carried out at the locations shown in the location plan in Appendix 1 in accordance with B.S. 1377: Part 9 1990. The test consists of mechanically driving a cone with a 50kg weight in 100mm intervals and monitoring the number of blows required. An equivalent Standard Penetration Test (SPT) ‘N’ value may be calculated by dividing the total number of blows over a 300mm drive length by 1.5. The dynamic probe logs are provided in Appendix 4 of this Report.

3.6. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.

The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata. Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 6 of this Report.

3.7. Surveying

The exploratory hole locations have been recorded using a KQ GEO Technologies KQ-M8 System which records the coordinates and elevation of the locations to ITM as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.8. Insitu Plate Bearing Test

The plate bearing tests were carried out using a 450mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the displacement was monitored in accordance with BS1377 Part 9 using independently mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 5 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and generally comprised;

- Topsoil
- Made Ground
- Granular Deposits
- Cohesive Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.40m BGL.

MADE GROUND: Made Ground deposits were encountered in WS04 to a depth of

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and were described typically as *brown slightly sandy gravelly CLAY.* The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had some, occasional or frequent cobble and boulder content, where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Granular deposits were encountered below the base of the cohesive deposits and were typically described as grey *brown clayey sandy sub rounded to sub angular fine to coarse GRAVEL with occasional cobbles and rare boulders.* The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs.

4.2. Insitu Strength Testing

The correlated DPH blow counts indicate that the overburden deposits are soft or soft to firm to depth of 1.90m to 2.40m BGL and become stiff with depth in the dynamic probes that achieved deeper depths (DP05 and DP06).

4.3. Groundwater

No groundwater was noted during the investigation however we would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

At the location of the proposed structures allowable bearing capacities of 125 - 180 kN/m^2 is recommended for conventional strip or pad foundations on the deposits at the depths outlined in the table below.
The possibility for variation in the depth of the made ground in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

	Allowable Bearing Capacities (ABC) kN/m^2						
Trial Pit	**ABC**	**Depth**	**Comment**	**Trial Pit**	**ABC**	**Depth**	**Comment**
No.	**kN/m^2**	**m BGL**		**No.**	**kN/m^2**	**m BGL**	
DP01	125	0.80	**Granular**	**DP/BH07**	180	1.80	**Granular**
DP/BH02	125	0.80	**Granular**	**DP/BH08**	180	1.80	**Granular**
DP/BH03	180	1.00	**Granular**	**DP09**	125	0.80	**Granular**
DP04	125	0.80	**Granular**	**DP10**	125	0.80	**Granular**
DP05	125	2.40	**---**				
DP/BH06	180	1.80	**Granular**				

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendices of this Report. The low CBR test results in some locations indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.
The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.4. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported.

The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.

5.5. Soakaway Design

Infiltration rates of between f=1.212 x 10^{-3} m/s and 5.998 x 10^{-6} m/s were calculated for the soakaway locations indicated on the site location plan.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

[redacted]

RECEIVED: 07/06/2024

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

			Site Site Investigation Athlumney	**Trial Pit Number** **TP01**
Machine : 3CX **Method :** Trial Pit	**Dimensions** 1.8 x 0.50 x 1.50	**Ground Level (mOD)** 46.87	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688906.6 E 768214.3 N	**Dates** 17/02/2023	**Engineer**	**Sheet** 1/1

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Brown slightly gravelly TOPSOIL		
				46.37	0.50	Grey/brown very clayey coarse sub rounded to sub angular GRAVEL with occasional cobbles		
					(1.00)			
				45.37	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP01

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 3CX **Method :** Trial Pit	**Dimensions** 1.8 x 0.60 x 1.5	**Ground Level (mOD)** 48.32	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688961.9 E 768164.6 N	**Dates** 17/02/2023	**Engineer**	**Sheet** 1/1

Site: Site Investigation Athlumney

Trial Pit Number: TP02

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown sandy TOPSOIL		
				48.02	0.30	Brown very clayey gravelly fine to coarse SAND		
					(1.20)			
1.00	BA							
1.50	BA			46.82	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP02

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Site Site Investigation Athlumney			**Trial Pit Number** TP03
Machine : 3CX **Method :** Trial Pit	**Dimensions** 2.20 x 0.65 x 1.50	**Ground Level (mOD)** 47.62	**Client** Hendrick Ryan
	Location 688911.8 E 768150.8 N	**Dates** 17/02/2023	**Engineer**
Job Number 12517-01-23	**Sheet** 1/1		

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown sandy TOPSOIL		
				47.22	0.40 (0.30)	Soft to firm brown sandy CLAY with occasional cobbles		
				46.92	0.70 (0.80)	Brown clayey coarse sub angular to sub rounded GRAVEL with many cobbles and occasional boulders		
1.50	BA			46.12	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP03

[redacted] Ground Investigations Ireland Ltd www.gii.ie			Site: Site Investigation Athlumney	Trial Pit Number: TP04
Machine : 3CX **Method :** Trial Pit	**Dimensions** 2.0 x 0.70 x 1.50	**Ground Level (mOD)** 51.49	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 689048.4 E 768093.5 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown sandy TOPSOIL		
				51.19	0.30 (1.20)	Brown very clayey sandy GRAVEL angular to sub rounded with occasional cobbles		
				49.99	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP04

[redacted] Ground Investigations Ireland Ltd www.gii.ie			Site: Site Investigation Athlumney	Trial Pit Number: TP05
Machine : 3CX Method :	Dimensions: 2.0 x 0.50 x 1.5	Ground Level (mOD): 46.28	Client: Hendrick Ryan	Job Number: 12517-01-23
	Location: 688851.3 E 768175.1 N	Dates: 17/02/2023	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Soft brown sandy TOPSOIL		
				45.98	0.30 (0.30)	Soft to firm brown slightly sandy slightly gravelly CLAY. Gravels are sub rounded to sub angular		
				45.68	0.60	Grey/brown clayey coarse sub rounded to sub angular GRAVEL with occasional cobbles and boulders		
1.00	BA				(0.90)			
1.50	BA			44.78	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP05

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 3CX **Method :**	**Dimensions** 2.0 x 0.6 x 1.7	**Ground Level (mOD)** 49.37	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688942.3 E 768129.2 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Site: Site Investigation Athlumney

Trial Pit Number: **TP06**

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown sandy TOPSOIL with rootlets		
				49.07	0.30	Brown clayey fine to coarse SAND		
1.00	BA				(1.40)			
1.50	BA							
				47.67	1.70	Complete at 1.70m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP06

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Site	Trial Pit Number
Site Investigation Athlumney	TP07

Machine : 3CX Method : Trial Pit	Dimensions 1.6 x 0.6 x 1.5	Ground Level (mOD) 51.70	Client Hendrick Ryan	Job Number 12517-01-23
	Location 688984.8 E 768100.8 N	Dates 15/02/2023	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown sandy TOPSOIL.		
				51.30	0.40 (0.20)	Soft to firm brown slightly sandy slightly gravelly CLAY.		
				51.10	0.60 (0.90)	Brown very clayey sandy fine to coarse angular to sub rounded GRAVEL with some cobbles.		
				50.20	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP07

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 360 Excavator **Method :** Trial Pit	**Dimensions** 1.80 x 0.60 x 1.50	**Ground Level (mOD)** 51.84	**Site** Site Investigation Athlumney **Client** Hendrick Ryan	**Trial Pit Number** **TP08** **Job Number** 12517-01-23
	Location 689024.3 E 768077.1 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Brown slightly sandy TOPSOIL		
				51.64	0.20	Firm brown gravelly CLAY		
					(0.80)			
1.00	BA			50.84	1.00	Firm brown slightly sandy slightly gravelly CLAY with some cobbles particles are sub angular to angular		
					(0.50)			
1.50	BA			50.34	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP08

[redacted] Ground Investigations Ireland Ltd www.gii.ie			Site Site Investigation Athlumney	Trial Pit Number **TP09**
Machine : 3CX **Method :** Trial Pit	**Dimensions** 2.3 X 0.70 X 1.50	**Ground Level (mOD)** 51.91	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688966.9 E 768098.5 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown slightly sandy TOPSOIL.		
				51.51	0.40 (0.30)	Brown clayey coarse sub rounded to angular GRAVEL with many cobbles and occasional boulders.		
				51.21	0.70 (0.80)	Brown clayey sandy sub angular to sub rounded fine to coarse GRAVEL with many cobbles		
				50.41	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP09

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 3CX **Method :** Trial Pit	**Dimensions** 2.0 x 0.6 x 1.5	**Ground Level (mOD)** 51.93	**Site** Site Investigation Athlumney **Client** Hendrick Ryan	**Trial Pit Number** TP10 **Job Number** 12517-01-23
	Location 688991.1 E 768071 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy TOPSOIL		
				51.63	0.30 (0.30)	Soft brown slightly sandy CLAY		
				51.33	0.60 (0.40)	Brown clayey very sandy GRAVEL		
1.00	BA			50.93	1.00 (0.50)	Brown/Grey clayey sub angular to angular fine to coarse GRAVEL with some cobbles		
1.50	BA			50.43	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP10

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 3CX **Method :**	**Dimensions** 1.80 x 0.60 x 1.50	**Ground Level (mOD)** 50.05	**Site** Site Investigation Athlumney	**Trial Pit Number** **TP11**
	Location 688980 E 768140.3 N	**Dates** 16/02/2023	**Client** Hendrick Ryan	**Job Number** 12517-01-23
			Engineer	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy TOPSOIL		
				49.75	0.30			
					(0.40)	Brown very clayey fine to coarse SAND with occasional cobbles		
				49.35	0.70			
					(0.80)	Brown clayey sub angular to sub rounded fine to coarse GRAVEL with many cobbles and occasional boulders		
				48.55	1.50	Complete at 1.50m		

Plan

Remarks

Trial Pit stable
No groundwater encountered
Trial Pit backfilled upon completion of soakaway test

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP11

Ground Investigations Ireland Ltd www.gii.ie		Site Site Investigation Athlumney	Trial Pit Number **TP12**

Machine : 360 Excavator Method :	Dimensions 2.0 x 0.6 x 1.5	Ground Level (mOD) 51.68	Client Hendrick Ryan	Job Number 12517-01-23
	Location 689014.8 E 768111.4 N	Dates 15/02/2023	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy TOPSOIL		
				51.38	0.30	Soft to firm brown slightly sandy CLAY with occasional cobbles		
					(0.30)			
0.50	BA							
				51.08	0.60	Brown slightly sandy slightly clayey fine to coarse angular to sub rounded GRAVEL		
					(0.40)			
1.00	BA			50.68	1.00	Brown clayey sub angular fine to coarse GRAVEL with many cobbles and occasional boulders		
					(0.50)			
				50.18	1.50	Complete at 1.50m		

Plan	Remarks

Scale (approx)	Logged By	Figure No.
1:25	PD	12517-01-23.TP12

[redacted]

SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.8m x 0.5m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
17/02/2023	0	-1.000
17/02/2023	15	-1.100
17/02/2023	75	-1.150
17/02/2023	195	-1.200
17/02/2023	275	-1.300
17/02/2023	315	-1.350
17/02/2023	335	-1.380

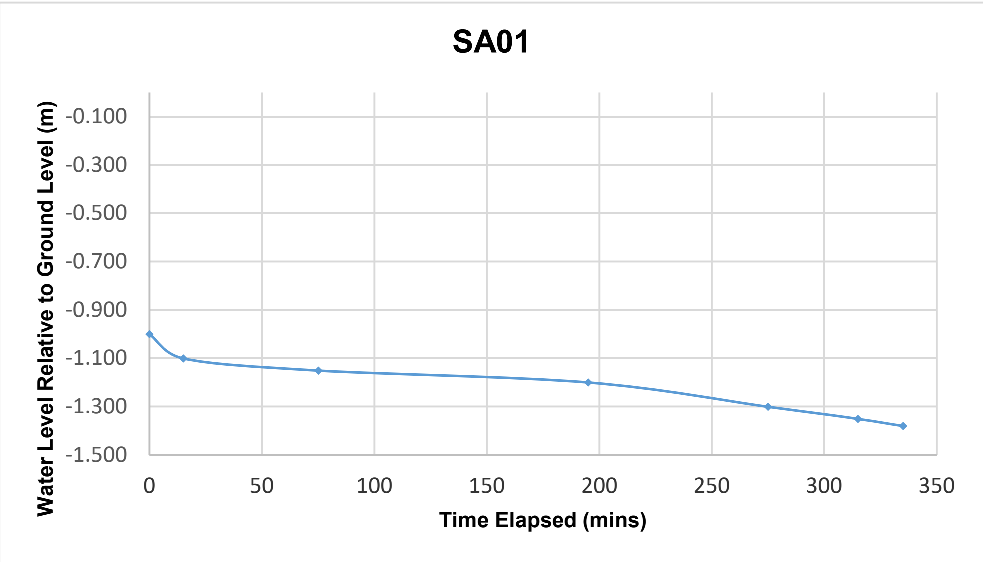
Start depth	Depth of Pit	Diff	75% full	25%full
1.00	**1.500**	**0.500**	**1.125**	**1.375**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.800	0.500	0.250	0.23

Tp75-25 (from graph) (s) **18300**

50% Eff Depth	ap50 (m2)
0.250	2.05

f = 5.998E-06 m/s



[redacted]

SA02

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.50m x 0.50m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
17/02/2023	0	-0.900
17/02/2023	15	-1.000
17/02/2023	26	-1.040
17/02/2023	50	-1.100
17/02/2023	100	-1.150
17/02/2023	160	-1.220
17/02/2023	220	-1.300
17/02/2023	260	-1.400

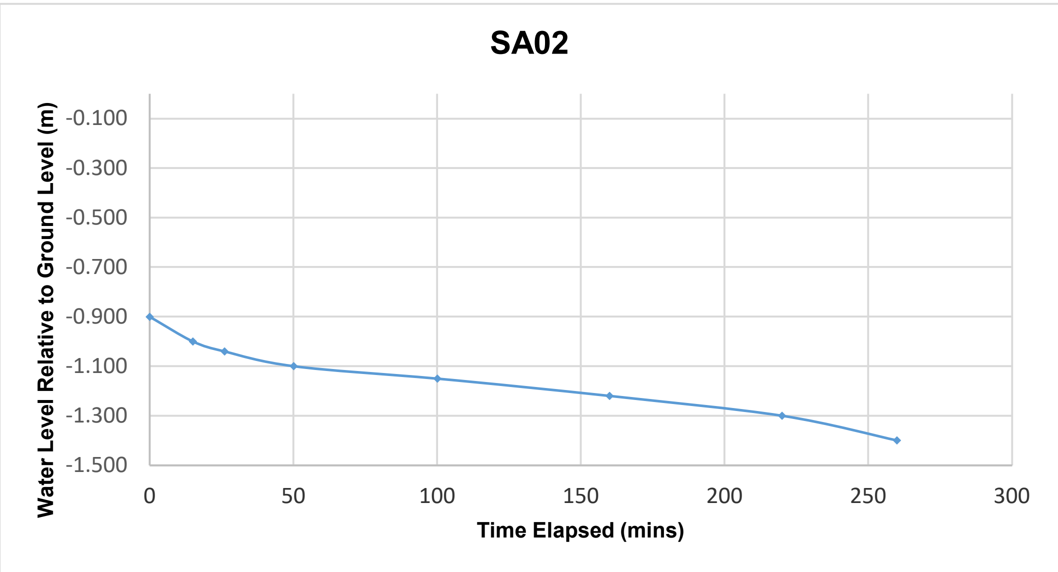
Start depth	Depth of Pit	Diff	75% full	25%full
0.90	**1.500**	**0.600**	**1.05**	**1.35**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.500	0.500	0.300	0.23

Tp75-25 (from graph) (s) **12840**

50% Eff Depth	ap50 (m2)
0.300	1.95

f = 8.986E-06 m/s



[redacted]

SA03

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m x 0.65m 1.50m (L x W x D)

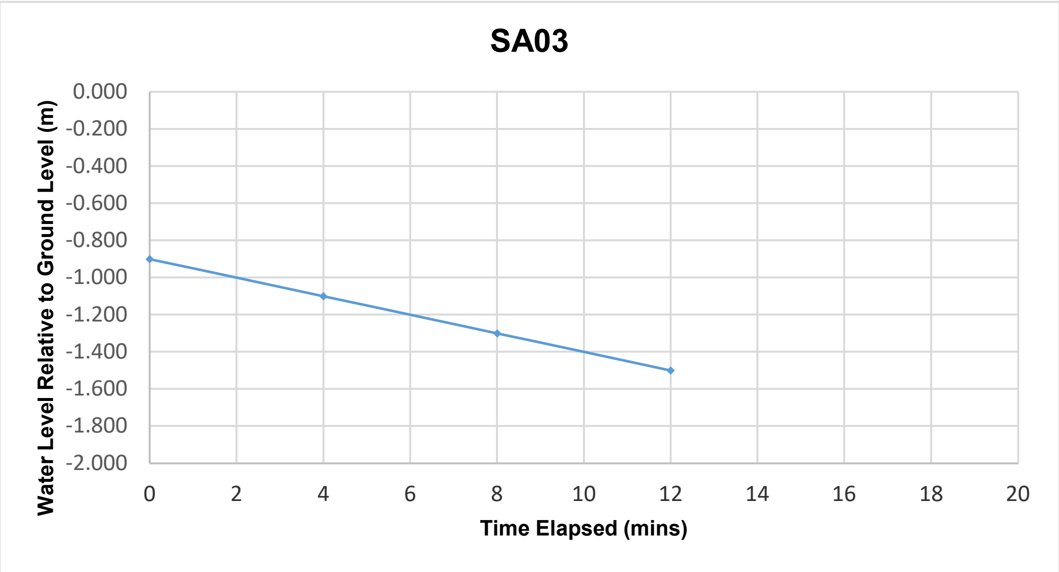
Date	Time	Water level (m bgl)
15/02/2023	0	-0.900
15/02/2023	4	-1.100
15/02/2023	8	-1.300
15/02/2023	12	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
0.90	**1.500**	**0.600**	**1.05**	**1.35**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.200	0.650	0.300	0.43

Tp75-25 (from graph) (s)	480	50% Eff Depth	ap50 (m2)
		0.300	3.14

f = 2.846E-04 m/s



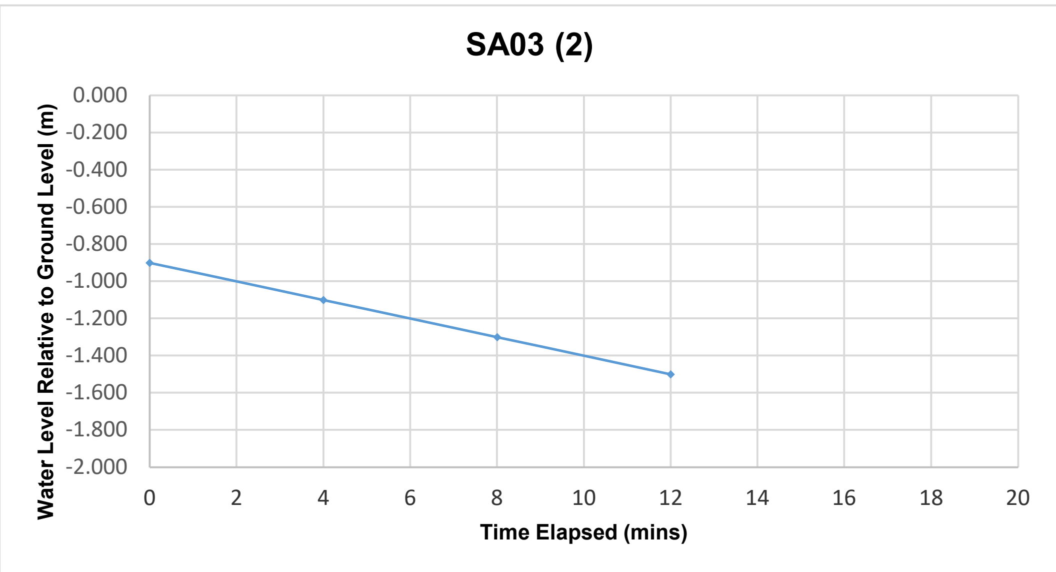
[redacted]

SA03 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m x 0.65m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
15/02/2023	0	-0.900
15/02/2023	4	-1.100
15/02/2023	8	-1.300
15/02/2023	12	-1.500

Start depth	Depth of Pit		Diff	75% full	25%full
0.90	**1.500**		**0.600**	**1.05**	**1.35**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
2.200	0.650			0.300	0.43
Tp75-25 (from graph) (s)		480		50% Eff Depth	ap50 (m2)
				0.300	3.14
f =	2.846E-04	m/s			



[redacted]

SA04

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.70m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
15/02/2023	0	-1.000
15/02/2023	5	-1.170
15/02/2023	12	-1.350
15/02/2023	19	-1.500

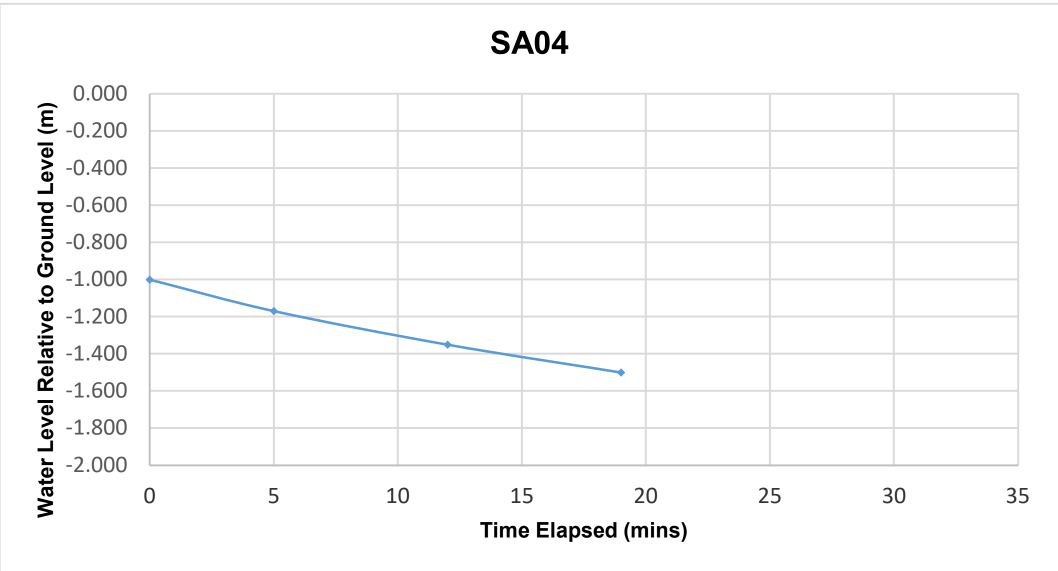
Start depth	Depth of Pit	Diff	75% full	25%full
1.00	1.500	0.500	1.125	1.375

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.700	0.250	0.35

Tp75-25 (from graph) (s) **420**

50% Eff Depth	ap50 (m2)
0.250	2.75

f = 3.030E-04 m/s



[redacted]

SA04

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.70m x 1.5m (L x W x D)

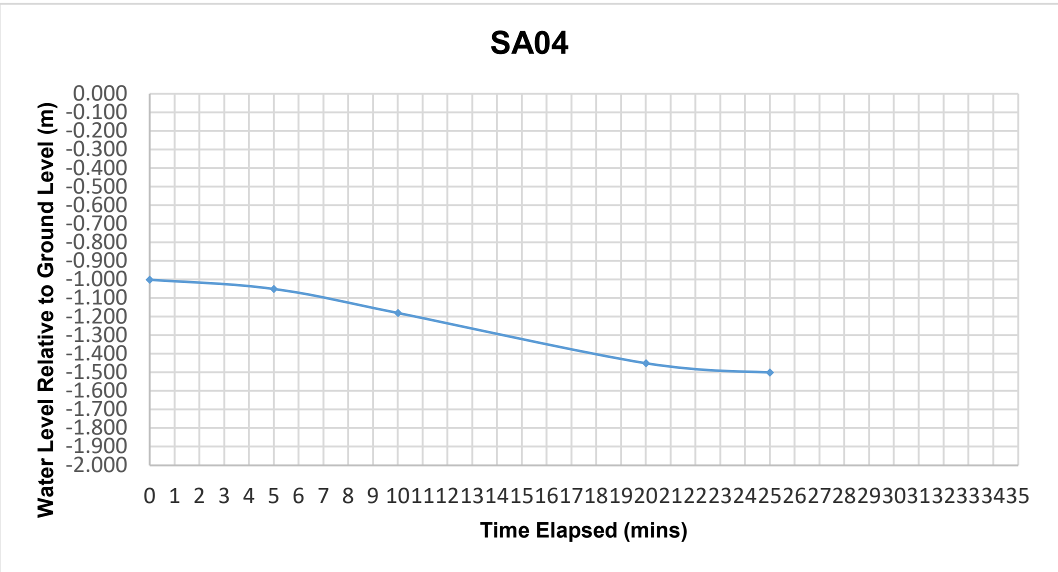
Date	Time	Water level (m bgl)
15/02/2023	0	-1.000
15/02/2023	5	-1.050
15/02/2023	10	-1.180
15/02/2023	20	-1.450
15/02/2023	25	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	**1.500**	**0.500**	**1.125**	**1.375**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.700	0.250	0.35

Tp75-25 (from graph) (s)	600	50% Eff Depth	ap50 (m2)
		0.250	2.75

f = 2.121E-04 m/s



[redacted]

SA05

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.50m x 1.5m (L x W x D)

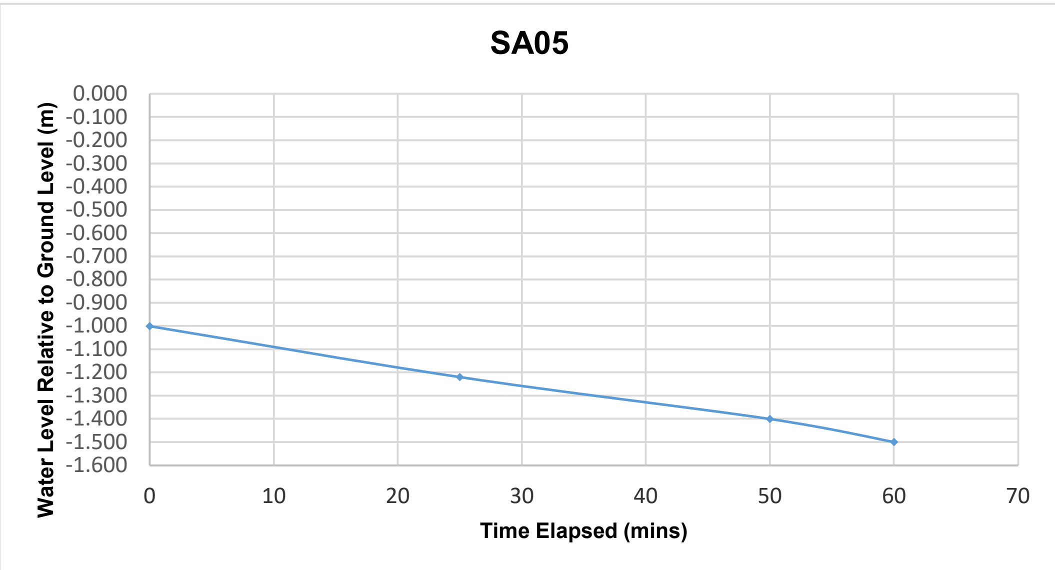
Date	Time	Water level (m bgl)
17/02/2023	0	-1.000
17/02/2023	25	-1.220
17/02/2023	50	-1.400
17/02/2023	60	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	1.500	0.500	1.125	1.375

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.500	0.250	0.25

Tp75-25 (from graph) (s)	2100	50% Eff Depth	ap50 (m2)
		0.250	2.25

f = 5.291E-05 m/s



[redacted]

SA05 (1)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.50m x 1.5m (L x W x D)

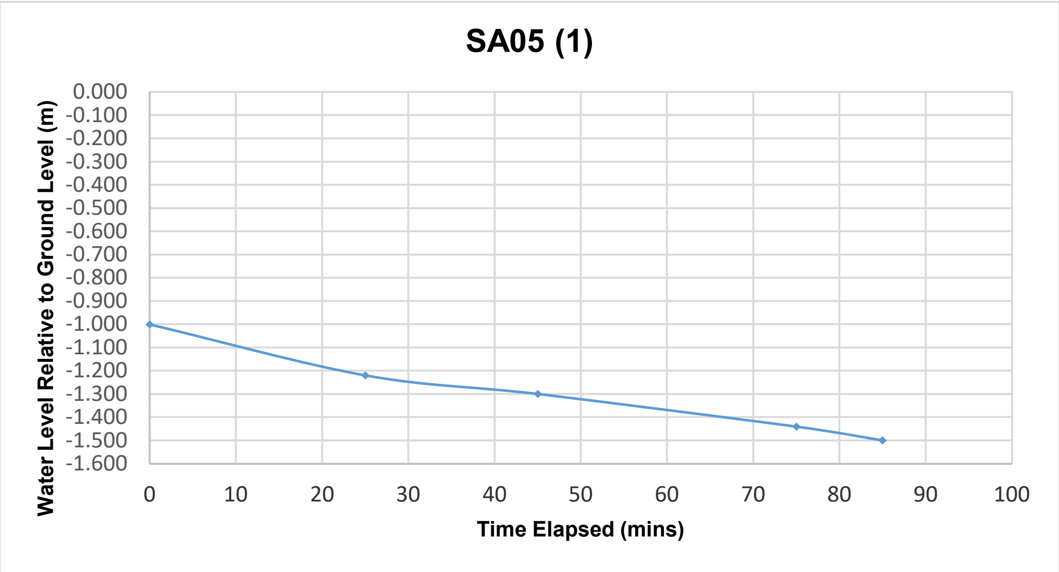
Date	Time	Water level (m bgl)
17/02/2023	0	-1.000
17/02/2023	25	-1.220
17/02/2023	45	-1.300
17/02/2023	75	-1.440
17/02/2023	85	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	**1.500**	**0.500**	**1.125**	**1.375**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.500	0.250	0.25

Tp75-25 (from graph) (s)		50% Eff Depth	ap50 (m2)
	2820	0.250	2.25

f = 3.940E-05 m/s



[redacted]

SA06

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.00m x 0.60m 1.7m (L x W x D)

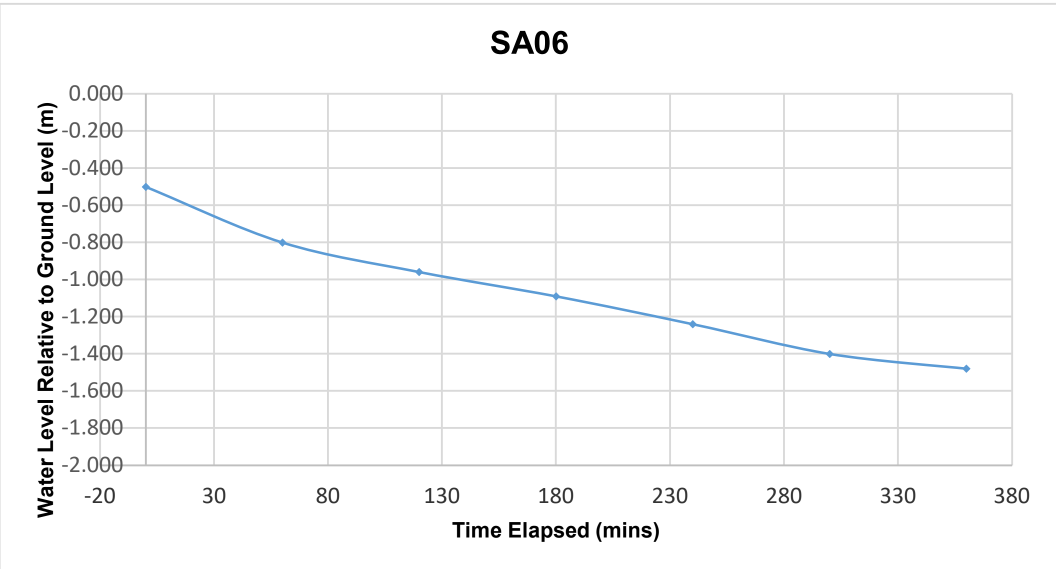
Date	Time	Water level (m bgl)
16/02/2023	0	-0.500
16/02/2023	60	-0.800
16/02/2023	120	-0.960
16/02/2023	180	-1.090
16/02/2023	240	-1.240
16/02/2023	300	-1.400
16/02/2023	360	-1.480

Start depth	Depth of Pit	Diff	75% full	25%full
0.50	**1.700**	**1.200**	**0.8**	**1.4**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.700	0.600	0.84

Tp75-25 (from graph) (s)		50% Eff Depth	ap50 (m2)
	14400	0.600	4.64

f = 1.257E-05 m/s



[redacted]

SA07

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.60m x 0.60m x 1.50m (L x W x D)

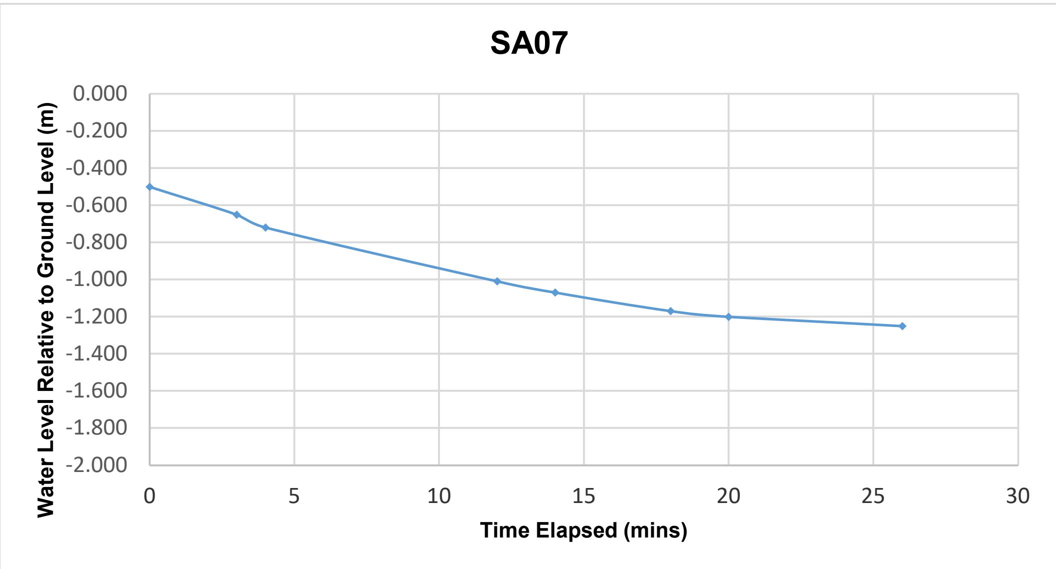
Date	Time	Water level (m bgl)
15/02/2023	0	-0.500
15/02/2023	3	-0.650
15/02/2023	4	-0.720
15/02/2023	12	-1.010
15/02/2023	14	-1.070
15/02/2023	18	-1.170
15/02/2023	20	-1.200
15/02/2023	26	-1.250

Start depth	Depth of Pit		Diff	75% full	25%full
0.50	**1.500**		**1.000**	**0.75**	**1.25**

Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
1.500	0.600		0.500	0.45

			50% Eff Depth	ap50 (m2)
Tp75-25 (from graph) (s)		**1860**	0.500	3

f = 8.065E-05 m/s



[redacted]

SA07 (2)

Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 1.60m x 0.60m x 1.50m (L x W x D)

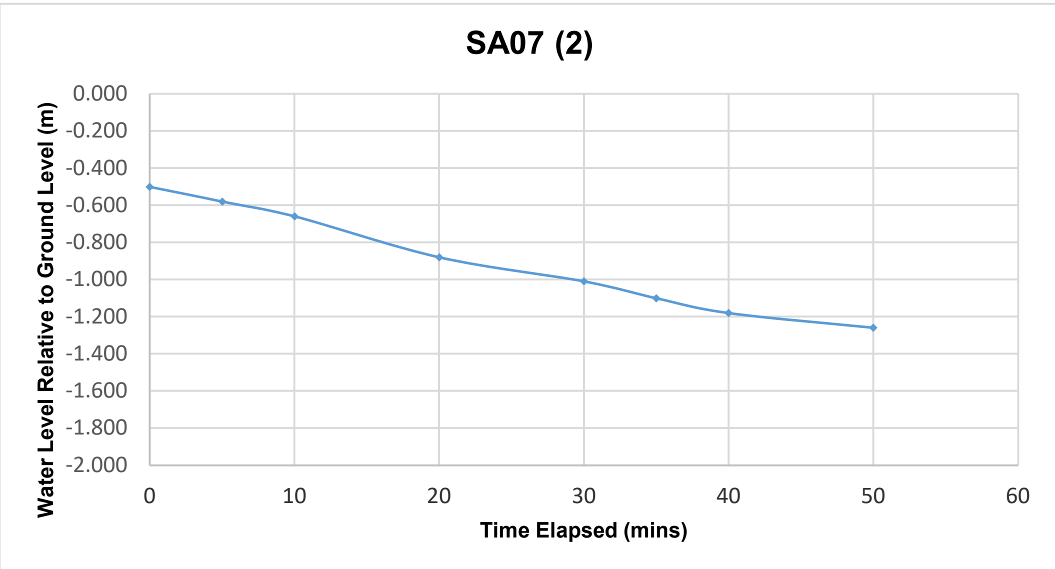
Date	Time	Water level (m bgl)
15/02/2023	0	-0.500
15/02/2023	5	-0.580
15/02/2023	10	-0.660
15/02/2023	20	-0.880
15/02/2023	30	-1.010
15/02/2023	35	-1.100
15/02/2023	40	-1.180
15/02/2023	50	-1.260

Start depth	**Depth of Pit**	**Diff**	**75% full**	**25%full**
0.50	**1.500**	**1.000**	**0.75**	**1.25**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.500	0.600	0.500	0.45

Tp75-25 (from graph) (s)	**2160**	50% Eff Depth	ap50 (m2)
		0.500	3

f = 6.944E-05 m/s



[redacted]

SA08

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.50m x 0.70m 2.00m (L x W x D)

Date	Time	Water level (m bgl)
15/02/2023	0	-1.000
15/02/2023	1	-1.250
15/02/2023	4	-1.500

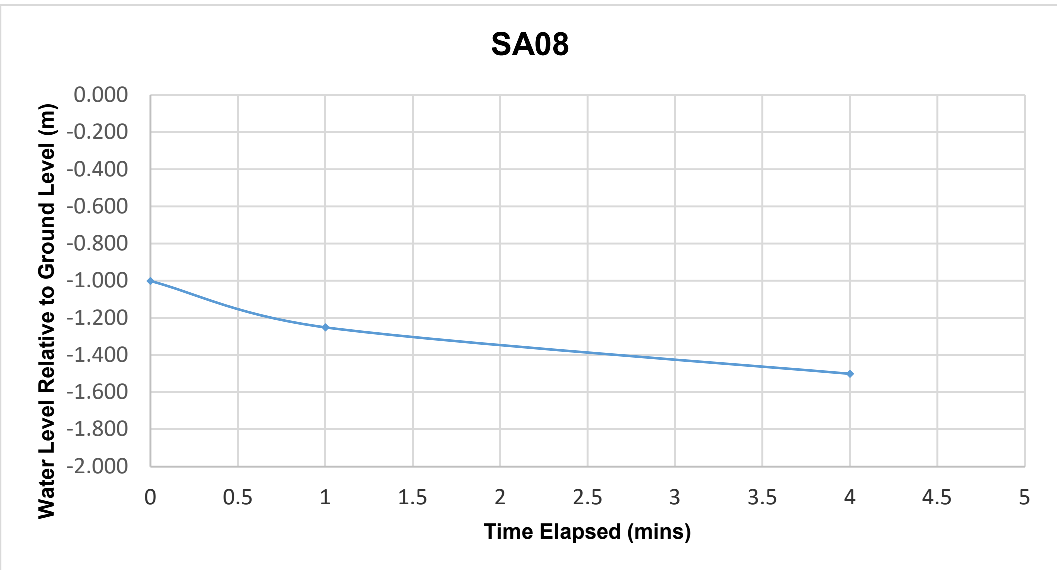
Start depth	Depth of Pit	Diff	75% full	25%full
1.00	**1.500**	**0.500**	**1.125**	**1.375**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.500	0.600	0.250	0.23

Tp75-25 (from graph) (s) **120**

50% Eff Depth	ap50 (m2)
0.250	1.95

f = 9.615E-04 m/s



[redacted]

SA08 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.50m x 0.70m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
15/02/2023	0	-1.000
15/02/2023	2	-1.250
15/02/2023	6	-1.500

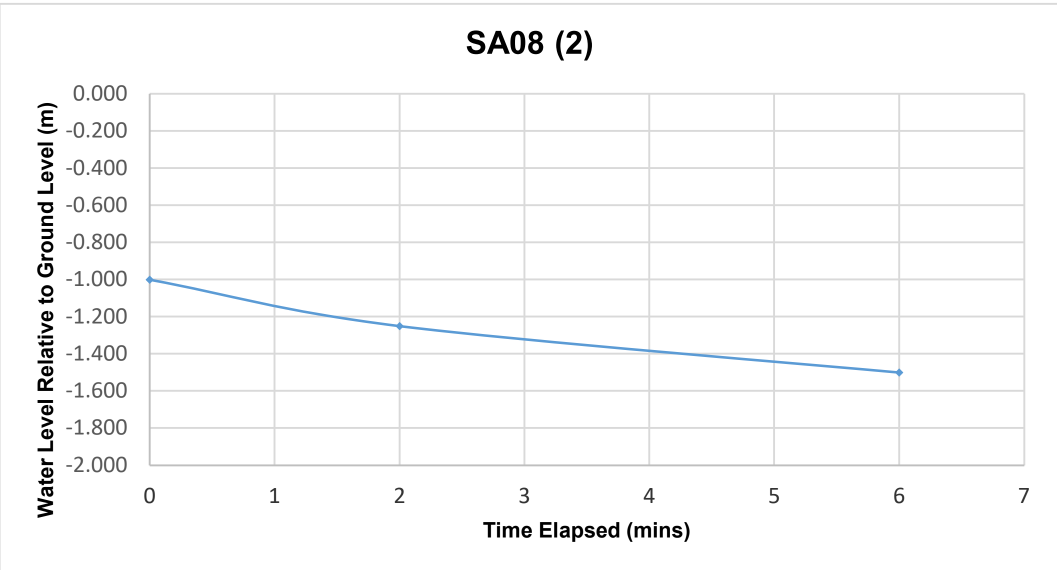
Start depth	Depth of Pit	Diff	75% full	25%full
1.00	1.500	0.500	1.125	1.375

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.500	0.600	0.250	0.23

Tp75-25 (from graph) (s) **180**

50% Eff Depth	ap50 (m2)
0.250	1.95

f = 6.410E-04 m/s



[redacted]

SA08 (3)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.50m x 0.70m 1.50m (L x W x D)

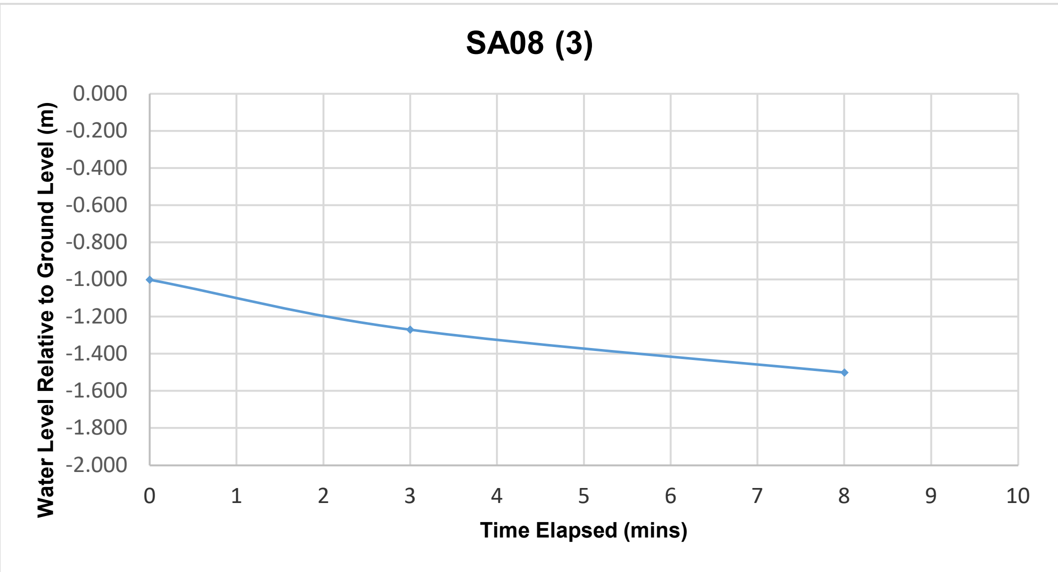
Date	Time	Water level (m bgl)
15/02/2023	0	-1.000
15/02/2023	3	-1.270
15/02/2023	8	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	**1.500**	**0.500**	**1.125**	**1.375**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
1.500	0.600	0.250	0.23

Tp75-25 (from graph) (s)	**342**	50% Eff Depth	ap50 (m2)
		0.250	1.95

f = 3.374E-04 m/s



[redacted]

SA09

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.3m x 0.7m x 1.5m (L x W x D)

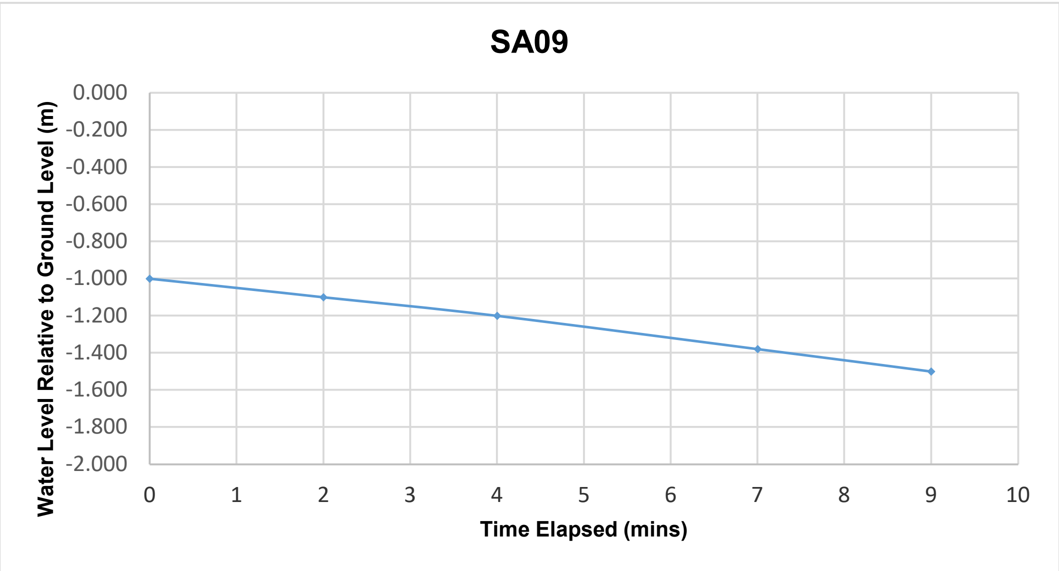
Date	Time	Water level (m bgl)
16/02/2023	0	-1.000
16/02/2023	2	-1.100
16/02/2023	4	-1.200
16/02/2023	7	-1.380
16/02/2023	9	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	1.500	0.500	1.125	1.375

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.300	0.700	0.250	0.40

Tp75-25 (from graph) (s)	318	50% Eff Depth	ap50 (m2)
		0.250	3.11

f = 4.070E-04 m/s



[redacted]

SA09 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.3m x 0.7m x 1.5m (L x W x D)

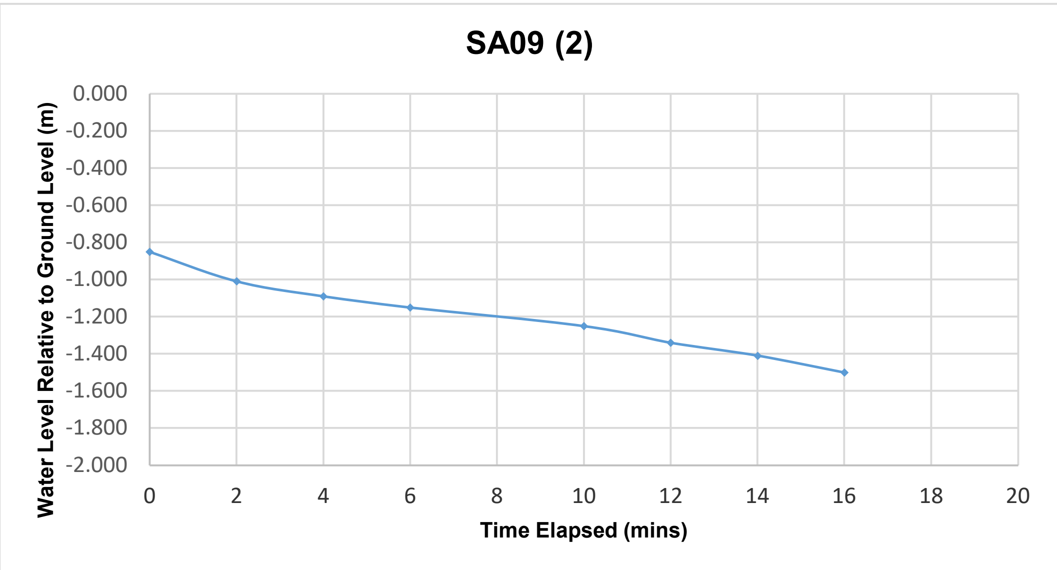
Date	Time	Water level (m bgl)
16/02/2023	0	-0.850
16/02/2023	2	-1.010
16/02/2023	4	-1.090
16/02/2023	6	-1.150
16/02/2023	10	-1.250
16/02/2023	12	-1.340
16/02/2023	14	-1.410
16/02/2023	16	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
0.85	**1.500**	**0.650**	**1.0125**	**1.3375**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.300	0.700	0.325	0.52

Tp75-25 (from graph) (s)	660	50% Eff Depth	ap50 (m2)
		0.325	3.56

f = 2.227E-04 m/s



[redacted]

SA10

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.6m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
16/02/2023	0	-1.000
16/02/2023	3	-1.500

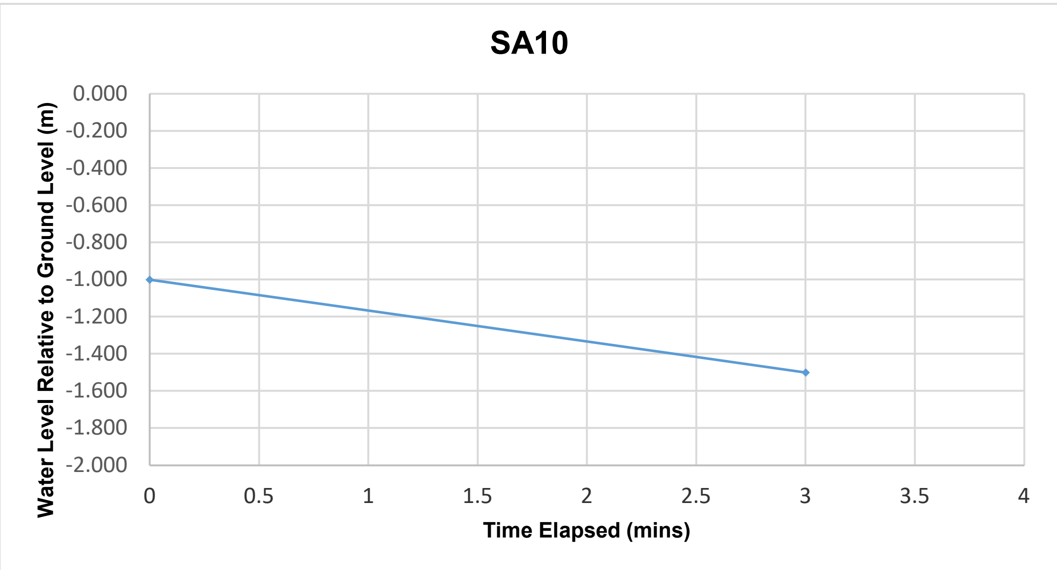
Start depth	Depth of Pit	Diff	75% full	25%full
1.00	1.500	0.500	1.125	1.375

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.600	0.250	0.30

Tp75-25 (from graph) (s) **99**

50% Eff Depth	ap50 (m2)
0.250	2.5

f = 1.212E-03 m/s



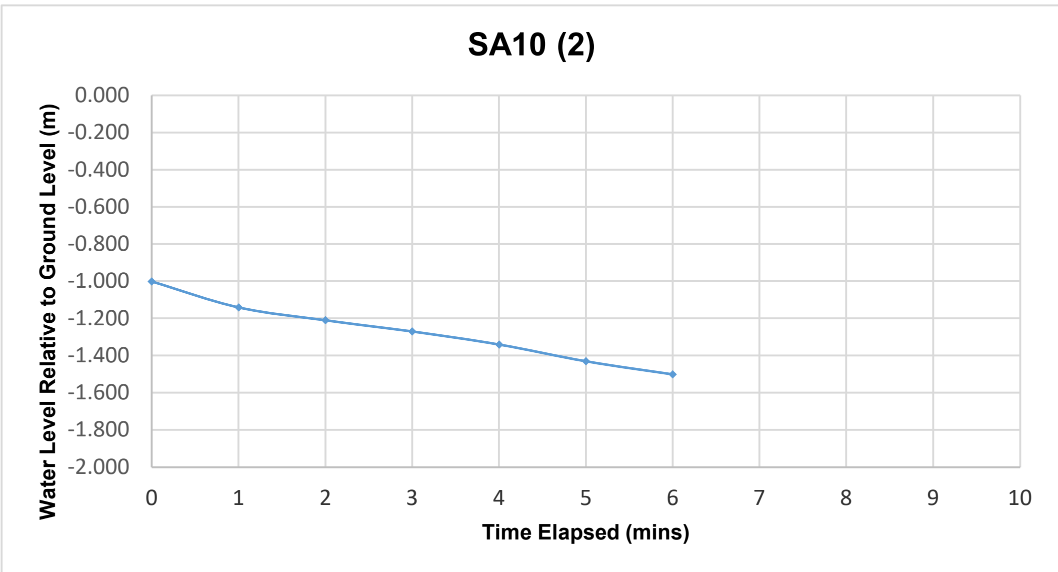
[redacted]

SA10 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.6m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
16/02/2023	0	-1.000
16/02/2023	1	-1.140
16/02/2023	2	-1.210
16/02/2023	3	-1.270
16/02/2023	4	-1.340
16/02/2023	5	-1.430
16/02/2023	6	-1.500

Start depth	Depth of Pit		Diff	75% full	25%full
1.00	**1.500**		**0.500**	**1.125**	**1.375**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
2.000	0.600			0.250	0.30
Tp75-25 (from graph) (s)		**228**		50% Eff Depth	ap50 (m2)
				0.250	2.5
f =	**5.263E-04**	**m/s**			



[redacted]

SA11

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.6m x 1.5m (L x W x D)

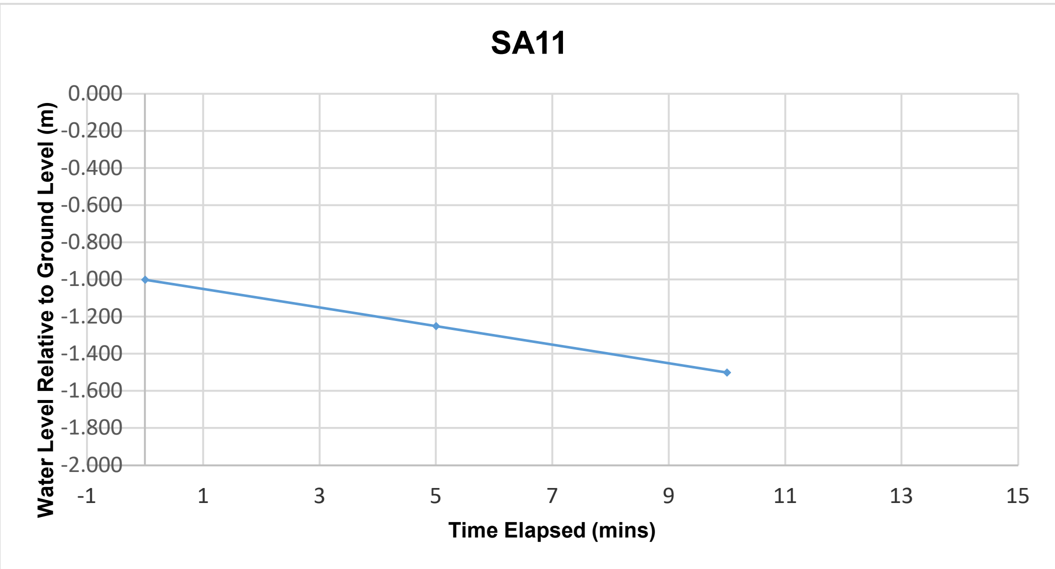
Date	Time	Water level (m bgl)
16/02/2023	0	-1.000
16/02/2023	5	-1.250
16/02/2023	10	-1.500

Start depth	Depth of Pit	Diff	75% full	25%full
1.00	**1.500**	**0.500**	**1.125**	**1.375**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.600	0.250	0.30

Tp75-25 (from graph) (s)	**246**	50% Eff Depth	ap50 (m2)
		0.250	2.5

f = 4.878E-04 m/s



[redacted]

SA11 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.6m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
16/02/2023	0	-0.900
16/02/2023	4	-1.130
16/02/2023	5	-1.260
16/02/2023	14	-1.500

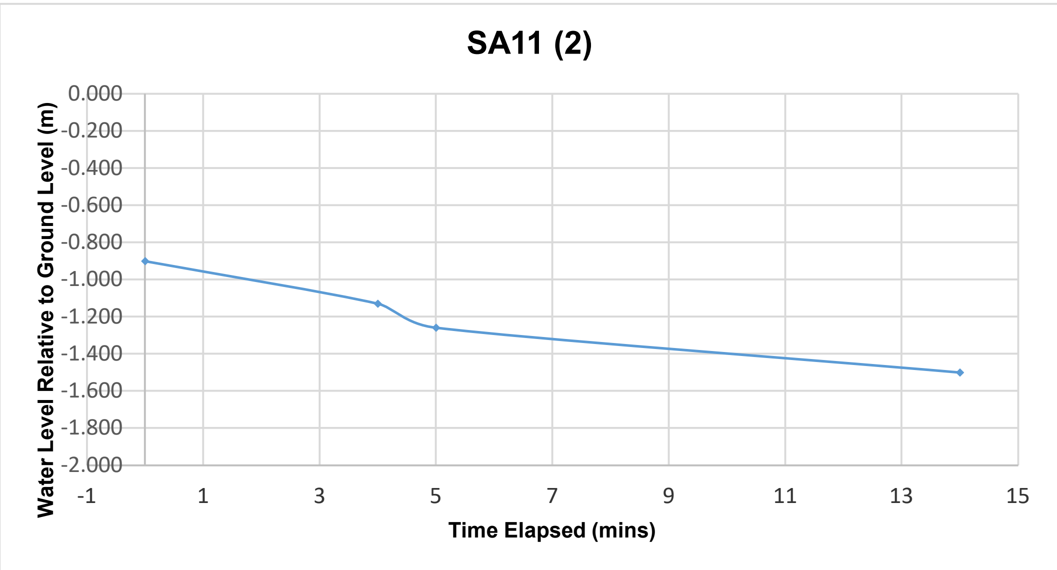
Start depth	Depth of Pit	Diff	75% full	25%full
0.90	1.500	0.600	1.05	1.35

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.600	0.300	0.36

Tp75-25 (from graph) (s) **339**

50% Eff Depth	ap50 (m2)
0.300	2.76

f = 3.848E-04 m/s



[redacted]

SA012

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.60m x 1.5m (L x W x D)

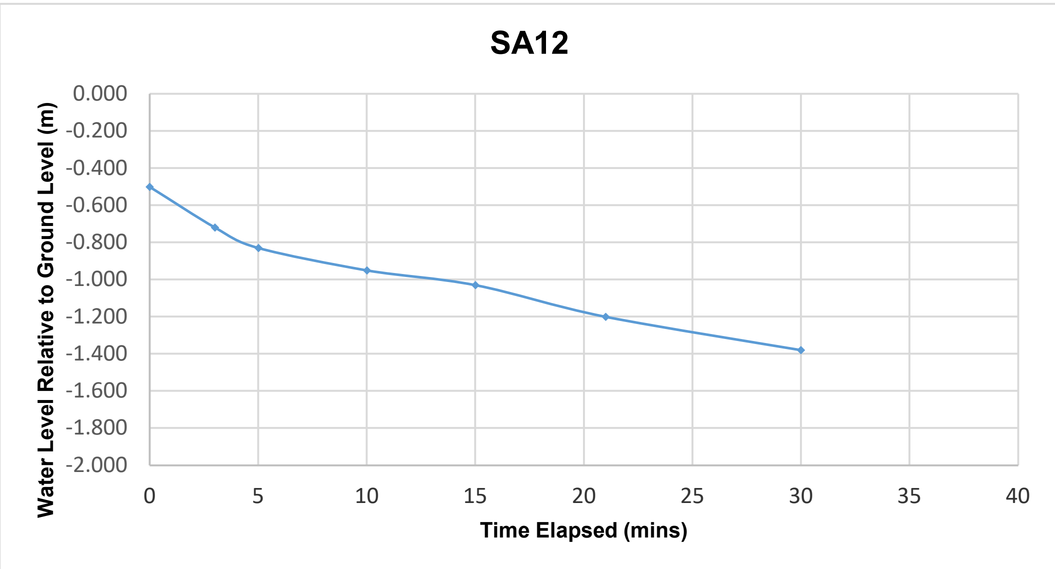
Date	Time	Water level (m bgl)
15/02/2023	0	-0.500
15/02/2023	3	-0.720
15/02/2023	5	-0.830
15/02/2023	10	-0.950
15/02/2023	15	-1.030
15/02/2023	21	-1.200
15/02/2023	30	-1.380

Start depth	**Depth of Pit**		**Diff**	**75% full**	**25%full**
0.50	**1.500**		**1.000**	**0.75**	**1.25**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.600	0.500	0.60

Tp75-25 (from graph) (s)	**1140**	50% Eff Depth	ap50 (m2)
		0.500	3.8

f =   1.385E-04   m/s



[redacted]

SA012 (2)

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.60m x 1.5m (L x W x D)

Date	Time	Water level (m bgl)
15/02/2023	0	-0.300
15/02/2023	13	-0.590
15/02/2023	24	-0.970
15/02/2023	28	-1.190
15/02/2023	36	-1.500

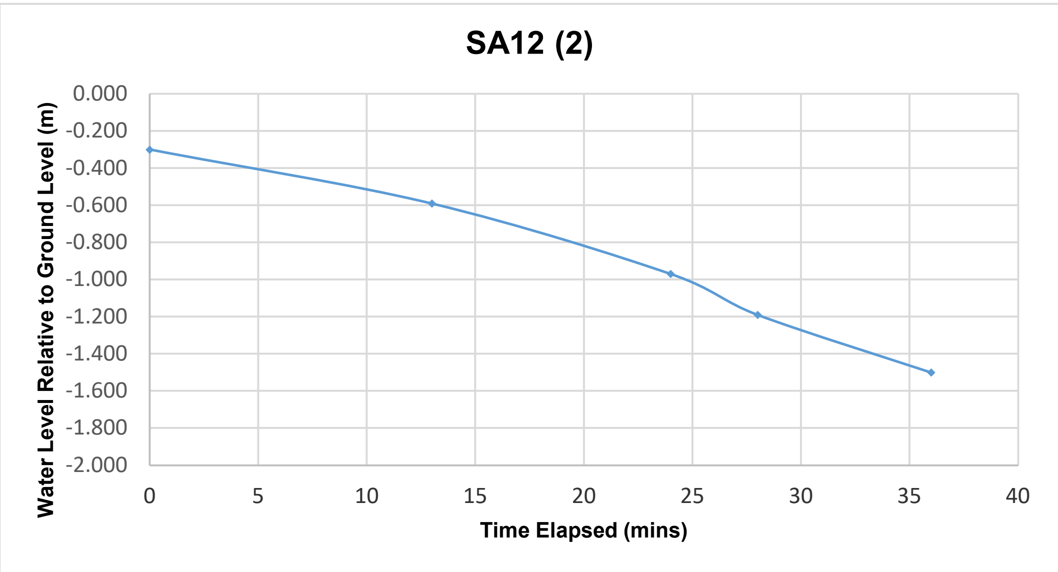
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.500	1.200	0.6	1.2

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.600	0.600	0.72

Tp75-25 (from graph) (s) **888**

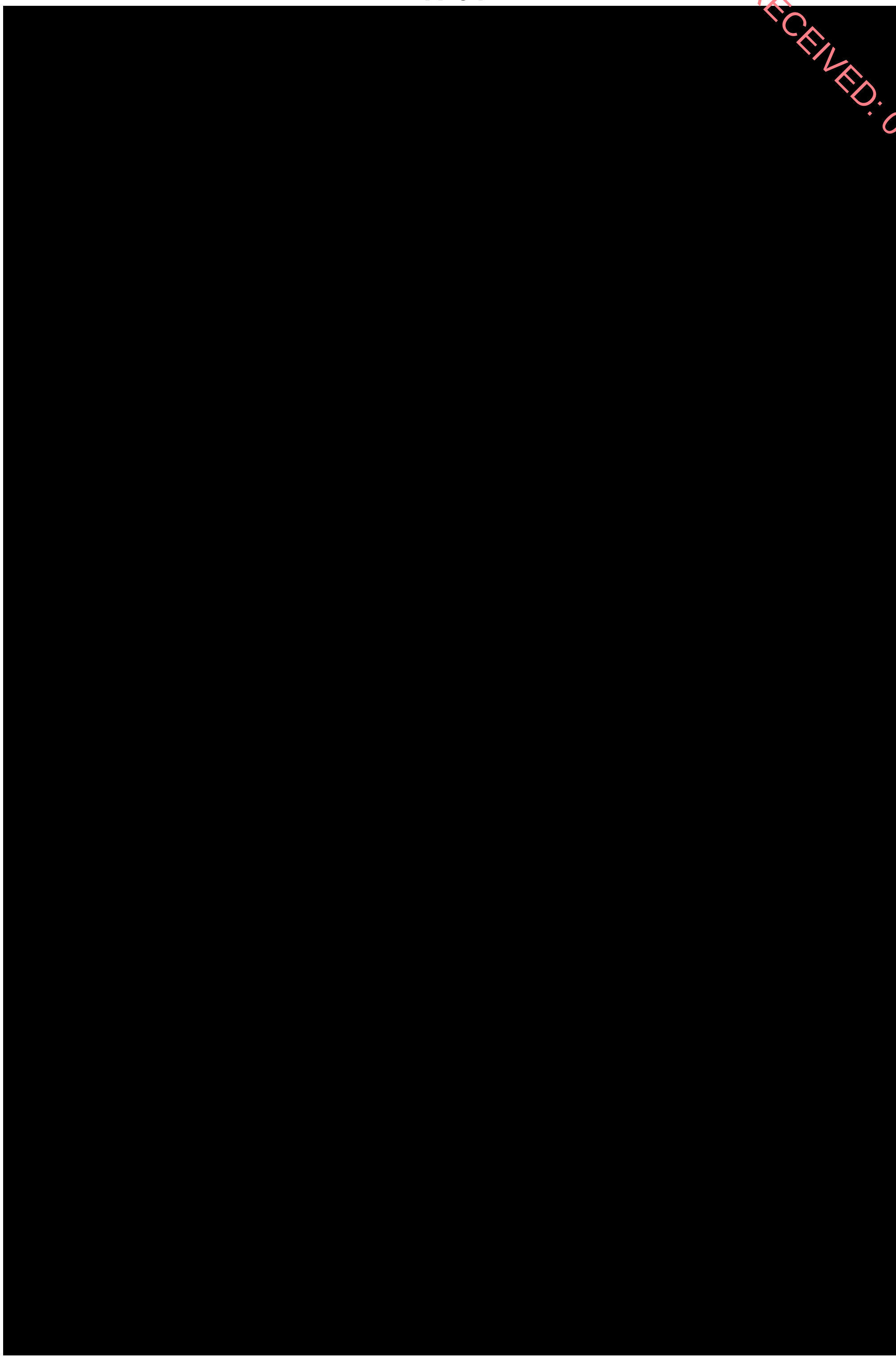
50% Eff Depth	ap50 (m2)
0.600	4.32

f = 1.877E-04 m/s

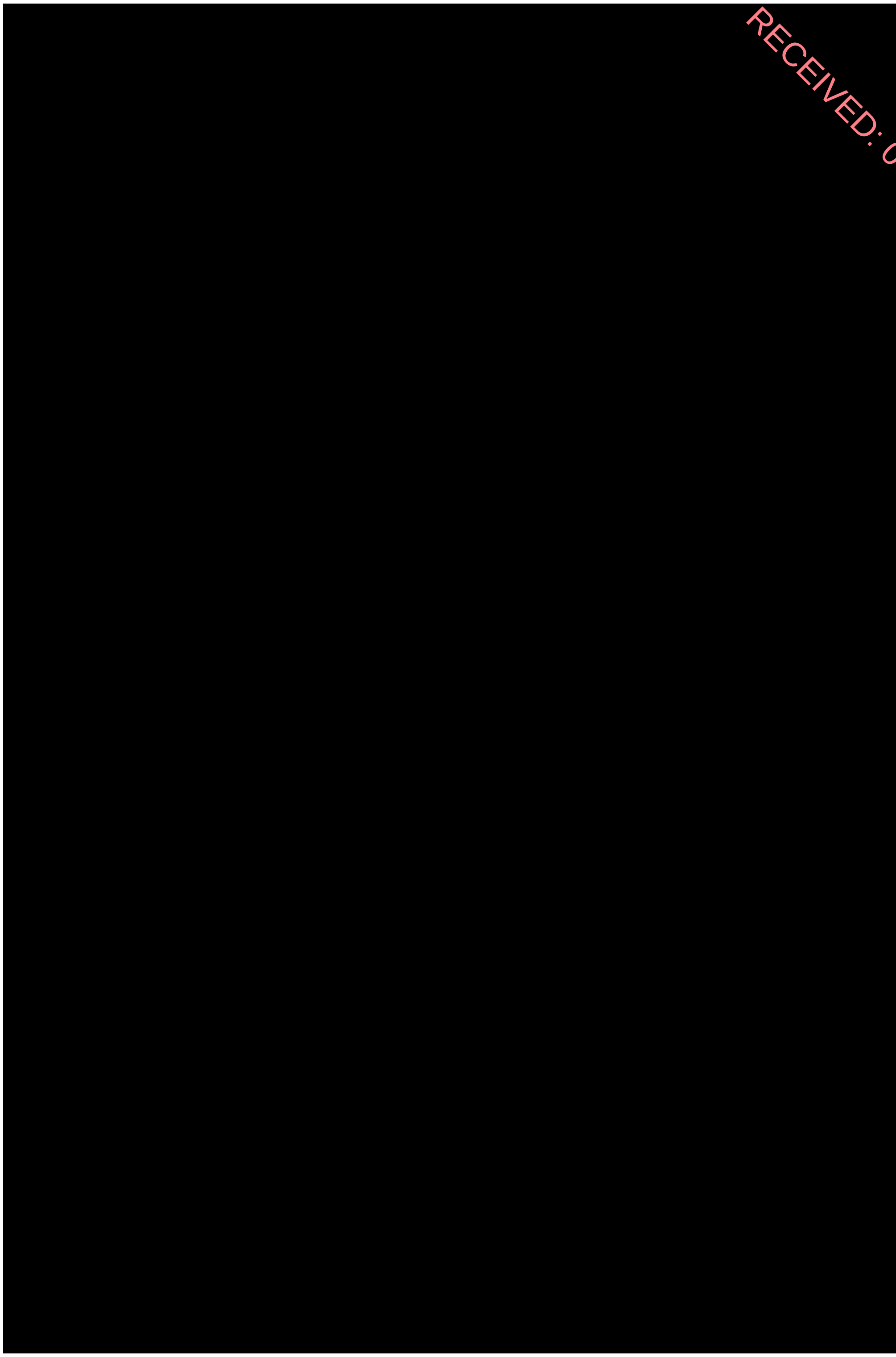


Athlumney Trial Pit Photographs

TP01



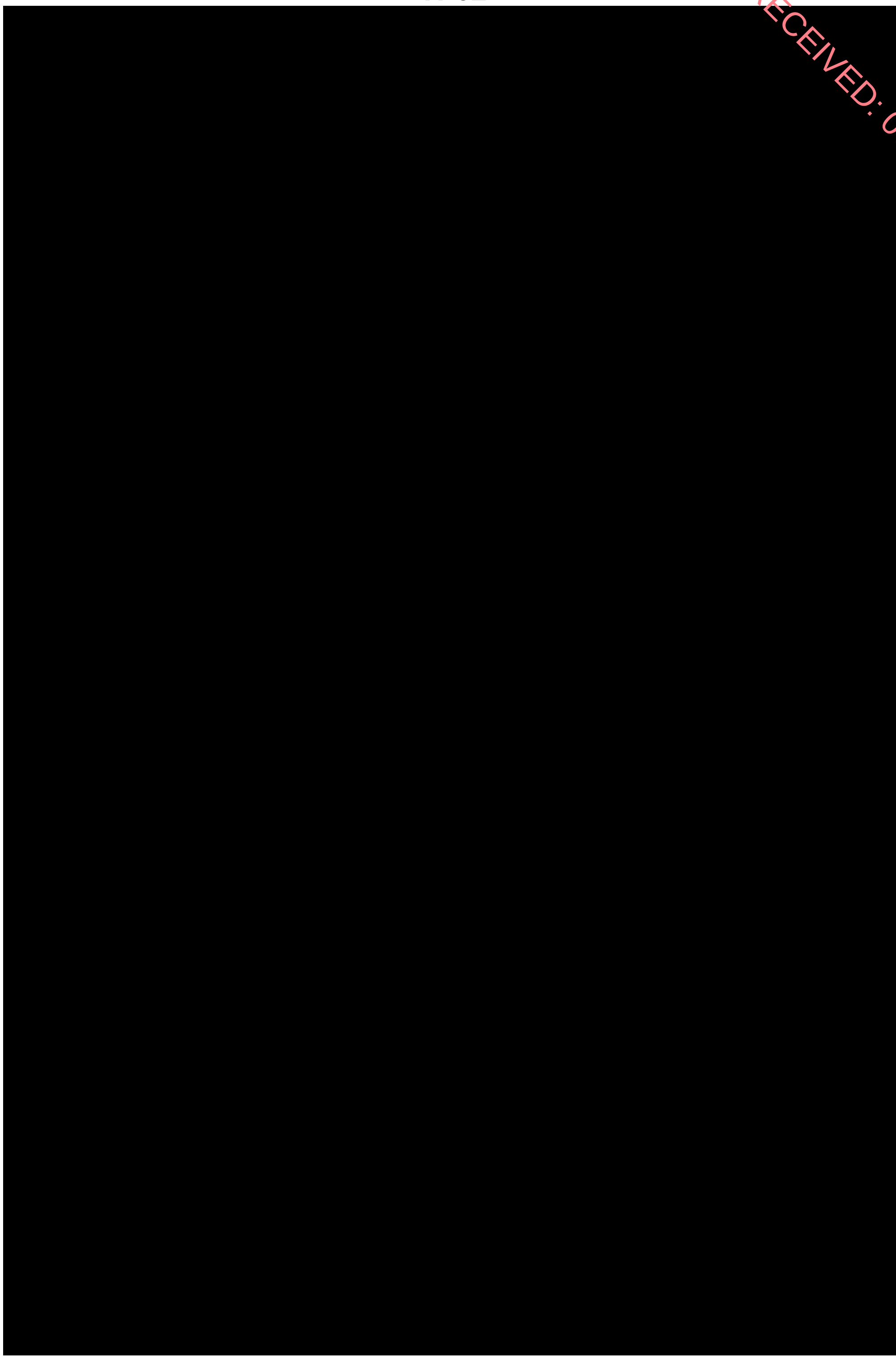
Athlumney Trial Pit Photographs



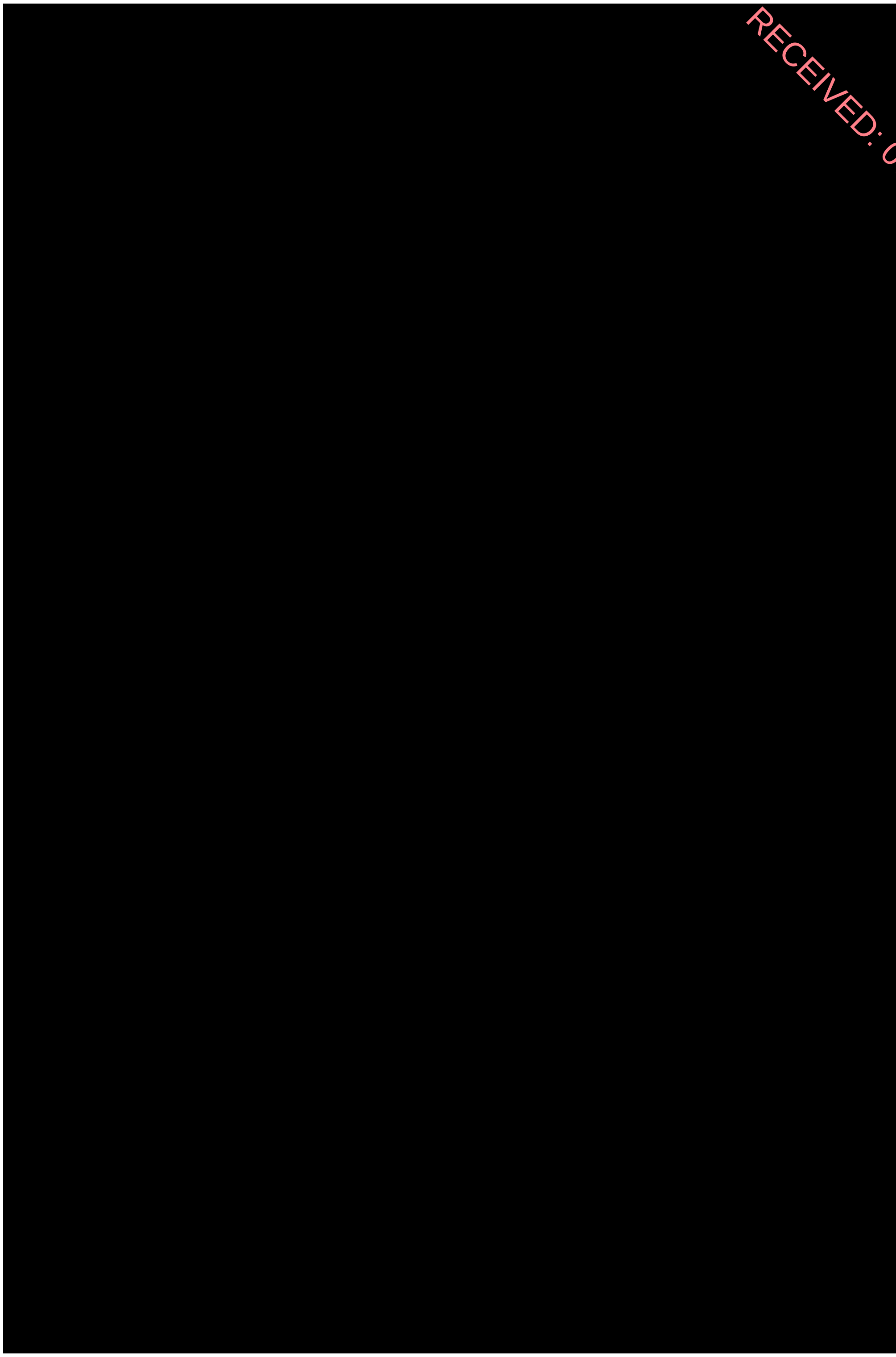
Athlumney Trial Pit Photographs

RECEIVED: 07/06/2024

TP02

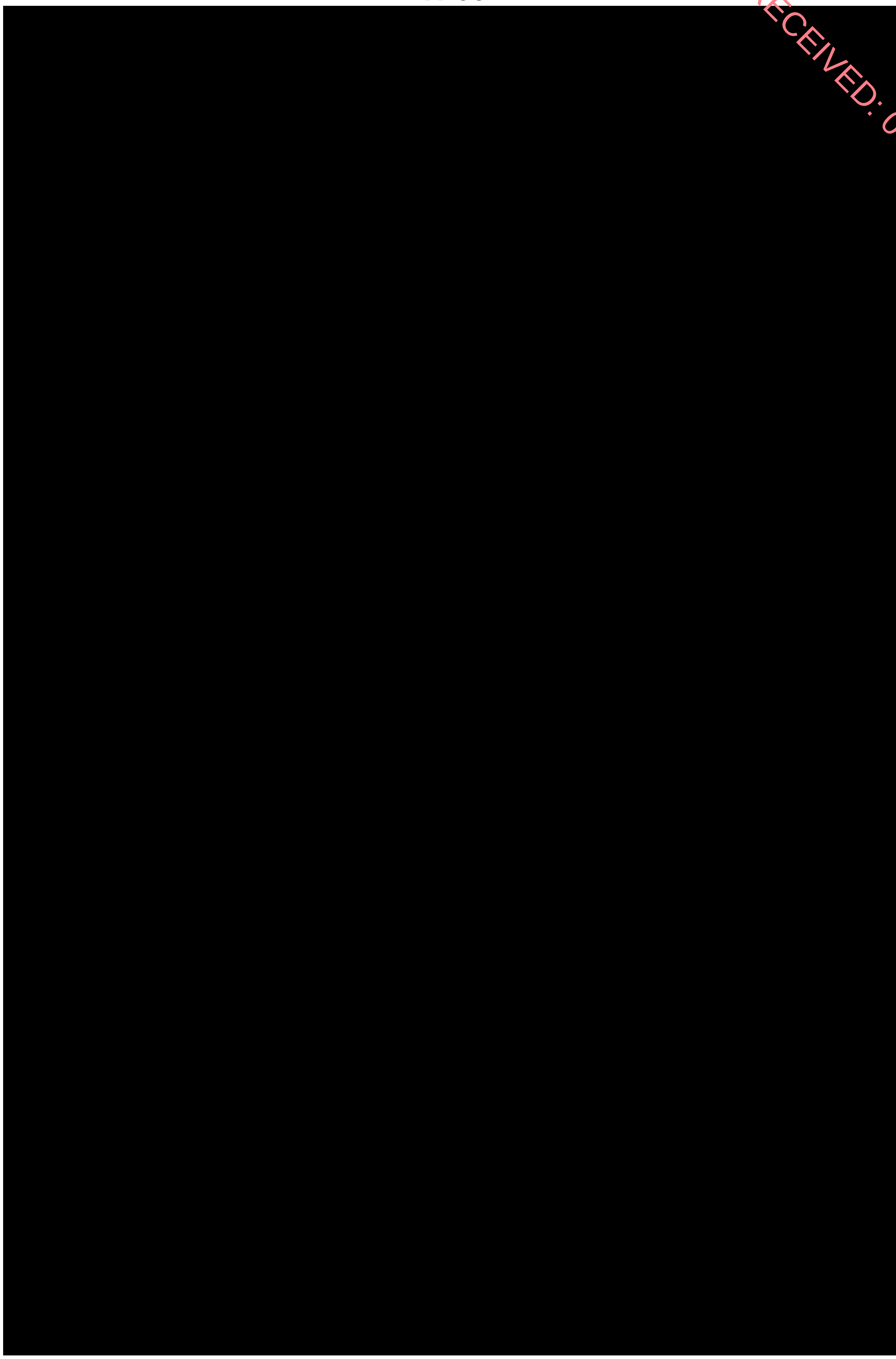


Athlumney Trial Pit Photographs

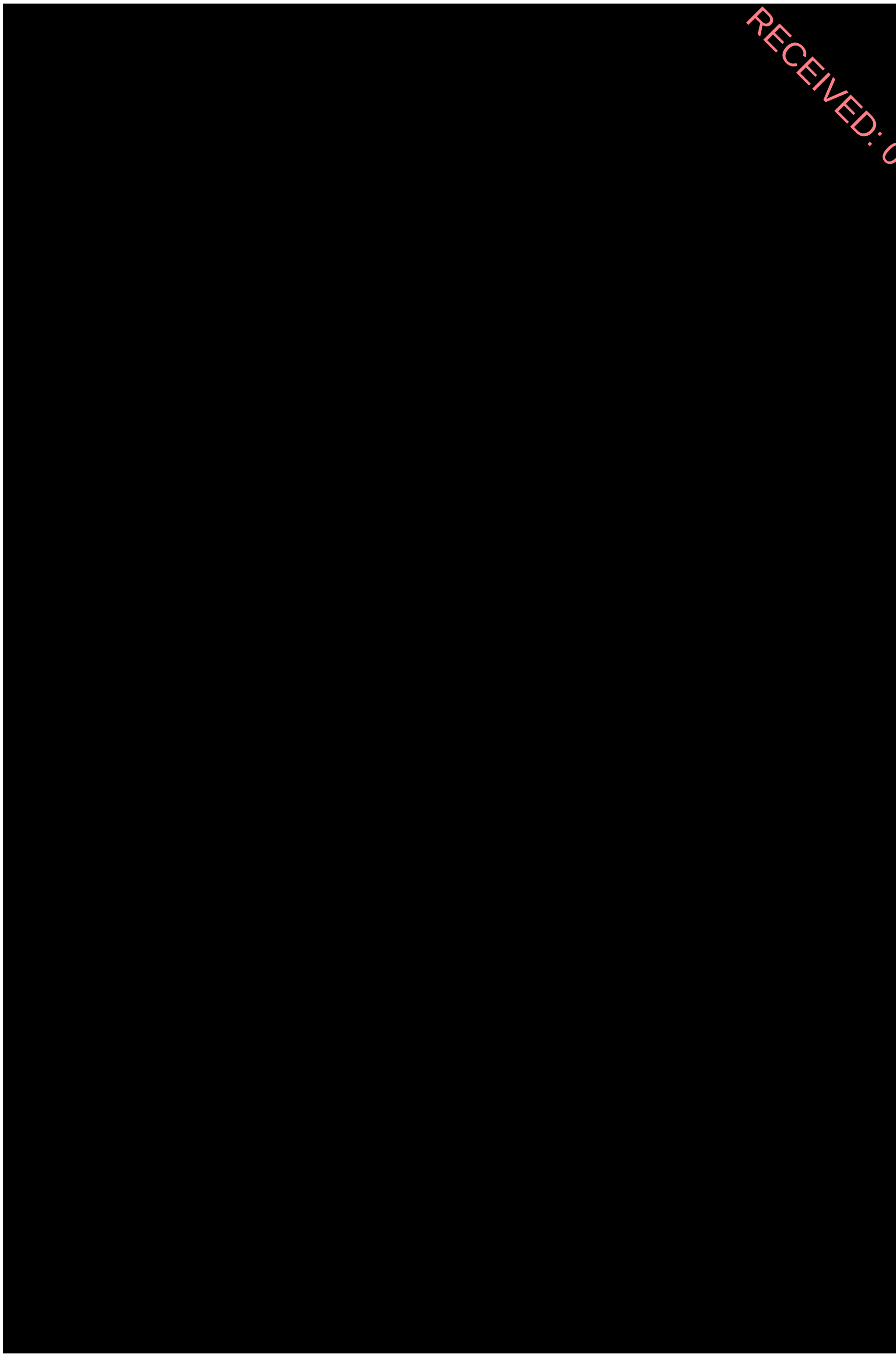


Athlumney Trial Pit Photographs

TP03

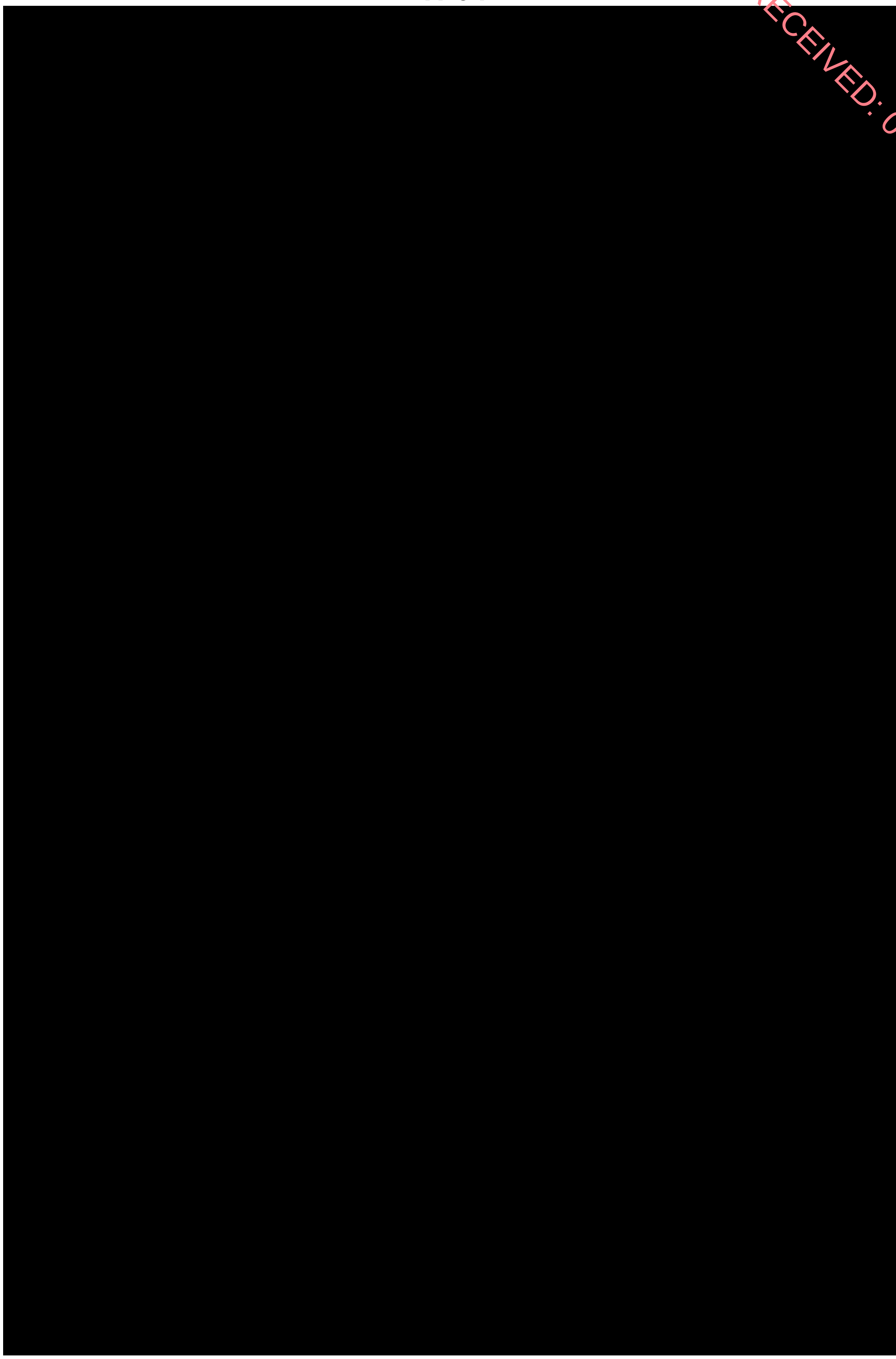


Athlumney Trial Pit Photographs

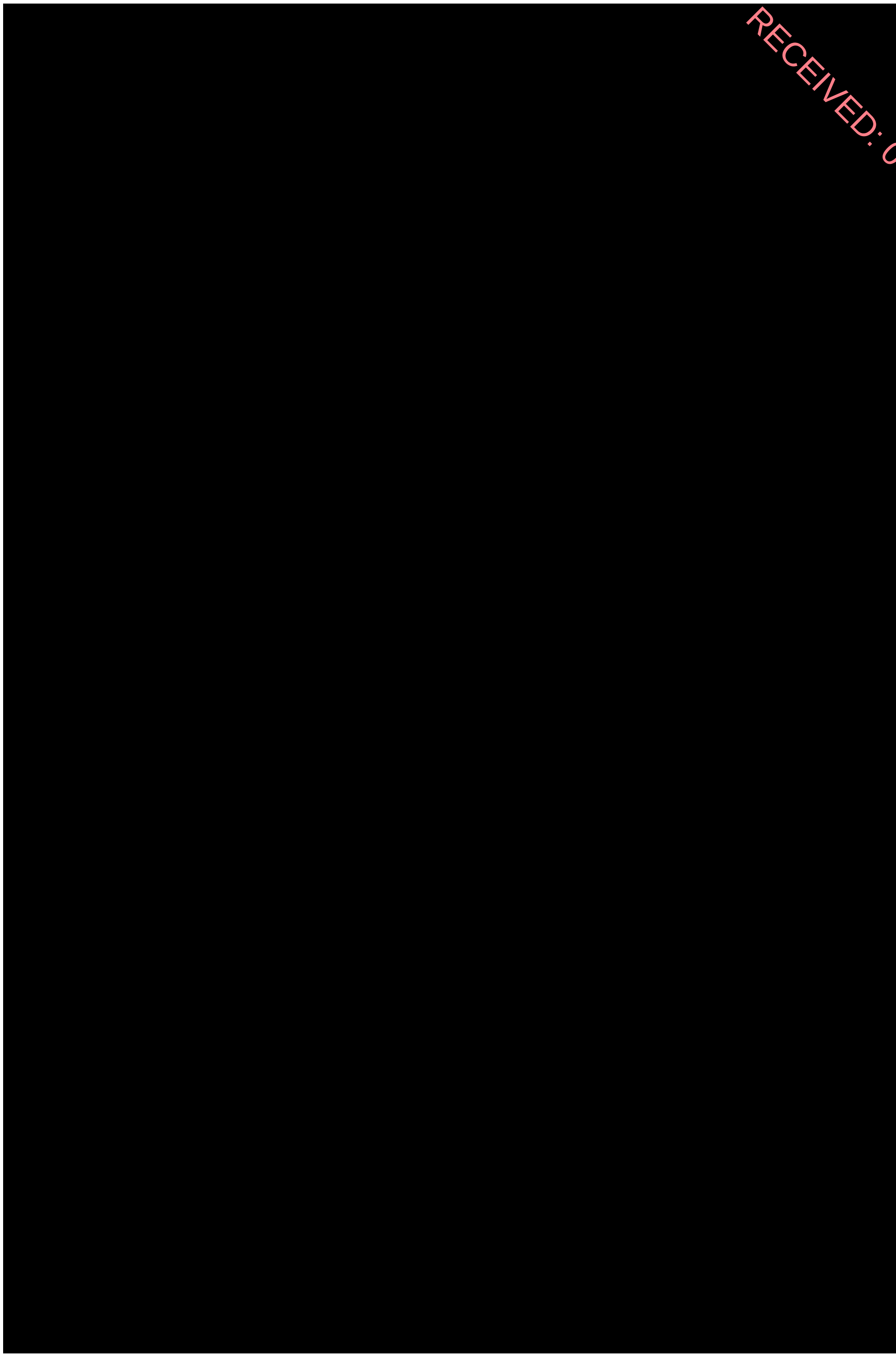


Athlumney Trial Pit Photographs

TP04

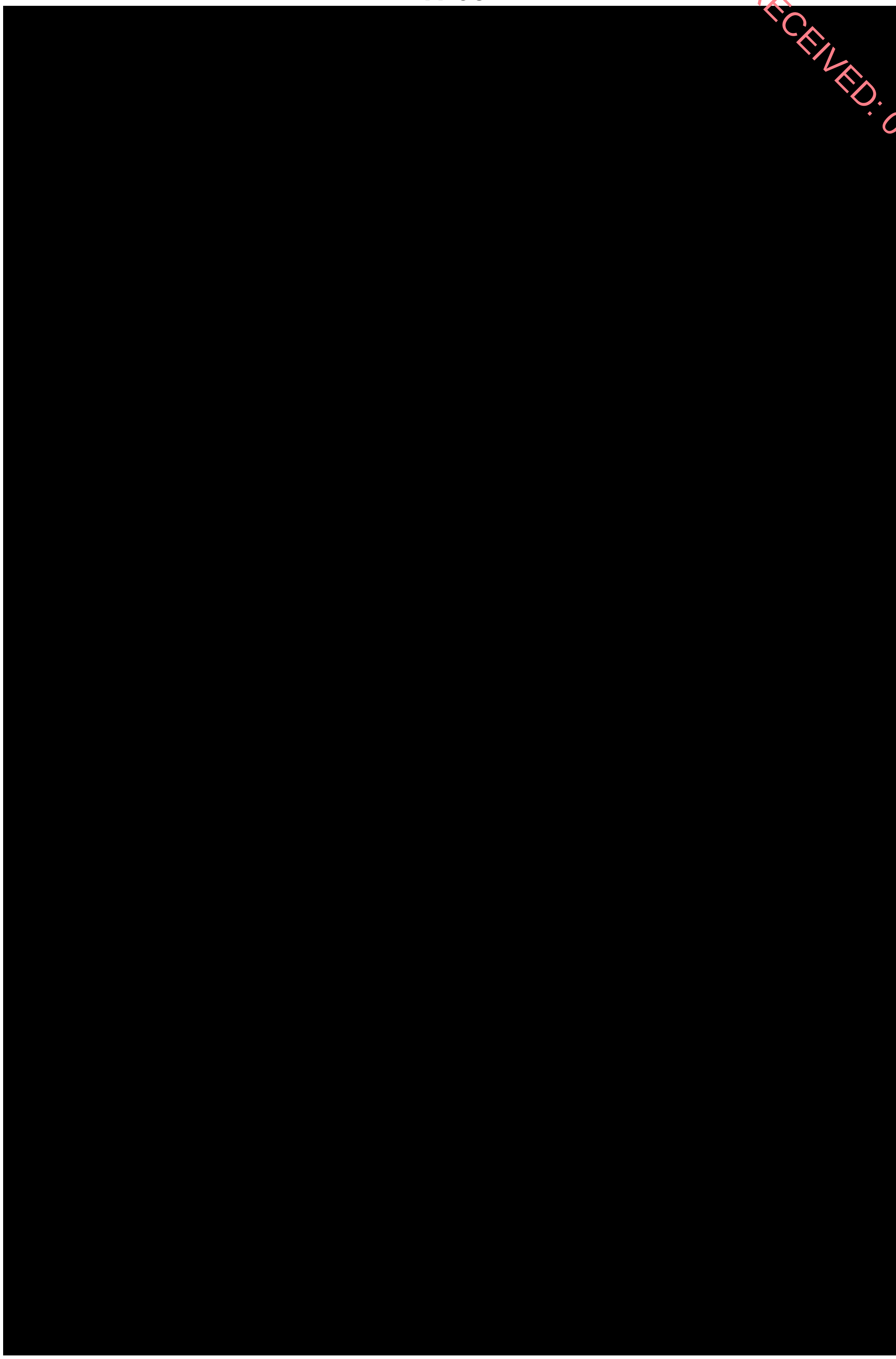


Athlumney Trial Pit Photographs

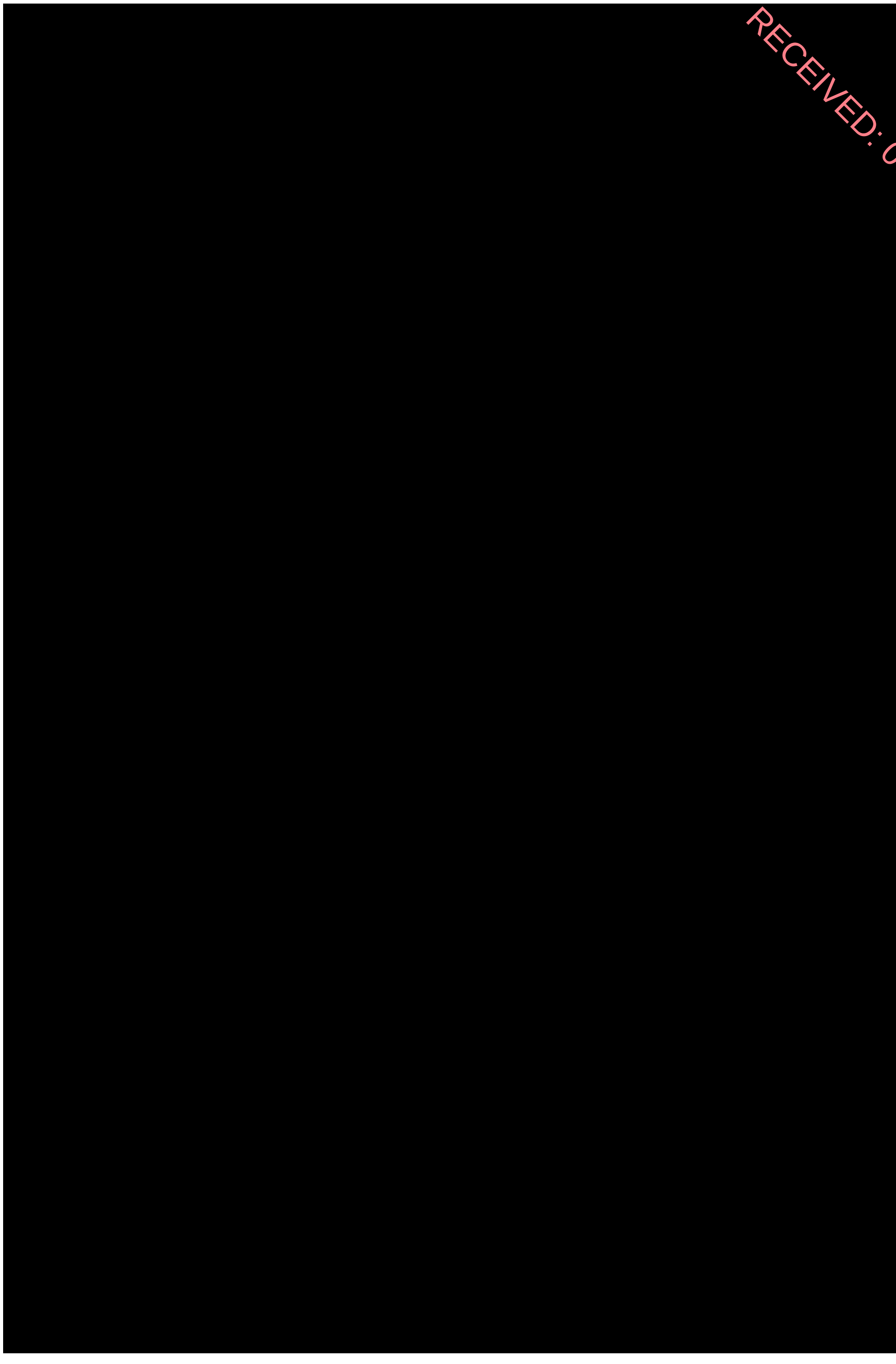


Athlumney Trial Pit Photographs

TP05

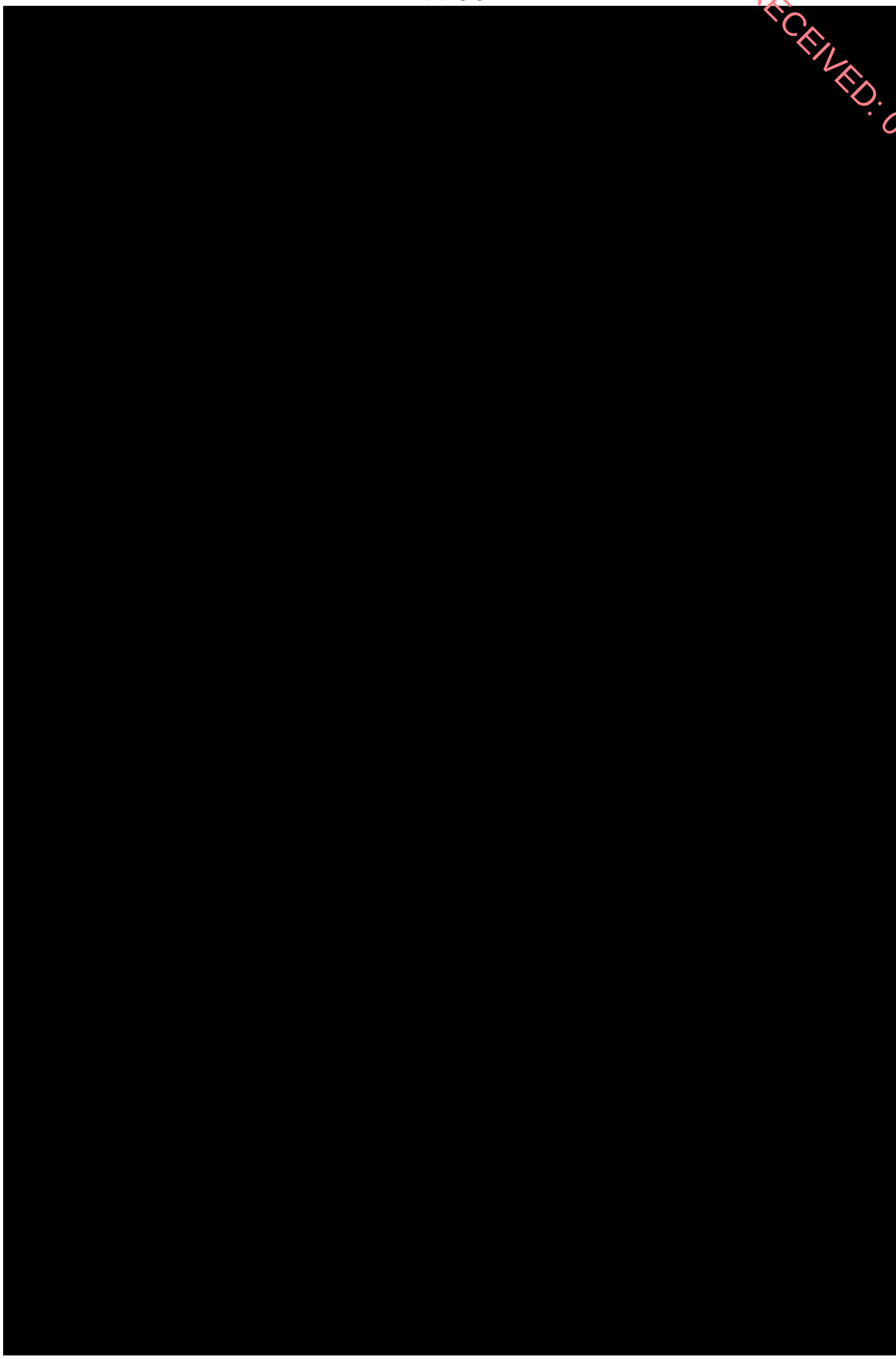


Athlumney Trial Pit Photographs

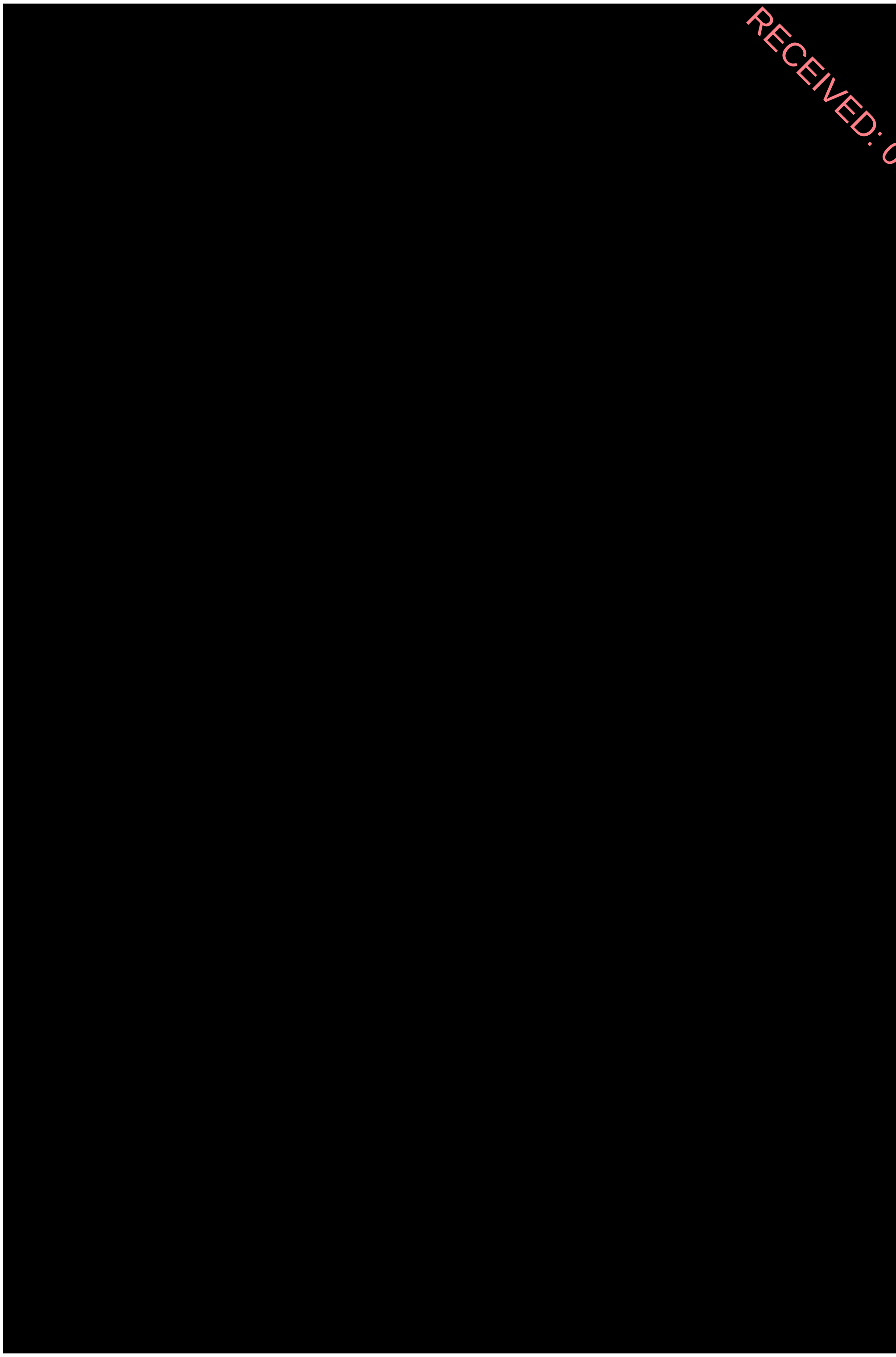


Athlumney Trial Pit Photographs

TP06



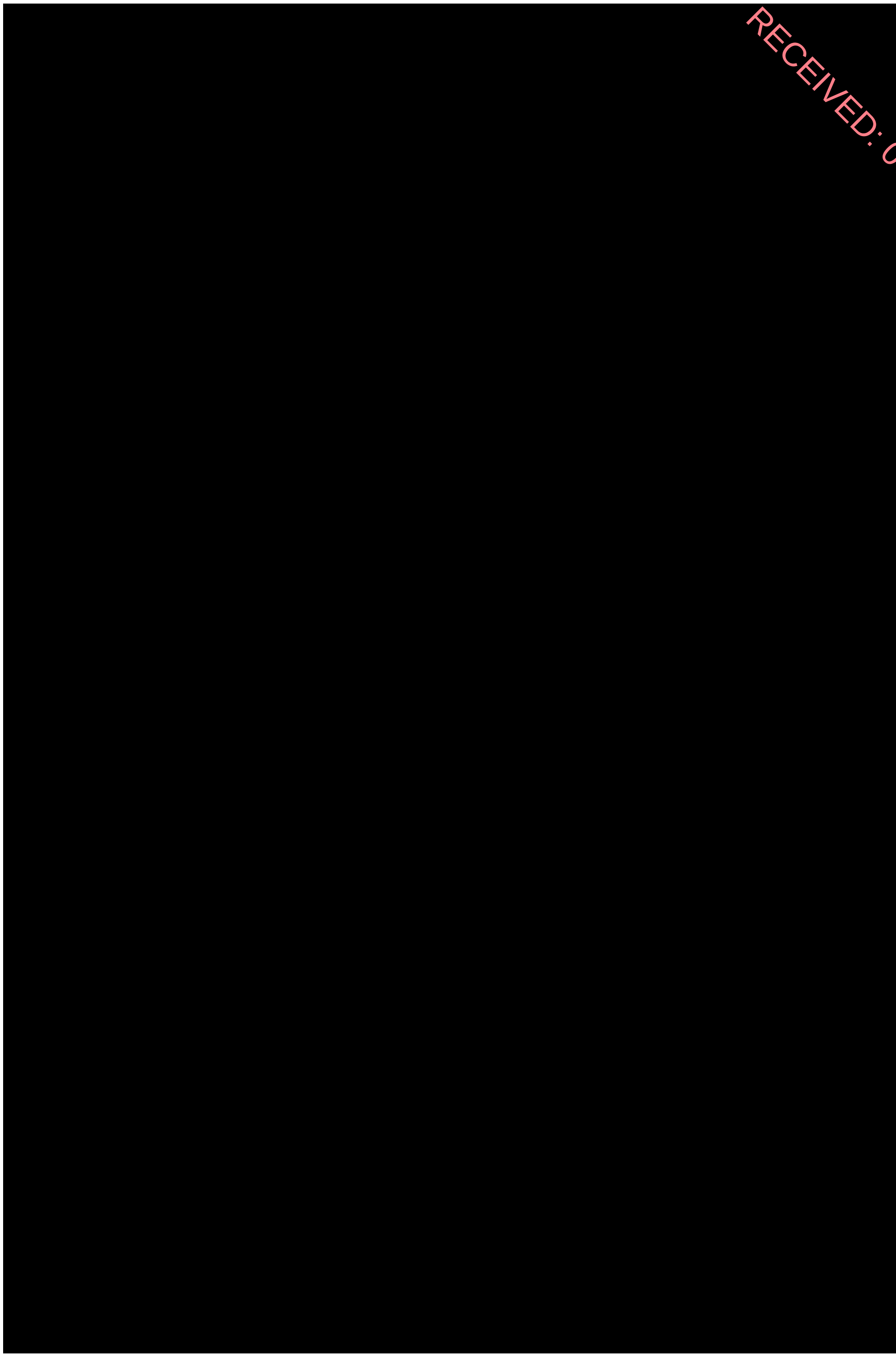
Athlumney Trial Pit Photographs



Athlumney Trial Pit Photographs

TP07

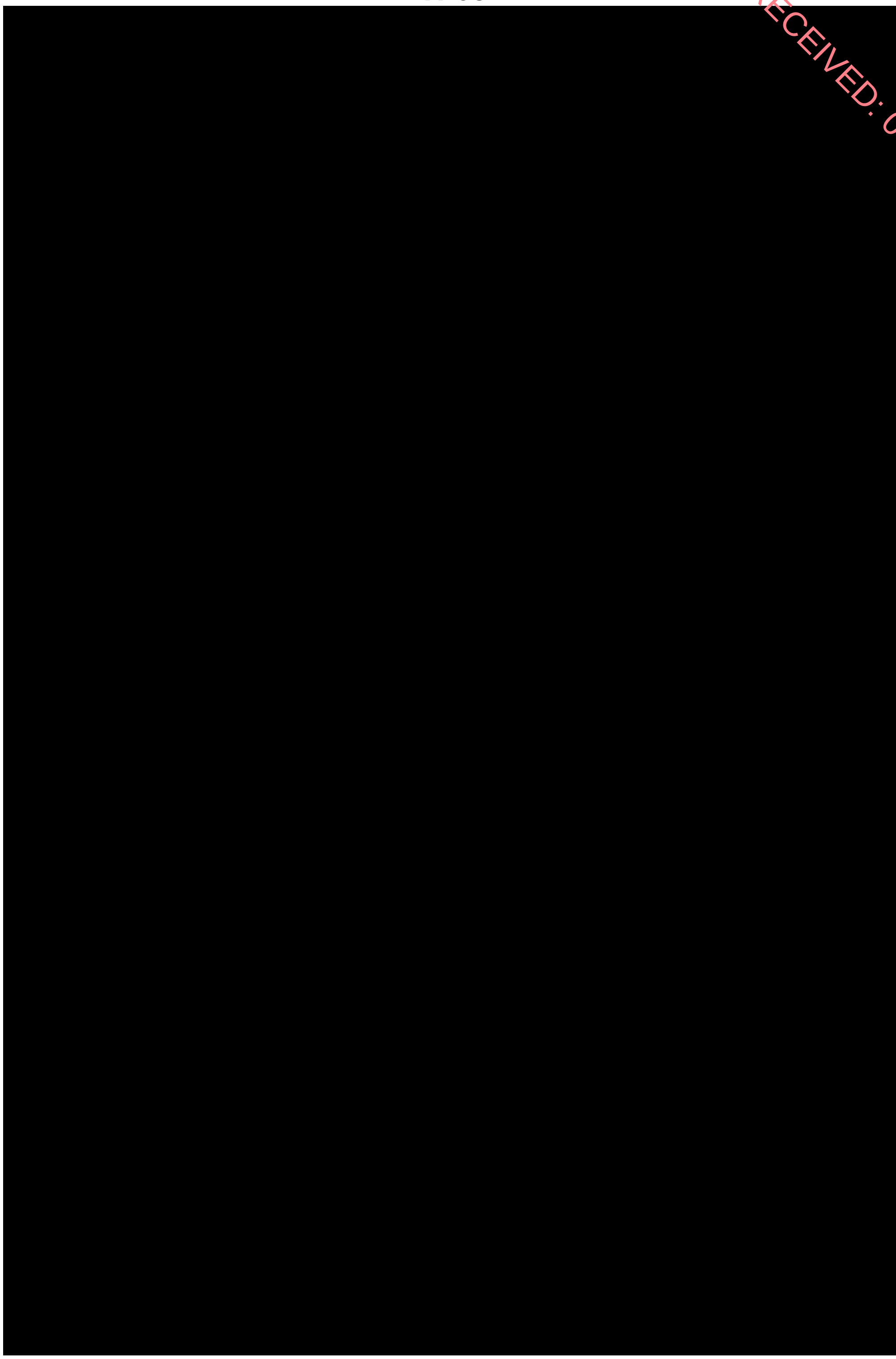
Athlumney Trial Pit Photographs



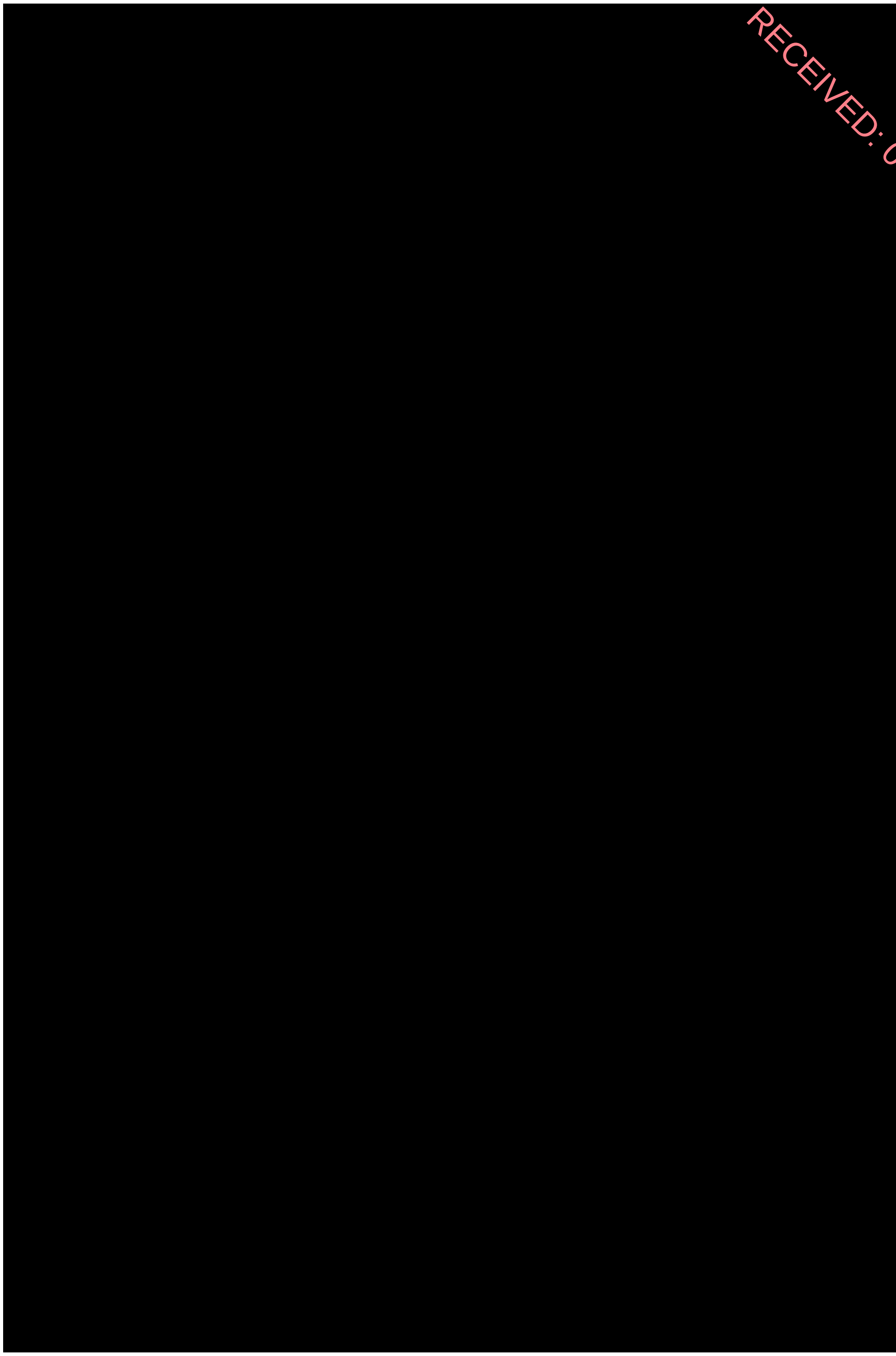
Athlumney Trial Pit Photographs

RECEIVED: 07/06/2024

TP08



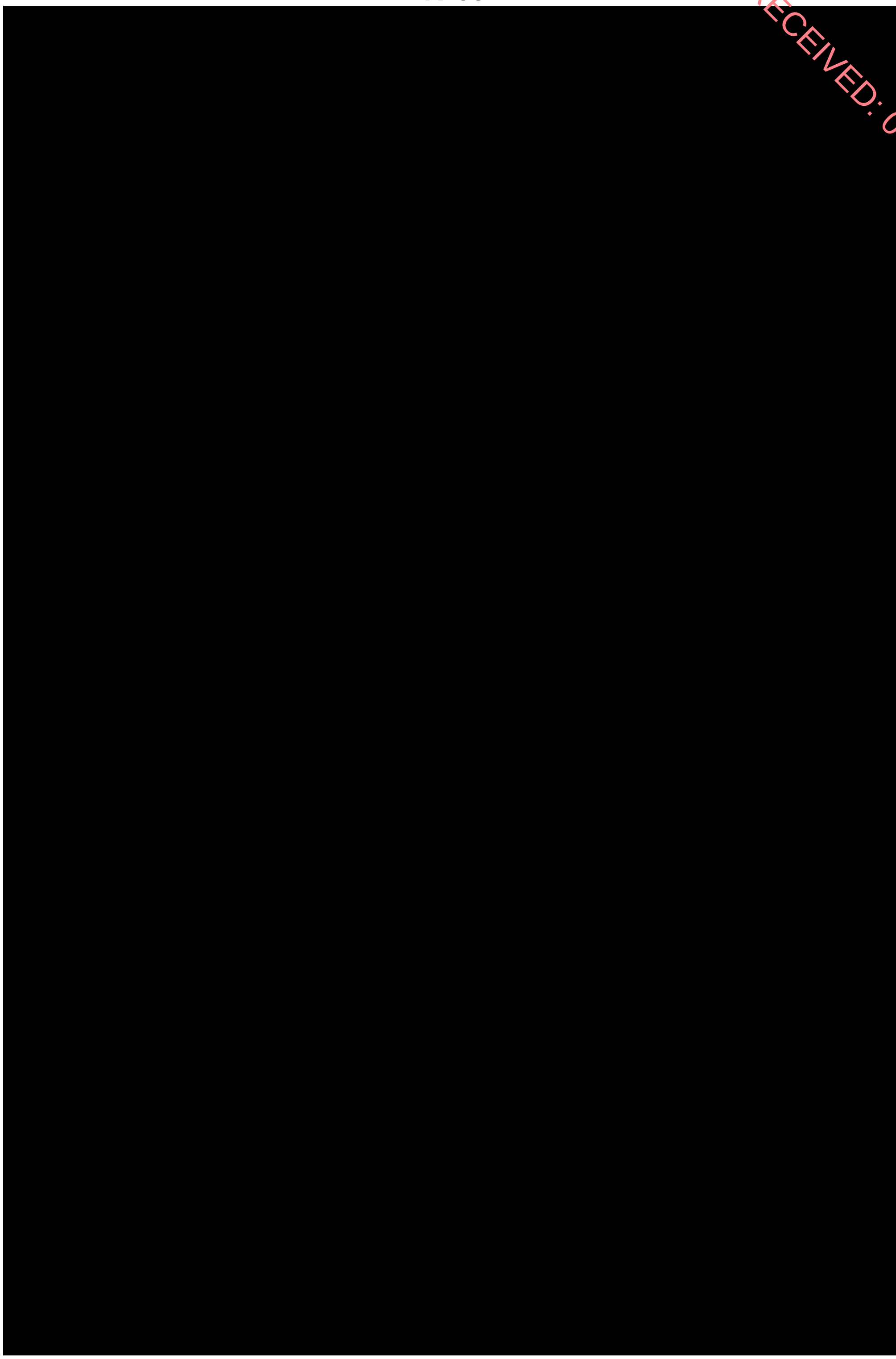
Athlumney Trial Pit Photographs



Athlumney Trial Pit Photographs

RECEIVED: 07/06/2024

TP09

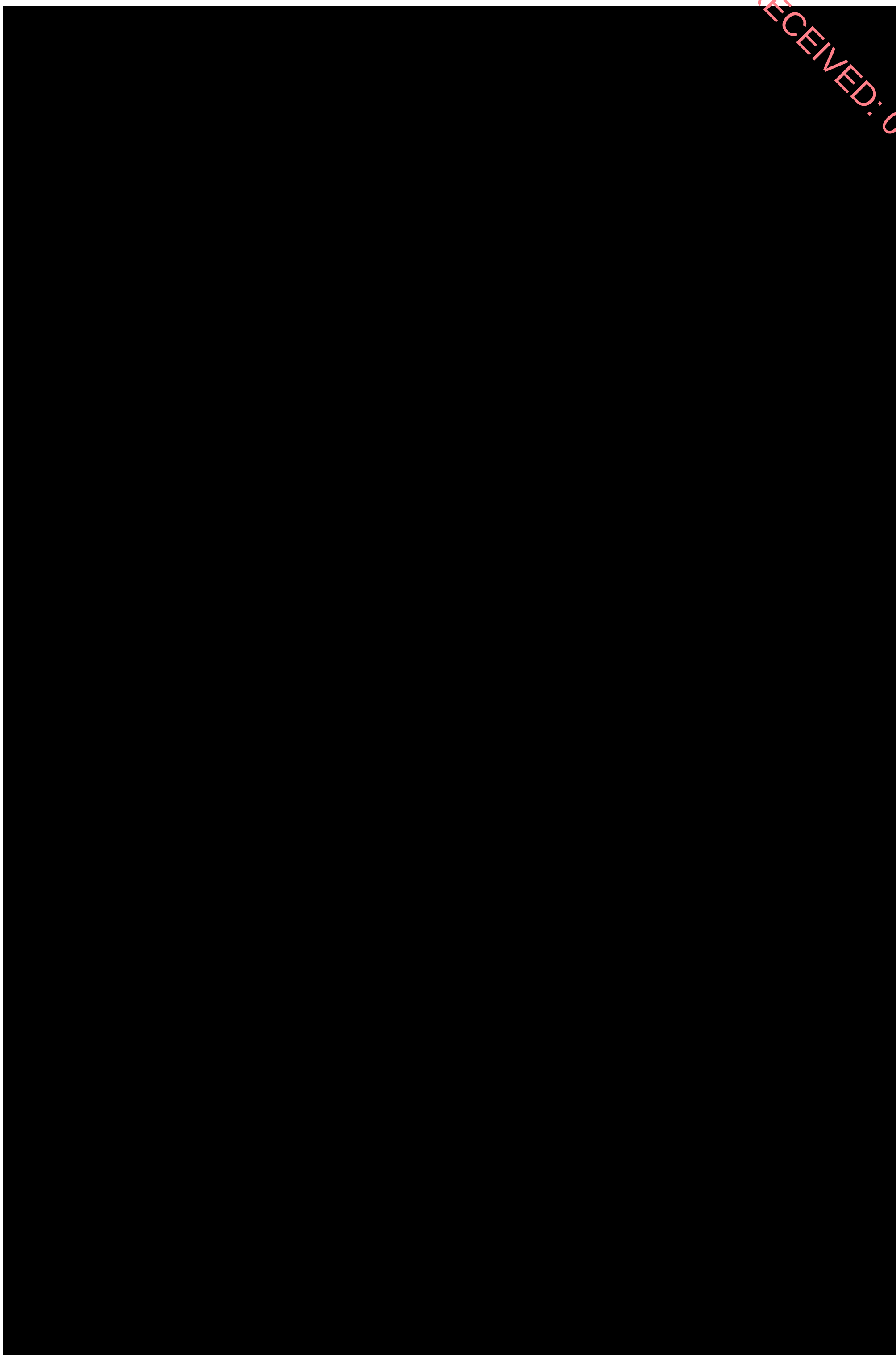


Athlumney Trial Pit Photographs

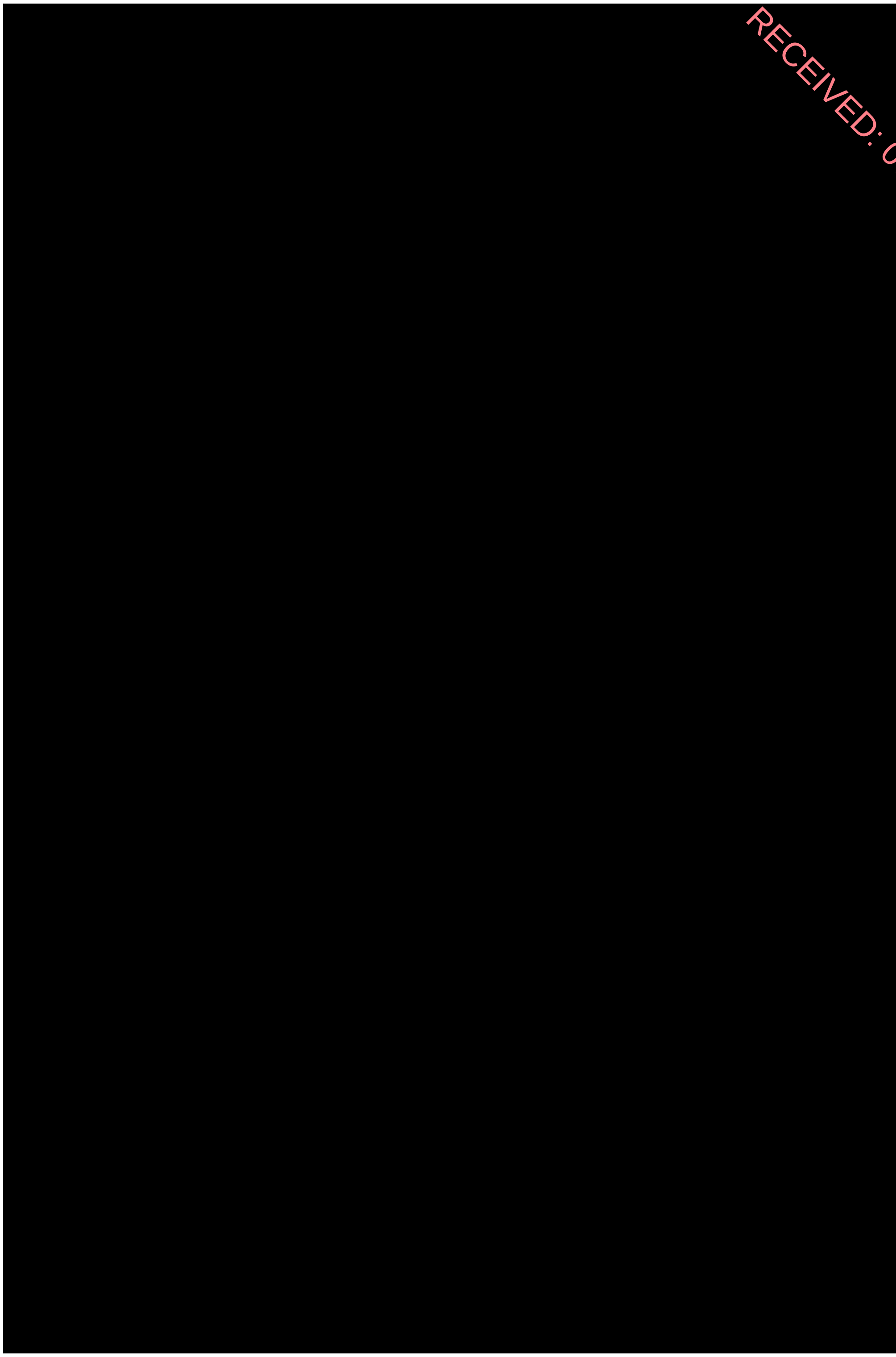
[redacted]

Athlumney Trial Pit Photographs

TP10

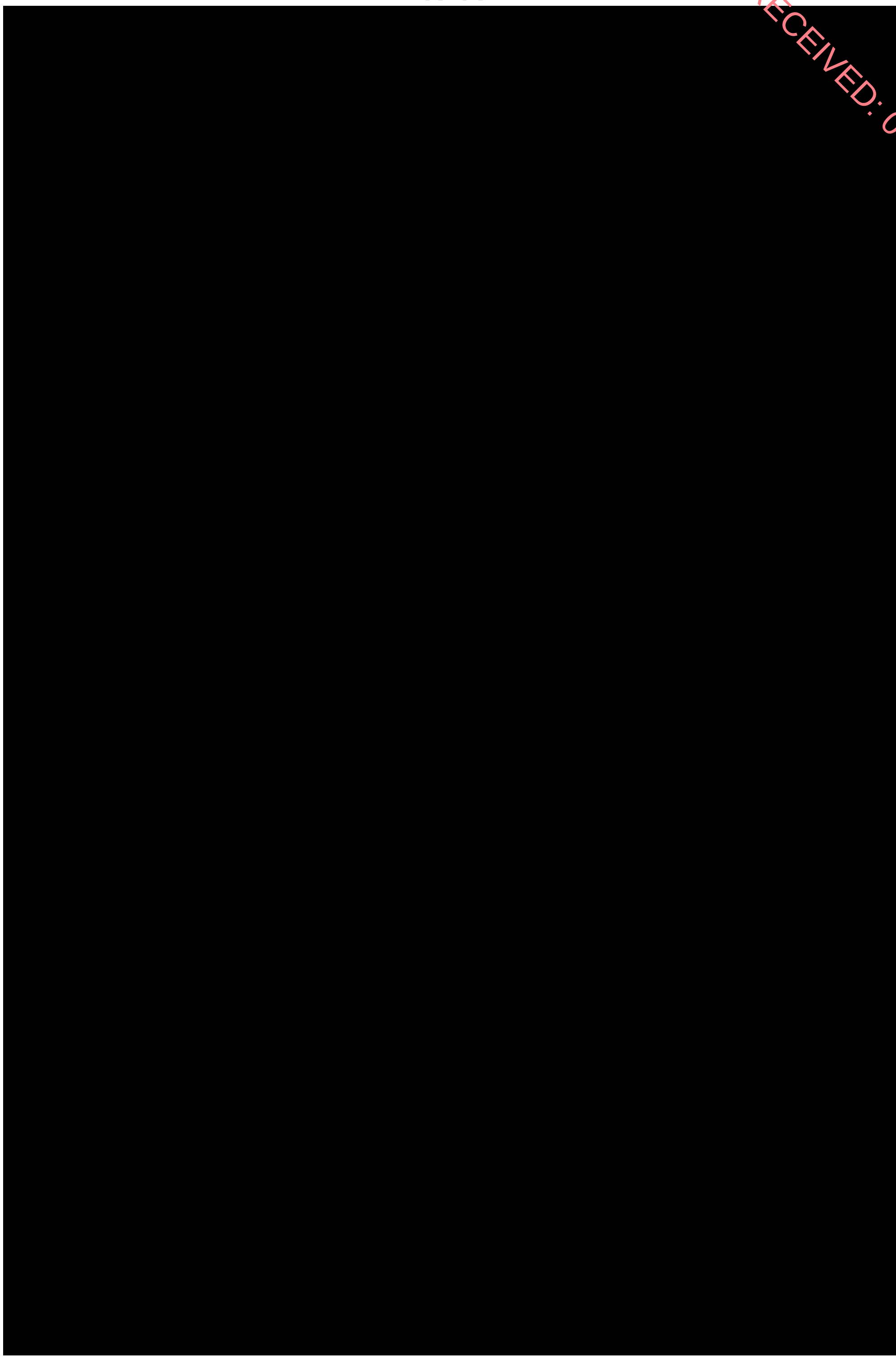


Athlumney Trial Pit Photographs



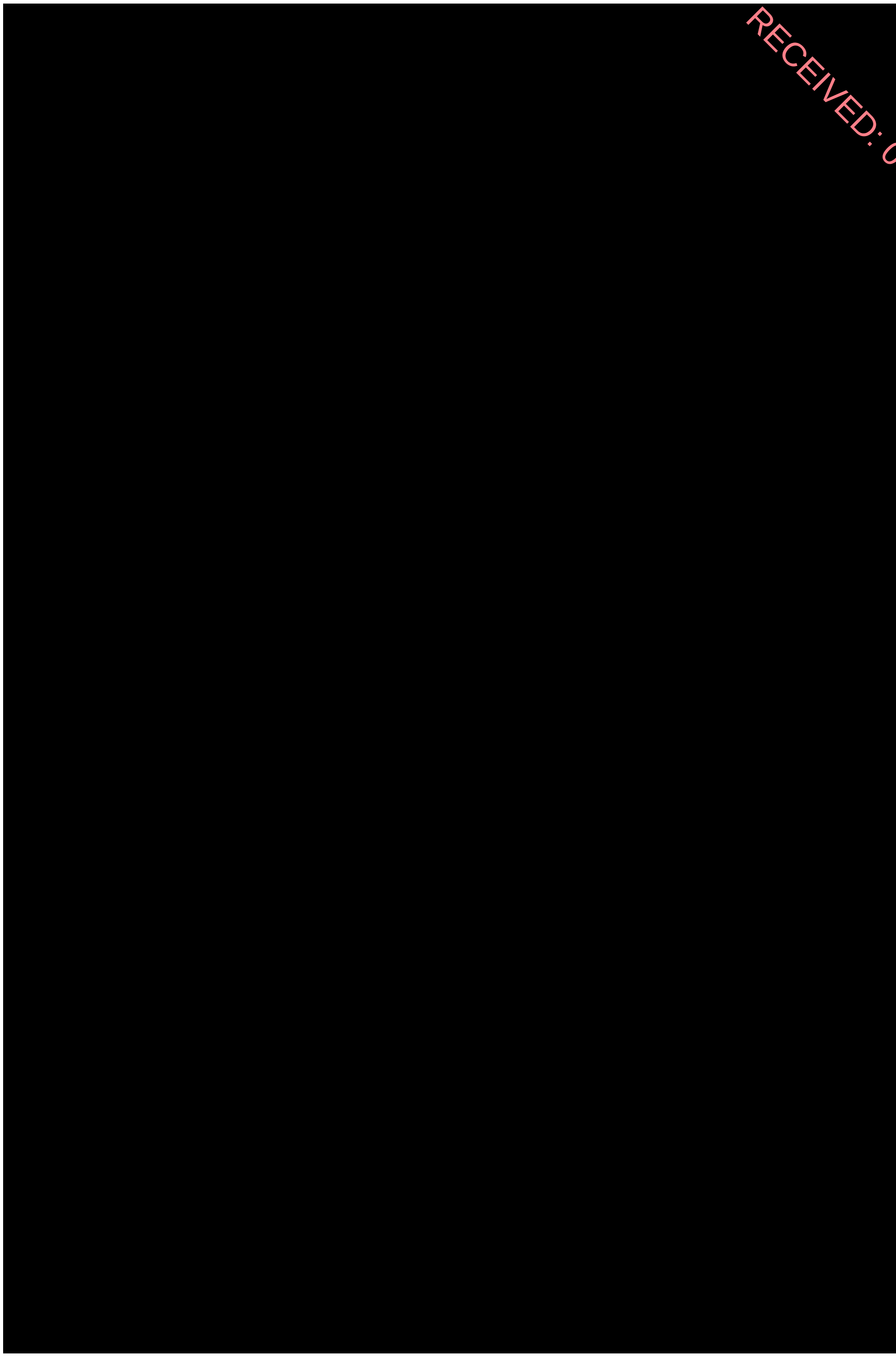
Athlumney Trial Pit Photographs

TP11



Athlumney Trial Pit Photographs

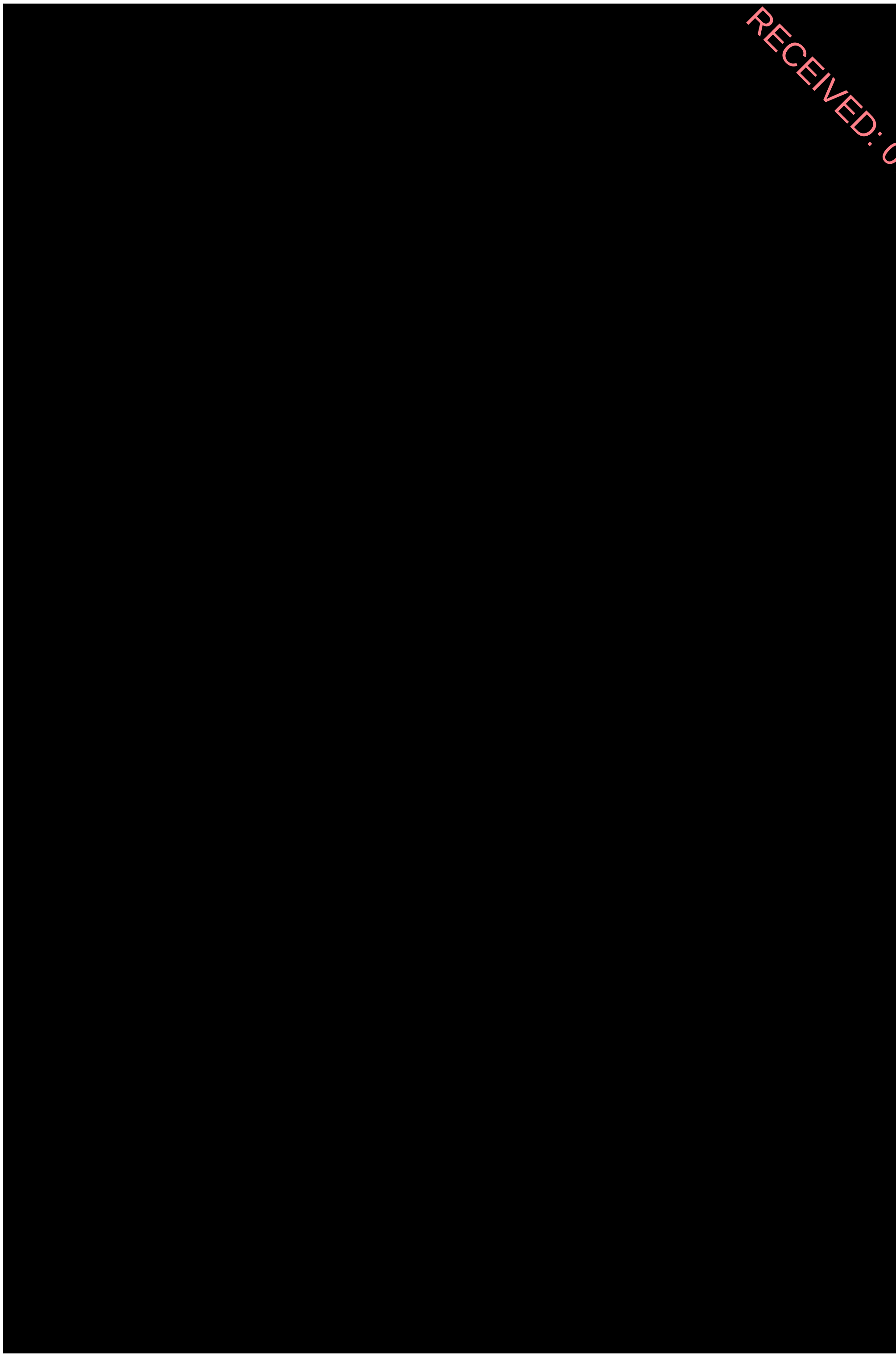
RECEIVED: 07/06/2024



Athlumney Trial Pit Photographs

TP12

Athlumney Trial Pit Photographs



[redacted]

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Tec 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 87mm to 0.60m	**Ground Level (mOD)** 46.25	**Site** Site Investigation Athlumney	**Number** **WS01**
			Client Hendrick Ryan	**Job Number** 12517-01-23
	Location 688847.4 E 768190.8 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	B				(0.20)	Brown slightly sandy slightly gravelly TOPSOIL		
0.20-0.35	B			46.05	0.20 (0.15)	Soft to firm mottled brown slightly sandy slightly gravelly silty CLAY.		
0.35-0.60	B			45.90	0.35 (0.25)	Loose to medium dense grey slightly clayey fine to coarse angular GRAVEL with one cobble.		
				45.65	0.60	Complete at 0.60m		

Remarks 0-0.6m: 100% recovery. Window sample refused at 0.60m BGL.	**Scale (approx)** 1:25	**Logged By** RM
	Figure No. 12517-01-23.WS01	

[redacted] Ground Investigations Ireland Ltd www.gii.ie	Site Site Investigation Athlumney	Number **WS02**

Machine : Tec 10 Method : Drive-in Windowless Sampler	Dimensions 87mm to 1.00m 64mm to 1.40m	Ground Level (mOD) 46.20	Client Hendrick Ryan	Job Number 12517-01-23
	Location 688873.6 E 768229 N	Dates 16/02/2023	Engineer	Sheet 1/1

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	B				(0.20)	Brown slightly gravelly TOPSOIL.		
0.20-0.80	B			46.00	0.20 (0.60)	Stiff mottled brown slightly gravelly silty CLAY.		
0.80-1.40	B			45.40	0.80 (0.60)	Medium dense clayey sandy angular to sub-angular fine to coarse GRAVEL.		
				44.80	1.40	Complete at 1.40m		

Remarks Window sample refused at 1.40m BGL. 0-1.0m: 90% recovery. 1.0-1.40m: 100% recovery.	Scale (approx) 1:25	Logged By RM
	Figure No. 12517-01-23.WS02	

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney			**Number** WS03
Machine : Tec 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 87mm to 1.00m 64mm to 1.40m	**Ground Level (mOD)** 47.48	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688918.9 E 768198.7 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	B				(0.40)	Dark brown slightly sandy slightly gravelly TOPSOIL		
0.40-0.80	B			47.08	0.40 (0.40)	Soft mottled brown slightly sandy slightly gravelly silty CLAY.		
0.80-1.40	B			46.68	0.80 (0.50)	Loose to medium dense dark brown clayey sandy angular to sub-angular fine to coarse GRAVEL.		
				46.18	1.30 (0.10)	Medium dense dark brown clayey sandy angular to sub-angular fine to coarse GRAVEL.		
				46.08	1.40	Complete at 1.40m		

Remarks
Window sample refused at 1.40m BGL.
0-1.0m: 75% recovery.
1.0-1.40m: 87% recovery.

Scale (approx) 1:25	**Logged By** RM
Figure No. 12517-01-23.WS02	

Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney	**Number**	**WS04**
Machine : Tec 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 87mm to 1.00m 64mm to 2.00m	**Ground Level (mOD)** 48.43	**Client** Hendrick Ryan
Job Number	12517-01-23		
Location 688946.6 E 768179.1 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.26	B				(0.26)	MADE GROUND. Brown slightly sandy slightly gravelly Topsoil with grass and ceramic and glass fragments.		
0.26-0.45	B			48.17	0.26 (0.19)	MADE GROUND. Brown slightly sandy gravelly Clay.		
0.45-2.00	B			47.98	0.45 (1.55)	Medium dense brown slightly clayey gravelly fine to coarse SAND.		
				46.43	2.00	Complete at 2.00m		

Remarks
Window sample refused at 2.0m BGL.
0-1.0m: 80% recovery.
1.0-2.0m: 87% recovery.

Scale (approx)	Logged By
1:25	RM

Figure No.
12517-01-23.WS04

Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney
Number	**WS05**
Machine	Tec 10
Method	Drive-in Windowless Sampler
Dimensions	87mm to 2.00m 64mm to 2.50m
Ground Level (mOD)	48.80
Client	Hendrick Ryan
Job Number	12517-01-23
Location	688976.2 E 768153.6 N
Dates	15/02/2023
Engineer	
Sheet	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	B				(0.20)	Brown slightly sandy slighlty gravelly TOPSOIL.		
0.20-1.05	B			48.60	0.20 (0.85)	Very soft brown slightly sandy slightly gravelly silty CLAY.		
1.05-1.30	B			47.75	1.05 (0.25)	Loose brown silty fine SAND.		
1.30-2.15	B			47.50	1.30 (0.85)	Loose brown clayey fine to coarse SAND. (1.35 - 1.40m BGL) Loose dark grey angular fine to coarse GRAVEL lens.		
2.15-2.50	B			46.65	2.15 (0.25)	Very loose gravelly fine to coarse SAND.		
				46.40	2.40 (0.10)	Dense gravelly fine to coarse SAND.		
				46.30	2.50	Complete at 2.50m		

Remarks
Window sample refused at 2.50m BGL.
0-1.0m: 92% recovery.
1.0-2.0m: 91% recovery.
2.0-2.50m: 100% recovery.

Scale (approx)	Logged By
1:25	RM

Figure No.
12517-01-23.WS05

Ground Investigations Ireland Ltd

www.gii.ie

Site Site Investigation Athlumney				**Number** WS06
Machine : Tec 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 87mm to 2.00m 64mm to 2.60m	**Ground Level (mOD)** 51.58	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 689012.9 E 768122.9 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				51.50	0.08 (0.08)	Brown slightly sandy slighlty gravelly TOPSOIL with grass.		
0.08-0.30	B			51.28	0.30 (0.22)	POSSIBLE MADE GROUND. Brown slightly sandy slightly gravelly Clay with rare red brick fragments.		
0.30-0.80	B			50.78	0.80 (0.50)	Loose light brown gravelly silty fine SAND.		
0.80-1.40	B			50.18	1.40 (0.60)	Soft brown slightly gravelly slightly sandy CLAY. (1.25 - 1.30m BGL) Loose clayey angular to sub-angular fine to ocarse GRAVEL lens		
1.40-2.60	B			48.98	2.60 (1.20)	Medium dense bluish grey sandy clayey angular to sub-angular fine to coarse GRAVEL.		
						Complete at 2.60m		

Remarks
Window sample refused at 2.60m BGL.
0-1.0m: 77% recovery.
1.0-2.0m: 59% recovery.
2.0-2.60m: 78% recovery.

Scale (approx)	Logged By
1:25	RM

Figure No. 12517-01-23.WS06

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Tec 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 87mm to 2.00m 64mm to 2.60m	**Ground Level (mOD)** 51.41	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 689042.9 E 768100.3 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

Site: Site Investigation Athlumney

Number: WS07

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	B				(0.20)	Brown slightly gravelly TOPSOIL.		
0.20-0.60	B			51.21	0.20 (0.40)	Soft to firm brown slightly sandy slightly gravelly Clay.		
0.60-1.00	B			50.81	0.60 (0.40)	Dense grey sandy clayey fine to coarse angular to sub-angular GRAVEL.		
				50.41	1.00	Complete at 2.60m		

Remarks
Window sample refused at 2.60m BGL.
0-1.0m: 77% recovery.
1.0-2.0m: 59% recovery.
2.0-2.60m: 78% recovery.

Scale (approx)	Logged By
1:25	RM

Figure No.
12517-01-23.WS07

Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney		**Number**	**WS08**
Machine : Tec 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 87mm to 1.60m	**Ground Level (mOD)** 51.53	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 689034.2 E 768088.6 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.30	B			51.45	(0.08) 0.08	Brown slightly sandy slighlty gravelly TOPSOIL with grass.		
0.30-1.05	B				(0.97)	Soft brown slightly sandy slightly gravelly CLAY		
1.05-1.50	B			50.48	1.05 (0.45)	Medium dense brown slightly clayey gravelly fine to coarse SAND		
1.50-1.60	B			50.03	1.50 (0.10)	Stiff brown slightly sandy slightly gravelly silty CLAY		
				49.93	1.60	Complete at 1.60m		

Remarks
Window sample refused at 1.60m BGL.
0-1.0m: 81% recovery.
1.0-1.60m: 100% recovery.

Scale (approx) 1:25	**Logged By** RM
Figure No. 12517-01-23.WS08	

[redacted] Ground Investigations Ireland Ltd www.gii.ie	Site: Site Investigation Athlumney	Number: **WS09**

Machine : Tec 10 Method : Drive-in Windowless Sampler	Dimensions: 87mm to 1.00m	Ground Level (mOD): 51.68	Client: Hendrick Ryan	Job Number: 12517-01-23
	Location: 688997.4 E 768101.9 N	Dates: 15/02/2023	Engineer:	Sheet: 1/1

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	B				(0.20)	Brown TOPSOIL.		
0.20-0.60	B			51.48	0.20 (0.20)	Soft brown slightly sandy slightly gravelly CLAY.		
				51.28	0.40 (0.20)	Firm brown slightly sandy gravelly CLAY.		
0.60-1.00	B			51.08	0.60 (0.30)	Stiff brown slightly sandy gravelly CLAY.		
				50.78	0.90 (0.10)	Dense grey slightly clayey angular fine to coarse GRAVEL.		
				50.68	1.00	Complete at 1.00m		

Remarks
Window sample refused at 1.0m BGL.
0-1.0m: 85% recovery.

Scale (approx)	Logged By
1:25	RM

Figure No.
12517-01-23.WS09

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney			**Number** WS10
Machine : Tec 10 **Method :** Drive-in Windowless Sampler	**Dimensions** 87mm to 1.00m	**Ground Level (mOD)** 46.89	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688901.6 E 768174.8 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.20	B				(0.20)	Brown slightly sandy slightly graevlly TOPSOIL.		
0.20-0.60	B			46.69	0.20 (0.40)	Stiff brown slightly sandy slightly gravelly CLAY		
0.60-1.00	B			46.29	0.60 (0.40)	Medium dense grey clayey sandy sub-angular to sub-rounded fine to coarse GRAVEL.		
				45.89	1.00	Complete at 1.00m		

Remarks
Window sample refused at 1.0m BGL.
0-1.0m: 90% recovery.

Scale (approx) 1:25	**Logged By** RM
Figure No. 12517-01-23.WS10	

Athlumney – Window Sample Photographs

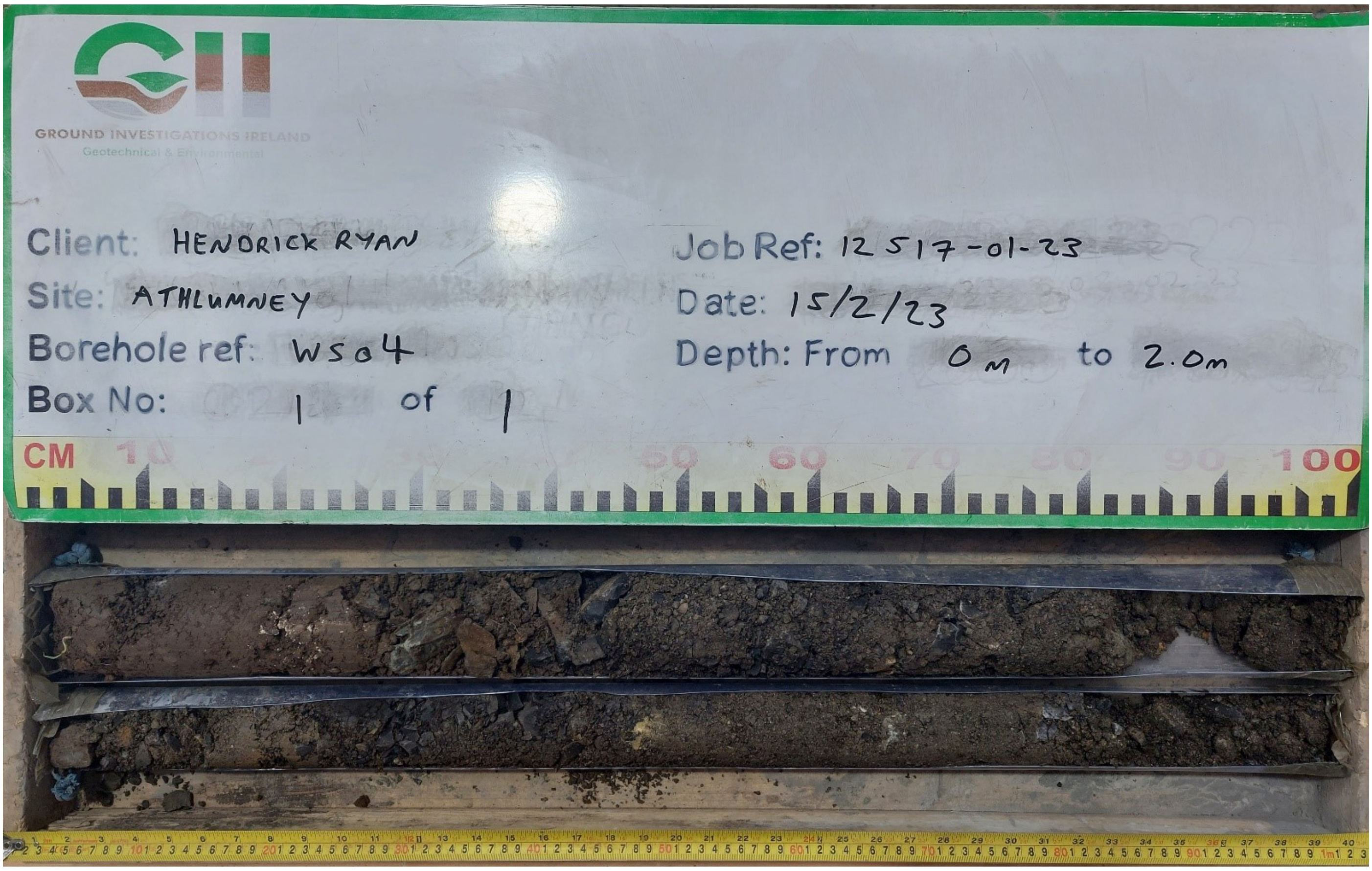
WS01

WS02

Athlumney – Window Sample Photographs

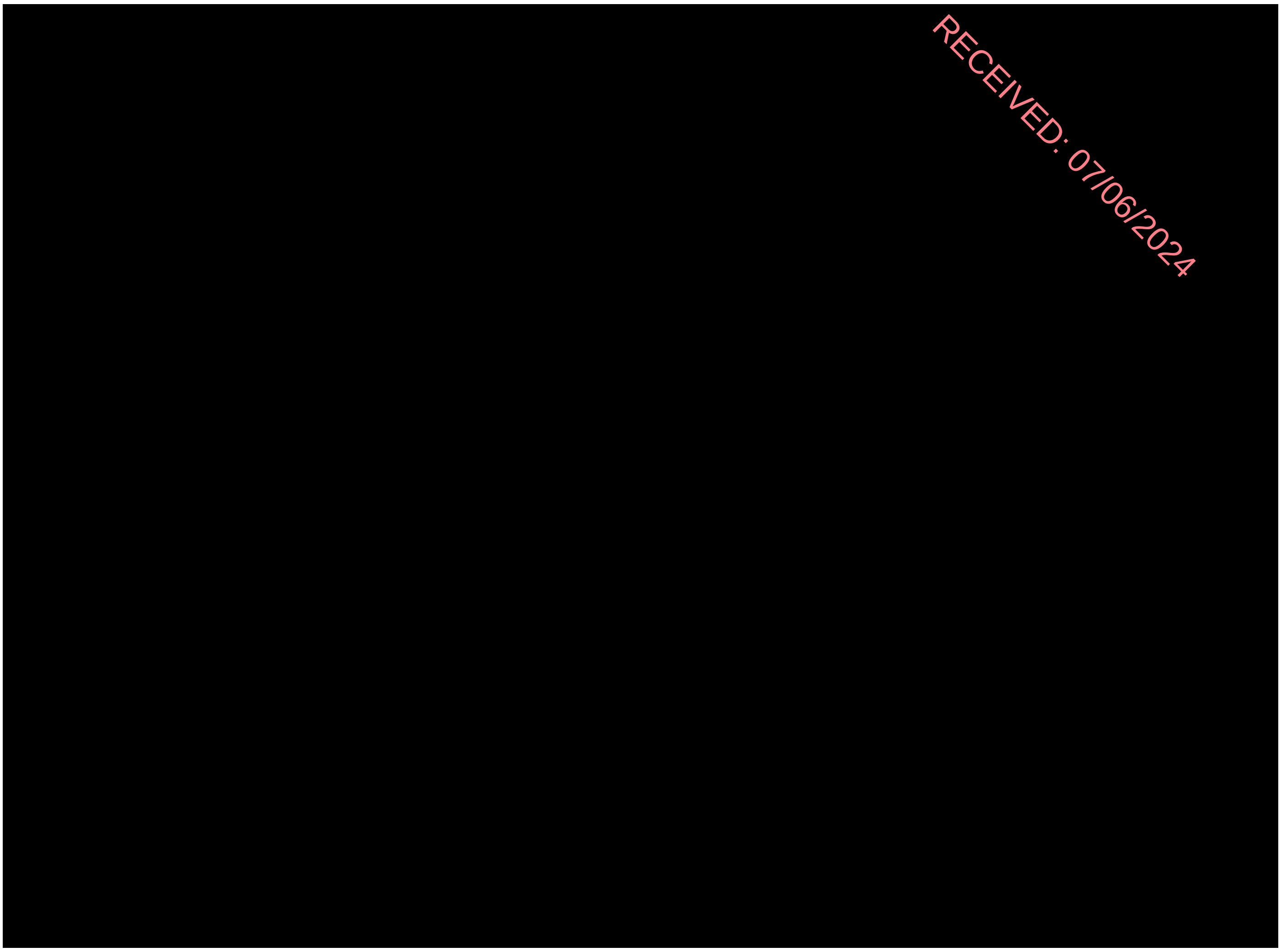
WS03

WS04



Athlumney – Window Sample Photographs

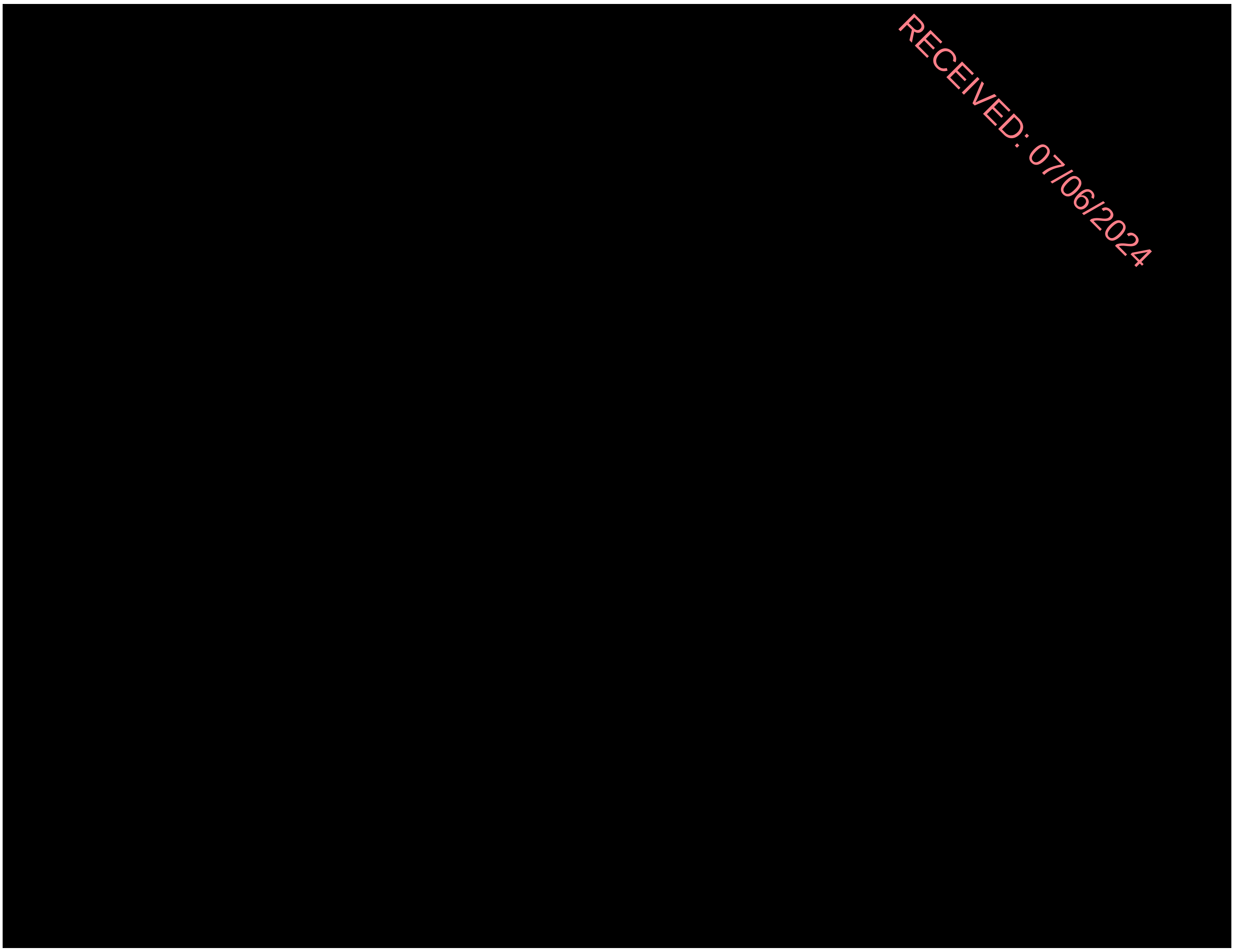
WS05



RECEIVED: 07/06/2024

Athlumney – Window Sample Photographs

WS06



Athlumney – Window Sample Photographs

WS08

[redacted]

WS09

[redacted]

Athlumney – Window Sample Photographs

WS10

[redacted]

[redacted]

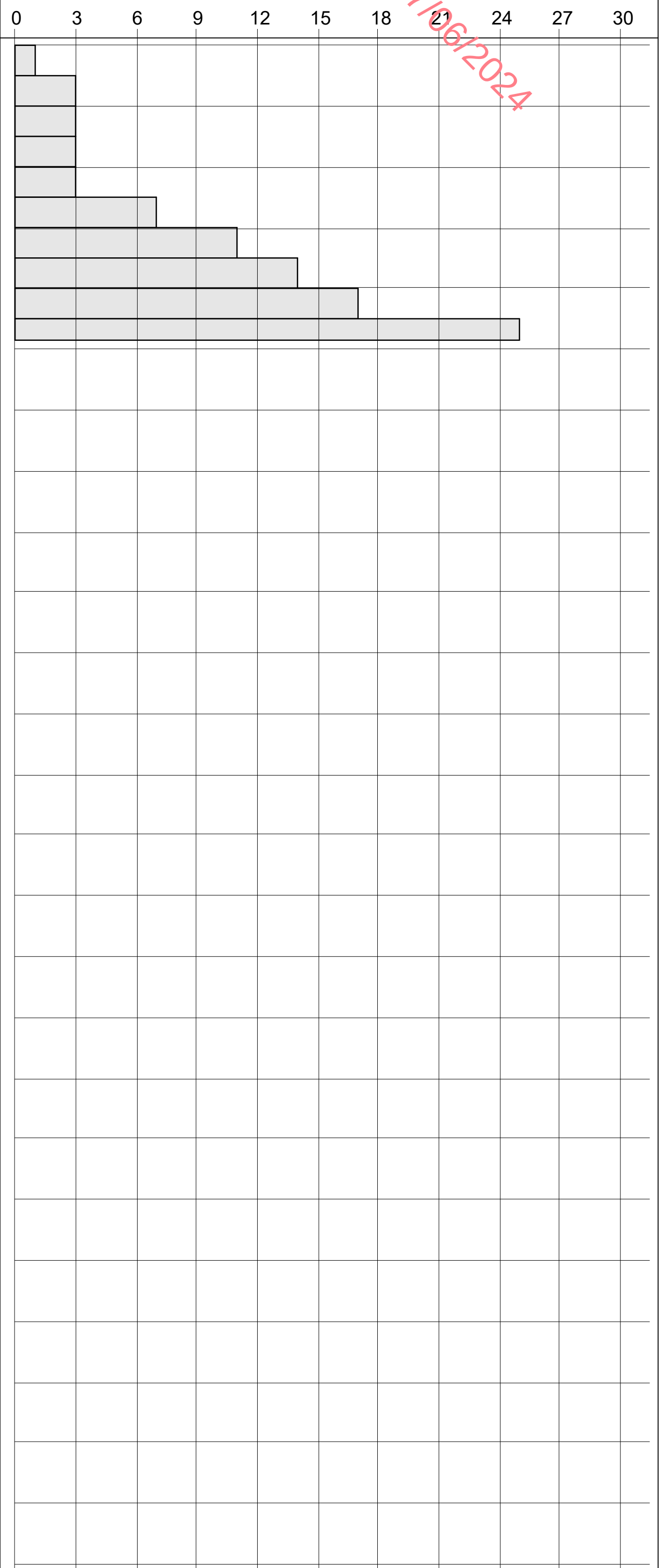
Ground Investigations Ireland Ltd
www.gii.ie

Site Site Investigation Athlumney				**Probe Number** DP01
Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)** 46.21	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688847.1 E 768190.9 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	3	
0.20-0.30	3	
0.30-0.40	3	
0.40-0.50	3	
0.50-0.60	7	
0.60-0.70	11	
0.70-0.80	14	
0.80-0.90	17	
0.90-0.97	25	

Level (mOD)	Depth (m)
46.21	0.00
45.71	0.50
45.21	1.00
44.71	1.50
44.21	2.00
43.71	2.50
43.21	3.00
42.71	3.50
42.21	4.00
41.71	4.50
41.21	5.00

Blows for Depth Increment



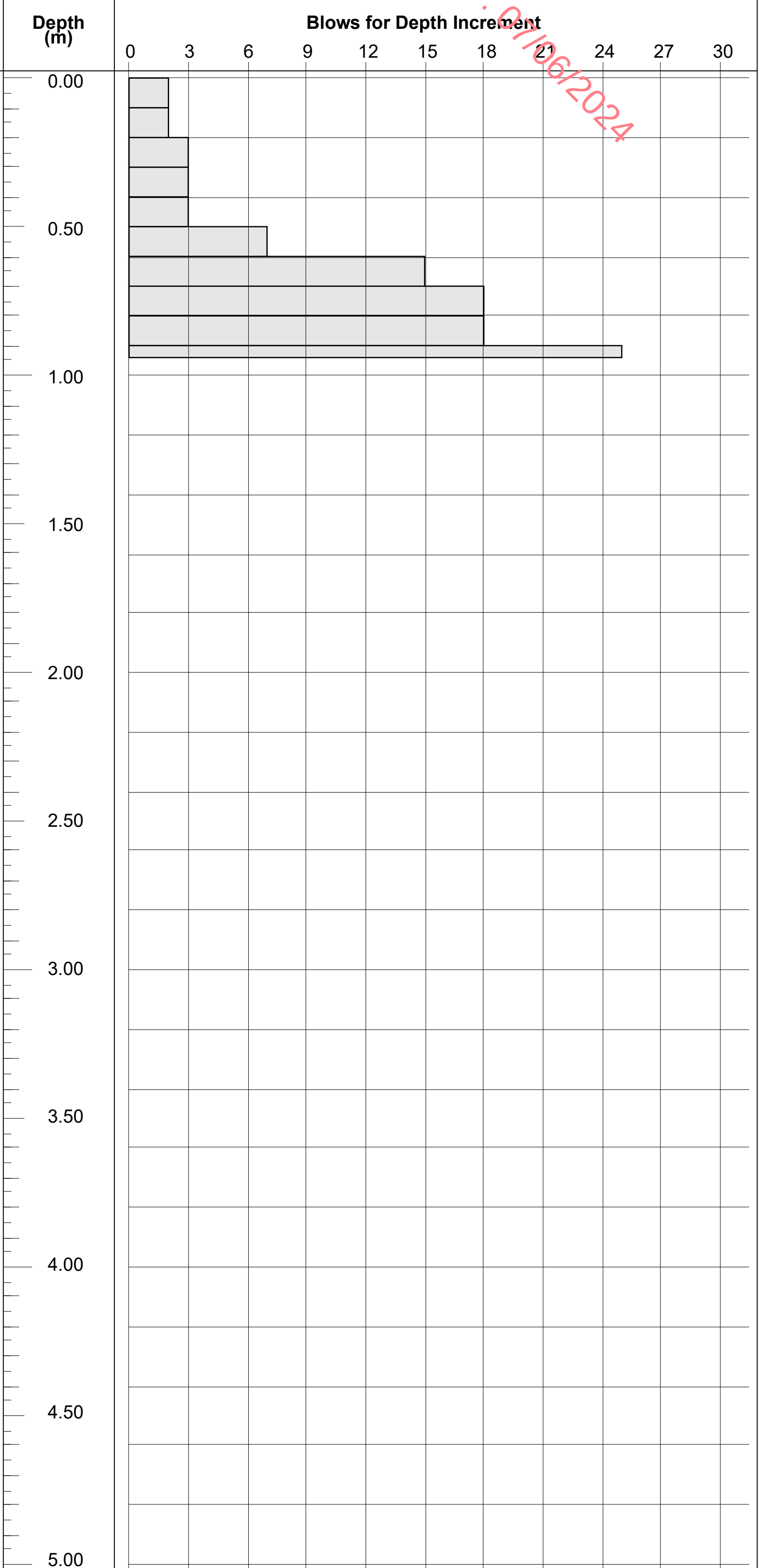
Remarks
Probe refused at 0.97m BGL.

Scale (approx)	Logged By
1:25	RM

Figure No.
12517-01-23.DP01

Ground Investigations Ireland Ltd www.gii.ie			Site: Site Investigation Athlumney	Probe Number: **DP01A**
Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)**	**Client**: Hendrick Ryan	**Job Number**: 12517-01-23
	Location	**Dates**: 16/02/2023	**Engineer**	**Sheet**: 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	2		
0.20-0.30	3		
0.30-0.40	3		
0.40-0.50	3		
0.50-0.60	7		
0.60-0.70	15		
0.70-0.80	18		
0.80-0.90	18		
0.90-0.94	25		



Remarks
Probe refused at 0.94m BGL.

Scale (approx)	Logged By
1:25	RM

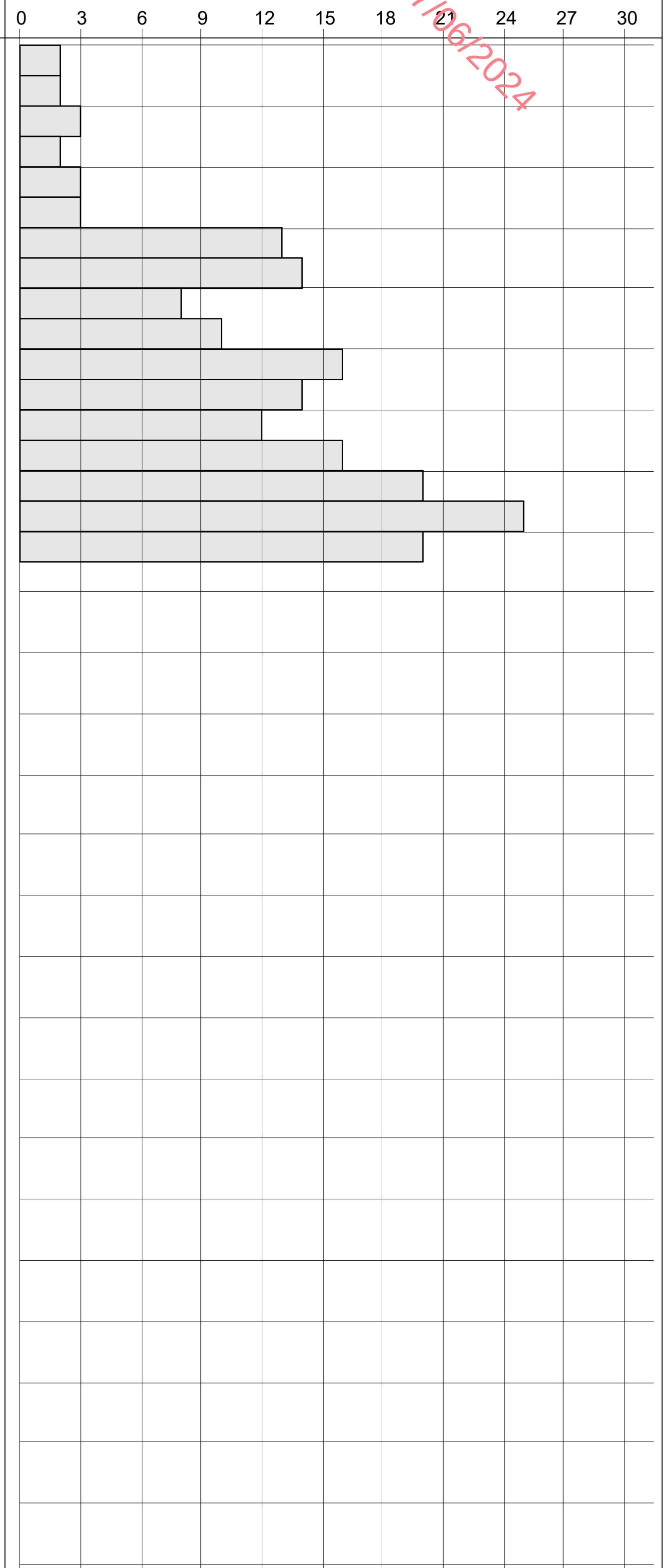
Figure No. 12517-01-23.DP01B

[redacted]	Ground Investigations Ireland Ltd www.gii.ie			Site Site Investigation Athlumney	Probe Number **DP02**
Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**		**Ground Level (mOD)** 46.20	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688873.9 E 768228.9 N		**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	2	
0.20-0.30	3	
0.30-0.40	2	
0.40-0.50	3	
0.50-0.60	3	
0.60-0.70	13	
0.70-0.80	14	
0.80-0.90	8	
0.90-1.00	10	
1.00-1.10	16	
1.10-1.20	14	
1.20-1.30	12	
1.30-1.40	16	
1.40-1.50	20	
1.50-1.60	25	
1.60-1.70	20	

Level (mOD)	Depth (m)
46.20	0.00
45.70	0.50
45.20	1.00
44.70	1.50
44.20	2.00
43.70	2.50
43.20	3.00
42.70	3.50
42.20	4.00
41.70	4.50
41.20	5.00

Blows for Depth Increment



Remarks
Probe refused at 1.70m BGL.

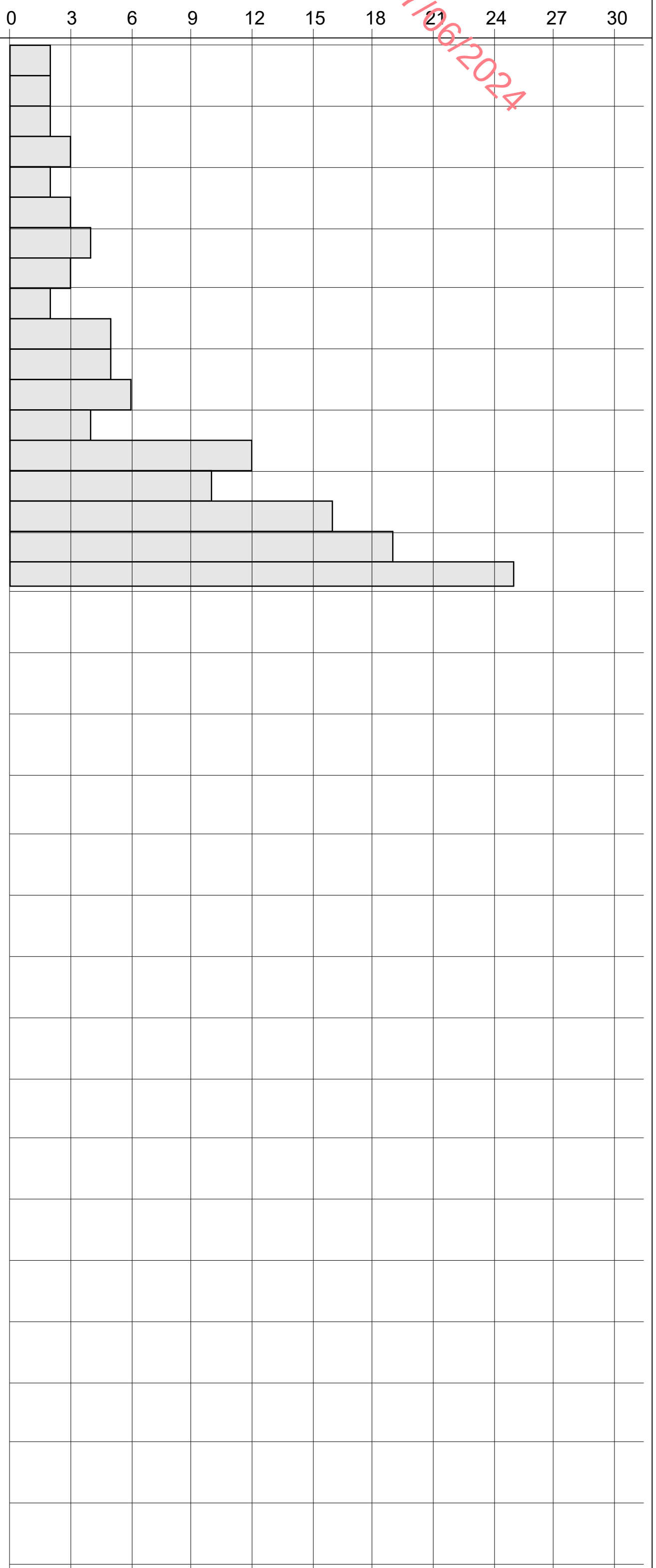
Scale (approx)	Logged By
1:25	RM

Figure No.
12517-01-23.DP02

Ground Investigations Ireland Ltd www.gii.ie		Site: Site Investigation Athlumney	Probe Number: DP03
Machine : Tec 10 Method : Dynamic Probe	Cone Dimensions	Ground Level (mOD): 47.50	Client: Hendrick Ryan	Job Number: 12517-01-23
	Location: 688919.4 E 768198.9 N	Dates: 15/02/2023	Engineer:	Sheet: 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		47.50	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		47.00	0.50
0.60-0.70	4			
0.70-0.80	3			
0.80-0.90	2			
0.90-1.00	5			
1.00-1.10	5		46.50	1.00
1.10-1.20	6			
1.20-1.30	4			
1.30-1.40	12			
1.40-1.50	10			
1.50-1.60	16		46.00	1.50
1.60-1.70	19			
1.70-1.78	25			
			45.50	2.00
			45.00	2.50
			44.50	3.00
			44.00	3.50
			43.50	4.00
			43.00	4.50
			42.50	5.00

Blows for Depth Increment



Remarks
Probe refused at 1.78m BGL.

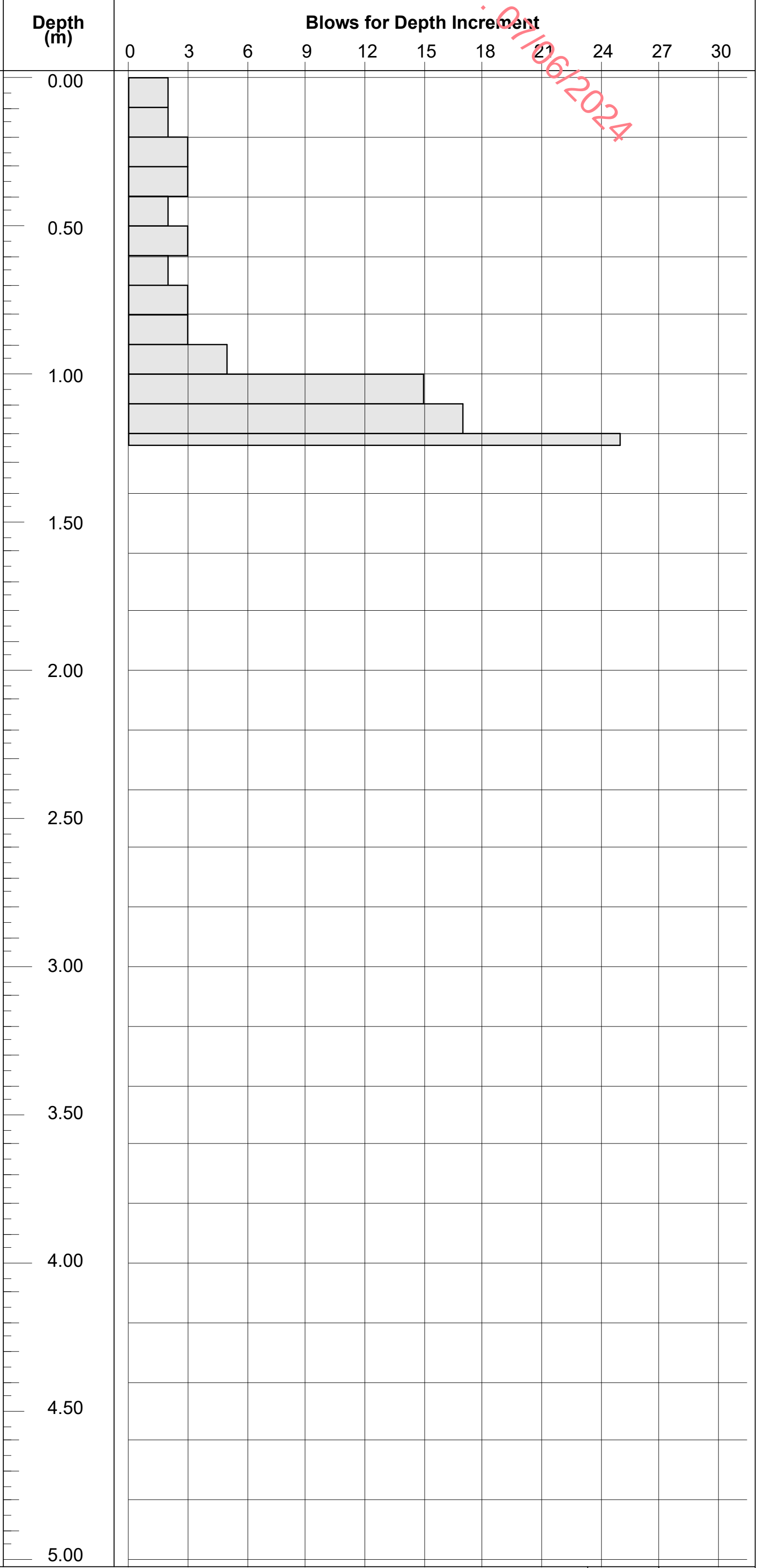
Scale (approx)	Logged By
1:25	RM

Figure No.
12517-01-23.DP03A

Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney		**Probe Number**	**DP03A**
Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)**	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	2		
0.20-0.30	3		
0.30-0.40	3		
0.40-0.50	2		
0.50-0.60	3		
0.60-0.70	2		
0.70-0.80	3		
0.80-0.90	3		
0.90-1.00	5		
1.00-1.10	15		
1.10-1.20	17		
1.20-1.24	25		



Remarks
Probe refused at 1.24m BGL.

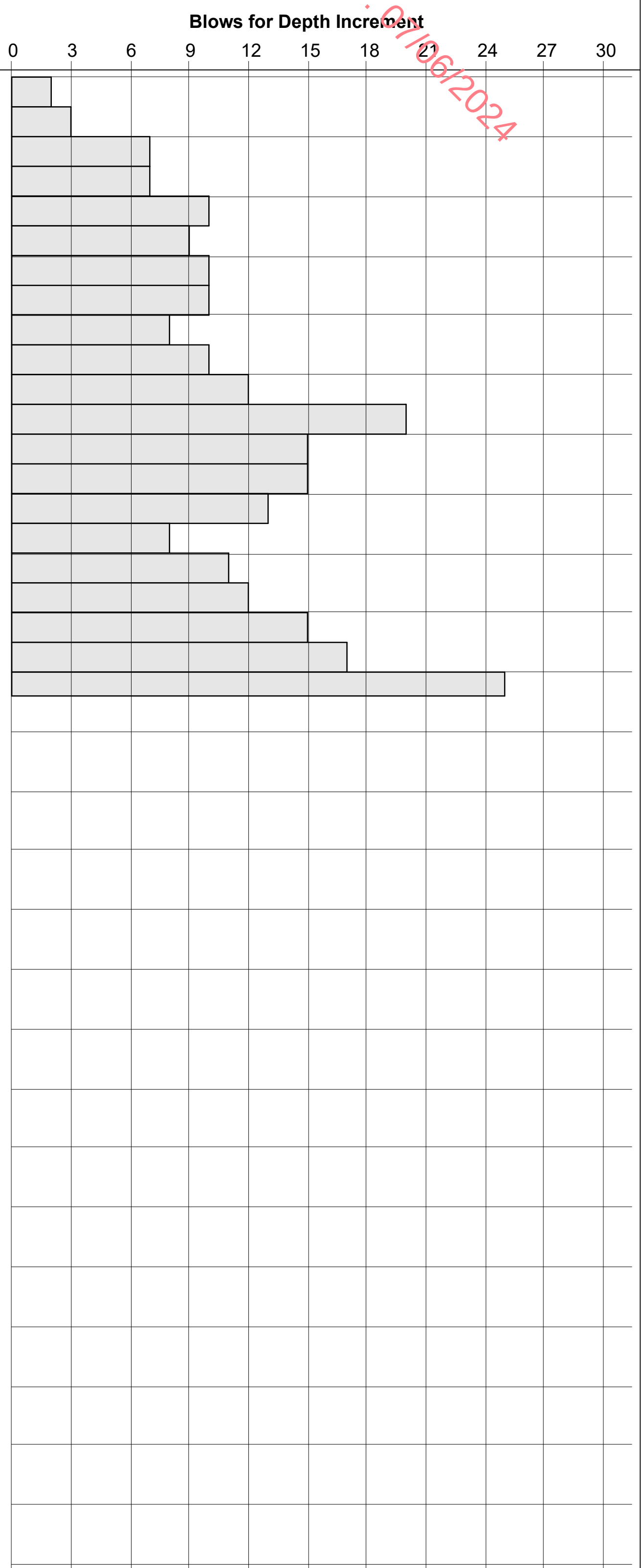
Scale (approx)	**Logged By**
1:25	RM

Figure No.
12517-01-23.DP03A

[redacted] Ground Investigations Ireland Ltd www.gii.ie			Site: Site Investigation Athlumney	Probe Number: **DP04**
Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)** 48.45	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688946.4 E 768178.5 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	3	
0.20-0.30	7	
0.30-0.40	7	
0.40-0.50	10	
0.50-0.60	9	
0.60-0.70	10	
0.70-0.80	10	
0.80-0.90	8	
0.90-1.00	10	
1.00-1.10	12	
1.10-1.20	20	
1.20-1.30	15	
1.30-1.40	15	
1.40-1.50	13	
1.50-1.60	8	
1.60-1.70	11	
1.70-1.80	12	
1.80-1.90	15	
1.90-2.00	17	
2.00-2.08	25	

Level (mOD)	Depth (m)
48.45	0.00
47.95	0.50
47.45	1.00
46.95	1.50
46.45	2.00
45.95	2.50
45.45	3.00
44.95	3.50
44.45	4.00
43.95	4.50
43.45	5.00



Remarks
Probe refused at 2.08m BGL.

Scale (approx)	Logged By
1:25	RM

Figure No. 12517-01-23.DP04

[redacted]

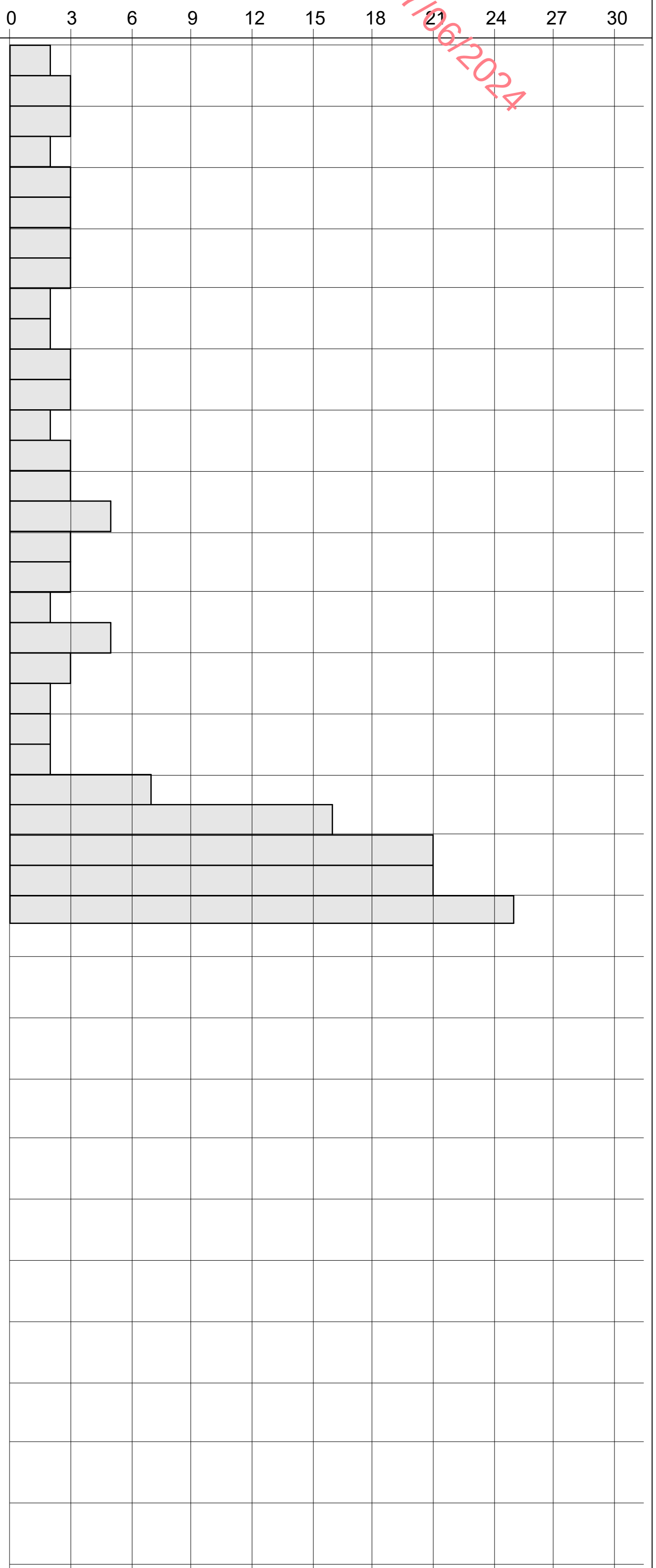
Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney
Probe Number	DP05
Machine	Tec 10
Method	Dynamic Probe
Cone Dimensions	
Ground Level (mOD)	48.82
Client	Hendrick Ryan
Job Number	12517-01-23
Location	688976.5 E 768153.9 N
Dates	15/02/2023
Engineer	
Sheet	1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	3	
0.20-0.30	3	
0.30-0.40	2	
0.40-0.50	3	
0.50-0.60	3	
0.60-0.70	3	
0.70-0.80	3	
0.80-0.90	2	
0.90-1.00	2	
1.00-1.10	3	
1.10-1.20	3	
1.20-1.30	2	
1.30-1.40	3	
1.40-1.50	3	
1.50-1.60	5	
1.60-1.70	3	
1.70-1.80	3	
1.80-1.90	2	
1.90-2.00	5	
2.00-2.10	3	
2.10-2.20	2	
2.20-2.30	2	
2.30-2.40	2	
2.40-2.50	7	
2.50-2.60	16	
2.60-2.70	21	
2.70-2.80	21	
2.80-2.89	25	

Level (mOD)	Depth (m)
48.82	0.00
48.32	0.50
47.82	1.00
47.32	1.50
46.82	2.00
46.32	2.50
45.82	3.00
45.32	3.50
44.82	4.00
44.32	4.50
43.82	5.00

Blows for Depth Increment



Remarks
Probe refused at 2.89m BGL.

Scale (approx)	Logged By
1:25	RM

Figure No. 12517-01-23.DP05

[redacted]

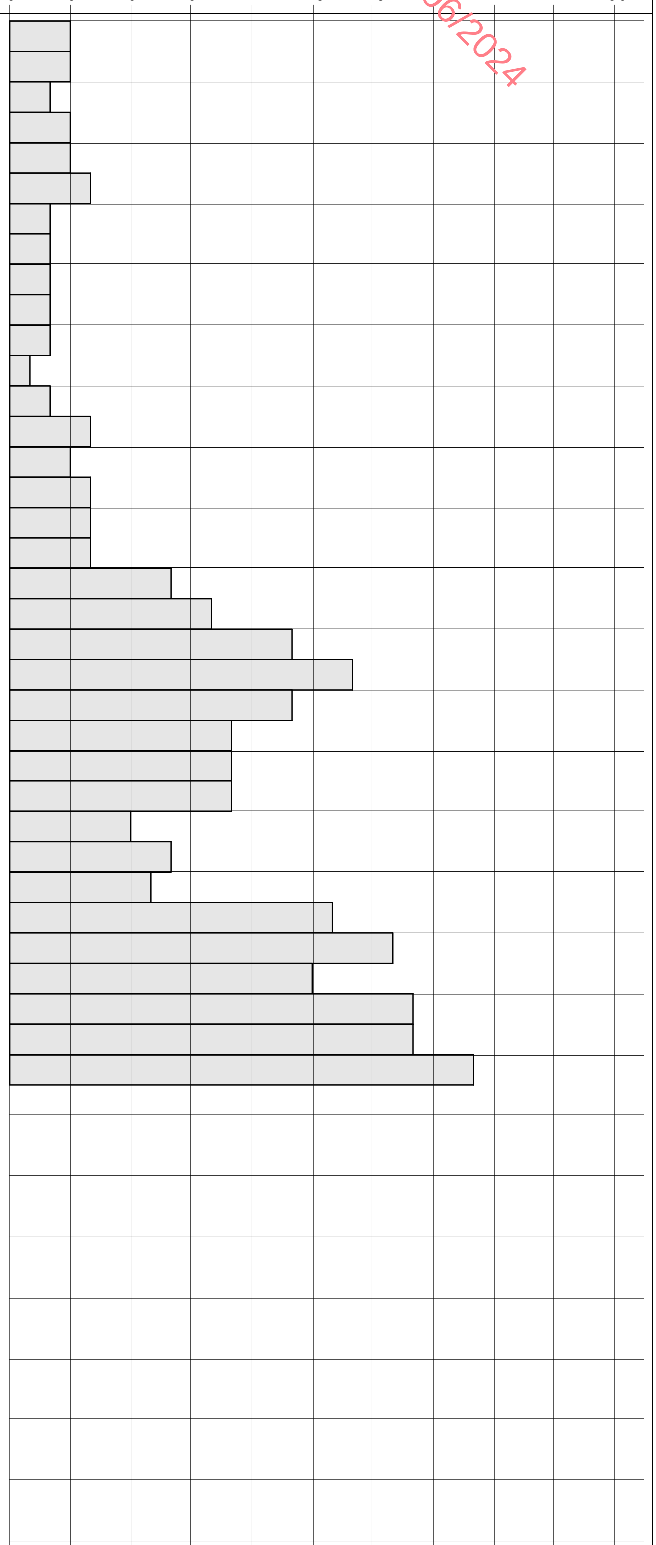
Ground Investigations Ireland Ltd
www.gii.ie

Machine : Tec 10 **Method : ** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)** 51.60	**Site** Site Investigation Athlumney	**Probe Number** **DP06**
	Location 689012.6 E 768123.1 N	**Dates** 15/02/2023	**Client** Hendrick Ryan	**Job Number** 12517-01-23
			Engineer	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	3	
0.10-0.20	3	
0.20-0.30	2	
0.30-0.40	3	
0.40-0.50	3	
0.50-0.60	4	
0.60-0.70	2	
0.70-0.80	2	
0.80-0.90	2	
0.90-1.00	2	
1.00-1.10	2	
1.10-1.20	1	
1.20-1.30	2	
1.30-1.40	4	
1.40-1.50	3	
1.50-1.60	4	
1.60-1.70	4	
1.70-1.80	4	
1.80-1.90	8	
1.90-2.00	10	
2.00-2.10	14	
2.10-2.20	17	
2.20-2.30	14	
2.30-2.40	11	
2.40-2.50	11	
2.50-2.60	11	
2.60-2.70	6	
2.70-2.80	8	
2.80-2.90	7	
2.90-3.00	16	
3.00-3.10	19	
3.10-3.20	15	
3.20-3.30	20	
3.30-3.40	20	
3.40-3.50	23	

Level (mOD)	Depth (m)
51.60	0.00
51.10	0.50
50.60	1.00
50.10	1.50
49.60	2.00
49.10	2.50
48.60	3.00
48.10	3.50
47.60	4.00
47.10	4.50
46.60	5.00

Blows for Depth Increment



Remarks
Probe refused at 3.50m BGL.

Scale (approx)	**Logged By**
1:25	RM

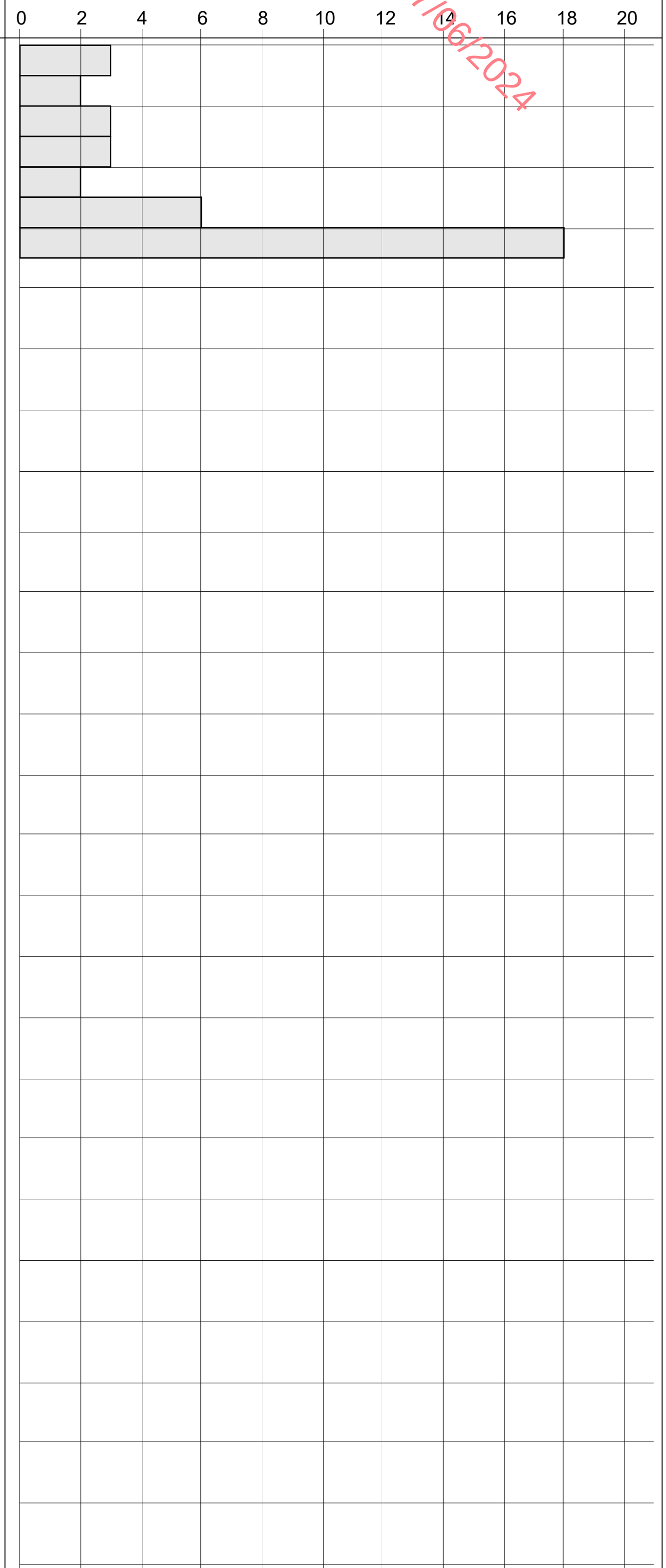
Figure No.
12517-01-23.DP06

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)** 51.48	**Site** Site Investigation Athlumney	**Probe Number** DP07
	Location 689042.7 E 768100.7 N	**Dates** 15/02/2023	**Client** Hendrick Ryan	**Job Number** 12517-01-23
			Engineer	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		51.48	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	6		50.98	0.50
0.60-0.70	18			
			50.48	1.00
			49.98	1.50
			49.48	2.00
			48.98	2.50
			48.48	3.00
			47.98	3.50
			47.48	4.00
			46.98	4.50
			46.48	5.00

Blows for Depth Increment



Remarks
Probe refused at 0.70m BGL.

Scale (approx)	Logged By
1:25	RM

Figure No. 12517-01-23.DP06

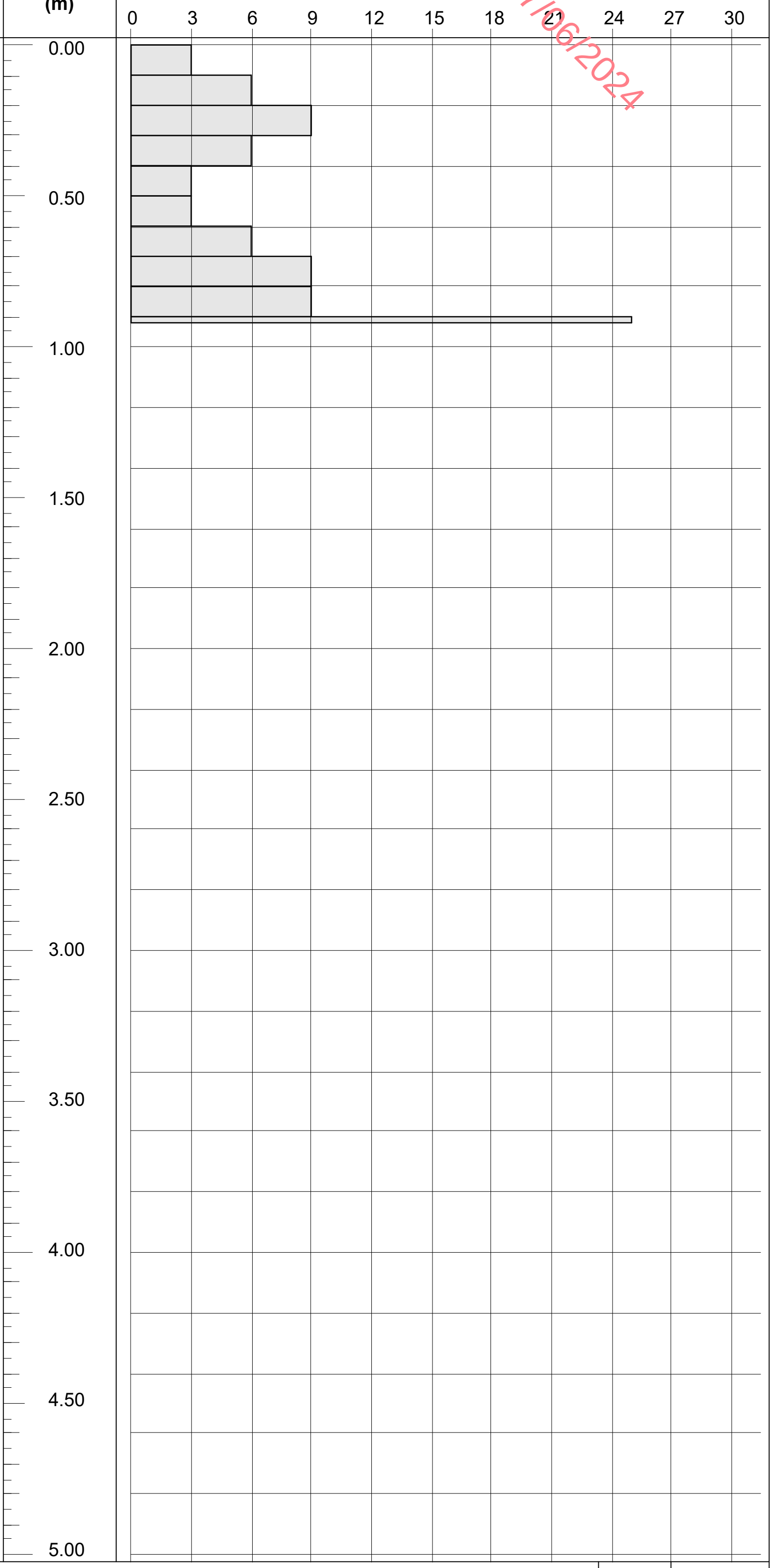
[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Tec 10 **Method : ** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)**	**Site** Site Investigation Athlumney	**Probe Number** **DP07A**
	Location	**Dates** 15/02/2023	**Client** Hendrick Ryan	**Job Number** 12517-01-23
			Engineer	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	3		
0.10-0.20	6		
0.20-0.30	9		
0.30-0.40	6		
0.40-0.50	3		
0.50-0.60	3		
0.60-0.70	6		
0.70-0.80	9		
0.80-0.90	9		
0.90-0.92	25		

Blows for Depth Increment



Remarks
Probe refused at 0.92m BGL.

Scale (approx)	**Logged By**
1:25	RM

Figure No.
12517-01-23.DP07A

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Tec 10 **Method : ** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)** 51.60	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 689034.2 E 768088.9 N	**Dates** 15/02/2023	**Engineer**	**Sheet** 1/1

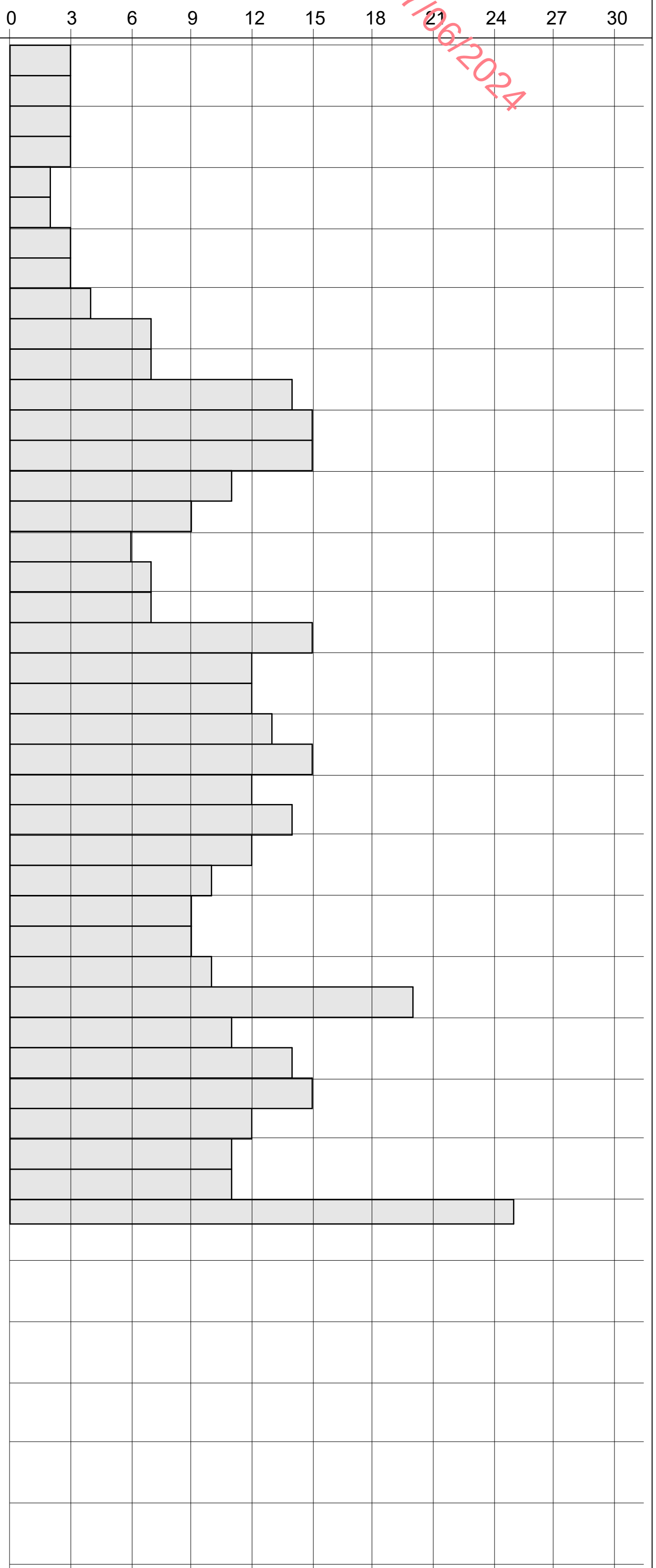
Site: Site Investigation Athlumney

Probe Number: DP08

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	3	
0.10-0.20	3	
0.20-0.30	3	
0.30-0.40	3	
0.40-0.50	2	
0.50-0.60	2	
0.60-0.70	3	
0.70-0.80	3	
0.80-0.90	4	
0.90-1.00	7	
1.00-1.10	7	
1.10-1.20	14	
1.20-1.30	15	
1.30-1.40	15	
1.40-1.50	11	
1.50-1.60	9	
1.60-1.70	6	
1.70-1.80	7	
1.80-1.90	7	
1.90-2.00	15	
2.00-2.10	12	
2.10-2.20	12	
2.20-2.30	13	
2.30-2.40	15	
2.40-2.50	12	
2.50-2.60	14	
2.60-2.70	12	
2.70-2.80	10	
2.80-2.90	9	
2.90-3.00	9	
3.00-3.10	10	
3.10-3.20	20	
3.20-3.30	11	
3.30-3.40	14	
3.40-3.50	15	
3.50-3.60	12	
3.60-3.70	11	
3.70-3.80	11	
3.80-3.88	25	

Level (mOD)	Depth (m)
51.60	0.00
51.10	0.50
50.60	1.00
50.10	1.50
49.60	2.00
49.10	2.50
48.60	3.00
48.10	3.50
47.60	4.00
47.10	4.50
46.60	5.00

Blows for Depth Increment



Remarks
Probe refused at 3.88m BGL.

Scale (approx)	**Logged By**
1:25	RM

Figure No. 12517-01-23.DP08

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)** 51.67	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688996.8 E 768101.4 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

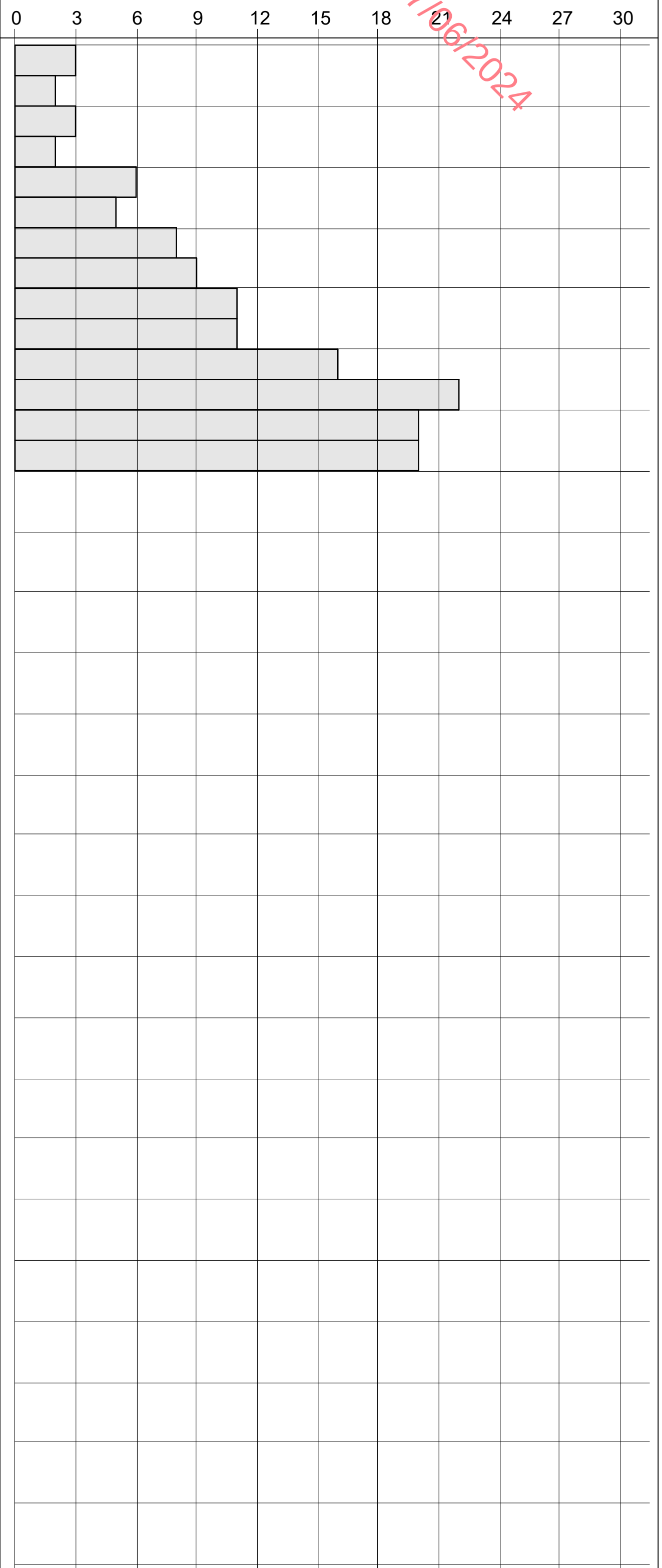
Site: Site Investigation Athlumney

Probe Number: DP09

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	3	
0.10-0.20	2	
0.20-0.30	3	
0.30-0.40	2	
0.40-0.50	6	
0.50-0.60	5	
0.60-0.70	8	
0.70-0.80	9	
0.80-0.90	11	
0.90-1.00	11	
1.00-1.10	16	
1.10-1.20	22	
1.20-1.30	20	
1.30-1.40	20	

Level (mOD)	Depth (m)
51.67	0.00
51.17	0.50
50.67	1.00
50.17	1.50
49.67	2.00
49.17	2.50
48.67	3.00
48.17	3.50
47.67	4.00
47.17	4.50
46.67	5.00

Blows for Depth Increment



Remarks
Probe refused at 1.40m BGL.

Scale (approx)	Logged By
1:25	RM

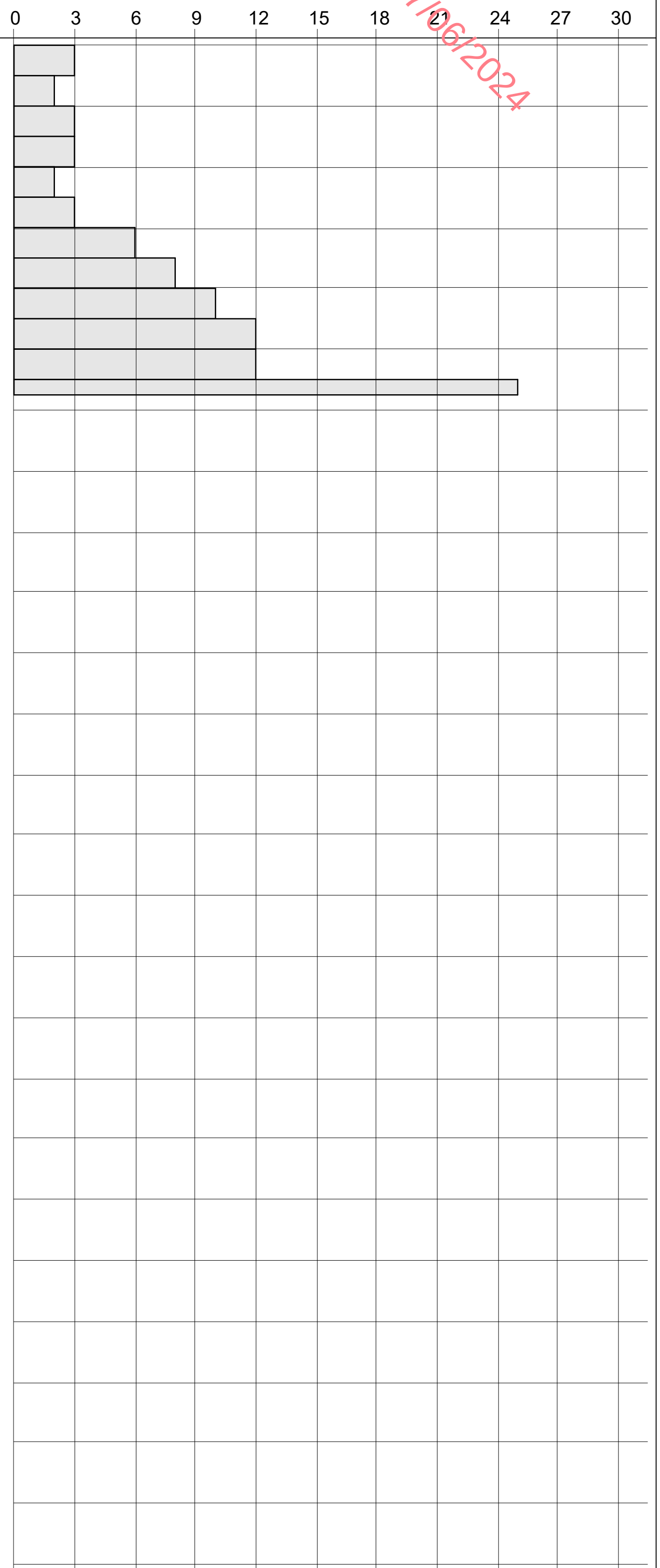
Figure No. 12517-01-23.DP09

[redacted] Ground Investigations Ireland Ltd
www.gii.ie

Site	Site Investigation Athlumney		**Probe Number**	**DP10**
Machine : Tec 10 **Method :** Dynamic Probe	**Cone Dimensions**	**Ground Level (mOD)** 46.92	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location 688901.8 E 768174.3 N	**Dates** 16/02/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		46.92	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		46.42	0.50
0.60-0.70	6			
0.70-0.80	8			
0.80-0.90	10			
0.90-1.00	12			
1.00-1.10	12		45.92	1.00
1.10-1.15	25			
			45.42	1.50
			44.92	2.00
			44.42	2.50
			43.92	3.00
			43.42	3.50
			42.92	4.00
			42.42	4.50
			41.92	5.00

Blows for Depth Increment



Remarks
Probe refused at 1.15m BGL.

Scale (approx)	Logged By
1:25	RM

Figure No. 12517-01-23.DP10

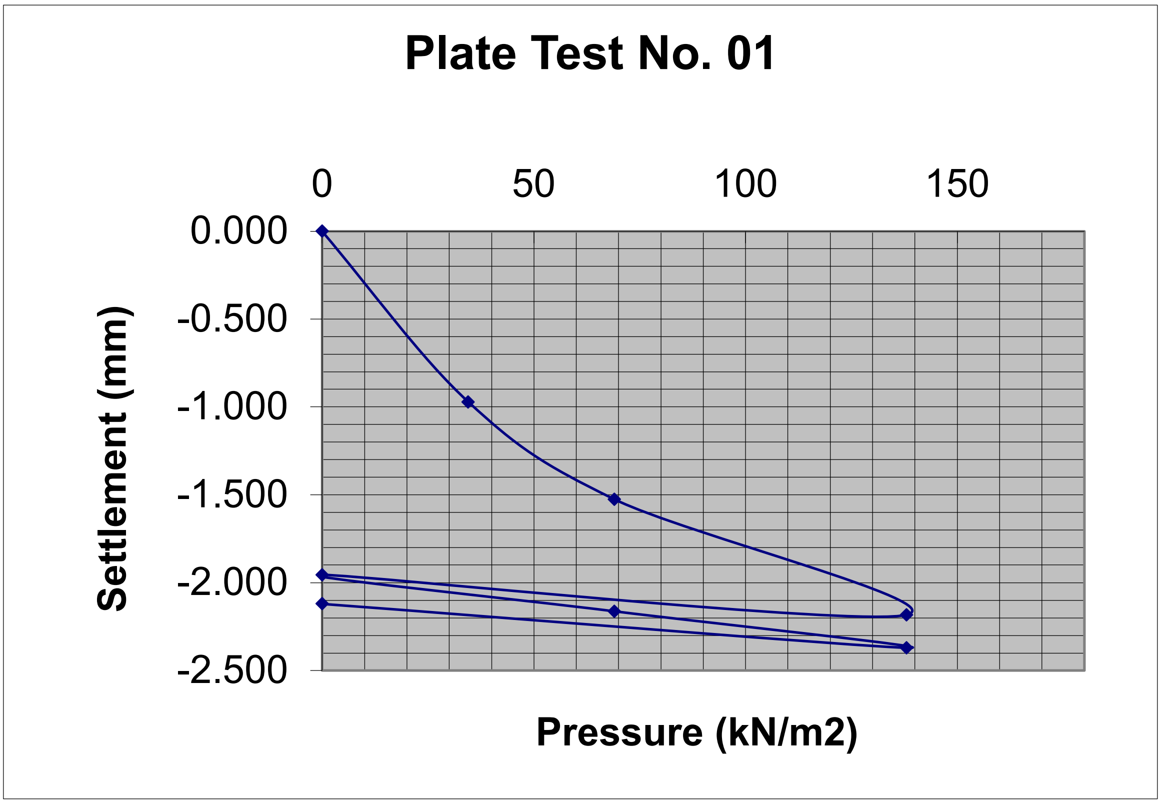
[redacted]

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.972
69	-1.525
138	-2.1825
0	-1.955
69	-2.1625
138	-2.37
0	-2.12

[redacted]

RECEIVED: 07/06/2024

LOCATION	Athlumney, Meath	**MATERIAL**	Brown clayey subangular to subrounded fine to coarse GRAVEL
CONTRACT NO.	12517-01-23		
DATE	15/02/2023		
CLIENT	Hendrick Ryan	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-01	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **30.57 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **224.69 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **3.62 %**

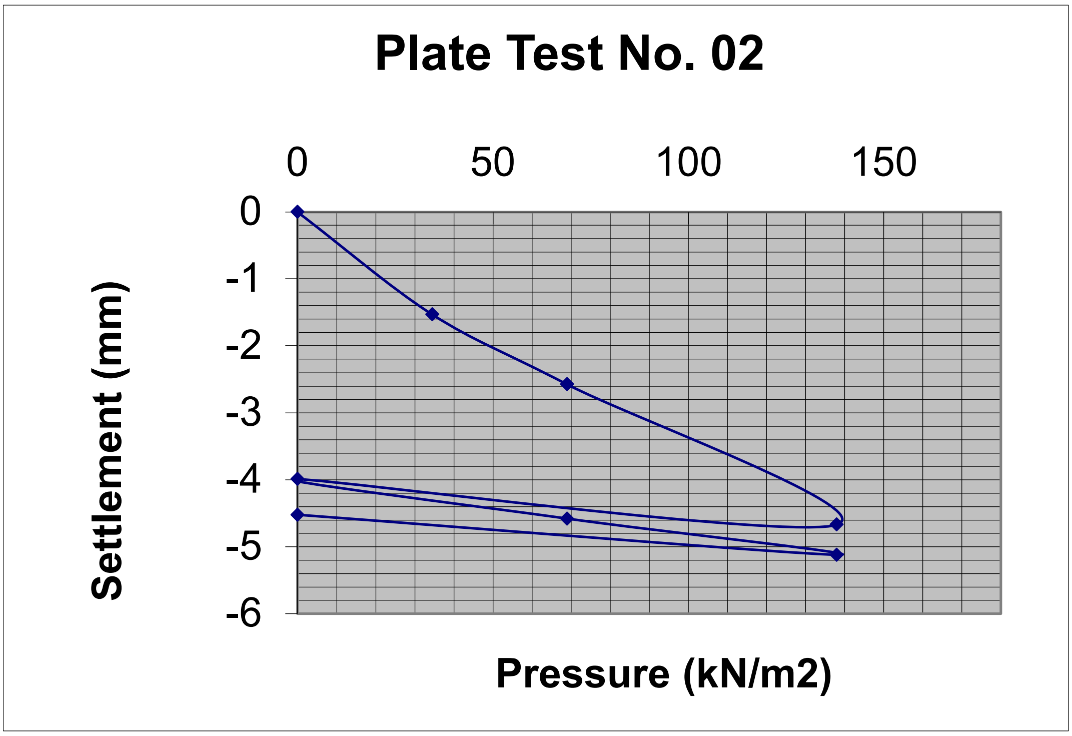
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **114.72 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.5315
69	-2.574
138	-4.668
0	-3.99
69	-4.58
138	-5.1215
0	-4.5235

[redacted]

LOCATION Athlumney, Meath
CONTRACT NO. 12517-01-23
DATE 15/02/2023
CLIENT Hendrick Ryan
PLATE DIAMETER 457mm
TEST NO. CBR-02

MATERIAL Brown clayey SAND
DEPTH 1.00m
NOTES
SAMPLES



Modulus of subgrade reaction, K (Initial) = **18.11 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **79.02 MN/m2/m**

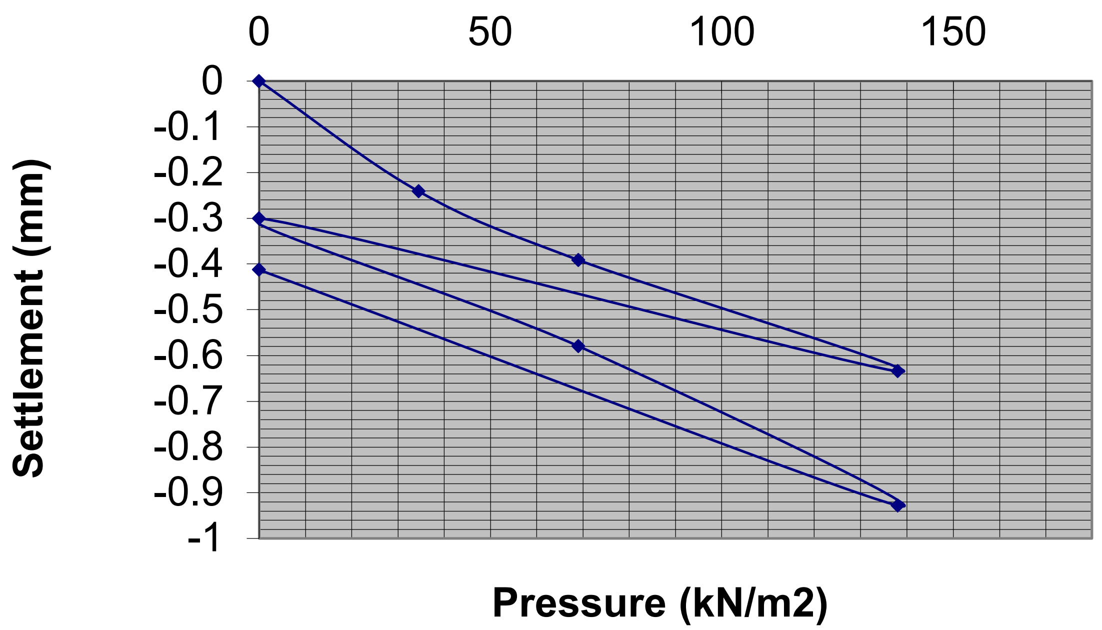
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.46 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **18.76 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.241
69	-0.391
138	-0.7345
0	-0.3
69	-0.5795
138	-0.928
0	-0.4125

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Athlumeny, Meath	**MATERIAL**	Brown slightly sandy gravelly CLAY.
CONTRACT NO.	12517-01-23		
DATE	16/02/2023		
CLIENT	Hendrick Ryan	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-03	**SAMPLES**	

Plate Test No. 03



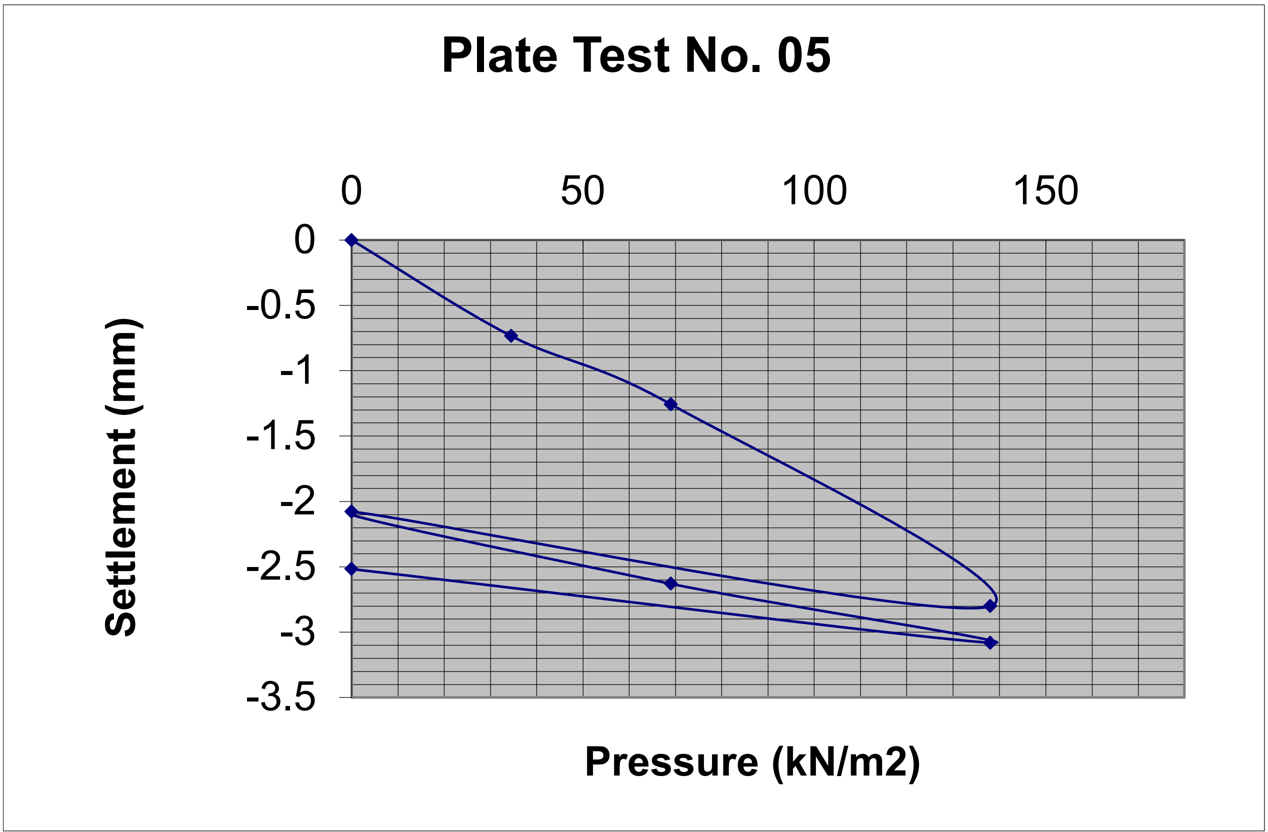
Modulus of subgrade reaction, K (Initial) = **119.24 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **166.81 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **38.26 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **68.46 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.733
69	-1.257
138	-2.8015
0	-2.0785
69	-2.629
138	-3.081
0	-2.5165

[redacted]

LOCATION	Athlumney, Meath	**MATERIAL**	Brown clayey subangular to subrounded fine to coarse GRAVEL
CONTRACT NO.	12517-01-23		
DATE	16/02/2023		
CLIENT	Glenveagh Properties Pl	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-05	**SAMPLES**	



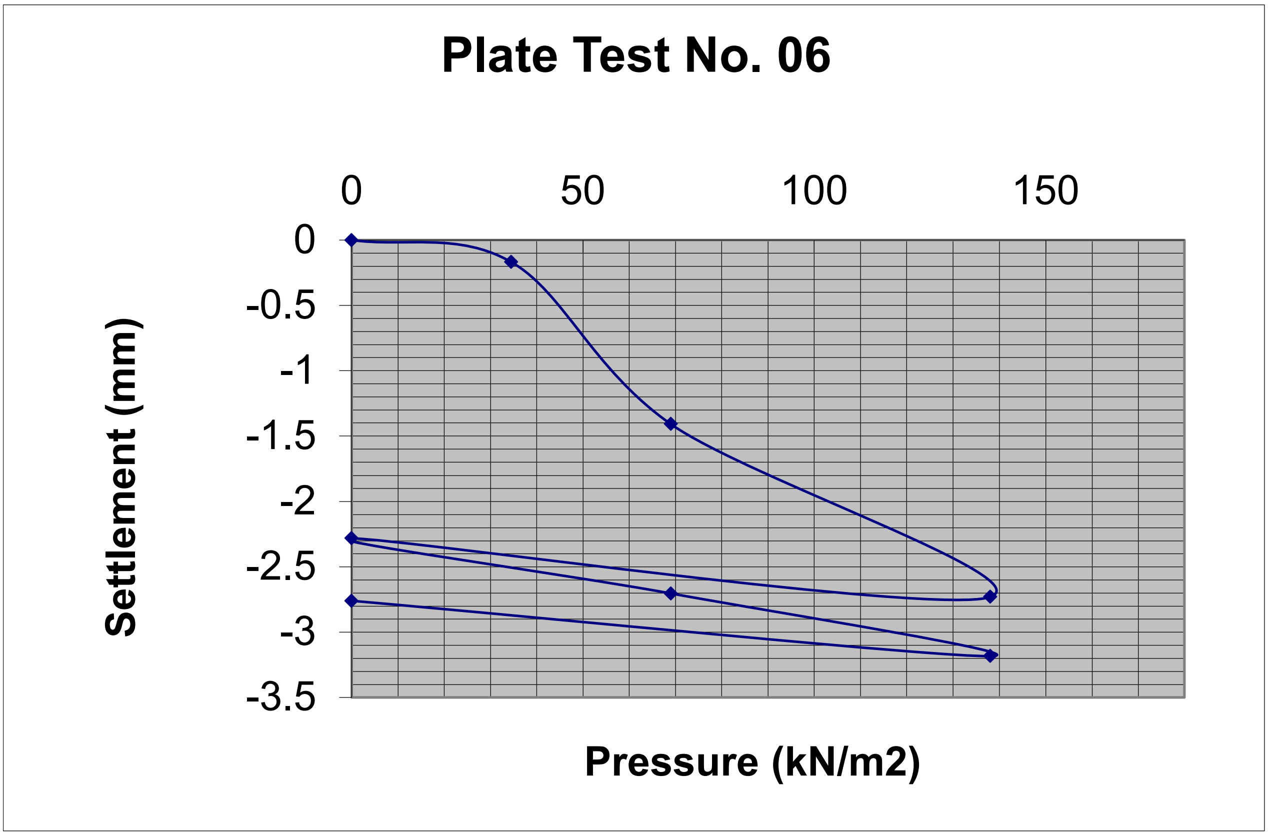
Modulus of subgrade reaction, K (Initial) =	**37.09 MN/m2/m**
Modulus of subgrade reaction, K (Reload) =	**84.69 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 =	**5.06 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 =	**21.15 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.667
69	-1.407
138	-2.73
0	-2.2815
69	-2.704
138	-3.183
0	-2.7605

[redacted]

LOCATION	Athlumney, Meath	**MATERIAL**	Brown clayey subangular to subrounded fine to coarse GRAVEL
CONTRACT NO.	12517-01-23		
DATE	17/02/2023		
CLIENT	Hendrick Ryan	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-06	**SAMPLES**	



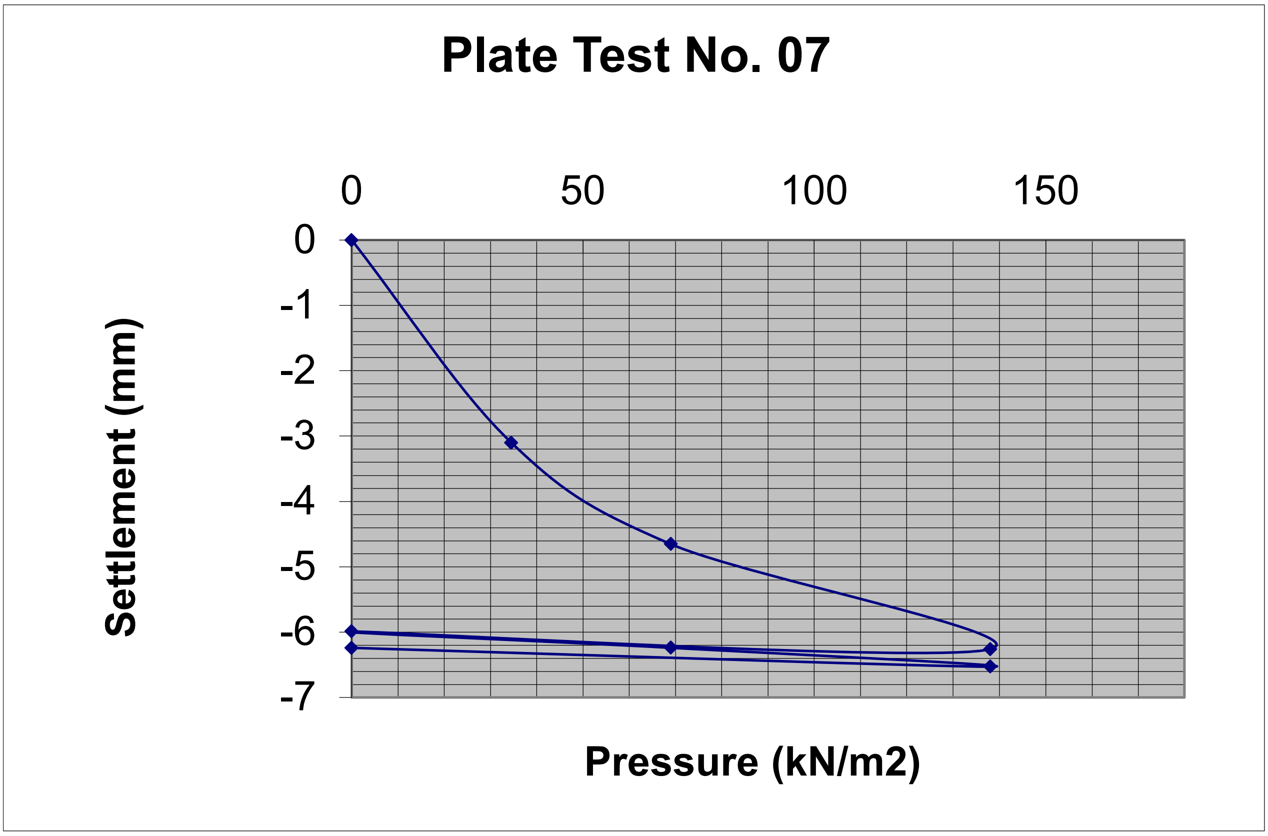
Modulus of subgrade reaction, K (Initial) = **33.14 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **110.35 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **4.16 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **33.46 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-3.3995
69	-4.651
138	-6.2615
0	-5.99
69	-6.238
138	-6.5275
0	-6.2415

[redacted]

LOCATION	Athlumney, Meath	**MATERIAL**	Brown clayey slightly sandy subangular to subrounded fine to coarse GRAVEL
CONTRACT NO.	12517-01-23		
DATE	16/02/2023		
CLIENT	Hendrick Ryan	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-07	**SAMPLES**	



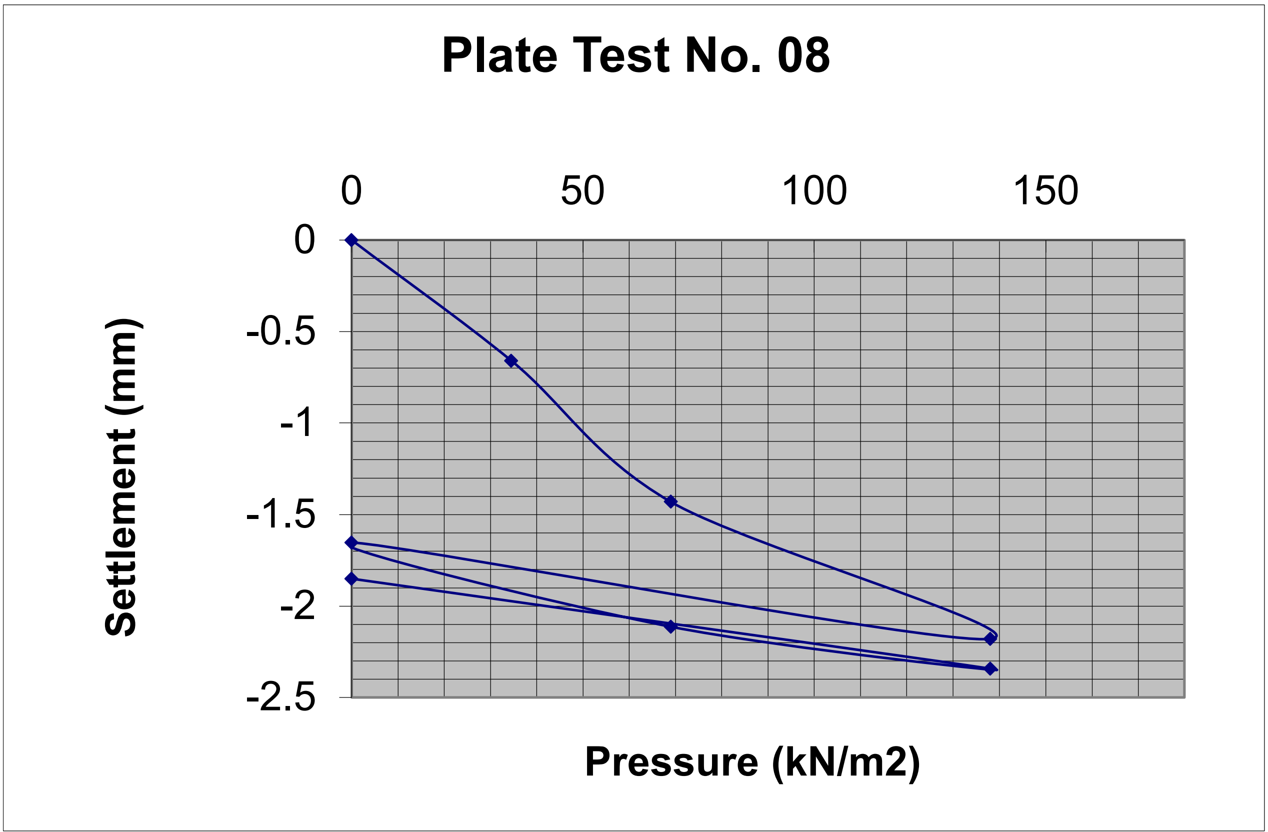
Modulus of subgrade reaction, K (Initial) = **10.02 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **188.00 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.52 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **84.22 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.659
69	-1.43
138	-2.18
0	-1.653
69	-2.114
138	-2.3425
0	-1.8515

[redacted]

LOCATION	Athlumney, Meath	**MATERIAL**	Greyish brown very clayey sandy subangular fine to coarse GRAVEL
CONTRACT NO.	12517-01-23		
DATE	17/02/2023		
CLIENT	Hendrick Ryan	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-08	**SAMPLES**	



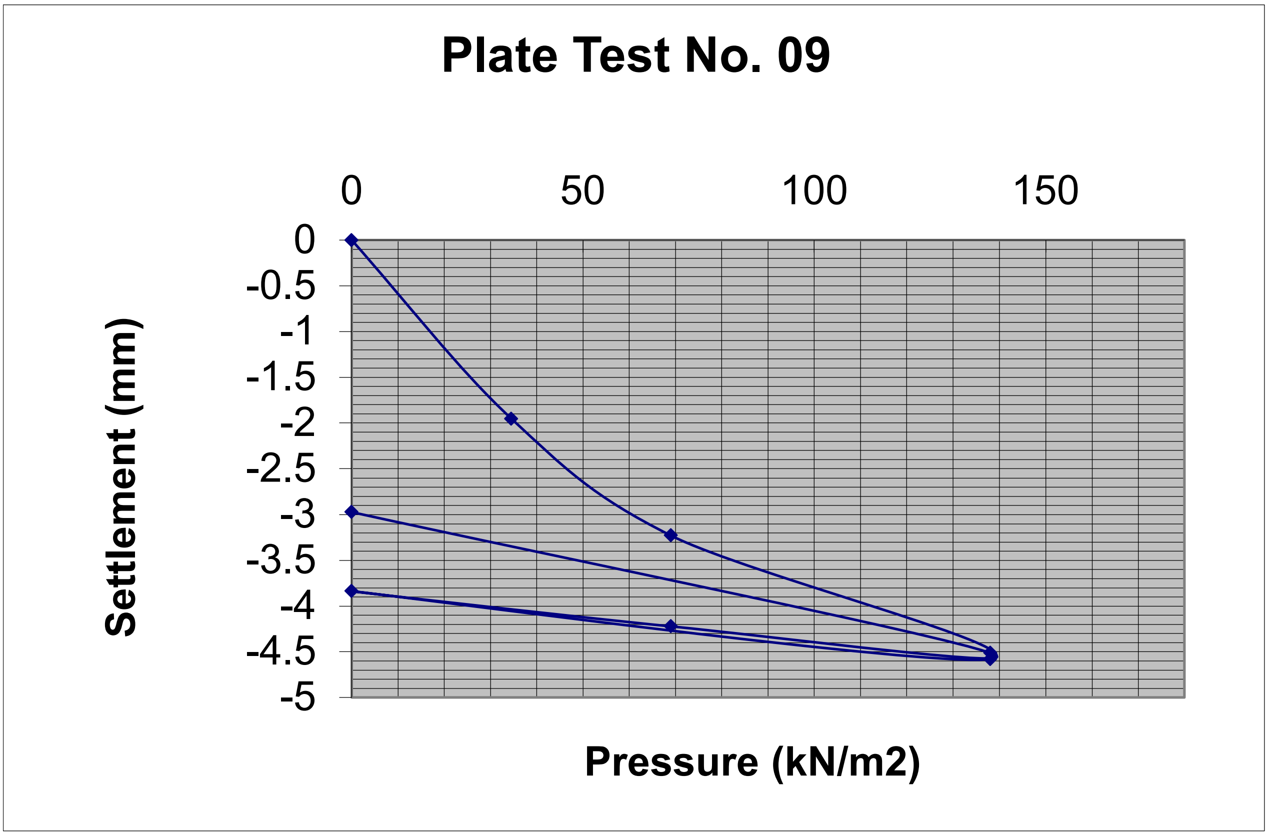
Modulus of subgrade reaction, K (Initial) = **32.60 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **101.14 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **4.04 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **28.76 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.952
69	-3.2285
138	-4.5805
0	-3.8365
69	-4.2215
138	-4.512
0	-2.973

[redacted]

LOCATION	Athlumney, Meath	**MATERIAL**	Brown clayey sandy angular to subrounded fine to coarse GRAVEL with many cobbles
CONTRACT NO.	1257-01-23		
DATE	17/02/2023		
CLIENT	Hendrick Ryan	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-09	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **14.44 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **121.10 MN/m2/m**

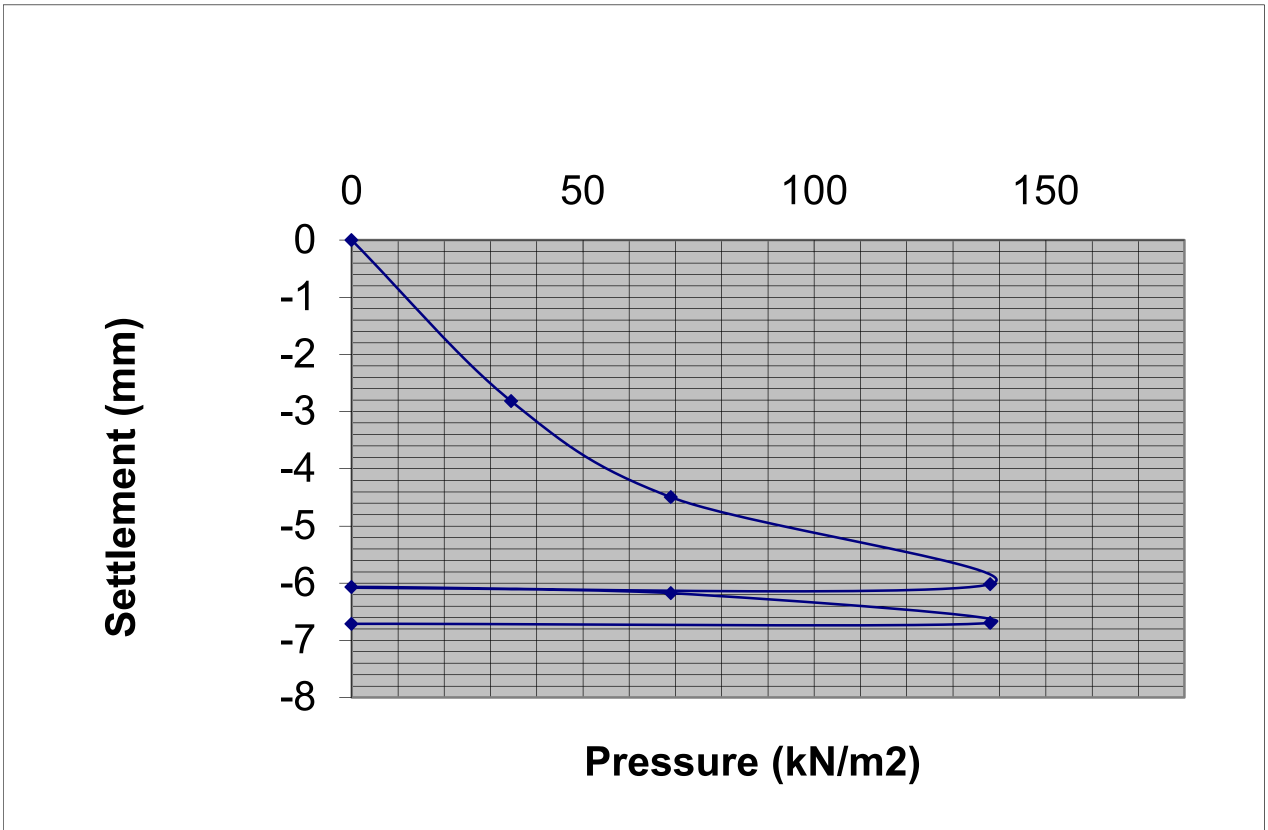
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.99 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **39.30 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-2.818
69	-4.497
138	-6.0185
0	-6.07
69	-6.1765
138	-6.6975
0	-6.7135

[redacted]

LOCATION Athlumney, Meath
CONTRACT NO. 12517-01-23
DATE 16/02/2023
CLIENT Hendrick Ryan
PLATE DIAMETER 457mm
TEST NO. CBR-10

MATERIAL Brown very sandy clayey angular to subrounded fine to coarse GRAVEL
DEPTH 1.00m
NOTES
SAMPLES



Modulus of subgrade reaction, K (Initial) = **10.37 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **437.78 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.56 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **364.44 %**

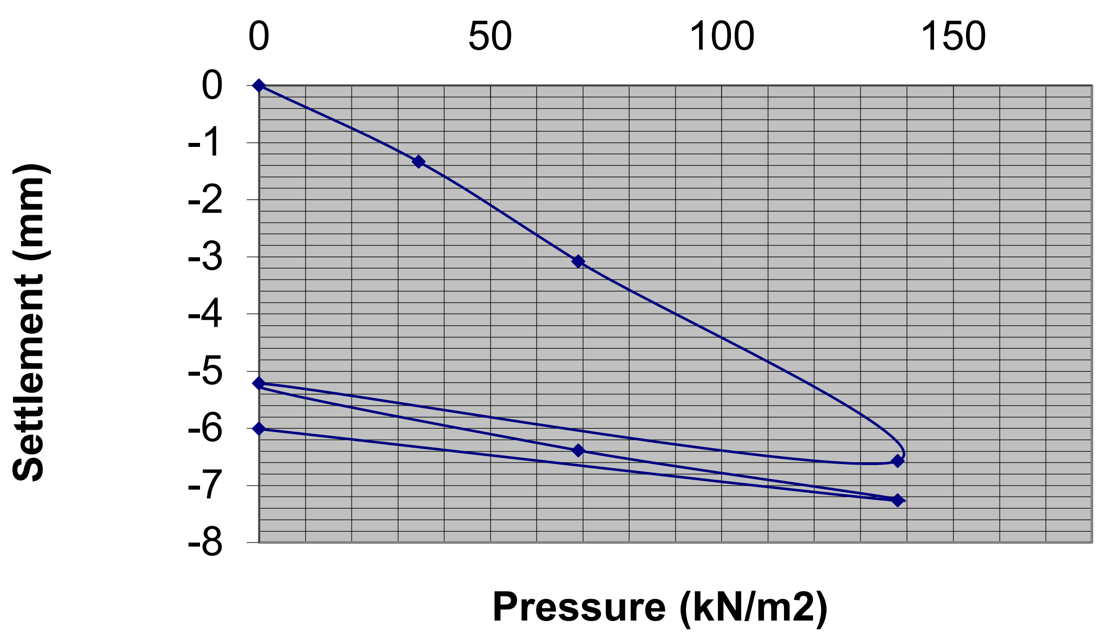
Applied Load	Gauge settlement
0	**0.000**
34.5	-1.334
69	-3.08
138	-6.573
0	-5.216
69	-6.3875
138	-7.2635
0	-6.01

[redacted]

LOCATION Athlumney, Meath
CONTRACT NO. 12517-01-23
DATE 15/02/2023
CLIENT Hendrick Ryan
PLATE DIAMETER 457mm
TEST NO. CBR-11

MATERIAL Brown very clayey sandy fine to coarse GRAVEL sub angular to sub rounded
DEPTH 1.00m
NOTES
SAMPLES

Plate Test No. 01



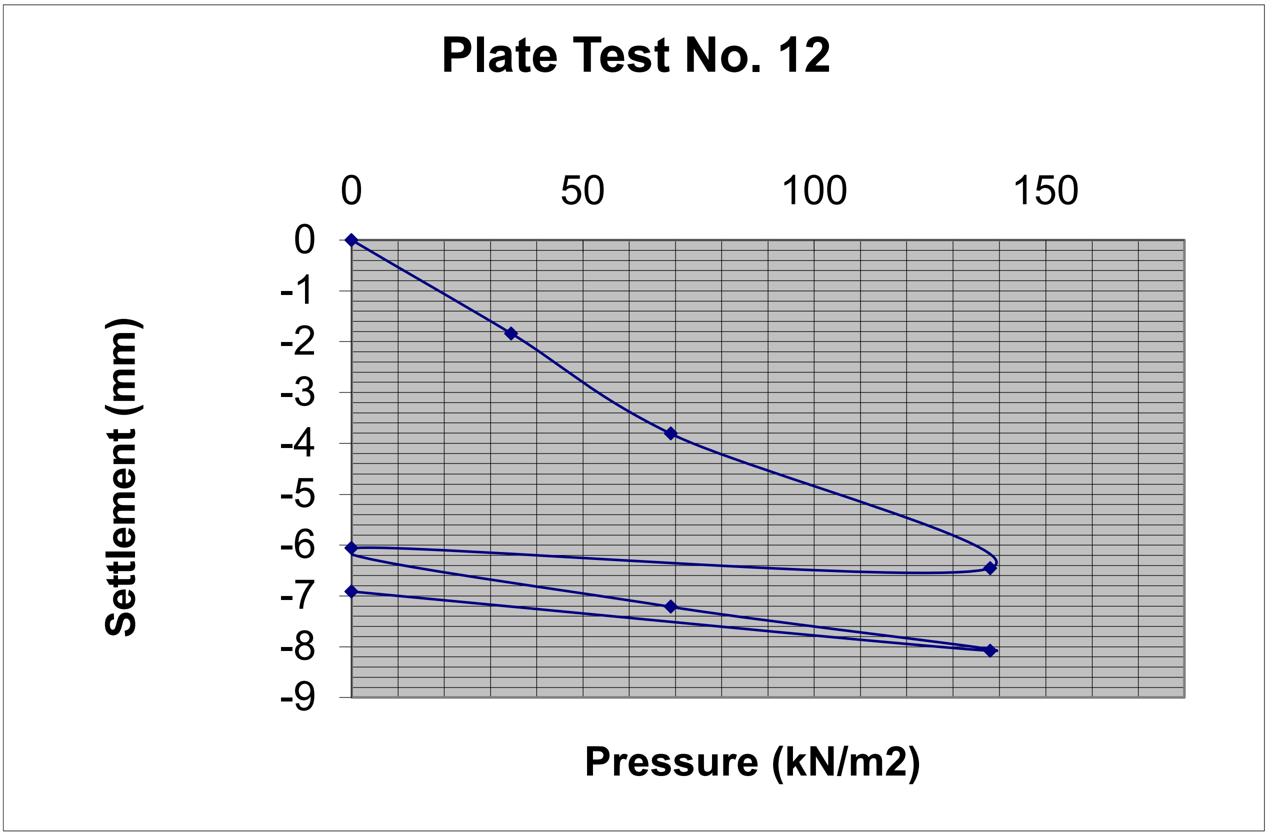
Modulus of subgrade reaction, K (Initial) = **15.14 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **39.80 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.07 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **5.71 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.84
69	-3.808
138	-6.4575
0	-6.0625
69	-7.215
138	-8.0805
0	-6.9145

[redacted]

LOCATION	Athlumney, Meath	**MATERIAL**	Brown clayey gravelly fine to coarse SAND
CONTRACT NO.	12517-01-23		
DATE	17/02/2023		
CLIENT	Hendrick Ryan	**DEPTH**	1.00m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-12	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **12.24 MN/m2/m**
Modulus of subgrade reaction, K (Reload) = **40.45 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.74 %**
Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **5.88 %**

[redacted]

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 1.30m	**Ground Level (mOD)**	**Site** Site Investigation Athlumney **Client** Hendrick Ryan	**Borehole Number** **BH02**	**Job Number** 12517-01-23
	Location	**Dates** 18/04/2023	**Engineer**	**Sheet** 1/1	

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30) 0.30	Brown slightly sandy slightly gravelly TOPSOIL.		
0.50	BA					(0.40) 0.70	Soft brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravels are fine to coarse, sub angular to sub rounded.		
1.00-1.04 1.00	SPT(C) 25*/40 50/0 BA			25/50		(0.60) 1.30	Very stiff brown very sandy Gravelly CLAY. Sand is fine to coarse. Gravels are fine to coarse, sub angular to subrounded.		
							Complete at 1.30m		

Remarks
Chiselling from 1.00m to 1.30m for 1 hour.

Scale (approx) 1:50	**Logged By** PD
Figure No. 12517-01-23.BH02	

BA0.50
BA1.0

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to	**Ground Level (mOD)**	**Client** Hendrick Ryan	**Job Number** 12517-01-23	
	Location	**Dates** 18/04/2023	**Engineer**	**Sheet** 1/1	

Site: Site Investigation Athlumney

Borehole Number: BH03

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30) 0.30	Soft brown sandy gravelly CLAY.		
						(0.60) 0.90	Firm brown very sandy gravelly CLAY. Gravels are fine to coarse, sub angular to sub rounded.		
1.00-1.04	SPT(C) 25*/40 50/0			25/50		(0.20) 1.10	Grey angular fine to coarse GRAVEL		
							Complete at 1.10m		

Remarks
Chiselling from 0.90m to 1.10m for 1.0 hour.

Scale (approx)	Logged By
1:50	PD

Figure No.
12517-01-23.BH03

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Site Site Investigation Athlumney				**Borehole Number** BH06
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 1.10m	**Ground Level (mOD)**	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location	**Dates** 18/04/2023	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.30) 0.30	Brown sandy gravelly TOPSOIL		
0.50	BA					(0.70)	Brown sandy gravelly CLAY. Sand is fine to coarse. Gravels are fine to coarse, sub angular to sub rounded.		
1.00-1.04	SPT(C) 25*/40 50/0			25/50		1.00 1.10	Grey angular fine to coarse GRAVEL		
1.00	BA						Complete at 1.10m		

Remarks Chiselling from 1.00m to 1.10m for 1.0 hour.	**Scale (approx)** 1:50	**Logged By** PD
	Figure No. 12517-01-23.BH06	

Ground Investigations Ireland Ltd www.gii.ie		Site: Site Investigation Athlumney	Borehole Number: BH07
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm to 1.10m	**Ground Level (mOD)**	**Client** Hendrick Ryan	**Job Number** 12517-01-23
	Location	**Dates** 17/04/2023	**Engineer**	**Sheet** 1/1

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.90)	Brown sandy CLAY		
0.50	B								
						0.90 (0.20)	Grey angular fine to coarse GRAVEL		
1.00-1.03	SPT(C) 25*/30 50/0			25/50		1.10	Complete at 1.10m		
1.00	B								

Remarks
Chiselling from 0.90m to 1.10m for 1 hour.

Scale (approx)	Logged By
1:50	EB

Figure No. 12517-01-23.BH07

[redacted]

Ground Investigations Ireland Ltd
www.gii.ie

Site	Borehole Number
Site Investigation Athlumney	BH08

Machine : Dando 2000 Method : Cable Percussion	Casing Diameter 200mm to 3.50m	Ground Level (mOD)	Client Hendrick Ryan	Job Number 12517-01-23
	Location	Dates 17/04/2023	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50	B					(0.70) 0.70	Brown sandy CLAY		
1.00-1.45 1.00	SPT(C) N=18 B			2,3/4,4,5,5		(1.80)	Stiff sandy gravelly CLAY with some angular to subrounded cobbles. Gravel is fine to coarse subangular to subrounded		
2.00-2.45 2.00	SPT(C) N=20 B			3,4/4,4,7,5		2.50			
						(0.70)	Very stiff brown slightly sandy gravelly CLAY with some angular cobbles and boulder fragments		1
3.00-3.30 3.00	SPT(C) 50/150 B			2,3/10,40 Water strike(1) at 3.30m, rose to 2.90m in 20 mins.		3.20 (0.30) 3.50	Grey angular fine to coarse GRAVEL of Limestone		1
							Complete at 3.50m		

Remarks
Chiselling from 3.20m to 3.50m for 1 hour.

Scale (approx)	Logged By
1:50	EB

Figure No.
12517-01-23.BH08

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

Ground Investigations Ireland

Athlumney, Navan, Co.Meath

HendrickRyan Consulting Engineers

Ground Investigation Report

October 2020

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

DOCUMENT CONTROL SHEET

Project Title	Athlumney, Navan, Co.Meath
Engineer	HendrickRyan Consulting Engineers
Project No	9948-09-20
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	S Mclaughlin	F McNamara	F McNamara	Dublin	07 October 2020

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

CONTENTS

APPENDICES

1.0 Preamble

On the instructions of HendrickRyan Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., in October 2020 at the site of the proposed residential development in Athlumney, Navan, Co.Meath.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. The site is currently greenfield and is situated in Athlumney, Navan, Co.Meath. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 14 No. Trial Pits to a maximum depth of 2.8m BGL
- Carry out 13 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and are generally comprised;

;

- Topsoil
- Cohesive Deposits
- Granular Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.40m BGL.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and were described typically as *brown sandy gravelly CLAY with many cobbles and occasional boulders* overlying a *brownish grey sandy gravelly CLAY with many cobbles and occasional boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had occasional, some or many cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: The granular deposits were encountered below the cohesive deposits and were typically described as *brown slightly sandy clayey sub rounded to sub angular fine to coarse GRAVEL with many cobbles and rare boulders or Greyish brown clayey gravelly fine to coarse SAND with many cobbles occasional boulders.* The secondary silt/clay constituents varied across the site and with depth while occasional or many cobble and boulder content also present where noted on the exploratory hole logs.
It should be noted that many of the trial pits where granular deposits or groundwater were encountered, experienced instability. This was described either as side wall spalling or as side wall collapse in the remarks section at the base of the trial pit logs.

4.2. Groundwater

Groundwater was noted during the investigation however we would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendation

5.2. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

5.3. Soakaway Design

Infiltration rates calculated are displayed in the following table:

Location	Infiltration Rate
SA01	Failed
SA02	Failed
SA03	f=1.4 x 10^{-4} m/s
SA04	Failed
SA05	f=5.9 x 10^{-5} m/s
SA06	f=2.0 x 10^{-4} m/s
SA07	Failed
SA08	f=4.8 x 10^{-3} m/s
SA09	Failed
SA10	f=3.8 x 10^{-4} m/s
SA11	f=4.1 x 10^{-5} m/s
SA12	Failed
SA14	f=1.0 x 10^{-3} m/s

At the locations of SA01, SA02, SA04, SA07, SA09 and SA12 the water level dropped too slowly to allow calculation of 'f' the soil infiltration rate, or groundwater was encountered. These locations are therefore not recommended as suitable for soakaway design and construction.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan

	Approx. Ground Level	Depth		Approx. Ground Level	Depth
1	48.8	1.5 - 2m	8	49.5 - 50	1.5 - 2m
2	49.4	1.5 2m.	9	47.0	1.5 - 2m.
3	48.8	2m.	10	52.0	3.5 - 4m.
4	49.50	1.5m.	11	48.0	1.5m.
5	49.00	1.5m.	12	45.0	1.5m.
6	50.00	1.5m.	13	44.5	1.5m.
7	47.00.	1.5m	14	52.0	1.5m.

RECEIVED: 07/06/2024

PHASE 1

IF PERCOLATION RATES ARE VERY POOR - EXTEND EXCAVATION DEEPER. CALL TO DISCUSS WHEN ON SITE. - 0868139892

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd www.gii.ie			Site Athlumney, Navan, Co. Meath	Trial Pit Number **TP01**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.00 x 0.55 x 2.00	**Ground Level (mOD)**	**Client** Albert Developments Ltd.	**Job Number** 9948-09-20
	Location	**Dates** 29/09/2020	**Engineer** Hendrick Ryan	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(1.10) 1.30	Soft to firm brown sandy slightly gravelly CLAY with many angular to subrounded cobbles and occasional boulders.		
					(0.70) 2.00	Soft to firm brownish grey sandy slightly gravelly CLAY with occasional angular to subrounded cobbles and boulders.		
2.00	B					Complete at 2.00m		

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
SA01 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP01

Ground Investigations Ireland Ltd www.gii.ie	Site: Athlumney, Navan, Co. Meath	Trial Pit Number: TP02

Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.10 x 0.60 x 2.00	Ground Level (mOD)	Client: Albert Developments Ltd.	Job Number: 9948-09-20
	Location	Dates: 29/09/2020	Engineer: Hendrick Ryan	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(1.10) 1.30	Soft to firm brown sandy slightly gravelly CLAY with some angular to subrounded cobbles and occasional black sand lenses.		
					(0.70) 2.00	Soft to firm brownish grey slightly sandy slightly gravelly CLAY with some angular to subrounded cobbles and boulders.		
2.00	B					Complete at 2.00m		

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
SA02 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP02

Ground Investigations Ireland Ltd www.gii.ie	Site Athlumney, Navan, Co. Meath	Trial Pit Number TP03

Machine : JCB 3CX Method : Trial Pit	Dimensions 2.10 x 0.60 x 2.00	Ground Level (mOD)	Client Albert Developments Ltd.	Job Number 9948-09-20
	Location	Dates 29/09/2020	Engineer Hendrick Ryan	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.50) 0.70	Soft to firm brown slightly sandy gravelly CLAY with many angular to subrounded cobbles and occasional boulders.		
					(1.10) 1.80	Soft to firm greyish brown sandy gravelly CLAY with many angular to subrounded cobbles and occasional boulder.		
					(0.20) 2.00	Loose brown slightly sandy clayey angular fine to coarse GRAVEL with many angular cobbles.		
2.00	B					Complete at 2.00m		

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
SA03 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP03

Ground Investigations Ireland Ltd www.gii.ie			Site Athlumney, Navan, Co. Meath	Trial Pit Number **TP04**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.00 x 0.65 x 1.50	**Ground Level (mOD)**	**Client** Albert Developments Ltd.	**Job Number** 9948-09-20
	Location	**Dates** 29/09/2020	**Engineer** Hendrick Ryan	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.90) 1.10	Soft to firm brown slightly sandy slightly gravelly CLAY with some angular to subrounded cobbles.		
					(0.40) 1.50	Soft to firm greyish brown slightly sandy slightly gravelly CLAY with many angular to subrounded cobbles and occasional boulders.		
1.50	B					Complete at 1.50m		

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
SA04 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP04

Ground Investigations Ireland Ltd www.gii.ie		Site Athlumney, Navan, Co. Meath	Trial Pit Number **TP05**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.00 x 0.55 x 1.50	**Ground Level (mOD)**	**Client** Albert Developments Ltd.	**Job Number** 9948-09-20
	Location	**Dates** 29/09/2020	**Engineer** Hendrick Ryan	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					0.30 (0.50)	Soft to firm brown slightly sandy slightly gravelly CLAY with some angular to subrounded cobbles.		
					0.80 (0.70)	Soft to firm greyish brown sandy gravelly CLAY with some angular to subrounded cobbles and occasional boulders.		
1.50	B				1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered during excavation.
Trial pit stable.
SA05 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP05

Ground Investigations Ireland Ltd www.gii.ie	Site: Athlumney, Navan, Co. Meath	Trial Pit Number: TP06
Machine : JCB 3CX; Method : Trial Pit; Dimensions: 2.20 x 0.60 x 1.50; Ground Level (mOD): ; Location: ; Dates: 29/09/2020	Client: Albert Developments Ltd. ; Engineer: Hendrick Ryan	Job Number: 9948-09-20; Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					0.40 (0.70)	Soft to firm brown slightly sandy gravelly CLAY with some angular to subroounded cobbles and occasional boulders.		
					1.10 (0.40)	Loose greyish brown clayey gravelly fine to coarse SAND with many angular to subrounded cobbles and some boulders.		
1.50	B				1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered during excavation.
Slight spalling of side wall in trial pit.
SA06 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP06

Ground Investigations Ireland Ltd
www.gii.ie

Machine : JCB 3CX Method : Trial Pit	Dimensions 2.00 x 0.60 x 1.50	Ground Level (mOD)	Site Athlumney, Navan, Co. Meath	Trial Pit Number TP07
			Client Albert Developments Ltd.	Job Number 9948-09-20
	Location	Dates 30/09/2020	Engineer Hendrick Ryan	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
			Water strike(1) at 0.30m.		0.30	Soft to firm brown sandy slightly gravelly CLAY.		1
					(0.70)			
					1.00	Soft to firm greyish brown slightly sandy slightly gravelly CLAY with frequent angular to subrounded cobbles.		
					(0.50)			
1.50	B				1.50	Complete at 1.50m		

Plan

Remarks

Slight groundwater seepage at 0.30m BGL.
Trial Pit stable.
SA07 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP07

Ground Investigations Ireland Ltd www.gii.ie	Site: Athlumney, Navan, Co. Meath	Trial Pit Number: TP08

Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.20 x 0.80 x 2.00	Ground Level (mOD)	Client: Albert Developments Ltd.	Job Number: 9948-09-20
	Location	Dates: 30/09/2020	Engineer: Hendrick Ryan	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.50) 0.70	Soft to firm greyish brown slightly sandy slightly gravelly CLAY with many angular to subrounded cobbles and occasional boulders.		
					(1.30) 2.00	Loose grey sandy clayey angular to subrounded fine to coarse GRAVEL with many angular to subrounded cobbles and occasional boulders.		
2.00	B					Complete at 2.00m		

Plan

Remarks

No Groundwater encountered during excavation.
Slight spalling of sidewalls below 0.70m BGL.
SA08 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP08

Ground Investigations Ireland Ltd www.gii.ie	Site: Athlumney, Navan, Co. Meath	Trial Pit Number: TP09
Machine : JCB 3CX; Method : Trial Pit; Dimensions: 2.50 x 0.60 x 2.20; Ground Level (mOD): ; Location: ; Dates: 30/09/2020	Client: Albert Developments Ltd. Engineer: Hendrick Ryan	Job Number: 9948-09-20; Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.40) 0.60	Soft to firm grey slightly sandy slightly gravelly CLAY.		
					(0.90) 1.50	Soft to firm brown slightly sandy gravelly CLAY with some angular to subrounded cobbles and occasional boulders.		
2.00	B				(0.70) 2.20	Loose greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with many angular to subrounded cobbles and some boulders.		
						Complete at 2.20m		

Plan

Remarks

No Groundwater encountered during excavation.
Trial Pit stable.
SA09 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP09

Ground Investigations Ireland Ltd www.gii.ie		Site: Athlumney, Navan, Co. Meath	Trial Pit Number: TP10
Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.30 x 0.60 x 2.80	Ground Level (mOD):	Client: Albert Developments Ltd.	Job Number: 9948-09-20
	Location:	Dates: 30/09/2020	Engineer: Hendrick Ryan	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Dark brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.40) 0.50	Soft to firm grey slightly sandy slightly gravelly CLAY with many subangular to subrounded cobbles.		
					(0.60) 1.10	Soft to firm brown slightly sandy gravelly CLAY with some angular to subrounded cobbles and occasional boulders.		
					(1.70) 2.80	Loose greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with many angular to subrounded cobbles and some boulders.		
2.80	B					Refusal at 2.80m		

Plan

Remarks

No Groundwater encountered during excavation.
Trial Pit stable.
SA10 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP10

Ground Investigations Ireland Ltd www.gii.ie			Site: Athlumney, Navan, Co. Meath	Trial Pit Number: **TP11**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.00 x 0.50 x 1.60	**Ground Level (mOD)**	**Client** Albert Developments Ltd.	**Job Number** 9948-09-20
	Location	**Dates** 30/09/2020	**Engineer** Hendrick Ryan	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.70) 0.90	Soft to firm brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0.70) 1.60	Loose brownish grey slightly sandy clayey subangular to subrounded fine to coarse GRAVEL with many subangular to subrounded cobbles and occasional boulders.		
1.60	B					Complete at 1.60m		

Plan

Remarks

No Groundwater encountered during excavation.
Trial Pit stable.
SA11 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP11

Ground Investigations Ireland Ltd
www.gii.ie

Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.00 x 0.60 x 1.70	**Ground Level (mOD)**	**Site** Athlumney, Navan, Co. Meath	**Trial Pit Number** **TP12**
	Location	**Dates** 30/09/2020	**Client** Albert Developments Ltd.	**Job Number** 9948-09-20
			Engineer Hendrick Ryan	**Sheet** 1/1

RECEIVED: 07/06/2024

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	Brownish grey slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.80) 1.10	Loose brownish grey slightly gravelly fine to coarse SAND with occasional subangular to subrounded cobbles.		
			Water strike(1) at 1.50m.		(0.60) 1.70	Loose grey slightly gravelly clayey SAND with occasional brown silt lenses and occasional subangular to subrounded cobbles.		1
1.70	B					Complete at 1.70m		

Plan

Remarks

Groundwater strike at 1.50m BGL.
Trial Pit stable.
Trial pit left open to monitor groundwater infiltration.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP12

Ground Investigations Ireland Ltd www.gii.ie			Site Athlumney, Navan, Co. Meath	Trial Pit Number **TP13**
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.60 x 0.70 x 2.00	**Ground Level (mOD)**	**Client** Albert Developments Ltd.	**Job Number** 9948-09-20
	Location	**Dates** 30/09/2020	**Engineer** Hendrick Ryan	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.90) 1.10	Loose greyish brown slightly gravelly clayey fine to medium SAND with occasional subangular to subrounded cobbles.		
			Water strike(1) at 1.60m.		(0.90) 2.00	Very soft grey mottled light brown gravelly sandy SILT/CLAY with many angular to subrounded and occasional boulders.		1
						Complete at 2.00m		

Plan

Remarks

Groundwater strike at 1.60m BGL.
Trial Pit unstable.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP13

Ground Investigations Ireland Ltd
www.gii.ie

Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.40 x 0.65 x 1.60	**Ground Level (mOD)**	**Site** Athlumney, Navan, Co. Meath **Client** Albert Developments Ltd.	**Trial Pit Number** TP14 **Job Number** 9948-09-20
	Location	**Dates** 30/09/2020	**Engineer** Hendrick Ryan	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	Brown slightly sandy slightly gravelly TOPSOIL with rootlets.		
					(0.45) 0.60	Soft to firm brown slightly sandy gravelly CLAY with some angular to subrounded cobbles.		
1.50	B				(1.00) 1.60	Loose greyish brown sandy clayey angular to subrounded fine to coarse GRAVEL with many angular to subrounded cobbles and occasional boulders.		
						Complete at 1.60m		

Plan

Remarks

No Groundwater encountered during excavation.
Slight spalling of sidewall below 0.60m BGL.
SA14 undertaken in pit.
Trial Pit backfilled upon completion.

Scale (approx)	Logged By	Figure No.
1:25	C. Byrne	9948-09-20.TP14

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP01

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP02

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP03

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP04

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP05

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP06

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP07

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP08

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP09

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP10

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP11

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP12

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP13

Athlumney, Navan, Co. Meath – Trial Pit Photographs
Hendrick Ryan – 9948-09-20

TP14

APPENDIX 3 – Soakaway Records

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

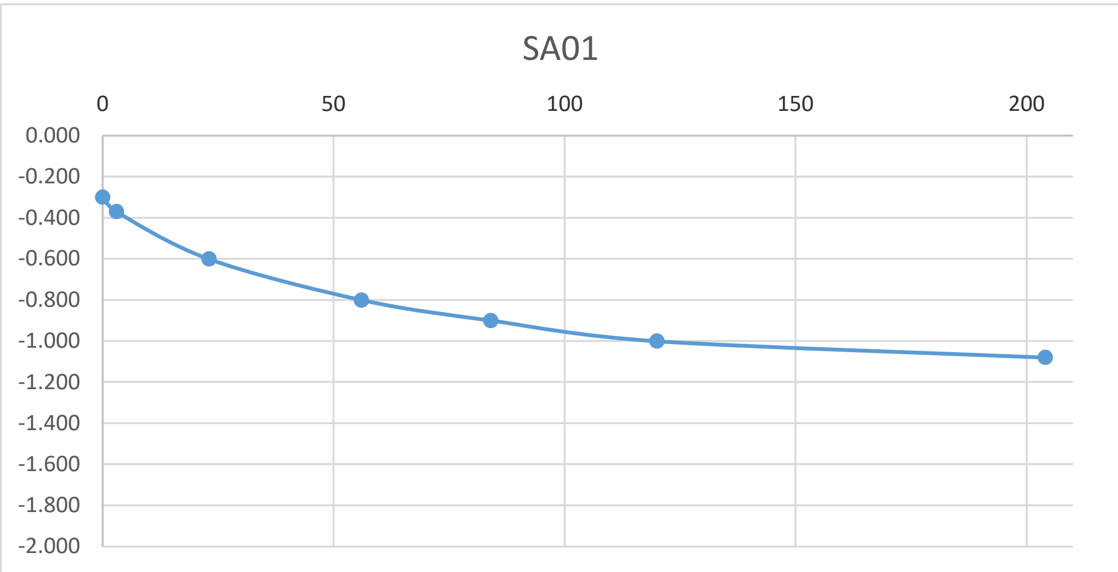
SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.55m 2.0m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2020	0	-0.300
29/09/2020	3	-0.370
29/09/2020	23	-0.600
29/09/2020	56	-0.800
29/09/2020	84	-0.900
29/09/2020	120	-1.000
29/09/2020	204	-1.080

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	2.000	1.700	0.725	1.575



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

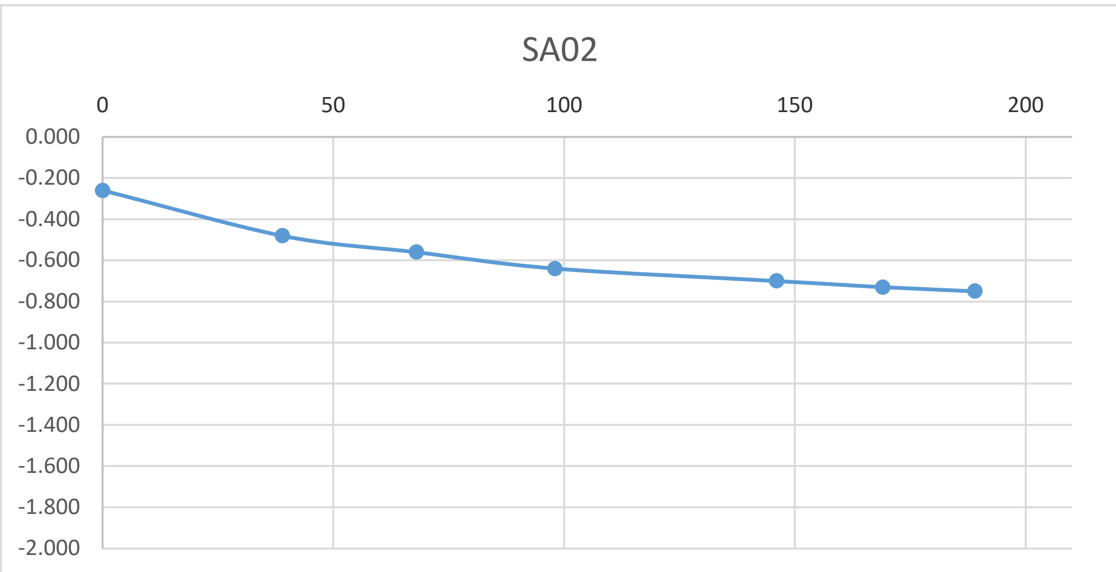
SA02

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.1m x 0.6m 2.0m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2020	0	-0.260
29/09/2020	39	-0.480
29/09/2020	68	-0.560
29/09/2020	98	-0.640
29/09/2020	146	-0.700
29/09/2020	169	-0.730
29/09/2020	189	-0.750

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.26	2.000	1.740	0.695	1.565



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

SA03

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.10m x 0.60m 2.00m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2020	0	-0.300
29/09/2020	6	-0.58
29/09/2020	10	-0.780
29/09/2020	16	-1.000
29/09/2020	20	-1.120
29/09/2020	33	-2.000

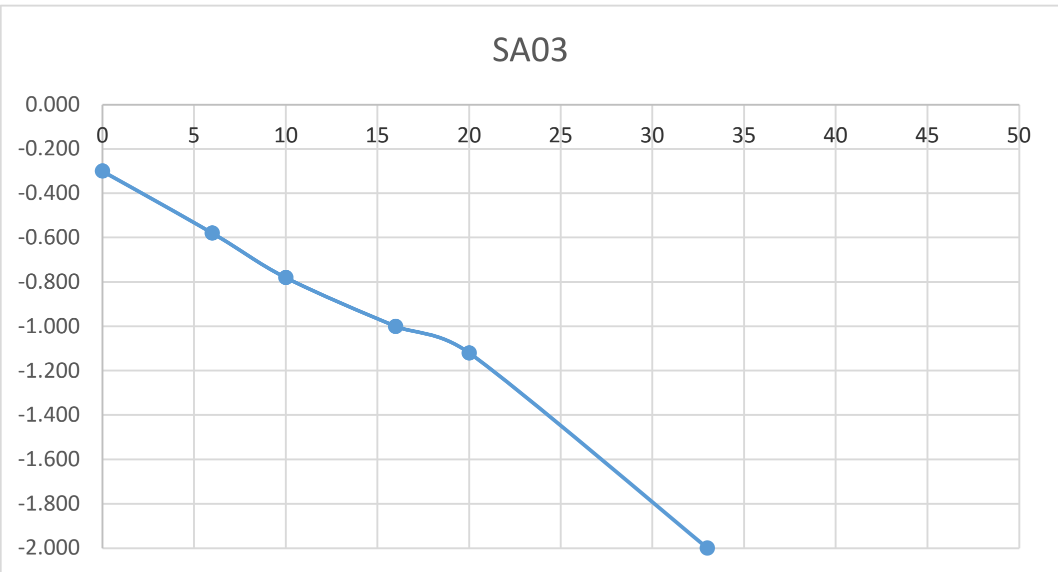
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**2.000**	**1.700**	**0.725**	**1.575**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.100	0.600	0.850	1.07

Tp75-25 (from graph) (s) **1260**

50% Eff Depth	ap50 (m2)
0.850	5.85

f = 1.453E-04 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

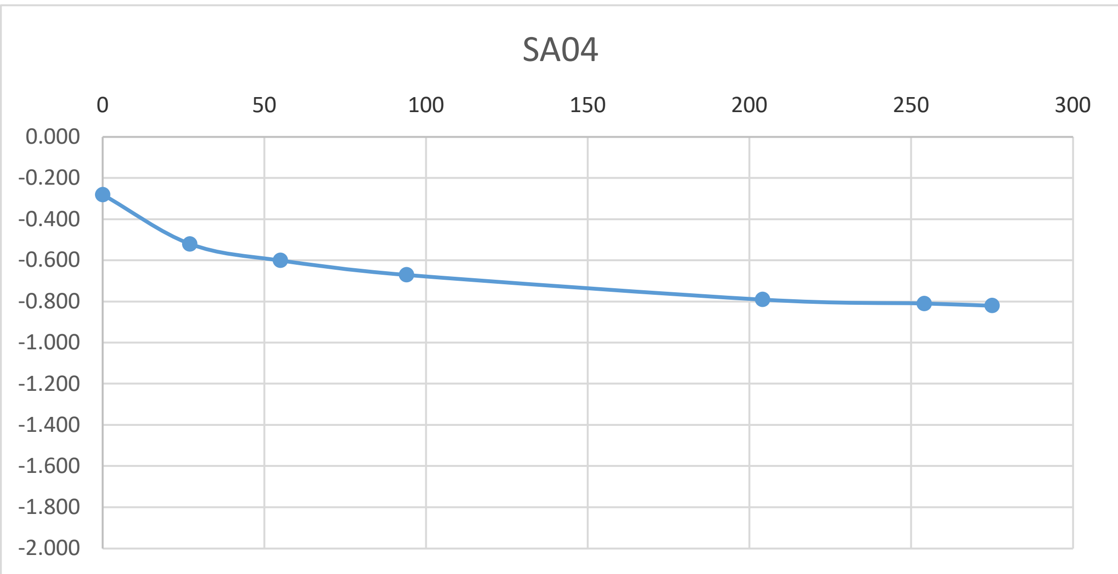
SA04

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.65m 1.5m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2020	0	-0.280
29/09/2020	27	-0.520
29/09/2020	55	-0.600
29/09/2020	94	-0.670
29/09/2020	204	-0.790
29/09/2020	254	-0.810
29/09/2020	275	-0.820

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.28	1.500	1.220	0.585	1.195



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

SA05

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.00m x 0.55m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2020	0	-0.300
29/09/2020	16	-0.660
29/09/2020	24	-0.760
29/09/2020	60	-1.200
29/09/2020	98	-1.500

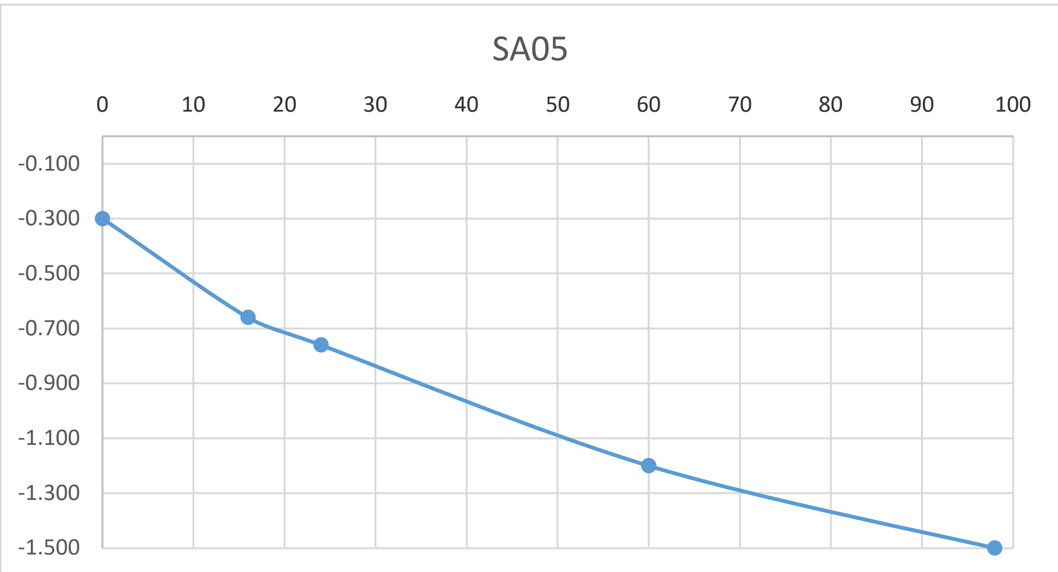
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.500	1.200	0.6	1.2

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.100	0.600	0.600	0.76

Tp75-25 (from graph) (s) **2820**

50% Eff Depth	ap50 (m2)
0.600	4.5

f = 5.957E-05 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Cattherinestown House
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA06

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m x 0.60m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2020	0	-0.300
29/09/2020	2	-0.480
29/09/2020	4	-0.590
29/09/2020	5	-0.670
29/09/2020	23	-1.200
29/09/2020	39	-1.500

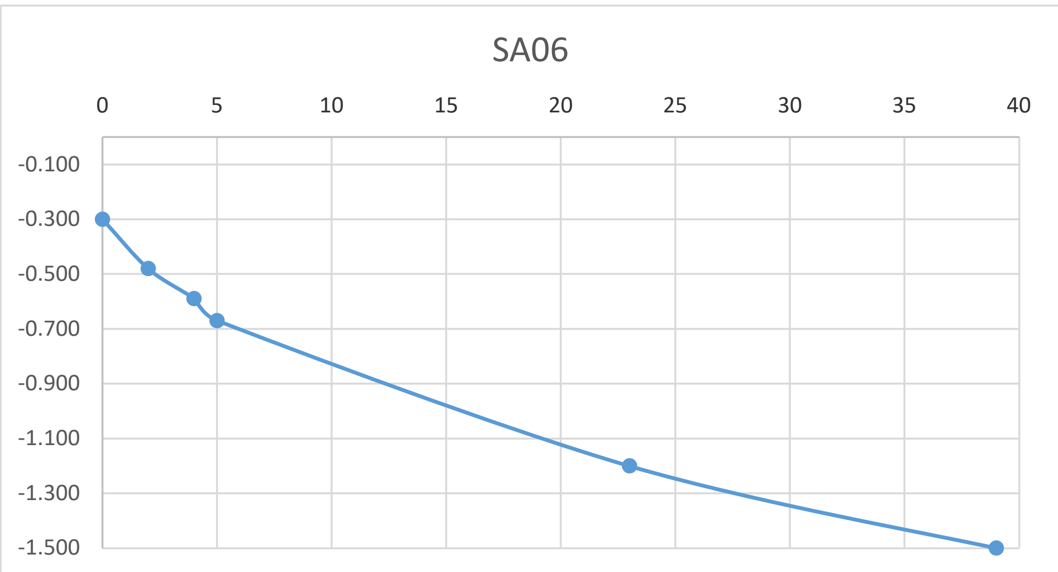
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**1.500**	**1.200**	**0.6**	**1.2**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.200	0.600	0.600	0.79

Tp75-25 (from graph) (s) **840**

50% Eff Depth	ap50 (m2)
0.600	4.68

f = 2.015E-04 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

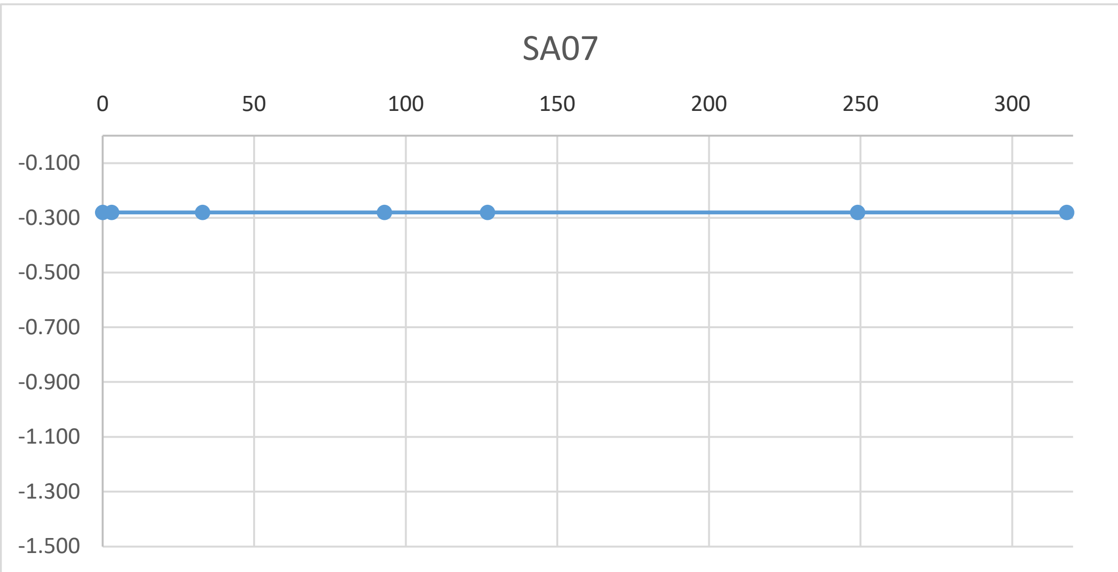
SA07

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.0m x 0.60m 1.5m (L x W x D)

Date	Time	Water level (m bgl)
30/09/2020	0	-0.280
30/09/2020	3	-0.280
30/09/2020	33	-0.280
30/09/2020	93	-0.280
30/09/2020	127	-0.280
30/09/2020	249	-0.280
30/09/2020	318	-0.280

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.28	1.500	1.220	0.585	1.195



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA08

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m x 0.80m 2.00m (L x W x D)

Date	Time	Water level (m bgl)
30/09/2020	0	-0.300
30/09/2020	1	-1.130
30/09/2020	2	-1.410
30/09/2020	3	-2.000

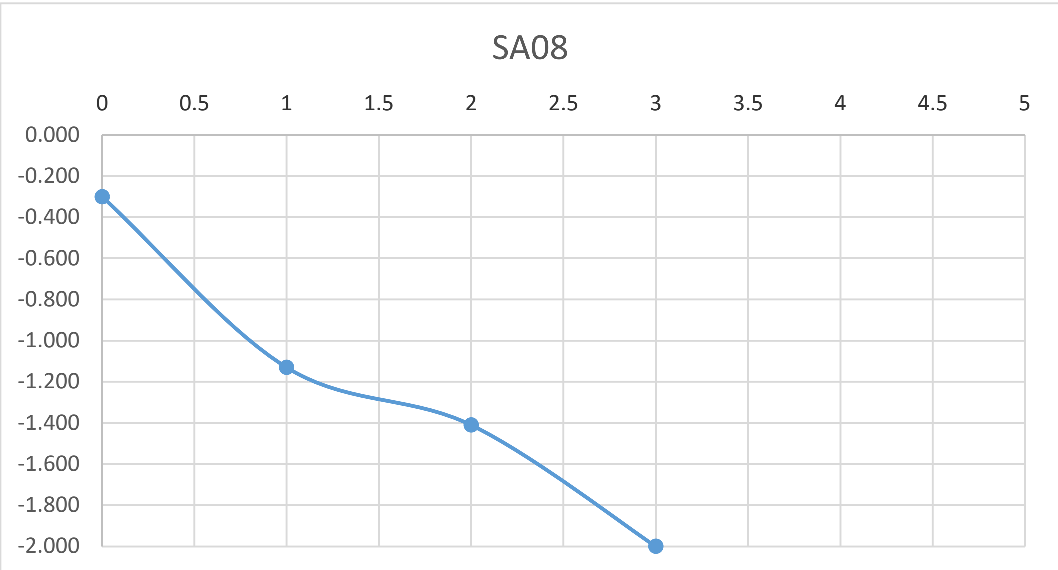
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**2.000**	**1.700**	**0.725**	**1.575**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.200	0.800	0.850	1.50

Tp75-25 (from graph) (s) **45**

50% Eff Depth	ap50 (m2)
0.850	6.86

f = 4.846E-03 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

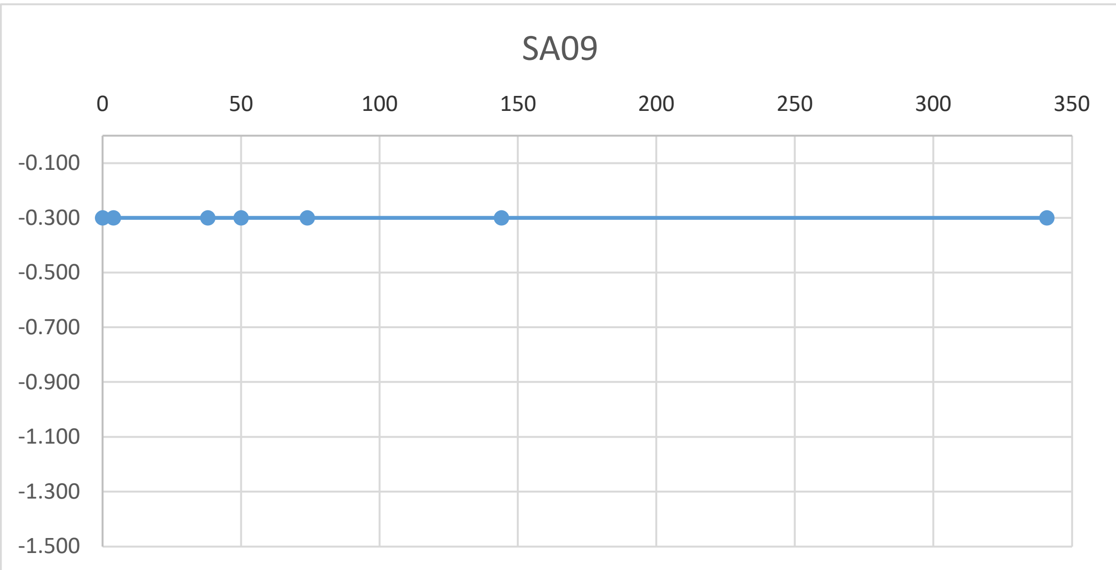
RECEIVED: 07/06/2024

SA09
Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.50m x 0.60m 2.20m (L x W x D)

Date	Time	Water level (m bgl)
30/09/2020	0	-0.300
30/09/2020	4	-0.300
30/09/2020	38	-0.300
30/09/2020	50	-0.300
30/09/2020	74	-0.300
30/09/2020	144	-0.300
30/09/2020	341	-0.300

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**2.200**	**1.900**	**0.775**	**1.725**



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

RECEIVED: 07/06/2024

Cathernestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin,
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA10

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.30m x 0.60m 2.80m (L x W x D)

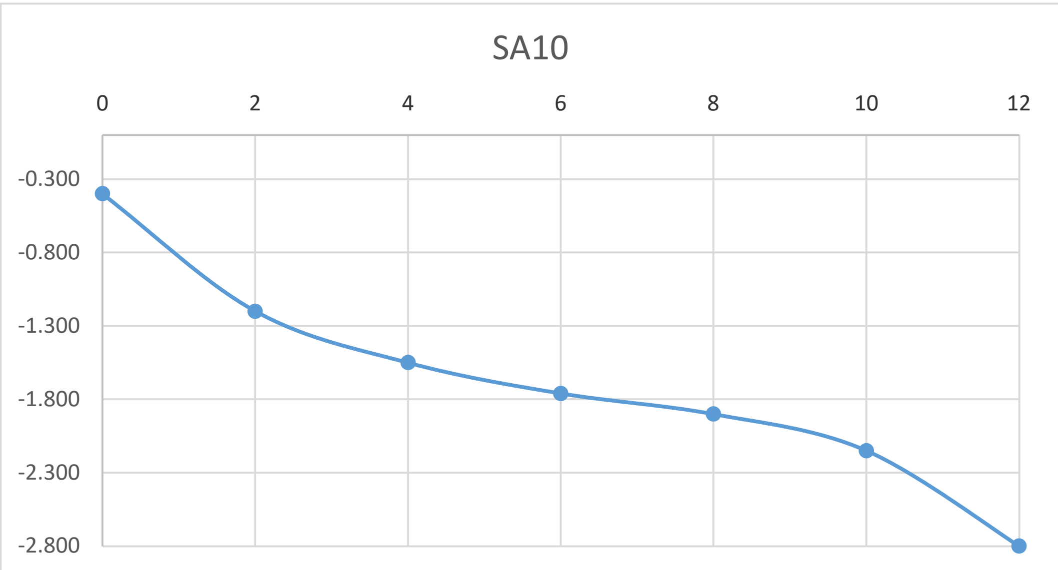
Date	Time	Water level (m bgl)
30/09/2020	0	-0.400
30/09/2020	2	-1.200
30/09/2020	4	-1.550
30/09/2020	6	-1.760
30/09/2020	8	-1.900
30/09/2020	10	-2.150
30/09/2020	12	-2.800

Start depth	Depth of Pit	Diff	75% full	25%full
0.40	**2.800**	**2.400**	**1**	**2.2**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.300	0.600	1.200	1.66

Tp75-25 (from graph) (s)	**522**	50% Eff Depth	ap50 (m2)
		1.200	8.34

f = 3.804E-04 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

SA11

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.00m x 0.50m 1.60m (L x W x D)

Date	Time	Water level (m bgl)
30/09/2020	0	-0.300
30/09/2020	9	-0.570
30/09/2020	18	-0.720
30/09/2020	36	-0.940
30/09/2020	59	-1.160
30/09/2020	75	-1.300
30/09/2020	83	-1.600

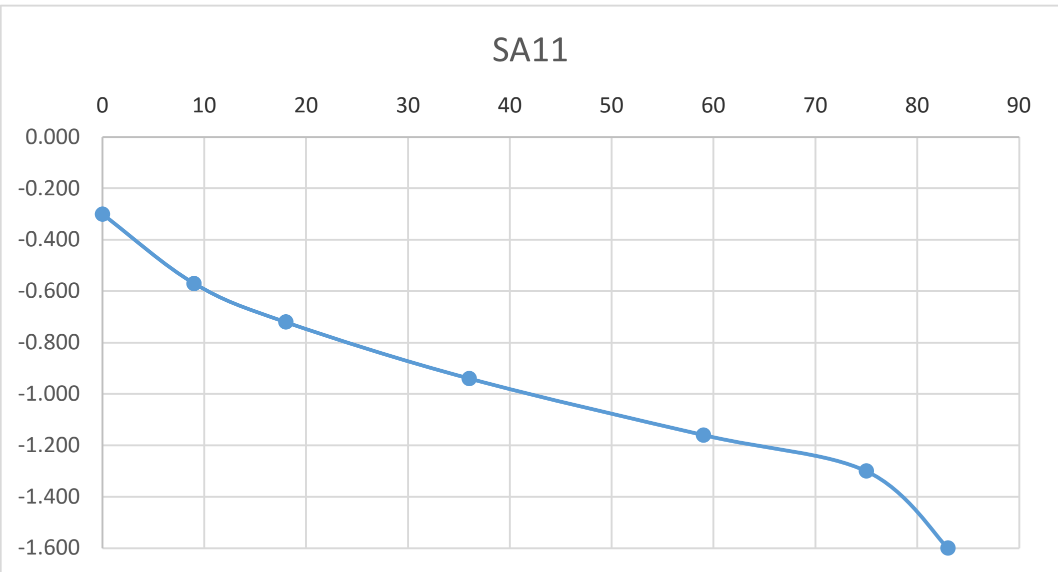
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	1.600	1.300	0.625	1.275

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.000	0.500	0.650	0.65

Tp75-25 (from graph) (s) **3660**

50% Eff Depth	ap50 (m2)
0.650	4.25

f = 4.179E-05 m/s



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

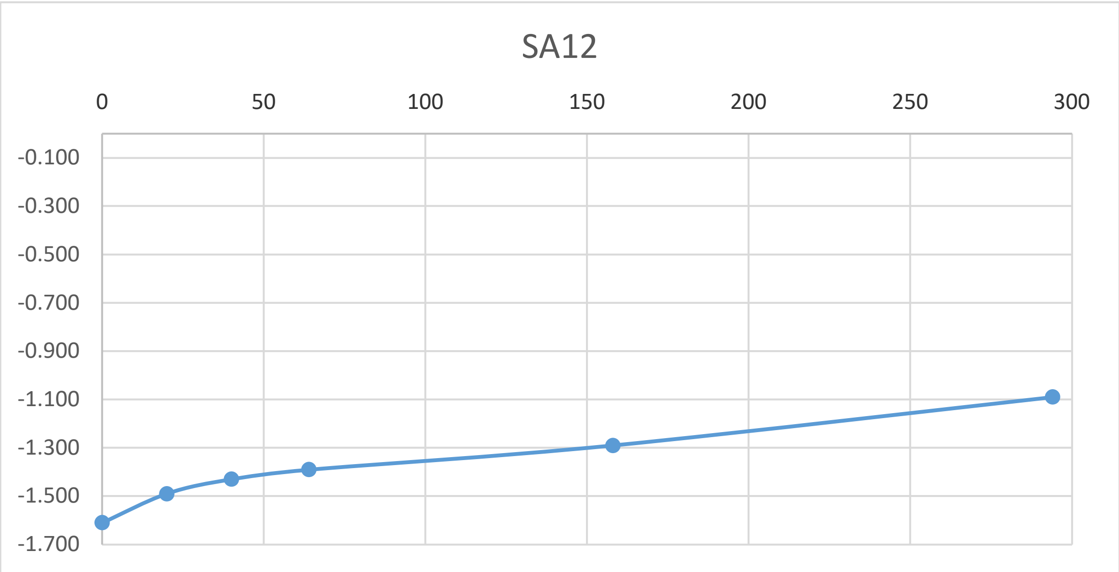
SA12

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.00m x 0.50m 1.70m (L x W x D)

Date	Time	Water level (m bgl)
30/09/2020	0	-1.610
30/09/2020	20	-1.490
30/09/2020	40	-1.430
30/09/2020	64	-1.390
30/09/2020	158	-1.290
30/09/2020	294	-1.090

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
1.61	1.700	0.090	1.6325	1.6775



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin,
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

RECEIVED: 07/06/2024

SA14

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.40m x 0.65m 1.60m (L x W x D)

Date	Time	Water level (m bgl)
30/09/2020	0	-0.300
30/09/2020	2	-0.780
30/09/2020	4	-1.140
30/09/2020	6	-1.300
30/09/2020	8	-1.600

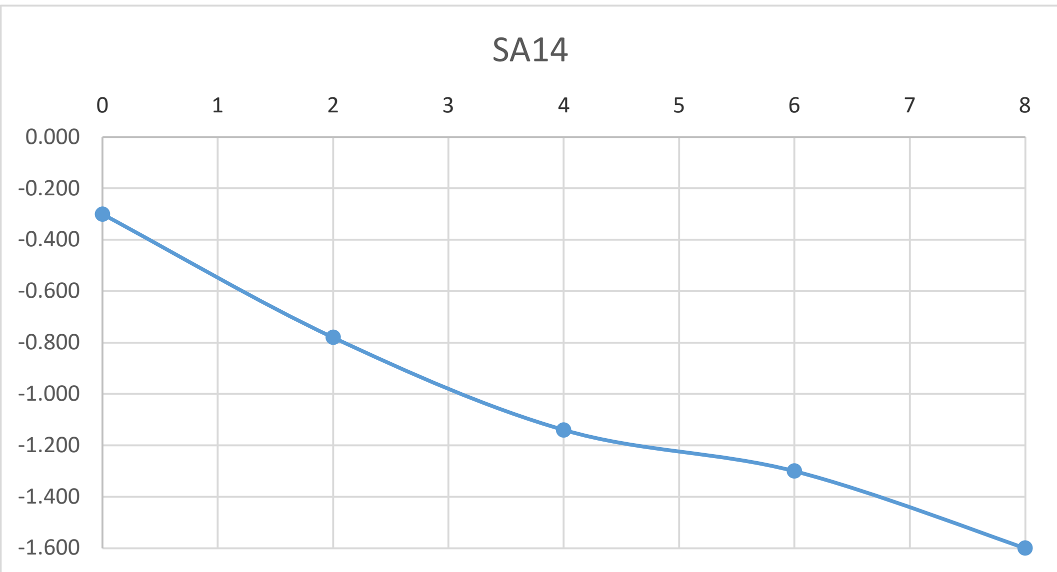
Start depth	Depth of Pit	Diff	75% full	25%full
0.30	**1.600**	**1.300**	**0.625**	**1.275**

Length of pit (m)	Width of pit (m)	75-25Ht (m)	Vp75-25 (m3)
2.400	0.650	0.650	1.01

Tp75-25 (from graph) (s) **168**

50% Eff Depth	ap50 (m2)
0.650	5.525

f = 1.092E-03 m/s



Appendix D2 Outline Construction and Environmental Management Plan

HENDRICK RYAN

Consulting Engineers

Outline Construction Environmental Management Plan

Proposed development at Boyne Village (Phase 1b), Athlumney, Navan, Co. Meath

May 2024

HENDRICKRYAN
Consulting Engineers

CONTENTS

CONTENTS

DOCUMENT CONTROL SHEET

Client	Albert Developments Ltd
Document Title	Outline Construction Environmental Management Plan
Project Number	2135 (Phase 1b)
Inspection made by	

Revision	Author	Approved by	Date of issue
P1	Patrick McStay	Patrick McStay	17th May 2023
P2	Patrick McStay	Patrick McStay	24th July 2023
P3	Patrick McStay	Patrick McStay	2nd August 2023
P4	Patrick McStay	Patrick McStay	1st May 2024
P5	Patrick McStay	Patrick McStay	18th May 2024
P6	Patrick McStay	Patrick McStay	25th May 2024

1 Introduction

1.1 Background

This Outline Construction Environmental Management Plan (Outline CEMP) sets out the procedures, standards, work practices and management responsibilities to address potential environmental effects that may arise from the construction of a proposed development at Boyne Village (Phase 1b), Athlumney, Navan. Co. Meath.

The purpose of the Construction Environmental Management Plan is to outline how the construction project will avoid, minimise or mitigate adverse effects on the environment and surrounding area.

The Outline CEMP shall be considered a live document at all times. It is subject to review and amendment throughout the duration of the proposed works. Information presented in the Outline CEMP is therefore subject to change and refinement through the design and construction process.

This plan will be refined by the appointed Contractor into a detailed Contractor CEMP as more information becomes available regarding the proposed layout, construction methods, programme and potential environmental impacts to be mitigated against. The elements contained within this plan will be included in the Contractor's CEMP, which will be prepared prior to construction by the appointed Contractor.

Following completion of the proposed works, the Contractor shall prepare a Handover Environmental Management Plan that will contain essential environmental information needed by the bodies responsible for the future maintenance and operation of the asset.

1.2 Objectives

The primary purpose of this Outline CEMP and subsequent Contractor CEMP is to ensure that the proposed development is compliant with current environmental legislation and to minimise potential adverse effects occurring during the proposed works.

The Construction Environmental Management Plan shall

- Act as a continuous reference during the design, construction, and commissioning stages of the proposed development with respect to environmental issues
- Demonstrate how design and construction activities will address the requirements of environmental legislation, environmental policy, regulatory authorities, relevant stakeholders and good practice
- Identify potential environmental risks and ensure that any adverse effects are minimised during construction
- Identify objectives and mitigation commitments and detail how these will be implemented on site
- Identify key roles and responsibilities associated with delivering the project with respect to environmental issues and necessary controls, communication and training requirements
- Describe the Contractor's proposals to ensure that the environment requirements of the design are achieved during the construction works
- Provide a monitoring, review and audit cycle to assess the effectiveness of environmental control measures and outline how any necessary corrective action will be implemented
- Act as a vehicle for handing over key environmental information to the body responsible for management of the completed development / infrastructure.

1.3 Scope

The scope of this Outline CEMP covers the design and construction of a proposed development at Boyne Village (Phase 1b), Athlumney, Navan, Co. Meath.

The spatial scope of the proposed development covers

- The site within the red line boundary
- Any additional working areas used to facilitate the proposed works
- Access to and egress from the site

This Outline CEMP considers the following subject areas

- Air Quality & Climate
- Energy
- Archaeology & Cultural Heritage
- Geology & Soils
- Landscape & Visual Impact
- Materials
- Nature Conservation & Biodiversity
- Noise and Vibration
- Transport & Traffic Management
- Waste
- Water quality and drainage

This Outline CEMP provides guidance to the Contractor regarding information to be included in the Construction CEMP. The Construction CEMP shall be a Contractor produced document that describes how the information and conditions provided in the Outline CEMP is incorporated into the construction works.

2 Project Description

2.1 Overview

The proposed development is to be located at a site on lands with an area of approximately 13.39ha. within the townlands of 'Ferganstown and Ballymacon', Navan, Co. Meath.

The (Phase 1B) development will consist of the construction of a mixed-use development comprising 322no. dwellings, a Community Centre and Sports Hall, a Neighbourhood Centre, and a district public park as follows:

A) 212 no. houses consisting of 177 no. 3-bedroom houses and 35 no. 4-bedroom houses (all houses 2-storeys except House Types F1, F2, F3 [corner], E1, E2, and E3 [corner];
B) 26 no. duplex units comprising, 13 no. 2-bedroom units and 13 no. 3-bedroom units (in 2 no. 3-storey blocks [with 8 no. duplex units abutting Apartment Block 2 in a 3-storey configuration];
C) 84 no. apartments across 3 no. apartment buildings (Block 2 [5-storeys] comprises 24 no. apartments consisting of 12 no. 1-bedroom apartments and 12 no. 2-bedroom apartments), Block 3 [5-storeys above neighbourhood centre - 6-storeys in total] comprising 36 no. apartments consisting of 14 no. 1- bedroom apartments and 22 no. 2-bedroom apartments and Block 4 [4-storeys above community centre - 5-storeys in total] comprising 24 no. apartments consisting of 9 no. 1-bedroom apartments and 15 no. 2-bedroom apartments (all apartments with balconies).
D) Series of landscaped/Public Open Space areas of c.3.72 hectares including playground areas and a Public Park of c.1.65 ha of open space as well as additional communal open space for the apartments and duplex apartments;
E) Provision of a c. 512 sq. m creche at ground floor of Block 2 as well as a 1,778 sq.m. Community Centre and Sports Hall (including a c.837 sqm sports hall [double height] ancillary changing rooms, 4 no. community rooms and ancillary administration/office space rooms/ESB Substation);
F) Provision of a convenience anchor retail unit (net floor space 1,000 sq. m [GFA 1,390 sq. m.]), takeaway, c. 82 sq. m, café, c. 210 sq. m, pharmacy c. 88 sq. m and General Practice Surgery c. 232 sq. m) as well as ESB substation and bins, all accommodated within the ground floor level of the neighbourhood centre to the north-west of the site;
G) 693 no. car parking spaces, 289 no. bicycle parking spaces throughout the development;
H) Provision of a temporary foul water pumping station (and associated storage) located within the district public park to service the scheme;
I) Provision of surface water attenuation measures as well as all ancillary site development works (reprofiling of site and field drain diversions as required) as well as connection to the public water supply and drainage services (including culvert along the Old Road frontage);
J) ESB sub-station, hard and soft landscaped areas, public lighting, bin stores, all ancillary landscape works including planting and boundary treatments and the provision of cycle paths, and all ancillary site development works.

An Ecological Impact Assessment (EcIA), Natura Impact Statement (NIS) and Environmental Report have been prepared for the proposed development. An Environmental Impact Assessment Report will be submitted with the LRD application in due course. The Contractor's CEMP will incorporate the mitigation measures contained in the EIAR.

The proposed site location can be seen on Figure 2-1 below.

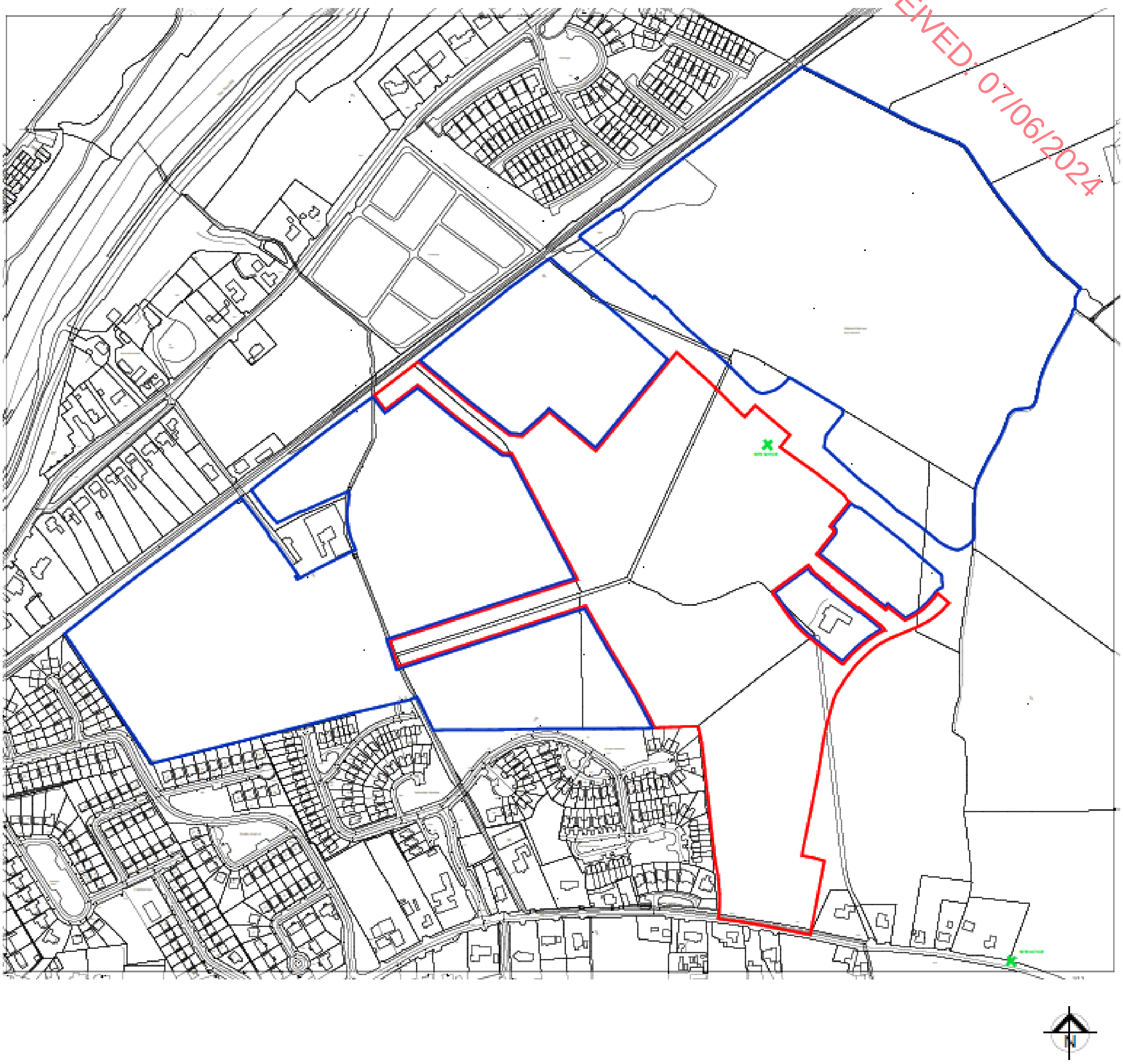


Figure 2-1: Site Location

2.2 The site and surrounding lands

The proposed site plan can be seen on Figure 2-2 below.

Figure 2-2: Site Plan

2.3 Phased Construction

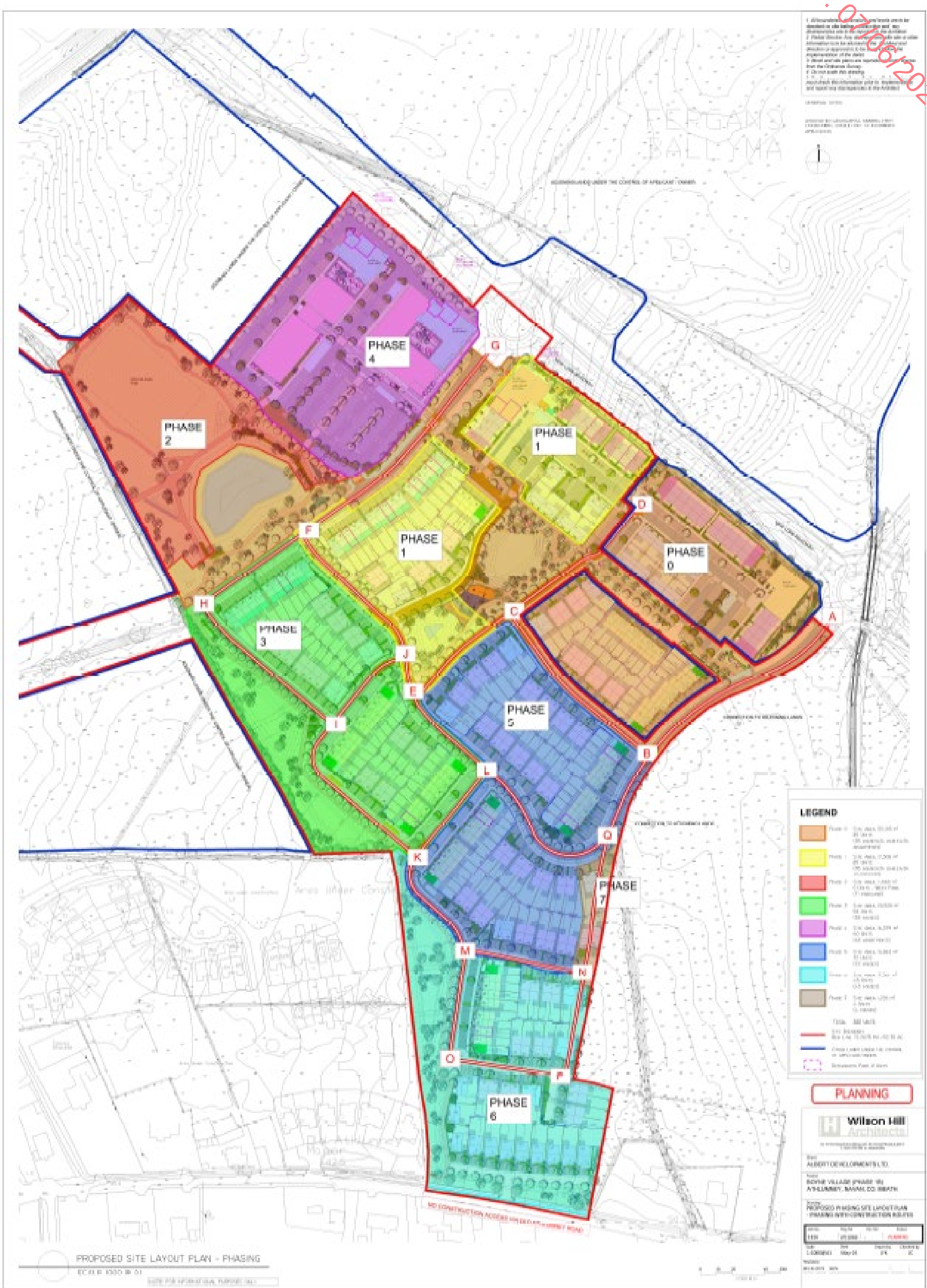


Figure 2-3: Phasing Plan

The proposed development is to be constructed in phases. The proposed phasing is shown above. Phasing has been designed to ensure that occupied areas of the site where people are living have been fully separated from undeveloped areas of the site where construction works are to be carried out. Roads used by construction traffic will be separated from areas of the site which are occupied. The construction works are to be separated from the residential development using 2.4m high hoarding. Figure 2-3 shows the proposed phasing for the development.

Phase 0

Phase 0 which is located adjacent to the LDR6 relates to an area of the site which previously received planning permission (Planning Ref: 211046 / ABP-312746-22) for 98 housing units including a 4-storey apartment building, duplex units and housing.

This phase of the development will require some works within the main parkland including the construction of an attenuation pond and the installation of a waste water pump station (WWPS). Some underground services (surface water, wastewater etc) will need to be installed under the road which provides access to the parkland & Neighbourhood Centre (Phase 2 & 4) during construction of Phase 0.

This area of the site is currently under construction and is accessible from the eastern roundabout (Roundabout 2) on the LDR 6. Roads A - D will be constructed at this stage and accessible to residents.

Phase 1

Phase 1 is also located adjacent to the LDR 6. This area of the site consists of a 4-storey apartment building, duplex units and housing (85No residential units). A crèche is contained within the apartment building and will be constructed within this phase of the development.

The attenuation pond in the parkland will be enlarged during the construction of Phase 1 to provide additional storage for surface water runoff. A section of the road from the western roundabout (Roundabout 3) on the LDR6 will be constructed at this stage to provide access to Phase1. Internal roads will be constructed between Phase 0 & Phase 1 which can now be accessed from both roundabouts (Roundabouts 2 & 3) on the LDR6. Roads A – G will have been constructed at this stage and be accessible to residents.

Phase 2

Phase 2 will consist of the development of the parkland adjacent to the proposed neighbourhood centre. The size of the attenuation pond will be increased to its full capacity for the proposed development at this stage.

Phase 3

Phase 3 will consist of the development of (58No houses). Additional access roads and surface water detention basins will be provided at this stage of the development. Roads A – L will have been constructed at this stage and be accessible to residents.

Phase 4

It is hoped that a critical mass of residents in the area would now allow the development of the Neighbourhood Centre in Phase 4 which contains retail units, 60No. residential units and associated parking. The development of the neighbourhood centre at an earlier stage would be considered premature and the lack of a substantial number of residents would potentially result in an inability to occupy retail units for a long period of time.

Phase 5

Phase 5 will consist of the development of 64-70No.houses. Additional access roads and surface water detention basins will be provided at this stage of the development. Roads A – N & B - L will have been constructed at this stage and be accessible to residents.

Several houses (approximately 6-12) on the eastern site boundary of Phase 5 will not be constructed at this stage. This area of land will be used to provide temporary access to Phase 6 of the works and a compound with site facilities.

Phase 6

Phase 6 will consist of the development of 21No. houses. Additional access roads and surface water detention basins will be provided at this stage of the development. The new culvert at the Old Athlumney Road will be installed at this stage. All roads will have been constructed at this stage and be accessible to residents. A new entrance from the Old Athlumney Road will provide access for nine houses.

Phase 7

Phase 7, which completes the development, consists of the construction of the houses at the eastern boundary of Phase 5 (6-12No. houses) which were omitted to provide access to Phase 6.

2.4 Proposed Site Development Activities

The Construction Environmental Management Plan relates to the following site activities

- Site clearance works
- Ground preparation works
- Development of site infrastructure
- Construction of buildings
- Hard & soft landscaping of site

2.5 Indicative Outline Construction Timeline

The development will be constructed on a phased basis. An indicative outline construction timeline is shown below. Note that the appointed Contractor shall develop a detailed construction programme following appointment.

Table 2-1: Indicative Outline Construction Timeline for each phase

Activity	Duration
Site clearance and set-up	8 Weeks
Install site services	26 Weeks
Substructures (foundations)	26 Weeks
Superstructures	26 Weeks
Roads & paving	26 Weeks
Landscaping	16 Weeks

2.6 Construction Compound

A construction compound will be required to be located adjacent to each phase of the construction works. It is intended that the construction compound will be located immediately adjacent to the construction site in an area which is separated from previously constructed residential areas and can be easily secured. The Contractor will be required to identify the location of compounds in the Construction Management Plan for the works. Indicative locations for compounds are shown below.

Construction of Phase 1 will likely commence with the duplexes and apartments followed by the houses. A temporary compound located at the proposed carpark at the neighbourhood centre (Phase 4) could facilitate the construction of Phase 1 – 3 and the buildings at Phase 4. A second compound may be located at Phase 7 to facilitate construction of Phase 5 & 6. This compound will be removed as the Contractor completes Phase 7.

The main compound will have an approximate area of 2,000 – 2,500m^2 in size and will include stores, offices, material storage areas, plant storage and parking for site and staff vehicles. This site is proposed to remain in place for the duration of the construction works but may be scaled up or down during particular activities on site.

The construction compound will need to incorporate any protection and control measures outlined in the Construction & Environmental Management Plan, Environmental Report and comply with requirements outlined in the Construction Erosion and Sediment Control Plan (CESCP) and planning conditions.

These areas will be incorporated into the development on completion of the works. Temporary buildings and containers, parking areas and material such as rubble, aggregates and un-used construction materials will be removed and disposed appropriately.

Figure 2-3: Indicative Construction Compound Location

3 Construction Environmental Management Plan

This Section describes the general construction management plan to be implemented during construction works and details relevant requirements, procedures and plans.

3.1 General Site Management

An example list of relevant legislation and guidance can be found in Appendix D.

3.1.1 Construction Working Hours

Construction activities shall only take place in accordance with typical permitted construction hours.

- 7am – 7pm Monday to Friday
- 8am – 2pm Saturdays (or as permitted by Meath County Council)
- No works Sundays or on Public Holidays
- Work outside of normal hours shall only take place where written permission has been received from Meath County Council. The location of any works anticipated to be undertaken outside normal working hours shall be limited and strictly defined.

3.1.2 Pre-Construction Works

Pre-construction works may include the following

- Completion of pre-construction surveys on adjoining third-party buildings / structures, site boundaries, roads & footpaths etc
- Installation of hoarding to perimeter of site
- Identification of existing services, utilities etc adjacent to site
- Provision of temporary site accommodation, welfare facilities etc.
- Site Clearance Works

3.1.3 Site Housekeeping

- Good housekeeping helps maintain an efficient & safe construction site and is an important part of good environmental practice. The site shall be maintained in a tidy, secure manner with clearly defined access routes.
- The Contractor shall
    - Ensure the site is secure from un-authorised entrance
    - Adequately plan the site with designated areas for accommodation, parking, plant, storage of materials and waste
    - Segregate waste as it is produced and arrange for frequent removal
    - Keep the site clean and tidy
    - Ensure that no ‘wind-blown’ litter or debris leaves the site including the use of covered skips
    - Keep hoardings tidy
    - Provide wheel washing facilities
    - Keep roads free from soil through using a road sweeper

3.1.4 Site access and traffic management

- Access to & egress from the construction site shall be via the existing road network and shall be managed by signage and flagmen
- Construction related traffic shall enter / exit the site using the existing roundabout at the LDR 6
- Pedestrian footpaths & site access crossover points shall be managed by flagmen where necessary

- It is estimated that construction materials shall be delivered to site at a rate of approximately one delivery per hour during peak construction works
- A road sweeping vehicle shall be used to clean roads and pavements as required during the construction works
- Refuelling of site plant and vehicles shall only be conducted by using a mobile refuelling vehicle fitted with appropriate spill kit
- The use of truck horns shall not be permitted

3.2 Environmental Management of Construction Works

Environmental noise and dust deposition monitoring surveys shall be conducted throughout the construction phase to monitor and assess the impact that site works may have on the receiving environment and on local receptors.

The results of all surveys shall be maintained by the Project Manager and made available to Meath County Council as requested.

3.3 Resource & Waste Management Plan

A separate Resource & Waste Management Plan (RWMP) has been provided as part of the Application documentation.

The RWMP shall be implemented throughout the construction of the development to ensure

- That site activities are effectively managed to minimise waste generation and to maximise the re-use and recycling of waste materials
- That waste materials are appropriately segregated and stored in a managed dedicated waste storage area

That all waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved licensed facilities in compliance with the *Waste Management Act 1996* and all associated Waste Management Regulations.

4 Environmental Management

4.1 Overview

The Construction Environmental Management Plan (CEMP) shall address the requirements of the Objectives listed in Section 1 of this document and any new environmental information made available to the Contractor. The CEMP shall comply with the requirements of the relevant authorities / stakeholders.

The CEMP shall be prepared by the Contractor and submitted to the Design Team and Local Authority prior to commencing on site. It shall be prepared in sufficient detail to describe the Contractor's proposed management, control and mitigation strategy for each environmental aspect.

Consideration shall be given to relevant adjoining construction works in the management of construction activities on site. Where necessary, the CEMP shall include Method Statements from the Contractor for specific works (e.g. working in or near watercourses). (Appendix B)

The CEMP shall be continuously developed and updated during the design process and construction stage and shall be reviewed on a regular basis with the Client as necessary.

4.2 Key Environmental Aspects and Impacts

The Contractor shall prepare a site-specific Environmental Risk Assessment (ERA) to be included in the CEMP (Appendix C). The Contractor should also include the following

- Environmental guidelines on how to prepare an Environmental Risk Assessment
- Monitoring and checklists that shall be implemented to manage the environment
- Identify environmentally sensitive area and control measures to be implemented on site
- The procedure for undertaking an ERA to assist in the identification of environmental aspects of the projects,activities, products and services.

4.3 Roles and Responsibilities

The Contractor shall appoint a competent (suitably experienced & qualified) Construction Environmental Management Plan Co-ordinator (CEMPC) to co-ordinate implementation of the Contractor's proposals and monitoring / assessment of any impacts of the project with respect to environmental requirements.

The CEMPC shall

- act as the point of contact for environmental issues with the Contractor's employees, sub-contractors, relevant authorities / stakeholders and the public
- prepare, implement and review (assess / audit the performance of) the CEMP with the sole purpose of ensuring that the environment is safeguarded at all times from anticipated / unexpected adverse effects throughout the duration of the construction works
- be responsible for controlling any environment impacts resulting from the activities of the Contractor and his sub-contractors in accordance with the CEMP
- have the authority to ensure that the CEMP is implemented effectively
- notify the Client of any transgressions in respect of the CEMP so that necessary action may be taken

The duties of the CEMPC shall include the following

- Implementing the CEMP procedures

- Environmental monitoring, recording and reporting;
- Maintaining and auditing the CEMP and relevant documents which relate to it
- Environmental training including toolbox talks to site staff and design staff
- Liaising with statutory authorities (as required)
- Assist in communicating with relevant authorities / stakeholders and local community
- Any other activities that may be necessary to the environment during the construction works

Additional environmental specialists (as listed in Table 4-1) shall be made available to provide advice on the CEMP as required during the construction works. The CEMP would typically assign environmental responsibilities to the following members of the construction team during the course of the construction works.

Table 4-1: Contractor Roles & Responsibilities

Role	Responsibilities
Project Director	Assign specific environmental duties to competent members of the Construction Team Identify the environmental training needs of personnel and provide appropriate training Ensure that environmental aspects associated with the project are adequately resourced & managed Promote continuous improvement of environmental performance during the course of the construction works
CEMP Co-ordinator (CEMPC)	Develop, maintain and audit the Construction Environmental Management Plan to ensure all aspects, impacts and statutory requirements are adequately addressed by the CEMP Ensure that the works are constructed in accordance with the CEMP Develop and implement a programme of regular environmental inspections, monitoring & reporting by Environmental Site Representatives in accordance with the CEMP Liaise with relevant statutory authorities, stakeholders, environmental bodies & local community as required Attend regular construction meetings to ensure that environmental issues are discussed and addressed by the Construction Team Comply with duties under relevant legislation and company procedures with respect to investigating & reporting any environmental incidents Nominate Environmental Site Representatives Appoint any environmental specialists (if required) Ensure identified environmental specialists are in attendance on site as required by the CEMP Provide adequate training & support to all site operatives in relation to environmental aspects, impacts, regulatory requirements, best practice, constraints & acceptable methods of work Review & address any non-conformance reports provided by the Environmental Site Representative (or any other relevant stakeholder) to identify any potential contributing issues in order to develop mitigating measures
Project Manager	Ensure that the CEMP is produced, developed (as appropriate during the construction works), implemented & issued to all relevant parties Provide a “first point of contact” for environment issues / incidents Monitor any corrective actions to be taken by the site manager and ensure that appropriate corrective actions are implemented with minimum delay Provide regular reports to the Client regarding environmental performance, including details of any incidents or non-conformances that have occurred and necessary corrective actions taken Ensure that all site operatives are aware of the CEMP and their responsibilities associated with it Evaluate the competence of all sub-contractors & suppliers with respect to the CEMP. Ensure that they are aware of the requirements of the CEMP and comply with required procedures

Role	Responsibilities
	Communicate with all relevant stakeholders & interested parties associated with the works (eg site operatives, employees, partners, sub-contractors, suppliers, designers & relevant third parties)
Site Manager	Ensure that appropriate environmental training is provided to all personnel prior to commencing works on site & that training is refreshed / updated at appropriate intervals during the works Maintain a record of all environmental training provided Monitor & assess the performance of personnel and activities with respect to the CEMP and ensure appropriate resources and arrangements are in place in order that personnel can function in a manner which minimises risks to the environment. Implement regular environmental inspections with the Environmental Site Representative Complete any corrective actions identified by the Environmental Site Representative and report to the Client as required Assist and support the Environmental Manager (CEMPC) and statutory bodies in the investigation of any incidents Promptly notify the Environmental Site Representative of any environmental issue / incident that arises during the works
Environmental Specialist	Attend site to monitor works in accordance with the requirements of relevant legislation, Contract Documents and CEMP Identify potential environmental risks develop suitable control measures Report to the Environmental Site Representative

4.4 Environmental Complaints Register

An Environmental Complaints Register shall be established to record and deal with potential internal & external complaints. The register shall be used to document relevant complaints. If a complaint is received, thefollowing information shall be recorded

- Name of complainant (if provided)
- Date and time of the complaint
- Nature of complaint

All complaints received from internal and external sources shall be reported to the Environmental Management Plan Co-ordinator and Senior Site Management. The CEMPC shall address the complaint in a timely manner

4.5 Supervision, Monitoring and Inspections

Activities that could potentially have a significant impact on the environment shall be adequately supervised by the Contractor. Periodic monitoring and inspections will be carried out by the Design Team on behalf of the Client.

4.6 Environmental Auditing

Planned and documented audits aimed at evaluating the conformance of the project shall be carried out at regular intervals. The frequencyof the audits shall be agreed in advance with the Client.

5 Environmental Management Plan

This Section describes measures to be implemented during the proposed works to minimise the effects of construction related noise, vibration, dust etc on the receiving environment and adjoining areas

This Outline CEMP considers the following subject areas

- Air Quality & Climate
- Energy
- Archaeology & Cultural Heritage
- Geology & Soils
- Landscape & Visual Impact
- Nature Conservation & Biodiversity
- Noise and Vibration
- Transport & Traffic Management
- Waste
- Water quality and drainage
- Environmental Management
- General Site Management

5.1 Air Quality and Climate

Construction works can negatively affect air quality. Measures will be required to ensure that the proposed works are carried out in manner which minimises

- the emission of dust and other pollutants
- disruption and risks to human health
- negative impacts on the environment and ecological habitats

5.1.1 Legislation and Guidance

Legislation, policy and guidelines relevant to the management of air quality and climate are noted below

- European Union Clean Air Policy
- European Union Directive (2008/50/EC)
- European Union Ambient air quality directives (EU, 2004, 2008)
- Air Quality Standards Regulations (S.I. 180 of 2011)
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority - 2011)

5.1.2 Key Impacts

Impacts from construction works include emissions from vehicles / plant and the generation of dust from activities such as earthworks and construction processes which use concrete, aggregates etc. Dust and air pollution (including odours) can cause disruption to the public and properties located adjacent to the construction works. It can also adversely impact other environmental receptors including watercourses and ecologically sensitive areas.

5.1.3 Environmental Control Measures and Proposals

A dust control strategy shall be put in place to ensure that no significant nuisance is imposed on sensitive receptors. Effective management of dust emissions will be ensured through the development and implementation of a Dust Management Plan (DMP).

Dust Management Plan Overview

The Dust Management Plan shall

- Specify a site policy regarding dust
- Identify and assign responsibility for dust control to site management
- Identify control measures to be implemented for each potential environmental impact
- Develop documented procedures for managing site practices and controls
- Develop procedures for assessing the implementation of the dust management plan

Identify control measures to be implemented for each potential environmental impact

General

The Contractor shall implement measures to minimise the amount of dust and other emissions (including odour) produced during the construction works. The Contractor shall implement all necessary mitigation measures including those noted below

- Assign responsibility for dust & emissions control to site management (eg CEMPC)
- Training all staff, sub-contractors and site operatives in the importance of minimising the generation of dust
- Liaise with public as required
- Regular site inspections shall be undertaken by the CEMPC / Environmental Representative to assess compliance with the CEMP
- The Contractor shall comply with any mitigation measures specified by Statutory Bodies, Local Authority, Planning Permission, relevant stakeholders and any supplementary environmental reports made available to the Contractor
- Works shall be planned to take account of the location of sensitive receptors, activities associated with operation of the local community/businesses, local topography, wind direction and any potential sources of pollution
- The Contractor and Client shall agree any specific monitoring requirements and action levels

Discussion with the Client shall be undertaken at an early stage by the Contractor to determine any specific monitoring requirements and to agree to any proposed trigger/action levels.

Dust mitigation measures

The aim of effective dust management is to prevent dust becoming airborne at source. This can be done through good design and effective control strategies.

- The siting of construction activities and positioning of earthworks storage piles shall take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance occurring
- Effective site management shall include the ability to respond to adverse weather conditions (eg wind) through restricting site operations or using effective control measures quickly prior to the potential nuisance occurs
- Appropriately trained staff shall be available to monitor dust control methods during working hours
- Buildings / structures shall have external scaffolding with dust screening as required

- A Complaint Register shall be maintained which records any complaint received relating to the construction works and details any necessary remedial actions
- Regular briefings shall be given to all construction staff to maintain awareness of the need to minimise dust
- The implementation and effectiveness of dust control procedures shall be monitored at regular intervals to assess their effectiveness. In the event of dust nuisance occurring outside the site, construction activities shall be reviewed and necessary changes implemented to rectify the problem
- The Contractor shall be able to demonstrate full compliance with the dust control measures at all times

Some specific dust control measures which may be employed on site are noted below

Dust Control – Site Roads

Site roads (particularly unpaved) can be a significant source of dust from construction sites if control measures are not in place. Effective dust control can be achieved by

- Unpaved surfaces shall be used by essential site traffic only
- A speed limit of 20 km/h will be applied to unpaved surfaces on site
- Periodic wetting of unpaved surfaces using a bowser shall be carried out as required during dry weather. The frequency of application will vary according to soil type, weather conditions and vehicular use
- Paved roads shall be swept to remove mud and aggregate materials from their surface

Dust Control - Land Clearing / Earth Moving

Land clearing and earth-moving carried out during periods of dry weather with high winds can generate dust.

- When there is a likelihood of dust nuisance occurring (dry, windy weather) a bowser shall be used to wet / moisture exposed soil
- Earth moving works may temporarily cease should surface wetting prove ineffective at controlling dust

Dust Control – Storage Piles

The location and moisture content of storage piles affect their potential to contribute towards dust emissions

- Stored material shall be protected from exposure to wind by storing the material in sheltered areas of the site
- When there is a likelihood of dust nuisance occurring (dry, windy weather), stored material shall be wetted to suppress dust
- Vegetation will be allowed to grow on soil which has been stockpiled on site. This will help maintain the moisture content of the material by reducing the rate of evaporation and suppress dust
- Fine powder materials (eg cement) shall be stored in sealed bags to prevent dust

Dust Control – Public Roads

Spillage of debris (eg aggregates,soil, waste) onto public roads can be minimised by using the following measures:

- Vehicles transporting material to and from site shall be enclosed or covered to minimise the escape of dust
- Public roads outside the site shall be regularly inspected for cleanliness and cleaned as necessary using a road sweeper.
- Prior to leaving site, the wheels of trucks shall be washed / cleaned

Dust Monitoring

Dust deposition levels shall be monitored on a quarterly basis for the duration of construction works to assess the impact of site activities on the local ambient air-quality and to demonstrate that the environmental control measures are effective in minimising the impact of demolition and construction site activities on the local receiving environment.

Dust deposition measurements shall be conducted to determine the potential for dust nuisance or complaint to arise from local residents' adjacent site works areas. The following procedure shall be implemented at the site on commencement of site activities:

- The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a continuous basis for the duration of the construction works
- The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures
- The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing off-site buildings
- After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m2-day in accordance with the relevant standards
- Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be prepared and maintained by the Site Manager and made available to the Meath County Council as requested
- The German Federal Government Technical Instructions on Air Quality Control - *TA Luft* specifies an emission value for the protection against significant nuisance or disadvantage due to dust-fall. The limiting value is 350 mg/m2-day. Dust deposition levels shall be assessed against this limit. This limit value is commonly specified by Local Authorities at construction sites

5.2 Energy

Emissions Control

Where possible, the following measures shall be implemented during the construction works to minimise emissions (eg CO_2, NO_x)

- Materials required for the construction works shall be sourced locally.
- Materials encountered on site shall be re-used (eg rock shall be crushed for hard-core to minimise the volume of crushed stone imported to site)
- Materials shall be handled efficiently to minimise the waiting time for loading and unloading
- Materials with a reduced environmental impact shall be specified, such as
    - Ground Granulated Blast Furnace Slag shall be used to replace Ordinary Portland Cements
    - In-situ soils / gravels shall be re-used on site
- Unnecessary movement of vehicles on site shall be avoided
- All vehicles / plant shall be turned off when not in operation. Idling engines shall not be permitted for excessive time periods
- Exhaust emissions from vehicles and other plant operating on site shall be minimised by routine servicing and the use of low emission fuels where possible
- Where feasible, the use of diesel or petrol-powered generators shall be minimised and mains electricity or battery powered equipment used as an alternative

Energy Management System

The Contractor shall be required to implement an Energy Management System during the construction works which shall include the use of

- Insulated temporary buildings
- Thermostatic controls on all heating systems in temporary buildings
- Low energy equipment and power saving functions on all computer systems
- Low flow fittings on water supply (eg taps, toilets)

5.3 Archaeology & Cultural Heritage

5.3.1 Legislation and Guidance

Legislation, policy and guidelines relevant to the management of the existing cultural heritage assets in the area are as follows:

- Heritage Act
- National Monuments Acts
- National Heritage Plan (2002), Department of Arts, Heritage, Gaeltacht and the Islands.
- Planning and Development Acts
- Meath County Council Development Plan 2021 - 2027
- Policy & Guidelines on Archaeological Excavation (1999), Department of Arts, Heritage, Gaeltacht and the Islands

5.3.2 Key Impacts

In the absence of adequate investigation, control measures, management and mitigation it is possible that Archaeology & Cultural Heritage could potentially be impacted by the proposed works in a number of ways. These include

- Groundworks associated with foundations and / or installation of services could potentially have a severe impact upon any buried archaeological remains should they be present at these locations
- Groundworks associated with the construction of roads, footpaths & landscaping could potentially have a severe impact upon any buried archaeological remains should they be present within the footprint of the proposed works

5.3.3 Environmental Control Measures and Proposals

It is not anticipated that items of Archaeological or Cultural Heritage are present on the site of the proposed development.

5.4 Geology & Soils

5.4.1 Legislation and Guidance

Legislation, policy and guidelines relevant to the management of the existing geology and soils at the site include

- European Union Water Framework Directive (WFD) (2000/60/EC)
    - European Communities (Water Policy) Regulations, 2003
    - European Communities Environmental Objectives (Surface Water) Regulations
    - European Communities Environmental Objectives (Groundwater) Regulations
    - European Communities Groundwater Directive
- *Towards Setting Guideline Values for the Protection of Groundwater in Ireland*' (Interim Report), Environmental Protection Agency (EPA)
- Source Protection and Catchment Management to protect Groundwater supply, EPA
- European Union Waste Framework Directive (2008/98/EC)
- Waste Management Act 1996
- Council Directive 1999/31/EC on the landfill of waste
- EU Council Decision (2003/33/EC) criteria and procedures for the acceptance of waste at landfills

5.4.2 Key Impacts

Potential impacts on the geology and soils at the site include

- Soil excavation, removal, filling
- Depletion of natural resources
- Accidental spills and leaks (eg fuel)
- Spillage from the use of construction materials (eg concrete)

5.4.3 Environmental Control Measures and Proposals

Mitigation measures are required to minimise potential impacts occurring as a consequence of proposed works. These shall include

- Soil excavation, removal, filling
- Use of natural resources (sources of fill material)
- Accidental spills and leaks (fuel & chemical handling, transport and storage;
- Use of construction materials (concrete)

For each of potential impact on the environment, the Contractor shall identify control and protection measures to be implemented.

Soil Management Plan

The Contractor shall develop a Construction Erosion and Sediment Control Plan (CESCP) for the management, use and re-use of excavated materials on site where permitted in accordance with the relevant legislation & guidance and provided that re-used materials comply with the engineering requirements specified for materials to be used in the works.

Re-using '*site won*' materials can reduce potential impacts on the environment and result in cost savings by avoiding the use of new building materials and reducing waste disposal costs. Where it is proposed to use '*site won*' excavated soil, the Contractor shall detail how this process is to be managed and documented including

- Identify and record the location from where the material has been excavated
- Define areas where excavated soil is intended for disposal / re-use
- Define areas of suitable / unsuitable soil for re-use
- Define the criteria for assessing whether the soil is suitable (eg contamination)
    - Identify the proposed sampling of excavated material (eg number and location of soil samples)
    - Name and credentials of Laboratory to carry out testing
    - Parameters for which the soil is to be tested, pass / fail criteria

The Contractor shall establish the controls necessary to manage the generation, handling & storage of soil waste on site and transport from site. Temporary storage of soil shall be managed to prevent / minimise potential negative impacts on the receiving environment.

The Contractor's CEMP shall include a methodology for the excavation and management of excavated material. Controls may include

- Movement of material shall be minimised to reduce potential degradation of the soil structure and generation of dust
- In order to minimise potential environmental impact of stockpiles, the following mitigation measures shall be implemented during the construction works
    - Position spoil and temporary material stockpiles (eg soil, stone) at locations away from rivers, drainage systems and areas potentially subject to flooding to minimise run-off into soil and groundwater
    - The top and side of material stockpiles shall be compacted with smooth gradients to shed rainwater and prevent ponding, infiltration and silt run-off
    - Vegetation will be permitted to grow on soil stockpiles to stabilise the surface and prevent silt run-off
- Soil waste shall be managed in accordance with relevant waste legislation & guidance
- Excavated material shall be segregated, stockpiled on site and sampled. Soil waste shall be classified to identify an appropriate receiving waste facility
- All material to be removed from site shall be transported to an appropriately licensed facility
- Prior to the removal of waste from site, appropriate waste classification information shall be submitted to the licenced facility to confirm the suitability of the material in writing prior to transfer
- Imported fill materials shall be delivered to site using public roads
- All material shall be transported to / from site using covered vehicles
- Temporary drainage used during construction works shall be designed & managed to reduce runoff carrying silts into the ground and nearby watercourses

The CEMP shall indicate waste soil classifications to identify appropriate disposal based on the nature ofthe material (eg natural soil, made ground/fill)

Appropriate documentation shall be maintained regarding the removal of soil waste including

- Name of the driver / haulier
- Name of the person responsible for the recovery / disposal of waste
- Destination of waste
- Weight of each waste consignment
- EWC Code for the waste soil material
- Written confirmation of the acceptance / recovery / disposal of each waste consignment
- Details of each individual consignment dispatched from site
    - Description of waste (location reference, stockpile number, type and origin of soil)
    - Date and time of dispatch from site

  - Name of haulage company
  - Details of Contractor and Haulier docket numbers
  - Vehicle registration number and driver name
  - Volume/weight of waste removed
  - Name of waste receiving facility
  - Date and time of arrival at waste receiving facility
  - Details of any rejected consignments
- Waste Transfer Forms for hazardous soil wastes transferred from the site (stamped at receiving facility)
- Trans-frontier Shipment of Waste forms for hazardous soil wastes transferred abroad
- Results of analysis tests conducted on excavated soil

Fuel and Chemical Handling

In order to prevent spillages of fuel, and to minimise the risk of potential impacts on soil / groundwater quality, mitigation measures to be adopted during the construction works shall include

- A bunded storage area shall be provided at the construction compound for oils, solvents and other chemicals required to be stored on site
- The bund shall provide a minimum volume of 125% of the capacity of the largest storage vessel
- Drainage from the bunded area shall pass through an oil interceptor for treatment prior to discharging to the public sewer
- All containers within the storage area shall be clearly labelled so that appropriate remedial action can be taken in the event of a spillage
- When moving drums from the bunded storage area to other location on site an appropriately sized spill pallet shall be used to contain any spillages that occur during transit
- Refuelling / servicing of construction vehicles shall take place in designated areas located away from surface water gullies, drains and watercourses. Spill kits shall be provided at fuelling points in order to provide for accidental or spillages in the area. Used spill kit materials shall be disposed of using a licenced hazardous waste facility in accordance with relevant legalisation

Control of Concrete

- Ready-mixed concrete shall be transported to site using an appropriate concrete delivery vehicle. A suitable risk assessment for wet concreting shall be carried out by the Contractor prior to works commencing on site. This shall address measures to be implemented to prevent discharge of alkaline waste-water or contaminated water to underlying subsoil and groundwater
- Concrete pours shall take place within designated protected areas in order to prevent concrete runoff into unprotected soil / groundwater / watercourses occurring
- Washing of concrete delivery vehicles shall be carried out in a designated washing area which is appropriately managed to prevent runoff occurring to unprotected soil / groundwater / watercourses
- Abutments and embankments shall be set back from river / watercourses by an appropriate distance in order to minimise potential impacts from bridge / culvert construction works on the watercourse and floodplain where applicable
- Appropriate drainage measures (including settlement / silt control) shall be implemented to minimise potential impacts on watercourses during construction work.
- The use of pre-fabricated construction shall be maximised in order to reduce the scope of construction works to be carried out over watercourses and minimise the use of concrete at this location

Sources of Aggregates and Clean Fill for the Project

- Where possible, fill material shall be sourced from local appropriately licensed facilities (eg quarry)

- Soil / fill material to be delivered to site shall be appropriately sampled and certified to confirm that it is 'clean', free from deleterious materials and will not introduce contamination to the environment, soil, groundwater etc
- Potential suppliers shall be assessed for the following criteria
  - Environmental management status
  - Regulatory and legal compliance status of the company.
- 'Clean' fill material shall be sourced from suppliers that comply with the above requirements. If recycled aggregate is used as imported fill, chemical testing shall be carried out to confirm that the material is 'clean' (i.e. will not introduce contamination to the environment).
- The Contractor's CEMP shall include an appendix with the necessary Waste Haulier and Waste Facility licences (Appendix E)

5.5 Landscape & Visual Impact

5.5.1 Legislation and Guidance

Legislation, policy and guidelines relevant to the management of landscape and visual impact include:

- The European Landscape Convention of the Council of Europe;
- National Landscape Strategy for Ireland 2015-2025; and
- NRA's '*Guidelines for Protection and Preservation of Trees, Hedgerows and Scrub Prior to, during and PostConstruction of National Road Schemes*' (2006).

5.5.2 Key Impacts

Potential landscape and visual impacts in the absence of adequate management and mitigation measures may include:

- Impacts from vegetation removal on visual receptors and the local landscape
- Impacts on the local landscape from site clearance, earthworks and use of machinery on site

5.5.3 Environmental Control Measures and Proposals

For each of the potential sources of an impact on the landscape environment, the Contractor shall identify control and protection measures to be employed. The following measures have been identified to ensure no significant adverse impacts on the environment arise from the proposed development. These shall be included in the Contractor's CEMP

Reduction Measures

- Disturbance of existing vegetation shall be minimised
- Where appropriate, new planting shall be provided to help integrate the proposed works into the surrounding landscape, provide screening (where required), reflect vegetation patterns of local habitats, re-connect hedgerows to re-establish field patterns, and minimise the effect on the landscape character of the area
- Road boundaries shall be planted to reduce headlight glare intrusion into adjacent properties / dwellings (where appropriate)
- Signage shall be located sensitively so that it does not increase the visual effect upon adjacent properties / dwellings
- Adequate protection shall be provided for trees which are to be retained in areas close to construction works

Remediation Measures

- Landscape planting shall be carried out in accordance with the landscape design and include the following
  - Appropriate native screen planting shall be provided where the works have an adverse visual effect on adjacent properties or views
  - Appropriate planting will be provided where the design aim is to integrate the works into the landscape
  - Wildflower mixes derived from native seed stock (Irish provenance) will be used to maximise biodiversity
  - Vegetative turves will be re-used and reinstated wherepossible to retain native seed mix and to encourage rapid colonisation of vegetation
  - Construction compounds and former areas of material stockpiles shall be reinstated and landscaped to match the vegetation and land use in the vicinity following completion of the works

5.6 Nature Conservation & Biodiversity

A Project Ecologist shall be appointed to the proposed development.

The Contractor shall liaise with the Project Ecologist regarding the implementation of ecological mitigation measures regarding relevant ecology receptors as set out in relevant documents including the Ecological Impact Assessment and NIS.

5.7 Noise & Vibration

5.7.1 Legislation and Guidance

Legislation, policy and guidelines relevant to the management of noise & vibration includes

- Environmental Protection Agency Act 1992 (Noise) Regulations 1994
- The recommendations in British Standards Institution BS 5228: (2009+A1:2014), 'Code of practice for noise & vibration control on construction and open sites – Part 1
- European Communities (Construction Plant and Equipment) Permissible, Noise Level Regulations, 1988 (S.I.No. 320 of 1988)
- European Communities (Noise Emission by Equipment for use Outdoors) Regulations 2001 (S.I. No. 632 of2001)
- CIRIA guidance document C741'*Environmental good practice on site guide'* (2015)*;*
- NRA's '*Guidelines for the Treatment of Noise and Vibration in National Road Schemes*' (2004); and
- NRA's '*Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*'(2014).

5.7.2 Key Impacts

Noise and vibration impacts may arise from many sources and to varying degrees during the course of the works depending on the stage of construction. Due to the nature of the activities on a construction site, there is potential for the generation of noise and vibration levels above those currently experienced in the surrounding environment.

Construction activities likely to adversely impact noise levels include

- Earthworks
- Bridge construction over the River Blackwater including installation of piled foundations

- Drainage installation
- Surfacing of paved areas

In addition to direct impacts from construction activities, there is also the potential for additional impacts to occur at nearby properties and other sensitive receptors as a result of construction traffic using the existing road network. The potential for such impacts / adverse effects is dependent on the volume of construction traffic and routes taken to access the site. There is potential for ground vibration due to the construction works which will mainly result from the use of piling rigs and vibratory rollers to compact earthworks and road surfacing.

The Contractor shall identify potential sources of noise and vibration from construction machinery and from activities carried out during the works. This shall include off-site noise and vibration generation from road traffic directly associated with the works (e.g. deliveries to and from the site).

5.7.3 Environmental Control Measures and Proposals

For each of potential impact on the existing environment, the Contractor shall identify the control and protection measures to be implemented. The following mitigation measures havebeen identified and should be addressed in the Contractor's CEMP.

General

This section prescribes mitigation measures necessary for the Contractor to minimise and monitor noise and vibration impacts associated with the proposed development

- The Contractor shall comply with mitigation measures specified in the planning permission, Local Authority requirements, the documents listed in Appendix D, and any new (or updated) environmental reports made available to the Contractor
- The Contractor shall select construction machinery which has low potential for the generation of noise and / or vibration.
- The Contractor shall be responsible for implementing noise and vibration mitigation related to construction activities (including all works carried out by the Contractor and any sub-contractor)
- The Contractor shall liaise with the Local Authority to ensure that noise and vibration during construction is effectively managed. This shall include communicating details of the various phases of work, demonstrating how good site practices will be adopted in order to mitigate construction noise and vibration
- The Contractor shall designate an appropriate person / site representative (CEMPC) who shall liaise with relevant authorities / environmental bodies and the local community as required with respect to noise and vibration impacts during the construction process
- The Contractor shall highlight specific activities that are expected to create significant noise and vibration. The Contractors shall demonstrate how these impacts shall be managed / mitigated.
- Where significant noise or vibration is expected, this shall be notified to any potential affected parties

Noise & vibration mitigation measures

Appropriate noise & vibration mitigation measures shall be implemented including

- Limiting the hours during which noisy site activities are permitted
- Appointing a site representative responsible for all matters relating to noise & vibration who shall liaise with the Local Authority, relevant stakeholders and the public
- Selection of construction machinery with low potential for the generation of noise and / or vibration and use of quiet working methods where practicable

- Plant and Machinery used on site shall comply with the European Communities (Construction Plant and Equipment) Permissible, Noise Level Regulations, 1988 (S.I. No. 320 of 1988) or the most recent regulations current at the time of construction
- All noise producing equipment used on site shall comply with European Communities (Noise Emission by Equipment for use Outdoors) Regulations 2001 (S.I. No. 632 of 2001) or the most recent regulations current at the time of construction
- All machinery to be switched off when not in use
- Noisy machinery shall be located as far away from sensitive receptors as practicable
- Mufflers (or silencers) shall be used when practicable and permitted by Manufacturers
- Temporary barriers shall be erected around noisy equipment (eg generators) when work is being carried out adjacent to a sensitive receptor. Barriers shall be appropriately designed and located to maximise effectiveness
- Should construction noise levels rise above NRA/TII guidance levels, appropriate mitigation measures shall be implemented to reduce noise levels
- The use of vibratory rollers shall be monitored to ensure acceptable levels of vibration are maintained at sensitive receptors. Appropriate measures shall be taken to minimise levels when necessary

5.7.4 Noise Monitoring

If considered appropriate, a continuous live noise monitoring system shall be installed in proximity to the closest residential areas for the duration of the construction phase. The systems shall be capable of transmitting text and e-mail alerts to appropriate site staff should a noise limit value be approached or exceeded. This will allow site management to take additional measures to control and mitigate noise at source.

Noise levels shall be assessed against the construction noise limit criteria defined in *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise 2009+A1: 2014* and as detailed below.

Table 5-1: extracted from BS 5228-1:2009 + A1:2014 Construction Noise Limit Criteria

Construction Noise Limit Criteria			
Location / Day		Assessment Period	External Noise Limit Criteria
All receptors		07.00 – 08.00	70 dB(A), $L_{Aeq,1hr}$
Monday to Saturday	Morning		
All receptors		08.00 – 19.00	75 dB(A), $L_{Aeq,11hr}$
Monday to Friday	Daytime		
All receptors		08.00 – 14.00	75 dB(A), $L_{Aeq,6hr}$
Saturday	Daytime		

5.7.5 Vibration Monitoring

In order to minimise the effect of construction activities on the receiving environment, structural vibration monitoring may be conducted during the course of the works.

If considered appropriate, vibration monitoring shall be conducted adjacent to the site boundary using calibrated vibration monitors and geophones. The systems shall be capable of transmitting text and e-mail alerts to appropriate site staff should a vibration level be approached or exceeded. This will allow site management to take additional measures to control and mitigate vibration at source.

Transient vibration guide values for cosmetic damage to structures as specified in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration* is

- 15mm/sec Peak Component Particle Velocity at 4 Hz
- 20mm/sec Peak Particle Velocity at 15 Hz.
- 50mm/sec at frequencies of 40 Hz and greater

A conservative limit of 10.0mm/sec PPV (peak particle velocity) is proposed to be applied for construction works on site.

Vibration monitoring may be conducted adjacent to each site boundary during construction works which involve activities that have the potential to generate high levels of ground-borne vibrations.

The location of geo-phone monitoring points shall be chosen according to the guidelines in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 1:1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2:1993 Guide to damage levels arising from groundborne vibration.*

5.8 Traffic Management

This section describes mitigation measures necessary for the Contractor to minimise potential impacts on construction operatives, the local community and road users who may be affected by the proposed works and travel management / vehicle usage associated with the works.

In general, the proposed construction works are to be carried out adjacent to a section of the LDR 6 which is not yet open for public use and is isolated from public roads and open space. Therefore, the majority of the works can be constructed without significant impact on the existing road network. However, vehicles making deliveries to the site will impact on the local road network.

Refer to Section 2.3 for details on proposed phasing of the proposed development.

5.8.1 Legislation and Guidance

Legislation and guidelines relevant to maintaining the safety of the public adjacent to construction works includes

- Safety, Health & Welfare at Work (Construction) Regulations 2013
- Traffic Signs Manual Chapter 8 Temporary Traffic Measures and Sign Roadworks (2009), Department forTransport/Highways Agency
- Traffic Management Guidelines (2019), Department of Transport.

5.8.2 Project Description

Site Access Routes

Transporting materials to and from site could potentially create nuisance to road users and residents living adjacent to haul roads. To minimise this risk, it is important that the location of site access points for use by construction vehicles is agreed with the Local Authority.

It is proposed that local access to the site will generally be provided from the existing roundabout on the LDR 6. <u>Construction traffic is not permitted to use the Old Athlumney Road due to the narrow road width and condition of same.</u>

The condition and width of all access roads shall be assessed by the Contactor to ensure that they are suitable for use by heavy construction traffic and delivery of over-sized loads.

Construction Traffic Routing

In general, materials will be delivered to site using the public road network. Local access points will be required to enter the construction site from the LDR 6. These access points may require local traffic management. Construction traffic is not permitted to use the Old Athlumney Road due to the narrow road width and condition of same.

Construction Parking

Parking for construction operatives will be provided within the construction compound.

Traffic Management Plan

The Contractor shall establish a Traffic Management Plan for the construction works. The TMP shall

- Address the movement of vehicles, machinery and pedestrians within the site boundary and on adjacent public roads & footpaths
- Ensure that the safety of construction operatives, public road users and pedestrians is not compromised as a consequence of the works

This shall be achieved through the effective implementation of traffic mitigation measures. When considering mitigation measures, the Contractor shall pay particular attention to sensitive and vulnerable users (eg children, elderly etc) and take account of stakeholders whose activities may be affected by the proposed works (eg local schools, residents, businesses etc)

5.8.3 Environmental Control Measures and Proposals

Traffic Management Measures

The Contractor shall conduct a Traffic Risk Assessment to establish the necessary measures required to manage all traffic activity associated with the proposed works. The traffic management measures shall be appropriate to the proposed works and enable the Contractor to manage risks efficiently and effectively.

Typical control measures may include the use of

- Barriers to define footways and segregate pedestrian zones from roads and areas used by vehicles s
- Temporary signage to highlight hazards (eg site accesses, temporary traffic management etc)

Traffic mitigation measures to be considered by the Contractor include

- Disturbance to public roads, footpaths & cycle-ways shall be minimised. Where diversions are required, users shall be facilitated to continue their journey with minimal interference with adequate provision made for vulnerable uses (eg elderly, wheelchair users, prams, children etc). Where alternative pedestrian facilities are to be provided, they shall be segregated from vehicular traffic.
- Signage shall be provided for all road users, cyclists & pedestrians identifying alterations / temporary diversions to existing public infrastructure. Signage shall be installed at appropriate locations in advance of the construction works / access points
- Access to & egress from the construction site shall be via the existing road network and shall be managed by signage and flagmen. Pedestrian footpaths & site access crossover points shall be managed by flagmen.
- Construction traffic shall enter / exit the site at designated locations only

- Parking for machinery and other vehicles shall be provided at the Site Compound only. Parking will not be permitted at other locations or on the public road.
- Materials shall generally be delivered to the Site Compound only.
- The site compound shall be accessed from the roundabout
- Deliveries to site shall be planned in advance. Construction & delivery vehicles shall be instructed to use only approved / agreed access points
- Journeys to and from the site by site operatives, suppliers and other visitors shall be minimised. The use of sustainable modes of transport shall be encouraged
- The movement of construction machinery on public roads shall be minimised.
- Vehicles used to transport materials to / from the site shall be covered to prevent debris from falling onto the road
- Vehicles shall be adequately serviced and maintained to avoid any leaks or spillage of oil, petrol or diesel
- A road sweeping vehicle shall be used to clean roads and pavements as required during the construction works to ensure that they are kept clean of construction related debris and other material
- Refuelling of site plant and vehicles shall only be conducted by using a mobile refuelling vehicle fitted with appropriate spill kit
- A wheel washing facility shall be provided to remove soil / debris from vehicles prior to leaving the site
- Road closures and restrictions shall be planned in advance and agreed with the Local Authority and other relevant stakeholders
- Adequate protection to be provided from traffic hazards that may arise as a result of construction activities and journeys to / from the site
- Potential adverse impacts on the public road network shall be managed to ensure network performance is maintained at an acceptable level
- Speed restrictions shall be applied within the construction site
- The use of truck horns shall not be permitted

The Contractor shall comply with any mitigation measures specified in planning permission, Local Authority requirements and any updated or new supplementary documents available to the Contractor. The Contractor shall obtain any relevant permits relating to road closures and traffic management from the Local Authority.

Monitoring of Traffic Management Measures

Traffic management measures shall be implemented from the commencement of construction works. The performance of these measures shall be continuously monitored to ensure that the desired outcomes have been achieved.

5.9 Waste Management

5.9.1 Legislation and Guidance

Legislation, policy and guidelines relevant to the management of waste on construction sites includes

- Directive 2008/98/EC on waste (Waste Framework Directive)
- The Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, 2010
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of Annex II to Directive 1999/31/EC
- European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC)
- Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC)
- EPA's European Waste Catalogue and Hazardous Waste List (2002)

- Waste Management Act 1996 (S.I. No. 10 of 1996) as amended by the Waste Management (Amendment) Act2001
- Litter Pollution Act 1997 and Regulations
- Eastern Midlands Region Waste Management Plan 2015 – 2021
- EPA, Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-hazardous (2015)
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction DemolitionProjects, Department of Environment, Community and Local Government;
- CIRIA guidance document C741'*Environmental good practice on site guide* (2015)'*;* and
- NRA's '*Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan'.*

5.9.2 Key Impacts

During construction works a range of waste materials are typically generated (eg excavated material, demolition material.

5.9.3 Environmental Control Measures and Proposals

The Contractor shall develop a Waste Management Plan (WMP) relating to all construction activities associated with the proposed works. The Waste Management Plan shall apply to all work undertaken by the Contractor and sub-contractors. In preparing the Waste Management Plan, the Contractor shall consider any measures specified in the planning permission, Local Authority requirements, relevant legislation & guidance and industry best practice.

Waste Management Strategy

The Contractor shall manage waste in accordance with a Waste Management Hierarchy as shown below.

- Prevent
- Reduce
- Reuse
- Recycle
- Dispose

Objectives of this Waste Management Strategy include minimising the quantity of construction waste on site, promoting recycling, re-use and recovery of waste materials and the diversion of waste materials from landfill when practicable.

The Waste Management Strategy shall be implemented throughout the construction works to ensure that

- Site activities are effectively managed to minimise the generation of waste
- Site activities maximise opportunities for the re-use and recycling of waste materials
- Waste materials are appropriately segregated and stored in suitable storage areas
- All waste materials generated on site are removed by appropriately licensed waste haulage contractors and disposed at appropriately licensed facilities

Excavated material (eg uncontaminated soil) could potentially be re-used in the works, and would therefore not require to be disposal as waste. In developing the WMP, the Contractor shall consider the re-use of material where practicable, permitted by relevant waste guidance and where the material meets the engineering requirements.

5.9.4 Waste Identification and Classification

Construction & Demolition Waste can be categorised as shown on Table 5.2 below which has been extracted from the European Waste Catalogue.

Table 5.2 – European Waste Catalogue

	Description of Waste
17 01	**Concrete, bricks, tiles, ceramics**
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 06*	Mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing dangerous substances
17 01 07	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 02	**Wood, glass and plastic**
17 02 01	Wood
17 02 02	Glass
17 02 03	Plastic
17 02 04*	Glass, Plastic and wood containing or contaminated with dangerous substances
17 03	**Bituminous mixtures, coal tar and tarred products**
17 03 01*	Bituminous mixtures containing coal tar
17 03 02	Bituminous mixtures containing other than those mentioned in 17 03 01
17 03 03*	Coal tar and tarred products
17 04	**Metals (including their alloys)**
17 04 01	Copper, bronze, brass
17 04 02	Aluminium
17 04 03	Lead
17 04 04	Zinc
17 04 05	Iron and Steel
17 04 06	Tin
17 04 07	Mixed metals
17 04 09*	Metal waste contaminated with dangerous substances
17 04 10*	Cables containing oil, coal tar and other dangerous substances
17 04 11	Cables other than those mentioned in 17 04 10
17 05	**Soil (including excavated soil from contaminated sites), stones and dredged spoil**
17 05 03*	Soil and stones containing dangerous substances
17 05 04	Soil and stones other than those mentioned in 17 05 03

	Description of Waste
17 05 05*	Dredging spoil containing dangerous substances
17 05 06	Dredging spoil other than those mentioned in 17 05 05
17 05 07*	Track ballast containing dangerous substances
17 05 08	Track ballast other than those mentioned in 17 05 07
17 06	**Insulation materials and asbestos-containing construction materials**
17 06 01*	Insulation materials containing asbestos
17 06 03*	Other insulation materials consisting of or containing dangerous substances
17 06 04	Insulation materials other than those mentioned in 17 06 01 and 17 06 03
17 06 05*	Construction materials contained asbestos
17 08	**Gypsum-based construction material**
17 08 01*	Gypsum-based construction materials contaminated with dangerous substances
17 08 02	Gypsum-based construction materials other than those mentioned in 17 08 01
17 09	**Other construction and demolition waste**
17 09 01*	Construction and demolition waste containing mercury
17 09 02*	Construction and demolition waste containing pcb (for example pcb-containing sealants, pcb-containing resin-based floorings, pcb-containing sealed glazing units, pcb-containing capacitors)
17 09 03*	Other construction and demolition wastes(including mixed wastes)containing dangerous substances
17 09 04	Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03
*Any waste marked with an asterisk (*) is considered as a hazardous waste pursuant to Directive 91/689/EEC on hazardous waste (European Waste Catalogue and Hazardous Waste List (valid from 1/1/2002) Environmental Protection Agency, Ireland)	

5.9.5 Proposed Waste Management Operation

Proposals for Minimisation, Re-use and Recycling of Resources & Waste

Waste is to be segregated on site into the categories shown above. A dedicated waste storage area is to be provided on site with suitable skips and re-cycling receptacles for all waste material. Materials are to be collected from site as required by appropriately licensed specialist contractor for delivery to an appropriately licensed facility.

The majority of waste on the project will arise mainly from bulk excavation and general construction activities relating to construction of new building, roads and services. The Purchasing Manager shall ensure that materials are ordered so that the quantity delivered, the timing of delivery and the storage of materials is not conducive to the unnecessary creation of waste.

For all movements of waste from site, a record shall be kept by the C&D Waste Manager detailing type and weight of material removed and destination. This shall be compared with delivery records of materials entering to site in order to determine a waste generation percentage for each material. This can be used to provide a comparison of actual volumes of construction waste for recovery, reuse and recycling relative to targets previously established. It can also be used to help identify the source of failure to meet targets and reduce costs for waste disposal.

Concrete, bricks, tiles, ceramics

Concrete waste will be collected in receptacles with mixed C & DW materials for subsequent separation and recovery at a remote facility.

Wood, glass and plastic

Uncontaminated wood, glass and plastic will be cleaned, segregated and stored in a suitable receptacles for recycling.

Packaging will be sourced segregated for recycling / return to supplier.

Metals

Metals will be segregated and stored in a suitable receptacles for recycling.

Soil & Stones (Excavated Material)

Where possible, excavated inert soil will be stored in segregated piles for re-use for landscaping purposes. Excess soil will be removed from site for disposal.

Soil will be removed from site by suitable specialist Contractor licensed under the Waste Management Act 1996 and relevant regulations.

All soil will be classified in accordance with The Council of European Union - Council Decision 2003/33/EC and disposed of as required in a suitable licensed facility.

Contaminated Soil

Where contaminated soils are discovered or occur as a result of accidental oil / fuel spillage during construction works, they will be isolated and tested in accordance with 2003/33/EC for contamination.

Contaminated soil will be excavated and exported from site by an appropriately licensed specialist waste contractor and sent for treatment/disposal to an appropriately licensed waste facility.

Hazardous Material

All waste material shall be classified as inert, non-hazardous or hazardous in accordance with EPA Waste Classification Guidance. Where hazardous materials are identified on site, they shall be segregated from other wastes to avoid further contamination.

A suitable specialist Contractor (licensed under the Waste Management {Collection Permit} Regulations 2007) must deal with hazardous waste. The material must be disposed in a suitable licensed facility (Waste Management Act 1996 and Waste Management {Facility Permit} Regulations of 2007.

All waste shall be weighed and documented prior to leaving site. Records shall be maintained on site and at the relevant waste facility.

Invasive Species

Prior to construction commencing a site specific construction stage invasive species management plan and associated biosecurity measures will be drawn up and implemented throughout the construction stage and as necessary to avoid the spread of invasive plant species on or off the site. Refer to EcIA prepared by Environmental Consultant.

5.9.6 Roles & Responsibilities

Project Manager (Contracts Manager)

The Project Manager shall have overall responsibility for the implementation of the Resource & Waste Management Plan (RWMP) {may also be referred to as Construction & Demolition Waste Management Plan (C&DWMP)}. The Project Manager shall ensure that all adequate resources are provided to ensure that the R&WMP is fully implemented.

The Project Manager shall advise the Local Planning Authority of the waste facilities to which inert and hazardous materials are to be exported.

Resource Manager

The Site Manager shall appoint a dedicated Resource Manager (RM) to ensure commitment to the Resource & Waste Management Plan. The RM shall be appropriately trained and shall be responsible for implementing the Resource & Waste Management Plan. The RM shall have the authority to instruct all site personnel to comply with the specific provisions of the Plan.

The role of the Resource Manager (RM) will include

- Implementation of the RWMP and associated recycling targets
- Managing everyday handling of waste on the site
- waste assessment and characterisation
- effective communication of the objectives of the RWMP with all site personnel, sub-contractors, suppliers, specialist waste contractors etc
- maintain accurate records quantities of waste, surplus material etc
- Maintain a record of all materials (quantity, description etc) exported from site is maintained in a Waste Management File
- Inspect waste storage areas, housekeeping etc
- Ensuring that contracted waste haulage drivers hold appropriate Waste Collection Permits for the transport of waste material and that all waste materials have been delivered to an appropriate licensed facility according to the following regulations
  - Waste Management (Collection Permit) Regulations 2007
  - Waste Management (Collection Permit) Amendment Regulations 2008
  - Waste Management (Facility Permit and Registration) Regulations 2007
  - Waste Facility Permit under the Waste management (Facility Permit and Registration) Amendment Regulations 2008
- carry out audits to ensure waste management targets are being achieved

Site Personnel

All personnel on site will be responsible for the effective implementation of the plan. All staff will receive adequate training on waste prevention, segregation and best practice guidelines.

At operational level, a named designated person from the Main Contractor and named designated personnel from each sub-contractor on site shall be assigned direct responsibility to ensure that the discrete operation of the RWMP are performed throughout the course of the project.

Training

Copies of the RWMP will be made available to all relevant personnel on site. All site personnel and sub-contractors shall be instructed on the objectives of the RWMP and informed of the responsibilities that fall upon them as a consequence of its provisions.

Where source segregations, selective demolition and material reuse techniques apply, each member of staff shall be given instructions on how to comply with the RWMP. Posters will be designed to reinforce the key messages of the RWMP and will be displayed prominently for the benefit of staff.

Disposal

Only Waste Haulage Contractors with a valid Waste Collection Permit shall be allowed to collect waste from the site. The Contractor shall ensure that the Waste Haulage Contractor

- Is permitted to collect the particular type of waste
- Is permitted to collect waste within the Local Authority area
- Uses a waste collection vehicle identified on the Waste Collection Permit
- Transfers the waste to a licenced waste facility identified on the Waste Collection Permit

Record Keeping

The C&D Waste Manager shall maintain a written record of all waste material (quantity, type etc) reused / recycled and exported from site during the works. Records are to be maintained in a Waste File on site.

Records for material exported from site shall include

- Name of Project of Origin
- Date
- Waste Type EWC Code and description
- Quantity / Volume of waste collected
- Waste collection contractor’s Name, Waste Collection Permit Number and collection receipt including vehicle registration number
- Destination of waste load including Waste Permit / Licence number of facility
- Description of how waste at facility shall be used / treated i.e. disposal / recovery / export and appropriate confirmation
- Written confirmation of the acceptance and recovery or disposal of any hazardous waste consignments
- Details of any rejected consignments
- Results of any chemical analysis relating to waste materials, excavated soils etc
- Waste Transfer Records for any hazardous material exported from site
- Appropriate records for International Waste Shipments (IWS) or Trans-frontier Shipment of Waste where hazardous waste is transferred abroad for treatment

The waste records shall be issued to the relevant stakeholders (eg Client, Planning Authority) as required / requested.

Waste Audits

Periodic audits will be carried out on the waste collection system by the Contractor throughout the construction period.

The records above can be compared with delivery records of materials entering site in a Waste Audit which identifies the amount, nature and composition of waste generated on site and determines a waste generation percentage for each material. The Waste Audit will examine the manner in which waste is produced and can be used to provide a comparison of actual volumes of construction waste for recovery.

The measured waste quantities can be used to

- quantify the costs of management and disposal
- to determine how reuse and recycling of materials compares with targets previously identified

- to identify the source of failure to meet targets
- to identify operational factors, management policies etc which contribute to the generation of waste and identify corrective action
- to reduce costs for waste disposal
- identify lessons to be learned to improve future C&D Waste Management Plans.

The effectiveness of the RWMP shall be audited regularly throughout the course of the works enabling a 'Performance Target' to be established

Litter or Debris

- The Contractor shall maintain a tidy site and dispose of materials in the appropriate manner
- A high standard of housekeeping shall be maintained and waste materials shall be stored in waste bins or skips
- Roads and hard-standings shall be cleaned regularly to prevent the build-up of material which could be washed into watercourses

5.9.7 Consultation with relevant bodies

The Main Contractor shall liaise with the Planning Authority throughout the construction works to ensure that appropriate methods of waste reduction, reuse and recycling are being utilised and that the Resource & Waste Management Plan complies with the requirements of the Planning Authority.

5.10 Water Quality and Drainage

5.10.1 Legislation and Guidance

Legislation, policy and guidelines relevant to the management of the existing water environment at the proposed site includes

- European Union Water Framework Directive WFD (2000/60/EC)
- European Communities (Water Policy) Regulations, 2003
- European Communities Environmental Objectives (Surface Water) Regulations 2009
- The EU Floods Directive 2007/60/EC
- European Communities (Assessment and Management of Flood Risks) Regulations 2010

5.10.2 Key Impacts

In the absence of adequate management and controls, impacts which could potentially occur during works may arise from construction activities include

- Polluted drainage discharging from site
  - Discharge of vehicle wash-down water
  - Discharge of construction materials (eg runoff from wet concrete)
  - Wastewater / effluent spillage
  - Sediment erosion and silted water runoff
  - Spillages from refuelling facilities, chemical and waste storage / handling areas
- Changes to the existing drainage network including interception and/or diversion of existing watercourses / drainage channels
- Increased runoff from new artificial surfaces (eg hard standings, pavements) relative to existing Greenfield condition
- Construction of watercourse crossings;
- Works within water or adjacent to existing drainage / outfalls

5.10.3 Environmental Control Measures and Proposals

The Contractor shall adopt adequate mitigation measures in order to minimise the risk of significant impacts occurring. Potential impacts relate to

- Sedimentation (suspended solids)
- Accidental spills and leaks

For each of the potential impact on the water environment, the Contractor shall identify control and protection measures to be employed. Appropriate permits (eg discharge license) shall be obtained where required during the construction works. The Contractor shall employ adequate mitigation measures in the CEMP including

Pollution Control

<u>General Measures</u>

- The Contractor shall develop a Construction Erosion & Sediment Control Plan. The purpose of the CESCP is to use effective water management to
    - minimise erosion
    - prevent the movement of sediment as a result of erosion
    - prevent sediment from being carried and released off site

  The CESCP shall outline procedures to be implemented for the effective control of erosion and sediment
- The Contractor shall provide adequate measures (eg silt fences, settlement ponds, silt traps, temporary cut off wall) to minimise conveyance of polluted (eg suspended solids, chemicals) water from the construction zone into local watercourses. Control measures shall be detailed and installed to ensure they cater for the variations in water level and to minimise the risk of flooding to the construction area
- Earthworks shall be programmed & carried out to avoid periods of relatively high rainfall
- Construction materials and machinery shall not be stored within 25m of the 1-in-100 year (1% AEP) flood plain where applicable
- The Contractor shall devise a Response Plan to minimise the risk of accidental spillages, flooding or other unexpected events resulting in pollutants entering drainage networks, groundwater, watercourses etc. Staff shall be adequately trained to implement the plan
- The Contractor shall investigate for the presence of unknown / hidden services (eg old drainage pipes) under the area of the works which may convey pollutants to local watercourses
- Adequate procedures to be employed in areas where de-watering is required to facilitate the construction works to prevent sediment discharging to nearby watercourses
- Wheel wash facilities with silt traps to be provided at site access points
- Adequate control measures (eg high-performance silt fences) shall be installed around the works area as required
    - Drainage and runoff controls shall be installed prior to commencing site clearance and earthworks
    - The area of exposed ground shall be minimised
    - Vegetation shall be established as soon as practicable where soil has been exposed

<u>Sedimentation (Suspended Solids)</u>

- Drainage channels and streams shall be clearly identified on site and shown on site plans
- Construction compounds will be located at a minimum distance of 25 m from watercourses and out of the 1-in-100 year (1% AEP) flood plain
- Drains carrying high sediment load shall be diverted through settlement ponds located between the construction area and the nearest surface water drain / watercourse

- Surface water runoff from working areas shall not discharge directly to local watercourses. Drainage systems shall be constructed prior to the commencement of major construction works to facilitate effective silt management. Discharge from settlement / treatment ponds shall be controlled and maintained at Greenfield runoff rates
- Rainwater shall be diverted away from construction areas using existing nearby drainage channels, streams etc. Water shall be filtered to prevent sediment from entering drainage channels, streams etc. Periodic water sampling shall be carried out by the Contractor during the proposed works. Parameters to be monitored shall be agreed in advance with the Local Authority.
- Excavations shall remain open for limited time periods to reduce surface water / groundwater ingress. Water containing sediments shall pass through a settlement pond (or other filtration system) prior to discharging to the public sewer or watercourse.
- A discharge permit shall be obtained for the disposal of any water arising from pumping
- Spoil and temporary material stockpiles (eg stone, hardcore, soil) shall be positioned in locations which are distant from drainage systems and away from areas potentially subject to flooding
- Runoff from spoil heaps and stockpiles shall be prevented from entering watercourses directly and shall be diverted through on-site settlement ponds

Accidental Spillages and Leaks

In order to prevent accidental spillages (eg fuel, chemical) impacting on groundwater, nearby water courses the Contractor shall adopt all necessary mitigation measures including

- In general, construction vehicles shall not be permitted to re-fuel on site.
- Plant fuel and liquid construction materials shall be stored in impermeable bunded containers which are covered from the elements. All vehicles, generators etc shall be inspected (minimum once per week) to ensure that there is no fuel leaking.
- All empty containers containing residual quantities of oils, hydro-carbons, chemicals etc shall be stored in dedicated bunded receptacles prior to removal from site.
- Oil spill kits shall be located throughout the site
- All construction staff shall be informed of how to clean a spill and correctly dispose of the contaminated material
- Accidental oil or fuel spills shall be immediately cleaned with appropriate adsorbant materials
- All contaminated material shall be placed in an appropriately labelled waste receptacle awaiting off-site disposal by an appropriately licenced waste contractor

5.11 Extreme Weather Events

The Contractor shall consider the impacts of extreme weather events (eg drought, wind, precipitation, temperature extremes etc) and the possible impacts of such conditions during construction on repectors and mitigation of same. The Contractor shall use a short-to-medium range weather forecasting service from Met Eireann or other approved meteorological data and weather forecast provider to inform short-to-medium term programme management, environmental control and mitigation measures.

The detailed CEMP shall consider all measures deemed necessary and appropriate to manage extreme weather events and shall specifically cover training of personnel and prevention and monitoring arrangements for staff.

As appropriate, method statements shall also consider extreme weather events where risks have been identified, e.g. work at height.

Appendix A

Construction Compound Location Map

Appendix B

Contractor Method Statements

(documents to be provided by Main Contractor in Construction Environmental Management Plan)

Appendix C

Environmental Risk Register

This procedure has been developed in order to define the criteria used to

- Identify environmental impacts associated with the proposed works
- Identify a procedure for assessing the significance of environmental impacts
- Develop an environmental impacts register for the construction works

Scope

This document applies to all activities associated with the construction works including the activities of staff, contractors, sub-contractors etc

Responsibilities

The Environmental Co-ordinator is responsible for ensuring that the Register of Environmental Aspects & Impacts is maintained and updated regularly (eg monthly)

Procedure – Environmental Aspect Identification

The procedure for developing an Environmental Aspects Register is noted below

- Representatives from all relevant areas / disciplines shall participate in the identification process to ensure maximum effectiveness
- The environments aspects associated with all construction work activities shall be documented in the aspect evaluation table
- The impact associated with each aspect shall then be listed
- Local impacts (eg change in local air quality) & global impacts (eg release of greenhouse) as a consequence of the works shall be considered
- A ranking shall be assigned to each aspect with respect to
  - Likelihood of Occurrence (L)
  - Severity of Consequences (S)
- The overall significance rating (C) is obtained

$$C = L \times S$$

- The criteria for assessing the Likelihood of Occurrence (L) and the Severity of Consequences (S) is shown on the following tables
- An aspect with a score of 9 or greater is considered to be a significant environmental risk and must be controlled

Table C-1: Likelihood of Occurrence (L)

Rating Value	1	2	3	4	5
	Never / cannot occur	Unlikely to occur	Likely to occur once/twice	Possibility of a number of occurrences	Highly Likely

Rating (S) of the Severity of Consequences shall take account of the following

- Legislative and regulatory compliance
- Community / employee sensitivity
- Impact on air, land & water
- Potential for resource depletion
- Accidents & emergencies

Table C-2: Severity of Consequences (S)

Rating Value	1	2	3	4	5
	Unlikely to have an impact on any of the previous categories	May have a low impact on some of the previous categories	May have a moderate impact on 3 (or more) of the previous categories	Likely to have a moderate to major impact on most of the previous categories	Likely to have a major impact on all of the previous categories

Table C-3: Overall Significance Rating (C)

Ref	Work Activity	Environmental Aspect	Environmental Impact before Controls	Initial Risk Level (without controls)			Risk Control Measures	Residual Risk Level (with controls)			Is there a significant residual risk to be passed on? (y/n)	Actions necessary to control the risk (comments, recommendations)	Responsibility	Status (active /closed)

Appendix D

Example list of Relevant Legislation & Guidance

Air Quality and Climate

Legislation, policy and guidelines relevant to the management of air quality and climate are noted below

- European Union Clean Air Policy
- European Union Directive (2008/50/EC)
- European Union Ambient air quality directives (EU, 2004, 2008)
- Air Quality Standards Regulations (S.I. 180 of 2011)
- Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority - 2011)

Archaeology & Cultural Heritage

Legislation, policy and guidelines relevant to the management of the existing cultural heritage assets in the area are as follows:

- Heritage Act
- National Monuments Acts
- National Heritage Plan (2002), Department of Arts, Heritage, Gaeltacht and the Islands.
- Planning and Development Acts
- Meath County Council Development Plan 2021 - 2027
- Policy & Guidelines on Archaeological Excavation (1999), Department of Arts, Heritage, Gaeltacht and the Islands

Geology & Soils

Legislation, policy and guidelines relevant to the management of the existing geology and soils at the site include

- European Union Water Framework Directive (WFD) (2000/60/EC)
    - European Communities (Water Policy) Regulations, 2003
    - European Communities Environmental Objectives (Surface Water) Regulations
    - European Communities Environmental Objectives (Groundwater) Regulations
    - European Communities Groundwater Directive
- *Towards Setting Guideline Values for the Protection of Groundwater in Ireland*' (Interim Report), Environmental Protection Agency (EPA)
- Source Protection and Catchment Management to protect Groundwater supply, EPA
- European Union Waste Framework Directive (2008/98/EC)
- Waste Management Act 1996
- Council Directive 1999/31/EC on the landfill of waste
- EU Council Decision (2003/33/EC) criteria and procedures for the acceptance of waste at landfills

Landscape & Visual Impact

Legislation, policy and guidelines relevant to the management of landscape and visual impact include:

- The European Landscape Convention of the Council of Europe;
- National Landscape Strategy for Ireland 2015-2025; and
- NRA's '*Guidelines for Protection and Preservation of Trees, Hedgerows and Scrub Prior to, during and PostConstruction of National Road Schemes*' (2006).

Nature Conservation & Biodiversity

Legislation, policy and guidelines relevant to the management of nature conservation & biodiversity includes

- EU Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna)
- EU Birds Directive (Council Directive 2009/147/EC on the Conservation of Wild Birds)
- EU Water Framework Directive (Council Directive 2000/60/EC)
- Wildlife Act 1976
- Wildlife Act 2000
- European Communities (Bird & Natural Habitats) Regulations 2011 & 2015
- Flora (Protection) Order 2015
- Environmental Planning & Construction Guidelines (NRA)

Noise & Vibration

Legislation, policy and guidelines relevant to the management of noise & vibration includes

- Environmental Protection Agency Act 1992 (Noise) Regulations 1994
- The recommendations in British Standards Institution BS 5228: (2009+A1:2014), 'Code of practice for noise & vibration control on construction and open sites – Part 1
- European Communities (Construction Plant and Equipment) Permissible, Noise Level Regulations, 1988 (S.I.No. 320 of 1988)
- European Communities (Noise Emission by Equipment for use Outdoors) Regulations 2001 (S.I. No. 632 of2001)
- CIRIA guidance document C741'*Environmental good practice on site guide'* (2015)*;*
- NRA's '*Guidelines for the Treatment of Noise and Vibration in National Road Schemes*' (2004); and
- NRA's '*Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes*'(2014).

Traffic Management

Legislation and guidelines relevant to maintaining the safety of the public adjacent to construction works includes

- Safety, Health & Welfare at Work (Construction) Regulations 2013
- Traffic Signs Manual Chapter 8 Temporary Traffic Measures and Sign Roadworks (2009), Department forTransport/Highways Agency
- Traffic Management Guidelines (2019), Department of Transport.

Waste Management

Legislation, policy and guidelines relevant to the management of waste on construction sites includes

- Directive 2008/98/EC on waste (Waste Framework Directive)
- The Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, 2010
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of Annex II to Directive 1999/31/EC
- European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC)
- Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC)
- EPA's European Waste Catalogue and Hazardous Waste List (2002)
- Waste Management Act 1996 (S.I. No. 10 of 1996) as amended by the Waste Management (Amendment) Act2001
- Litter Pollution Act 1997 and Regulations
- Eastern Midlands Region Waste Management Plan 2015 – 2021
- EPA, Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-hazardous, (2015)
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction DemolitionProjects, Department of Environment, Community and Local Government;
- CIRIA guidance document C741'*Environmental good practice on site guide* (2015)*'*; and
- NRA's '*Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan'.*

Appendix E

Waste Licences

(documents to be provided by Main Contractor in Construction Environmental Management Plan)

HENDRICKRYAN
Consulting Engineers

10 Priory Office Park, Stillorgan Road,
Blackrock, County Dublin,
A94 K735,
Ireland.

t: +353 1 283 4866
e: info@hendrickryan.ie
w: www.hendrickryan.ie

Hendrick Ryan + Associates Ltd.
Registered in Ireland, Registration No. 235066.

Directors:
Peter Ryan,
BA, BAI, CEng, FIEI, FConsEI, MIStructE, MICE.
David Ryan,
ACA
Associate
Patrick McStay,
BEng, MSc, CEng, MIEI, MIStructE.