Volume III - Appendices to Environmental Impact Assessment Report

Proposed Residential Development

Lands at Rathmullan Road, Drogheda, Co. Meath

Trailford Ltd

September 2019

Hughes Planning & Development Consultants

70 Pearse Street, Dublin 2

+353 (0)1 539 0710 – info@hpdc.ie – www.hpdc.ie

Appendix 4.1 Flood Risk Assessment

Rathmullan, Co. Meath

Flood Risk Assessment

Final Report

September 2019

www.jbaconsulting.ie

Trailford Ltd.

JBA Project Manager

Tim Cooke
Unit 8, Block 660,
Greenogue Business Plaza,
Rathcoole,
Dublin.

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Contract

This report describes work commissioned by David O'Reilly, on behalf of Trailford Ltd, by a letter dated 18th April 2019. Trailford Ltd's representative for the contract was David O'Reilly of Trailford Ltd. Tim Cooke of JBA Consulting carried out this work.

Prepared by ..... Tim Cooke BE BSc MIEAUST

Senior Engineer

Reviewed by ..... Ross Bryant BSc MSc CEnv MCIWEM C.WEM

Principal Analyst

Purpose

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Abbreviations

AEP ..... Annual Exceedance Probability
CDP..... County Development Plan
CFRAM ..... Catchment Flood Risk Assessment and Management
DoEHLG ..... Department of the Environment, Heritage and Local Government
FRA ..... Flood Risk Assessment
GSI ..... Geological Survey of Ireland
LAP ..... Local Area Plan
LDP ..... Local Development Plan
OPW ..... Office of Public Works
PFRA ..... Preliminary Flood Risk Assessment
SFRA ..... Strategic Flood Risk Assessment
mOD ..... Meters above Ordinance Datum

1 Overview

Under the Planning System and Flood Risk Management Guidelines for Planning Authorities (DoEHLG & OPW, 2009) proposed development must undergo a Flood Risk Assessment to ensure sustainability and effective management of flood risk. This requires a review of all available flood information and assessment of Flood Zones for the development site.

1.1 Term of Reference and Scope

JBA Consulting was appointed by Trailford Limited to prepare a Flood Risk Assessment (FRA) for the proposed development in Rathmullan, Co. Meath.

1.2 Aims and Objectives

This study is being completed to assess the level of flood risk to the proposed site. It aims to identify, quantify and communicate to the applicant, Planning Authority officials and other shareholders, the risk of flooding to land, property and people and the measures required to manage the risk. The objectives are to:

- Identify potential sources of flood risk,
- Confirm the level of flood risk and identify key hydraulic features,
- Assess the impact that the proposed development has on flood risk in adjacent areas,
- Develop appropriate flood risk mitigation and management measures which will allow for the development to appropriately manage flood risk.

1.3 Development Proposal

The proposed development consists of a Strategic Housing Development on residential zoned lands west of Drogheda town centre. The accommodation provided on the site consists of;

- 661 residential units with a crèche and retail unit.

The application includes all associated infrastructure necessary to service the above. This includes a network of foul water and storm water pipes, watermains, and a network of roads and footpaths.

The total surfaced area of the proposed development, including roads, roofs, and other paved areas is approximately 10.39 Ha.

The proposed estate road levels around the site range from 18.73 to 36.50 m OD Malin and proposed finished floor levels range between 19.25 to 36.50 m OD Malin.

The main access for the site will be provided via a new 4 arm signalised junction with arms linking the Rathmullan Road (East), the Rathmullan Road (West) the proposed site access and the local access road to the south of the signalised junction. A second access into the housing development is proposed via a new priority junction to the south of the site onto the existing local access road.

The design and layout of the proposal has been prepared to fully comply with the current relevant design standards and specifications applicable to this form of development. The applicant has drawn upon considerable experience in the design and implementation of such proposals.

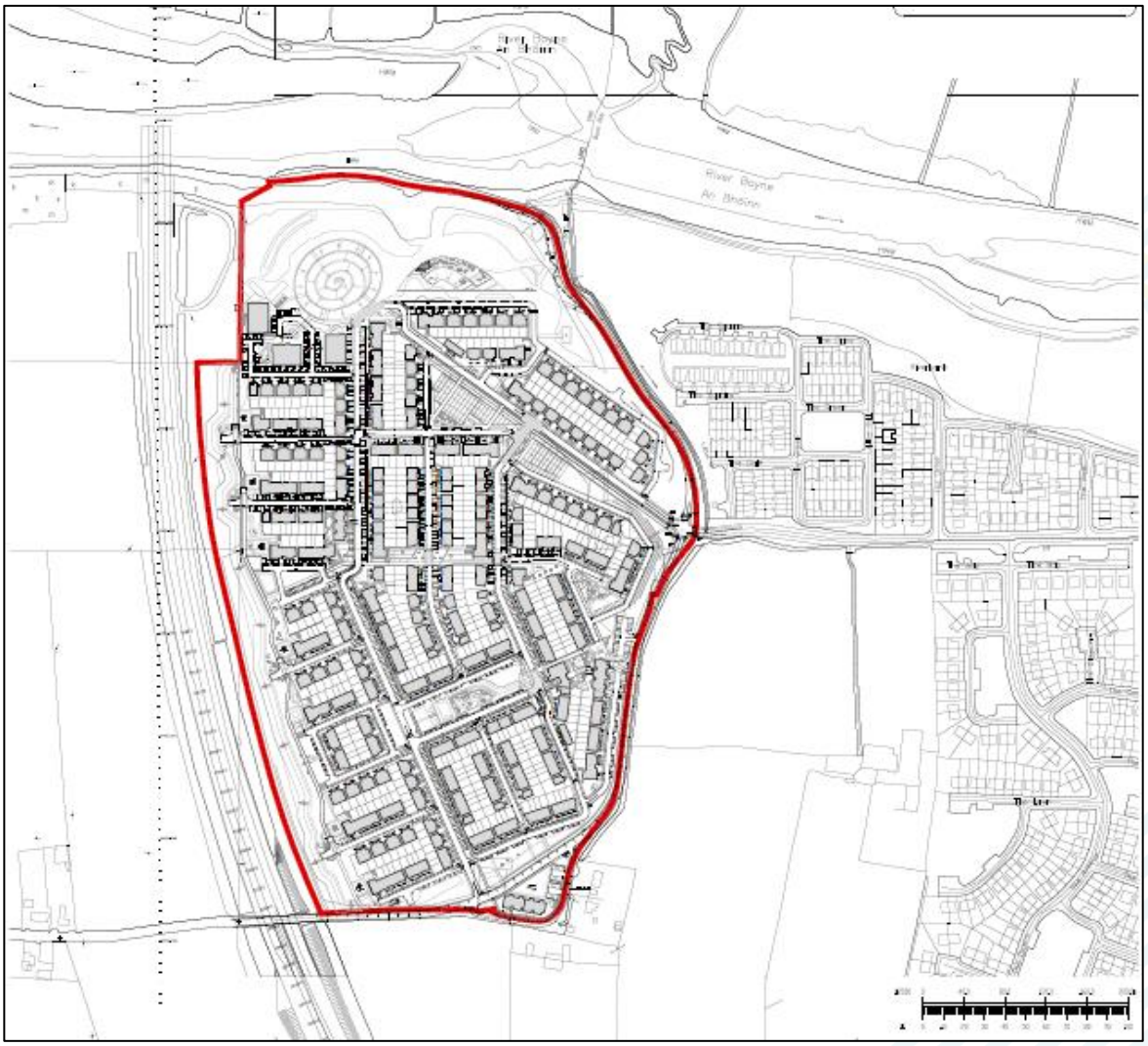


Figure 1-1: Development Proposal Layout (extract from Waterman Moylan)

2 Site Background

2.1 Location

The site is located on the western fringe of Drogheda, Co. Meath. It is situated south of the River Boyne between the M1 Motorway and Rathmullan Road. Riverbank and Highlands residential estates are neighbouring developed areas to the east of the site. The site is currently greenfield with further agricultural fields to the south and west of the site intersected by the M1 Motorway. The site location is shown in Figure 2-1.

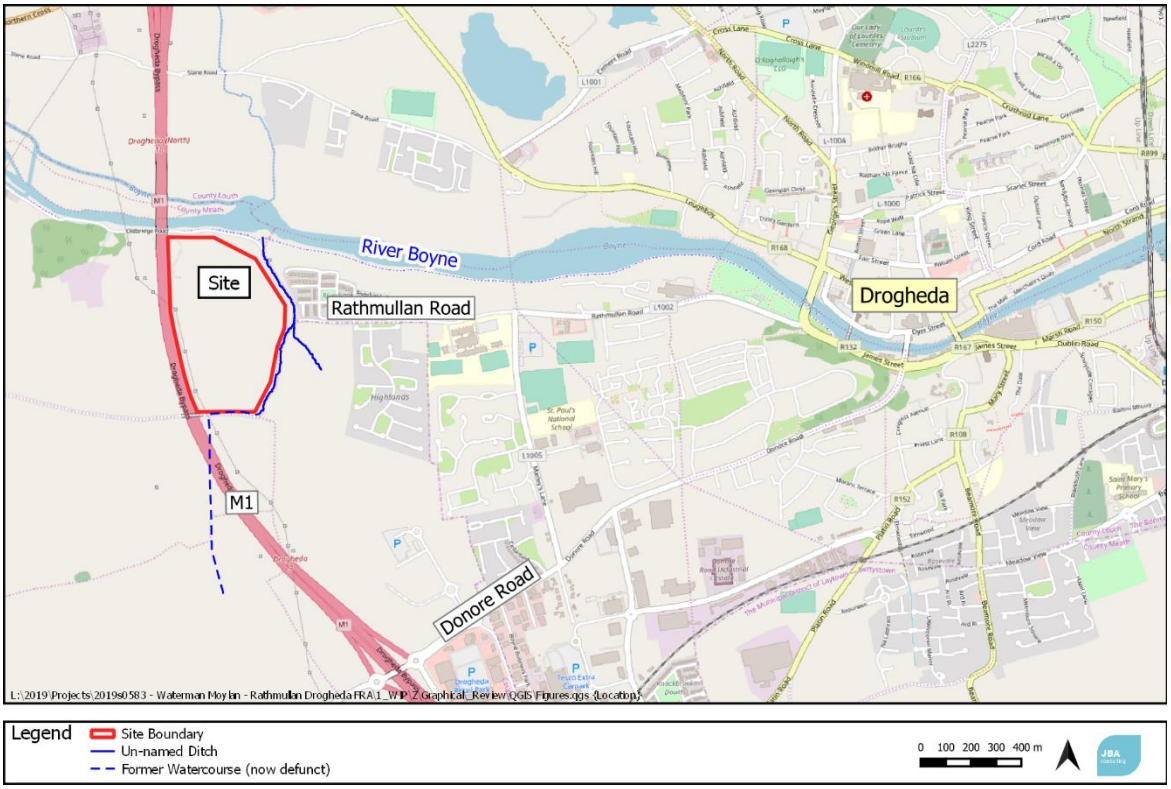


Figure 2-1: Site Location

2.2 Watercourses

There are two identified watercourses within the vicinity of the site.

1 River Boyne

The River Boyne flows from west to east adjacent to the northern boundary of the site. The River Boyne is approximately 112km long flowing from Trinity Well, Newberry Hall, near Carbury in County Kildare and discharges into the Irish Sea between Mornington and Baltray just downstream of Drogheda. The total catchment area is approximately 2,695km^2.

2 Un-named ditch

Located adjacent to Rathmullan Road there is an un-named ditch running in a south-north direction as identified in Figure 2-1. This ditch is a dry feature which does not appear to have any active hydraulic connectivity with lands to the south of the site. Prior to construction of the M1 motorway this ditch formed the lower reach of a watercourse originating to the south west of the site, however significant cutting required for the M1 has disconnected this former watercourse (see Figure 2-1).

As discussed further in Section 2.5, flows from the upper catchment of the former watercourse are now incorporated into the surface water drainage network of the M1 and do not continue to flow into the now defunct ditch. Photographs taken from site provided in Section 2.6 confirm the current disconnected status of the ditch and that it is no longer a functional fluvial watercourse adjacent to the site.

2.3 Topography

As shown in Figure 2-2, the construction of the M1 motorway has significantly altered the natural drainage direction of the lands to the south of the site.

Lidar surveyed by FUGRO-BKS from May 2010-May 2011 is publicly available from Open Topographic Data Viewer provided by Transport Infrastructure Ireland. The LiDAR as shown in Figure 2-2 confirms the cutting of the M1 motorway to a depth of approximately 4-5m below natural levels within the vicinity of the site. An open surface water collection drain intercepts surface water flow on the western side of the M1 and redirects flow into the M1 piped surface water drainage network running north to outfall into the River Boyne. This restricts the naturally draining catchment of the un-named ditch to the eastern side of the M1 with an area of approximately 0.8km^2. Of this area, only 0.15km^2 is located upstream of the site. Figure 2-3 provides a topographic cross-section illustrating the severe cutting of the M1 below natural ground levels.

The cross-section profile in Figure 2-4 shows the significant fall in elevation from south to north across the site with existing ground levels dropping by approximately 30m across the site. The northern boundary of the site still remains at elevation at approximately 10mOD, before dropping steeply down to the River Boyne.

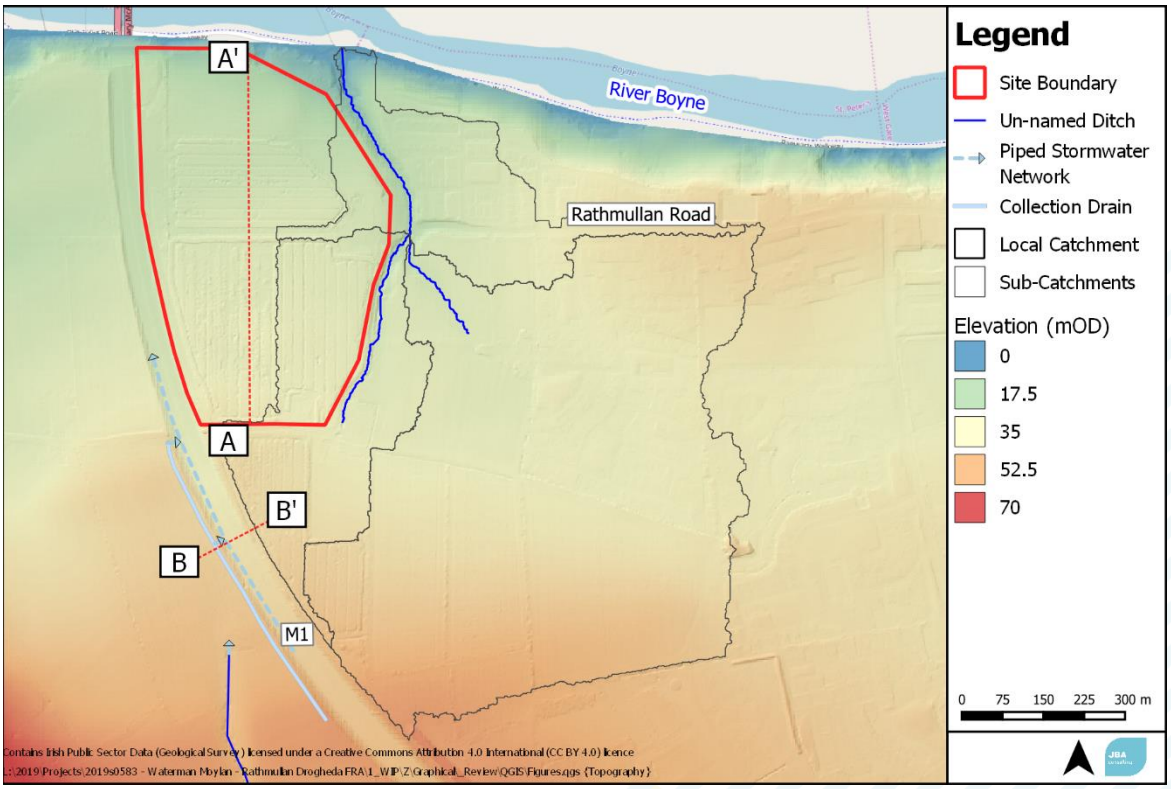


Figure 2-2: Topography of the site and local catchment

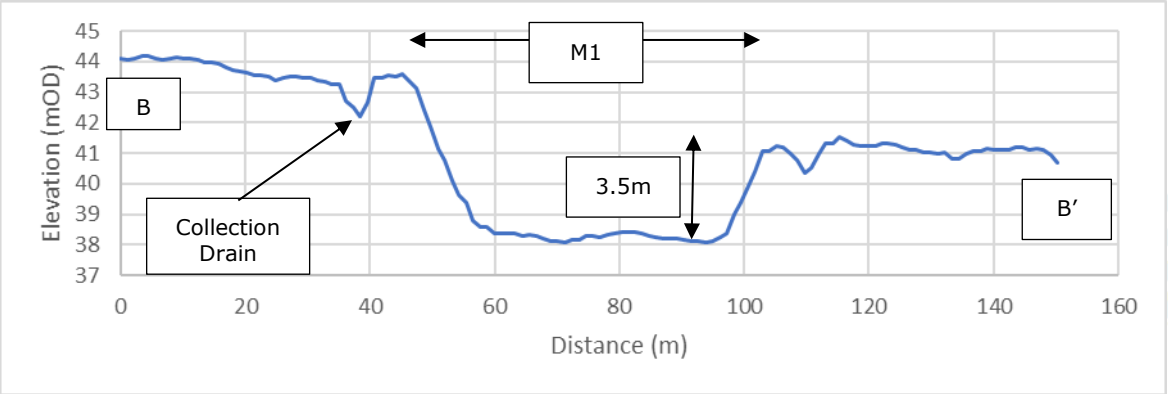


Figure 2-3: Cross-section profile across M1

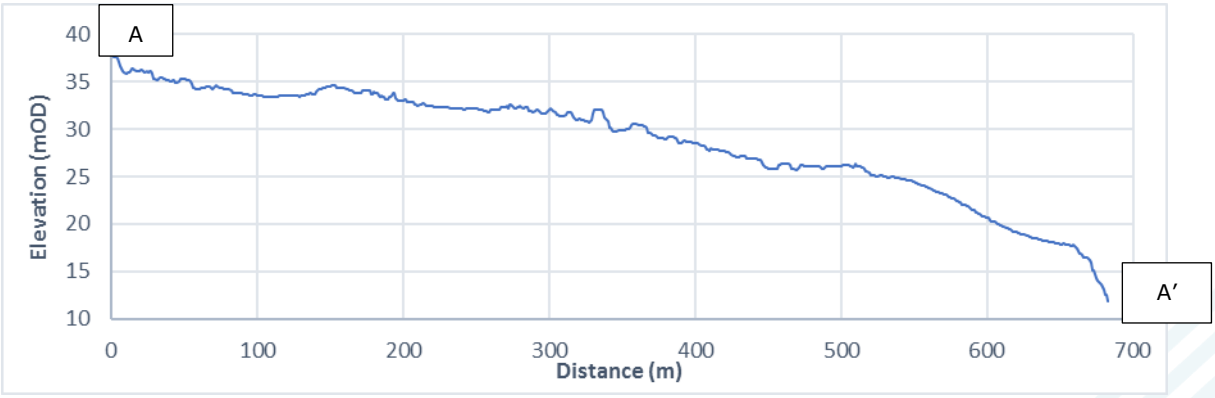


Figure 2-4: Cross-section profile south-north across the site

2.4 Site Geology

The groundwater and geological maps of the total site, provided by the Geological Survey of Ireland (GSI), have been studied and an extract of the quaternary soils map is presented in Figure 2-5 with a brief summary of each soil type in Table 2-1. The subsoil at the proposed sites is till derived from sandstone and shales, a largely heterogenous and mixed soil type. There are no alluvium deposits mapped within the site boundary, which would indicate historic fluvial flooding.

The underlying bedrock formation is Platin Formation. The dominant lithology is crinoidal and peloidal grainstone, locally conglomeratic. Cherty and micritic units are also present. It is generally coarser, paler and less well-sorted than the underlying Crufty Formation

Patches of Karstified bedrock are isolated to the historical drainage line of the un-named ditch adjacent to the eastern boundary of the site.

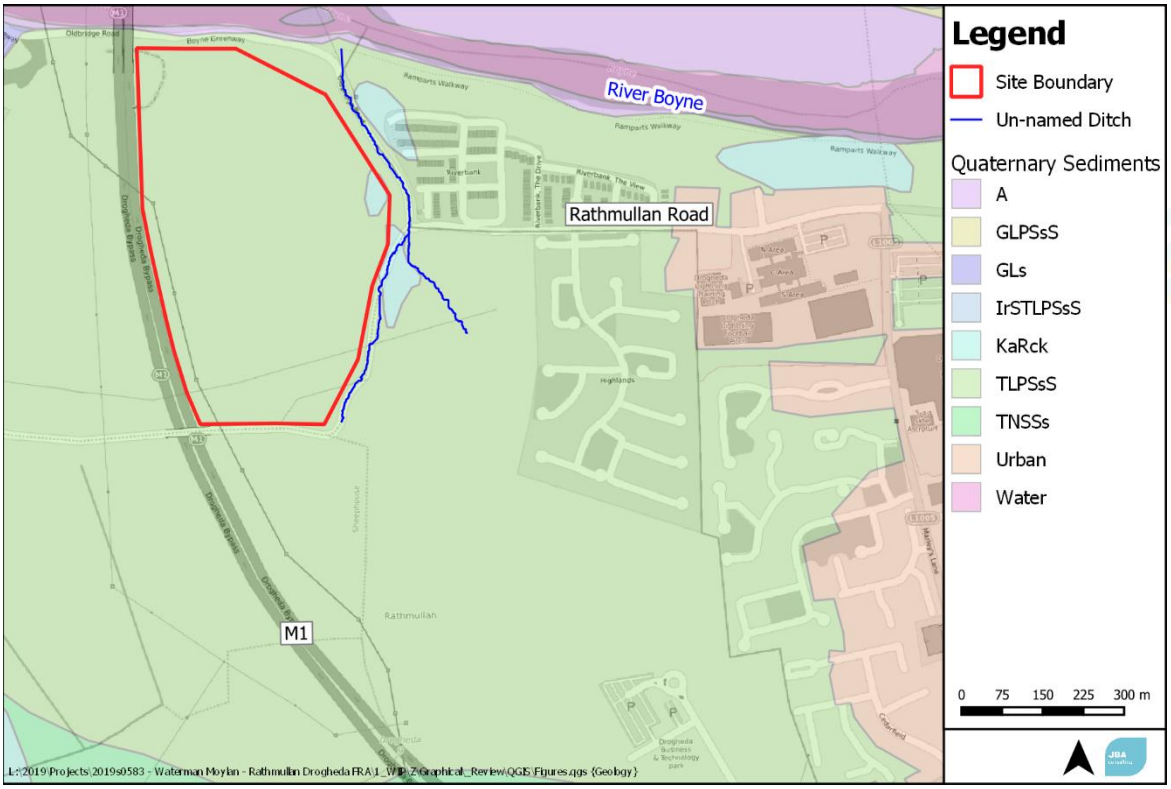


Figure 2-5: Quaternary Soils

Table 2-1 Subsoil Lithology

Quaternary Sediment	Lithology
A	Alluvium
GLPSsS	Gravels derived from Lower Palaeozoic sandstones and shales
GLs	Gravels derived from Limestones
IrSTLPSsS	Irish Sea Till derived from Lower Palaeozoic sandstones and shales
KaRck	Karstified bedrock outcrop or subcrop
TLPSsS	Till derived from Lower Palaeozoic sandstones and shales
TNSSs	Till derived from Namurian sandstones and shales
Urban	Urban
Water	Water

2.5 M1 Motorway

Prior to construction of the M1, the previous watercourse had a catchment area of approximately 1.9km^2 extending further to the south west. As shown in Figure 2-6, the Flood Studies Update (FSU) hydrological catchment still includes this larger catchment area pre-dating construction of the M1. The un-named watercourse is also shown to be crossing M1.

However, as discussed in Section 2.3, the construction of the M1 Motorway has significantly altered the topography of the natural catchment of the former watercourse. Appendix A includes construction drawings from the Northern Motorway Project (the M1) for the portion of the road crossing the prior watercourse. An extract of this is also provided in Figure 2-7. This confirms the significant cutting of the M1 road levels of at least 3.5m below natural ground levels.

The construction drawings also clearly show piped culverts intercepting the drain line of the prior watercourse along with overland flows from adjacent fields and redirects these flows into the surface water drainage network of the motorway. The culverted system then flows parallel to the road surface and discharges directly into the River Boyne.

None of the former overland flow or flows contained within the former watercourse are now able to cross the M1, resulting in the disconnection of the former watercourse into a dry ditch and reducing the catchment area to that as shown in Figure 2-2.

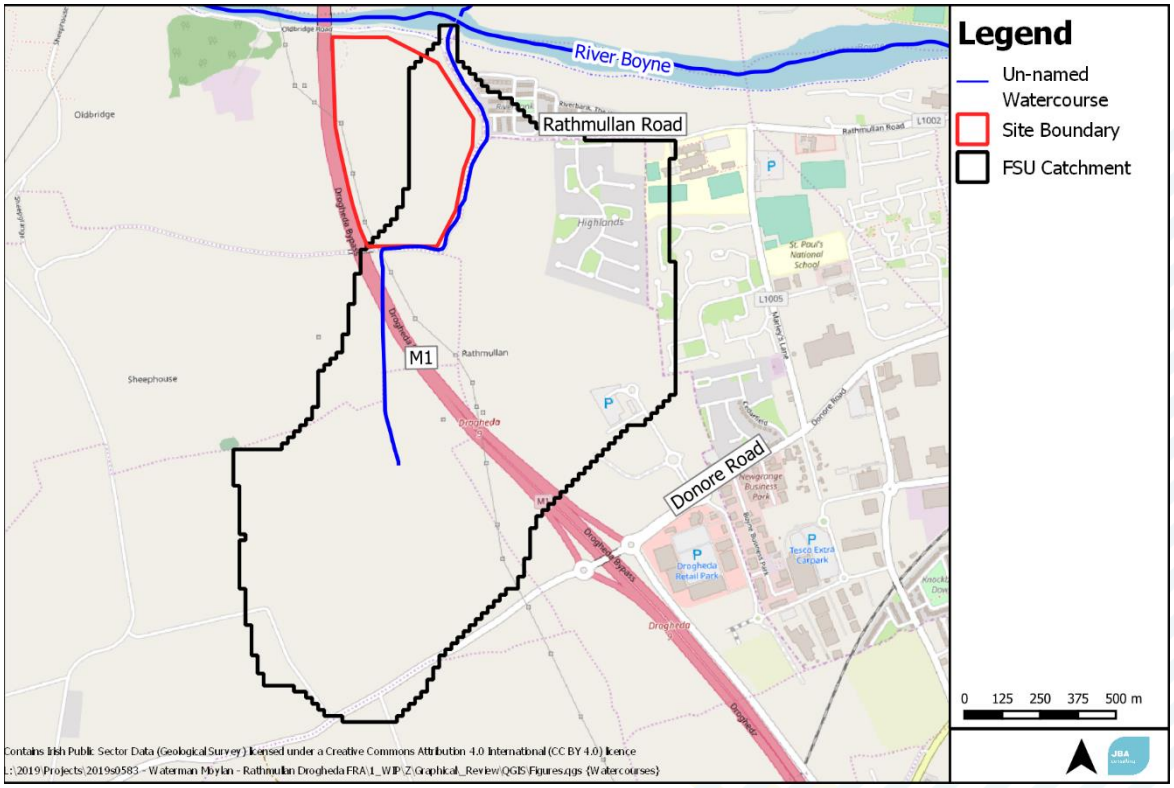


Figure 2-6: Former watercourse and catchment

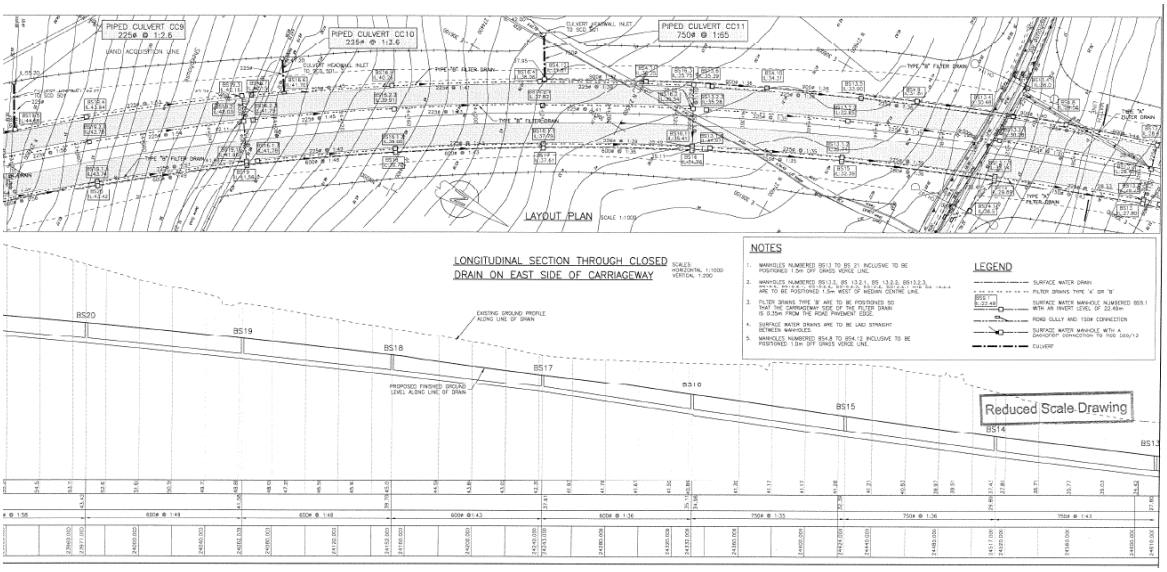


Figure 2-7: Extract of M1 Motorway construction drawings

2.6 Site Visit

A site visit was undertaken by JBA Consulting on Wednesday 24th April 2019. The site visit was able to confirm that the former watercourse has been disconnected by the M1 Motorway, verified the presence of piped culverts diverting surface water flows into the M1 surface water drainage network, and that the former watercourse adjacent to the site now exists as a dry ditch unable to convey flow. Figure 2-8 identifies the locations and corresponding identification numbers for the photographs and details of the site visit summarised in Table 2-2.

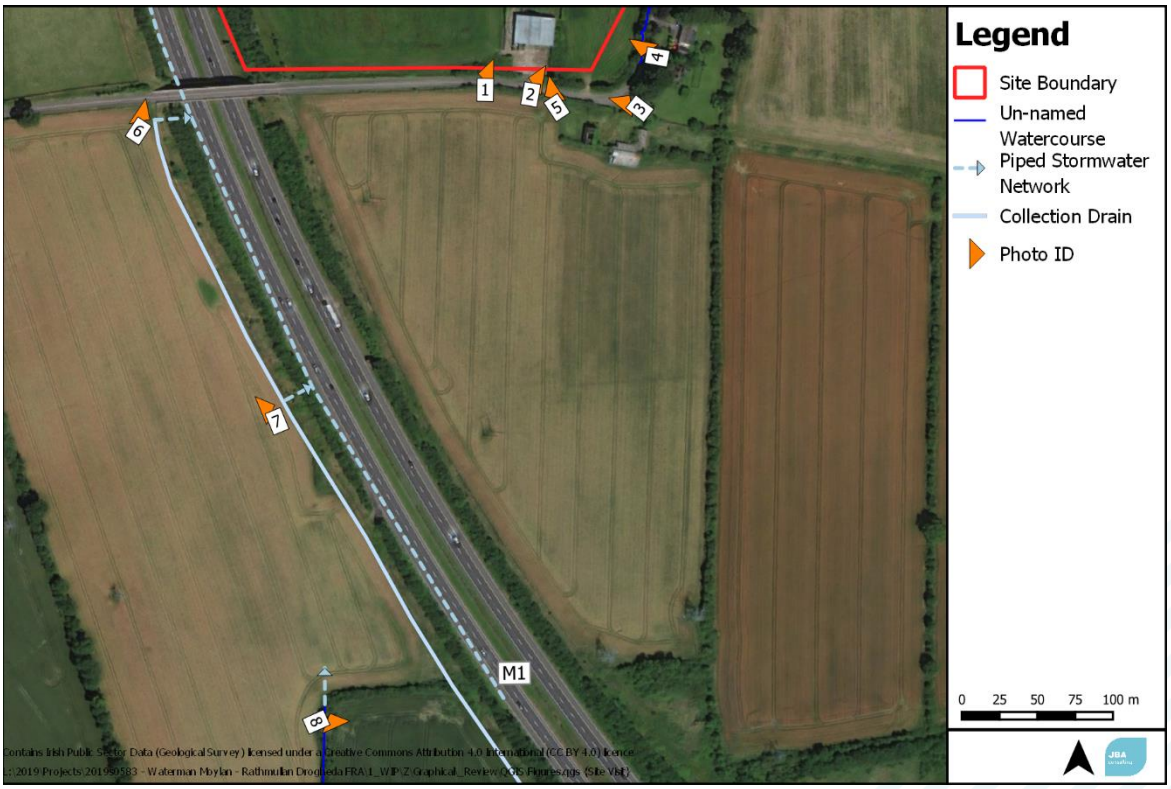


Figure 2-8: Site Visit Locations

Table 2-2: Photographs from Site

Photo No. 1 Dry ditch located between the southern boundary of the site and Rathmullan Road. The ditch is completely overgrown with vegetation and brambles, contained no water and shows no evidence of fluvial activity	
Photo No. 2 Access to farm sheds from Rathmullan Road across the ditch on the southern boundary of the site. The culvert under the vehicular access to the site has been completely collapsed with 100% blockage. The hole at the location of collapse is clearly visible in the photograph.	

Photo No. 3 The ditch between residential properties and Rathmullan Road adjacent to the south-eastern corner of the site (looking north). The outlet of the culvert under Rathmullan Road has been completely blocked and is no longer visible. The ditch has been almost entirely infilled with garden refuse and green waste. There is no fluvial connection or possible watercourse remaining within the ditch.	
Photo No. 4 The ditch between residential properties and Rathmullan Road adjacent to the south-eastern corner of the site (looking south). The ditch has been almost entirely infilled with garden refuse and green waste.	
Photo No. 5 View of fields looking south from Rathmullan Road towards the M1. The blue motorway sign is barely visible highlighting the significant cutting of the M1 below natural ground levels. There is no ability for surface water flows to cross the M1.	

Photo No. 6 Culverted pipe entrance collecting surface water flows from the fields to the west of the M1 and redirecting into the motorway stormwater drainage network.	
Photo No. 7 Second observed culverted pipe entrance collecting surface water flows from the fields to the west of the M1 and redirecting into the motorway stormwater drainage network.	
Photo No. 8 Culverted pipe entrance of the former drain upstream of the M1	

3 Flood Risk Identification

An assessment of the potential and scale of flood risk at the site was conducted using historical and predictive information. This has identified any sources of potential flood risk to the site and reviewed historic flood information. The findings from the flood risk identification stage of the assessment are provided in the following sections. Further detail on the Planning Guidelines and technical concepts is provided in Appendix B.

3.1 Flood History

Several sources of flood information were reviewed to establish any recorded flood history at, or near the site. This includes the OPW's website, www.floodmaps.ie. Which highlights areas at risk of flooding through the collection of recorded data and observed flood events. Refer to Figure 3-1 for location of the identified historic flood events in the area.

3.1.1 Floodmaps.ie

There is a well recorded history of flooding within Drogheda Town and surrounds however none of which has been recognised as having any impact on the site. Due to the rising topography of the site, flooding of the River Boyne at locations identified as 1, 2 and 3 in Figure 3-1 do not impact upon the site. Similarly, localised recurring flooding from heavy rain, insufficient drainage capacity or stream overflow have occurred in adjacent areas but none of which have any record of affecting the site.

Table 3-1 provides further details of the recorded flood history in the general area.

Figure 3-1: Historic Flood Map

Table 3-1: Local Flood History

Location ID	REPORT
1	***Drogheda/Louth Collection Meeting – Minutes/Map (21.02.2006/21.10.2006) – Minutes of meeting identifying areas subject to flooding in Drogheda Town Council area***

57. River Boyne, Left Bank upstream Drogheda
Area subject to flooding. Part of floodplain. (Photos, report to be provided) [Flood ID 4599]

71. Simcock's Lane/Trinity Street Junction
Historically heavy rain caused flooding of two properties. Remedial works have been carried out. [Flood ID 4613]

72. Rathmullan Road
Road floods due to insufficient drainage capacity. Backing up of drains results in lifting of manholes. [Flood ID 4614]

2	***Louth/Cooley/Slane Area Meeting – Minutes/Map (10.10.2005/05.04.2005) – Minutes of meeting identifying areas subject to flooding***

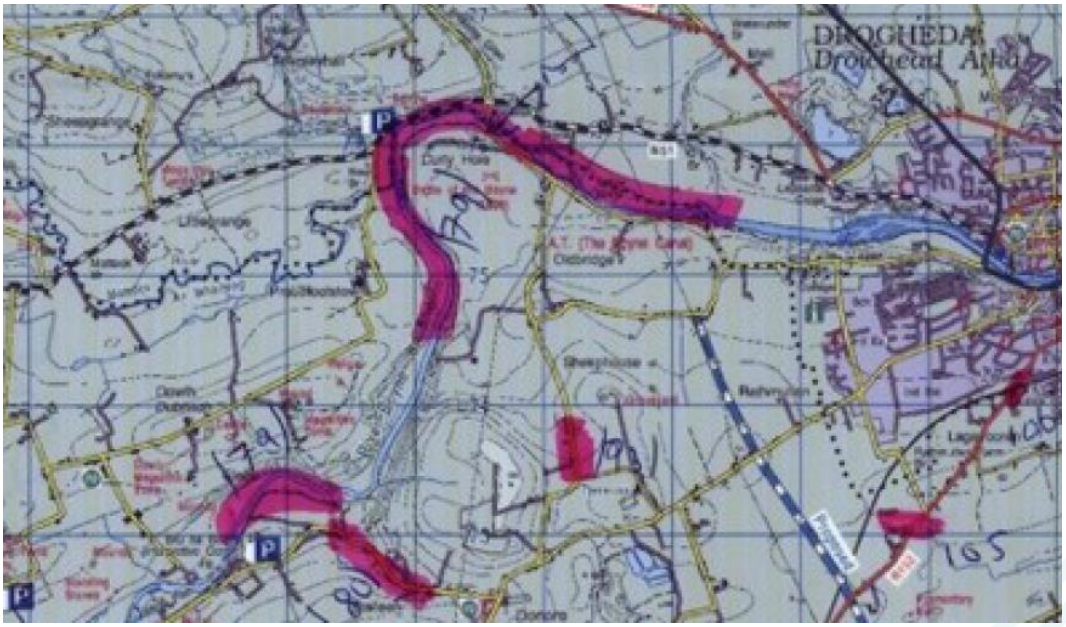
14. Slane Road (N51) near Curley Hole.
Stretch of road floods due to combination of river flooding and high tide. [Flood ID 3086]

3	***Slane Area Engineer Meeting – Minutes/Map (15.04.2005) – Minutes of Meeting identifying areas subject to flooding***

79. 4 stretches of the Boyne from Slane to Drogheda– River Boyne flood plain. Floods 1 to 2 times per year. Roads are liable to flood.
Flood Id = 3086, 935, 936, 937

93. Sheephouse Road, Donore– Stream overflows its banks every year after heavy rain. Road is liable to flood.

105. R152 south of Drogheda – Stream overflow its banks after heavy rain every year. Road is liable to flooding.
Flood Id = 964



3.1.2 Internet Search

An internet search was conducted to gather any additional information of flood history at the site not found within floodmaps.ie. Whilst flooding in the Drogheda area has occurred at regularly intervals, no further information was available that indicated any flood impacts affecting the site.

3.2 Predictive Flood Mapping

The subject area has been assessed by 3 flood mapping or modelling studies which are listed below:

- OPW Preliminary Flood Risk Analysis (PFRA)
- Eastern CFRAM
- Meath County Council Strategic Flood Risk Assessment (SFRA)

The level of detail presented by each method varies according to the quality of the information used and the approaches involved. The Eastern CFRAM is the most detailed assessment of flood extent and supersedes the fluvial flood outlines presented by the OPW PFRA study.

3.2.1 OPW PFRA

The Preliminary Flood Risk Assessment (PFRA) is a requirement of the EU Flood Directive (2007/60EC). One of the PFRA deliverables is flood probability mapping for various sources, pluvial (surface water), groundwater, fluvial and tidal. The PFRA is a preliminary or 'indicative' assessment and analysis has been undertaken to identify areas potentially prone to flooding and should not be used as the sole basis for defining the Flood Zones.

Figure 3-2 presents the OPW PFRA flood extents at the site and surrounding area, which shows no risk of groundwater, fluvial or coastal flooding to the site, but does indicate two small isolated spots of indicative flooding for the 1% AEP pluvial event.

Figure 3-2: OPW PFRA Pluvial and Groundwater flood map

3.2.2 Eastern Catchment Flood Risk Assessment (Eastern CFRAM)

The Eastern CFRAM study is the most detailed flood mapping produced for the Drogheda region. The Study commenced in June 2011 with final flood maps issued during 2016. The study involved detailed hydraulic modelling of rivers and their tributaries. Flood maps have been finalised for Drogheda and an extract of the fluvial flood map covering the site and surrounding area is provided in Figure 3-3.

The mapped CFRAM fluvial flood extents identified mottled flooding originating at the southern boundary of the site and flowing northwards across the site for all events equal to and greater than the 10%AEP. The mottled appearance indicates that predicted depths are extremely shallow, and the steep slope of the site suggests that this is overland flow across the site and are not floodplain storage.

However, the CFRAM hydraulic modelling does not replicate the existing form or function of the watercourse. Predicted flood extents have included the full former watercourse catchment to the west of the M1 as discussed within the Eastern CFRAM Study HA07 Hydrology Report and UoM07 Hydraulics Report. The CFRAM model fails to acknowledge the presence of the M1 Motorway and the discontinuation of the stream from its previous course. As discussed in Section 2 and confirmed during the site visit, the former watercourse is now redirected into the M1 surface water drainage network, leaving a disconnected and inactive dry ditch to the east of the M1. The predicted mapping produced within the ECFRAM Study is therefore not an accurate representation of fluvial flood risk to the site.

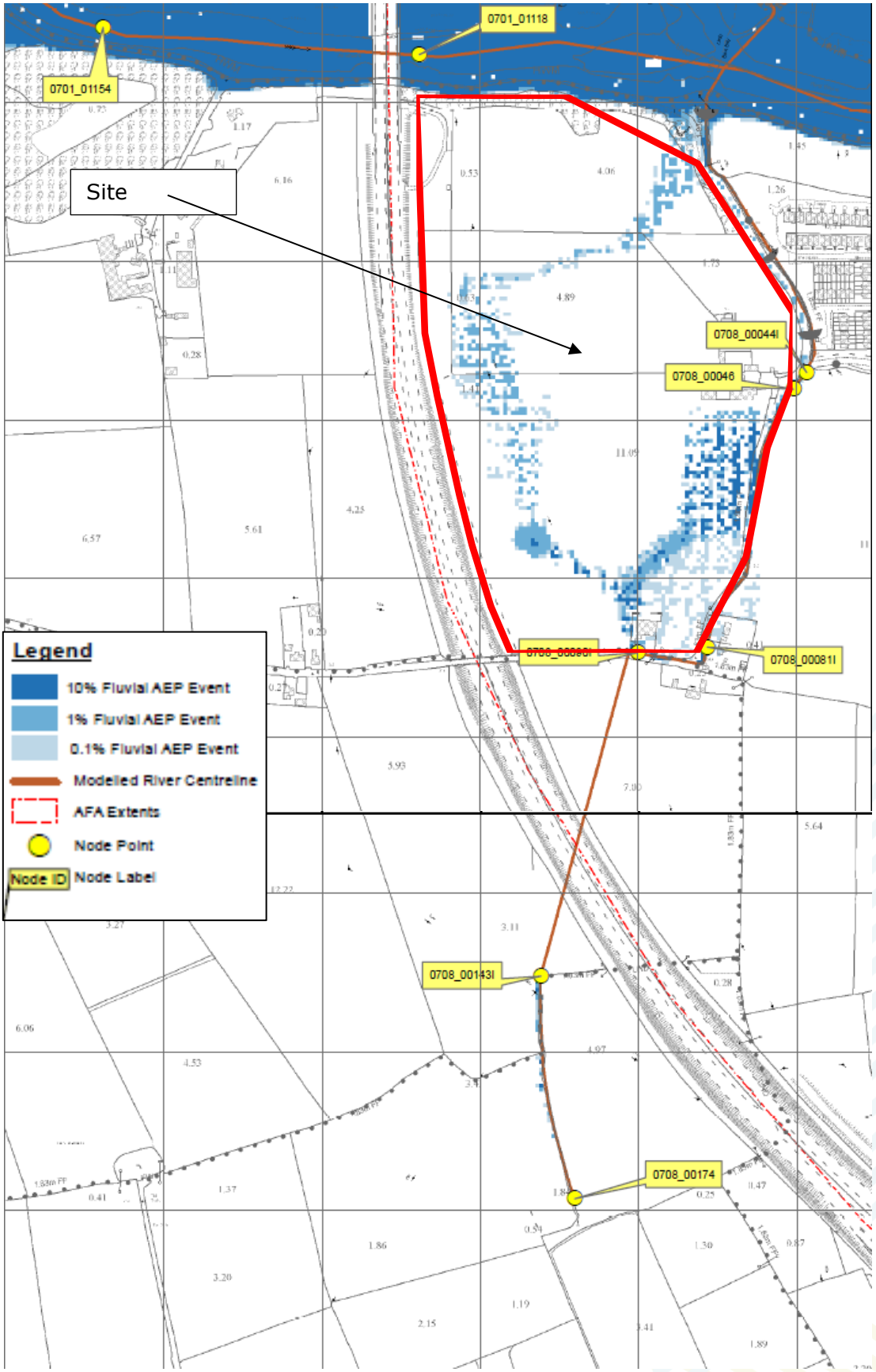


Figure 3-3: Eastern CFRAM Fluvial map

3.2.3 Flood Risk Assessment and Management Plan for Proposed Variation 3 to Meath CDP 2013 – 2019

The Strategic Flood Risk Assessment is designed to be updated as further flood risk information becomes available and changes to the development plan are proposed under a formal variation. There are two prior iterations of the SFRA for the Meath CDP 2013-2019 that are currently published. This variation aligns the development plan with the Economic Development Strategy for County Meath 2014-2022 in relation to statutory land use planning. Draft CFRAM mapping was incorporated into this document as shown in Figure 3-4.

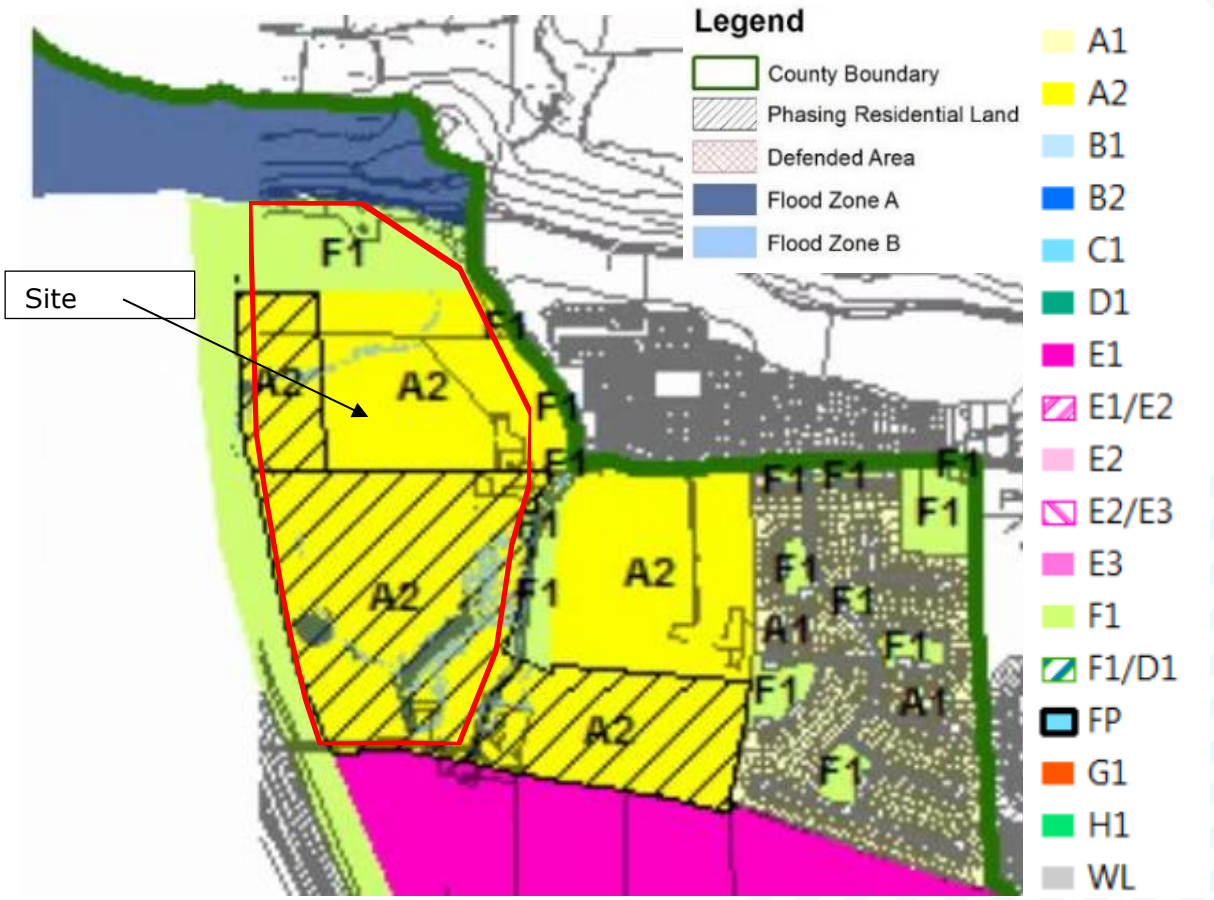


Figure 3-4: CDP Flood Zone Mapping

3.3 Sources of Flooding

The initial stage of a Flood Risk Assessment requires the identification and consideration of probable sources of flooding. Following the initial phase of this Flood Risk Assessment, it is possible to summarise the level of potential risk posed by each source of flooding. The flood sources are described below.

3.3.1 Fluvial

Prior to the construction of the M1 motorway, the primary source of flood risk to the site was fluvial flooding. This is recognised within the mapping output of the Eastern CFRAM Study. This study has however, been shown within Section 2 and confirmed during the site visit, to not accurately represent current conditions of the site and associated fluvial flood risk. The Eastern CFRAMs mapping does not consider the interception of the former watercourse and incorporation of flows into the stormwater drainage network of the M1 motorway. Nor does it take it account the derelict nature of the former watercourse adjacent to the site which no longer serves as a functional fluvial channel. Upon detailed review of all available fluvial flood information and surface water drainage construction drawings of the M1 Motorway, it is determined within this report that fluvial flood risk from the former un-named watercourse is no longer present, as there is no watercourse remaining which could be a source of flooding to the site. Figure 2-2 identifies the upland catchment of the site as only 0.15km^2, and that a third of this is contained within the site boundary. The upslope area of the site should no longer be considered as a fluvial catchment as it is limited to localised surface run-off and is therefore pluvial. Additionally, site elevation levels remain sufficiently high that there is no direct risk of fluvial flooding from the River Boyne. Fluvial flood risk to the site is therefore screened out at this stage.

3.3.2 Coastal

The site has a fall in excess of 30m across the site, with the lowest proposed Finished Floor Level on the northern boundary adjacent to the River Boyne is at 19.25mOD, well above any potential coastal flood levels. Tidal flood sources have therefore been screened out at this stage.

3.3.3 Groundwater

Groundwater flooding results from high sub-surface water levels that impact upper levels of the soil strata and overland areas that are usually dry. There has been no groundwater flooding reported in this area by the OPW PFRA maps.

No groundwater strikes were noted during the Site Investigation works which included trial pits and boreholes to depths of up to 8m below ground level. These works were carried out in November 2018 when it would be expected that ground water is relatively high due to the predominance of winter rainfall in Ireland.

Groundwater is not expected to be a risk confirmed by the OPW PFRA mapping and the geology on site. It has therefore been screened out at this stage.

3.3.4 Pluvial/Surface Water

Pluvial or surface water flooding is the result of rainfall-generated flows that arise before run-off can enter a watercourse or sewer. The OPW PFRA mapping indicates minimal potential for pluvial flood on the site, however, the poor design of a surface water system or the inappropriate design of road, ground and finished floor levels can influence the specific surface water flood risk to a site.

To manage the potential generation of surface water run-off by the proposed development, careful consideration has been given to the overall site design. Proposed mitigation measures to reduce risk of pluvial flooding are discussed in detail in Section 4.

4 Flood Risk Assessment

Following detailed review of all available flood information, groundwater, coastal and fluvial sources have been screened out for this site.

Whilst two small isolated spots of pluvial flooding are identified within the indicative PFRA pluvial mapping, the steep slope of the site and the mitigation measure included within the proposed design adequately address any flood risk from pluvial sources.

As discussed throughout Section 2 and summarised in Section 3.3.1, due to the outdated catchment conditions represented within the Eastern CFRAMs flood modelling and mapping incorrectly identifying fluvial flood risk to the site, it is the finding of this site-specific flood risk assessment that the current Flood Zones for the site are not appropriate and the entire site should be redefined as Flood Zone C.

The Planning System and Flood Risk Management Guidelines for Planning Authorities, classes residential development as a highly vulnerable land use and is therefore appropriate for development only within Flood Zone C without the need to provide a justification test.

This FRA confirms the proposed development footprint within the subject site as being located wholly within Flood Zone C and is therefore appropriate for residential development from a flood risk perspective.

4.1 Mitigation

Although this site-specific flood risk assessment has concluded that the entire development footprint is located within Flood Zone C, mitigation measures have been considered and included within the proposed development where necessary, to mitigate the risk of pluvial flooding to and from the site.

4.1.1 Finished Floor Levels

The lowest proposed Finished Floor Level on the northern boundary adjacent to the River Boyne is at 19.25mOD, well above any potential coastal flood levels. The topographic gradient across the site minimises any natural accumulation or ponding of water on-site, however Finished Floor Levels across the site retain a minimum freeboard of at least 150mm above surrounding hard surfaces including the road network.

4.1.2 Surface Water Run-Off

It is proposed to store excess storm water up to the 1 in 100-year storm event within 4 No. underground storage systems, one per surface water catchment. The attenuation storage will normally be dry and will only fill up during storm events. The stormwater will then be released after the storm, at a controlled rate via the hydrobrake manholes.

The total capacity of the attenuation storage is 4,521 m^3. This is sufficient storage capacity to store water from the critical 100-year storm for the subject site with 20% climate change allowed for in the calculations.

Any flows from the system in design exceedance events will be directed along roads and into greenfield space adjacent to the outfalls, reducing any residual risk to dwellings. Further details are provided in the accompanying Site Drainage report produced by Waterman Moylan.

4.1.3 Access

Access to the site is located directly from Rathmullan Road and is located within Flood Zone C. Whilst historical flooding is noted on Rathmullan Road from poor stormwater drainage further to the east, the road provides access from three separate directions to the site, ensuring safe access and egress from flood risk.

4.1.4 Third Party Impacts

As the site is wholly contained within Flood Zone C and the surface water drainage system appropriately attenuates stormwater from the site, there is no increased flood risk to third parties from this development

5 Conclusion

JBA Consulting has undertaken a detailed Site-Specific Flood Risk Assessment for the proposed site development in Rathmullan Co. Dublin. The site is currently a greenfield site located on the western fringe of Drogheda, Co. Meath. It is situated south of the River Boyne between the M1 Motorway and Rathmullan Road. No historic flooding has been identified within the site boundary.

A portion of the site is currently incorrectly classified as Flood Zone A/B, due to the outdated catchment conditions represented within the Eastern CFRAMs flood modelling and mapping. This CFRAM study does not reflect the interception of the former un-named watercourse and incorporation of its flows into the M1 motorway surface water drainage network.

From reviewing available sources of flooding, including the flood extent and depth maps produced as part of the Eastern CFRAM, the proposed development is at low risk of flooding and should be classified as Flood Zone C.

This recommendation has been communicated to the OPW who have now noted the mapping of this area as requiring review and potential update, following the additional information provided within this assessment.

The proposed development consists of a Strategic Housing Development on residential zoned lands west of Drogheda town centre. The accommodation provided on the site consists of;

- 661 residential units with a crèche and retail unit.

The proposed estate road levels around the site range from 18.73 to 36.50 m OD Malin and proposed finished floor levels range between 19.25 to 36.50 m OD Malin. Finished Floor Levels across the site retain a minimum freeboard of at least 150mm above surrounding hard surfaces including the road network. Surface water will be managed through the use of underground attenuation tanks and controlled discharge.

The main access for the site will be provided via a new 4 arm signalised junction with arms linking the Rathmullan Road (East), the Rathmullan Road (West) the proposed site access and the local access road to the south of the signalised junction. A second access into the housing development is proposed via a new priority junction to the south of the site onto the existing local access road.

The Flood Risk Assessment was undertaken in accordance with 'The Planning System and Flood Risk Management' guidelines and confirm that the development can manage risk in agreement with the core principles contained within.

Appendices

A Appendix – Northern Motorway Project Drainage Layout

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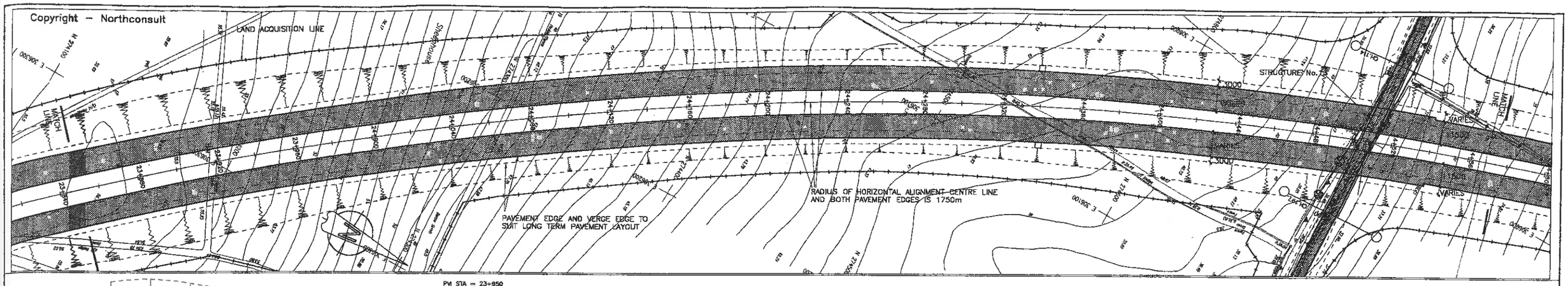

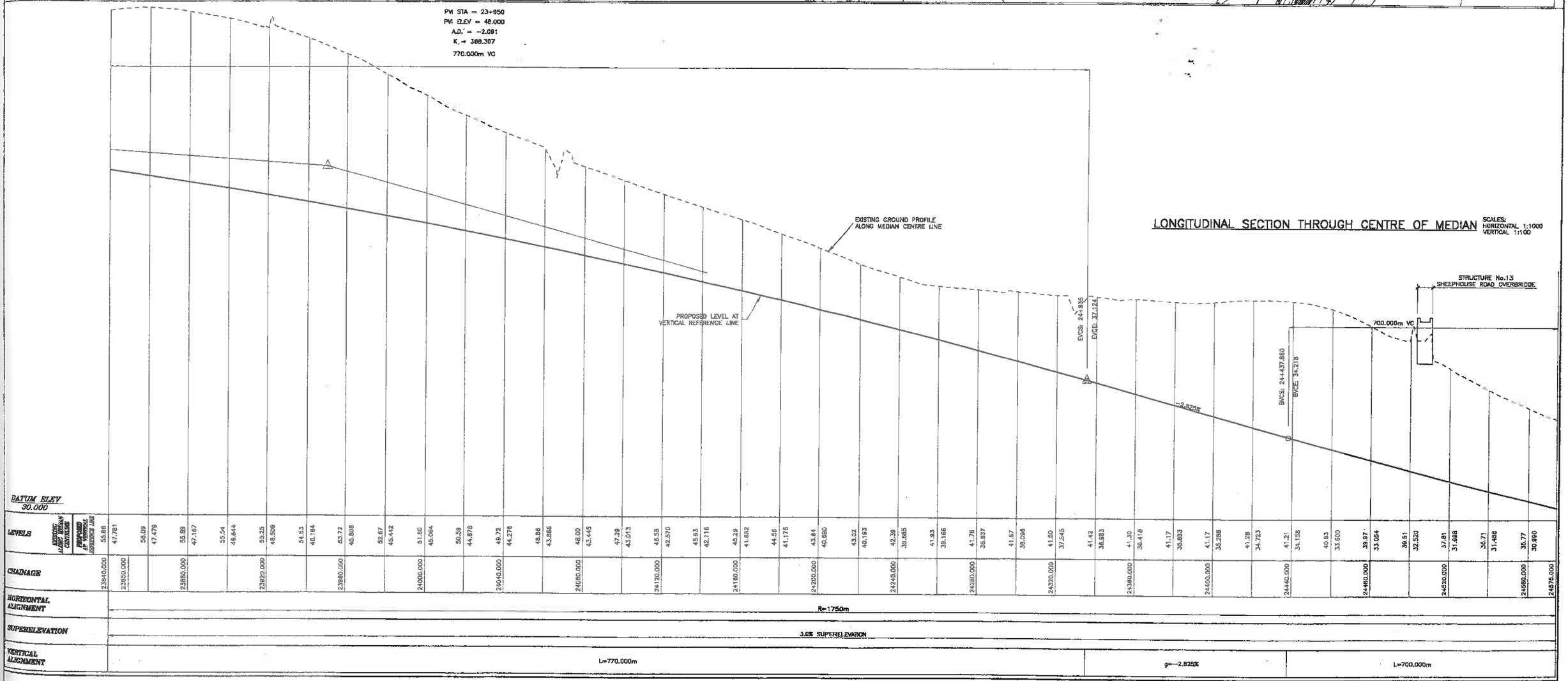

LONGITUDINAL SECTION THROUGH CENTRE OF MEDIAN

SCALES:
HORIZONTAL 1:1000
VERTICAL 1:100

DATUM ELEV 30.000

CHAINAGE	EXISTING ALONG MEDIAN CENTRE LINE	PROPOSED AT VERTICAL REFERENCE LINE
23840.000	55.86	47.781
23850.000		58.09
	55.89	47.476
23880.000		55.89
	55.54	47.167
	55.25	46.844
23920.000		48.509
	54.53	48.184
	53.72	46.808
23960.000		52.67
	51.60	45.442
24000.000		45.084
	50.59	44.878
	49.72	44.276
24040.000		48.86
	48.00	43.266
24080.000		43.445
	47.29	43.013
24120.000		48.58
	45.83	42.570
	45.29	42.116
24160.000		45.652
	44.56	41.176
24200.000		43.84
	43.02	40.680
	42.39	40.193
24240.000		42.39
	41.93	39.865
	41.76	39.166
24280.000		41.76
	41.67	38.837
	41.50	38.096
24320.000		41.50
	41.42	37.545
	41.30	38.683
24360.000		36.418
	41.17	36.823
24400.000		41.17
	41.28	35.288
	41.21	34.723
24440.000		34.158
	40.83	33.600
	39.97	33.054
24480.000		38.51
		32.520
24520.000		37.81
		31.988
		36.71
		31.456
24560.000		35.77
		30.960
24575.000		

HORIZONTAL ALIGNMENT: R=1750m

SUPERELEVATION: 3.0% SUPERELEVATION

VERTICAL ALIGNMENT: L=770.000m | g=−2.825% | L=700.000m

Project Title:

NORTHERN MOTORWAY PROJECT
GORMANSTON TO MONASTERBOICE

Origin: Roughan & O' Donovan Consulting Engineers

Client:

Meath County Council

Meath County Council
Northern Motorway Project Office

County Engineer
Mr. Oliver Perians B.E., C.Eng., F.I.E.I.

Project Engineer
Mr. Charles McCarthy B.E., M.I.E.I.

Consulting Engineer: **Northconsult**

McCarthy & Partners Consultants Ltd.
Balgriffin House,
Balgriffin, Dublin 17
Tel: 353-1-8480000
Fax: 353-1-8470310
Email: dublin@mccarthy.ie.ie

MC O'Sullivan & Co. Ltd.
Ashurst, Mount Merrion Ave.,
Blackrock, Dublin
Tel: 353-1-2884499
Fax: 353-1-2835676
Email: mcosdub@iol.ie

Roughan & O'Donovan Ltd.
Arena House,
Arena Road,
Sandyford, Dublin 18
Tel: 353-1-2940800
Fax: 353-1-2940820
Email: info@rod.ie
Website: www.roughanodonovan.com

Rev.	Date	Description	Appr.
A	–	NOT USED	
B	–	NOT USED	
C	AUG.'99	MINOR REVISIONS	GPS
D	1/5/00	CONSTRUCTION ISSUE	GPS

Rev.	Date	Description	Appr.

Contract Title: Contract No. 7 : Road Contract South Of Boyne River CH.11300 To CH.24600

Drawing Title: Motorway Road Layout Sheet 19 CH.23850 To CH.24575

Status: Construction

Designed:	GPS	File Name:	971891041	Drawing Nr.	Rev
Drawn:	M.M.			7RL-1041	D
Approved:	GPS	Scale:	1 : 1000		
Checked:	GPS	Date:	03-08-98		

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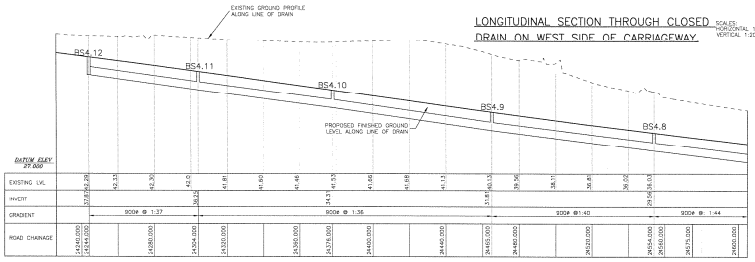
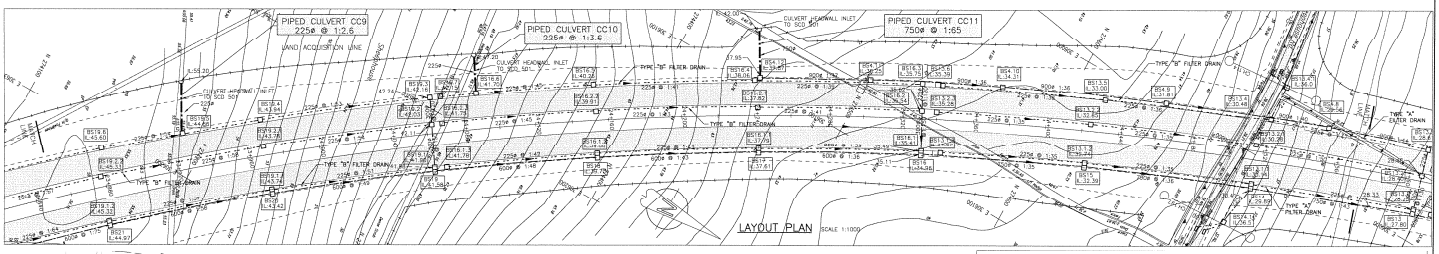
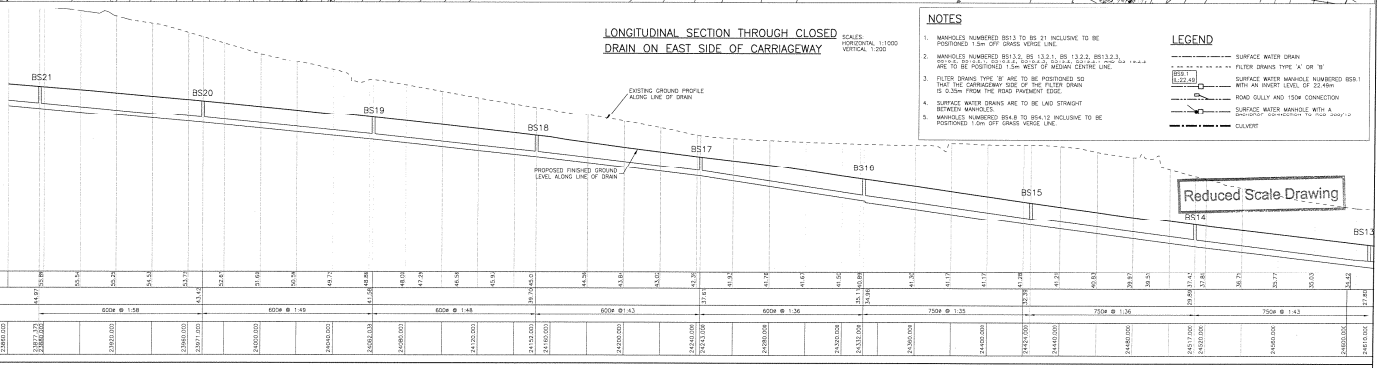


LONGITUDINAL SECTION THROUGH CLOSED DRAIN ON WEST SIDE OF CARRIAGEWAY SCALES: HORIZONTAL 1:1000 VERTICAL 1:200





LONGITUDINAL SECTION THROUGH CLOSED DRAIN ON EAST SIDE OF CARRIAGEWAY SCALES: HORIZONTAL 1:1000 VERTICAL 1:200

NOTES

1. MANHOLES NUMBERED BS1.3 TO BS 21 INCLUSIVE TO BE POSITIONED 1.5m OFF GRASS VERGE LINE.
2. MANHOLES NUMBERED BS1.3.0, BS 1.3.2.1, BS 1.3.2.2, BS1.3.2.3, BS1.3.2, BS1.3.3, BS1.3.4, BS1.3.5, BS1.3.6, BS1.3.7, BS1.3.8, BS1.3.9, BS1.3.10, BS1.3.11, BS1.3.12, BS1.3.13, BS1.3.14, BS1.3.15, BS1.3.16, BS1.3.17, BS1.3.18, BS1.3.19, BS1.3.20, BS1.3.21 ARE TO BE POSITIONED 1.5m WEST OF MEDIAN CENTRE LINE.
3. FILTER DRAINS TYPE 'B' ARE TO BE POSITIONED SO THAT THE CARRIAGEWAY SIDE OF THE FILTER DRAIN IS 0.35m FROM THE ROAD PAVEMENT EDGE.
4. SURFACE WATER DRAINS ARE TO BE LAID STRAIGHT BETWEEN MANHOLES.
5. MANHOLES NUMBERED BS4.8 TO BS4.12 INCLUSIVE TO BE POSITIONED 1.5m OFF GRASS VERGE LINE.

LEGEND

- SURFACE WATER DRAIN
- FILTER DRAINS TYPE 'A' OR 'B'
- BS3.1 / 22.46 — SURFACE WATER MANHOLE NUMBERED BS3.1 WITH AN INVERT LEVEL OF 22.46m
- ROAD GULLY AND 150Ø CONNECTION
- SURFACE WATER MANHOLE WITH A 150Ø OUTLET CONNECTION TO ROAD GULLY
- CULVERT

Reduced Scale Drawing

Project Title: **NORTHERN MOTORWAY PROJECT**
GORMANSTON TO MONASTERBOICE

Origin: Roughan & O' Donovan Consulting Engineers

Client: **Meath County Council**
Meath County Council
Northern Motorway Project Office
County Engineer
Mr. Oliver Perkins B.E., C.Eng., F.I.E.I.
Project Engineer
Mr. Charles McCarthy B.E., M.I.E.I.

Consulting Engineer: **Northconsult**

McCarthy & Partners Consultants Ltd.
Balgriffin House, Balgriffin, Dublin 17
Tel: 353-1-8460000
Fax: 353-1-8470310

MC O'Sullivan & Co. Ltd.
Ashurst, Mount Merrion Ave., Blackrock, Dublin
Tel: 353-1-2884493
Fax: 353-1-2835676

Roughan & O'Donovan Ltd.
Arena House, Arena Road, Sandyford, Dublin 18
Tel: 353-1-2940800
Email: mail@rod.ie
Website: www.roughanodonovan.com

Rev.	Date	Description	Appr.
C	Aug. 99	Minor Revisions	GPS
D	1.5.00	Construction Issue	GPS

Rev.	Date	Description	Appr.

Contract Title: Contract No. 7 : Road Contract South Of Boyne River CH.11300 To CH.24800

Drawing Title: Drainage Layout Sheet 19 CH.23850 To CH.24575

Status: CONSTRUCTION

Designed:	J.H.R	File Name:	97189113Z
Drawn:	S.K.	Scale:	As Shown
Approved:	GPS	Date:	30-3-99
Checked:	J.H.R		

Drawing Nr.: 7RD 113Z

Rev.: D

B Appendix – Understanding Flood Risk

Flood risk is generally accepted to be a combination of the likelihood (or probability) of flooding and the potential consequences arising. Flood risk can be expressed in terms of the following relationship:

Flood Risk = Probability of Flooding x Consequences of Flooding

B.1 Probability of Flooding

The likelihood or probability of a flood event (whether tidal or fluvial) is classified by its Annual Exceedance Probability (AEP) or return period (in years. A 1% AEP flood has a 1 in 100 chance of occurring in any given year. In his report, flood frequency will primarily be expressed in terms of AEP, which is the inverse of the return period, as shown in the table below and explained above. This can be helpful when presenting results to members of the public who may associate the concept of return period with a regular occurrence rather than an average recurrence interval and is the terminology which will be used throughout this report.

Table: Conversion between return periods and annual exceedance probabilities

Return period (years)	Annual exceedance probability (%)
2	50
10	10
50	2
100	1
200	0.5
1000	0.1

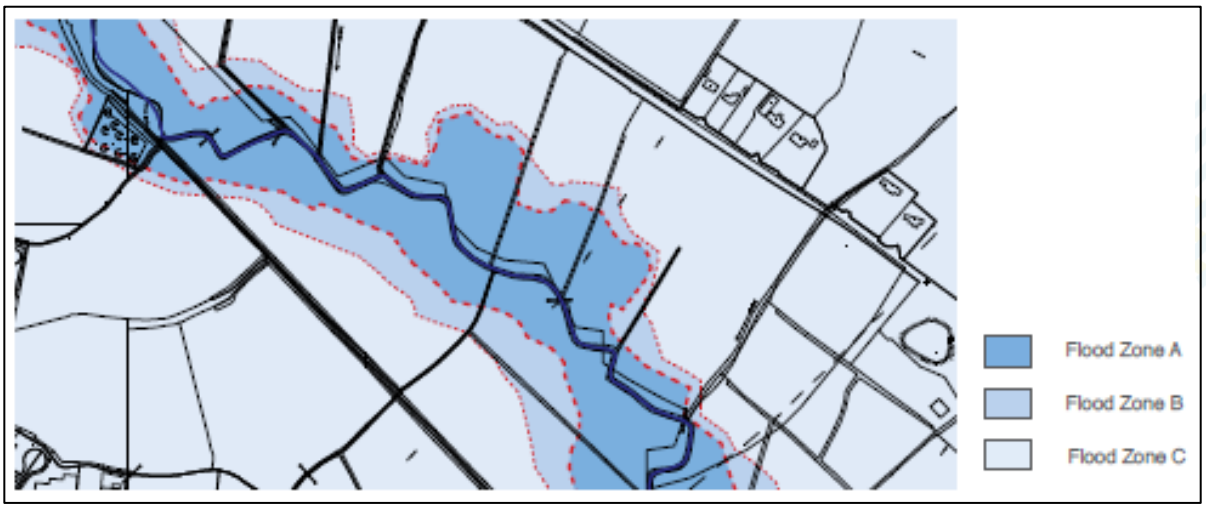
B.2 Flood Zones

Flood Zones are geographical areas illustrating the probability of flooding. For the purposes of the Planning Guidelines, there are 3 types of levels of flood zones, A, B and C.

Zone	Description
Flood Zone A	Where the probability of flooding is highest; greater than 1% (1 in 100) from river flooding or 0.5% (1 in 200) for coastal/tidal flooding.
Flood Zone B	Moderate probability of flooding; between 1% and 0.1% from rivers and between 0.5% and 0.1% from coastal/tidal.
Flood Zone C	Lowest probability of flooding; less than 0.1% from both rivers and coastal/tidal.

It is important to note that the definition of the flood zones is based on an undefended scenario and does not take into account the presence of flood protection structures such as flood walls or embankments. This is to allow for the fact that there is a residual risk of flooding behind the defences due to overtopping or breach and that there may be no guarantee that the defences will be maintained in perpetuity.

Figure: Indicative Flood Zones (OPW & DoEHLG 2009)



B.3 Consequences of Flooding

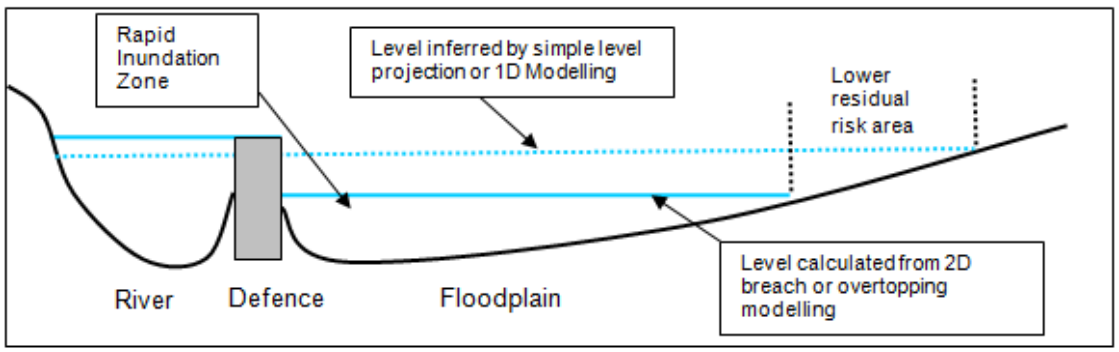
Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow. Rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc.)

The 'Planning System and Flood Risk Management' provides three vulnerability categories, based on the type of development, which are detailed in the Guidelines, and are summarised as:

- **Highly vulnerable**, including residential properties, essential infrastructure and emergency service facilities;
- **Less Vulnerable**, such as retail and commercial and local transport infrastructure, such as changing rooms.
- **Water compatible, including open space, outdoor recreation and associated essential infrastructure, such as changing rooms.**
-

B.4 Residual Risk

The presences of flood defences, by their very nature, hinder the movement of flood water across the floodplain and prevent flooding unless river levels rise above the defence crest level or a breach occurs. This is known as residual risk:



Offices at

Dublin
Limerick

Registered Office
24 Grove Island
Corbally
Limerick
Ireland

+353(0)61 345463
info@jbaconsulting.ie
www.jbaconsulting.ie
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Appendix 5.1 Screening Report & Natura Impact Statement

SCREENING REPORT & NATURA IMPACT STATEMENT

INFORMATION FOR STAGE 1 SCREENING &

STAGE 2 APPROPRIATE ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT

RATHMULLAN, CO. MEATH

Prepared for Trailford Ltd.

Project Reference		**180205**			
Rev.	**Status**	**Author**	**Reviewed By**	**Approved By**	**Issue Date**
I02	Draft	LH	CC	AC	11/09/2019

Scott Cawley, College House, 71-73 Rock Road, Blackrock, Co Dublin, A94 F9X9, Ireland

Tel+353(1)676-9815 Fax +353(1) 676-9816

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1 Introduction

This report, which contains information required for the competent authority (in this instance An Bord Pleanála to undertake both Stage 1 Screening for Appropriate Assessment and Stage 2 Appropriate Assessment (AA) in respect of a proposed residential development (herein the 'proposed development') at lands located off Rathmullan Road, Co. Meath (herein the 'subject lands'), was prepared by Scott Cawley Ltd. on behalf of the applicant. The report provides information and appraises the potential for the proposed development to have significant effects, either individually or in combination with other plans or projects, on the integrity of any Natura 2000 sites (hereafter 'European sites'[1]). The information in this report forms part of, and should be read in conjunction with, the documentation accompanying the application for permission for the proposed development.

Article 6(3) of *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora* (as amended) (hereafter 'the Habitats Directive') requires that, any plan or project not directly connected with or necessary to the management of a European site, but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to AA of its implications for the site in view of the site's conservation objectives. For the purposes of the application for permission in respect of the proposed residential development, the requirements of Article 6(3) have been transposed into Irish law by Part XAB of the Planning and Development Act 2000, as inserted.

The possibility of there being a significant effect on a European site will generate the need for a Stage 2 AA to be carried out by the competent authority for the purposes of Article 6(3). Accordingly, a Stage 1 Screening for AA in respect of an application for consent for proposed development must be carried out by the competent authority (in this case, An Bord Pleanála) in order to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on any European site. A Stage 2 AA is required if it cannot be excluded, based on objective information, that a proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The Screening stage operates merely to determine whether a full AA must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

This document comprises information to enable An Bord Pleanála to perform both Stage 1 screening for Appropriate Assessment and Stage 2 full Appropriate Assessment if required. The information in relation to the Stage 1 Screening Stage is presented in Section 4 of this document which comprises the Screening Report. Whereas, information to enable the Board to perform its statutory function to

[1] Natura 2000 sites are defined under the Habitats Directive (Article 3) as a European ecological network of special areas of conservation composed of sites hosting the natural habitat types listed in Annex I and habitats of the species listed in Annex II. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats. In Ireland these sites are designed as *European sites* – as defined under the Planning and Development Act s and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs).

conduct a full Appropriate Assessment, if required, is presented in Sections 5, 6 and 7 (which sections comprise the NIS).

2 Methodology

2.1 Authors' Qualifications & Expertise

This Natura Impact Statement (NIS) has been prepared by Laura Higgins and has been reviewed by Colm Clarke and Aebhín Cawley of Scott Cawley.

Laura Higgins holds a first class honours degree in Zoology from Trinity College Dublin. Laura has a range of fieldwork experience in Ireland including habitat, invasive species and protected species surveys. She has surveyed a wide range of mammal, bird and invertebrate species in terrestrial and aquatic habitats in Ireland. Laura has a great interest in ecology and is continually improving her professional skills through training courses and volunteer work. Since joining Scott Cawley, her work has included the collection of ecological data, data analysis and preparing Appropriate Assessment reports and Ecological Impact Assessments for residential and infrastructural projects across the country.

Colm Clarke holds an honours degree in Natural Sciences and a Master's degree in Biodiversity and Conservation, both awarded by Trinity College Dublin. He is an Associate member of the CIEEM, and has professional experience working in Australia and New Zealand, as well as more recent experience in Ireland and the UK. Prior to joining Scott Cawley, Colm was involved in the completion of Ecological Impact Assessments of numerous renewable energy and quarrying projects. Since joining Scott Cawley, Colm has been project manager on ecological assessments that include EIA, EcIA and AA. These have included complex projects such as bridge repair works in European Sites, linear infrastructure projects, and the assessment of large outdoor music events. Colm is involved in several ongoing ecological clerk of works roles where he is required to liaise with specialists from other disciplines. His area of expertise is botanical surveying; however, he has a wide range of ecological experience including bat surveys, protected mammal surveys and survey for crayfish.

Aebhín Cawley is Director with Scott Cawley. She holds an honours degree in Zoology from Trinity College, Dublin and a postgraduate diploma in Physical Planning at Trinity. She is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Full Member of the CIEEM. Aebhin Cawley is an experienced ecological consultant with extensive experience in public and private sector projects including renewable energy, ports and other major infrastructural developments. Aebhín has been undertaking Ecological Impact and Appropriate Assessment work in Ireland since 2002 and regularly provides Appropriate Assessment training to local authorities and other public sector organisations. She authored guidelines on Appropriate Assessment for the EPA and delivered training on its application to its inspectorate.

2.2 Guidance

This Natura Impact Statement has been prepared having regard to the following guidance documents where relevant:

- *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities.* (Department of Environment, Heritage and Local Government, 2010 revision).
- *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities.* Circular NPW 1/10 & PSSP 2/10.
- *Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC* (European Commission Environment Directorate-General, 2001); hereafter referred to as the EC Article 6 Guidance Document. The guidance within this document provides a non-mandatory methodology for carrying out assessments required under Article 6(3) and (4) of the Habitats Directive.
- *Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitat's Directive 92/43/EEC* (EC Environment Directorate-General, 2000 updated November 2018); hereafter referred to as MN2000.
- *Guidelines for Good Practice Appropriate Assessment of Plans under Article 6(3) Habitats Directive.* Findings of an international workshop on Appropriate Assessment in Oxford, December 2009.
- *Communication from the Commission on the precautionary principle* (European Commission, 2000)
- *Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the Concepts of Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence.* Opinion of the European Commission. (European Commission, 2007)

The information comprised in this report will assist the competent authority to conduct both the required Stage 1 Screening and Stage 2 Appropriate Assessments in respect of the proposed development and was based on a desk study as well as site visits carried out within the subject lands on 25th September 2018 and 26th March 2019. Information relied upon included the following information sources, which included maps, ecological and water quality data:

- Ordnance Survey Ireland mapping and aerial photography available from OSI online GeoHive mapping resource (Ordnance Survey Ireland, 2018);
- Data on protected species and European sites, available for download and interrogation from the National Parks and Wildlife Service maps and data page (NPWS, 2018);
- Data on waterbodies, available for download and interrogation from the Environmental Protection Agency web map service (EPA, 2018);
- Information on soils, geology and hydrogeology in the area available for download and interrogation from the Geological Survey Ireland online Spatial Resources service (GSI, 2018);
- The Environmental Impact Assessment Report (EIAR) prepared for the planning application for the proposed development

- Information on the status of EU protected habitats and species in Ireland (National Parks & Wildlife Service, 2013a & 2013b); and,
- Environmental Impact Statement chapter 7 Flora and Fauna. (Robertson & Associates, 2006). An Bord Pleanala, 20017 Planning reference: PL17 .224875 SA 60260
- Ecological Impact Assessment of adjacent development at Rathmullan Road. (Scott Cawley, 2007)
- Construction Environmental Management Plan (CEMP) prepared for the planning application for the proposed development (Waterman Moylan Consulting Engineers Ltd., 2019)

2.3 Stage 1 Screening Methodology

The above referenced guidance documents set out a staged process for carrying out the assessment required under the Habitats Directive, the first stage of which is referred to as screening. This screening stage identifies the likely significant impacts on a European site, if any, which would arise from a proposed development either alone or in combination with other plans and projects.

The possibility of there being a significant effect on a European site will generate the need for a Stage 2 AA to be carried out by the competent authority for the purposes of Article 6(3). In this instance, the competent authority is An Bord Pleanála. A screening for Appropriate Assessment of an application for consent for proposed development must be carried out by the competent authority to assess, in view of best scientific knowledge, if the proposed development, individually or in combination with another plan or project is likely to have a significant effect on any European site. A Stage 2 Appropriate Assessment is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site. The first (Screening) stage for Appropriate Assessment operates merely to determine whether a (Stage 2) Appropriate Assessment must be undertaken on the implications of the plan or project for the conservation objectives of relevant European sites.

Screening for AA involves the following:

- Determining whether a project or plan is directly connected with or necessary to the conservation management of any European sites[2];
- Describing the details of the project/plan proposals and other plans or projects that may cumulatively affect any European sites;
- Describing the characteristics of relevant European sites; and
- Appraising likely significant effects of the proposed project on relevant European sites.

Section 4 of this report provides a summary of the information gathered for the AA screening and Sections 5, 6 and 7 of this report take forward the assessment into full AA.

[2] In this instance the proposed development is not directly connected with or necessary to the conservation management of any European sites.

2.4 Stage 2 AA Methodology

For Stage 2 AA, the potential for a proposed development, individually or in combination with other plans or projects, to adversely affect the integrity of European sites must be examined with respect to the specific conservation objectives of the relevant European sites. This Stage 2 AA also requires consideration of the specific mitigation measures that will be implemented to ensure an absence of adverse effects on the integrity of European sites. Stage 2 AA must provide a clear conclusion regarding the absence (considering the implementation of mitigation measures) of adverse effects on the integrity of European sites. In order to grant permission, the competent authority must conclude, having conducted the Stage 2 AA that the proposed development will not have an adverse effect on the integrity of any identified European sites.

For the avoidance of doubt, and as demonstrated by the conclusions of this report, it is not necessary in the case of this proposed development to progress to further stages of the assessment process *i.e.* the developer does not seek to rely upon the provisions of Article 6(4) of the Habitats Directive.

3 Overview of Proposed Development and its Receiving Environment

3.1 Location and Context of the Proposed Development to European Sites

The proposed development is located off the Rathmullan Road west of Drogheda, Co. Meath and centred on Irish Grid Reference O 06135 75054. The subject lands are a greenfield site and are comprised of several habitats. The subject lands are dominated by horticultural land with hedgerows, dry meadows and grassy verges and recolonising bare ground. No watercourses were identified within the subject lands, but the River Boyne is present directly to the north of the subject lands. To the west the site is bounded by the M1 motorway. Agricultural land is present south and south-east of the subject lands and an existing residential development occupy the lands adjacent to the north eastern part of the site. EPA maps show the Stragrennan stream running directly adjacent to the subject lands however it is culverted. There are no surface water drains onsite.

The closest European Sites are located within the River Boyne. The River Boyne and Blackwater SAC (002299) is located directly adjacent to the subject lands while the River Boyne and Blackwater SPA is located *c.* 100m upstream of the subject lands.

The River Boyne and Blackwater SAC (002299) has been designated for the following Annex I habitats and Annex II species:

- Alkaline fens [7230]
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0]
- *Lampetra fluviatilis* (River Lamprey) [1099]
- *Salmo salar* (Salmon) [1106]
- *Lutra lutra* (Otter) [1355]

None of these habitats or species occur within the subject lands. While there is an area of woodland located along the northern part of the subject lands, analysis of 20m x 20m relevés undertaken within this habitat against definitions of EU annex I habitats (European Commission, 2013; NPWS, 2013) determined that the woodland does not correspond to [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*), due to the absence of typical species

for the habitat. Notwithstanding the fact that the lands do not host any Qualifying interest habitat or species of any European sites, in the absence of mitigation, surface or foul water may run off into the River Boyne and have adverse impacts on the habitats and species for which this SAC has been designated. (NPWS, 2018)

The River Boyne and Blackwater SPA (004080) has been designated for Kingfisher (*Alcedo atthis*) [A229]. There is no suitable habitat for this species present within the subject lands. However, in the absence of mitigation, surface or foul water may run off into the River Boyne and have adverse impacts on this species. The European Sites within the Boyne Estuary are located downstream of the subject lands and have the potential to be affected by the proposed development.

The Boyne Coast and Estuary SAC (001957) is located *c.* 5.7km from the subject lands and has been designated for the following habitats:

- Estuaries [1130]
- Mudflats and sandflats not covered by seawater at low tide [1140]
- Annual vegetation of drift lines [1210]
- Salicornia and other annuals colonising mud and sand [1310]
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]
- Embryonic shifting dunes [2110]
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]
- Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]

None of these habitats occur within the subject lands and are located approximately 5.7km downstream of the subject lands. However, in the absence of mitigation, surface or foul water may run off into the River Boyne and have adverse impacts on the habitats and species for which this SAC has been designated. The Boyne Estuary SPA (004080) is located *c.* 4.4km from the subject lands and has been designated for a range of wetland bird species. None of these bird species are known to utilise any of the habitats present in the subject lands and none of these species (or signs of them) were noted within the subject lands during field surveys undertaken in September 2018 or March 2019. However, in the absence of mitigation, surface or foul water may run off into the River Boyne and have adverse impacts on these species.

3.2 Description of the Proposed Development

Full details of the proposed development are provided in the applicant's planning documentation. In brief, the proposed development will involve:

- The demolition of two sets of existing farm buildings within the subject lands;
- The widening of Rathmullan road;
- The construction of 661 housing units including detached, semi-detached and terraced houses as well as apartment buildings; and,
- The construction of 1 no. retail unit, 1 no. café and a creche.

4 Provision of Information for Screening

4.1 Zone of Influence of the Proposed Development

There is no set recommended distance from a proposed development for which European sites are considered as being relevant for AA. Available guidance (NPWS, 2010) recommends that '*the distance should be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects*'.

For significant effects to arise, there must be a potential impact enabled by having a '*source*' (*e.g.* construction works at a proposed development site), a '*receptor*' (*e.g.* a European site or its qualifying interests), and a pathway between the source and the receptor (*e.g.* a watercourse connecting a proposed development site to a European site). The identification of a pathway does not automatically mean that significant effects will arise, however, the absence of a pathway means that a significant effect is not possible. The likelihood for significant effects will depend upon the characteristics of the source (*e.g.* nature of construction works), the characteristics of the pathway (*e.g.* nature of the watercourse receiving run-off from construction) and the characteristics of the receptor (*e.g.* the sensitivities of the European site and its qualifying interests or special conservation interests).

In this instance the zone of influence of the proposed development is considered to extend to European sites within the Boyne River catchment, *i.e.* in the same catchment as the proposed development. This is because the subject lands are located directly adjacent to the River Boyne. A pollution event within the subject lands has the potential to contaminate the European Sites within the River Boyne catchment downstream of the subject lands.

This zone of influence encompasses the following European sites, both of which are connected to the proposed development via the surface water and foul water networks, and which are within the potential zone of airborne emissions:

- River Boyne and Blackwater SAC (002299)- the SAC boundary overlaps with the northern boundary of the subject lands and is designated for a range of Annex I habitats, Annex II fish and otter;
- The River Boyne and Blackwater SPA (004080)- *c.*100m north-west of the subject lands and designated for kingfisher;
- The Boyne Coast and Estuary SAC (001957)- *c.* 5.7km east and designated for a range of Annex I habitats;
- The Boyne Estuary SPA (004080) is located c. 4.4km east and designated for a range of wetland bird species.

It is often considered appropriate to examine all European sites within 15km as a starting point. In this instance, no European sites outside of the Boyne River and Estuary are considered to be within the zone of influence of the proposed development due to the following reasons:

- It is acknowledged that the subject lands are hydrologically linked to European sites in the Irish Sea with marine and coastal qualifying interests via the surface and foul water networks. Nonetheless, there is no possibility of significant effects on any European sites outside of the Boyne Estuary in light of the large marine water buffer that separates the surface and foul

water outfalls from any other European sites, and in light of the existence of foul water infrastructure to adequately treat foul waters prior to discharge to the receiving environment;

- There are no potential source-pathway-receptor links between the subject lands and European sites designated for terrestrial habitats. This is because the lands do not contain any habitats which appear on Annex I of the Habitats Directive therefore, there is no possibility that the lands act as an *ex situ* site for any of these habitats; and,
- There are no potential source-pathway receptor links between the subject lands and European sites that are designated for wetland and marine bird species outside of the Boyne River and Estuary. This is because the lands do not contain records of any of these species, none of these species were noted within the lands during field surveys undertaken in September 2018 or March 2019. The lands are not considered to be important inland sites for any of these species considering the dominant habitat types within – horticultural land, hedgerows, rough grassland and buildings.

4.2 Potential Impacts

4.2.1 Surface Waters

In the absence of mitigation, the possibility of significant effects cannot be ruled out with regards to the European sites within the Boyne River and Estuary. This is because:

- The subject lands are directly adjacent to the River Boyne which discharge into the Boyne Estuary downstream;
- During the construction phase of the proposed development, there is potential for sediments and pollutants such as oils and other hydrocarbons to be mobilised to the surface water network; and,
- In light of the proximity of the proposed development to downstream European sites, it is not outside of the realms of possibility that pollutants reach the river and estuary and potentially affect qualifying interests within. Such a scenario would be most likely if works were to coincide with a period of heavy rainfall such as during a storm event.

4.2.2 Foul Waters

The operation stage of this development will involve the generation of foul waters. Full details about the treatment of foul effluent are outlined in the Water chapter of the EIAR. In summary, foul effluent will be directed via a new pumping station in the north eastern corner of the site to the Drogheda Wastewater Treatment Plant (Drogheda WWTP) via the existing public sewer network. The Drogheda WWTP is required meet environmental legislative requirements as set out in EPA license it operates under. A letter of consent has been obtained from Irish Water agreeing to the proposed measures as detailed in the Water chapter.

4.2.3 Atmospheric Emissions

The possibility of significant effects on European sites arising from airborne emissions has been ruled out based on the results of Chapter 9, the Air Quality chapter of this EIAR. No perceptible impacts to air quality and climate are expected during the operation phase of the development. A dust management plan has been prepared to control dust produced as a result of the construction phase of the development.

Figure 3: European sites within 15km of the proposed development.

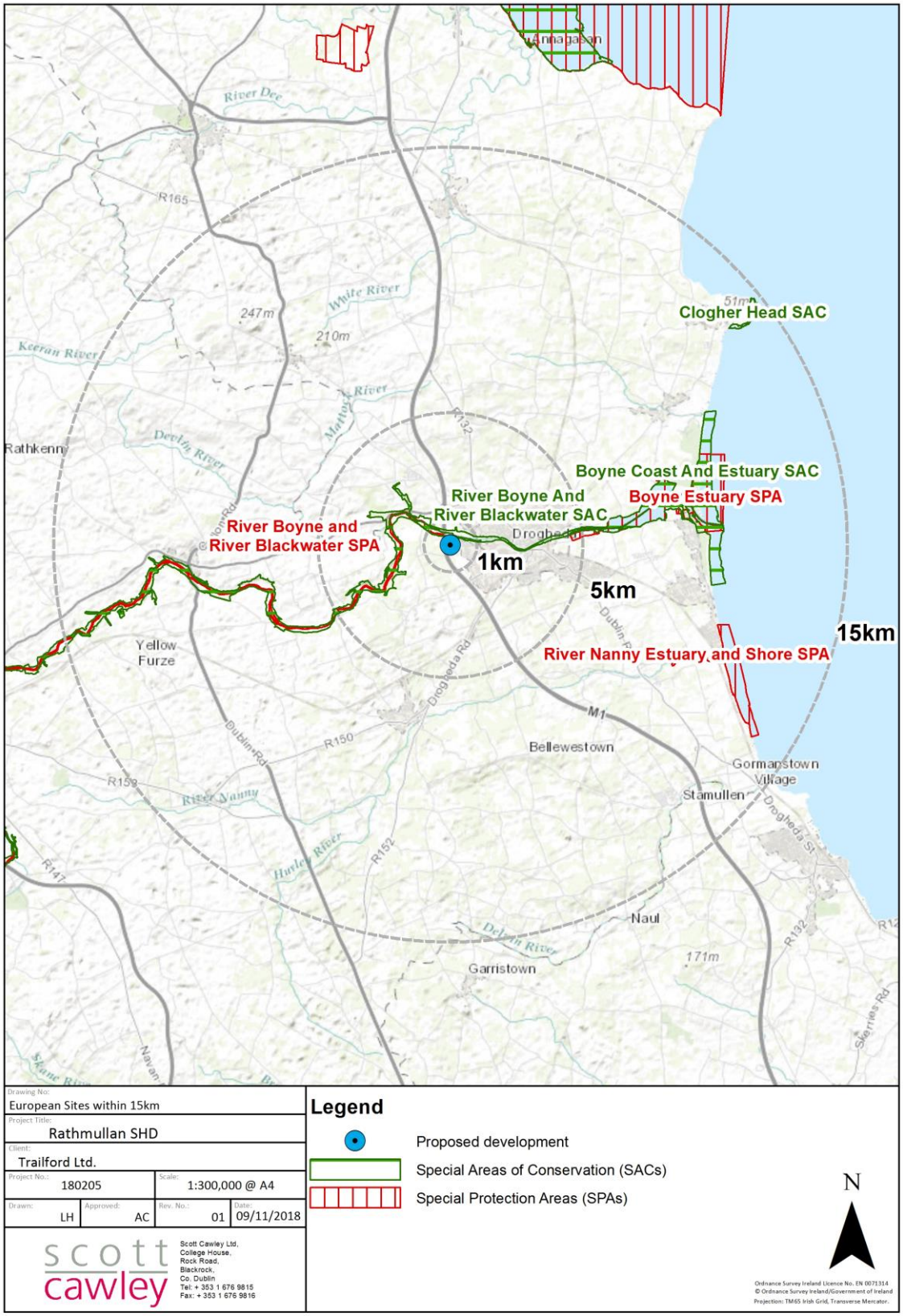
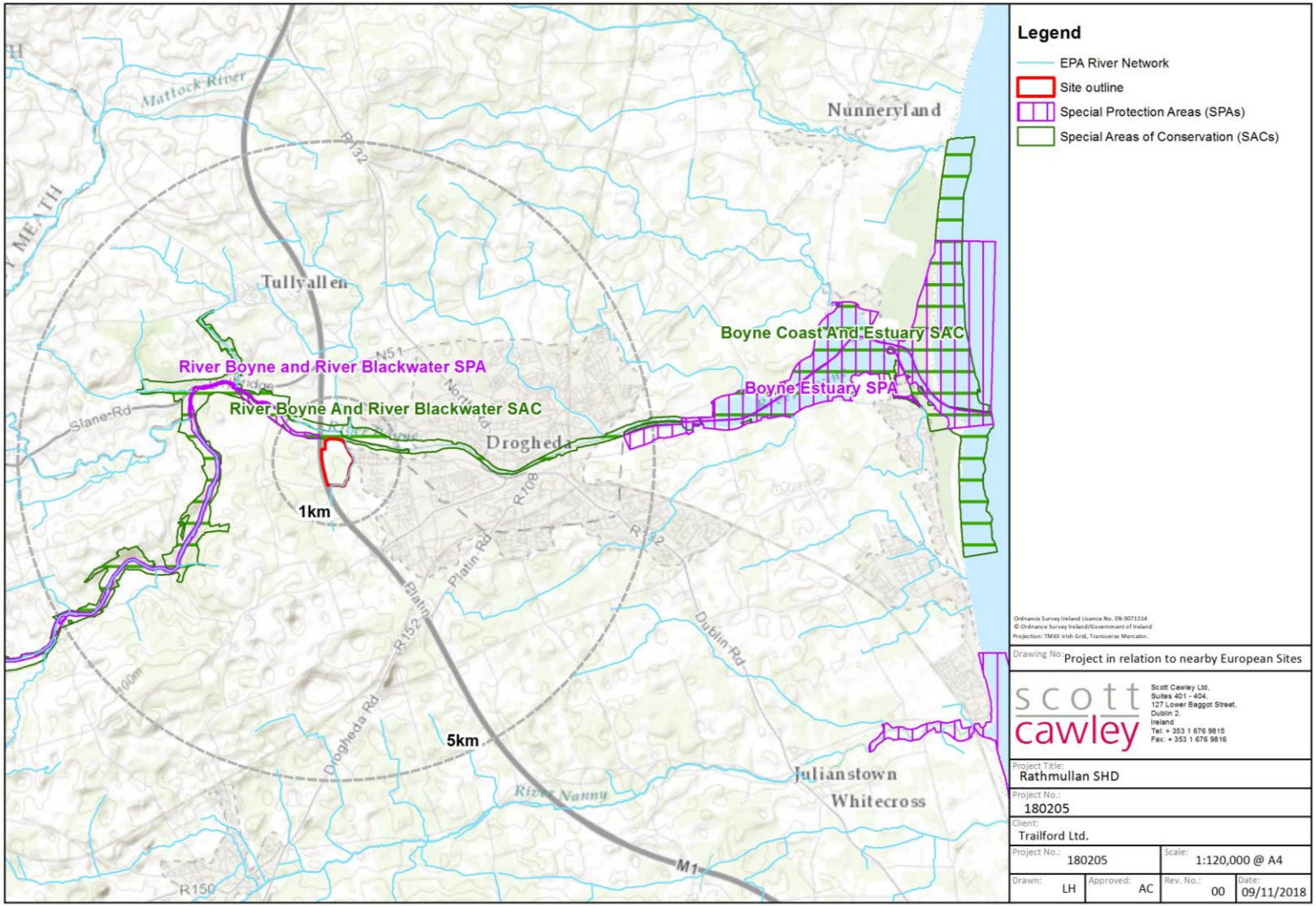


Figure 4: The subject lands in relation to European sites within the potential zone of influence of the project.



4.3 Conclusions on Information Provided for Screening Assessment

Information to enable An Bord Pleanála to perform its statutory function to carry out a screening for AA has been presented within this section of the report.

Following an examination, analysis and evaluation of the relevant information including, in particular, the nature of the proposed development and the likelihood of significant effects on European sites, and again applying the precautionary principle, it is the professional opinion of the authors that it is not possible to exclude, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a likely significant effect on the following four European sites:

- River Boyne and Blackwater SAC (002299);
- The River Boyne and Blackwater SPA (004080);
- The Boyne Coast and Estuary SAC (001957); and,
- The Boyne Estuary SPA (004080).

In the case of the four European sites listed above for which the possibility of significant effects cannot be excluded, the only likely significant risks to those European sites (in the absence of mitigation) arises from potential construction-related discharges to surface waters from the proposed development and the potential for these effects to reach downstream European sites. It was concluded, therefore, that likely significant effects on these four European sites may require mitigation to avoid adverse impacts on the integrity of the European sites concerned. Therefore, this application has been accompanied by a Natura Impact Statement on the basis that the competent authority may wish to carry out a Stage 2: full Appropriate Assessment.

However, the authors of this report acknowledge it is for An Bord Pleanála as competent authority, to carry out a screening for appropriate assessment and to reach one of the following determinations:

(a) Stage 2 AA of the proposed development is required if it cannot be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site;

(b) Stage 2 AA of the proposed development is not required if it can be excluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.

5 Provision of Information for Appropriate Assessment

The potential for significant effects arising from the proposed development on the integrity of River Boyne and Blackwater SAC (002299), The River Boyne and Blackwater SPA (004080), The Boyne Coast and Estuary SAC (001957) and The Boyne Estuary SPA (004080) considering their conservation objectives is examined in this section.

5.1 Summary of European Sites Relevant to the Stage 2 Appropriate Assessment

5.1.1 River Boyne and Blackwater SAC (002299)

Condition of site and management

The *Natura 2000 Standard Data Form* (NPWS, 2017a) lists the SAC as being an important example of alluvial woodland of the *Salicetum albo-fragilis* type which has developed on three alluvium islands. Alkaline fen vegetation is well represented at Lough Shesk. This SAC is one of the most important in eastern Ireland for salmon *Salmo salar* and has extensive spawning grounds within the river. The SAC also supports an important population of river lamprey *Lampetra fluviatilis* although the distribution and abundance of this species is not well known. Otter *Lutra lutra* is also widespread throughout the river. Threats to the site include increased habitation, pollution, discharge, recreational use the removal of hedges, copses or scrub.

5.1.2 The River Boyne and Blackwater SPA (004080)

Condition of site and management

The Natura 2000 Standard Data Form (NPWS, 2017b) states that the SPA is of national importance for kingfisher *Alcedo atthis*. Threats and pressures identified as having highest impact on the European sites include urbanisation, roads and motorways, and dispersed habitation. The conservation objectives for the River Boyne and River Blackwater SPA (004232) are generic. Information on the distribution of kingfisher within the River Boyne catchment in Cummins *et al.* (2010) states that the river contains 0.12 kingfisher per km, and has a nest density of 0.11 per km. A total of 20-22 territories were estimated to occur within the catchment based on these surveys, and the densities of birds and nesting territories are amongst the highest in the country.

5.1.3 The Boyne Coast and Estuary SAC (001957)

Condition of site and management

The Natura 2000 Standard Data Form (NPWS, 2017c) lists the SAC as being an important example of eight coastal habitats: estuaries, mudflats and sandflats not covered by seawater at low tide, annual vegetation of drift lines, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), embryonic shifting dunes, shifting dunes along the shoreline with Ammophila arenaria (white dunes) and fixed coastal dunes with herbaceous vegetation (grey dunes).

5.1.4 The Boyne Estuary SPA (004080)

Condition of site and management

The Natura 2000 Standard Data Form (NPWS, 2017d) states that it is one of the most important sites for wintering waterfowl on the east coast. It has a total of 10 species with populations of national importance - of particular note is that it supports 7.0% of the national total of red knot *Calidris canutus* and 4.0% of the total for golden plover *Pluvialis apricaria*. Other species which have populations of national importance include shelduck *Tadorna tadorna*, oystercatcher *Haematopus ostralegus*, lapwing *Vanellus vanellus*, black-tailed godwit *Limosa limosa*, redshank *Tringa totanus* and turnstone *Arenaria interpres*. The site provides both feeding and roosting areas for the birds. Little tern *Sterna albifrons* breeds here.

5.1.5 Qualifying Interests potentially exposed to risk

All Annex I habitats within The River Boyne catchment that are potentially at risk from silt-laden surface water discharges, contaminated water discharges or an accidental pollution incident during construction works associated with the proposed development, if they were of a sufficient magnitude and duration are as follows:

- [91E0] Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
- [1130] Estuaries
- [1140] Mudflats and sandflats not covered by seawater at low tide
- [1210] Annual vegetation of drift lines
- [1310] *Salicornia* and other annuals colonising mud and sand
- [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

The remaining qualifying interests, [2110] Embryonic shifting dunes, [2120] shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) and [2130] fixed dunes with herbaceous vegetation (grey dunes), are not considered to be potentially exposed to risk in light of their location above the high-tide mark. Alkaline fens [7230] are present upstream of the proposed development. This means that there is no potential source-pathway-receptor link connecting these habitats to the proposed development.

The bird species for which The River Boyne and Blackwater SPA and The Boyne Estuary SPA have been designated are closely linked with aquatic habitats within the river and estuary for feeding and roosting.

Therefore, they could potentially be vulnerable to the potential effects of contaminated surface water discharges or an accidental pollution incident during construction works associated with the proposed development, if they were of a sufficient magnitude and duration to affect water quality in the River Boyne and affect feeding resources for birds.

5.2 Conservation Objectives

The Habitats Directive and Part XAB of the Planning and Development Act 2000 requires the focus of the AA at this second stage to be on the integrity of European sites *"in light of their conservation objectives."* Site specific conservation objectives (SSCOs) for the qualifying interests and special conservation interests of the European Sites in question that are considered potentially exposed to risk from the proposed development are summarised in Table 1, overleaf. The attributes and targets for the conservation objective are included and the potential for significant effects on these attributes and targets is considered within Table 1.

Table 1: Site specific conservation objectives, attributes and targets, and potential effects arising from the proposed development.

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
River Boyne and River Blackwater SAC (002299)				
[1099] River Lamprey *Lampetra fluviatilis* – <u>Maintain or restore the favourable conservation condition.</u> According to the *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2013), this species is of 'favourable' conservation status in Ireland.				
Distribution	% of river accessible	Access to all water courses down to first order streams.	There is no site-specific information on the conservation objectives for the River Boyne and River Blackwater SAC (002299). The conservation objectives outlined in this table are derived from conservation objectives for other European sites.	No Works are not taking place within any aquatic habitats within the SAC therefore there will be no impacts on access to watercourses
Population structure of juveniles	Number of age/size groups	At least three age/size groups of river/brook lamprey present.		Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could influence the quality, extent and availability of any juvenile habitat present downstream of the proposed development which in turn could affect the population structure and density of the juvenile lamprey population. Additionally, an accidental pollution event during construction and/or operation, of a sufficient magnitude, could impact lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds.

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
Juvenile density in fine sediment	Juveniles/m²	Mean catchment juvenile density of brook/river lamprey at least 2/m².		Yes An accidental pollution event could affect the density of juvenile lamprey in sediments in the Boyne immediately downstream of the proposed development.
Extent and distribution of spawning habitat	m² and occurrence	No decline in extent and distribution of spawning beds.		Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could influence the extent and distribution of spawning habitat present downstream
Availability of juvenile habitat	Number of positive sites in 2nd order channels (and greater), downstream of spawning areas	More than 50% of sample sites positive.		Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could influence the quality, extent and availability of any juvenile habitat present downstream of the proposed development which in turn could affect the population structure and density of the juvenile lamprey population. Additionally, an accidental pollution event during construction and/or operation, of a sufficient magnitude, could impact lamprey spawning habitat downstream through silt smothering sand/gravel beds. Such impacts could affect the extent and distribution of spawning grounds.

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
[1106] Atlantic Salmon *Salmo salar* <u>Maintain or restore the favourable conservation condition.</u> According to the *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2013), this species is of 'inadequate' conservation status in Ireland.				
Distribution: extent of anadromy	% of river accessible	100% of river channels down to second order accessible from estuary.	There is no site-specific information on the conservation objectives for the River Boyne and River Blackwater SAC (002299). The conservation objectives outlined in this table are derived from conservation objectives for other European sites.	No Works are not taking place within any aquatic habitats within the SAC therefore there will be no impacts on river accessibility from estuary.
Adult spawning fish	Number	Conservation Limit (CL) for each system consistently exceeded.		Yes An accidental pollution event during construction and/or operation of a sufficient magnitude could impact fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily, with an increased risk of a population level effect if a pollution event were to occur in conjunction with fish migrating upstream from the sea to spawning grounds. Impacts could also result in a reduction in salmon fry abundance downstream, at least temporarily.
Salmon fry abundance	Number of fry/5 minutes electrofishing	Maintain or exceed 0+ fry mean catchment-wide abundance threshold value.		Yes An accidental pollution event during construction and/or operation of a sufficient magnitude could impact fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
				damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily, with an increased risk of a population level effect if a pollution event were to occur in conjunction with fish migrating upstream from the sea to spawning grounds. Impacts could also result in a reduction in salmon fry abundance downstream, at least temporarily.
Out-migrating smolt abundance	Number	No significant decline.		Yes An accidental pollution event during construction and/or operation of a sufficient magnitude could impact fish through silt smothering spawning grounds or affecting respiration, chemical contaminants physically damaging fish or causing mortality as a result of toxins. Such impacts could result in a reduction in fish numbers, at least temporarily, with an increased risk of a population level effect if a pollution event were to occur in conjunction with fish migrating upstream from the sea to spawning grounds. Impacts could also result in a reduction in salmon out-migrating smolt, at least temporarily.
Number and	Number and	No decline in number and		Yes

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
distribution of redds	occurrence	distribution of spawning redds due to anthropogenic causes.		Increased silt loading could affect the distribution and abundance of redds downstream from the proposed development.
Water quality	EPA Q Value	At least Q4 at all sites sampled by EPA.		Yes An accidental pollution event during construction and/or operation of a sufficient magnitude could affect water quality within the Boyne Estuary.
[1355] Otter *Lutra lutra* – Maintain or restore the favourable conservation condition. According to the *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2013), this species is of 'favourable' conservation status in Ireland.				
Distribution	Percentage positive survey sites	No significant decline.	There is no site-specific information on the conservation objectives for the River Boyne and River Blackwater SAC (002299). The conservation objectives outlined in this table are derived from conservation objectives for other European sites.	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the water quality of this QI species' habitat and forage species and therefore impact the distribution of the species.
Extent of terrestrial habitat	Hectares	No significant decline.		No Works are not taking place within any areas of suitable habitat for this species - there is no suitable habitat (terrestrial, marine or freshwater) for otter, and no couching sites or holts were identified within the lands or adjacent areas during surveys to inform this report. Therefore, there will be no impact on the extent of terrestrial, marine or freshwater
Extent of marine habitat	Hectares	No significant decline.		
Extent of freshwater (river) habitat	Kilometres	No significant decline.		
Extent of freshwater (lake/lagoon) habitat	Hectares	No significant decline.		

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
Couching sites and holts	Number	No significant decline.		habitat, or couching sites and holts.
Fish biomass available	Kilograms	No significant decline.		Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the water quality within the SAC which in turn would impact fish biomass availability.
Barriers to connectivity	Number	No significant increase.		No The proposed development does not include any works within the European site, or any works which could contribute to the imposition of barriers to connectivity within the European site.
[7230] Alkaline Fens – <u>Maintain or restore the favourable conservation condition.</u> According to the *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2013), this habitat is of 'bad' conservation status in Ireland.				
Habitat area	Hectares	Area stable or increasing, subject to natural processes.	There is no site-specific information on the conservation objectives for the River Boyne and River Blackwater SAC (002299). The conservation objectives outlined in this table are derived from conservation objectives for other European sites.	No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat area of alkaline fens. This habitat is located upstream of the proposed development.
Habitat distribution	Occurrence	No decline, subject to natural processes.		No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat distribution of alkaline fens. This habitat is located upstream of the proposed

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
				development.
Hydrological regime	Flow rates, metres	Appropriate natural hydrological regime necessary to support the natural structure and functioning of the habitat.		No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat distribution of alkaline fens. This habitat is located upstream of the proposed development and there is no possibility of construction affecting the hydrological regime of Alkaline fens within this SAC.
Peat formation	Flood duration	Active peat formation, where appropriate.		No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat distribution of alkaline fens. This habitat is located upstream of the proposed development and there is no possibility of construction affecting flood regimes and peat formation within alkaline fens in the European site.
Water quality: nutrients	Water chemistry measures	Appropriate water quality to support the natural structure and functioning of the habitat.		No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat distribution of alkaline fens. This habitat is located upstream of the proposed development therefore surface and foul water discharges do not have the potential to affect water quality within the River Boyne and its

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
				catchment.
Vegetation composition: typical species	Presence	Maintain vegetation cover of typical species including brown mosses and vascular plants.		No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat distribution of alkaline fens. This habitat is located upstream of the proposed development. and there is no possibility of construction run-off affecting the vegetation composition within the European site.
Vegetation composition: trees and shrubs	Percentage	Cover of scattered native trees and shrubs less than 10%.		No Tree and shrub cover are dependent on grazing regimes and other management measures which are outside of the scope of the proposed development. As this habitat is located upstream of the subject lands, there is no possibility of surface water discharges or airborne emissions contributing to increase tree and shrub cover within alkaline fens in the European site.
Physical structure: disturbed bare ground	Percentage	Cover of disturbed bare ground less than 10%. Where tufa is present, disturbed bare ground less than 1%.		No Cover of disturbed bare ground is dependent on stocking rates or disturbance from undertaking works within the habitat. Considering the location of the proposed development away from the European site, there is no possibility of affecting this attribute.
Physical structure:	Percentage	Areas showing signs of drainage as		No

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
drainage		a result of drainage ditches or heavy trampling less than 10%.		Drainage structure is dependent on trampling, stocking or direct construction of channels within the qualifying interest habitat. As the proposed development is not within the European site, there is no possibility of affecting this attribute.
[91E0] *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) - <u>Maintain or restore the favourable conservation condition.</u> According to the *Status of EU Protected Habitats and Species in Ireland* (NPWS, 2013), this habitat is of 'bad' conservation status in Ireland.				
Habitat area	Hectares	Area stable or increasing, subject to natural processes.	There is no site-specific information on the conservation objectives for the River Boyne and River Blackwater SAC (002299). The conservation objectives outlined in this table are derived from conservation objectives for other European sites.	Yes As this habitat is periodically inundated by the annual rise of river levels (NPWS, 2013a), an accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the water quality of this habitat, impacting the vegetation within the habitat, and therefore impacting habitat area, habitat distribution, woodland size and woodland structure.
Habitat distribution	Occurrence	No decline.		
Woodland size	Hectares	Area stable or increasing.		
Woodland structure: cover and height	Percentage and metres	Diverse structure with a relatively closed canopy containing mature trees; subcanopy layer with semi-mature trees and shrubs; and well-developed herb layer.		
Woodland structure: community diversity and extent	Hectares	Maintain diversity and extent of community types.		
Woodland structure: natural regeneration	Seedlings: sapling: pole ratio	Seedlings, saplings and pole age-classes occur in adequate proportions to ensure survival of woodland canopy.		
Hydrological regime: flooding	Metres	Appropriate hydrological regime necessary for maintenance of		No Surface waters generated from the proposed

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
depth/height of water table		alluvial vegetation.		development site entering the River Boyne and River Blackwater SAC will not be of a sufficient volume to affect the flooding depth/height of water table.
Woodland structure: dead wood	m^3 per hectare; number per hectare	At least 30m^3/ha of fallen timber greater than 10cm diameter; 30 snags/ha; both categories should include stems greater than 40cm diameter (greater than 20cm diameter in the case of alder).		No Works are not taking place within the woodland habitat and therefore there will be no impacts on the amount or categories of dead wood present.
Woodland structure: veteran trees	Number per hectare	No decline		Yes As this habitat is periodically inundated by the annual rise of river levels (NPWS, 2013a), an accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the water quality of this habitat and therefore impact vegetation composition and woodland structure.
Vegetation composition: native tree cover	Percentage	No decline. Native tree cover not less than 95%.		
Vegetation composition: typical species	Occurrence	A variety of typical native species present, depending on woodland type, including alder (*Alnus glutinosa*), willows (*Salix spp*) and, locally, oak (*Quercus robur*) and ash (*Fraxinus excelsior*).		
Vegetation composition: negative indicator species	Occurrence	Negative indicator species, particularly non-native invasive species, absent or under control.		No Works are not taking place within or adjacent to this habitat type and therefore there will be no direct impacts. No non-native invasive plant species listed on the Third Schedule of the European Communities (Birds and Natural

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
				Habitats) Regulations, 2011, are present within the proposed development site and therefore, there is no risk of introduction to the European site.
Boyne Coast and Estuary SAC (001957)				
Estuaries [1130] (Maintain or restore the favourable conservation condition)				
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes.	Habitat area was estimated as 403ha using OSi data and the defined Transitional Water Body area under the Water Framework Directive	No Works are not taking place within estuarine habitat therefore there will be no impact on natural processes.
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal estuarine mud and fine sand with *Hediste diversicolor* and *Corophium volutator* community; and Subtidal fine sand dominated by polychaetes community.	Habitat structure was elucidated from intertidal and subtidal surveys undertaken in 2010 (ASU, 2011; EcoServe, 2011)	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the sensitive aquatic species associated with this habitat and therefore impact community distribution.
Mudflats and sandflats not covered by water at low tide [1140] (Maintain or restore the favourable conservation condition)				
Habitat area	Hectares	The permanent habitat area is stable or increasing, subject to natural processes.	Habitat area was estimated using OSi data as 403ha	No Works are not taking place within the intertidal zone therefore there will be no impact on natural processes.
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal estuarine	Habitat structure was elucidated from an intertidal survey undertaken in 2010 (ASU, 2011). See marine supporting document for	Yes An accidental pollution event during construction and/or operation, of a sufficient

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
		mud and fine sand with *Hediste diversicolor* and *Corophium volutator* community; and Fine sand dominated by bi-valves community complex.	further details	magnitude, could potentially negatively affect the sensitive aquatic species associated with this habitat and therefore impact community distribution.
[1310] *Salicornia* and other annuals colonising mud and sand – Maintain or restore the favourable conservation condition				
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	Based on data from Saltmarsh Monitoring Project (McCorry and Ryle, 2009). Habitat mapped at two sub-sites surveyed, giving a total estimated area of 4.05ha. NB further unsurveyed areas maybe present within the site. See coastal habitats supporting document for further details	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the sensitive aquatic flora species associated with this habitat and therefore impact habitat area and distribution
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	Based on data from McCorry and Ryle (2009). Salicornia is an annual species, so its distribution can vary significantly from year to year. At Baltray, saltmarsh is expanding in infilled intertidal zone. Large area of Mornington saltmarsh was reclaimed in the past. See coastal habitats supporting document for further details	
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain/restore, natural circulation of sediments and organic matter, without any physical obstructions.	Based on data from McCorry and Ryle (2009). Sediment supply is particularly important for this pioneer saltmarsh community, as the distribution of this habitat depends on accretion rates. Sediment supply to saltmarshes at Baltray and Mornington is likely to be affected by the construction of navigation walls and dredging of the main	No Works are not taking place within or adjacent to this habitat therefore there will be no impact on natural processes.

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
			channel. See coastal habitats supporting document for further details	
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession.	Based on data from McCorry and Ryle (2009). Creeks deliver sediment throughout saltmarsh system. At Baltray and Mornington the structure is modified by drainage channels. See coastal habitats supporting document for further details	
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime.	This pioneer saltmarsh community requires regular tidal inundation. See coastal habitats supporting document for further details	
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	Based on data from McCorry and Ryle (2009). At Baltray and Mornington there are zonations within the saltmarsh habitats as well as transitions to adjacent sand dune systems. See coastal habitats supporting document for further details	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the sensitive aquatic species associated with this habitat and therefore impact vegetation structure and composition.
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward.	Based on data from McCorry and Ryle (2009). At Baltray and Mornington grazing is absent and sward height is variable. See coastal habitats supporting document for further details	
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Based on data from McCorry and Ryle (2009). See coastal habitats supporting document for further details	
Vegetation	Percentage	Maintain the presence of species-	Based on data from McCorry & Ryle (2009).	

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
composition: typical species and sub-communities	cover	poor communities listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009).	See coastal habitats supporting document for further details	
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.	Based on data from McCorry & Ryle (2009). Spartina is well established at this site. Swards of *Spartina* are widespread at Baltray and there has been significant expansion of *Spartina* at Mornington since 2000. See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to the expansion of common cordgrass.
[1330] Atlantic salt meadows *(Glauco-Puccinellietalia maritimae* – (Maintain or restore the favourable conservation condition)				
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	Area stable or increasing, subject to natural processes, including erosion and succession. For sub-sites mapped: Baltray- 17.67ha, Mornington- 8.76ha. See map 6	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the sensitive aquatic flora species associated with this habitat and therefore impact habitat area and distribution.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	No decline or change in habitat distribution, subject to natural processes. See map 6 for known distribution	
Physical structure: sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions.	Maintain natural circulation of sediments and organic matter, without any physical obstructions	No Works are not taking place within or adjacent to this habitat therefore there will be no impact on natural processes.
Physical structure: creeks and pans	Occurrence	Maintain creek and pan structure, subject to natural processes, including erosion and succession.	Maintain creek and pan structure, subject to natural processes, including erosion and succession	
Physical structure: flooding regime	Hectares flooded; frequency	Maintain natural tidal regime.	Maintain natural tidal regime	

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect the sensitive aquatic species associated with this habitat and therefore impact vegetation structure and composition.
Vegetation structure: vegetation height	Centimetres	Maintain structural variation within sward.	Maintain structural variation within sward	
Vegetation structure: vegetation cover	Percentage cover at a representative number of monitoring stops	Maintain more than 90% of area outside creeks vegetated.	Maintain more than 90% of area outside creeks vegetated	
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009).	Maintain range of sub- communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species - *Spartina anglica*	Hectares	No significant expansion of common cordgrass (*Spartina anglica*), with an annual spread of less than 1%.	No significant expansion of common cordgrass (Spartina anglica), with an annual spread of less than 1%	No Works are not taking place within or adjacent to this habitat type and therefore there is no risk of affecting common cordgrass abundance or distribution in the European site.

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
[1410] Mediterranean salt meadows (*Juncetalia maritimi*) – The status of this qualifying interest is under review.				
[2110] Embryonic shifting dunes – <u>Maintain or restore the favourable conservation condition</u>				
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	Based on data from the Coastal Monitoring Project (Ryle et al., 2009). Habitat is very difficult to measure in view of its dynamic nature and was recorded at both sub-sites, giving a total estimated area of 3.18ha. See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat area.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	Based on data from Ryle *et al*. (2009). See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat distribution.
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions.	Based on data from Ryle *et al.* (2009). Dunes are naturally dynamic systems that require continuous supply and circulation of sand. The training wall at the mouth of the Boyne Estuary has led to an accumulation of sand at Mornington and enhanced the development of dunes at the northern section. The dunes are accreting at the southern end of Baltray, with wide areas of embryonic dune and strandine fronting mobile and fixed dunes. See coastal habitats supporting document for further details	No Works are not taking place within or adjacent to this habitat therefore there will be no impact on natural processes.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural	Based on data from Ryle *et al*. (2009). Both sand dune systems at Baltray and Mornington occur adjacent to extensive estuarine	No The proposed development does not include any works within the European site, or any

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
		processes including erosion and succession.	saltmarshes. See coastal habitats supporting document for further details	works which could contribute to changes in vegetation zonation.
Vegetation composition: plant health of foredune grasses	Percentage cover	More than 95% of sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*) should be healthy (i.e. green plant parts above ground and flowering heads present)	Based on data from Ryle *6*. (2009). See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to changes in vegetation composition.
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the presence of species-poor communities with typical species: sand couch (*Elytrigia juncea*) and/or lyme-grass (*Leymus arenarius*).	Based on data from Ryle *et al*. (2009). See coastal habitats supporting document for further details	
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover.	Based on data from Ryle et al. (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn (Hippophae rhamnoides) should be absent or effectively controlled. See coastal habitats supporting document for further details	No Works are not taking place within or adjacent to this habitat type and therefore there is no risk of affecting sea buckthorn abundance or distribution in the European site.
[2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) – <u>Maintain or restore the favourable conservation condition</u>				
Habitat area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	Habitat was mapped during the Coastal Monitoring Project (Ryle et al. 2009). Habitat was recorded at both sub-sites, giving a total estimated area of 4.97ha. Habitat is very difficult to measure in view of its dynamic nature. See coastal habitats supporting	No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat area.

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
			document for further details	
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	Based on data from Ryle et al. (2009). Shifting dunes were recorded at both Baltray and Mornington sub-sites. See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat distribution.
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediments and organic matter, without any physical obstructions.	Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Marram (*Ammophila arenaria*) reproduces vegetatively and requires constant accretion of fresh sand to maintain active growth encouraging further accretion. The training wall at the mouth of the Boyne Estuary has led to an accumulation of sand at Mornington and enhanced the development of dunes at the northern section. The dunes are accreting at the southern end of Baltray, with wide areas of embryonic dune and strandine fronting mobile and fixed dunes. See coastal habitats supporting document for further details	No Works are not taking place within or adjacent to this habitat therefore there will be no impact on natural processes.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	Based on data from Gaynor (2008) and Ryle *et al.* (2009). Both sand dune systems at Baltray and Mornington occur adjacent to extensive estuarine saltmarshes. See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to changes in vegetation zonation.
Vegetation composition: plant health of dune	Percentage cover	95% of marram grass (*Ammophila arenaria*) and/or lyme-grass (*Leymus arenarius*) should be	Based on data from Ryle et al. (2009). See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
grasses		healthy (i.e. green plant parts above ground and flowering heads present).		works which could contribute to changes in vegetation composition.
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain the presence of species-poor communities dominated by marram grass (*Ammophila arenaria*) and/or lymegrass (*Leymus arenarius*).	Based on data from Ryle *et al.* (2009). See coastal habitats supporting document for further details	
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover.	Based on data from Ryle *et al.* (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. Ragwort (*Senecio jacobaea*) was recorded from Mobile dunes at both Baltray and Mornington. See coastal habitats supporting document for further details	No Works are not taking place within or adjacent to this habitat type and therefore there is no risk of affecting sea buckthorn abundance or distribution in the European site.
[2130] Fixed coastal dunes with herbaceous vegetation (grey dunes) – <u>Maintain or restore the favourable conservation condition</u>				
Habitat area	Hectares	Area increasing, subject to natural processes including erosion and succession.	Based on data from the Coastal Monitoring Project (Ryle *et al*., 2009). Habitat was recorded at both sub-sites, giving a total estimated area of 46.87ha. See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to a reduction in habitat area.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural	Based on data from the Coastal Monitoring Project (Ryle *et al*., 2009). Fixed dunes	No The proposed development does not include

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
		processes.	recorded at both Baltray and Mornington. See coastal habitats supporting document for further details	any works within the European site, or any works which could contribute to a reduction in habitat distribution.
Physical structure: functionality sediment supply	Presence/ absence of physical barriers	Maintain natural circulation of sediment and organic matter, without any physical obstructions.	Based on data from the Coastal Monitoring Project (Ryle *et al*., 2009). The training wall at the mouth of the Boyne Estuary has led to an accumulation of sand at Mornington and enhanced the development of dunes at the northern section. The dunes are accreting at the southern end of Baltray, with wide areas of embryonic dune and strandine fronting mobile and fixed dunes. See coastal habitats supporting document for further details	No Works are not taking place within or adjacent to this habitat therefore there will be no impact on natural processes.
Vegetation structure: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	Based on data from Ryle *et al*. (2009). Both sand dune systems at Baltray and Mornington occur adjacent to extensive estuarine saltmarshes. See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to changes in vegetation zonation.
Vegetation structure: bare ground	Percentage cover	Bare ground should not exceed 10% of fixed dune habitat, subject to natural processes.	Based on data from Gaynor (2008) and Ryle *et al.* (2009). The estimated area of bare sand at Mornington currently accounts for greater than 10% of the fixed dune habitat. See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site and therefore it is not considered likely that the proposed development will result in changes to area of bare ground in sand dune habitats.
Vegetation structure: sward height	Centimetres	Maintain structural variation in the sward.	Based on data from Gaynor (2008) and Ryle *et al*. (2009). See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to changes in vegetation structure.

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
Vegetation composition: typical species and sub-communities	Percentage cover at a representative number of monitoring stops	Maintain range of sub-communities with typical species listed in Ryle et al. (2009).	Based on data from Gaynor (2008) and Ryle et al. (2009). The locally rare species viper's bugloss (Echium vulgare) was recorded in the fixed dunes at Baltray. Mornington is the most northerly known site in Ireland for wild clary (Salvia verbenaca). See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to changes in vegetation composition.
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-native species) to represent less than 5% cover.	Based on data from Ryle *et al.* (2009). Negative indicators include non-native species, species indicative of changes in nutrient status and species not considered characteristic of the habitat. Sea buckthorn (*Hippophae rhamnoides*) should be absent or effectively controlled. At both Baltray and Mornington, creeping thistle (*Cirsium arvense*), ragwort (*Senecio jacobaea*) and common nettle (*Urtica dioica*) were recorded in fixed dunes. See coastal habitats supporting document for further details	No Works are not taking place within or adjacent to this habitat type and therefore there is no risk of affecting negative indicator species abundance or distribution in the European site.
Vegetation composition: scrub/trees	Percentage cover	No more than 5% cover or under control.	Based on data from Ryle *et al.* (2009). See coastal habitats supporting document for further details	No The proposed development does not include any works within the European site, or any works which could contribute to changes in vegetation composition.
River Boyne and River Blackwater SPA (004232)				

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
[A229] Kingfisher *Alcedo atthis* – <u>Maintain or restore the favourable conservation condition</u>				
Population trend	Percentage change	Long term population trend stable or increasing	There are no site-specific conservation objectives for the River Boyne and River Blackwater SPA (004232). There is therefore no information publicly available on the long-term population trend or the distribution of kingfisher along the Boyne River.	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect aquatic habitats in the SPA. A reduction in water quality could affect factors that support the breeding population, such as prey abundance/biomass. Such impacts could potentially affect nest occupation and productivity which in turn could affect the number and range of areas used by kingfisher and the population numbers in the SPA.
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by the special conservation interest species, other than that occurring from natural patterns of variation		
Boyne Estuary SPA (004080)				
<u>To maintain the favourable conservation condition of:</u> [A048] Shelduck *Tadorna tadorna* [A130] Oystercatcher *Haematopus ostralegus* [A140] Golden Plover *Pluvialis apricaria* [A141] Grey Plover *Pluvialis squatarola* [A142] Lapwing *Vanellus vanellus* [A143] Knot *Calidris canutus* [A144] Sanderling *Calidris alba*				

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
[A156] Black-tailed Godwit *Limosa limosa* **[A162] Redshank *Tringa totanus*** **[A169] Turnstone *Arenaria interpres***				
Population trend	Percentage change	Long term population trend stable or increasing	Long-term[3] population trends by species (from part 4 of NPWS (2013e): • [A048] Shelduck *Tadorna tadorna* – Increase of 39% (**favourable condition**) • [A130] Oystercatcher *Haematopus ostralegus* – Increase of 7.7% (**favourable condition**) • [A140] Golden Plover *Pluvialis apricaria* – Increase of 35.7% (**favourable condition**) • [A141] Grey Plover *Pluvialis squatarola* – Increase of 64% (**favourable condition**) • [A142] Lapwing *Vanellus vanellus* – Decrease of 45.9% (**unfavourable condition**) • [A143] Knot *Calidris canutus* – Increase of 80.1% (**favourable condition**) • [A144] Sanderling *Calidris alba* – Increase of 366.8% (**favourable condition**) • [A156] Black-tailed Godwit *Limosa limosa* – Increase of 21% (**favourable condition**) • [A162] Redshank *Tringa totanus* -	Yes An accidental pollution event during construction and/or operation, of a sufficient magnitude, could potentially negatively affect aquatic habitats in the SPA. A reduction in water quality could affect factors that support breeding populations, such as prey abundance/biomass. Such impacts could potentially affect nest occupation and productivity which in turn could affect the number and range of areas used by these conservation interest species and the population numbers in the SPA.

[3] Long-term population trend referenced relates to a 14-year period between 1995/96 and 2009/10 for bird populations in Malahide Estuary SPA (004025) as per NPWS (2013e)

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
			Decrease of 1% (**Intermediate (unfavourable) condition**) • [A169] Turnstone *Arenaria interpres* – Decrease of 31.6% (**unfavourable condition**)	
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by the special conservation interest species, other than that occurring from natural patterns of variation	Waterbird distribution from the 2011/2012 season are summarised as follows based on NPWS (2013y): • [A048] Shelduck *Tadorna tadorna* – Foraging sites tend to be concentrated in the outer estuary at the Beacon, while roosting is throughout the Boyne Estuary. • [A130] Oystercatcher *Haematopus ostralegus* – Foraging occurs on intertidal areas in the estuary and the Shore at Baltray and Lady's Finger. Roosting is concentrated along the Boyne Channel. • [A140] Golden Plover *Pluvialis apricaria* – Relatively little foraging appears to occur within the European site proper, although roosting is concentrated in the outer Boyne Estuary at Mornington East, the Beacon and Braghan. • [A141] Grey Plover *Pluvialis squatarola* – Some low-level foraging scattered throughout the European site. Roosting concentrated on intertidal sands in the Baltray.	

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
			• [A142] Lapwing *Vanellus vanellus* – Foraging concentrated on the inner Boyne Estuary between ARP and Mornington East. Roosting is between Mornington West and Braghan. • [A143] Knot *Calidris canutus* – Foraging and roosting are concentrated on intertidal sediments in the outer Boyne Estuary at Baltray and Lady's Finger. • [A144] Sanderling *Calidris alba* – Foraging largely concentrated at Baltray. • [A156] Black-tailed Godwit *Limosa limosa* – Foraging is concentrated in the inner estuary between Arp and Mornington East/Quinsborough East. Roosting is concentrated in Braghan and Port to Beaulieu House. • [A162] Redshank *Tringa totanus* – Foraging and roosting occurs within the inner estuary between Arp and The Beacon/Braghan. • [A169] Turnstone *Arenaria interpres* – Foraging is concentrated in the outer estuary at Braghan, the Beacon, Baltray and Lady's Finger	
[A195] Little Tern *Sterna albifrons* – <u>To maintain the favourable conservation condition.</u>				
Breeding population abundance:	Number	No significant decline	Measure based on standard tern survey methods (see Walsh *et al*., 1995). Mitchell *et*	No The breeding population of little terns in the

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
apparently occupied nests (AONs)			*al*. (2004) provides summary population information for Louth. The Seabird Monitoring Programme (SMP) also provides background data (JNCC, 2013). In 2010, 43 breeding pairs were recorded at this colony (Reilly, 2010).	Boyne Estuary SPA (004080) is considered to be chiefly influenced by the availability of nesting habitat, and levels of disturbance from humans, based on information provided in *Boyne Estuary Special Protection Area Conservation Objectives Supporting Document* (NPWS, 2012). There is not considered to be any potential for the proposed development to influence the breeding population (abundance).
Productivity rate: fledged young per breeding pair	Mean number	No significant decline	Measure based on standard tern survey methods (see Walsh *et al*., 1995). For 2010, an estimated productivity rate of 2.2 fledged birds per breeding pair was reported (Reilly, 2010)	No The number of fledged young per breeding pair is considered to be linked to levels of disturbance from humans, and prey availability in adjacent waters, and will not be significantly influenced by any potential impacts arising from the proposed development.
Distribution: breeding colonies	Number; location; area (Hectares)	No significant decline	Little tern nest in well-camouflaged shallow scrapes on sand and shingle beaches, spits or inshore islets (Mitchell *et al*., 2004). For a description of the area used by the colony in 2010, see Reilly (2010)	No As the proposed development does not include any works within the European site, and as the distribution of breeding colonies depends on the presence of suitable nesting locations, there is no potential for significant impacts on distribution of breeding colonies.
Prey biomass available	Kilogrammes	No significant decline	Key prey items: Mainly small, often juvenile, fish; invertebrates, especially crustaceans and insects. Key habitats: Very shallow water, advancing or receding tidelines, brackish	No It is not anticipated that prey availability will be significantly impacted by discharges (surface water, foul water or airborne) from

Attribute	Measure	Target	Notes	Potential Effects Arising from Proposal
			lagoons and saltmarsh creeks, sand-banks close to the coast. Foraging range: Max 11km, mean max 6.94km, mean 4.14km (BirdLife International Seabird Database (Birdlife International, 2013))	the proposed development. This is because any discharges reaching the marine environment will be diluted and absorbed to levels will not be noticeable.
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	Seabird species can make extensive use of the marine waters adjacent to their breeding colonies. Foraging range: Max 11km, mean max 6.94km, mean 4.14km (BirdLife International Seabird Database (Birdlife International, 2013)	No The proposed development does not include any works within the European site, or any works which could contribute to the imposition of barriers to connectivity within the European site.
Disturbance at the breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding little tern population	Little tern nest in well-camouflaged shallow scrapes on sand and shingle beaches, spits or inshore islets (Mitchell *et al*., 2004)	No The proposed development does not include any works within the European site, or any works which could contribute to noise or visual disturbance of birds at their breeding site.
[A999] Wetlands – maintain the favourable conservation condition				
Habitat area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 594 hectares, other than that occurring from natural patterns of variation	The wetland habitat area was estimated as 594ha using OSI data and relevant orthophotographs.	No The proposed development does not include any works within the European site. It will not alter the rate of sediment deposition or erosion within the European site, and therefore there is no potential for it to influence wetland habitat area.

6 Appraisal of Potential Impacts on European sites

6.1 Accidental pollution incident during construction

There are four European sites with a direct hydrological connection with the proposed development- River Boyne and River Blackwater SAC (002299), Boyne Coast and Estuary SAC (001957), River Boyne and River Blackwater SPA (004232) and Boyne Estuary SPA (004080).

It is anticipated that the proposed development will involve several construction phases when it is expected that topsoil and subsoil will be exposed to rainfall, and when there is a risk of accidental leakage of oils and other contaminants from construction equipment. An appropriate range of mitigation measures will be provided, outlined in full in the CEMP but in brief, these include:

- A series of cut off trenches throughout the site which follow existing contours, fitted with check dams and/or straw bales and a final settlement pond;
- A suitably qualified person will inspect this system during construction works to ensure it is functioning properly and that excessive silt does not reach the River Boyne;
- All refuelling will take place within a dedicated construction compound which will be located at a distance from the slope to the river; and,
- The use of drip trays, bunding and emergency response measures for spills.

While it is acknowledged that water quality within the Boyne transitional waterbody downstream of the lands is of only '*moderate*' status, significant adverse effects are not predicted for the habitats and species for which European sites in the Boyne river and estuary are designated considering their conservation objectives due to the following:

- The proposed development does not include any works within the European sites that could contribute a to reduction in special interest habitats or damage habitats that are important for the special conservation interest species;
- Although there is potential for construction-related pollutants and sediments to be mobilised, this will be limited to storm events during the construction phase of the proposed development. The mitigation measures outlined in the water chapter detail how pollutants and sediments will be prevented from entering the River Boyne; and,
- Any potential effects on water quality within the receiving environment would likely be of short duration only.

6.2 Mitigation Measures to Ensure an Absence of Adverse Effects on the Integrity of European Sites

The full range of mitigation measures to be incorporated into the proposed development are outlined in the CEMP and in Table 2 below. Upon review of these mitigation measures, it is the professional opinion of the authors and design team that the mitigation measures, when implemented, will ensure that no adverse effects on European sites will arise from the construction or operational stages of the proposed development.

Table 2: Schedule of Ecological Mitigation as outlined in the CEMP.

No.	Impact Identified with Biodiversity Chapter of EIAR and/or Natura Impact Statement	Mitigation	Result of Mitigation
1	All construction phase impacts	Employment of Environmental Specialist to monitor works	Undertakes pre-construction checks for protected species, reviews method statement of contractor to ensure that it incorporates all aspects of CEMP. Provides tool box talks and other training, and ensures understanding by all involved of all mitigation measures. Assesses effectiveness of mitigation, checks weather forecast and site conditions where trigger levels are required, checks for adequacy of infiltration where water is being pumped, undertakes weekly water-quality monitoring.
2	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	Designated parking at least 50m from any watercourse.	Ensures no soil disturbance or hydrocarbons leak near aquatic zone
3	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	The site compound will be located at least 50m from any watercourse. All potentially polluting materials will be contained within bunds with a capacity of 110% of their contents.	Prevents pollution of the aquatic zone from toxic pollutants
4	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	Fuels, oils, greases and other potentially polluting chemicals will be stored in bunded compounds at the Contractor's compound or at a location at least 50m from any stream. Bunds are to be provided with 110% capacity of storage container. Spill kits will be kept on site at all times and all staff trained in their appropriate use. Method statements for dealing with accidental spillages will be provided the Contractor for review by the Employer's Representative.	Prevents contamination of aquatic zone by toxic pollutants

5	Water quality impacts Reduction in habitat quality	Silt barrier devices will be installed between the works area and any watercourses to prevent any construction related sediments from entering the existing ditches and watercourses.	Ensures no movement of soil or contaminated water from the construction site to the River Boyne
6	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	Pouring of concrete will not be permitted within 50m of any watercourse during inclement weather	Prevents pollution of the aquatic zone by toxic pollutants
7	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	A designated wash down area within the Contractor's compound will be used for cleaning of any equipment or plant, with the safe disposal of any contaminated water.	Prevents contamination of aquatic zone by suspended solids or pollutants, ensures invasive species material is not transported off site
8	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	Spill kits will contain 10 hr terrestrial oil booms (80mm diameter x 1000mm) and a plastic sheet, upon which contaminated soil can be placed to prevent leaching to ground water	Prevents contamination of aquatic zone by petrochemicals
9	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	Any refuelling and maintenance of equipment will be done at designated bunded areas with full attendance of plant operative(s) within contained areas at least 50m from any watercourse	Prevents contamination of aquatic zone by petrochemicals
10	Water quality impacts Reduction in habitat quality Mortality of aquatic key ecological receptors/qualifying interests	All silt fencing remains actively managed and regularly checked until the construction works are completed The responsibility, reporting and management of silt fencing during the period after the construction has been completed will be clearly stated in the contract documents	Prevents contamination of aquatic zone by suspended solids from bare soil
11	Unforeseen discovery of bats	Tree inspection surveys will be undertaken by a licenced bat worker to assess whether the trees marked for felling have any suitability to support roosting bats. If the trees are confirmed to have potential roosting features, these trees must be inspected at height for roosting bats the day prior to felling works. Once surveyor is	Compliance with legislation protecting bats Avoidance of impacts on roosting bats

		satisfied that bats are not present within potential roosting features, the tree will be felled. If bats are encountered during any works at the site the relevant works will be suspended until the advice of a suitably qualified and licenced bat ecologist is sought. A derogation licence may need to be sought from NPWS in order to permit removal of bats and mitigate for the loss of any roosts on the site.	
12	Nesting birds	All tall woody and herbaceous vegetation in worked areas should be removed outside of the breeding bird season (1st March to 31st August, inclusive) to avoid the destruction of nests or disturbance of breeding birds If this is not possible, trees will be inspected by a qualified ecologist immediately prior to removal. If it is found that breeding birds are present, felling works must be suspended immediately and cannot recommence until chicks have fledged and the nest has been abandoned.	Compliance with legislation protecting birds
13	Woodland and hedgerows	All hedgerows and immature woodland marked for retention will be fenced off at the outset of works and for the duration of construction to avoid damage to the trunk, branches or root systems of the trees. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree (National Roads Authority, 2005-2011). In general, the RPA covers an area equivalent to a circle with a radius 12 times the stem diameter (measured at 1.5m above ground level for single stemmed trees); Where fencing is not feasible due to insufficient space, protection for the tree/hedgerow will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it. It	Avoidance of impacts on KER habitats

		will still be necessary to ensure that the area within the RPA is not used for vehicle parking or the storage of materials (including oils and chemicals) Soil will not be placed within the Root Protection Area of trees or within 5m of hedgerows; The woodland will not be lit during the construction or operational phases of the development; and, The construction compound will be located a minimum of 50m from watercourses.	

6.3 Potential Effects of the Project In-Combination with other Plans and Projects

This section of the report presents the assessment carried out to examine whether any other plans or projects have the potential to act in-combination with the proposed development to adversely affect the integrity of the four European sites within its ZoI: the River Boyne and River Blackwater SAC, the River Boyne and River Blackwater SPA, the Boyne Coast and Estuary SAC and the Boyne Estuary SPA.

All other European sites fall beyond the ZoI of the proposed development. Therefore, there is no potential for any other plans or projects to act in combination with the proposed development to adversely affect the integrity of any other European sites.

The only potential impact pathway connecting the proposed development to these European sites is the existing surface water network which drains to the River Boyne. Any national, regional or local land use plans, or any existing or proposed projects, within the River Boyne and River Blackwater catchments have the potential to affect the receiving ecological environment (particularly the aquatic environment) and have the potential to act in-combination with the proposed development to affect the European sites within the Boyne river and estuary.

As discussed above, with the mitigation measures fully implemented none of the potential impacts associated with the proposed development will result in any perceptible residual effect on the receiving environment. Therefore, there will not be any residual impacts associated with the proposed development that will affect the conservation objectives supporting the conservation condition of the qualifying interests and the special conservation interests of the European sites located in the Boyne river and Estuary, and the proposed development will not adversely affect the integrity of those European site.

As the proposed development itself will not have any perceptible effects on any European sites, there is no potential for any other plan or project to adversely affect the integrity of the River Boyne and Blackwater SAC, River Boyne and Blackwater SPA, Boyne Coast and Estuary SAC and Boyne Coast SPA in-combination with the proposed development.

7 Conclusions on the Stage 2 Appropriate Assessment Process

In order for AA to comply with the requirements of Article 6(3) the Habitats Directive and Part XAB of the Planning and Development Act 2000, a Stage 2 AA undertaken by the competent authority must include an examination, analysis, evaluation, findings, conclusions and a final determination. The information in this report will, along with all other submissions and observations received, enable Fingal County Council to perform its statutory function in this regard is presented within this NIS.

Following an examination, analysis and evaluation of the relevant information including, in particular, the nature of the proposed development and the relationship between the subject lands and the relevant European sites and, applying the precautionary principle, it is the professional opinion of the authors of this report that there will be no adverse impact on the integrity of the four relevant European sites.

In the case of the four relevant European sites, the only potentially significant risks to those European sites (in the absence of mitigation) arise from potential construction-related surface water discharges. However, with the full implementation of the mitigation measures outlined in this NIS these risks will be avoided. Consequently, there will be no risk of adverse effects on qualifying interest/special conservation interest habitats or species, nor the attainment of specific conservation objectives, either alone or in-combination with other plans or projects, for the relevant European sites. As a result, the constitutive characteristics of the four European sites concerned that are connected to the qualifying interests for which the sites have been designated will not be adversely affected.

The Stage 1 Screening appraisal contained in this report considered the potential for significant impacts arising from the proposed development on European sites within the potential zone of influence of the project. In this case the distance of 15km exceeds the potential zone of influence of the proposed works and any likelihood of significant effects in relation to European Sites beyond 15km can be ruled out. Following screening, the only European sites for which potential significant impacts have been identified are River Boyne and Blackwater SAC (002299), River Boyne and Blackwater SPA (004232), Boyne Coast and Estuary SAC (001957) and Boyne Estuary SPA (004080). Impacts which were considered to have the potential to affect these European sites related to the potential construction-related surface water discharges from the proposed development and the potential for these effects to reach downstream European sites. Potential cumulative impacts were also considered.

A range of precautionary measures have been incorporated into the project design, and other mitigation measures have been developed and proposed, with the purpose of avoiding or minimising impacts on the qualifying interests and conservation objectives of the relevant European sites. The efficacy of these measures was also considered and no issues in respect of their effective implementation were identified.

In conclusion, in the light of the best scientific knowledge, it is concluded that no reasonable scientific doubt remains as to the absence of adverse effects from the proposed development on any European site.

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Appendix 5.2 Species lists

BC2- Horticultural land

Broadbean	*Vicia faba*
Red clover	*Trifolium pratense*
Spear thistle	*Cirsium vulgare*
Willowherb sp.	*Epilobium sp.*
Broad-leaved willowherb	*Epilobium montanum*
Lesser burdock	*Arctium minus*
Fat-hen	*Chenopodium album*
Wheat	*Triticum vulgare*
	Persicaria maculosa

GS2- Dry meadows and grassy verges

Common nettle	*Urtica dioica*
Common ivy	*Hedera helix*
Cleavers	*Galium aparine*
Creeping thistle	*Cirsium arvense*
Broad-leaved willowherb	*Epilobium montanum*
Great willowherb	*Epilobium hirsutum*
Rosebay willowherb	*Chamerion angustifolium*
Common couch	*Elytrigia repens*
Yorkshire fog	*Holcus lanatus*
Meadow buttercup	*Ranunculus acris*
Gorse	*Ulex europaeus*
Eared willow	*Salix aurita*
Ribwort plantain	*Plantago lanceolata*

WN2 Oak-Ash-Hazel Woodland

Beech	*Fagus sylvatica*
Sycamore	*Acer pseudoplatanus*
Hawthorn	*Crataegus monogyna*
Pedunculata oak	*Quercus robur*
Common ivy	*Hedera helix*
Bramble	*Rubus fruticosus agg.*
English elm	*Ulmus procera*
Ash	*Fraxinus excelsior*
Soft Shield-fern	*Polystichum setiferum*
Bird cherry	*Prunus padus*
Elder	*Sambucus nigra*
Hazel	*Corylus avellana*
Lime sp.	*Tilia sp.*
Hart's tongue	*Asplenium scolopendrium*
Hart's-tongue thyme moss	*Plagiomnium undulatum*
Tamarisk thuidium moss	*Thuidium tamariscinum*
Horn calcareous moss	*Mnium hornum*
Huebener - Flat Neckera	*Neckra complanata*
Silvery bryum	*Bryum argentum*
Golden saxifrage	*Chrysosplenium oppositifolium*,
Meadow buttercup	*Ranunculus acris*
Primrose	*Primula vulgaris*
Honeysuckle	*Lonicera periclymenum*
Lords and ladies	*Arum maculatum*
Cow parsley	*Anthriscus sylvestris*
Ground elder	*Aegopodium podagraria* were

WL1- Hedgerows

Common nettle	*Urtica dioica*
Bramble	*Rubus fruticosus agg.*
Hawthorn	*Crataegus monogyna*
Elder	*Sambucus nigra*
Common ivy	*Hedera helix*
Ash	*Fraxinus excelsior*
Rose sp.	*Rosa sp.*
Arctium lappa	*Greater burdock*
Cow parsley	*Anthriscus sylvestris*
Cock's foot	*Dactylis glomerata*
Spear thistle	*Cirsium vulgare*
Cleavers	*Galium aparine*
Sycamore	*Acer pseudoplatanus*

WL2 & WS3 – Treelines and Immature Woodland

White poplar	*Populus alba*
Rowan	*Sorbus aucuparia*
Silver birch	*Betula pendula*
Bramble	*Rubus fruticosus agg.*
Grey alder	*Alnus incana*
Sycamore	*Acer pseudoplatanus*

ED2/ED3 – Spoil and Bare Ground/ Recolonising Bare Ground

Herb-Robert	*Geranium robertianum*
Bramble	*Rubus fruticosus agg.*
Common nettle	*Urtica dioica*
Common Ragwort	*Senecio jacobaea*
Broad-leaved Dock	*Rumex obtusifolius*
Common ivy	*Hedera helix*
Cleavers	*Galium aparine*
Slender Speedwell	*Veronica filiformis*
Dove's-foot Crane's-bill	*Geranium molle*
Bittercress sp.	*Cardamine sp.*
Perennial Rye-grass	*Lolium perenne*
Broad-leaved willowherb	*Epilobium montanum*
Red Fescue	*Festuca rubra*
Common dandelion	*Taraxacum officinale agg.*
Smooth Hawk's-beard	*Crepis capillaris*
False Oat-grass	*Arrhenatherum elatius*
White clover	*Trifolium repens*
Saltbush sp.	*Atriplex sp.*
Greater plantain	*Plantago major*
Common groundsel	*Senecio vulgaris*
Bramble	*Rubus fruticosus agg.*
Ribwort plantain	*Plantago lanceolata*
Rose sp.	*Rosa sp.*
Cock's-foot	*Dactylis glomerata*
Bush Vetch	*Vicia sepium*
Black Medick	*Medicago lupulina*
Oat	*Avena sativa*

FS2/WN6- Tall-herb swamps/ Wet willow-alder-ash woodland

Bulrush	*Typha latifolia*
Common reed	*Phragmites australis*
Marsh marigold	*Caltha palustris*
Wild celery	*Apium graveolens*
Wild Angelica	*Angelica sylvestris*
Cuckoo flower	*Cardamine pratensis*
Dock species	*Rumex sp.*
Common club-rush	*Schoenoplectus lacustris*
Common couch	*Elytrigia repens*
Yellow iris	*Iris pseudacorus*
Common Valerian	*Valeriana officinalis*
Great willowherb	*Epilobium hirsutum*
Common nettle	*Urtica dioica*
Creeping buttercrup	*Ranunculus repens*
Reed Canary-grass	*Phalaris arundinacea*
Reed Sweet-grass	*Glyceria maxima*
Lesser celandine	*Ficaria verna*
Meadowsweet	*Filipendula ulmaria*
Brambles	*Rubus fruticosus agg.*
Willow species	*Salix sp.*
Japanese knotweed	*Fallopia japonica*

Appendix 5.3 Draft Bat Mitigation Strategy

DRAFT BAT MITIGATION STRATEGY

PROPOSED STRATEGIC HOUSING DEVELOPMENT
RATHMULLAN ROAD, DROGHEDA, CO. MEATH

INFORMATION SUPPORTING AN APPLICATION FOR A DEROGATION LICENCE UNDER THE EU BIRDS AND HABITATS DIRECTIVES

PROPOSED SCIENTIFIC AGENT:
SCOTT CAWLEY LTD.
COLLEGE HOUSE
71-73 ROCK ROAD
BLACKROCK
CO. DUBLIN
A94 F9X9

LICENSEE NAME:
TRAILFORD LTD.

1. Introduction

Currently there are nine species of bat known to breed in Ireland, while two other species have been recorded on a single occasion. All species and their roost sites are strictly protected under both European and Irish legislation including:

- *Wildlife Act 1976 and Wildlife (Amendment) Act, 2000 (S.I. No. 38 of 2000)*;
- *Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna 1992 (Council Directive 92/43/EEC)*;
- *European Communities (Birds and Natural Habitats) Regulations, 2011*.

It is an offence under Section 23 of the *Wildlife Acts 1976-2012* and under Section 51 of the *European Communities (Birds and Natural Habitats) Regulations, 2011* to kill a bat or to damage or destroy the breeding or resting place of any bat species. Under the *European Communities (Birds and Natural Habitats) Regulations, 2011* actions that intentionally or unintentionally harm, damage or destroy a bat or its roosting site are considered to be an offence. In addition, if it is possible to establish a clear cause-effect relationship between one or more human-induced activities and the deterioration of a breeding site or resting place of a European protected species, then an offence is likely under the regulations. This places an onus of due diligence on anyone proposing to carry out works that may result in such damage, deterioration or destruction. According to Section 54(2) of the *European Communities (Birds and Natural Habitats) Regulations* 2011, a derogation licence to disturb bats or the breeding or resting places may be granted '*where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range*'.

Furthermore, as a signatory to the EUROBATS Agreement (Agreement on the Conservation of Populations of European Bata, 1994), Ireland is required to protect their habitats and important feeding areas from damage or disturbance. All Irish bat species are listed in Appendix II of the Bern Convention (1979), as species requiring protection.

The IUCN Red List categories and criteria are used as an easily understood system for classifying species by their risk of global extinction (IUCN 2012). Irish bats have most recently been categorised in the updated IUCN red list of terrestrial mammals in Ireland. All bats normally occurring on the island are listed as "Least Concern"[1], with the exception of Leisler's bat ("Near Threatened")[2] and Brandt's bat ("Data Deficient")[3](Marnell et al. 2009). The greater horseshoe bat's status is not yet determined in Ireland as only one record has been confirmed.

1.1 Overview of Proposed Works

In brief, the proposed development consists of:

- The demolition of a number of derelict farm buildings onsite;

[1] A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

[2] A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened, Widespread and abundant taxa are included in this category.

[3] A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.

- The removal of some hedgerow habitat;
- The construction of 661 residential units including houses and apartments;
- The construction of 1 no. retail until, 1 no. café, a creche and,
- The creation of recreational open space.

The subject properties for the demolition works are a series of derelict/disused farm buildings: A single round-roofed shed is located in the southern part of the subject lands at O 06194 74728; and a cluster of sheds and outbuildings are located at the eastern end of the lands at O 06313 75057, close to the junction between the Rathmullan Road and Oldbridge.

This derogation licence aims to cover demolition of sheds within the lands, and any activities which have the potential to affect roosting bats within the lands. The aforementioned works may involve disturbance of bats and destruction of bat roosts. Under the *European Communities (Birds and Natural Habitats) Regulations 2011* and under the *Wildlife Acts* it is an offence to wilfully capture or kill bats or to deliberately disturb them, and it is an offence to allow their roosts to be damaged or destroyed whether deliberate or not.

The licensee is therefore obliged to ensure that the proposed works do not cause such an offence.

2. Survey Methodologies

2.1 Desk Study

The NBDC database of species was consulted for records of bats within the vicinity of the subject lands.

2.2 Field Survey Methodology

A dusk emergence survey was undertaken by Aebhín Cawley CEnv MCIEEM, Director of Scott Cawley on 29th August 2018. The survey was conducted using direct observation and handheld ultrasound detector (Pettersson D240X) and was carried out from 15 minutes prior to sunset to one and a half hours after sunset. The weather on the survey night was within the range suitable for bat activity (*i.e.* above 8°C, dry and calm).

3. Results

3.1 Results of Desktop Surveys

Based on interrogation of NBDC records, six of Ireland's nine bat species have been recorded within the 2km of the subject lands: Daubenton's bat *Myotis daubentonii*, Leisler's bat *Nyctalus leisleri*, brown long-eared bat *Plecotus auritus*, Natterer's bat *Myotis nattereri*, common pipistrelle bat *Pipistrellus pipistrellus*, and soprano pipistrelle bat *P. pygmaeus*.

3.2 Results of Field Survey

Based on survey observations, bats utilise two buildings within the subject lands as roosts.

Both roosts are small in size, with two bats noted utilising buildings in each case. Two common pipistrelle bats were observed emerging from the interior of an open round-roofed shed building in the south of the subject lands approximately 30 minutes after sunset on 28th August 2018. The exact location of the roost within the shed building could not be determined based on the survey, although it is possible that they roosted between sheets of corrugated roofing material.

A second roost was recorded in a derelict lean-to addition to a large farm shed (see Plate 1~~Plate 5~~) in the east of the subject lands. This roost also consisted of a pair of common pipistrelle bats. The exact

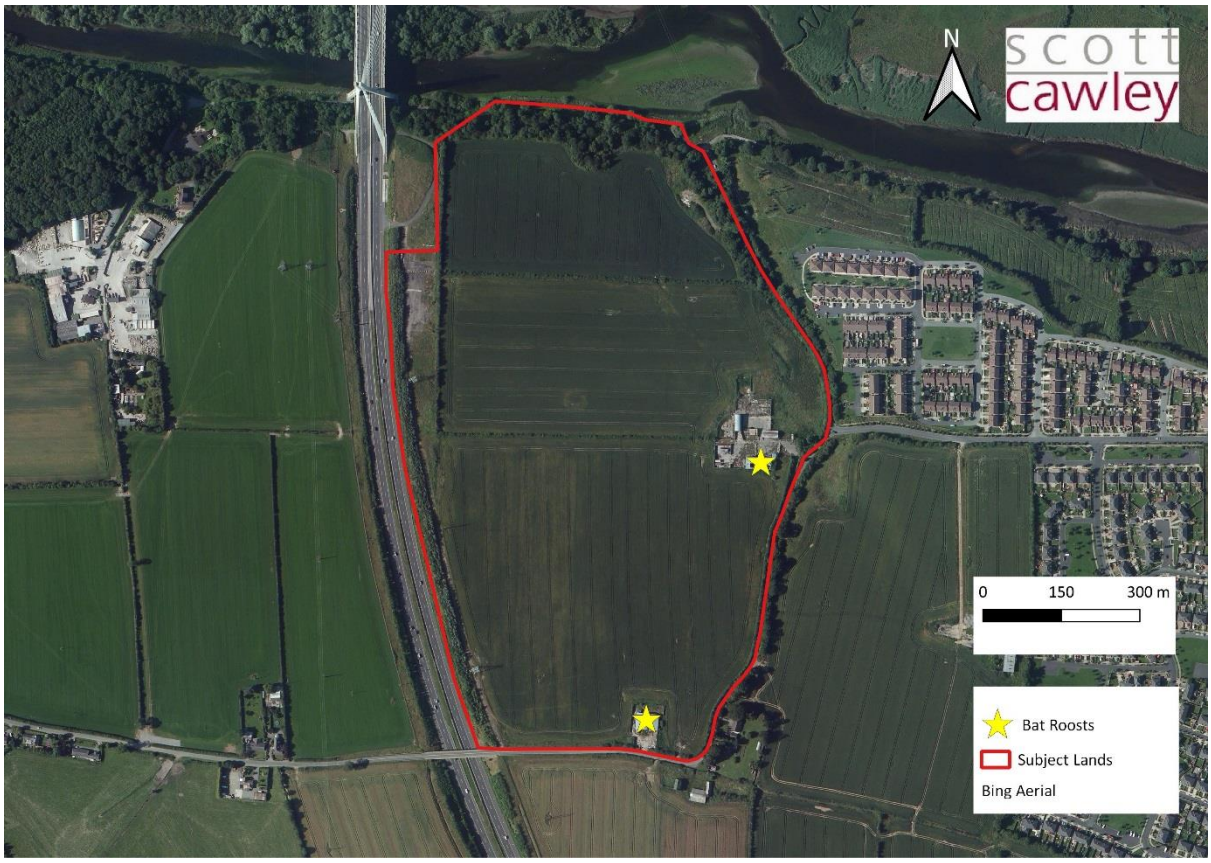
location of the roost could not be determined within the lean-to. Nonetheless, as this part of the building is roofless, and covered in a dense growth of ivy, it is most likely that the bats were roosting behind plates of ivy stems where they come into contact with the wall of the structure. Secondary signs of roosting, *i.e.* droppings and/or staining were not noted in the case of either identified roost.

In light of the size of the roosts, hosting a small number of bats, and their relatively open nature, it is considered that they are transitional or night-time roosts. The buildings are considered to be of low suitability for maternity roosts or for hibernation roosts.

Plate 1: Derelict farm shed. The lean-to with common pipistrelle roost is located at the rear of this structure.

Plate 2: Shed in southern part of subject lands which contains a small roost of common pipistrelle bats.

Figure 1: Bat roosts in relation to subject lands and surrounding lands.



3.3 Potential Activities Affecting Bats and Proposed Mitigation

The demolition of the sheds within the lands has the potential to result in the disturbance, or in a worst-case scenario, the mortality of bats. If a mortality event occurred, it would affect a small number of bats.

3.3.1 Timing and Phasing of works

At the time of writing, the proposed development remains at the planning stage. Pending planning permission being granted by the competent authority (in this instance, An Bord Pleanála), it is understood that works in the lands will commence in 2019 and continue for several years.

In light of the presence of roosting bats within farm sheds in the lands, it is proposed that demolition works of these sheds be undertaken during the shoulder seasons for bat activity between maternity roosting and hibernation roosting. This corresponds to the periods September to early November and March until mid-May. This corresponds to periods when bats are likely to be active, but when potential impacts from disturbance are lowest.

3.3.2 Closure of Roost

An emergence/re-entry survey will be undertaken at each shed the night preceding demolition works by a suitably experienced ecologist. The timing of the survey will depend on the suitability of weather for bat activity, *i.e.* it will only take place if weather conditions are considered to be suitable for bat activity. In general this corresponds to dusk temperatures above 8°C, with relatively light winds and dry weather.

Where no bats are recorded emerging from/returning to the buildings, demolition works will proceed unhindered. Where bats are noted returning to or emerging from the buildings, the ecologist will note the location of the roost. Bats will be retrieved by hand from the roost and transferred to a bat box prior to demolition of the buildings. The bat box will be deployed on a tree in woodland to the north of the lands.

3.3.3 Compensatory replacement of Roosts

A single panel-type bat box, of type Schwegler Bat Tube 1FR[4], Schwegler Bat Access Panel 1FE[5], or Bat Wall System 3FE[6], will be built into two apartment blocks on the northern edge of the proposed development (approximate locations illustrated in Figure 2). The boxes will be installed on the eastern wall of these buildings at a height above 3m above ground level. The entrance to the boxes will not be artificially illuminated and have been located with respect to proximity to suitable foraging habitat: Retained woodland in the north of the proposed development; and to minimise light spill from apartment units and street lights.

Monitoring of use of bat boxes within the lands will be undertaken the summer following completion of works. Follow up checks will take place 3 years and 5 years post completion. Results of the monitoring surveys will be provided to the local authority and the NPWS.

[4] Bat Tube 1FR (see http://www.schwegler-natur.de/portfolio_1395072079/fledermaus-fassadenroehre-1fr/?lang=en)

[5] Bat Access Panel 1FE (see http://www.schwegler-natur.de/portfolio_1395072079/fledermaus-einlaufblende-1fe/?lang=en)

[6] Bat Wall System 3FE (see http://www.schwegler-natur.de/portfolio_1395072079/fledermaus-wandsystem-3fe/?lang=en)

Figure 2: Proposed locations for compensatory roosts (Blue stars).

4. Conclusions

The lands off the Rathmullan Road, Drogheda, Co. Meath support a population of roosting bats. Measures have been proposed to minimise disturbance of roosting bats during the demolition of structures within the lands. Measures have also been proposed to compensate for the loss of these structures which are known to host roosting bats. Monitoring will be undertaken in accordance with the conditions of a granted derogation licence to assess success of compensatory measures following completion of works.

5. REFERENCES

Kelleher, C. and Marnell, F. (2006). *Bat Mitigation Guidelines for Ireland*. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Appendix 6.1 Site Investigation Report

PRELIMINARY DRAFT REPORT

RATHMULLAN DROGHEDA
PROPOSED HOUSING
CLARD DEVELOPMENTS

WATERMAN MOYLAN
CONSULTING ENGINEERS

CONTENTS

APPENDICES

FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

General.

Recommendations made, and opinions expressed in the report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held for conditions which have not been revealed by exploratory work, or which occur between exploratory hole locations. Whilst the report may suggest the likely configuration of strata, both between exploratory hole locations, or below the maximum depth of the investigation, this is only indicative, and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

Boring Procedures.

Unless otherwise stated, the 'Shell and Auger' technique of soft ground boring has been employed. All boring operations sampling and/or logging of soils and in-situ testing complies with the recommendations of the British Standard Code of Practice BS 5930 (1981), 'Site Investigation' and BS 1377:1990, 'Methods of test for soils for civil engineering purposes'.

Whilst the technique allows the maximum data to be obtained in soft ground, some disturbance and variation of soft and layered soils is unavoidable. Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

Where peat has been encountered during siteworks, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 & Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986).

Routine Sampling.

Undisturbed samples of soils, predominantly cohesive in nature are obtained unless otherwise stated by a 104mm diameter open-drive tube sampler. In granular soils, and where undisturbed sampling is inappropriate, disturbed samples are collected. Smaller disturbed samples are also recovered at intervals to allow a visual examination of the full strata section.

In-Situ Testing.

Standard penetration tests, utilising either the standard split spoon sampler or solid cone and automatic trip-hammer are conducted unless otherwise where required by instruction. Subsequent to a seating drive of 150mm, a summation for the number of blows for 300mm penetration is recorded on the boring records together with the blow count for each 75mm penetration. In cases where incomplete penetration is obtained, the number of blows for the recorded value of penetration are noted. In coarse granular soils, a cone end is fitted to the sampler and a similar procedure adopted.

Groundwater.

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level.

Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage condition, tidal variation or other causes.

Retention of Samples.

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

REPORT ON A SITE INVESTIGATION
FOR A HOUSING DEVELOPMENT
AT WEST DROGHEDA
COUNTY MEATH

FOR
CLARD DEVELOPMENTS LTD

WATERMAN MOYLAN
CONSULTING ENGINEERS

Report No. 21345 **NOVEMBER 2018**

I Introduction

A new housing development is proposed for a greenfield site located at Rathmullan, Drogheda West.

An investigation of sub soil conditions in the area of development has been ordered by Waterman Moylan, Consulting Engineers on behalf of Clard Developments Ltd.

The programme of the investigation included the construction of Boreholes, Trial Pits and Dynamic Probes to establish criteria on which to base foundation and infra-structural design. Work was carried out in accordance with BS 5930, Code of Practice for Site Investigations (1999).

In addition percolation testing to BRE Digest 365 was scheduled and carried out at several locations to establish soil percolation characteristics.

A programme of laboratory testing to confirm geotechnical and environmental soil parameters followed site operations.

This report includes all factual data pertaining to the project and comments on the findings relative to the new development.

II Fieldwork

The proposed development is to be undertaken on existing farm land located at Rathmullan, Drogheda West. The development area is bounded by the M1 Motorway to the West, The River Boyne to the North and The Riverbank Housing Estate to the East. The location is shown on the site map in Appendix VI. This drawing also shows the location of the various exploratory positions.

The field investigation included the following elements.

- Cable Percussion Boreholes at five locations
- Machine Excavated Trial Pits at five locations
- HD Dynamic Probes at five locations
- BRE Digest 365 Percolation Tests at five locations

The various locations have been referenced to national grid and OD levels established. Photographs of all excavations are included with this report in the relevant appendices.

Boreholes

Five exploratory holes were scheduled and bored with conventional 200mm cable-tool methods using a Dando Exploratory Rig. Each location was electronically scanned and shallow trial pits were opened to ensure that existing services were not damaged. One additional hole (BH02A) was bored when shallow refusal was recorded in the original location.

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement. In general it was not possible to recover undisturbed samples because of the high stone/cobble content of the strata encountered.

The boreholes consistently identified surface topsoil (300mm) overlying initially firm brown sandy gravelly CLAY. The gravelly CLAY stratum increases in strength to stiff and very stiff below about 1.20 metres with holes continuing to completion at depths between 5.80 and 8.50 metres. Angular and sub-angular cobbles and boulders were noted at varying depths in each borehole. The soils represent GLACIAL TILL or BOULDER CLAY deposition, typical of the region.

The final refusal depths may be indicative of boulders in the glacial clay or possibly the local bedrock horizon. Proof core drilling would be required to confirm the presence of bedrock in the area.

No water was encountered during the course of boring. Long-term ground water observation was not required.

Trial Pits

A JCB excavator was used under geotechnical engineering supervision to open trial pits at five locations.

Detailed trial pit records are presented in Appendix II. These records note stratification and ground water regime and detail sampling, obstructions and excavation stability. Photographs of each location are also included with the records.

The records confirm the borehole findings with topsoil overlying firm to stiff brown very sandy gravelly CLAY, typically containing cobble and boulder fragments. Difficulty in advancing the trial pits was noted in each location. Three pits were terminated on boulder obstructions between 1.50 and 2.00 metres BGL however TP01 continued to 2.60 metres and TP03 to 3.00 metres.

Ground water was not encountered during excavation of the trial pits. The pits were backfilled and compacted with the excavated spoil.

Dynamic Probes

Heavy Duty Probes were taken at a total of five locations each adjacent to an excavated trial pit and referenced DP01 to DP05.

Probing was in accordance with the heavy-duty probe specification of BS 1377: Part 9: 1990. In these tests, the soil resistance is measured in terms of the number of drop-hammer blows required to drive the test probe through each 100 mm increment of penetration. Probing is terminated when the blow count exceeds 25/100mm to avoid damage to the apparatus. Where loose material is present a single blow count may drive the apparatus in excess of 100mm. In this instance blow counts of zero may be recorded. Individual probe records are contained in Appendix III.

The probe graphs generally reflect a pattern of gradually increasing soil strength with penetration depth with probe refusals generally occurring between 1.20 and 3.00 metres. Isolate thin soft zones (100mm to 200mm thick) were noted at 1.70 metres BGL in DP01 and DP02.

A probe resistance of N100 = 4 with no significant underlying deterioration is indicative of an allowable bearing pressure of 100 Kpa, suitable for traditional two storey house construction.

Probe No.	**Depth to $N_{100} = 5$**	**Refusal**
DP01	0.50	2.50
DP02	1.80	3.10
DP03	0.50	1.20
DP04	0.50	1.50
DP05	0.50	1.10

Percolation Test to BRE Digest 365

Infiltration testing was performed at five locations in accordance with BRE Digest 365 'Soakaway Design'. The test pit was excavated and logged. The test material was firm to stiff brown very sandy gravelly CLAY with cobbles and boulders

To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pit, and records taken of the fall in water level against time. The test is carried out over two cycles following initial soakage.

The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second. In these calculations the exposed area is the sum of the base area and the average internal area of the permeable stratum over the test duration. Designs are based on the slowest infiltration rate, which has been calculated from the final cycle.

In the test locations the water level dropped slowly over the test period. The design calculations are presented in Appendix IV, with the infiltration rates as follows:

SA 01	**Infiltration Rate (f)**	**0.00057 m/min**
SA02	**Infiltration Rate (f)**	**0.00068 m/min**
SA03	**Infiltration Rate (f)**	**0.00029 m/min**
SA04	**Infiltration Rate (f)**	**0.00052 m/min**
SA05	**Infiltration Rate (f)**	**0.00051 m/min**

The results are typical of low-permeability glacial till deposition.

III Testing

a. In-Situ

Standard penetration tests were carried out in each borehole at 1.00 metre intervals to establish relative soil strength. Results are presented in the right hand column of the boring records and are summarised as follows:

Stratum	**N Value Range**	**Comment**
Brown sandy gravelly CLAY		
1.00 metres BGL	10 to 18	Firm to Stiff
2.00 metres BGL	16 to 30	Stiff
3.00 metres BGL	25 to 33	Stiff to Very Stiff
4.00 metres BGL	31 to 51	Very Stiff to Hard
5.00 metres BGL	23 to 53	Stiff to Hard

b. Laboratory

All geotechnical samples from the boreholes and trial pits have been returned to the IGSL laboratory for initial visual inspection, a schedule of testing was prepared and tests carried out.

The programme of testing included the following elements and all results are presented in Appendix V. Standard geotechnical testing is carried out by IGSL in it's INAB-accredited laboratory. Chemical and environmental testing was carried out by CHEMTEST in the UK.

a. Classification (Liquid and Plastic Limits)
b. Particle size distribution (Sieve Analysis and Hydrometer)
c. Sulphate and pH determination
d. RILTA Environmental Suite

Classification and Moisture Content

Liquid and plastic limits were determined for samples of the cohesive soils from the trial pits and boreholes. Results are detailed and plotted on the standard Casagrande Classification Chart.

Particle Size Distribution

Grading curves for selected samples of the gravelly clay stratum from the boreholes were determined by wet sieve and hydrometer analysis.

Chemical (pH and Sulphate)

Four samples were submitted for chemical analysis.

RILTA Environmental Suite

Five sample were submitted for RILTA Suite (WAC) analysis.

IV Discussion

The proposed new housing development is to be undertaken on agricultural land at Rathmullan in Drogheda North.

A comprehensive investigation of sub soil conditions has been carried out for Waterman Moylan on behalf of Clard Developments Ltd.

This preliminary report is based on field findings, detailed geotechnical and environmental testing is being carried out to confirm design parameters.

The detailed findings are presented earlier in this report and these can be summarised as follows:

Boreholes indicate topsoil overlying firm brown sandy gravelly CLAY which extends to about 1.20 metres BGL. This overlies stiff to very stiff to hard brown gravelly CLAY (Brown Boulder CLAY). Boreholes were completed on refusal at depths between 5.80 and 8.50 metres. The final borehole depths are not indicative of rock horizon. No ground water was encountered.

Trial Pits confirmed this general pattern, with numerous cobble and boulder particles noted and recovered and excavation difficulty noted in several locations.

NEW HOUSE FOUNDATIONS

Standard Penetration Tests and Dynamic Probes indicate that an allowable bearing pressure of at least 125 kN/sq.m. can be taken at a depth of 1.00 metre BGL. Conventional reinforced strip or pad foundations will therefore be appropriate for this development with foundations placed 0.70 to 0.80 metres BGL.

At one probe location (DP02) a reduction in soil strength was noted between 1.60 and 1.80 metres. The overlying soils are stiff and consideration could be given to founding at 0.70 metres with a reduced bearing pressure of 75 kN/sq.m. to avoid overstressing the weaker underlying zone.

Alternatively foundations in this area could be deepened to 1.80 metres to achieve the higher allowable bearing pressure.

The sub soils increase in strength with depth and results indicate an allowable bearing pressure of 250 kN/sq.m. on the soils below 2.00 metres.

Careful visual inspection of foundation excavations is advised to ensure uniformity and suitability of the founding medium. This is particularly relevant given the variation noted at DP02.

PERCOLATION

Testing to BRE Digest 365 was carried out at five location with relatively low infiltration available in the gravelly boulder clay formation. An average infiltration rate (f) of 0.00050 metres/minute has been obtained.

ENVIRONMENTAL

CONCRETE

IGSL/JC
November 2018

Appendix I Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen,Drogheda,Co.Louth	BOREHOLE NO.	BH01
		SHEET	Sheet 1 of 1
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	02/11/2018
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 4.20	DATE COMPLETED	05/11/2018
CLIENT	SPT HAMMER REF. NO.	BORED BY	W.Cahill
ENGINEER Waterman Moylan	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL/subsoil			0.30						
	Firm light brown sandy SILT/CLAY with some gravel and occasional cobbles				AA11709	B	1.00		N = 10 (2, 2, 3, 3, 2, 2)	
1				1.80						
	Stiff to very stiff dark brown sandy SILT/CLAY with grvael and occasional cobbles and boulders				AA11710	B	2.00		N = 21 (4, 4, 5, 5, 5, 6)	
2										
					AA11711	B	3.00		N = 33 (5, 5, 7, 9, 7, 10)	
3										
				4.20	AA11712	B	4.00		N = 48/75 mm (15, 10, 48)	
4	Obstruction End of Borehole at 4.20 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4	4.2	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Cat scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21345.GPJ IGSL.GDT 14/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen,Drogheda,Co.Louth	**BOREHOLE NO.**	**BH01A**
		SHEET	Sheet 1 of 1
CO-ORDINATES	**RIG TYPE** Dando 2000	**DATE COMMENCED**	02/11/2018
GROUND LEVEL (m AOD)	**BOREHOLE DIAMETER (mm)** 200	**DATE COMPLETED**	05/11/2018
	BOREHOLE DEPTH (m) 6.20		
CLIENT	**SPT HAMMER REF. NO.**	**BORED BY**	W.Cahill
ENGINEER Waterman Moylan	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL/subsoil			0.30						
	firm light brown sandy SILT/CLAY with some gravel and occasional cobbles			1.80	AA10561	B	1.00		N = 11 (2, 3, 2, 3, 3, 3)	
2	Stiff to very stiff dark brown sandy SILT/CLAY with grvael and occasional cobbles and boulders			3.60	AA10562	B	2.00		N = 21 (4, 6, 4, 6, 5, 6)	
					AA10563	B	3.00		N = 31 (5, 4, 5, 6, 9, 11)	
4	Dense grey/brown fine to coarse clayey GRAVEL with cobbles and some boulders			4.20	AA10564	B	4.00		N = 42 (6, 6, 9, 9, 10, 14)	
	Very stiff dark brown SILT			4.50						
5	Very stiff dark brown very gravelly SILT/CLAY with cobbbles and occasional boulders				AA10565	B	5.00		N = 41 (5, 7, 9, 9, 11, 12)	
6				6.20	AA10566	B	6.00		N = 50/75 mm (7, 18, 50)	
	Obstruction End of Borehole at 6.20 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.5	3.7	0.75	
6	6.2	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Cat scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen,Drogheda,Co.Louth	BOREHOLE NO.	BH02
		SHEET	Sheet 1 of 1
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	06/11/2018
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED	06/11/2018
	BOREHOLE DEPTH (m) 6.50		
CLIENT	SPT HAMMER REF. NO.	BORED BY	W.Cahill
ENGINEER Waterman Moylan	ENERGY RATIO (%)	PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.15						
	Subsoil			0.35						
	Firm to stiff light brown sandy SILT/CLAY with gravel and occasional cobbles				AA105601	B	1.00		N = 18 (2, 3, 3, 4, 6, 5)	
1										
					AA105602	B	2.00		N = 16 (3, 3, 4, 4, 4, 4)	
2				2.90						
	Very stiff to hard light brown sandy SILT/CLAY with gravel,cobbles and some boulders				AA105603	B	3.00		N = 35 (5, 6, 6, 8, 10, 11)	
3										
					AA105604	B	4.00		N = 51 (6, 9, 11, 13, 14, 13)	
4										
					AA105605	B	5.00		N = 53 (11, 13, 10, 9, 19, 15)	
5										
					AA105606	B	6.00		N = 50/75 mm (25, 50)	
6				6.50						
	Obstruction End of Borehole at 6.50 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.2	4.5	0.75	
5.4	5.6	1	
6.3	6.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Cat scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21345.GPJ IGSL.GDT 14/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen,Drogheda,Co.Louth	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	**RIG TYPE** Dando 2000	**DATE COMMENCED**	12/11/2018
GROUND LEVEL (m AOD)	**BOREHOLE DIAMETER (mm)** 200	**DATE COMPLETED**	12/11/2018
	BOREHOLE DEPTH (m) 7.50		
CLIENT	**SPT HAMMER REF. NO.**	**BORED BY**	W.Cahill
ENGINEER Waterman Moylan	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL/subsoil			0.20						
1	Firm dark brown sandy SILT/CLAY with some gravel and occasional cobbles			1.60	AA105620	B	1.00		N = 15 (2, 2, 2, 3, 3, 7)	
2	Stiff light brown sandy SILT/CLAY with gravel and some cobbles and boulders				AA105621	B	2.00		N = 22 (2, 3, 4, 5, 6, 7)	
3				3.20	AA105622	B	3.00		N = 36 (4, 6, 8, 8, 9, 11)	
4	Very stiff light brown sandy SILT/CLAY with gravel and some cobbles and boulders				AA105623	B	4.00		N = 50 (7, 9, 12, 11, 12, 15)	
5					AA105624	B	5.00		N = 23 (4, 4, 4, 6, 6, 7)	
6					AA105625	B	6.00		N = 30 (5, 6, 7, 7, 8, 8)	
7				7.50	AA105626	B	7.00		N = 50/150 mm (8, 14, 16, 34)	
8	Obstruction End of Borehole at 7.50 m									
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.3	4.5	0.75	
7.2	7.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Cat scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21345.GPJ IGSL.GDT 14/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen,Drogheda,Co.Louth	BOREHOLE NO.	BH04
		SHEET	Sheet 1 of 1
CO-ORDINATES		RIG TYPE	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)		BOREHOLE DEPTH (m)	8.50
		DATE COMMENCED	09/11/2018
		DATE COMPLETED	09/11/2018
CLIENT		SPT HAMMER REF. NO.	
ENGINEER	Waterman Moylan	ENERGY RATIO (%)	
		BORED BY	W.Cahill
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	Soft dark brown sandy SILT/CLAY with some gravel (subsoil)			0.20						
	Firm to stiff light brown sandy SILT/CLAY with gravel and some cobbles and boulders				AA105612	B	1.00		N = 17 (2, 4, 3, 5, 5, 4)	
1										
					AA105613	B	2.00		N = 21 (3, 2, 4, 4, 4, 9)	
2										
					AA105614	B	3.00		N = 25 (3, 5, 4, 5, 7, 9)	
3				3.30						
	Very stiff brown gravelly CLAY with cobbles				AA105615	B	4.00		N = 31 (6, 5, 7, 7, 9, 8)	
4										
					AA105616	B	5.00		N = 33 (5, 5, 5, 5, 8, 15)	
5				5.80						
	Stiff light brown sandy SILT/CLAY with gravel				AA105617	B	6.00		N = 24 (3, 6, 4, 5, 5, 10)	
6				6.80						
	Very stiff mottled light and dark brown sandy SILT/CLAY with gravel and angular cobbles				AA105618	B	7.00		N = 35 (8, 7, 9, 10, 8, 8)	
7										
					AA105619	B	8.00		N = 50/150 mm (8, 7, 15, 35)	
8				8.50						
	Obstruction End of Borehole at 8.50 m									
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
5.4	5.6	0.5	
8.3	8.5	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Cat scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21345.GPJ IGSL.GDT 14/11/18

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen,Drogheda,Co.Louth	**BOREHOLE NO.**	**BH05**
		SHEET	Sheet 1 of 1
CO-ORDINATES	**RIG TYPE** Dando 2000	**DATE COMMENCED**	07/11/2018
GROUND LEVEL (m AOD)	**BOREHOLE DIAMETER (mm)** 200	**DATE COMPLETED**	07/11/2018
	BOREHOLE DEPTH (m) 5.80		
CLIENT	**SPT HAMMER REF. NO.**	**BORED BY**	W.Cahill
ENGINEER Waterman Moylan	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL/subsoil			0.25						
1	Firm to stiff light brown sandy SILT/CLAY with gravel,cobbles and occasional boulders			1.90	AA105607	B	1.00		N = 18 (2, 3, 3, 4, 5, 6)	
2	Very stiff dark brown sandy SILT/CLAY with gravel,cobbles and occasional boulders				AA105608	B	2.00		N = 30 (3, 4, 5, 7, 9, 9)	
3					AA105609	B	3.00		N = 50/225 mm (8, 12, 14, 15, 21)	
4					AA105610	B	4.00		N = 36 (6, 9, 9, 10, 9, 8)	
5					AA105611	B	5.00		N = 31 (2, 4, 5, 7, 7, 12)	
6	Obstruction End of Borehole at 5.80 m			5.80					N = 50/225 mm (12, 13, 16, 15, 19)	
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.1	3.3	0.75	
5.6	5.8	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Cat scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21345.GPJ IGSL.GDT 14/11/18

Appendix II Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 21345

CONTRACT 21345	TRIAL PIT NO. TP01
	SHEET Sheet 1 of 1
LOGGED BY TOS	CO-ORDINATES
	DATE STARTED 05/11/2018
	DATE COMPLETED 05/11/2018
CLIENT	GROUND LEVEL (m)
ENGINEER Waterman Moylan	EXCAVATION METHOD JCB 3CX

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30							
Firm / stiff brown sandy gravelly CLAY with medium cobble content / low boulder content. Sand is fine to coarse gravel is angular / subangular of grey limestone					AA104513	B	0.50		
1.0									
Compact very gravelly SAND with medium cobble content and medium boulder content. Sand is fine to coarse gravel is subangular / subrounded fine to coarse of grey limestone		1.30			AA104514	B	1.50		
2.0									
End of Trial Pit at 2.60m		2.60			AA104515	B	2.50		
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Trial pit terminated at 2.6 due to refusal in Boulders

IGSL TP LOG 21345.GPJ IGSL.GDT 19/11/18

TRIAL PIT RECORD

REPORT NUMBER 21345

CONTRACT 21345	TRIAL PIT NO. TP02
	SHEET Sheet 1 of 1
LOGGED BY TOS	CO-ORDINATES
	DATE STARTED 05/11/2018
	DATE COMPLETED 05/11/2018
CLIENT	GROUND LEVEL (m)
ENGINEER Waterman Moylan	EXCAVATION METHOD JCB 3CX

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL					AA104510	B	0.20		
		0.35							
Firm / stiff orange brown slightly gravelly sandy CLAY. Sand is fine to coarse gravel is angular / subangular fine to coarse of dark grey limestone					AA104511	B	0.50		
1.0									
		1.30							
Compact BOULDERS and COBBLES with gravelly very sandy clay. Sand is fine to coarse gravel is angular / subangular fine to coarse of grey limestone					AA104512	B	1.50		
2.0									
		2.30							
End of Trial Pit at 2.30m									
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Trial pit terminated at 2.3 due to refusal in Boulders

IGSL TP LOG 21345.GPJ IGSL.GDT 19/11/18

TRIAL PIT RECORD

REPORT NUMBER 21345

CONTRACT 21345	TRIAL PIT NO. TP03
	SHEET Sheet 1 of 1
LOGGED BY TOS	CO-ORDINATES
	DATE STARTED 05/11/2018
	DATE COMPLETED 05/11/2018
CLIENT	GROUND LEVEL (m)
ENGINEER Waterman Moylan	EXCAVATION METHOD JCB 3CX

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	TOPSOIL									
	Firm / stiff brown slightly gravelly sandy CLAY with low cobble content. Sand is fine to coarse gravel is subangular / subrounded fine to coarse of grey limestone		0.30			AA104506	B	0.50		
1.0	Compact very gravelly SAND with medium cobble content and medium boulder content. Sand is fine to coarse gravel is subangular / subrounded fine to coarse of grey limestone		1.00			AA104507	B	1.20		
2.0						AA104508	B	2.00		
3.0	End of Trial Pit at 3.00m		3.00			AA104509	B	3.00		
4.0										

Groundwater Conditions
Dry

Stability
Good

General Remarks
Trial pit terminated at scheduled depth

IGSL TP LOG 21345.GPJ IGSL.GDT 19/11/18

TRIAL PIT RECORD

REPORT NUMBER 21345

CONTRACT 21345		TRIAL PIT NO.	TP04
		SHEET	Sheet 1 of 1
LOGGED BY TOS	CO-ORDINATES	DATE STARTED	05/11/2018
		DATE COMPLETED	05/11/2018
CLIENT	GROUND LEVEL (m)	EXCAVATION METHOD	JCB 3CX
ENGINEER Waterman Moylan			

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Firm / stiff orange brown slightly gravelly sandy CLAY. Sand is fine to coarse gravel is angular / subangular fine to coarse of dark grey limestone		0.30			AA104503	B	0.20		
					AA104504	B	0.50		
1.0									
Compact BOULDERS and COBBLES with gravelly very sandy clay. Sand is fine to coarse gravel is angular / subangular fine to coarse of grey limestone		1.50			AA104505	B	1.60		
2.0									
End of Trial Pit at 2.30m		2.30							
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Trial pit terminated at 2.3 due to slow progress in compact boulders and cobbles

TRIAL PIT RECORD

REPORT NUMBER 21345

CONTRACT 21345	TRIAL PIT NO. TP05
	SHEET Sheet 1 of 1
LOGGED BY TOS	CO-ORDINATES
	DATE STARTED 05/11/2018
	DATE COMPLETED 05/11/2018
CLIENT	GROUND LEVEL (m)
ENGINEER Waterman Moylan	EXCAVATION METHOD JCB 3CX

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL									
Firm / stiff orange brown slightly gravelly sandy CLAY. Sand is fine to coarse gravel is angular / subangular fine to coarse of dark grey limestone		0.40			AA104501	B	0.50		
1.0 Compact BOULDERS and COBBLES with gravelly very sandy clay. Sand is fine to coarse gravel is angular / subangular fine to coarse of grey limestone		1.00			AA104502	B	1.20		
End of Trial Pit at 1.60m		1.60							
2.0									
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Good

General Remarks
Trial pit terminated at 1.6 due to slow progress in compact boulders and cobbles

IGSL TP LOG 21345.GPJ IGSL.GDT 19/11/18

Appendix III Probe Records

DYNAMIC PROBE RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen , Drogheda , Co.Louth	PROBE NO.	DP01
		SHEET	Sheet 1 of 1
CO-ORDINATES		DATE DRILLED	05/11/2018
GROUND LEVEL (mOD)	HAMMER MASS (kg) 50	DATE LOGGED	05/11/2018
CLIENT	INCREMENT SIZE (mm) 100		
ENGINEER Waterman Moylan	FALL HEIGHT (mm) 500	PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	0
						0.10	3
						0.20	4
						0.30	4
						0.40	5
						0.50	8
						0.60	8
						0.70	5
						0.80	5
						0.90	5
1.0						1.00	6
						1.10	6
						1.20	7
						1.30	5
						1.40	4
						1.50	5
						1.60	4
						1.70	4
						1.80	2
						1.90	11
2.0						2.00	11
						2.10	11
						2.20	14
						2.30	20
						2.40	25
	End of Probe at 2.50 m						
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21345.GPJ IGSL.GDT 6/11/18

DYNAMIC PROBE RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen , Drogheda , Co.Louth	PROBE NO.	DP02
		SHEET	Sheet 1 of 1
CO-ORDINATES		DATE DRILLED	05/11/2018
GROUND LEVEL (mOD)	HAMMER MASS (kg) 50	DATE LOGGED	05/11/2018
CLIENT	INCREMENT SIZE (mm) 100		
ENGINEER Waterman Moylan	FALL HEIGHT (mm) 500	PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	0
						0.10	0
						0.20	1
						0.30	5
						0.40	4
						0.50	3
						0.60	5
						0.70	6
						0.80	7
						0.90	6
1.0						1.00	6
						1.10	4
						1.20	4
						1.30	3
						1.40	3
						1.50	2
						1.60	2
						1.70	1
						1.80	2
						1.90	6
2.0						2.00	10
						2.10	11
						2.20	9
						2.30	9
						2.40	11
						2.50	14
						2.60	16
						2.70	16
						2.80	18
						2.90	19
3.0	End of Probe at 3.10 m					3.00	25
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21345.GPJ IGSL.GDT 6/11/18

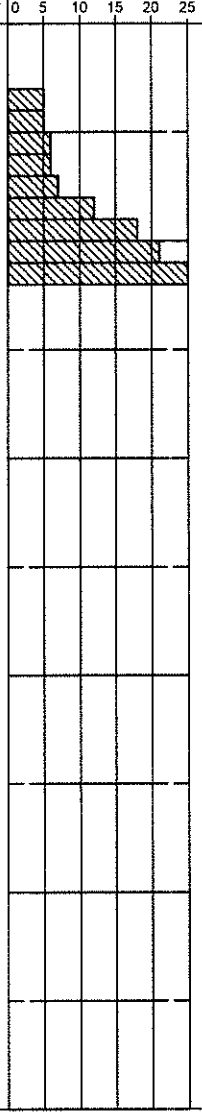
DYNAMIC PROBE RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen , Drogheda , Co.Louth	PROBE NO.	DP03
		SHEET	Sheet 1 of 1
CO-ORDINATES		DATE DRILLED	05/11/2018
GROUND LEVEL (mOD)	HAMMER MASS (kg) 50	DATE LOGGED	05/11/2018
CLIENT	INCREMENT SIZE (mm) 100	PROBE TYPE	DPH
ENGINEER Waterman Moylan	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	0
						0.30	5
						0.40	5
						0.50	6
						0.60	6
						0.70	7
						0.80	12
						0.90	18
1.0						1.00	21
						1.10	25
	End of Probe at 1.20 m						
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21345.GPJ IGSL.GDT 6/11/18

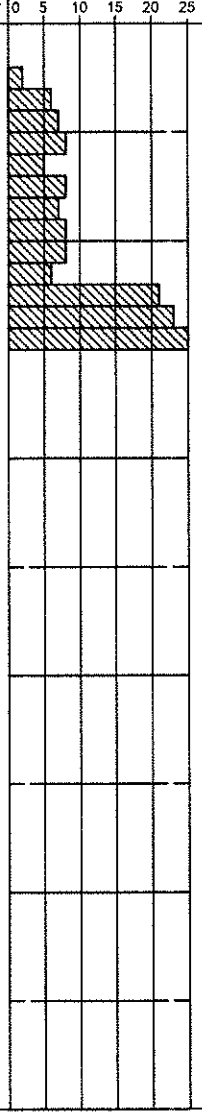
DYNAMIC PROBE RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen , Drogheda , Co.Louth	PROBE NO.	DP04
		SHEET	Sheet 1 of 1
CO-ORDINATES		DATE DRILLED	05/11/2018
GROUND LEVEL (mOD)	HAMMER MASS (kg) 50	DATE LOGGED	05/11/2018
CLIENT	INCREMENT SIZE (mm) 100	PROBE TYPE	DPH
ENGINEER Waterman Moylan	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	0
						0.10	0
						0.20	2
						0.30	6
						0.40	7
						0.50	8
						0.60	5
						0.70	8
						0.80	7
						0.90	8
1.0						1.00	8
						1.10	6
						1.20	21
						1.30	23
						1.40	25
	End of Probe at 1.50 m						
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21345.GPJ IGSL.GDT 6/11/18

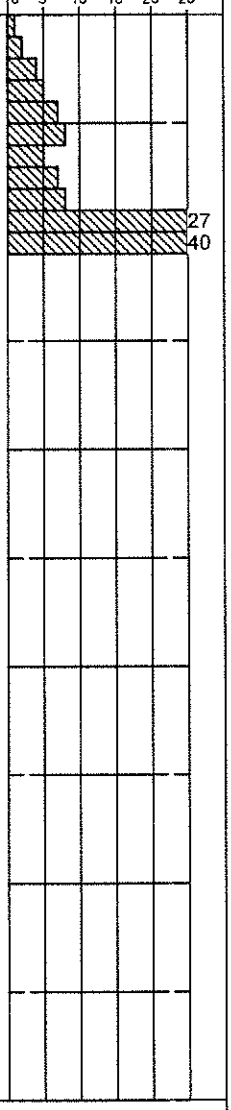
DYNAMIC PROBE RECORD

REPORT NUMBER 21345

CONTRACT	Rathmullen , Drogheda , Co.Louth	PROBE NO.	DP05
		SHEET	Sheet 1 of 1
CO-ORDINATES		DATE DRILLED	05/11/2018
GROUND LEVEL (mOD)	HAMMER MASS (kg) 50	DATE LOGGED	05/11/2018
CLIENT	INCREMENT SIZE (mm) 100	PROBE TYPE	DPH
ENGINEER Waterman Moylan	FALL HEIGHT (mm) 500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	1
						0.10	2
						0.20	4
						0.30	5
						0.40	7
						0.50	8
						0.60	5
						0.70	7
						0.80	8
						0.90	27
1.0						1.00	40
	End of Probe at 1.10 m						
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21345.GPJ IGSL.GDT 6/11/18

Appendix IV BRE Digest 365

Soakaway Design f -value from field tests (F2C) IGSL

Contract: Rathmullan, Drogheda Contract No. 21345
Test No. SA01
Client Waterman Moylan
Date: 06/11/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	
0.30	1.50	Firm / stiff brown slightly gravelly sandy CLAY with medium cobble	
		content	

Notes:

Field Data

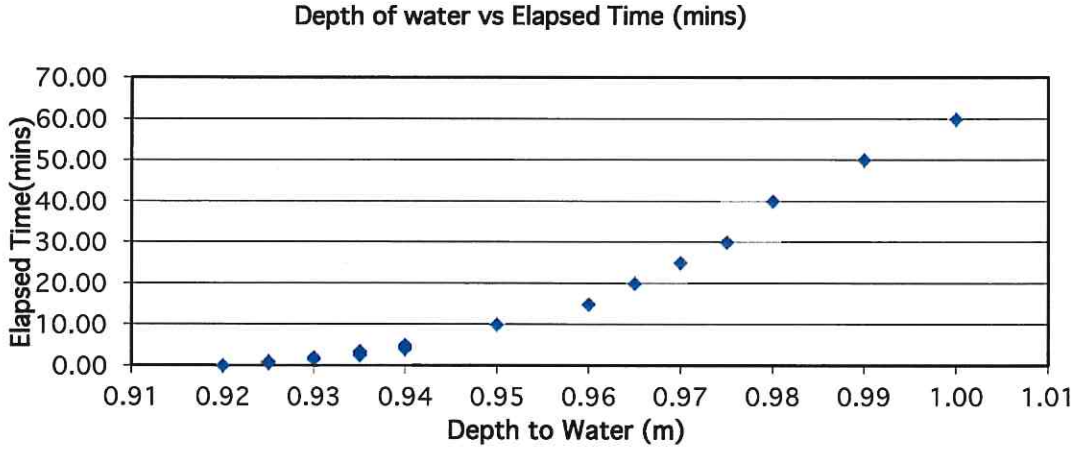
Depth to Water (m)	Elapsed Time (min)
0.92	0.00
0.93	0.50
0.93	1.00
0.93	1.50
0.93	2.00
0.94	2.50
0.94	3.00
0.94	3.50
0.94	4.00
0.94	4.50
0.94	5.00
0.95	10.00
0.96	15.00
0.97	20.00
0.97	25.00
0.98	30.00
0.98	40.00
0.99	50.00
1.00	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	1.50	m
Length of Pit (L)	1.80	m
Initial depth to Water =	0.92	m
Final depth to water =	1.00	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	2.7	m2
*Av. side area of permeable stratum over test period=	3.564	m2
Total Exposed area =	6.264	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00057 m/min or 9.5785E-06 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Rathmullan, Drogheda Contract No. 21345
Test No. SA02
Client Waterman Moylan
Date: 06/11/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	
0.30	1.50	Firm / stiff brown slightly gravelly sandy CLAY with medium cobble	
		content	

Notes:

Field Data

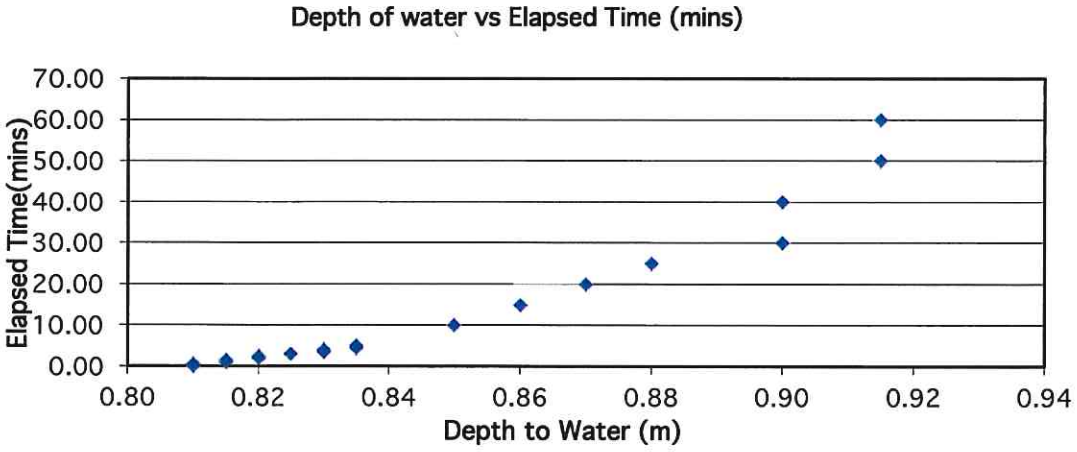
Depth to Water (m)	Elapsed Time (min)
0.81	0.00
0.81	0.50
0.82	1.00
0.82	1.50
0.82	2.00
0.82	2.50
0.83	3.00
0.83	3.50
0.83	4.00
0.84	4.50
0.84	5.00
0.85	10.00
0.86	15.00
0.87	20.00
0.88	25.00
0.90	30.00
0.90	40.00
0.92	50.00
0.92	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	1.50	m
Length of Pit (L)	1.80	m
Initial depth to Water =	0.81	m
Final depth to water =	0.92	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	2.7	m2
*Av. side area of permeable stratum over test period=	4.2075	m2
Total Exposed area =	6.9075	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00068 m/min or 1.1401E-05 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Rathmullan, Drogheda Contract No. 21345
Test No. SA03
Client Waterman Moylan
Date: 06/11/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	
0.30	1.50	Firm / stiff brown slightly gravelly sandy CLAY	

Notes:

Field Data

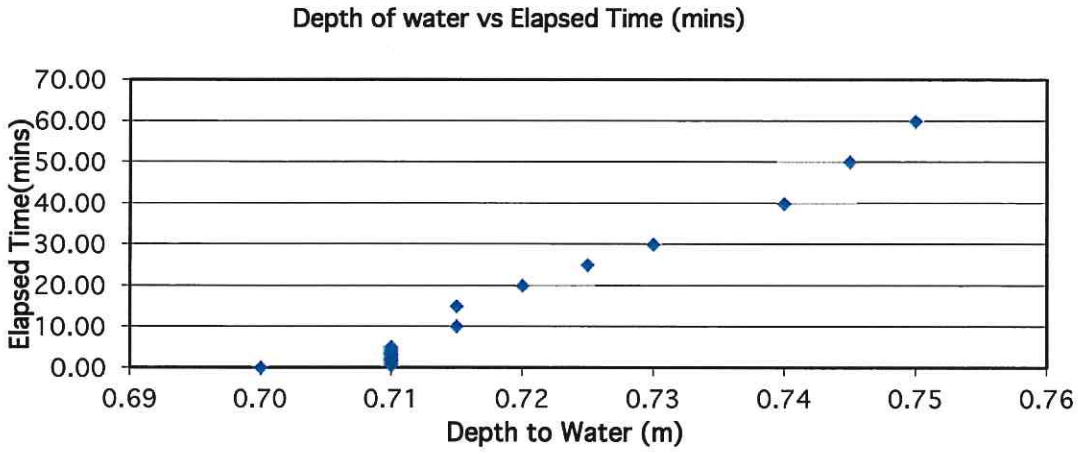
Depth to Water (m)	Elapsed Time (min)
0.70	0.00
0.71	0.50
0.71	1.00
0.71	1.50
0.71	2.00
0.71	2.50
0.71	3.00
0.71	3.50
0.71	4.00
0.71	4.50
0.71	5.00
0.72	10.00
0.72	15.00
0.72	20.00
0.73	25.00
0.73	30.00
0.74	40.00
0.75	50.00
0.75	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	1.50	m
Length of Pit (L)	1.80	m
Initial depth to Water =	0.70	m
Final depth to water =	0.75	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	2.7	m2
*Av. side area of permeable stratum over test period=	5.115	m2
Total Exposed area =	7.815	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00029 m/min or 4.7985E-06 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Rathmullan, Drogheda Contract No. 21345
Test No. SA04
Client Waterman Moylan
Date: 06/11/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	
0.30	1.50	Firm / stiff brown slightly gravelly sandy CLAY	

Notes:

Field Data

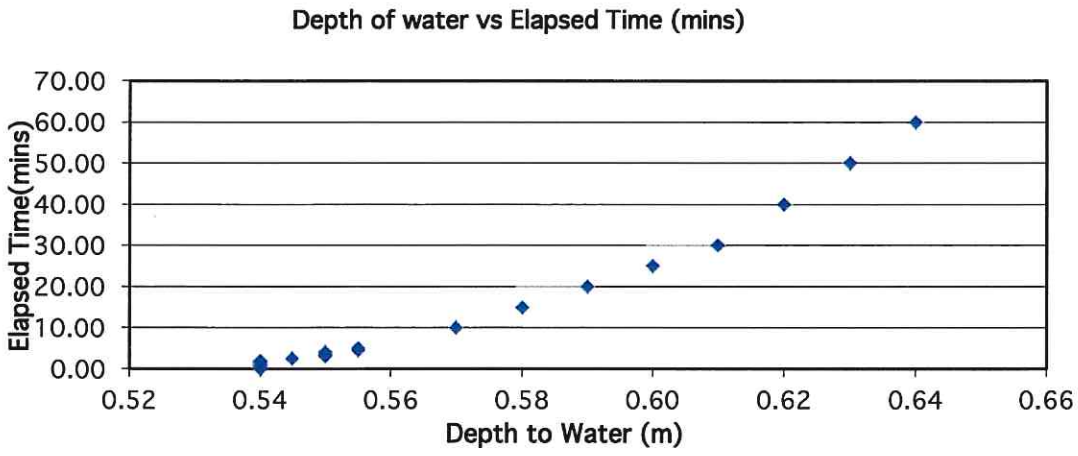
Depth to Water (m)	Elapsed Time (min)
0.54	0.00
0.54	0.50
0.54	1.00
0.54	1.50
0.54	2.00
0.55	2.50
0.55	3.00
0.55	3.50
0.55	4.00
0.56	4.50
0.56	5.00
0.57	10.00
0.58	15.00
0.59	20.00
0.60	25.00
0.61	30.00
0.62	40.00
0.63	50.00
0.64	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	1.50	m
Length of Pit (L)	1.80	m
Initial depth to Water =	0.54	m
Final depth to water =	0.64	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	2.7	m2
*Av. side area of permeable stratum over test period=	6.006	m2
Total Exposed area =	8.706	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00052 m/min or 8.6147E-06 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Rathmullan, Drogheda Contract No. 21345
Test No. SA05
Client Waterman Moylan
Date: 06/11/2018

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	
0.30	1.30	Firm / stiff orange brown slightly gravelly sandy CLAY	

Notes: Refusal at 1.3 due to cobble

Field Data

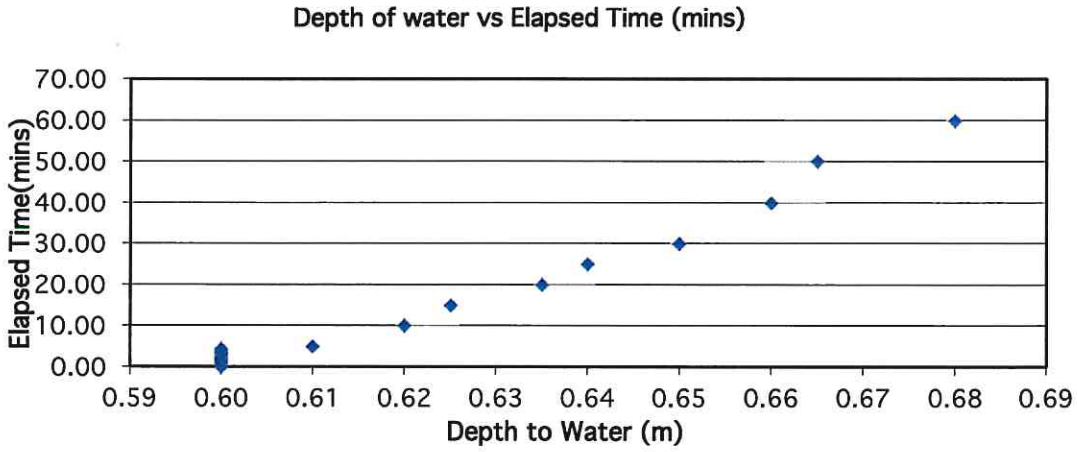
Depth to Water (m)	Elapsed Time (min)
0.60	0.00
0.60	0.50
0.60	1.00
0.60	1.50
0.60	2.00
0.60	2.50
0.60	3.00
0.60	3.50
0.60	4.00
0.60	4.50
0.61	5.00
0.62	10.00
0.63	15.00
0.64	20.00
0.64	25.00
0.65	30.00
0.66	40.00
0.67	50.00
0.68	60.00

Field Test

Depth of Pit (D)	1.30	m
Width of Pit (B)	1.50	m
Length of Pit (L)	1.80	m
Initial depth to Water =	0.60	m
Final depth to water =	0.68	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	2.7	m2
*Av. side area of permeable stratum over test period=	4.356	m2
Total Exposed area =	7.056	m2

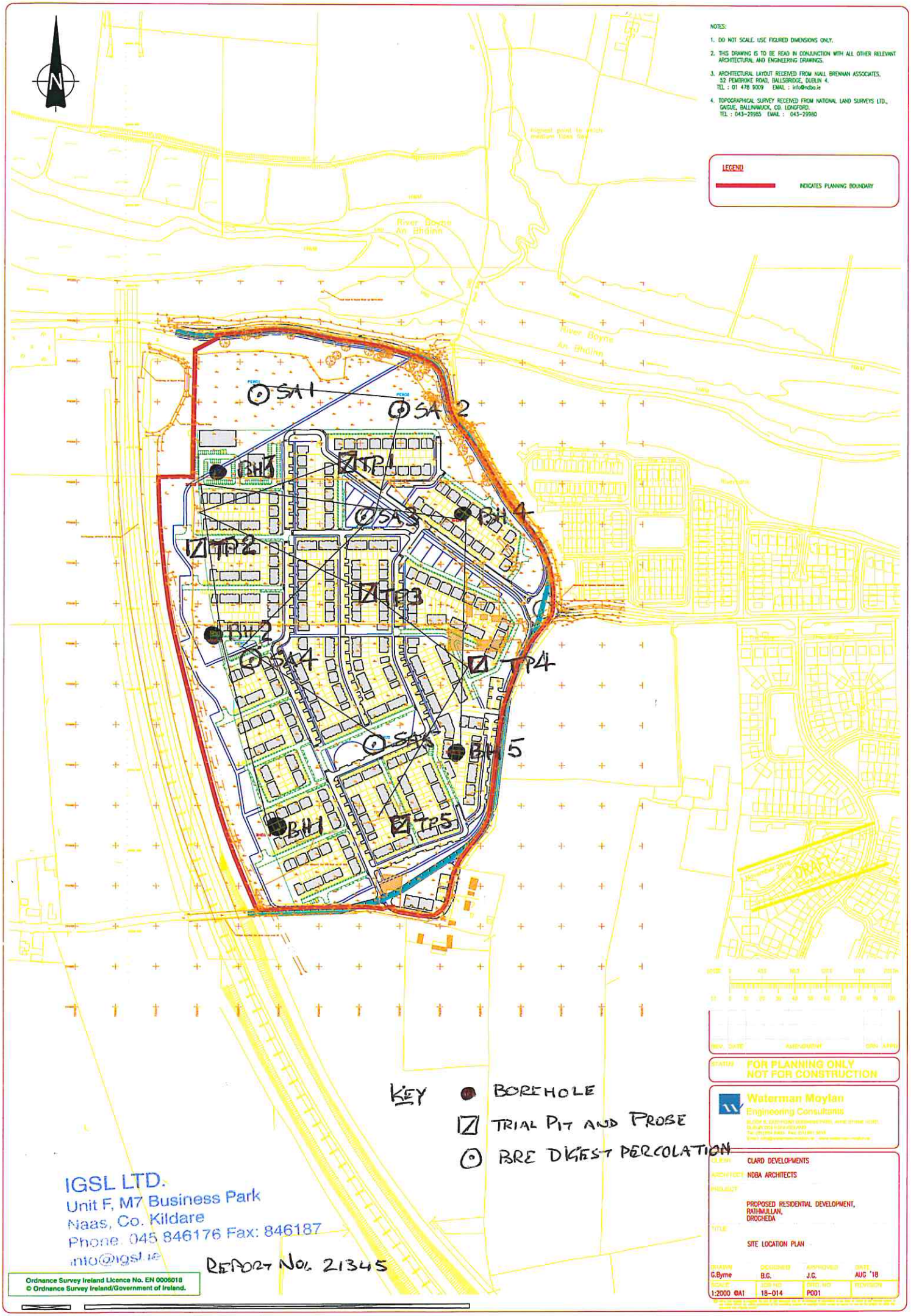
Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0.00051 m/min or 8.5034E-06 m/sec



Appendix V Laboratory Data

Appendix VI Site Plan


NOTES:
1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.
3. ARCHITECTURAL LAYOUT RECEIVED FROM HALL BRENNAN ASSOCIATES, 52 PEMBROKE ROAD, BALLSBRIDGE, DUBLIN 4. TEL : 01 478 9009 EMAIL : info@nbbc.ie
4. TOPOGRAPHICAL SURVEY RECEIVED FROM NATIONAL LAND SURVEYS LTD., SAGUE, BALLINAMUCK, CO. LONGFORD. TEL : 043-29955 EMAIL : 043-29980
LEGEND
INDICATES PLANNING BOUNDARY
River Boyne
An Bhóinn
SA1
SA2
SA3
SA4
SA5
BH1
BH2
BH3
BH4
BH5
TP1
TP2
TP3
TP4
TP5
KEY
BOREHOLE
TRIAL PIT AND PROBE
BRE DIGEST PERCOLATION
FOR PLANNING ONLY
NOT FOR CONSTRUCTION
Waterman Moylan
Engineering Consultants
CLIENT CLARD DEVELOPMENTS
ARCHITECT NOBA ARCHITECTS
PROJECT
PROPOSED RESIDENTIAL DEVELOPMENT, RATHMULLAN, DROGHEDA
TITLE
SITE LOCATION PLAN
DRAWN G.Byrne
DESIGNED B.G.
APPROVED J.G.
DATE AUG '18
SCALE 1:2000 @A1
JOB NO 18-014
DWG NO P001
REVISION
IGSL LTD.
Unit F, M7 Business Park
Naas, Co. Kildare
Phone: 045 846176 Fax: 846187
info@igsl.ie
REPORT NO. 21345
Ordnance Survey Ireland Licence No. EN 0006018
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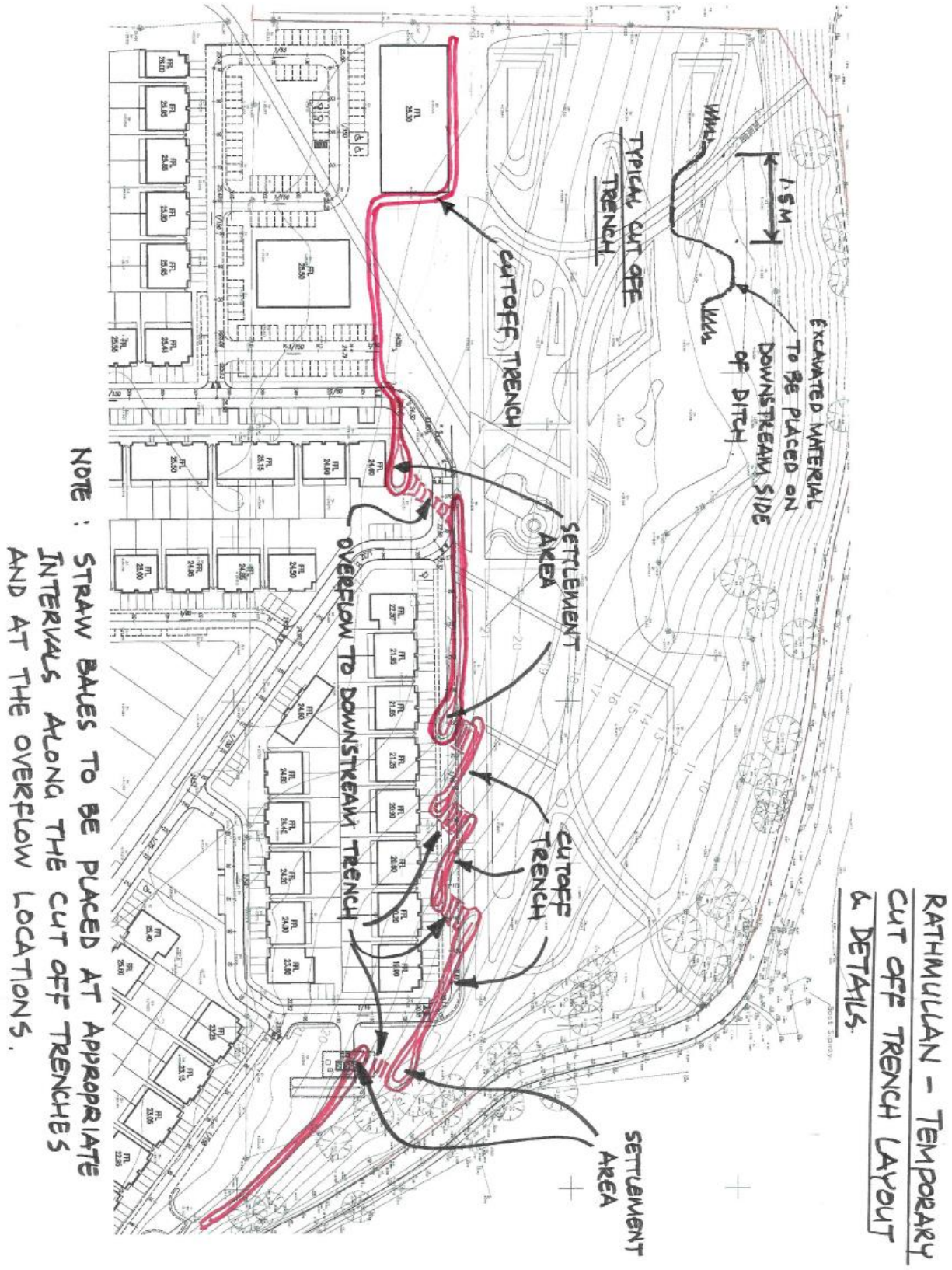
Appendix 7.1 Temporary Cut-off Trench Layout and Details



Appendix 9.1 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 PM_{10}, 40% for the hourly and annual limit value for NO_2 and 26% for hourly SO_2 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 $PM_{2.5}$. 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 $PM_{2.5}$ are included in Directive 2008/50/EC. The approach for $PM_{2.5}$ was to establish a target value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2010) and a limit value of 25 $\mu g/m^3$, as an annual average (to be attained everywhere by 2015), coupled with a target to reduce human exposure generally to $PM_{2.5}$ between 2010 and 2020. This exposure reduction target will range from 0% (for $PM_{2.5}$ concentrations of less than 8.5 $\mu g/m^3$ to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 $\mu g/m^3$). Where the AEI is currently greater than 22 $\mu g/m^3$ all appropriate measures should be employed to reduce this level to 18 $\mu g/m^3$ 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 $\mu g/m^3$ 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 NO_X (NO and NO_2) is applicable for the protection of vegetation in highly rural areas away from major sources of NO_X 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 NO_X 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 km^2 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.

Air Dispersion Modelling

The inputs to the DMRB model consist of information on road layouts, receptor locations, annual average daily traffic movements, annual average traffic speeds and background concentrations[15]. Using this input data the model predicts ambient ground level concentrations at the worst-case sensitive receptor using generic meteorological data.

The DMRB has recently undergone an extensive validation exercise (UK DEFRA, 2016a) as part of the UK's Review and Assessment Process to designate areas as Air Quality Management Areas (AQMAs). The validation exercise was carried out at 12 monitoring sites within the UK DEFRAs national air quality monitoring network. The validation exercise was carried out for NO_X, NO_2 and PM_{10}, and included urban background and kerbside/roadside locations, "open" and "confined" settings and a variety of geographical locations (UK DEFRA, 2016a).

In relation to NO_2, the model generally over-predicts concentrations, with a greater degree of over-prediction at "open" site locations. The performance of the model with respect to NO_2 mirrors that of NO_X showing that the over-prediction is due to NO_X calculations rather than the NO_X:NO_2 conversion. Within most urban situations, the model overestimates annual mean NO_2 concentrations by between 0 to 40% at confined locations and by 20% to 60% at open locations. The performance is considered comparable with that of sophisticated dispersion models when applied to situations where specific local validation corrections have not been carried out.

The model also tends to over-predict PM_{10}. Within most urban situations, the model will over-estimate annual mean PM_{10} concentrations by between 20% to 40%. The performance is comparable to more sophisticated models, which, if not validated locally, can be expected to predict concentrations within the range of ±50%.

Thus, the validation exercise has confirmed that the model is a useful screening tool for the Second Stage Review and Assessment, for which a conservative approach is applicable (UK DEFRA, 2016a).

Appendix 9.2 Transport Infrastructure Ireland Significance Criteria

Magnitude of Change	Annual Mean NO_2 / PM_{10}	No. days with PM_{10} concentration > 50 µg/m^3	Annual Mean $PM_{2.5}$
Large	Increase / decrease ≥4 µg/m^3	Increase / decrease >4 days	Increase / decrease ≥2.5 µg/m^3
Medium	Increase / decrease 2 - <4 µg/m^3	Increase / decrease 3 or 4 days	Increase / decrease 1.25 - <2.5 µg/m^3
Small	Increase / decrease 0.4 - <2 µg/m^3	Increase / decrease 1 or 2 days	Increase / decrease 0.25 - <1.25 µg/m^3
Imperceptible	Increase / decrease <0.4 µg/m^3	Increase / decrease <1 day	Increase / decrease <0.25 µg/m^3

Table A1 Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration [Note 1]		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m^3 of NO_2 or PM_{10}) (≥25 µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36 - <40 µg/m^3 of NO_2 or PM_{10}) (22.5 - <25 µg/m^3 of $PM_{2.5}$)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30 - <36 µg/m^3 of NO_2 or PM_{10}) (18.75 - <22.5 µg/m^3 of $PM_{2.5}$)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µg/m^3 of NO_2 or PM_{10}) (<18.75 µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m^3 of NO_2 or PM_{10}) (≥25 µg/m^3 of $PM_{2.5}$)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value With Scheme (36 - <40 µg/m^3 of NO_2 or PM_{10}) (22.5 - <25 µg/m^3 of $PM_{2.5}$)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value With Scheme (30 - <36 µg/m^3 of NO_2 or PM_{10}) (18.75 - <22.5 µg/m^3 of $PM_{2.5}$)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value With Scheme (<30 µg/m^3 of NO_2 or PM_{10}) (<18.75 µg/m^3 of $PM_{2.5}$)	Negligible	Negligible	Slight Beneficial

Note 1 Well Below Standard = <75% of limit value.

Table A2 Air Quality Impact Significance Criteria For Annual Mean NO_2 and PM_{10} and $PM_{2.5}$ Concentrations at a Receptor

Absolute Concentration in Relation to Objective / Limit Value	Change in Concentration Note 1		
	Small	**Medium**	**Large**
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (32 - <35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (26 - <32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value With Scheme (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value With Scheme (32 - <35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value With Scheme (26 - <32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value With Scheme (<26 days)	Negligible	Negligible	Slight Beneficial

Note 1 Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible

Table A3 Air Quality Impact Significance Criteria For Changes to Number of Days with PM_{10} Concentration Greater than 50 µg/m^3 at a Receptor

Appendix 9.3 Dust Minimisation Plan

A dust minimisation plan will be formulated for the construction phase of the project, as construction activities are likely to generate some dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the potential source and any impacts from dust deposition will typically be within two hundred metres of the construction area.

In order to ensure mitigation of the effects of dust nuisance, a series of measures will be implemented. Site roads shall be regularly cleaned and maintained as appropriate, dry sweeping of large areas should be avoided. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only. Furthermore, any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.

Vehicles using site roads shall have their speeds restricted where there is a potential for dust generation. Vehicles delivering material with dust potential to an off-site location shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust. Access gates to be located at least 10m from receptors where possible.

Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads. Public roads outside the site shall be regularly inspected for cleanliness, and cleaned as necessary. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable. Record should be kept of all inspections of the haul routes and any subsequent action in a site log book.

Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods, activities such as scabbling should be avoided. Bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.

At all times, the procedures put in place will be strictly monitored and assessed by the contractor. In the event of dust nuisance occurring outside the site boundary, satisfactory procedures will be implemented to rectify the problem. Dust monitoring should be put in place to ensure dust mitigation measures are controlling emissions. Dust monitoring should be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period between 28-32 days.

The Dust Minimisation Plan shall be reviewed at regular intervals during the construction phase 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. The name and contact details of a person to contact regarding air quality and dust issues should be displayed on the site boundary, this notice board should also include head/regional office contact details. Community engagement before works commence on site should be put in place, including a communications plan. All dust and air quality complaints should be recorded and causes identified, along with the measures taken to reduce emissions. This complaints log should be available for viewing by the local authority, if requested. Daily on and off site inspections should occur for nuisance dust and compliance with the dust management plan. This should include regular dust soiling checks of surfaces such as street furniture, windows, and cars within 100m of the site boundary. Cleaning should be provided if necessary.

Appendix 10.1 Construction & Demolition Waste Management Plan

APPENDIX 10.1

CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLAN FOR A PROPOSED MIXED-USE DEVELOPMENT

AT

RATHMULLAN, DROGHEDA, CO. MEATH

Report Prepared For

Trailford Ltd

Report Prepared By

Chonaill Bradley, Senior Environmental Consultant

Our Reference

CB/18/10499WMR01

Date of Issue

11 September 2019

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: + 353 21 438 7400
F: + 353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812
Directors: F Callaghan, C Dilworth,
T Donnelly, T Hayes, D Kelly, E Porter

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Details	Written by	Approved by
Signature		
Name	Chonaill Bradley	Elaine Neary
Title	Senior Environmental Consultant	Associate
Date	11 September 2019	11 September 2019

CONTENTS

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Construction & Demolition Waste Management Plan (C&D WMP), on behalf of Trailford Ltd., for a proposed mixed-use development on a site located at Rathmullan Road, Drogheda, Co. Meath.

The proposed development will involve and include:

Demolition of existing farm buildings on the subject site and construction of a residential housing scheme comprising 509 no. dwellings, 153 no. apartments/duplex units (providing a total of 662 no. residential dwellings) and neighbourhood centre, comprising of a creche, a café and a retail unit.

The purpose of this plan is to provide information necessary to ensure that the management of construction waste at the site is undertaken in accordance with current legal and industry standards including the *Waste Management Acts 1996 - 2011* and associated Regulations [1], *Protection of the Environment Act 2003* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* [4]. In particular, this Plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This C&D WMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of C&D waste to be generated by the proposed development and makes recommendations for management of different waste streams.

2.0 CONSTRUCTION & DEMOLITION WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998 known as *'Changing Our Ways'* [5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

The most recent national policy document was published in July 2012, entitled '*A Resource Opportunity - Waste Management Policy in Ireland'* [7]. This document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions in relation to C&D waste and commits to undertake a review of specific producer responsibility requirements for C&D projects over a certain threshold.

The National Construction and Demolition Waste Council (NCDWC) was launched in June 2002, as one of the recommendations of the Forum for the Construction Industry, in the Task Force B4 final report. The NCDWC subsequently produced '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* [8] in July 2006 in conjunction with the then Department of the

Environment, Heritage and Local Government (DoEHLG). The guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for waste manager and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, MCC etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a C&D Waste Management Plan for developments. This development requires a C&D WMP under the following criterion:

- *New residential development of 10 houses or more.*

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [9] published by FÁS and the Construction Industry Federation in 2002.

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of Meath County Council (MCC).

The *Eastern-Midlands Region Waste Management Plan 2015 – 2021* is the regional waste management plan for the MCC area published in May 2015.

The Regional Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of *"70% preparing for reuse, recycling and other recovery of construction and demolition waste"* (excluding natural soils and stones and hazardous wastes) to be achieved by 2020.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - 150 per tonne of waste which includes a €75 per tonne landfill levy introduced under the *Waste Management (Landfill Levy) (Amendment) Regulations 2012.*

The *Meath County Development Plan 2013 – 2019* [10] sets out a number of policies and objectives for County Meath in line with the objectives of the regional waste management plan. The plan identifies waste prevention and minimisation will be a priority and there will be increased focus on the schools, community and business sectors to reduce waste arisings. Waste policies and objectives with a particular relevance to the proposed development are:

Policies:

- *WM POL 1: To adopt the provisions of the waste management hierarchy and implement policy in relation to the county's requirements under the current or any subsequent waste management plan. All prospective developments in the county will be expected to take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan. Account shall*

also be taken of the proximity principle and the inter regional movement of waste as provided for under appropriate Minister Directives from time to time.

- *WM POL 4: To seek in the Council's dealings with private companies that all waste shall be undertaken in compliance with the requirement of the EPA and relevant waste management legislation and policy.*
- *WM POL 7: To encourage the recycling of construction and demolition waste and the reuse of aggregate and other materials in future construction projects.*

Objectives:

- *WM OBJ 2: To continue to expand environmental awareness initiatives designed to create increased public awareness of waste prevention minimisation, reuse and resource efficiency. This should be encouraged at all sectors of society.*
- *WM OBJ 7: To promote the implementation of Waste Management Activities in accordance with 'Best Practice' and national policy.*
- *WM OBJ 8: To facilitate the implementation of national legislation and national and regional waste management policy.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate legislation includes:
  - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended;
  - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended;
  - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended;
  - Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended;
  - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended;
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997);
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015) ;
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014);
  - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended;
  - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended;
  - European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 191 of 2015);
  - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended;
  - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended;
  - Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998);
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994); and
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended.
- Environmental Protection Act 1992 (No. 7 of 1992) as amended.

- Litter Pollution Act 1997 (No. 12 of 1997) as amended.
- Planning and Development Act 2000 (No. 30 of 2000) as amended [11].

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996 - 2001* and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the client ensures that the waste contractors engaged by the groundworks and construction contractor(s) are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a waste or Industrial Emissions (IE) licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESCRIPTION OF THE PROJECT

3.1 Location, Size and Scale of the Development

The site is located off the Rathmullan Road in the townland of Rathmullan, Drogheda, Co. Meath, approximately 2.5 km east of Drogheda town centre. It comprises a series of three large fields which are currently in agricultural use.

The site is bounded by the M1 Motorway, which runs along the eastern boundary of the site, the River Boyne, which defines the northern boundary of the site. Greenfield lands are located to the south and south east of the proposed site, with residential houses to the north east.

The proposed development will comprise the demolition of existing farm buildings on the subject site and construction of a residential housing scheme comprising 509 no. dwellings, 153 no. apartments/duplex units (providing a total of 662 no. residential dwellings) and neighbourhood centre, comprising of a creche, a café and a retail unit, on the 26.2 ha site.

A full description of the development is provided in Chapter 3 of the Environmental Impact Assessment Report (EIAR).

3.2 Details of the Non-Hazardous Wastes to be produced

There will be waste materials generated from the demolition of the existing farm buildings and hardstanding areas on site, as well as from the excavation of the building foundations. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete etc

Topsoil and subsoil will be excavated to facilitate site preparation, construction of the building foundations and access roads and the installation of underground services. The project engineers have estimated that there will be no surplus soils and stones generated from the excavations. If any excavated material is required to be removed from site it will be taken for for offsite reuse, recovery and/or disposal.

During the construction phase there may be a surplus of building materials, such as off-cuts of timber, plasterboard, insulation and plastic ducts, broken concrete blocks, bricks, tiles and metal waste. There may also be excess concrete during construction which will need to be disposed of. A significant volume of cardboard and soft plastic waste will be generated from packaging.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

3.3 Potential Hazardous Wastes to be produced

3.3.1 Contaminated Soil

Site investigations were undertaken at the site in November 2018 by IGSL. Soil samples were collected for analysis for the Waste Acceptance Criteria (WAC). Based on the samples collected, the soil would be classed as inert in accordance with the requirements for acceptance of waste at landfills (EC Council Decision 2003/33/EC [12]).

This legislation sets limit values for acceptance of waste material to landfills based on properties of the waste including potential pollutant concentrations and leachability. Based on the sampling conducted, it is anticipated that the surplus material will be suitable for acceptance at inert soil recovery facilities/landfills in Ireland.

No asbestos or Asbestos Containing Material (ACMs) were identified in any of the samples submitted for testing. In the unlikely event ACMs are identified, removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* If identified, asbestos will be taken to a suitably licensed or permitted facility.

In the unlikely event of hazardous material being encountered, it would need to be transported for treatment/recovery or exported abroad for disposal in suitable facilities. Additional sampling and analysis may be required prior to commencement of the excavations to provide further confirmation of the classification of the material prior to removal offsite. The density of the sampling and the range of analysis required are largely dependent on the requirements of the receiving facilities.

While it is not anticipated that any types of buried waste or contaminated material will be encountered during excavations at the proposed development site, it is recommended that all excavations should be carefully monitored by a suitably qualified

person to ensure that any waste or potentially contaminated material is identified and segregated, if encountered.

A more detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 6.0 (Land Geology and Hydrogeology).

3.3.2 Invasive Species

Scott Cawley Ltd. undertook a site assessment/survey searching directly for evidence of Japanese Knotweed (*Fallopia japonica*) and other invasive species on the 25th of September 2018 and the 26th of March 2019. This included a walkover survey of the entire site, and around part of the outside perimeter. No Knotweed plant species were recorded inside the site boundary. Japanese Knotweed was recorded nearby along the banks of the river Boyne. Further details can be found in Chapter 5.0 Biodiversity.

Japanese Knotweed is an alien invasive species listed under *Schedule 3 of Regulations SI No. 355/2015*. Scott Cawley Ltd's concluded that it is not present on this site.

3.3.3 Asbestos

A Refurbishment and Demolition Asbestos Survey was undertaken at the site by About Safety Ltd on the 15th April for the purpose of identifying and managing any asbestos containing materials (ACMs) on the premises. A report was issued which contains a register showing the location and type of asbestos and the risks and recommendations in relation to the material found.

During the course of the survey, the presence of ACMs was identified in a number of locations including asbestos roof sheeting, cement piping and associated debris around various areas of the site.

Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACM's will only be removed from site by a suitably permitted/licenced waste contractor. in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All material will be taken to a suitably licensed or permitted facility

3.3.4 Fuel/Oils

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, all storage tanks and all draw-off points will be bunded (or stored in double-skinned tanks) and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil wastage at the site.

3.3.5 Other Known Hazardous Substances

Waste paints, glues, adhesives and other known hazardous substances, if generated, will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner/cartridges, batteries (Lead, Ni-Cd or Mercury) and/or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes (if encountered) will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

3.4 Main C&D Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in Table 3.1. The List of Waste (LoW) code (as effective from 1 June 2015; also referred to as the European Waste Code or EWC) for each waste stream is also shown.

Waste Material	LoW Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Bituminous mixtures, coal tar and tarred products	17 03 02
Metals (including their alloys)	17 04 01-07
Soil and stones	17 05 04
Gypsum-based construction material	17 08 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-03
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04

Table 3.1 Typical waste types generated and EWCs (individual waste types may contain hazardous substances)

4.0 WASTE MANAGEMENT

4.1 Demolition Waste Generation

Demolition works at the site will involve the demolition of existing structures on site. Demolition figures published by the EPA in the *'National Waste Reports'* [14] and data from previous projects have been used to estimate the approximate break-down for indicative reuse (offsite), recycling and disposal targets of demolition waste. The approximate area of the existing structures to be demolished is c.1800m^2. This breakdown is shown in Table 4.1.

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	0.0	0	0.0	85	0.0	15	0.0
Concrete, Bricks, Tiles, Ceramics	297.0	30	89.1	65	193.1	5	14.9
Plasterboard	0.0	0	0.0	80	00	20	0.0
Asphalts	16.2	0	0.0	25	4.1	75	12.2
Metal	162.0	5	8.1	80	129.6	15	24.3
Slate	0.0	0	0.0	85	0.0	15	0.0
Timber	64.8	20	6.5	40	25.9	50	32.4
Total	**540.0**		**103.7**		**352.6**		**83.7**

Table 4.1 *Estimated off-site reuse, recycle and disposal rates for demolition waste*

The appointed demolition contractor will be required to prepare a detailed demolition management plan prior to work commencing which should refine the above estimated waste figures

4.2 Construction Waste Generation

Table 4.2 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports, the GMIT* [15] and other research reports.

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

Table 4.2 *Waste materials generated on a typical Irish construction site*

Table 4.3 shows the estimated construction waste generation for the proposed development based on the information available to date along with the targets for offsite management of the waste streams. The estimated waste amounts are based on an average large-scale development waste generation rate per m^2, using the waste breakdown rates shown in Table 4.2

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	825.9	10	82.6	80	660.7	15	82.6
Timber	700.8	40	280.3	55	385.4	5	35.0
Plasterboard	250.3	30	75.1	60	150.2	20	25.0
Metals	200.2	5	10.0	90	180.2	75	10.0
Concrete	150.2	30	45.0	65	97.6	15	7.5
Other	375.4	20	75.1	60	225.2	15	75.1
Total	2502.7	10	568.1	80	1699.3	50	235.3

Table 4.3 *Estimated reuse, recycle and disposal rates for construction waste*

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

4.3 Proposed Waste Management Options

Waste materials generated will be segregated on site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source where feasible. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the region that provide this service.

All waste arising's will be handled by an approved waste contractor holding a current waste collection permit. All waste arising's requiring disposal off-site will be reused,

recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

Some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (Ref. Article 30(1)(b) of the Waste Collection Permit Regulations 2007 as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste offsite in their work vehicles (which are not design for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s) detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR/permit or licence for the receiving waste facility for all waste removed off site for appropriate reuse, recycling, recovery and/or disposal.

Dedicated bunded storage containers will be provided for hazardous wastes which may arise such as batteries, paints, oils, chemicals etc, if required.

The management of the main waste streams is outlined as follows:

Topsoil/Subsoil

The Waste Management Hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling/recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works. However it is anticipated that all excavated material will, where possible, be reused onsite. As such, preferred option (prevention and minimisation) of prevention cannot be accommodated for the excavation phase.

If any material is found to be not suitable or required for reuse on site, it will be taken off site for offsite reuse, recovery and/or disposal. When this material is removed off-site it could be reused as a by-product (and not as a waste), if this is done, it will be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received.

The next option (beneficial reuse) may be appropriate for the excavated material pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27. However, it is not envisaged that Article 27 will be used to import material onto this site.

If the material is deemed to be a waste, then removal and reuse/recovery/disposal of the material will be carried out in accordance with the *Waste Management Acts 1996 – 2011* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the unlikely event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Silt & Sludge
During the construction phase, silt and petrochemical interception may be carried out on runoff and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed offsite.

Concrete Blocks, Bricks, Tiles & Ceramics
The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible.

Hard Plastic
As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber
Timber that is uncontaminated, i.e. free from paints, preservatives, glues etc., will be disposed of in a separate skip and recycled off-site.

Metal
Metals will be segregated and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard
There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the construction phases will be stored in a separate skip, pending collection for recycling. The site manager will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass
Glass materials will be segregated for recycling, where possible.

Waste Electrical and Electronic Equipment (WEEE)
Any WEEE will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling.

Other Recyclables
Where any other recyclable wastes such as cardboard is generated, it will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste
C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team (see Section 7.0) to determine if recyclable materials

have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Asbestos Containing Materials

The asbestos containing materials should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works begin. All asbestos removal work or encapsulation work must be carried out in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010*

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and/or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

It should be noted that until a construction contractor is appointed it is not possible to provide information on the specific destinations of each construction waste stream. Prior to commencement of construction and removal of any construction waste offsite, details of the proposed destination of each waste stream will be provided to MCC by the project team.

4.4 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project Waste Manager (see Section 7.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 - 2011*, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project waste manager (see Section 6.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR/permit or EPA Waste/IE Licence for that site will be provided to the nominated project waste manager (see Section 6.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from DCC (as the relevant authority on behalf of all local authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on site.

5.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is provided below.

The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

5.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle/recovery/disposal costs associated with the requirement for a waste contractor to take the material off-site.

Clean and inert soils, gravel, stones etc. which cannot be reused on site may be used for such activities as capping material for landfill sites. This material is often taken free of charge or a reduced fee for such purposes, reducing final waste disposal costs.

5.2 Recycling

Salvageable metals will earn a rebate which can be offset against the costs of collection and transportation of the skips.

Clean uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes such as timber from a site than mixed waste.

5.3 Disposal

Landfill charges in the Leinster region are currently at around €130 - 150 per tonne which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc. is also used as fill/capping material, wherever possible.

6.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the project waste manager to ensure commitment, operational efficiency and accountability during the C&D phases of the project.

6.1 Waste Manager Training and Responsibilities

The nominated waste manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site. The waste manager will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The waste manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management

on site. The waste manager will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this C&D WMP.

6.2 Site Crew Training

Training of site crew is the responsibility of the waste manager and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the C&D WMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas. A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

7.0 RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the construction waste arising's on site. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times.

For each movement of waste off-site, a signed docket will be obtained by the Waste Manager from the contractor, detailing the weight and type of the material and the source and destination of the material. This will be carried out for each material type. This system will also be linked with the delivery records. In this way, the percentage of C&D waste generated for each material can be determined.

The system will allow the comparison of these figures with the targets established for the recovery, reuse and recycling of C&D waste presented earlier and to highlight the successes or failures against these targets.

8.0 OUTLINE WASTE AUDIT PROCEDURE

8.1 Responsibility for Waste Audit

The appointed waste manager will be responsible for conducting a waste audit at the site during the C&D phase of the development.

8.2 Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site should be undertaken at regular intervals through the project. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery/reuse/recycling targets for the site.

Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Waste management costs will also be reviewed.

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

9.0 CONSULTATION WITH RELEVANT BODIES

9.1 Local Authority

Once the demolition and construction contractors have been appointed and prior to removal of any C&D waste materials offsite, details of the proposed destination of each waste stream will be provided to MCC.

MCC will also be consulted, as required, throughout the excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

9.2 Recycling/Salvage Companies

Companies that specialise in C&D waste management will be contacted to determine their suitability for engagement. Where a waste contractor is engaged, each company will be audited in order to ensure that relevant and up-to-date waste collection permits and facility COR/permits/licences are held. In addition, information regarding individual construction materials will be obtained, including the feasibility of recycling each material, the costs of recycling/reclamation and the means by which the wastes will be collected and transported off-site, and the recycling/reclamation process each material will undergo off site.

10.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate and associated legislation include:
   - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended;
   - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended;
   - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended;
   - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended;
   - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended;
   - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended;
   - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015);
   - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014);
   - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended;
   - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended;
   - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015);
   - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended;
   - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended;
   - The European Communities (Transfrontier Shipment of Hazardous Waste) Regulations 1988 (S.I. No. 248 of 1988);
   - European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011); and
   - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015).
2. Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
7. Department of Environment, Communities and Local Government (DoECLG), *A Resource Opportunity - Waste Management Policy in Ireland* (2012).
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Appendix 10.2 Operational Waste Management Plan

APPENDIX 10.2

OPERATIONAL WASTE MANAGEMENT PLAN FOR A PROPOSED MIXED-USE DEVELOPMENT

AT

RATHMULLAN, DROGHEDA, CO. MEATH

awnconsulting

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

Report Prepared For

Trailford Ltd

Report Prepared By

Chonaill Bradley, Senior Environmental Consultant

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Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: +353 21 438 7400
F: +353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812
Directors: F Callaghan, C Dilworth,
T Donnelly, E Porter
Associate Director: D Kelly

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Name	Chonaill Bradley	Elaine Neary
Title	Senior Environmental Consultant	Associate
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CONTENTS

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Operational Waste Management Plan (OWMP) on behalf of Trailford Ltd. for a proposed mixed-use development on a site located at Rathmullan, Drogheda, Co. Meath.

The proposed development will involve and include:

Demolition of existing farm buildings on the subject site and construction of a residential housing scheme comprising 509 no. dwellings, 153 no. apartments/duplex units (providing a total of 662 no. residential dwellings) and neighbourhood centre, comprising of a creche, a café and a retail unit.

This OWMP has been prepared to ensure that the management of waste during the operational phase of the proposed development is undertaken in accordance with the current legal and industry standards including, the *Waste Management Act 1996 – 2011* as amended and associated Regulations [1], *Protection of the Environment Act 2003* as amended [2], *Litter Pollution Act 2003* as amended [3], the *'Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021'* [4] and Meath County Council (MCC) Waste Management (Segregation, Storage & Presentation of Household and Commercial Waste) Bye-Laws *(2018)* [5]. In particular, this OWMP aims to provide a robust strategy for storing, handling, collection and transport of the wastes generated at site.

This OWMP aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. The OWMP also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources). The plan estimates the type and quantity of waste to be generated from the proposed development during the operational phase and provides a strategy for managing the different waste streams.

At present, there are no specific guidelines in Ireland for the preparation of OWMPs. Therefore, in preparing this document, consideration has been given to the requirements of national and regional waste policy, legislation and other guidelines.

2.0 OVERVIEW OF WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Government issued a policy statement in September 1998 titled as *'Changing Our Ways'* [6] which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Amongst other things, Changing Our Ways stated a target of at least 35% recycling of municipal (i.e. household, commercial and non-process industrial) waste.

A further policy document *'Preventing and Recycling Waste – Delivering Change'* was published in 2002 [7]. This document proposed a number of programmes to increase recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority.

This view was also supported by a review of sustainable development policy in Ireland and achievements to date, which was conducted in 2002, entitled *'Making Irelands Development Sustainable – Review, Assessment and Future Action'* [8]. This document also stressed the need to break the link between economic growth and waste generation, again through waste minimisation and reuse of discarded material.

In order to establish the progress of the Government policy document *Changing Our Ways*, a review document was published in April 2004 entitled *'Taking Stock and Moving Forward'* [9]. Covering the period 1998 – 2003, the aim of this document was to assess progress to date with regard to waste management in Ireland, to consider developments since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives outlined in *Changing Our Ways*.

In particular, *Taking Stock and Moving Forward* noted a significant increase in the amount of waste being brought to local authority landfills. The report noted that one of the significant challenges in the coming years was the extension of the dry recyclable collection services.

The most recent policy document was published in July 2012 titled *'A Resource Opportunity'*[10]. The policy document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions, including the following:

- A move away from landfill and replacement through prevention, reuse, recycling and recovery;
- A Brown Bin roll-out diverting 'organic waste' towards more productive uses;
- Introducing a new regulatory regime for the existing side-by-side competition model within the household waste collection market;
- New Service Standards to ensure that consumers receive higher customer service standards from their operator;
- Placing responsibility on householders to prove they use an authorised waste collection service;
- The establishment of a team of Waste Enforcement Officers for cases relating to serious criminal activity will be prioritised;
- Reducing red tape for industry to identify and reduce any unnecessary administrative burdens on the waste management industry;
- A review of the producer responsibility model will be initiated to assess and evaluate the operation of the model in Ireland; and
- Significant reduction of Waste Management Planning Regions from ten to three.

While *A Resource Opportunity* covers the period to 2020, it is subject to a mid-term review in 2016 to ensure that the measures are set out properly and to provide an opportunity for additional measures to be adopted in the event of inadequate performance. In early 2016, the Department of the Environment, Community and Local Government invited comments from interested parties on the discussion paper 'Exporting a Resource Opportunity'. While the EPA have issued a response to the consultation, an updated policy document has not yet been published.

Since 1998, the Environmental Protection Agency (EPA) has produced periodic *'National Waste (Database) Reports'* [11] detailing among other things estimates for household and commercial (municipal) waste generation in Ireland and the level of recycling, recovery and disposal of these materials. The 2016 National Waste Statistics, which is the most recent study published, reported the following key statistics for 2016:

- **Generated –** Ireland produced 2,763,166 t of municipal waste in 2016, this is a six percent increase since 2014. This means that each person living in Ireland generated 580kg of municipal waste in 2016;
- **Managed –** Waste collected and treated by the waste industry. In 2016, a total of 2,718,298 t of municipal waste was managed;

- **Unmanaged –**Waste that is not collected or brought to a waste facility and is therefore likely to cause pollution in the environment because it is burned, buried or dumped. The EPA estimates that 44,868 t was unmanaged in 2016;
- **Recovered –** the amount of waste recycled, used as a fuel in incinerators, or used to cover landfilled waste. In 2016, almost three quarters (74%) of municipal waste was recovered, this is a decrease from 79% in 2014;
- **Recycled –** the waste broken down and used to make new items. Recycling also includes the breakdown of food and garden waste to make compost. The recycling rate in 2016 was 41%, the same as 2014; and
- **Disposed –** the waste landfilled or burned in incinerators without energy recovery. Just over a quarter (26%) of municipal waste was landfilled in 2016).

2.2 Regional Level

The proposed development is located in the Local Authority area of Meath County Council (MCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the MCC area which was published in May 2015.

The regional plan sets out the following strategic targets for waste management in the region that are relevant to the proposed development:

- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130-150 per tonne of waste which includes a €75 per tonne landfill levy introduced under the *Waste Management (Landfill Levy) (Amendment) Regulations 2013.*

The *Meath County Development Plan 2013 – 2019* [12] sets out a number of policies and objectives for County Meath in line with the objectives of the regional waste management plan. The plan identifies a need to further reduce the role of landfilling in favour of higher value recovery options.

Waste policies and objectives with a particular relevance to this development are:

Policies:

- *WM POL 1: To adopt the provisions of the waste management hierarchy and implement policy in relation to the county's requirements under the current or any subsequent waste management plan. All prospective developments in the county will be expected to take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan. Account shall also be taken of the proximity principle and the interregional movement of waste as provided for under appropriate Minister Directives from time to time.*
- *WM POL 2: To promote and encourage the education and awareness on all issues associated with waste management, at household, industry and community level. This will include the promotion of waste reduction by encouraging the minimisation, re-use, recycling and recovery of waste within the county.*
- *WM POL 9: To encourage and support the expansion and improvement of the green bin (biodegradable waste) service in order to increase the quantity and quality of materials collected for recycling.*
- *WM POL 10: To encourage and support the provision of a separate collection of waste in accordance with the requirements of the Waste Management (Food*

Waste) Regulations 2009, the Waste Framework Directive Regulations, 2011 and other relevant legislation to meet the requirements of the Regional Waste Management Plan.

Objectives:

- *WM OBJ 7: To promote the implementation of Waste Management Activities in accordance with 'Best Practice' and national policy.*
- *WM OBJ 11: To ensure that household waste recycling is adequately addressed in all proposed new residential developments, by taking this into account during the Planning Application process.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No. 27 of 2003) and 2011 (No 20 of 2011). Sub-ordinate and associated legislation includes:
  - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended;
  - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended;
  - Waste Management (Facility Permit and Registration) Regulation 2007 (S.I No. 821 of 2007) as amended;
  - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended;
  - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended;
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended;
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015);
  - European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014);
  - Waste Management (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended;
  - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended;
  - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015);
  - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended;
  - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended;
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)*;* and
  - European Union (Properties of Waste Which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended.
- Environmental Protection Act 1992 (S.I. No. 7 of 1992) as amended;
- Litter Pollution Act 1997 (Act No. 12 of 1997) as amended and
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended[14]

These Acts and subordinate Regulations enable the transposition of relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996 - 2011* and subsequent Irish

legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal.) As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final disposal area, waste contractors will be employed to physically transport waste to the final waste disposal site.

It is therefore imperative that the residents, tenants and proposed building management company undertake on-site management of waste in accordance with all legal requirements and employ suitably permitted/licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contactor handle, transport and reuse/recover/recycle/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended or a waste or IED (Industrial Emissions Directive) licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

2.3.1 Meath County Council Waste Bye-Laws

The MCC "Meath County Council Waste Management (Storage, Presentation and Segregation of Household and Commercial Waste) By-Laws (2018)" came into effect on the 12thth of November 2018. These by-laws set a number of enforceable requirements on waste holders with regard to storage, separation and presentation of waste within the MCC functional area. Key requirements under these by-laws of relevance to the proposed development include the following:

- Kerbside waste presented for collection shall not be presented for collection earlier than 6.00pm on the day immediately preceding the designated waste collection day;
- All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 8:00am on the day following the designated waste collection day;
- An authorised waste collector is engaged to service the receptacles referred to in this section of these bye-laws, with documentary evidence, such as receipts, statements or other proof of payment, demonstrating the existence of this engagement being retained for a period of no less than two years. Such evidence shall be presented to an authorised person within a time specified in a written request from either that person or from another authorised person employed by Meath County Council;
- Adequate access and egress onto and from the premises by waste collection vehicles is maintained; and
- Written information is provided to each tenant or other occupier about the arrangements for waste separation, segregation, storage and presentation prior to collection,

The full text of the waste by-laws is available from the MCC website.

2.4 Regional Waste Management Service Providers and Facilities

Various contractors offer waste collection services for the residential and commercial sectors in the MCC region. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO.

As outlined in the regional waste management plan, there is a decreasing number of landfills available in the region. Only three municipal solid waste landfills remain operational and are all operated by the private sector. There are a number of other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

There is a civic amenity centre at Mell Road, Drogheda, Co. Louth which accepts a wide range of wastes including cardboard, newspaper, glass (green, brown, clear), aluminium, drink cans, textiles (e.g. clothes), car batteries, scrap metal, wood, washing machines, fridges, cookers and electrical appliances. There are also 9 no. bring banks in Drogheda that take glass and cans.

A copy of all CORs and waste permits issued by the Local Authorities are available from the NWCPO website and all waste/IE licenses issued are available from the EPA.

3.0 DESCRIPTION OF THE PROJECT

3.1 Location, Size and Scale of the Development

The site is located off the Rathmullan Road in the townland of Rathmullan, Drogheda, Co. Meath, approximately 2.5 km east of Drogheda town centre. It comprises a series of three large fields which are currently in agricultural use.

The site is bounded by the M1 Motorway, which runs along the eastern boundary of the site, the River Boyne, which defines the northern boundary of the site. Greenfield lands are located to the south and south east of the proposed site, with residential houses to the north east.

The proposed development will comprise the demolition of existing farm buildings on the subject site and construction of a residential housing scheme comprising 509 no. dwellings, 153 no. apartments/duplex units (providing a total of 662 no. residential dwellings) and neighbourhood centre, comprising of a creche, a café and a retail unit, on the 26.2Ha site.

A full description of the development is provided in Chapter 2.0 of the Environmental Impact Assessment Report (EIAR).

3.2 Typical Waste Categories

The typical non-hazardous and hazardous wastes that will be generated at the proposed development will include the following:

- Dry Mixed Recyclables (DMR) - includes waste paper (including newspapers, magazines, brochures, catalogues, leaflets), cardboard and plastic packaging, metal cans, plastic bottles, aluminium cans, tins and Tetra Pak cartons;
- Organic waste – food waste and green waste generated from internal plants/flowers;
- Glass; and
- Mixed Non-Recyclable (MNR)/General Waste.

In addition to the typical waste materials that will be generated at the development on a daily basis, there will be some additional waste types generated in small quantities which will need to be managed separately including:

- Green/garden waste may be generated from internal plants, gardens or external landscaping;
- Batteries (both hazardous and non-hazardous);
- Waste electrical and electronic equipment (WEEE) (both hazardous and non-hazardous);
- Printer cartridges/toners;
- Chemicals (paints, adhesives, resins, detergents, etc.) ;
- Light bulbs (Fluorescent Tubes, Long Life, LED and filament bulbs);
- Textiles (rags);
- Waste cooking oil (if any generated by the residents or commercial tenants);
- Furniture (and from time to time other bulky wastes); and
- Abandoned bicycles. Bicycle parking areas are planned for the development. As happens in other developments, residents and tenants sometimes abandon faulty or unused bicycles and it can be difficult to determine their ownership. However, it is proposed that these bicycles would be donated to charity, so they are unlikely to become a waste.

Wastes should be segregated into the above waste types to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

3.3 European Waste Codes

In 1994, the *European Waste Catalogue*[14] and *Hazardous Waste List*[15] were published by the European Commission. In 2002, the EPA published a document titled the *European Waste Catalogue and Hazardous Waste List*[16], which was a condensed version of the original two documents and their subsequent amendments. This document has recently been replaced by the EPA '*Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous*'[17] which became valid from the 1st June 2015. This waste classification system applies across the EU and is the basis for all national and international waste reporting, such as those associated with waste collection permits, CORs, permits and licences and EPA National Waste Database.

Under the classification system, different types of wastes are fully defined by a code. The List of Waste (LoW) code (also referred to as European Waste Code or EWC) for typical waste materials expected to be generated during the operation of the proposed development are provided in Table 3.1 below

Waste Material	LoW/EWC Code
Paper and Cardboard	20 01 01
Plastics	20 01 39
Metals	20 01 40
Mixed Non-Recyclable Waste	20 03 01
Glass	20 01 02
Biodegradable Kitchen Waste	20 01 08
Oils and Fats	20 01 25
Textiles	20 01 11
Batteries and Accumulators*	20 01 33* - 34
Printer Toner/Cartridges*	20 01 27* - 28
Green Waste	20 02 01
WEEE*	20 01 35*-36
Chemicals (solvents, pesticides, paints & adhesives, detergents, etc.) *	20 01 13*/19*/27*/28/29*30
Fluorescent tubes and other mercury containing waste*	20 01 21*
Bulky Wastes	20 03 07

** Individual waste type may contain hazardous materials*
Table 3.1 Typical Waste Types Generated and LoW Codes

4.0 ESTIMATED WASTE ARISINGS

A waste generation model (WGM) developed by AWN, has been used to predict waste types, weights and volumes arising from operations within the proposed development. The WGM incorporates building area and use and combines these with other data including Irish and US EPA waste generation rates.

The estimated quantum/volume of waste that will be generated from the residential units has been determined based on the predicted occupancy of the units.

The waste generation for the retail, crèche, café, exhibition space, men's shed and enterprise units is based on waste generation rates per m^2 floor area for the proposed area uses.

The estimated waste generation for the development for the main waste types is presented in Table 4.1, 4.2 and 4.3.

Waste type	Waste Volume (m^3/week)			
	Residential no. 2 Bedroom (Individual)	Residential no. 3 Bedroom (Individual)	Residential no. 4 Bedroom (Individual)	Residential Apartment Block A
Organic Waste	0.02	0.02	0.02	0.67
DMR	0.12	0.14	0.18	4.59
Glass	0.01	0.01	0.01	0.13
MNR	0.07	0.08	0.10	3.05
Total	**0.22**	**0.25**	**0.31**	**8.44**

Table 4.1 Estimated waste generation for the proposed development for the main waste types

Waste type	Waste Volume (m^3/week)			
	Residential Apartment Block B	Residential Apartment Block C	Residential Apartment Block D	Residential Apartment Block E
Organic Waste	0.32	0.10	0.20	0.20
DMR	2.16	0.69	1.38	1.38
Glass	0.06	0.02	0.04	0.04
MNR	1.44	0.46	0.91	0.91
Total	**3.97**	**1.26**	**2.53**	**2.53**

Table 4.2 Estimated waste generation for the proposed development for the main waste types

Waste type	Waste Volume (m^3/week)			
	Residential Apartment Block G (Each Block)	Crèche	Café	Retail
Organic Waste	0.05	0.05	0.09	0.09
DMR	0.34	1.91	0.17	1.71
Glass	0.01	0.01	0.01	0.05
MNR	0.23	0.85	0.22	0.71
Total	**0.63**	**2.82**	**0.47**	**2.55**

Table 4.3 Estimated waste generation for the proposed development for the main waste types

The BS5906:2005 Waste Management in Buildings – Code of Practice[19] was considered in the estimations of the waste arising. It has been assumed that the retail, café, and residential units will generate similar waste volumes over a seven-day period, while the crèche will operate over a five-day period. It is anticipated that the conservative estimation of waste quantities from the residents will be sufficient to cover the small quantities likely to be generated in the community facilities on a weekly basis.

5.0 WASTE STORAGE AND COLLECTION

This section provides information on how waste generated within the development will be stored and how the waste will be collected from the development. This has been prepared with due consideration of the proposed site layout as well as best practice standards, local and national waste management requirements including those of MCC. In particular, consideration has been given to the following documents:

- BS 5906:2005 Waste Management in Buildings – Code of Practice;
- EMR Waste Management Plan 2015 – 2021;
- Meath County Council Development Plan 2013 – 2016
- MCC, Waste Management (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018)*; and*
- DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018)[20].

Shared Waste Storage Area (WSAs) have been allocated within the development design for the residential units. Shared WSAs have been allocated externally for each apartment block. Residents of houses and duplexes will store their own bins in their back gardens, where externally accessible. Residents of houses and duplexes who do not have external access to their back gardens will have a shielded bin store located to the front of their house. A shared external WSA has also been allocated for the commercial units to share. These WSAs and can be viewed on the drawings submitted with the planning application.

Using the estimated waste generation volumes in Table 4.1 and 4.2, the waste receptacle requirements for MNR, DMR, organic waste and glass have been established for the WSAs. These are presented in Table 5.1.

Area/Use	Bins Required			
	MNR*	DMR**	Organic	Glass
Residential Houses & Duplexes (Individual)	1 x 120L	1 x 240L	1 x 120L	Bottle Bank
Residential Block A	3 x 1100L	4 x 1100L	3 x 240L	1 x 240L
Residential Block B	2 x 1100L	2 x 1100L	2 x 240L	1 x 240L
Residential Block C	1 x 1100L	1 x 1100L	1 x 120L	1 x 120L
Residential Block D	1 x 1100L	2 x 1100L	1 x 240L	1 x 120L
Residential Block E	1 x 1100L	2 x 1100L	1 x 120L	1 x 120L
Residential Block G (Each Block)	1 x 240L	2 x 240L	1 x 120L	1x 120L
Commercial WSA (Block C)	2 x 1100L	4 x 1100L	1 x 240L	1 x 120L

Note: ** = Mixed Non-Recyclables*
*** = Dry Mixed Recyclables*

Table 5.1 Waste storage requirements for the proposed development

The waste receptacle requirements have been established from distribution of the total weekly waste generation estimate into the holding capacity of each receptacle type.

Waste storage receptacles as per Table 5.1 above (or similar appropriate approved containers) will be provided by the facilities management company in the residential WSAs.

The types of bins used will vary in size, design and colour dependent on the appointed waste contractor. However, examples of typical receptacles to be provided in the WSAs are shown in Figure 5.1. All waste receptacles used will comply with the IS EN 840 2012 standard for performance requirements of mobile waste containers, where appropriate.

Figure 5.1 Typical waste receptacles of varying size (240L and 1100L)

5.1 Waste Storage – Residential Houses & Duplexes

Residents in the houses and duplexes will be required to segregate their waste into the following waste categories within their own units:

- Dry Mixed Recyclables (DMR);
- Mixed Non-Recyclables (MNR);
- Organic waste; and

- Glass.

It is anticipated that residents in houses and with side access to the rear of the property will store waste in bins at the back of their house. For houses and duplexes without external access to the rear of property, a dedicated shielded area for storage of 3 no. 140L wheelie bins has been allocated at the front of each property. Residents will be required to place their segregated waste materials into these bins as necessary.

It is anticipated that DMR, MNR and organic waste will be collected on a weekly basis, glass waste will be required to be brought to the nearest bottle bank or recycling centre.

Other waste materials such as textiles, batteries, printer toner/cartridges and WEEE may be generated infrequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.4.

5.2 Waste Storage – Residential Units

Residents will be required to segregate waste into the following main waste streams:

- Dry Mixed Recyclables (DMR);
- Mixed Non-Recyclables (MNR).
- Organic waste; and
- Glass;

Residents will be required to take their segregated waste materials to their allocated shared designated residential WSAs and dispose of their segregated waste into the appropriate bins. Locations of these WSAs can viewed on the drawings submitted with the planning application.

Each bin/container in the WSA will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which waste types can be placed in each bin.

Access to the residential WSAs will be restricted to authorised residents, facilities management and waste contractors by means of a key or electronic fob access. Using the estimated figures in Table 4.1, DMR, MNR, organic waste and glass will be collected on a weekly basis. Bins will be taken from the shared WSAs directly to the collection point on the road closest to the WSA.

Other waste materials such as textiles, batteries, printer toner/cartridges and WEEE may be generated infrequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.4.

5.3 Waste Storage – Retail/Café/Crèche

The retail/café/crèche units will be required to segregate waste within the development into the following main waste types:

- Dry Mixed Recyclables (DMR);
- Mixed Non-Recyclables (MNR).
- Organic waste; and
- Glass.

The staff will bring the segregated waste materials to the shared commercial WSA located on ground floor level at the rear of the building.

Suppliers for the tenants should be requested by the tenants to make deliveries in reusable containers, minimize packaging or to remove any packaging after delivery where possible, to reduce waste generated by the development.

Any kitchens in the units will contribute a significant portion of the volume of waste generated on a daily basis, and as such it is important that adequate provision is made for the storage and transfer of waste from these areas to the WSA.

It is anticipated that if kitchens are supplied waste will be generated in kitchens throughout the day, primarily at the following locations:

- Food Storage Areas (i.e. cold stores, dry store, freezer stores and stores for decanting of deliveries);
- Meat Preparation Area;
- Vegetable Preparation Area;
- Cooking Area;
- Dish-wash and Glass-wash Area; and
- Bar Area.

Small bins will be placed adjacent to each of these areas for temporary storage of waste generated during the day. Waste will then be transferred from each of these areas to the appropriate WSA and placed into the segregated bins as detailed in Table 5.1.

All bins/containers in the tenant's areas as well as in the WSA will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which wastes can be put in each.

Using the receptacles outlined in Table 5.1, it is anticipated that DMR, MNR, organic waste and glass will be collected on a weekly basis.

Other waste materials such as batteries, WEEE and printer toner/cartridges will be generated less frequently. An area has been allocated in the WSA for temporary storage of these items pending collection by a suitable waste contractor. The tenants nominated personnel will be required to bring these waste types from their units to the WSA as required. Facilties management may arrange collection depending on the agreement.

5.4 Waste Collection

There are numerous private contractors that provide waste collection services in the Meath County area. All waste contractors servicing the proposed development must hold a valid waste collection permit for the specific waste types collected. All waste collected must be transported to registered/permitted/licensed facilities only.

All waste requiring collection by the appointed waste contractor will be collected from the WSAs by facility management or the waste contractor (depending on the agreement) and taken to the waste collection point at the kerb.

The facility management or waste contractor will ensure that empty bins are promptly returned to the WSAs after collection/emptying.

It is recommended that bin collection times/days are staggered to reduce the number of bins required to be emptied at once and the time the waste vehicle is onsite. This will be determined during the process of appointment of a waste contractor.

5.5 Additional Waste Materials

In addition to the typical waste materials that are generated on a daily basis, there will be some additional waste types generated from time to time that will need to be managed separately. A non-exhaustive list is presented below.

Green waste

Green waste may be generated from external landscaping and internal plants/flowers. Green waste generated from landscaping of external areas will be removed by external landscape contractors. Green waste generated from gardens internal plants/flowers can be placed in the organic waste bins.

Batteries

A take-back service for waste batteries and accumulators (e.g. rechargeable batteries) is in place in order to comply with the Waste Management Batteries and Accumulators Regulations 2014 as amended. In accordance with these regulations consumers are able to bring their waste batteries to their local civic amenity centre or can return them free of charge to retailers which supply the equivalent type of battery, regardless of whether or not the batteries were purchased at the retail outlet and regardless of whether or not the person depositing the waste battery purchases any product or products from the retail outlet.

Commercial tenants cannot use the civic amenity centre. They must segregate their waste batteries and either avail of the take-back service provided by retailers or arrange for recycling/recovery of their waste batteries by a suiltably permited/licenced contractor. Facilties Management may arrange collection depending on the agreement held with the tenant.

Waste Electrical and Electronic Equipment (WEEE)

The *WEEE Directive 2002/96/EC* and associated Waste Management (WEEE) Regulations have been enacted to ensure a high level of recycling of electronic and electrical equipment. In accordance with the regulations, consumers can bring their waste electrical and electronic equipment to their local recycling centre. In addition consumers can bring back WEEE within 15 days to retailers when they purchase new equipment on a like for like basis. Retailers are also obliged to collect WEEE within 15 days of delivery of a new item, provided the item is disconnected from all mains, does not pose a health and safety risk and is readily available for collection.

As noted above, the commercial tenants cannot use the civic amenity centre. They must segregate their WEEE and either avail of the take-back/collection service provided by retailers or arrange for recycling/recovery of their WEEE by a suiltably permited/licenced contractor. Facilties Management may arrange collection depending on the agreement held with the tenant.

Printer Cartridge/Toners

It is recommended that a printer cartridge/toner bin is provided in the commercial units, where appropriate. The commercial tenants tenants will be required to store this waste within their unit and arrange for return to retailers or collection by an authorised waste contractor, as required.

Waste printer cartridge/toners generated by residents can usually be returned to the supplier free of charge or can be brought to a civic amenity centre.

Chemicals (solvents, paints, adhesives, resins, detergents etc.)

Chemicals (such as solvents, paints etc.) are largely generated from building maintenance works. Such works are usually completed by external contractors who

are responsible for the off-site removal and appropriate recovery/recycling/disposal of any waste materials generated.

Any waste cleaning products or waste packaging from cleaning products generated in the commercial units that is classed as hazardous (if they arise) will be appropriately stored within the tenant's own space. Facilties Management may arrange collection depending on the agreement held with the tenant.

Any waste cleaning products or waste packaging from cleaning products that are classed as hazardous (if they arise) generated by the residents should be brought to a civic amenity centre.

Light Bulbs (Fluorescent Tubes, Long Life, LED and Filament bulbs)
Waste light bulbs may be generated by lighting at the commercial tenants. It is anticipated that commercial tenants will be responsible for the off-site removal and appropriate recovery/disposal of these wastes. Facilties Management may arrange collection depending on the agreement held with the tenant.

Light bulbs generated by residents should be taken to the nearest civic amenity centre for appropriate storage and recovery/disposal.

Textiles
Where possible, waste textiles should be recycled or donated to a charity organisation for reuse.

Waste Cooking Oil
If the commercial tenants use cooking oil, waste cooking oil will need to be stored within the unit on a bunded area or spill pallet and regular collections by a dedicated waste contractor will need to be organised as required.

If the residents generate waste cooking oil, this can be brought to a civic amenity centre.

Furniture (and other bulky wastes)
Furniture and other bulky waste items (such as carpet etc.) may occasionally be generated by the commercial tenants. The collection of bulky waste will be arranged as required by the tenant. If residents wish to dispose of furniture, this can be brought a civic amenity centre.

Abandoned Bicycles
Bicycle parking areas are planned for the development. As happens in other developments, residents and tenants sometimes abandon faulty or unused bicycles and it can be difficult to determine their ownership. Abandoned bicycles should be donated to charity if they arise.

5.6 Waste Storage Area Design

The WSAs should be designed and fitted-out to meet the requirements of relevant design standards, including:

- Be fitted with a non-slip floor surface;
- Provide ventilation to reduce the potential for generation of odours with a recommended 6-10 air changes per hour for a mechanical system for internal WSAs;
- Provide suitable lighting – a minimum Lux rating of 220 is recommended;
- Be easily accessible for people with limited mobility;
- Be restricted to access by nominated personnel only;

- Be supplied with hot or cold water for disinfection and washing of bins;
- Be fitted with suitable power supply for power washers;
- Have a sloped floor to a central foul drain for bins washing run-off;
- Have appropriate signage placed above and on bins indicating correct use; and
- Have access for potential control of vermin, if required.

The facilities company(s) will be required to maintain the waste storage areas in good condition as required by the MCC Waste By-Laws.

6.0 CONCLUSIONS

In summary, this OWMP presents a waste strategy that addresses all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the development.

Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the *EMR Waste Management Plan 2015 – 2021*.

Adherence to this plan will also ensure that waste management at the development is carried out in accordance with the requirements of the *MCC Waste By-Laws and*

The waste strategy presented in this document will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated area for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy.

7.0 REFERENCES

1. Waste Management Act 1996 (S.I. No. 10 of 1996) as amended 2001 (S.I. No. 36 of 2001), 2003 (S.I. No. 27 of 2003) and 2011 (S.I. No. 20 of 2011). Sub-ordinate and associated legislation includes:
    - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended;
    - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended;
    - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended;
    - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended;
    - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014);
    - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997);
    - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015);
    - European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014);
    - Waste Management (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended;
    - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended 2015 (S.I. No. 190 of 2015);
    - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015);
    - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended 2000 (S.I. No. 73 of 2000);
    - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended;
    - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994); and
    - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015).
2. Environmental Protection Act 1992 (Act No. 7 of 1992) as amended;
3. Litter Pollution Act 1997 (Act No. 12 of 1997) as amended;
4. Eastern-Midlands Waste Region, *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021* (2015)
5. Meath County Council (MCC) Waste Management (Segregation, Storage & Presentation of Household and Commercial Waste) By-Laws *(2018).*
6. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998)
7. Department of Environment, Heritage and Local Government (DoEHLG) *Preventing and Recycling Waste - Delivering Change* (2002)
8. DoELG, *Making Ireland's Development Sustainable – Review, Assessment and Future Action (World Summit on Sustainable Development)* (2002)
9. DoEHLG, *Taking Stock and Moving Forward* (2004)
10. DoECLG, *A Resource Opportunity - Waste Management Policy in Ireland* (2012)
11. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.
12. MCC*, Meath County Development Plan 2013 – 2019* (2013)
13. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended 2010 (S.I. No. 30 of 2010) and 2015 (S.I. No. 310 of 2015).
14. European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC).
15. Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC).
16. EPA, *European Waste Catalogue and Hazardous Waste List* (2002)

17. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
18. BS 5906:2005 Waste Management in Buildings – Code of Practice.
19. DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).

ABACUS TRANSPORTATION SURVEYS

DROGHEDA TRAFFIC COUNTS
MANUAL CLASSIFIED JUNCTION TURNING COUNTS

APRIL 2018
ATH/18/016

SITE: 01 DATE: 10th April 2018
LOCATION: Rathmullan Road/Local Road DAY: Tuesday

TIME	MOVEMENT 1 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 2 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 3 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	MOVEMENT 4 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 5 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 6 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	PCU's Through Junction
07:00	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	07:00	0	0	0	0	0	0	0	3	0	0	0	0	3	3	5	0	0	0	0	5	5	10
07:15	4	1	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	07:15	2	0	0	0	0	2	2	1	0	0	0	0	1	1	4	0	0	0	0	4	4	12
07:30	4	3	1	0	0	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	07:30	2	0	0	0	0	2	2	0	0	0	0	0	0	0	9	0	0	0	0	9	9	20
07:45	7	4	0	0	1	12	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	07:45	2	0	0	0	1	3	4	2	1	0	0	0	3	3	3	4	0	0	0	7	7	27
H/TOT	16	9	1	0	1	27	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	H/TOT	6	0	0	0	1	7	8	6	1	0	0	0	7	7	21	4	0	0	0	25	25	69
08:00	11	2	0	0	1	14	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	08:00	2	0	0	0	0	2	2	1	0	0	0	0	1	1	10	2	0	0	2	14	16	34
08:15	37	0	1	0	0	38	39	1	0	0	0	0	1	1	0	0	0	0	0	0	0	08:15	1	2	0	0	0	3	3	8	0	0	0	2	10	12	11	0	0	0	0	11	11	66
08:30	43	0	1	0	0	44	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	08:30	8	0	0	0	0	8	8	5	1	0	0	0	6	6	13	1	0	0	0	14	14	73
08:45	47	2	0	0	1	50	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	08:45	4	1	0	0	0	5	5	14	1	0	0	0	15	15	22	2	1	0	2	27	30	101
H/TOT	138	4	2	0	2	146	149	1	0	0	0	0	1	1	0	0	0	0	0	0	0	H/TOT	15	3	0	0	0	18	18	28	2	0	0	2	32	34	56	5	1	0	4	66	71	273
09:00	15	4	0	0	1	20	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:00	2	0	0	0	0	2	2	13	1	0	0	1	15	16	18	1	0	0	0	19	19	58
09:15	12	1	0	0	0	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:15	5	0	0	0	0	5	5	3	0	0	0	0	3	3	4	2	0	0	0	6	6	27
09:30	22	1	0	0	1	24	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:30	3	0	0	0	0	3	3	2	0	0	0	0	2	2	3	0	0	0	0	3	3	33
09:45	14	0	0	0	0	14	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09:45	3	1	0	0	0	4	4	1	0	0	0	0	1	1	5	1	0	0	0	6	6	25
H/TOT	63	6	0	0	2	71	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	H/TOT	13	1	0	0	0	14	14	19	1	0	0	1	21	22	30	4	0	0	0	34	34	143
P/TOT	217	19	3	0	5	244	251	1	0	0	0	0	1	1	0	0	0	0	0	0	0	P/TOT	34	4	0	0	1	39	40	53	4	0	0	3	60	63	107	13	1	0	4	125	130	484

TIME	MOVEMENT 1 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 2 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 3 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	MOVEMENT 4 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 5 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 6 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	PCU's Through Junction
16:00	7	0	0	0	1	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16:00	2	0	0	0	0	2	2	1	0	0	0	0	1	1	9	3	0	0	0	12	12	24
16:15	14	2	0	0	0	16	16	2	0	0	0	0	2	2	0	0	0	0	0	0	0	16:15	2	0	0	0	0	2	2	5	1	0	0	0	6	6	21	5	0	0	1	27	28	54
16:30	9	3	0	0	0	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16:30	2	0	0	0	0	2	2	3	0	0	0	1	4	5	27	2	0	0	0	29	29	48
16:45	20	1	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16:45	2	0	1	0	0	3	4	5	0	0	0	0	5	5	17	2	0	0	0	19	19	49
H/TOT	50	6	0	0	1	57	58	2	0	0	0	0	2	2	0	0	0	0	0	0	0	H/TOT	8	0	1	0	0	9	10	14	1	0	0	1	16	17	74	12	0	0	1	87	88	175
17:00	18	3	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17:00	4	0	0	0	0	4	4	1	0	0	0	0	1	1	20	6	1	0	0	27	28	54
17:15	17	4	0	0	0	21	21	1	0	0	0	0	1	1	1	0	0	0	0	1	1	17:15	2	0	0	0	0	2	2	3	0	0	0	0	3	3	19	2	0	0	0	21	21	49
17:30	15	3	0	0	0	18	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17:30	4	0	0	0	0	4	4	1	0	0	0	0	1	1	13	3	0	0	0	16	16	39
17:45	19	1	0	0	0	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17:45	4	0	0	0	0	4	4	4	0	0	0	0	4	4	14	3	0	0	0	17	17	45
H/TOT	69	11	0	0	0	80	80	1	0	0	0	0	1	1	1	0	0	0	0	1	1	H/TOT	14	0	0	0	0	14	14	9	0	0	0	0	9	9	66	14	1	0	0	81	82	187
18:00	20	2	1	0	0	23	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18:00	2	1	0	0	0	3	3	2	1	0	0	0	3	3	13	1	0	0	0	14	14	44
18:15	17	2	0	0	0	19	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18:15	6	0	0	0	0	6	6	5	0	0	0	0	5	5	11	2	0	0	0	13	13	43
18:30	15	1	0	0	0	16	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18:30	1	1	0	0	0	2	2	2	0	0	0	0	2	2	7	1	0	0	0	8	8	28
18:45	15	0	0	0	0	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18:45	1	0	0	0	0	1	1	3	0	0	0	0	3	3	6	1	0	0	0	7	7	26
H/TOT	67	5	1	0	0	73	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	H/TOT	10	2	0	0	0	12	12	12	1	0	0	0	13	13	37	5	0	0	0	42	42	141
P/TOT	186	22	1	0	1	210	212	3	0	0	0	0	3	3	1	0	0	0	0	1	1	P/TOT	32	2	1	0	0	35	36	35	2	0	0	1	38	39	177	31	1	0	1	210	212	502

ABACUS TRANSPORTATION SURVEYS

DROGHEDA TRAFFIC COUNTS **APRIL 2018**
MANUAL CLASSIFIED JUNCTION TURNING COUNTS **ATH/18/016**

SITE: 02 DATE: 10th April 2018
LOCATION: Rathmullan Road/Marley's Lane DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
07:00	11	1	0	0	0	12	12	17	3	0	0	0	20	20	8	2	0	0	0	10	10	07:00	14	1	0	0	2	17	19	36	2	0	0	0	38	38	9	1	0	0	0	10	10	109
07:15	23	2	0	0	0	25	25	21	3	0	0	0	24	24	7	0	0	0	0	7	7	07:15	25	5	0	0	0	30	30	28	9	0	1	1	39	41	10	0	0	0	0	10	10	137
07:30	28	1	0	0	0	29	29	23	4	1	0	0	28	29	6	0	0	0	1	7	8	07:30	15	6	0	1	1	23	25	38	8	2	0	0	48	49	22	0	0	0	0	22	22	162
07:45	29	2	0	0	7	38	45	28	3	0	0	4	35	39	12	3	0	0	6	21	27	07:45	20	18	1	0	0	39	40	28	6	1	0	0	35	36	16	4	0	0	3	23	26	212
H/TOT	91	6	0	0	7	104	111	89	13	1	0	4	107	112	33	5	0	0	7	45	52	H/TOT	74	30	1	1	3	109	114	130	25	3	1	1	160	164	57	5	0	0	3	65	68	620
08:00	29	2	1	0	6	38	45	31	4	0	0	1	36	37	15	3	1	0	4	23	28	08:00	31	10	0	0	0	41	41	31	5	1	0	0	37	38	17	1	1	0	5	24	30	217
08:15	45	3	0	0	3	51	54	52	3	2	0	1	58	60	22	0	0	0	3	25	28	08:15	31	5	1	1	0	38	40	45	2	0	0	1	48	49	27	2	0	0	4	33	37	268
08:30	44	3	1	0	0	48	49	66	1	1	0	3	71	75	29	0	0	0	0	29	29	08:30	31	4	1	1	1	38	41	61	6	0	1	0	68	69	40	1	1	0	0	42	43	305
08:45	38	2	0	0	2	42	44	62	5	0	0	0	67	67	35	8	0	0	3	46	49	08:45	39	4	1	0	0	44	45	48	5	3	0	0	56	58	51	3	0	0	1	55	56	318
H/TOT	156	10	2	0	11	179	191	211	13	3	0	5	232	239	101	11	1	0	10	123	134	H/TOT	132	23	3	2	1	161	166	185	18	4	1	1	209	213	135	7	2	0	10	154	165	1107
09:00	47	3	0	0	0	50	50	50	6	0	0	1	57	58	38	3	0	0	0	41	41	09:00	55	8	1	0	1	65	67	32	4	1	0	3	40	44	34	2	0	0	0	36	36	295
09:15	20	3	0	0	0	23	23	19	1	0	0	0	20	20	13	3	0	0	0	16	16	09:15	35	3	1	0	1	40	42	37	8	0	0	3	48	51	15	1	0	0	0	16	16	168
09:30	18	3	0	0	0	21	21	15	1	0	0	1	17	18	10	0	0	0	0	10	10	09:30	39	9	1	0	1	50	52	23	1	0	0	1	25	26	16	1	0	0	0	17	17	144
09:45	30	1	0	0	1	32	33	15	1	0	0	0	16	16	12	1	0	0	1	14	15	09:45	35	6	0	0	0	41	41	33	9	2	0	1	45	47	10	1	0	0	0	11	11	163
H/TOT	115	10	0	0	1	126	127	99	9	0	0	2	110	112	73	7	0	0	1	81	82	H/TOT	164	26	3	0	3	196	201	125	22	3	0	8	158	168	75	5	0	0	0	80	80	769
P/TOT	362	26	2	0	19	409	429	399	35	4	0	11	449	462	207	23	1	0	18	249	268	P/TOT	370	79	7	3	7	466	480	440	65	10	2	10	527	545	267	17	2	0	13	299	313	2497

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
16:00	24	1	0	0	2	27	29	21	0	0	0	1	22	23	12	3	0	0	1	16	17	16:00	38	4	1	0	0	43	44	51	2	0	1	2	56	59	22	2	0	0	0	24	24	196
16:15	19	2	0	0	0	21	21	24	3	0	0	0	27	27	26	4	0	0	2	32	34	16:15	61	9	0	1	0	71	72	34	4	2	0	2	42	45	37	3	0	0	0	40	40	239
16:30	27	3	0	0	1	31	32	22	1	0	0	0	23	23	30	4	0	0	1	35	36	16:30	56	7	1	0	1	65	67	41	6	0	0	2	49	51	18	0	0	0	0	18	18	227
16:45	27	0	0	0	0	27	27	22	1	0	0	0	23	23	27	2	0	0	0	29	29	16:45	57	8	0	0	0	65	65	60	12	0	0	1	73	74	28	3	0	0	0	31	31	249
H/TOT	97	6	0	0	3	106	109	89	5	0	0	1	95	96	95	13	0	0	4	112	116	H/TOT	212	28	2	1	1	244	247	186	24	2	1	7	220	229	105	8	0	0	0	113	113	911
17:00	29	2	0	0	0	31	31	22	2	0	0	0	24	24	36	9	0	0	0	45	45	17:00	52	12	0	0	1	65	66	42	4	0	0	0	46	46	32	2	0	0	0	34	34	246
17:15	25	2	0	0	0	27	27	26	4	0	0	0	30	30	35	3	0	0	0	38	38	17:15	61	15	3	0	0	79	81	48	8	0	0	0	56	56	33	3	0	0	0	36	36	268
17:30	20	3	0	0	0	23	23	19	1	0	0	0	20	20	31	3	0	0	0	34	34	17:30	90	20	0	0	1	111	112	57	8	1	0	0	66	67	26	2	0	0	0	28	28	284
17:45	32	1	0	0	0	33	33	29	4	0	0	0	33	33	44	1	0	0	0	45	45	17:45	80	10	0	0	0	90	90	41	2	0	0	0	43	43	26	4	0	0	0	30	30	274
H/TOT	106	8	0	0	0	114	114	96	11	0	0	0	107	107	146	16	0	0	0	162	162	H/TOT	283	57	3	0	2	345	349	188	22	1	0	0	211	212	117	11	0	0	0	128	128	1071
18:00	23	3	1	0	0	27	28	21	1	0	0	0	22	22	42	2	0	0	0	44	44	18:00	79	4	1	1	0	85	87	34	2	0	0	0	36	36	32	2	0	0	0	34	34	250
18:15	23	3	0	0	0	26	26	23	2	0	0	0	25	25	38	5	0	0	0	43	43	18:15	66	8	0	0	0	74	74	37	5	0	0	0	42	42	20	1	0	0	0	21	21	231
18:30	23	1	0	0	0	24	24	33	3	0	0	0	36	36	26	4	0	0	0	30	30	18:30	49	3	0	0	0	52	52	49	4	0	0	0	53	53	34	1	0	0	0	35	35	230
18:45	20	1	0	0	0	21	21	29	1	0	0	0	30	30	30	4	0	0	0	34	34	18:45	63	15	0	0	0	78	78	46	3	0	0	0	49	49	22	1	0	0	0	23	23	235
H/TOT	89	8	1	0	0	98	99	106	7	0	0	0	113	113	136	15	0	0	0	151	151	H/TOT	257	30	1	1	0	289	291	166	14	0	0	0	180	180	108	5	0	0	0	113	113	946
P/TOT	292	22	1	0	3	318	322	291	23	0	0	1	315	316	377	44	0	0	4	425	429	P/TOT	752	115	6	2	3	878	887	540	60	3	1	7	611	621	330	24	0	0	0	354	354	2928

ABACUS TRANSPORTATION SURVEYS

DROGHEDA TRAFFIC COUNTS
MANUAL CLASSIFIED JUNCTION TURNING COUNTS

APRIL 2018
ATH/18/016

SITE: 03 DATE: 10th April 2018

LOCATION: Rathmullan Road/R132 Dublin Road DAY: Tuesday

TIME	MOVEMENT 1 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 2 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 3 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	MOVEMENT 4 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 5 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 6 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	PCU's Through Junction
07:00	13	1	0	0	2	16	18	7	1	0	0	0	8	8	10	0	0	0	0	10	10	07:00	66	7	0	3	4	80	88	44	12	2	4	7	69	82	32	4	0	0	0	36	36	242
07:15	34	4	0	0	0	38	38	19	2	0	0	0	21	21	8	2	0	1	0	11	12	07:15	70	12	4	7	3	96	110	55	13	0	7	4	79	92	25	9	1	0	1	36	38	311
07:30	35	2	0	0	1	38	39	13	3	0	1	0	17	18	12	2	0	0	0	14	14	07:30	107	18	3	3	2	133	140	69	20	1	3	11	104	119	39	11	1	0	0	51	52	383
07:45	35	13	1	0	4	53	58	18	1	0	0	1	20	21	14	3	0	0	1	18	19	07:45	119	20	6	2	4	151	161	96	15	4	5	3	123	135	30	8	2	0	2	42	45	438
H/TOT	117	20	1	0	7	145	153	57	7	0	1	1	66	68	44	7	0	1	1	53	55	H/TOT	362	57	13	15	13	460	499	264	60	7	19	25	375	428	126	32	4	0	3	165	170	1373
08:00	41	8	0	0	4	53	57	20	1	0	0	3	24	27	14	0	0	0	3	17	20	08:00	147	13	1	4	6	171	183	114	14	3	3	4	138	147	36	5	1	0	4	46	51	485
08:15	56	6	1	1	3	67	72	32	3	0	0	2	37	39	22	1	0	0	2	25	27	08:15	143	16	4	1	5	169	177	96	11	6	1	5	119	128	59	4	0	0	2	65	67	510
08:30	58	6	1	1	0	66	68	30	1	0	0	0	31	31	29	2	0	0	0	31	31	08:30	147	21	6	3	3	180	190	117	16	7	1	2	143	150	69	5	2	1	0	77	79	549
08:45	59	4	0	0	2	65	67	22	2	0	0	0	24	24	25	2	1	0	0	28	29	08:45	157	14	0	1	1	173	175	99	15	3	1	5	123	131	52	6	0	0	1	59	60	486
H/TOT	214	24	2	2	9	251	264	104	7	0	0	5	116	121	90	5	1	0	5	101	107	H/TOT	594	64	11	9	15	693	725	426	56	19	6	16	523	556	216	20	3	1	7	247	257	2029
09:00	36	4	1	0	0	41	42	31	1	0	0	0	32	32	25	4	0	0	0	29	29	09:00	143	25	3	2	7	180	191	92	18	2	1	4	117	123	42	6	1	0	3	52	56	472
09:15	62	4	1	0	1	68	70	24	4	0	0	1	29	30	21	3	0	0	2	26	28	09:15	122	8	3	2	7	142	153	109	13	5	5	1	133	143	36	6	1	0	0	43	44	467
09:30	38	7	0	0	1	46	47	22	2	0	0	0	24	24	6	1	0	0	1	8	9	09:30	107	16	6	1	5	135	144	96	20	6	2	5	129	140	31	2	0	0	0	33	33	397
09:45	53	6	0	0	1	60	61	12	3	0	0	0	15	15	9	0	0	0	1	10	11	09:45	107	18	5	2	2	134	141	101	20	0	3	1	125	130	32	8	2	1	0	43	45	403
H/TOT	189	21	2	0	3	215	219	89	10	0	0	1	100	101	61	8	0	0	4	73	77	H/TOT	479	67	17	7	21	591	630	398	71	13	11	11	504	536	141	22	4	1	3	171	177	1740
P/TOT	520	65	5	2	19	611	635	250	24	0	1	7	282	290	195	20	1	1	10	227	239	P/TOT	1435	188	41	31	49	1744	1854	1088	187	39	36	52	1402	1520	483	74	11	2	13	583	604	5142

ABACUS TRANSPORTATION SURVEYS

DROGHEDA TRAFFIC COUNTS
MANUAL CLASSIFIED JUNCTION TURNING COUNTS

APRIL 2018
ATH/18/016

SITE: 03 DATE: 10th April 2018

LOCATION: Rathmullan Road/R132 Dublin Road DAY: Tuesday

TIME	MOVEMENT 1 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 2 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 3 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	TIME	MOVEMENT 4 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 5 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	MOVEMENT 6 CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	PCU's Through Junction
16:00	51	4	1	0	1	57	59	19	4	0	0	2	25	27	31	2	0	0	1	34	35	16:00	173	17	5	1	5	201	210	114	18	2	4	4	142	152	46	4	0	0	1	51	52	535
16:15	55	10	0	1	0	66	67	23	1	0	0	0	24	24	29	3	1	0	0	33	34	16:15	140	22	5	4	5	176	189	135	12	3	2	2	154	160	40	7	2	0	1	50	52	526
16:30	63	9	0	0	1	73	74	19	0	0	0	0	19	19	20	0	1	1	0	22	24	16:30	139	22	6	9	3	179	197	114	14	1	0	3	132	136	49	2	0	0	2	53	55	504
16:45	64	11	1	1	1	78	81	17	1	0	0	0	18	18	23	4	0	0	0	27	27	16:45	127	21	5	0	1	154	158	135	13	4	0	1	153	156	58	7	0	0	1	66	67	506
H/TOT	233	34	2	2	3	274	281	78	6	0	0	2	86	88	103	9	2	1	1	116	119	H/TOT	579	82	21	14	14	710	753	498	57	10	6	10	581	604	193	20	2	0	5	220	226	2070
17:00	55	11	0	0	1	67	68	23	0	0	0	0	23	23	25	3	0	0	0	28	28	17:00	144	22	5	1	4	176	184	139	16	2	1	2	160	164	61	3	0	0	0	64	64	531
17:15	60	10	3	0	0	73	75	27	5	0	0	0	32	32	16	5	1	0	0	22	23	17:15	178	15	3	1	1	198	202	152	12	1	0	1	166	168	52	6	0	0	0	58	58	556
17:30	61	19	0	0	1	81	82	19	1	1	0	0	21	22	22	1	0	0	0	23	23	17:30	155	19	2	1	4	181	187	163	11	0	0	3	177	180	44	5	0	0	0	49	49	543
17:45	87	12	0	0	0	99	99	23	1	0	0	0	24	24	29	1	0	0	0	30	30	17:45	143	18	1	0	1	163	165	117	10	3	0	1	131	134	41	5	0	0	0	46	46	497
H/TOT	263	52	3	0	2	320	324	92	7	1	0	0	100	101	92	10	1	0	0	103	104	H/TOT	620	74	11	3	10	718	737	571	49	6	1	7	634	645	198	19	0	0	0	217	217	2127
18:00	69	2	1	1	0	73	75	17	1	0	0	0	18	18	26	2	1	0	0	29	30	18:00	175	10	1	1	11	198	211	153	21	0	1	0	175	176	51	2	0	0	0	53	53	562
18:15	62	5	0	0	0	67	67	16	2	0	0	0	18	18	25	2	0	0	0	27	27	18:15	143	10	4	0	1	158	161	95	7	1	0	2	105	108	33	3	0	0	0	36	36	417
18:30	47	5	0	0	0	52	52	16	1	0	0	0	17	17	25	2	0	0	1	28	29	18:30	134	15	0	0	5	154	159	98	10	4	0	3	115	120	48	4	0	0	0	52	52	429
18:45	71	5	1	0	0	77	78	19	1	0	0	0	20	20	23	2	0	0	0	25	25	18:45	136	11	4	0	3	154	159	118	9	0	0	0	127	127	47	3	0	0	0	50	50	459
H/TOT	249	17	2	1	0	269	271	68	5	0	0	0	73	73	99	8	1	0	1	109	111	H/TOT	588	46	9	1	20	664	690	464	47	5	1	5	522	531	179	12	0	0	0	191	191	1866
P/TOT	745	103	7	3	5	863	875	238	18	1	0	2	259	262	294	27	4	1	2	328	333	P/TOT	1787	202	41	18	44	2092	2180	1533	153	21	8	22	1737	1780	570	51	2	0	5	628	634	6064

ABACUS TRANSPORTATION SURVEYS

DROGHEDA TRAFFIC COUNTS **APRIL 2018**
MANUAL CLASSIFIED JUNCTION TURNING COUNTS **ATH/18/016**

SITE: 04 DATE: 10th April 2018

LOCATION: Donore Road/Marley's Lane DAY: Tuesday

TIME	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
07:00	4	0	0	0	0	4	4	42	5	0	0	4	51	55	9	2	0	0	0	11	11	9	3	0	2	4	18	25	29	8	2	1	5	45	52	8	1	0	0	0	9	9	156
07:15	4	1	0	0	0	5	5	39	11	0	0	2	52	54	24	4	0	0	0	28	28	19	6	2	5	3	35	46	33	4	2	1	2	42	46	5	0	0	0	0	5	5	184
07:30	5	1	0	0	0	6	6	48	16	2	0	0	66	67	18	5	0	0	1	24	25	35	7	1	4	2	49	57	34	6	1	6	5	52	65	5	2	1	0	1	9	11	231
07:45	13	7	0	0	2	22	24	44	10	1	1	0	56	58	27	6	0	0	4	37	41	42	8	2	1	3	56	61	36	11	1	2	3	53	59	15	2	0	0	3	20	23	266
H/TOT	26	9	0	0	2	37	39	173	42	3	1	6	225	234	78	17	0	0	5	100	105	105	24	5	12	12	158	188	132	29	6	10	15	192	223	33	5	1	0	4	43	48	836
08:00	12	3	0	0	3	18	21	38	3	1	0	0	42	43	20	5	2	0	2	29	32	37	8	0	1	5	51	57	25	5	3	7	7	47	65	19	5	0	0	3	27	30	247
08:15	35	5	0	0	1	41	42	61	2	2	0	1	66	68	26	4	1	2	0	33	36	53	9	4	2	1	69	75	47	9	0	0	1	57	58	23	0	0	0	1	24	25	304
08:30	48	4	0	0	3	55	58	40	3	1	1	1	46	49	45	2	0	1	1	49	51	48	5	1	6	4	64	76	41	11	2	0	3	57	61	48	1	1	0	2	52	55	350
08:45	57	2	2	0	0	61	62	43	4	0	0	0	47	47	47	9	1	1	2	60	64	73	8	1	0	4	86	91	71	12	5	1	1	90	95	60	3	0	0	3	66	69	427
H/TOT	152	14	2	0	7	175	183	182	12	4	1	2	201	206	138	20	4	4	5	171	183	211	30	6	9	14	270	299	184	37	10	8	12	251	278	150	9	1	0	9	169	179	1328
09:00	63	7	0	0	1	71	72	57	11	1	0	1	70	72	28	7	0	0	2	37	39	48	5	2	1	3	59	64	68	10	1	8	6	93	110	34	5	0	0	1	40	41	398
09:15	31	4	0	0	1	36	37	33	6	0	0	1	40	41	26	6	0	0	2	34	36	48	7	0	4	4	63	72	66	6	4	1	3	80	86	25	1	0	0	1	27	28	301
09:30	25	5	1	0	0	31	32	24	2	0	0	0	26	26	38	7	1	0	2	48	51	38	10	5	6	2	61	73	54	12	3	2	3	74	81	13	3	0	0	2	18	20	282
09:45	24	3	0	0	0	27	27	33	10	2	0	1	46	48	32	4	0	0	0	36	36	35	14	1	2	0	52	55	47	8	4	5	1	65	75	12	3	0	0	0	15	15	256
H/TOT	143	19	1	0	2	165	168	147	29	3	0	3	182	187	124	24	1	0	6	155	162	169	36	8	13	9	235	265	235	36	12	16	13	312	352	84	12	0	0	4	100	104	1236
P/TOT	321	42	3	0	11	377	390	502	83	10	2	11	608	627	340	61	5	4	16	426	450	485	90	19	34	35	663	752	551	102	28	34	40	755	853	267	26	2	0	17	312	330	3401

TIME	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
16:00	29	4	0	0	3	36	39	40	3	1	0	2	46	49	32	5	0	0	1	38	39	53	9	0	4	5	71	81	57	7	6	0	1	71	75	40	2	1	0	2	45	48	330
16:15	33	3	0	0	0	36	36	49	7	2	1	0	59	61	53	9	1	0	3	66	70	54	6	3	6	3	72	84	65	8	4	4	5	86	98	39	6	0	1	2	48	51	401
16:30	28	3	0	0	0	31	31	40	3	0	0	1	44	45	60	6	0	0	2	68	70	42	6	1	1	1	51	54	58	17	1	1	5	82	89	44	5	0	0	2	51	53	342
16:45	38	6	0	0	0	44	44	40	4	0	0	2	46	48	51	10	0	0	2	63	65	54	7	2	1	3	67	72	61	12	0	1	3	77	81	34	7	0	0	3	44	47	358
H/TOT	128	16	0	0	3	147	150	169	17	3	1	5	195	203	196	30	1	0	8	235	244	203	28	6	12	12	261	292	241	44	11	6	14	316	343	157	20	1	1	9	188	199	1430
17:00	35	4	0	0	1	40	41	42	5	0	0	0	47	47	55	7	1	0	2	65	68	66	14	2	0	2	84	87	73	5	1	0	1	80	82	38	11	0	0	0	49	49	373
17:15	30	3	1	0	0	34	35	41	8	0	0	0	49	49	67	10	2	0	0	79	80	46	6	3	1	1	57	61	81	7	1	1	2	92	96	56	11	0	0	0	67	67	387
17:30	32	3	0	0	0	35	35	38	4	1	0	0	43	44	95	20	0	0	1	116	117	52	8	1	0	2	63	66	68	4	0	2	2	76	81	64	3	0	0	1	68	69	411
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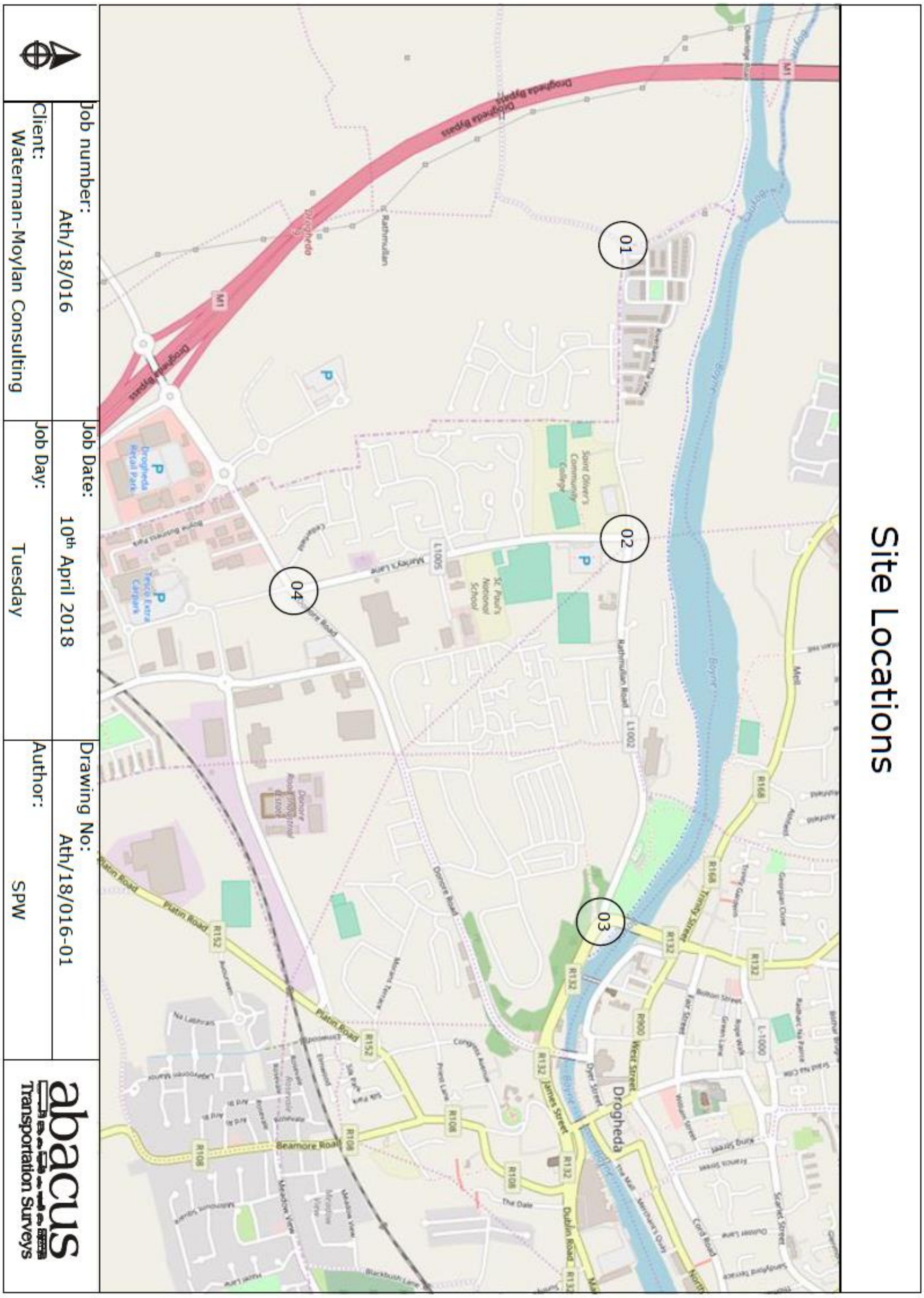
H/TOT	147	11	0	0	0	158	158	157	18	1	0	1	177	179	225	21	1	0	0	247	248	216	21	5	1	10	253	267	223	28	2	0	9	262	272	152	30	0	0	1	183	184	1307
P/TOT	400	42	1	0	4	447	452	487	56	5	1	6	555	565	701	101	6	1	11	820	835	639	81	18	14	31	783	841	758	100	15	9	32	914	965	514	79	1	1	11	606	619	4277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Client: Waterman-Moylan Consulting
Job Date: 10th April 2018
Job Day: Tuesday
Drawing No: Ath/18/016-01
Author: SPW
abacus
Transportation Surveys
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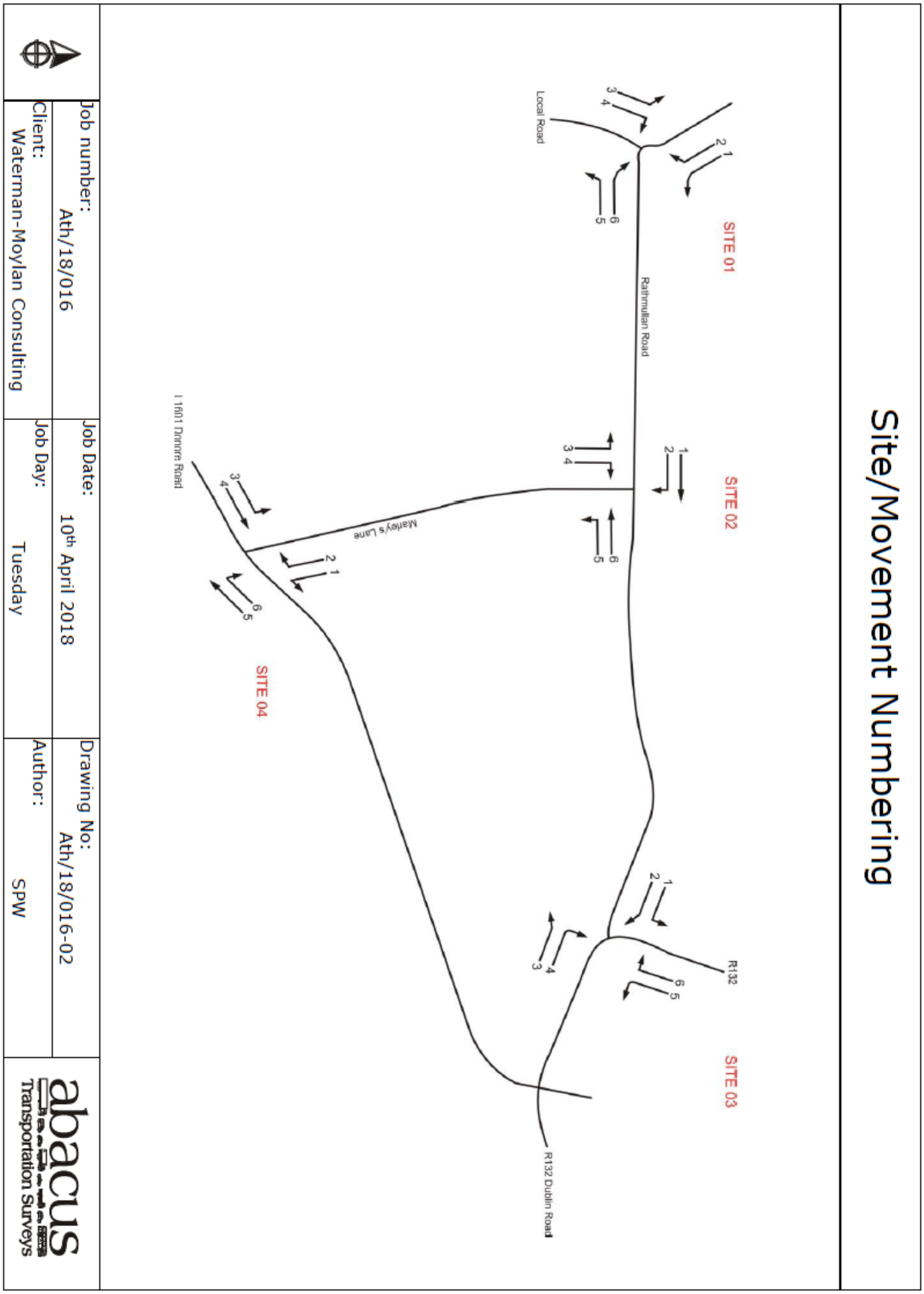
02
03
04
Drogheda
Rathmullan Road
Donore Road
Platin Road
Beamore Road
Drogheda Bypass
Boyne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SITE 02
SITE 03
SITE 04
Rathmullan Road
Local Road
Marley's Lane
R132
R132 Dublin Road
Job number: Ath/18/016
Job Date: 10th April 2018
Drawing No: Ath/18/016-02
Client: Waterman-Moylan Consulting
Job Day: Tuesday
Author: SPW
abacus Transportation Surveys

Appendix 11.1 Sites and Monuments Record

SMR No. ME020-004--- Townland: Oldbridge Class: Souterrain
Description Two circular chambers connected by a Y –shaped passageway. Field Survey, 13/06/83, Sweetman: "The original entrance is now completely blocked with collapse. There is a well preserved chamber at the east side. It is constructed with dry-stone walling with largish boulders (up to 2.50m x .40m) near the base and getting smaller higher up.

"The passages are built with dry-stone walling and lintels over. In some cases, there are substantial gaps between these lintels, which are filled with boulders. The eastern chamber has a *jamb at the south side of the exit; otherwise the dry-stone rises directly from the floor level. Some animal bone was to be seen to the east of the chamber, and maybe some occupation debris."*

SMR No. ME020-008--- Townland: Sheephouse Class: Enclosure site
Description: A circular cropmark is evident from an aerial photograph (No. 912). This existence of this feature was confirmed survey conducted in 1984. (Diameter c.50m).

SMR No. ME020-011--- Townland Sheephouse Class Church
Description Located on the top of Donore hill. The remains of the medieval church (ME020-011----) are located in a walled graveyard (dims c. 60m ENE-WSW; c. 35m NNW-SSE) which contains a 17th century tombstone (ME020-011002-) and a cross-head (ME020-011003-). There are also 18th century and 19th century memorials, which are recorded (Sadleir 1913-14). Near the gate of the graveyard is a watch-house, which would have formerly used to guard against the possible exhumation of the recently buried by body-snatchers. The head and part of the shaft of a disc-headed cross (H c. 0.5m) were in Donore graveyard (ME020-011001-) in 1968. One side is plain and the other has a raised cross in a solid ring, a cap and blank panelling. It was not present in 1984, but it might be inside the locked watch house.

SMR No. ME020-025--- Townland Oldbridge Class Battlefield
Description Battle of the Boyne, 1690: The table overleaf shows all sites associated with the battle field site.

SMR No.	Class
ME020-025001-	Battlefield
ME020-025002-	Ring-ditch
ME020-025003-	Ring-ditch
ME020-025004-	Burial
ME020-025005-	Road - road/trackway
ME020-025006-	Ford
ME020-025007-	Ford
ME020-025008-	Ford
ME020-025009-	Ford
ME020-025010-	Cultivation ridges
ME020-025011-	Field system
ME020-025012-	Field system
ME020-025013-	Settlement cluster
ME020-025014-	Ring-ditch
ME020-025015-	Ring-ditch
ME020-025016-	Ring-ditch
ME020-025017-	Ring-ditch
ME020-025018-	Field system
ME020-025019-	Prehistoric site - lithic scatter
ME020-025020-	Prehistoric site - lithic scatter

ME020-025021-	Prehistoric site - lithic scatter
ME020-025022-	Prehistoric site - lithic scatter
ME020-025023-	Prehistoric site - lithic scatter

SMR No. ME020-030--- Townland Oldbridge Class Standing Stone
Description: This monument was identified by Tom Condit, Department archaeologist.

SMR No: ME020-034--- Townland Oldbridge Class: Excavation (Misc)
Neolithic Pit: A single pit was uncovered on the access road route of the M1 ,50m north of its junction with the Sheephouse Road by Kieran Campbell, VJK Ltd. The pit, 1 m in diameter, produced sherds of a Western Neolithic shouldered bowl.

SMR No: ME020-035--- Townland Oldbridge Class: Excavation (Misc)
Prehistoric Pit. A small quantity of struck flint was recovered from a pit uncovered on the motorway approach to the Boyne Bridge route of the M1 by Kieran Campbell, VJK Ltd.

SMR No: ME020-036--- Townland Sheephouse Class: Excavation (Misc)

Prehistoric enclosure. An oval enclosure, situated on a gentle north-facing slope and measuring c. 30m x 30m, was discovered during test-trenching carried out by Valerie J. Keely Ltd. Topsoil stripping began in November 2000, revealing the extent of the enclosure, long with internal post holes and pits and additional peripheral material including cremation pits. Excavated by Dermot Neilis, lAC Ltd.

Multi-phase habitation site. This site was located 1 km west of Drogheda on the Rathmullan road and overlooked the Boyne to the north. It was excavated by Declan Moore, AES Ltd. It consisted of a line of post holes containing Neolithic Pottery, enclosure ditches, an oval enclosure, a circular ditch feature, a large enclosure. Throughout the site there was evidence of hearths, pits and post holes as well as a number of kilns.

Prehistoric activity. This site was discovered during monitoring of topsoil stripping during the construction of the M 1 motorway it was located between the two sites described above 2000:0778 and 2000: 1055. It contained a scattering of typical subsoil cut features such as refuse pits, hearths, stakes and post holes. The site produced very few artefacts and was excavated by Dermot Neilis, lAC Ltd.

SMR No. ME020-039--- Townland Oldbridge Class Ford
Description: This monument was identified by Tom Condit, Department archaeologist.

SMR No: ME020-040--- Townland: Donore Class: Excavation (Misc)

The site is one of a series of potential prehistoric sites identified during pre-development testing along the route of the Northern Motorway, Contract 7. This site (Site 10) is located approximately 500m to the south of the Donore Road, south-west of the town of Drogheda. The site is on a low ridge, with a good view of the surrounding countryside, including the Bronze Age complex (Sites 15 and 16) currently under excavation to the south. The site comprises a series of small pits and post-holes, with no obvious delimiting feature or structure. Identification of any structures is hampered by the site being transected by a modern field boundary ditch that cuts through what appears to be its central focus. Activity at the site appears to span a broad period of the earlier Bronze Age. To date, over 700 sherds of Bronze Age pottery have been recovered. Provisional identification suggests the presence of Beaker, Food Vessel, and Collared or Cordoned Urn pottery. Of particular interest are what appear to be the remains of several polypod bowls or similar, footed vessels. Five feet have been identified to date, in two distinct sizes, suggesting the presence of at least two vessels of this type. The function of the site is still unclear. It is least likely to be a funerary site. While cremated bone is present in many contexts, only small amounts are found, and there is no deliberation to their deposition. The absence of any hearths or clear structures at the site would appear to mitigate against a domestic function. However, the richest area of the site comprises a series of occupation-type layers delimited on the east side by a row of deep post-holes. Unfortunately, both these layers and the row of post-holes have been truncated by the field boundary ditch. Given the wealth of artefacts, and the span of time that they indicate, a ritual function for the site cannot be ruled out.

SMR No: ME020-041--- Townland: Oldbridge Class: Standing stone

Description Found to the east of the souterrain (ME020-004).

SMR No: ME020-042--- Townland: Donore Class: Habitation site

The site was discovered during monitoring along the line of the Northern Motorway, Contract 7 (Drogheda Bypass). It was in an area of firm ground on a north-facing slope rising up from the River Boyne. When first uncovered by mechanical excavator the site appeared as a scattering of small subsoil-cut features, including one possible structural slot-trench, grouped within an area measuring 40m east–west by 50m. The distribution of archaeological features across the site formed no discernible pattern. Two groups of features, which in the absence of artefactual evidence cannot be identified as contemporary, were excavated. These two groups were situated in the north-eastern and south-western corners of the site. A minimum distance of over 10m separated the two groups of features and the rest of the site appeared to be archaeologically sterile. The south-western group consisted of ten subsoil-cut features grouped within an area approximately 15m east–west by 10m. Most of these features were irregular in plan, with gently sloping sides and uneven or rounded bases. The morphology of two features was relatively post-hole-like. These features, which were 0.15m and 0.25m deep respectively, were both roughly circular or oval with sheer sides and flat bases. The stratigraphy of their fills did not, however, support a structural interpretation, nor was there any other surviving structural evidence in the immediate vicinity. Although more than half of the features in this group contained varying amounts of charcoal, none of them could be directly interpreted as hearths or showed any sign of burning in situ. One feature, which was suboval in plan, 0.27m deep and with a maximum diameter of 0.9m, was filled with a burnt stone and charcoal-rich deposit which may have represented the dumped residue of an open fire. The fills of two other rounded features, C4 and C26, also contained quantities of burnt stone and charcoal. No diagnostic artefacts were retrieved from these features. One finely struck flint flake from a prepared core, with a modern fracture, was retrieved from the topsoil in this area. The north-eastern group consisted of sixteen subsoil-cut features grouped within an area measuring approximately 30m north–south by 20m. In common with the features in the south-western group, the fills of over half of these features contained varying amounts of charcoal. None of them, however, contained traces of burnt or heat-shattered stone such as that removed from features in the south-western group. This group of features was artefactually richer than those to the south-west. Traces of burnt bone were recovered from the fill of a shallow possible rubbish-pit situated at the south-east of the group. A flake of struck flint was recovered from the upper fill of an irregular, steep-sided feature. More pieces of flint and some poorly preserved sherds of apparently prehistoric pottery were recovered from the largely sterile, grey silty clay fill of a slot-trench excavated at the centre of this group. The profile and dimensions of the slot varied widely from a shallow, almost bowl-shaped 'U' with a minimum depth of 0.12m to a more sheer-sided near-'V' profile with a maximum depth of 0.29m. It was 0.31–0.6m wide. The function of the slot remains unclear. It appeared to be a structural slot-trench encompassing a roughly oval area with a subrectangular annexe to the west. These areas, which appeared to form an annexed or figure-of-eight structure, had combined dimensions of 7.75m east–west by 5.8m. However, little further structural evidence supported this appearance. No evidence of stake- or post-holes was uncovered at the base of, or within the areas encompassed by, the slot. No interruption suggestive of an entrance occurred at any point in the sweep of either arc. At the extreme western side of the smaller arc a deposit of medium-sized stones contained within the fill was removed from the trench. These stones could be tentatively interpreted as a drainage feature at the threshold of a slot-built structure. Immediately to the north of these stones a small concentration of charcoal, which could represent an accumulation of charcoal blown through the possible entrance from an internal hearth, directly overlay the upper fill of the slot. Only one internal feature (C52) was uncovered within the possible structure. The survival of only one internal feature may be the result of post-depositional truncation or an original absence of internal supports. The internal feature was a shallow, subcircular, bowl-like pit 0.15m in depth with a maximum diameter of 0.5m. It was filled with a compact sterile sandy clay which revealed no indication of the feature's function. The presence of an apparently structural slot combined with randomly scattered subsoil cuts, some containing burnt bone, charcoal, burnt and heat-shattered stone with some flakes of struck flint and sherds of prehistoric pottery, suggests that Donore 2 may have been an occupation site at one or several stages in prehistory. Immediately downhill of the site, 200m to the north, a large, possibly Bronze Age enclosure has recently been excavated by Dermot Nelis, and 300m further to the north an enclosure site dating from the Neolithic to the Iron Age or Early Christian period has also been recently excavated by Declan Moore.

SMR No. ME020-049--- Townland Oldbridge Class: Excavation (Misc)
A two-day excavation was carried out on a 4m x 4m area of loose stone and associated deposits containing animal bone on the route of the M1 by Kieran Campbell, VJK Ltd. No dating evidence recovered.

SMR No: ME020-054--- Townland Oldbridge Class: Excavation (Misc)
This site was identified during monitoring along the route of the Northern Motorway, Gormanston–Monasterboice, Contract 7, approximately 500m south of the River Boyne. It was on gently sloping, northerly-facing ground. The two-month excavation revealed a series of narrow linear ditches, a curvilinear ditch, a U-shaped ditch and several possible post-holes. The earliest activity appeared to have been a shallow pit, aligned east–west. It was 0.17m deep, 0.77m long and 0.7m wide. It was oval in plan with a gradual break of slope at the top and was truncated on the east side by a later ditch. No finds were recovered from the single fill. The next phase of activity was the cutting into the natural of a ditch which also truncated the above-mentioned pit. It was a broad V-shaped ditch, c. 11.2m in maximum excavated length and c. 0.8m in width. It contained three fills. It had a sharp break of slope at the top and steeply sloping sides and was aligned on a north–south axis. An oval pit, orientated north–south and measuring 0.37m in depth, 1.85m in length and 1.1m in width, truncated the above-mentioned ditch. No dating evidence was recovered from this feature. A curvilinear ditch represents the next phase of activity on the site. It measured 1.42m in length, 0.36m in width and was 0.63m deep. No dating evidence was recovered from any of the eight fills. A small post-hole was found to be stratigraphically later than this ditch. A series of shallow pits was also uncovered on the site, sealed by topsoil and truncated natural. No more precise stratigraphic relationships could be established for these features. As before, no dating evidence was recovered to help aid interpretation.

SMR No: ME020-063--- Townland Oldbridge Class: Kiln
Prehistoric. This site was identified during monitoring of the M1 motorway. It was located in the southern end of a field close to the road between Oldbridge and Sheephouse town lands and the area of excavation measured approximately 130m x 10m. A bowl shaped feature that may represent the remains of a kiln was excavated by Dermot Neilis, lAC Ltd, along with a series of irregularly shaped pits.

SMR No: ME020-072--- Townland Oldbridge Class: Enclosure
A possible enclosure was identified on Lidar imagery.

SMR No: ME020-088--- Townland Oldbridge Class: Enclosure
Located at the bottom of a N-facing slope down to a W-E section of the River Boyne, with the river c. 100m to the N, and just E of the M1 motorway. Archaeological testing (08E0506) identified a large enclosure (int. diam. c. 70m) defined by a ditch which produced a wealth of Middle Bronze Age pottery.

Appendix 11.2 Geophysical Survey Report

GEOPHYSICAL SURVEY REPORT

OLDBRIDGE / RATHMULLAN

COUNTY MEATH

LICENCE NO. 07-R-190

23.06.2008

FOR

ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.

J.M.Leigh surveys

11 Our Ladys Road, Maryland, Dublin 8. Tel. 01 5210385. info@jmlsurveys.com

Oldbridge / Rathmullan, Co. Meath
Geophysical Survey Summary

Introduction

The geophysical survey was conducted for Archaeological Development Services Ltd. as part of a wider archaeological investigation of the proposed housing development in the townland of Oldbridge, County Meath. The proposed development area was subject to preliminary gradiometer scanning, totalling 20.3 hectares. Anomalies located during the preliminary gradiometer scan were targeted with detailed survey totalling 5.7 hectares.

Location Topography & Geology

The proposed development encompasses four fields to the east of Drogheda town and to the north of Rathmullan townland. The site is bound to the west by the M1 Motorway and to the north by the River Boyne. To the south of the proposed development is a local road which bridges the M1 Motorway.

The soils of the locality consist of grey brown podzols with associated gleys, over a parent material of till of Irish Sea origin, and limestone shale (Soil survey of Ireland 1980).

Archaeological Background

The proposed development is located within a rich archaeological environment, although no recorded monuments are located within the application area. Archaeological assessments, including an impact assessment report (Moraghan, M. 2007), and a cultural and heritage assessment (Whitaker, J. 2004) have been undertaken by Archaeological Development Services Ltd as part of the pre-development investigation of the site.

Archaeological investigations as part of the M1 Motorway Scheme identified two sites within close proximity to the south west corner of the current application area. These were a Neolithic pit (RMP ME020:034) and a pit of undetermined date (RMP ME020:054). Similarly, to the north of the application area another prehistoric pit (RMP ME020:035) was identified.

Southwest of the application area two enclosure sites (RMP ME020:008, ME020:030) have been identified. Further evidence of prehistoric activity within the townland of Oldbridge includes two recorded lithic scatters RMP ME020:025019, ME020:0250023),

two standing stones (RMP ME020:030 and ME020:00401) and a souterrain site (RMP ME020:004).

The location of the historic Battle of the Boyne is located to the west of the application area. Several fords running across the Boyne are located in the townland of Oldbridge. It is possible these fords were used during the famous battle and there is a recorded ford site (ME020-039) to the north of the study area.

In addition to the recorded monuments to the west of the application area, an archaeological complex (LH024:012) is located in the townland of Mell, north of the River Boyne in County Louth. The archaeological complex is less than 1km from the application area and includes two souterrain sites, a cemetery, an enclosure and a holy well.

*Summary of Results

Gradiometer scanning and targeted detailed gradiometer survey has highlighted several magnetic responses of potential archaeological origin.

Broad responses in Field 1 may represent natural variations in the sub-soil. However, a possible curvilinear ditch type response in the south east of the detailed survey Area 1 may represent a plough damaged archaeological ditch. A curvilinear trend and series of responses may equally represent plough damaged archaeology, perhaps suggestive of the remains of an enclosure. However, the responses are incoherent and no clear archaeological pattern is evident. It is equally possible that natural features are represented here.

A large ferrous spread of responses has been identified in Field 2 and is most likely modern in origin. In the south west of Field 2, Area 3A, parallel linear responses may represent a former track way or possibly drainage features. An archaeological interpretation is unclear.

In the southern most field (Field 4) a series of weak responses forms a large rectilinear boundary or enclosure ditch c125m x 85m. It is possible a field system extending north into Field 2 has been identified. The potential enclosure or field system is interposed by a circular response approximately 7.5m in diameter. It can be speculated that a ditched feature, possibly the remains of a habitation site, and associated pit features is located in Field 4, forming part of a large field system which extends into Field 2. Although this is speculative the responses are of archaeological strength and form and it is possible that archaeological remains are represented here.

Geophysical Survey Report
Oldbridge / Rathmullan, Co. Meath

1 Introduction

1.1 A geophysical survey has been conducted at a site in the townland of Oldbridge, County Meath, as part of a wider archaeological study conducted by Archaeological Development Services Ltd for a proposed housing development.

1.2 Geophysical survey was conducted with the aim of locating and identifying magnetic responses within the study area that may result from buried archaeological remains. The nature and extent of magnetic anomalies and areas of potential archaeological interest were identified and investigated with gradiometer scanning and targeted detailed gradiometer survey.

2 Survey Methodology

2.1 The geophysical survey consisted of a preliminary gradiometer scan of the proposed development area. A total of 20.3 hectares was subject to gradiometer scanning. Subsequent recorded detailed survey of 5.7 hectares was conducted in five areas (Areas 1-5) to investigate the scanned anomalies.

2.2 The preliminary scan was conducted with the gradiometer instrument in scanning mode and 10m traverses of the assessment area were undertaken. The magnetic variations along each 10m traverse were monitored by the instrument operator. Any magnetic responses that were thought to be of potential interest were marked in the field, for further investigation with a detailed gradiometer survey.

2.3 The detailed gradiometer survey was conducted with 20m x 20m survey grids with a sample interval of 0.25m and a traverse interval of 1m. Survey was undertaken with a Bartington GRAD-601 dual sensor instrument.

2.4 The site location is presented in Figure 1 at a scale of 1:20,000. Figure 2 is at a scale of 1:2,500 and presents the location of scanned anomalies and the subsequent areas of detailed survey (Areas 1-5). Detailed survey Areas 3 and 4 have been sub-divided for ease of display but are discussed as a whole within the text of this report.

2.5 Survey grids were set out by the staff of J. M. Leigh Surveys using *in situ* grid points established by the staff of Archaeological Development Services Ltd. All survey was

conducted with reference to the geo-referenced master grid. The survey location information is presented on the attached CD as Appendix A2.01.

2.6 Further information regarding the magnetometer instrument, the site methodology and terminology used can be found in the technical information section at the back of this report.

3 Data Display

3.1 The results of the detailed gradiometer survey are presented as an overall summary greyscale image and accompanying interpretation diagram in Figures 3 and 4, both at a scale of 1:1,750. Figures 5 to 9 present greyscale images and interpretations of survey Areas 1 to 5 at a scale of 1:1,000. All the summary diagrams (Figures 3 to 9) present processed data as greyscale images with a display range of -1nT to 2nT.

3.2 The raw data is presented as a series of archive plots in A1.01 to A1.17 The unprocessed data is presented as xy-trace plots, greyscale images and interpretation diagrams, all at a scale of 1:500 and can be viewed in PDF file format on the attached CD.

3.3 The display formats and the interpretation categories are discussed further in the technical information section.

4 Further Information & Ground Conditions

4.1 Geophysical survey was undertaken by Joanna Leigh between the 20th and 29th of May 2008. Survey fieldwork was conducted under licence 07-R-190 from the Department of the Environment, Heritage & Local Government.

4.2 At the time of fieldwork, Field 1 and 3 consisted of recently cut pasture. Fields 2 and 4 contained the remains of a harvested rapeseed crop.

4.3 Disused farm buildings were located in the south of Field 4, and in between Fields 2 and 3. The farm buildings consisted of concrete structures with corrugated iron roofs. The corrugated roofing produces strong magnetic disturbance that may mask more subtle responses, and no survey or interpretation of the areas immediately adjacent to the farm buildings could be undertaken. Localised magnetic disturbances caused by electricity pylons and telegraph poles within the application area are evident in some of the data sets.

4.4 A rectangular area in the north-east of Field 1 is part of the application area, however no survey could be undertaken here due to the location of a large spoil heap consisting of modern rubbish.

4.5 Numerous isolated ferrous-type responses are apparent throughout the data sets. These anomalies are usually caused by the presence of modern ferrous debris within the topsoil and are not referred to in the text unless considered relevant.

4.6 Letters in parentheses in the text of the report refer to specific responses highlighted on the interpretation diagrams.

5 Results of Gradiometer Scanning (Figure 2)

5.1 Gradiometer scanning throughout the application area identified multiple isolated scanned anomalies of potential archaeological origin. A natural background variation of ±1nT was observed throughout the application area. Variations from this background were marked in the field and further investigated. Detailed survey blocks (Areas 1-5) were located to investigate the anomalies identified during gradiometer scanning.

Field 1

5.2 Gradiometer scanning in Field 1 identified limited magnetic responses in the west of the field. As scanning continued in the east of the field, numerous isolated anomalies of some magnetic strength ±0.5nT were identified. The magnetic response in the east of this field was notably increased and detailed survey Area 1 was positioned along the southern boundary of Field 1 to investigate the anomalies identified.

Field 2

5.3 There was little variation in the background magnetic response of ±0.5nT in Field 2, although anomalies of potential along the southern half of the field were identified.

5.4 Broad isolated anomalies were identified, and a large spread of approximately 20m^2 of a large magnetic signature was noted. The spread of anomalies consisted of magnetic values in excess of the instruments detection range suggesting a modern origin. However, the spread of ferrous anomalies appeared well defined and no modern cause for the ferrous anomalies could be surmised. Detailed survey Area 3 was positioned to investigate the spread of ferrous responses.

5.5 The isolated anomalies identified were located predominantly in the south western corner of Field 2, and two further isolated anomalies were detected to the north of the ferrous anomalies. Detailed survey Area 2 and an extension of Area 3 was undertaken to investigate the remaining isolated anomalies.

Field 3

5.6 Gradiometer scanning in Field 3 was limited by the disturbance produced from modern features within the field. Fields 2 and 3 were subdivided by the remains of a sunken/banked track way. Along the edge of the former track way was a barbed wire fence. The track way and the fence caused magnetic disturbance along the eastern

edge of Field 3. A series of farm buildings in the south of Field 3 resulted in significant magnetic disturbance a minimum of 30m from the buildings. There was also a bore hole located in the centre of Field 3. The modern features within Field 3 produce magnetic disturbance and would mask any small magnetic anomalies of potential interest. No anomalies of potential interest were identified in Field 3 and no detailed survey was conducted here.

Field 4

5.7 Gradiometer scanning in Field 4 revealed a limited variation in natural background response. Clusters of isolated responses were identified in the north west of the field, and broad amorphous spreads of anomalies were concentrated in the central eastern section. In addition, some magnetically strong anomalies in the western half of the field were identified, and archaeological potential was unclear. A large detailed survey area was located in Field 4 to fully investigate the archaeological potential of the anomalies identified.

5.8 The enclosure site ME020:008 is located to the southwest of the application area. Detailed survey Area 5 was located in the southwest corner of the application area to confirm the absence of scanned anomalies here, and investigate any archaeological potential, given the close proximity of the enclosure site.

6 Results of Detailed Gradiometer Survey

Area 1 (Field 1) Figures 5 & 6

6.1 The detailed gradiometer survey in Area 1 has confirmed the scanning results and identified numerous isolated responses. The responses identified have a broad and amorphous appearance and an archaeological pattern is hard to discern. This is suggestive of natural variations and an archaeological interpretation is unclear.

6.2 In the east of Area 1, a curvilinear series of broad responses (A) may be of interest. The responses are located at the bottom of a slope and the natural topography may be reflected in the response. However, it is possible that a plough damaged boundary or ditch feature has been identified. An archaeological interpretation is tentative but must be considered.

6.3 In the centre of Area 1, several responses (B) and a series of faint linear trends may be of interest. It is possible that natural variations in the sub-soil are represented, however a curvilinear form is discernable from the surrounding broad amorphous responses. It is possible that plough damaged archaeological remains are present. The responses may represent an ephemeral archaeological ditch or enclosure feature. This is speculative and it is equally possible that the responses are the result of further natural variations. An archaeological interpretation is possible but tentative.

6.4 In the west of Area 1 several responses (C) are identified. Archaeological interpretation of the responses is tentative as no clear archaeological pattern is evident. The responses may represent further natural variations in the sub-soil.

Area 2 (Field 2) Figures 5 & 6

6.5 Area 2 is located in the central northern part of Field 2. Isolated responses (D) are similar in shape and form to the responses (C) identified in Area 1. The responses are of archaeological strength although no clear archaeological pattern is evident, and a natural origin is possible.

6.6 In the south of Area 2, faint linear trends (E) are evident. The trends most likely represent plough damaged field divisions, which continue into Area 3B. It is possible that a field system is represented here.

Area 3A & 3B (Field 2)

6.7 Areas 3A and 3B are located along the southern boundary of Field 2. The survey areas were positioned to investigate clusters of scanned anomalies located throughout the southern edge of the field.

6.8 In the west of Area 3A, two parallel linear responses (F) have been identified. The linear responses appear to be approximately 15m apart and are orientated perpendicular to the existing field boundary. It is possible that a former track way, or drainage feature has been identified. The responses in the south of the survey area are masked by the magnetic disturbance caused by the electricity pylon, located within the field boundary.

6.9 To the east of the linear responses (F) are several isolated responses (G) of archaeological strength and it is possible that a cluster of pit features is represented here. However, the field has been heavily ploughed and it is equally possible that the responses originate from the recent modern ploughing activity.

6.10 A weak linear response (H) in Area 3A may represent the remains of a former field division, or field drain.

6.11 An unusual ferrous response (I) has been identified in Area 3B. The response appears to be composed of multiple ferrous anomalies forming a rectilinear area of magnetic disturbance approximately 23m x 23m. The shape of the disturbance is curious and although the ferrous nature of the response is typical of modern disturbance, interpretation is unclear.

6.12 North of the ferrous disturbance (I), a cluster of responses (J) is evident. They may represent a continuation of the probable modern ferrous disturbance; however, it is possible that the responses (J) are of archaeological origin. The strength of the responses is less suggestive of a modern origin and a cluster of archaeological pits may be represented here.

6.13 Parallel linear responses (K) in the east of Area 3B are suggestive of former field divisions. They appear fragmented, perhaps as a result of modern ploughing. Perpendicular to (K) are several linear trends (L) approximately 12m apart. The responses (K) and (L) appear to form a ladder shaped series of field divisions. The field divisions may represent a field system, possibly continuing north into Area 2.

6.14 Further faint trends in Area 3B may represent a continuation of the possible field system, or the trends may represent more recent ploughing activity.

Areas 4A – 4D and Area 5 (Field 4) Figures 7, 8 & 9

6.15 A series of linear responses and trends (M) in Areas 4A, 4B, 4C and 4D appears to form a large rectilinear enclosure or boundary feature measuring c.125m east-west and c.85m north-south. The responses (M) may represent part of a former field system, which extends north into Field 2.

6.16 In the southeast of survey Area 4D, the potential boundary enclosure (M) is intersected by a circular response (N) of c. 7.5m diameter that is interpreted as of archaeological interest. A possible opening or entranceway is located in the south of the circular response. Several isolated responses of archaeological strength are located in close proximity to (M) and it is possible that a small enclosure or habitation site consisting of a ditched feature and pits is located here. It seems likely that the circular response (N) is associated with the possible enclosure / field system (M).

6.17 Isolated responses within the boundary enclosure (M) have been identified; however no clear archaeological pattern is evident. Although it is possible that ephemeral archaeological features are located here, archaeological interpretation is cautious.

6.18 Broad amorphous responses (O) in survey Areas 4B and 4D are evident. They do not appear to have any correlation or association with the boundary enclosure (M) and have no clear archaeological shape or form. The responses are interpreted as natural in origin.

6.19 Linear negative trends have been identified in the west of Area 4A. The trends appear to be orientated with the modern ploughing and it is likely that a track way for farm vehicle use s is represented here.

6.20 A spread of increased magnetic response (P) appears to run through survey Areas 4A, 4C and Area 5. The spread is orientated north south and is has a width of approximately 14m. It is probable that a former field division has been repeatedly ploughed out, forming the broad spread of increased magnetic response. No archaeological explanation for such a broad spread can be provided and a ploughed out former field boundary is the preferred interpretation.

6.21 In survey Area 4A several curvilinear and isolated responses (Q) are of potential interest. The responses appear magnetically strong and it is possible that they represent modern features and may be associated with the probable plough damaged former field boundary (P). However, their shape and form is curious and it is possible that short ditched features, in-filled with burnt material are represented here.

6.22 Ploughing trends in Field 4 are evident throughout the survey Areas 4A – 4D and Area 5. The trends correlate with the modern ploughing and are not considered to be of archaeological interest.

6.23 Broad ferrous responses in Area 4A and Area 5 are most likely of modern origin and interpreted as of archaeological interest.

7 Discussion & Conclusion

7.1 The geophysical survey has identified the remains of a large rectilinear enclosure ditch or field boundary remains located in Field 3. The responses appear fragmented and magnetically weak, and the possible antiquity of the feature is unclear. Nevertheless, the rectilinear responses suggest a ditched enclosure or field boundary feature approximately 125m x 85m.

7.2 A circular response c.7.5m in diameter has been identified in the southeast of the probable boundary ditch. It seems likely that the response is contemporary with the large boundary ditch and it is possible a small habitation site and associated field boundary or field enclosure have been identified. This is speculative but an archaeological interpretation must be considered.

7.3 In Field 1 amorphous responses have been detected and no clear archaeological pattern is evident. However, a faint curvilinear trend and series of responses may represent the plough damaged remains of an archaeological ditch feature. It is possible that the remains of a curvilinear enclosure ditch are represented here, although this is speculative.

7.4 In the south-west corner of Field 2, two parallel linear responses have been identified, and may represent a former track way or drainage features.

7.5 A rectilinear spread of ferrous responses in Field 2 is most likely modern in origin. Next to the ferrous responses are a series of responses and trends which form a ladder shape of field divisions and sub-divisions. The series of responses may represent a field system and is considered to be of archaeological potential. It is possible these responses are associated with the possible field enclosure and circular response to the south.

7.6 Through the centre of Field 4 a broad spread of increased magnetic response orientated north-south has been detected. It is possible a plough damaged former field boundary is represented here.

7.7 Although no substantial archaeological site or complex has been identified the geophysical survey results suggest the lands within the application area have been under agricultural use for some time. The modern ploughing resulted in some disturbance, particularly visible in Field 4 as series of linear trends running through the data sets. However, responses of potential interest have been identified and it is

possible former field divisions or field system and a potential habitation site have been identified. Although speculative, it is possible that prehistoric activity is represented here.

7.8 A test trenching strategy undertaken by Archaeological Development Services Ltd. is currently underway, at the time of this report, and is designed to establish the archaeological potential of the proposed development site. The test trenching strategy will also target the potential archaeology highlighted in this report, and clarify the true nature of the geophysical responses.

8 Technical Information Section

Instrumentation & Methodology

Fluxgate Gradiometer Survey

Gradiometer survey is the most frequently applied survey instrument as it can be used in 'Scanning' or detailed survey mode.

Scanning

This is a fast and effective reconnaissance technique. The instrument is set in scanning mode and regular traverses of the investigation area are made, usually at 10m intervals. This allows a fast and effective scan of the application area, looking for any responses which may be of archaeological potential. As the traverses are made, the operator observes the instrument readout, and any magnetic anomalies are marked for further investigation.

Detailed Gradiometer Survey

This is conducted to clearly define any responses detected during scanning, or can be applied as a stand alone methodology. Detailed survey is often applied with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is collected in grids 20m x 20m, and data is displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. A survey with a grid size of 10m x 10m and a traverse interval of 0.5m will provide a dataset with high resolution.

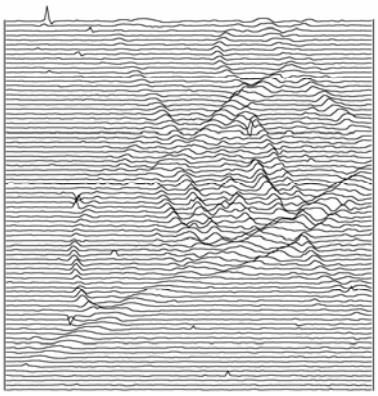
Bartington GRAD 601-2

The Bartington *Grad* 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey very fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

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.

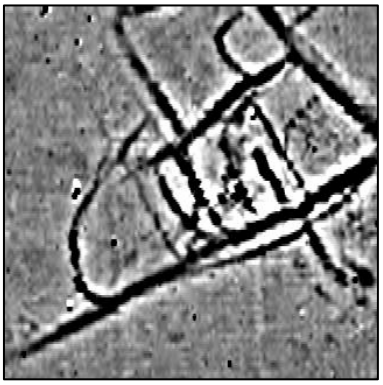
Data Display & Presentation

*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.

*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 dataset. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.

Interpretation

An interpretation of the data is made using many of the plots presented in the final report, in addition to examination of the raw and processed data. The project managers' knowledge and experience allows a detailed interpretation of the survey results with respect to archaeological potential.

**XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation.*

Glossary of Interpretation Terms

Archaeology

This category refers to responses which are interpreted as of clear archaeological potential, and are supported by further archaeological evidence such as aerial photography or excavation. 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 material.

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 or archaeological cultivation trends.

?Natural

A natural variation in the magnetic background of the subsoil identified as a broad amorphous response. This may result from geological features or variations in the underlying soil.

Ferrous Response

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 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.

References

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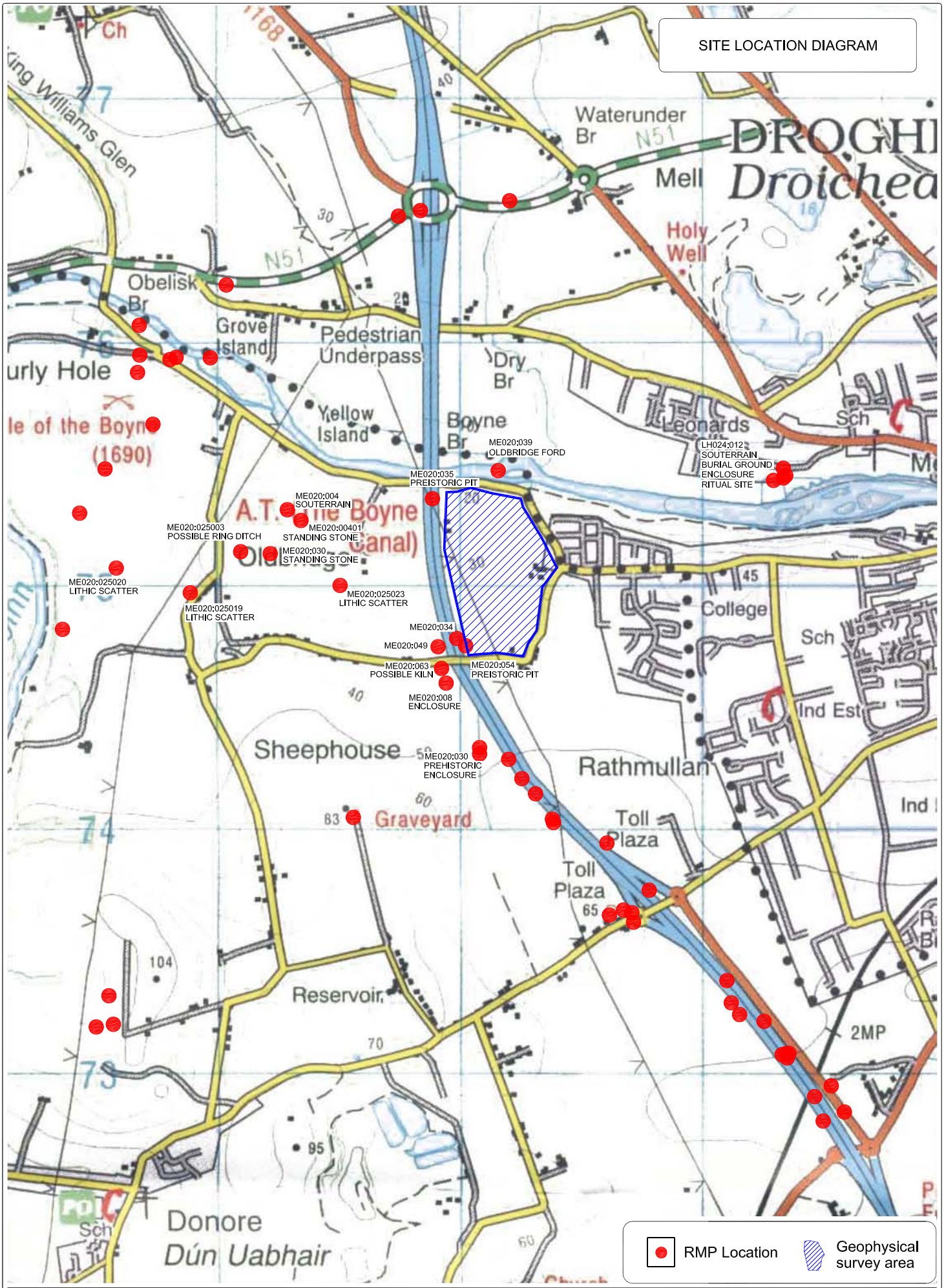
Moraghan, M. (2007) 'Impact Assessment Report for a Proposed Housing Development Oldbridge/Rathmullan, County Meath' Unpublished Report, ADS Ltd.

National Soil Survey of Ireland (1980) General soil map second edition (1:575,000). *An Foras Taluntais*

Whitaker, J. (2004) '*Cultural and Heritage Assessment of a Proposed residential Development Site at Rathmullan, Co. Meath*' Unpublished Report, ADS Ltd.

List of Figures

Archive diagrams on attached CD



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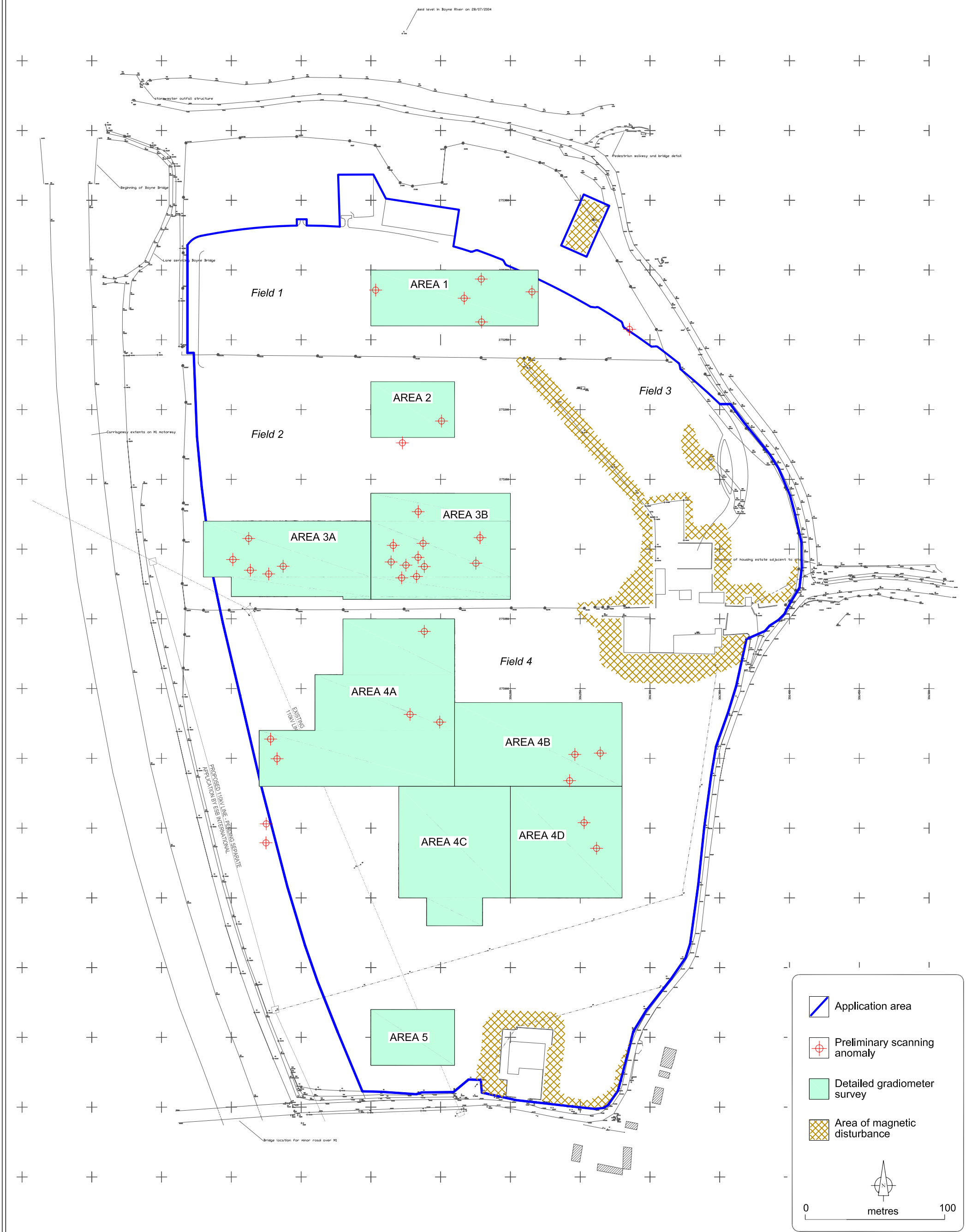
SURVEY LOCATION DIAGRAM



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Licence No.:	07 - R - 190
Issue Date:	23.06.2008

OVERALL SUMMARY GREYSCALE IMAGE

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OVERALL SUMMARY INTERPRETATION

Lane servicing Boyne Bridge

Field 1

Field 2

Field 3

Field 4

AREA 1

AREA 2

AREA 3A

AREA 3B

AREA 4A

AREA 4B

AREA 4C

AREA 4D

AREA 5

Boundary of housing estate adjacent

EXISTING 110kV LINE

PROPOSED 110kV LINE - PENDING SEPARATE APPLICATION BY ESB INTERNATIONAL

? Archaeology

Positive trend

Negative trend

Area of increased magnetic response

? Natural

Magnetic disturbance

Modern Ploughing

Ferrous response

0 metres 70

Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: OVERALL SUMMARY INTERPRETATION	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A3:	1:1,750
Figure:	4
Licence No.:	07 - R - 190
Issue Date:	23.06.2008

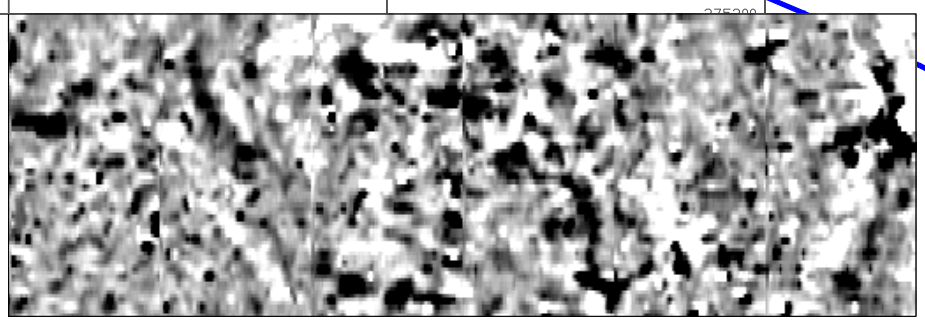
AREAS 1, 2 & 3: GREYSCALE IMAGE

2.0
nT
-1.0

0 metres 40

Boyne Bridge

AREA 1

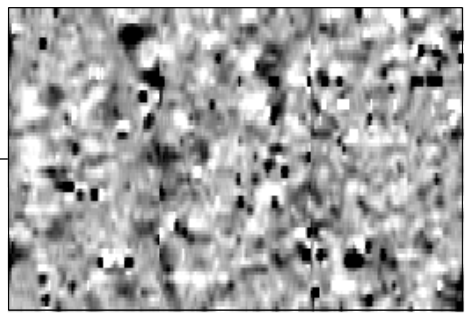


Field 1

275350

275250

AREA 2

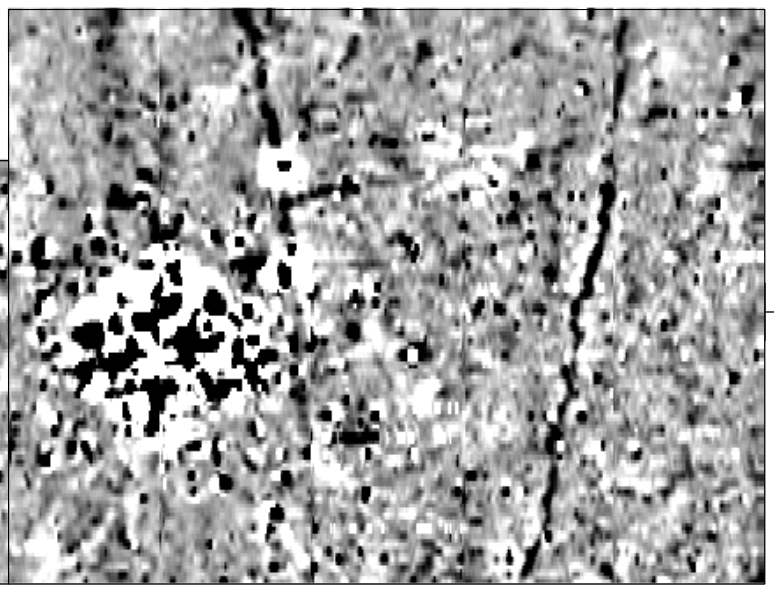


Field 2

275200

275150

AREA 3B



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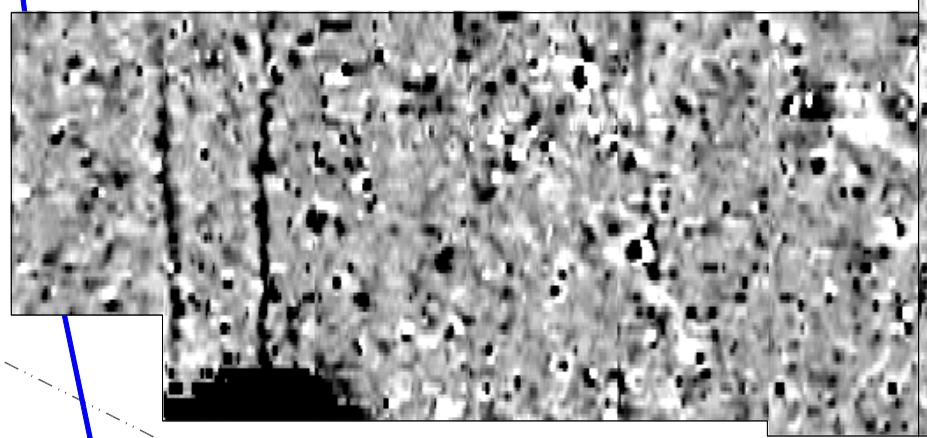

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275050

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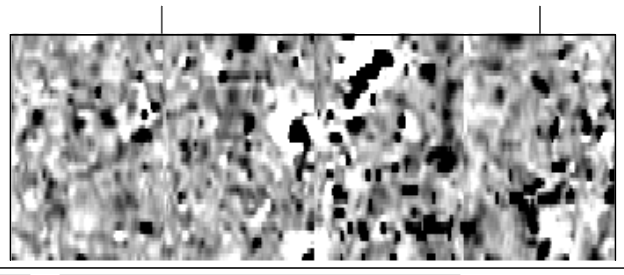

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Title:	AREAS 1, 2 & 3: GREYSCALE IMAGE

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Figure:	5
Licence No.:	07 - R - 190
Issue Date:	23.06.2008

AREAS 1, 2 & 3: INTERPRETATION

? Archaeology

Positive trend

Area of increased magnetic response

? Natural

Magnetic disturbance

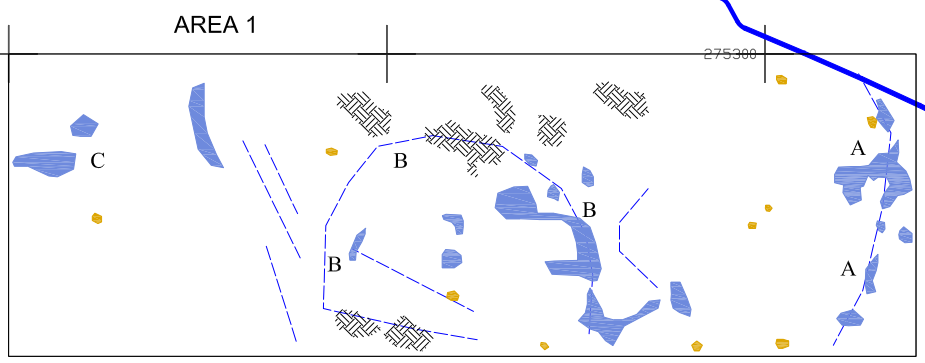
Ferrous response

0 metres 40

Boyne Bridge

Field 1

AREA 1



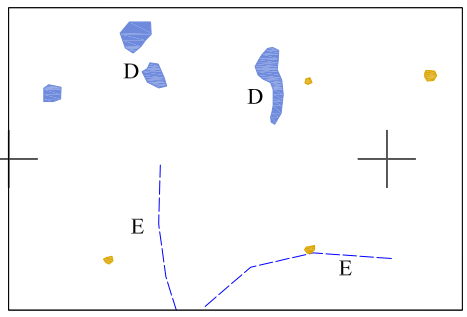
275350

275300

275250

Field 2

AREA 2

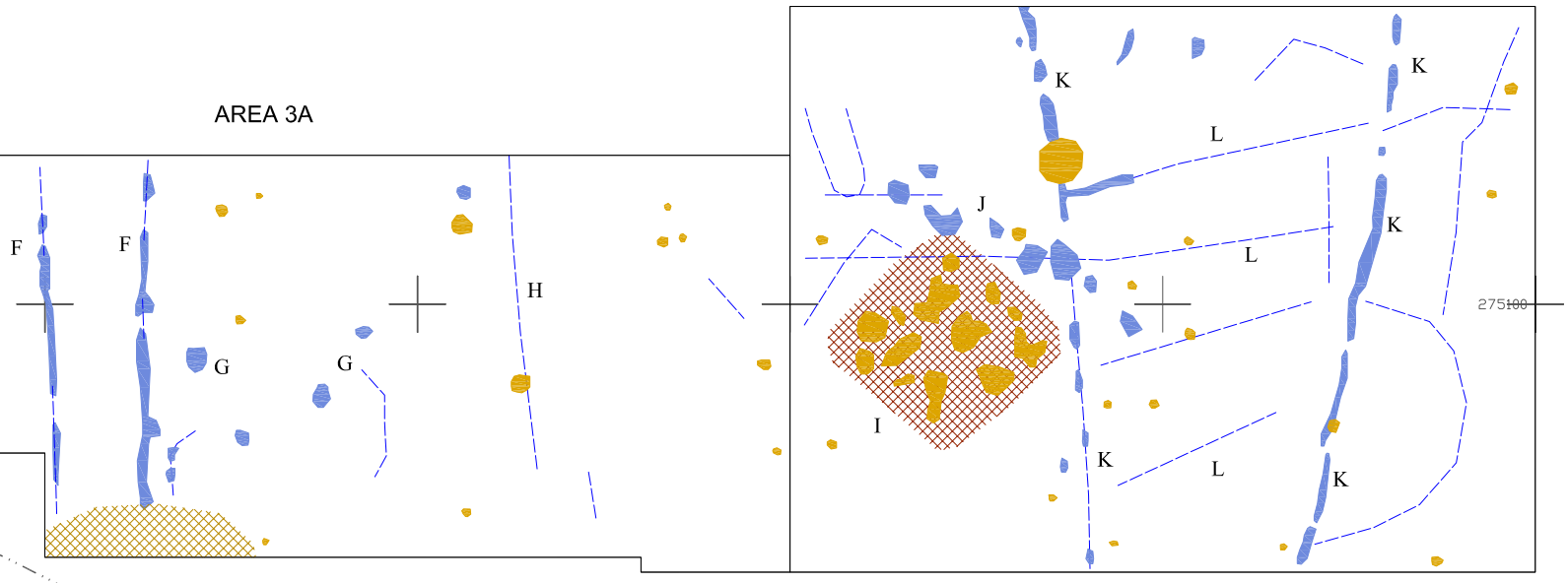


275200

275150

AREA 3B

AREA 3A



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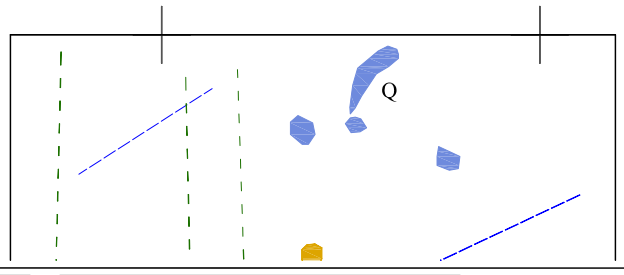

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Project:	GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH
Title:	AREAS 1, 2 & 3: INTERPRETATION

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Scale @ A3:	1:1,000
Figure:	6
Licence No.:	07 - R - 190
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AREA 4: GREYSCALE IMAGE

AREA 3A

AREA 3B

AREA 4A

AREA 4B

AREA 4C

AREA 4D

Field 4

EXISTING 110kV LINE

2.0
nT
-1.0

0 metres 40

Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREA 4: GREYSCALE IMAGE	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A3:	1:1,000
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Licence No.:	07 - R - 190
Issue Date:	23.06.2008

AREA 4: INTERPRETATION

AREA 3A

AREA 3B

AREA 4A

AREA 4B

AREA 4C

AREA 4D

Field 4

EXISTING 110kV LINE

275150
275100
275050
275000
306200
306250

? Archaeology
Positive trend
Negative trend
Modern ploughing
Area of increased magnetic response
? Natural
Magnetic disturbance
Ferrous response

0 metres 40

Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREA 4: INTERPRETATION	J.M.Leigh surveys www.jmlsurveys.com

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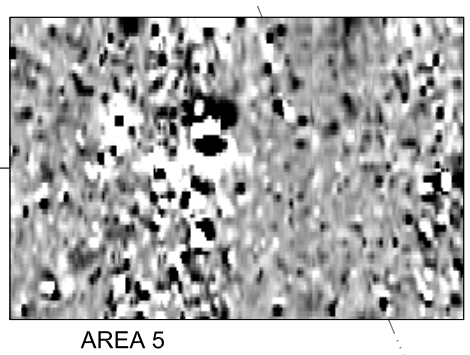
Licence No.:	07 - R - 190
Issue Date:	23.06.2008

AREA 4C

AREA 5: GREYSCALE IMAGE



AREA 5

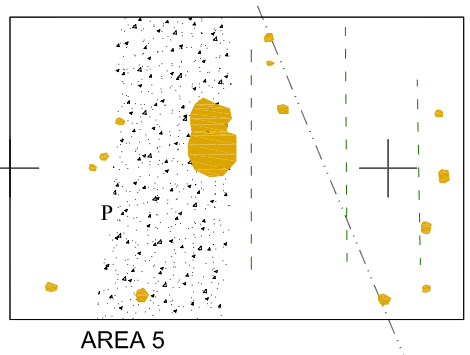
Field 4

2.0
nT
-1.0

0 metres 40

for minor road over M1

AREA 5: INTERPRETATION



AREA 5

Field 4

Area of increased magnetic response

Modern ploughing

Ferrous response

0 metres 40

for minor road over M1

Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREA 5: GREYSCALE IMAGE & INTERPRETATION	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A3:	1:1,000
Figure:	9
Licence No.:	07 - R - 190
Issue Date:	23.06.2008

Appendix 11.3 Archaeological Testing Report

Archaeological Testing Report

Oldbridge/Rathmullan,
Co. Meath

Licence No.: 08E0506
Author: Ros Ó'Maoldúin
Client: Mellon & O'Reilly
Date: June 2008

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CONTENTS

ILLUSTRATIONS

FIGURES

PLATES

NON TECHNICAL SUMMARY

The following report details the results of an Archaeological Impact Assessment carried out under licence 08E0506, on behalf Mellon & O'Reilly for a proposed housing development in the townland of Oldbridge, County Meath. The aim of this study was to assess the potential impacts on cultural heritage of the proposed development site which is located within the wider Battle of the Boyne landscape.

The site comprises 4 fields, covering an area of approximately 64 acres under grassland and tillage. It is located in the townland of Oldbridge, Barony of Lower Duleek, the eastern side of which borders Rathmullan townland. The site is bounded to the west by the M1 Motorway, the east and south by a local road, and the north by the Boyne River.

To date the majority of land, in the vicinity and east of the M1 has been developed for residential units and associated amenities.

Because of the Motorway divide on the West of the site there is no access to this site from the World Heritage Site.

Following discussions and agreement with DoEHLG detailed geophysical surveys were carried out over the study area followed by test trenching comprising of 99 mechanically stripped test trenches mostly 50m long and 2m in wide (see Fig 6) and metal detection of the resulting spoil.

In summary after extensive metal detection testing no artefacts identifiable as relating to the Battle of the Boyne were discovered. Test trenching to the subsoil uncovered a scatter of archaeological remains throughout the site, with notable concentrations in the north (Field 3) and south fields (Field 1). In the north field an enclosure of probable Middle Bronze Age date (c.1500BC) was located. In the south field a ring ditch was identified and 2 cremations were exhumed.

At all stages of this assessment, office consultation has taken place with Chief Archaeologist, Brian Duffy, and Senior Archaeologist, Planning Section, Victor Buckley and Assistant Principal, National Monuments. John McDermott. There has also been on site consultation and inspection as the assessment continued. The National Monuments Service has agreed broadly with the recommendations below, which have been presented to them.

INTRODUCTION

The assessment took place between June 4th and June 20th 2008 and aimed to assess the potential impacts on cultural heritage of the proposed development which is located within a landscape related to the Battle of the Boyne

The original methodology agreed with DoHELG comprised 86 trenches of up to 50m length. 3 of those trenches were not possible or required due to standing post-medieval buildings. 14 additional trenches were added during the course of the testing. These were added to test geophysical anomalies or further test features encountered during the works.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

The study area is located outside the buffer zone for *Bru na Boinne* UNESCO World Heritage Site (Ref. No. 659). A recently published LIDAR image[1] of the area includes the site of the development.

The study area is also located about 350 metres to the east of the core area[2] associated with the site of Battle of the Boyne (See Fig. 3), which has been significantly enlarged from the original constraints area for the battlefield (ME020-025).

However, there were no recorded archaeological monuments within the study area, although recent archaeological investigations as part of the M1 Motorway Scheme did discover two sites within the area which were preserved by record i.e. subjected to excavation. A pit, which was dated to the Neolithic Period (4000 BC – 2500BC) through pottery sherd typology analysis, was located in the southwest corner of the (ME020-034), while a little to the east of this site another pit was discovered (ME020-054). No dateable material was found but a general prehistoric date has been given for this pit.

To the northwest also outside of the study area another pit was uncovered (also part of the M1 Motorway Project). A general prehistoric date was given for this site (ME020-035). To the southwest, adjacent to the study area there was a possible kiln discovered (ME020-063) in the townland of Sheephouse. Also in the townland of Sheephouse a prehistoric enclosure was discovered from aerial photographs and fully excavated (ME020-008) in advance of the M1 works. A second enclosure was discovered to the west of ME020-008

[1] Smyth, J. 2007 Brú na Bóinne World Heritage Site, *Archaeology Ireland* **22** (2), 28-30.

[2] As designated by the OPW. The core area represents the location of the initial and fierce engagements of the battle. With regard to the wider landscape of the battle, the encampments of both armies are known to have been near the present village of Tullyallen (Williamite) and Donore Hill (Jacobite).

during advance works on the South-North gas pipeline, but due to re-alignment of the pipe this site was preserved *in situ*.

There is a strong representation of Bronze Age monuments located to the west of the study area between 500 metres and 1.3 kms distance. There are two standing stones (ME020-004 and ME020-030) located within about 200 metres of each other. Standing stones typically date from the Bronze Age period (2,500BC-700BC) although it can be difficult to establish their antiquity owing to the practice of erecting 'scratching posts' for cattle. The stones were erected for a variety of reasons such as burial markers. Other stones functioned as boundary markers or were positioned along old route ways. A possible Bronze Age ring ditch (ME020-025003) is located nearby to one of the standing stones (ME020-030). A ring ditch is part of a class of monuments that functioned as burial places, either singly or as cemeteries.

A recorded souterrain (ME020-004) is located a little to the northwest of the standing stone (ME020-004001) and about 650 metres west of the study area. A souterrain is an underground structure consisting of one or more chambers connected by narrow passages or creepways, usually constructed of drystone-walling with a lintelled roof over the passages and a corbelled roof over the chambers. Most souterrains appear to have been built in the early medieval period by ringfort inhabitants (c. 500 - 1000 AD) as a defensive feature and/or for storage.

The now defunct village of Oldbridge and the surrounding area is most famously known as being the setting for the Battle of the Boyne. In July 1690, the armies of William of Orange and James II fought along the south shore of the river, with the Williamite army winning outright. There were several fords at Oldbridge across the Boyne, which would have been easily crossed at half flood in mid-summer[3], and therefore this area proved an ideal location for the armies' camps. There is a recorded ford site (ME020-039) just to the north of the study area. A ford is defined as shallow place in a river or other stretch of water, which has been augmented by stone and/or timber, where people, animals and vehicles may cross. These may date to any period from prehistory to the 20th century. King William's army was located on the northern bank of the Boyne in County Louth, whilst King James's army was on the southern bank in County Meath. King James' principal camp, including his own headquarters, was on the elevated ground to the east of Oldbridge, on the hill of Donore, which is crowned by a ruined church[4] (ME020-001). The major importance of the site lies in the belief that the Williamite army used the narrow valley as a means of out flanking the Jacobite army's eastern side. According to tradition they crossed the river via the exposed sandbars / fords ('pass if you can' crossing) and advanced up the valley to attack the Donore Hill stronghold. Local folklore records that the crossing of the Boyne by King Billy, the subject of many paintings and banners, took place

[3] Boulger, D. *The Battle of the Boyne*, 148-182. London, 1911

[4] Wilde, W. The Boyne and Blackwater, 192-205. Dublin 3rd ed. 1949

at the foot of '*Pass if you can'*, which would place the crossing directly north to the study area. While the "pass if you can" ford provided a potential crossing point, a steep topographical incline delineating the northern extent of the site would likely have diverted the Williamite troops around to the east of the proposed impact.

It is also possible that the eastern extent of the Jacobite army encampment extended as far eastwards as the area recorded as Field 4 in the field inspection above[5]. The army of King William totalled 36,000 and thirty cannon, whilst King James's army consisted of just 23,000 men armed with six small cannon. In order to distinguish the men of the two armies from each other – neither side having a distinct national colour - William's troops were ordered to place a green sprig in their hats. James's troops wore pieces of white paper in their hats to associate them to their French allies, whose distinguishing mark was the white cockade.[6] The battle raged not only around James' camp, but actually in the Boyne itself. "…(The Jacobites) maintained a desperate fight in the bed of the river…(driving) the Danish brigade back into the stream."[7]

In 2000 the state acquired Oldbridge estate, an element of the battle's core landscape. Subsequently Dúchas (DoEHLG), commissioned a team from the Dept of Archaeology, UCD, to carry out an archaeological survey on the estate[8]. Geophysics revealed the probable site of Oldbridge village. Systematic field walking and metal detecting recovered musket balls and coins of a date relevant to the battle. A good overview of the battle is available in Murtagh's (2006) "The battle of the Boyne 1690: A guide to the battle field"[9] and a wider appreciation of the historical setting can be found in Child's (2007) "The Williamite wars in Ireland, 1688-91[10].

Navigation schemes on the major rivers of Ireland were taking place in the 18th century. Local large landholding families along the Boyne made a special request to the government to begin construction of a navigation system on the river in 1710. The Boyne was canalised between 1748 and 1790 in order to encourage trade with Dublin and to transport corn to the port of Drogheda. The Oldbridge part of the Boyne Navigation consists of a cut which commenced about 400 metres to the south of Oldbridge Estate and curved around the western and northern boundary of the estate. It then continued in a roughly south-eastern direction past Grove Island. It rejoined the Boyne just south of Yellow Island and outside

[5] Stout, G. Newgrange and the Bend of the Boyne, 114-119, Dublin 2002

[6] Wilde, W. The Boyne and Blackwater, 192-205. Dublin 3rd ed. 1949

[7] Macaulay, T.B. 1979 The History of England. Penguin Classics

[8] Cooney, G., Byrnes, E., Brady C. 2002 'The Archaeology of the Battle of the Boyne at Oldbridge, Co. Meath' *Archaeology Ireland* Vol. 16 No. 4 Winter 2002

[9] Murtagh, H. 2006 The battle of the Boyne 1690: A guide to the battlefield. Drogheda. The Boyne Valley Honey Company

[10] Childs, J. 2007 The Williamite wars in Ireland, 1688-1691. London Continuum Books

of the study area. The remainder of the river to Drogheda was navigable without the need for canals.

DETAILS OF PROPOSED DEVELOPMENT

Niall Mellon and Pat O' Reilly are co-owners of 26 hectares of land at Oldbridge, Rathmullen Road, Drogheda, County Meath. Theses lands are zoned residential and located within an area designated as a primary growth centre in Meath's County Council development plan. The owners originally lodged planning permission for the provision of 745 no. residential units, a 3.13ha neighbourhood park addressing the River Boyne, a 1.6ha linear park strip bounding the M1; traffic and carriageway improvements and reconfiguration to Rathmullen Road and to Sheephouse Road including the provision of a new vehicular access points to the site at Rathmullen Road (via a new roundabout) and at Sheephouse Road, crèche provision and related landscape and servicing works.

As part of the development, the owners will set aside the Northern slopes adjacent the Boyne, provide parking, allow access and erect relevant heritage signage for interested visitors

A decision to grant permission was made by the Meath County Council on the 20th July 2007, subject to 34 conditions. The number of residential units is now reduced to 683 residences, with an associated set aside of a component of the site to allow for the possible future provision of a school.

Meath County Councils decision was appealed to An Bord Pleanala on the 14th August 2007. On the 9th May 2008 An Bord Pleanala sought additional information relating to Archaeology, Noise and layout/design to be resubmitted before the 17th July 2007. The archaeology is being addressed by this report.

GEOPHYSICS

A geophysical survey was requested as part of the Request for Additional Information and was conducted as part of the wider archaeological investigation. The proposed development area was subject to preliminary gradiometer scanning and anomalies located during the preliminary gradiometer scan were targeted with detailed survey. Please see Appendix I for the full report.

SUMMARY OF REMAINS UNCOVERED

FIELD 1

Field 1 was the southernmost field. 48 of the trenches were in field 1. 6 contained definite archaeology, 22 contained remains of potential archaeological interest and 20 contained no remains of archaeological interest (see Fig 6).

The definite remains comprised 2 cremations (T23 & 11), a ring ditch (T87), a pit containing prehistoric pottery (T66), a pit containing a cache of prehistoric worked flint (T64) and a pit containing in-situ burning (T1). The potential remains comprised ditches and pits of unknown antiquity many of which may be of post-medieval or modern date. It is notable that a number of those undated ditches in the north east of the field (T47, 54 & 59) do appear to be sealed beneath the non-natural subsoil, suggesting some antiquity.

Along with the ring ditch and a number of other smaller anomalies, the geophysical survey revealed a rectangular relic field system in the centre of Field 1. It was encountered 7 times (T13, 87, 64, 15, 19, 65 & 16) and excavated in 6 cases but did not reveal any dating evidence. Trench 100 was stripped and a further 3m length of the ditch was excavated by hand, specifically to attempt retrieval of dating evidence from this feature, but none was discovered. It was found to cut the ring ditch (T87) and consequently post-dates it. It probably dates from the Medieval to post-medieval period and remains of unsure archaeological significance.

FIELD 2

Field 2 was in the centre of the development and contained 20.5 of the trenches. Only 1 of those contained definite archaeological remains, 9.5 contained potential remains and 11 contained no remains of archaeological interest (see Fig 6).

Only 1 feature considered of definite archaeological value was discovered in field 2. It comprised a ditch terminus or elongated pit (T49) that contained a fragment of burnt bone and was sealed beneath a layer of non natural subsoil. A number of geophysical anomalies were noted in Field 2 (see Appendix I and Fig 6) but where dating evidence was retrieved all were proven to be of post-medieval date.

FIELD 3

Field 3 was the northernmost field and is located just south of the Boyne River. It contained 22 trenches, 8 with definite archaeological remains, 5 with potential archaeological remains and 9 with no remains of archaeological interest (see Fig 6).

A prehistoric enclosure, of probable Middle Bronze Age date (c 1500BC) and approximately 70m in diameter, was discovered in field 3 (T50, 97, 44 & 95). A relatively dense cluster of archaeological remains was also encountered, mostly to the exterior of the enclosure (T68, 62, 99 & 46). The potential archaeological remains comprise undated ditches and pits.

The geophysical report proved of limited value in field 3 with most anomalies proving of relatively recent or non-archaeological origin.

FIELD 4

Field 4 was located to the northeast of the development and contained 6.5 trenches. It contained 1 trench with definite archaeological remains, 3.5 with potential archaeological remains and 2 with no archaeological remains (see Fig 6).

The remains labelled definitely archaeological in field 4 comprised a mettled surface and adjacent posthole. Its date remains unknown but the only artefact retrieved from its surface was a pottery crumb of potentially prehistoric date. The potential archaeological remains once again comprised undated ditches which do not match any previous maps but are of probable post-medieval date.

RECOMMENDATIONS

All topsoil disturbed in the course of the assessment was surveyed by a metal detector, but no artefacts identifiable as relating to the Battle of the Boyne were discovered. Despite this lack of artefactual evidence it is recommended that, due to the location of the proposal within the wider landscape of the Battle of the Boyne, all topsoil stripping undertaken in association with any developments of the site be further surveyed by metal detector.

There are substantial areas of the proposed development where nothing of archaeological significance was noted in the assessment trenches, indicating a reduced archaeological potential in these locations.

Elsewhere within the development, a number of other archaeological remains were identified (T1, 11, 64, 87, 23, 66, 30 & 35). Although significant, these features may prove isolated.

One definite and significant cluster of archaeological remains has been identified located in the north field. These archaeological remains comprise a prehistoric enclosure of probable Middle Bronze Age date c.1500BC and associated remains, mostly located to the exterior of the enclosure.

The proposed developments will impact on these surviving archaeological remains. However, the assessment has revealed that they have suffered from significant plough truncation and by and large survive only as sub soil cut features. It is therefore recommended that pre-development mitigation takes place in the form of archaeological excavation and preservation by record. In the case of the enclosure, it is recommended that an area some 100m by 200m be topsoil stripped under archaeological supervision, and all features uncovered be excavated and recorded

We also recommend that provision be made for further small scale investigation of features extending to the North and outside the development area, should any substantive unresolved archaeological questions remain.

It is further recommended that the smaller isolated features uncovered in the course of the assessment also be the subject of pre-development investigations consisting of the monitored topsoil removal of an area some 20m^2 area surrounding each feature and their subsequent excavation and recording.

The remainder of the field should be archaeologically monitored during or before construction works. This should be carried out by mechanical excavators fitted with toothless bucket under the supervision of a qualified archaeologist.

At all stages of this assessment, office consultation has taken place with Chief Archaeologist, Brian Duffy, and with Senior Archaeologist, Planning Section, Victor Buckley and Assistant Principal, National Monuments. John McDermott. There has also been on site consultation and inspection as the assessment continued. The National Monuments Service has agreed broadly with the above recommendations which have been presented to them.

Final recommendations are subject to approval by DoEHLG and National Museum of Ireland.

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INDIVIDUAL TRENCH REPORTS

Licence: **08E0506**
Field: **3**
Trench: **1**

Trench summary

Trench 1 was moved north from its original location to allow a longer trench within the development. It was 33.5m in length and traversed no noted geophysical anomalies. 2 features were tagged within its extent during monitoring. Excavation proved one to be of natural origin and the other to comprise 3 interconnecting features. The features consisted of a charcoal pit exhibiting *in-situ* burning and 2 potential postholes placed adjacent the west and east of the pit.

Monitoring archaeologist: Jim Kent
Date stripped: 06/06/08
Metal detecting archaeologist: Ros Ó'Maoldúin
Date spoil metal detected: 08/06/08
Recorded by: Bartosz Duszynski
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
101	Layer	Topsoil	D:0.2-0.3m
102	Layer	Subsoil	
103	Fill	Moderately compact light brown silty clay containing frequent flecks of charcoal and oxidized clay. Fill of 104.	L:1.2m, W:1m & D:0.25m
104	Cut	East west orientated oblong pit with a gently sloping southern side, and steep to vertical sides elsewhere, that broke gradually to a concave base.	L:1.2m, W:1m & D:0.25m
105	Cut	Potential posthole, located on the eastern side of 104. It was rectangular in plan with steep tapering sides that broke gradually to a concave base	Diam:0.25m & D:0.15m
106	Fill	Moderately compact light grey silty clay containing frequent charcoal flecks. Fill of 105.	Diam:0.25m & D:0.15m
107	Cut	Potential posthole, located on the western side of 104. It was	Diam:0.25m

		rectangular in plan and remained unexcavated.	
108	Fill	Moderately compact light grey silty clay containing frequent charcoal flecks. Fill of 107.	Diam:0.25m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	4
Logs	4
Plans	1
Sections	1
Photos	F6:45 & C6:10

Licence: **08E0506**
Field: **1**
Trench: **2**

Trench summary

Trench 2 was traversed by 3 north south orientated linear features, 2 which (204 & 206) were of relatively modern origin. 204 comprised a stone filled modern drain and 206 a ditch evident as a geophysical anomaly and excavated in trenches 23 and 59. The third, north south linear 202, comprised a ditch of uncertain antiquity from which no dating evidence was retrieved. No artefacts were retrieved from metal detecting the spoil of trench 2.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 10/06/08
Metal detecting archaeologist: Garret Sheehan
Date spoil metal detected: 16/06/08
Recorded by: Garret Sheehan and Anna Czlapicka
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
201	Dep	Mottled grey and greyish brown silty sand. Upper fill of north south linear 202.	L:2m exp., W:0.87m & D:0.34m
202	Cut	North south linear with moderately sloping sides breaking gradually to a concave base.	L:2m exp., W:0.84m & D:0.34m
203	Dep	Angular stones filling north south drain 204.	Not excavated in this trench
204	Cut	North south orientated modern drain.	Not excavated in this trench
205	Dep	Fill of north south linear 206.	Not excavated in this trench
206	Cut	North south orientated linear of modern origin also picked up in T57, 8, 15, 59 & 23.	Not excavated in this trench
207	Layer	Topsoil	D:0.35m

208	Dep	Firmly compacted brownish grey silty clay. Basal fill of 202.	L:2m exp., W:0.75m & D:0.26m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	3
Logs	3
Plans	1
Sections	1
Photos	F1:7-9 & C1:49-50

Licence: **08E0506**
Field: **1**
Trench: **3**

Trench summary

Trench 3 ran into the northern farm buildings, consequently only 16m was stripped. No archaeological remains were uncovered but 1 ferrous object was found during metal detecting.

Monitoring archaeologist: Jim Kent
Date stripped: 06/06/08
Metal detecting archaeologist: Jim Kent
Date spoil metal detected: 11/06/08
Recorded by: Daire Leahy
Date excavated and recorded: 12/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
301	Layer	Topsoil	D:0.3m
302	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
301	Fe	Metal object	

Archive list

Context sheets	0
Logs	1
Plans	0
Sections	0
Photos	C6:10

Licence: **08E0506**
Field: **4**
Trench: **43**

Trench summary

Monitoring revealed 5 potential features, 1 of which proved of natural origin. The 4 remaining features comprised 2 north south ditches (405 & 403), an east west sub-rectangular feature (407) and an oval pit (409). One sherd of post-medieval pottery was retrieved from the fill (402) of the easternmost north south orientated ditch (403), no datable artefacts were retrieved from the other (405). Test excavation of the sub-rectangular feature (407) did produce a fragment of burnt bone, however its depth, vertical sides and the nature of its fill suggest a relatively modern origin. The oval pit (409) was truncated by the sub-rectangular feature (407) and also produced no datable artefacts. One unidentifiable corroded iron object was retrieved from the metal detecting the spoil of trench 4.

Monitoring archaeologist: Anna Bakiewcz
Date stripped: 09/06/08
Metal detecting archaeologist: Rhiannon Mann
Date spoil metal detected: 17/06/08
Recorded by: Garrett Sheehan and Rhiannon Mann
Date excavated and recorded: 17/06/08
Date signed off: 17/06/08

Context Register

Context No	Type	Description	Dimensions
401	Layer	Topsoil	
402	Fill	Loosely compacted orangey brown silty clay containing v. occasional charcoal flecks. Fill of 403.	L:2.45m exp., W:0.85m & D:0.25m
403	Cut	North south linear with moderately sloping sides that broke gradually to a concave base.	L:2.45m exp., W:0.85m & D:0.25m
404	Fill	Firmly compacted orangey brown silty clay containing occasional charcoal flecks. Fill of 405.	L:2.5m exp., W:0.78m & D:0.27m
405	Cut	North south linear with steep to moderately sloping sides that broke gradually to a concave base.	L:2.5m exp., W:0.78m & D:0.27m

406	Fill	Firmly compacted dark brownish grey clay containing frequent decayed stone. Re-deposited natural, fill of 407.	L:2m exp., W:0.52m & D:1.6m
407	Cut	East west orientated sub-rectangular feature with v. steep to vertical sides that broke gradually to a concave base.	L:2m exp., W:0.52m & D:1.6m
408	Fill	Loosely compacted orange silty clay containing occasional charcoal flecks.	L:1.52m exp., W:0.56m & D:0.4m
409	Cut	Oval pit with gentle to moderately sloping sides that broke gradually to a concave base. Truncated on the north by 407.	L:1.52m exp., W:0.56m & D:0.4m

Finds list

Find #	Material	Description	Context/Location
401	Fe	1 piece of corroded iron	401
402	Pottery	1 sherd of post-medieval pottery	402
401	Bone	1 piece of burnt bone	404

Archive list

Context sheets	8
Logs	7
Plans	2
Sections	3
Photos	C1:52-64 & F1:1-6

Licence: **08E0506**
Field: **1**
Trench: **5**

Trench summary

No archaeological remains were uncovered in trench 5. 3 features were tagged during monitoring, but through excavation, all were proved of natural origin. No artefacts were recovered when metal detecting the spoil.

Monitoring archaeologist: Jim Kent
Date stripped: 06/06/08
Metal detecting archaeologist: Ros Ó'Maoldúin
Date spoil metal detected: 06/06/08
Recorded by: Jim Kent
Date excavated and recorded: 18/06/08
Date signed off: 18/06/08

Context Register

Context No	Type	Description	Dimensions
501	Layer	Topsoil	D:0.2-0.35m
502	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	C6:43

Licence: **08E0506**
Field: **1**
Trench: **6**

Trench summary

3 features were tagged in trench 6 during monitoring. Excavation proved 2 to be of natural origin and the third to be an oval pit containing a single fill and no datable artefacts.

Monitoring archaeologist: Jim Kent
Date stripped: 06/06/08
Metal detecting archaeologist: Jim Kent
Date spoil metal detected: 12/06/08
Recorded by: Robert Cwik
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
601	Layer	Topsoil	D:0.35m
602	Layer	Subsoil	
603	Fill	Loosely compacted mid to dark brown silty clay. Fill of 604.	L:0.58m, W:0.4m & D:0.24m
604	Cut	Northeast southwest orientated oval pit with steep to vertical sides that broke gradually to a concave base.	L:0.58m, W:0.4m & D:0.24m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	3
Plans	1
Sections	1
Photos	C6:54 & F6:7

Licence: **08E0506**
Field: **1**
Trench: **7**

Trench summary

Trench 7 was 10m long. No archaeological remains were uncovered within its extent and no artefacts were recovered from the metal detecting of its spoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 10/06/08
Metal detecting archaeologist: Jim Kent
Date spoil metal detected: 12/06/08
Recorded by: --
Date excavated and recorded: --
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
701	Layer	Topsoil	D:0.3m
702	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	3

Licence: **08E0506**
Field: **1**
Trench: **8**

Trench summary

Two features were discovered within trench 8. The first (805) was a relatively modern north south aligned ditch, visible as a geophysical anomaly and also noted in trenches 2, 15, 23, 57, 58 and 59. The second was a north south orientated, stone filled, post-medieval drain. 3 metal artefacts and 1 flint core were retrieved from the spoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 06/06/08
Metal detecting archaeologist: Garret Sheehan
Date spoil metal detected: 16/06/08
Recorded by: Garret Sheehan and Anna Czaplicka
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
801	Dep	Topsoil	D:0.4 - 0.5m
802	Dep	Greyish brown silty sand fill of cut 805. Modern	L:1.6m exp., W:0.7m & D:?
803	Dep	Stone fill of /north south drain 804.	L:1.6m exp., W:1.25m & D:0.37
804	Cut	Cut of north south orientated, post-medieval drain.	L:1.6m exp., W:1.25m & D:0.37m
805	Cut	Cut of relatively modern north south orientated ditch. Plastic retrieved from fill.	L:1.6m exp., W:0.7m & D:?

Finds list

Find #	Material	Description	Context/Location

801	Fe	Iron nail	801
802	Fe	Iron flat bar with nails	801
803	Flint	Potential core	801
804	Fe/Wood	Iron and wood peg	801

Archive list

Context sheets	4
Logs	6
Plans	1
Sections	1

Licence: **08E0506**
Field: **1**
Trench: **9**

Trench summary

Trench 9 was traversed by 1 ditch and 3 modern field drains. The ditch was northeast southwest orientated and had a concave base. No artefacts were retrieved from its fill and it remains undated.

Monitoring archaeologist: Jim Kent
Date stripped: 06/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 20/06/08
Recorded by: Tara Clarke
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
901	Dep	Topsoil	D:0.4 - 0.5m
902	Dep	Mid-orangey brown clay. Non natural subsoil.	D:?
903	Dep	Natural subsoil.	
904	Cut	Light brown sandy clay fill of ditch 905.	L:8.5m exp., W:0.66m & D:0.28m
905	Cut	Cut of northeast southwest orientated linear with moderately sloping sides that broke gently to a concave base.	L:8.5m exp., W:0.66m & D:0.28m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2

Logs	4
Plans	1
Sections	1

Licence: **08E0506**
Field: **1**
Trench: **10**

Trench summary

Trench 10 was 20m in length and was moved 10m to the south due to overhanging electricity cables. One potential pit was tagged during the monitoring but it turned out to be natural in origin. No artefacts were retrieved when metal detecting the spoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 10/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 20/06/08
Recorded by: Bartosz Duszynski
Date excavated and recorded: 17/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
1001	Layer	Topsoil	D:0.5m
1002	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	C6:23

Licence: **08E0506**
Field: **1**
Trench: **11**

Trench summary

4 features were tagged in trench 11during monitoring. 2 of those were north south orientated modern stone filled drains. The remaining 2 features comprised 2 pits. The most easterly (1103) contained a cremation deposit and one flint flake. The other (1106) produced no dateable artefacts. One piece of unidentifiable corroded iron was retrieved when metal detecting and a further 4 flint flakes were retrieved.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 10/06/08
Metal detecting archaeologist: Garrett Sheehan
Date spoil metal detected: 06/06/08
Recorded by: Garrett Sheehan
Date excavated and recorded: 20/06/08
Date signed off: 10/06/08

Context Register

Context No	Type	Description	Dimensions
1101	Fill	Moderately compact brown silty clay containing occasional charcoal and burnt bone. Upper fill of 1103.	L:0.4m, W:0.33m & D:0.4m
1102	Fill	Moderately compact silty clay containing frequent charcoal flecks and occasional burnt bone. Basal fill of 1103.	L:0.26m, W:0.2m & D:0.1m
1103	Cut	North south orientated oval pit moderately sloping sides breaking gently to a concave base.	L:0.8m, W:0.58m & D:0.3m
1104	Layer	Natural subsoil.	
1105	Fill	Loosely compacted greyish brown clayey silt containing occasional charcoal flecks. Fill of 1106.	L:2.6m, W:1.1m & D:0.18m
1106	Cut	Northeast southwest orientated oblong pit containing occasional charcoal flecks.	L:2.6m, W:0.65m & D:0.18m

Finds list

Find #	Material	Description	Context/Location
1101	Flint	Flint flake	1101
1102	Fe	Corroded piece of iron	1101
1103	Bone	Burnt bone	1102
1104	Flint	Flint flake	1102
1105	Flint	Flint flake	1101
1106	Flint	Flint flake	1101
1107	Bone	Burnt bone	1101
1108	Flint	Flint flake	1101

Archive list

Context sheets	6
Logs	7
Plans	1
Sections	2
Photos	F2:27, 29, 33 & 35-37 C1: 65, 66, 71, 74 & 79-82
Samples	2

Licence: **08E0506**
Field: **1**
Trench: **12**

Trench summary

3 features were tagged during the monitoring of trench 12, but through excavation, all were proved natural. No artefacts were retrieved during the metal detecting of the spoil.

Monitoring archaeologist: Jim Kent
Date stripped: 18/06/08
Metal detecting archaeologist: Jim Kent
Date spoil metal detected: 18/06/08
Recorded by: Jim Kent
Date excavated and recorded: 18/06/08
Date signed off: 18/06/08

Context Register

Context No	Type	Description	Dimensions
1201	Layer	Topsoil	D:0.3-0.35m
1202	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	C6:42

Licence: **08E0506**
Field: **1**
Trench: **13**

Trench summary

Two north south orientated ditches were uncovered within trench 13. The furthest east (1305) was noted on the geophysical survey as part of a field system occurring in fields 1 and 2. It was also present in trenches 64, 15, 19, 16 and 28. The section revealed in trench 13 was 1.4m wide, 0.45m deep, had gradually tapering sides that broke gently to a rounded base and contained only one fill (1304). The second ditch (1306) was 2m wide, 0.55m deep and contained two fills (1307 & 1308). No artefacts were retrieved from either intervention but both features were sealed beneath subsoil (1302), suggesting some antiquity. No artefacts were retrieved when metal detecting the spoil.

Monitoring archaeologist: Jim Kent
Date stripped: 06/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 20/06/08
Recorded by: Bartosz Duszynski
Date excavated and recorded: 16/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
1301	Dep	Topsoil	D:0.45 - 0.5m
1302	Dep	Non natural subsoil	D:0.2m
1303	Dep	Natural subsoil	
1304	Fill	Firmly compacted mid brown silty clay containing occasional flecks of charcoal. Fill of cut 1305.	L: 2m exp., W:1.4m & D:0.45m.
1305	Cut	Cut of north south orientated linear with gradually tapering sides that broke gently to a rounded base.	L: 2m exp., W:1.4m & D:0.45m.
1306	Cut	Cut of north south orientated linear gradually sloping sides that broke gradually to an uneven	L:2m exp., W:2m & D:0.55m.

		base.	
1307	Fill	Firmly compacted mid brown sandy clay containing occasional flecks of charcoal. Upper fill of cut 1306.	L:2m exp., W:2m & D:0.4m
1308	Fill	Firmly compacted light brown silty clay containing frequent flecks of charcoal . Basal fill of cut 1306	L:2m exp., W:2m & D:0.15m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	5
Logs	3
Plans	2
Sections	2

Licence: **08E0506**
Field: **1**
Trench: **14**

Trench summary

Trench 14 extended over two geophysical anomalies of potential archaeological interest. 3 features were tagged during monitoring but through excavation 2 were proved of natural origin. The remaining feature comprised a north south linear from which no datable artefacts were retrieved.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 06/06/08
Metal detecting archaeologist: Aaron Johnston
Date spoil metal detected: 06/06/08
Recorded by: Toril Bergsvik Johnston
Date excavated and recorded: 19/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
1401	Layer	Topsoil	D:0.2-0.25m
1402	Layer	Subsoil	
1403	Layer	Non natural subsoil	D:0.15-0.2m
1404	Fill	Loosely compacted greyish brown sandy clay containing occasional charcoal flecks. Fill of 1405	L:2.4m exp., W:1m & D:0.32m
1405	Cut	North south orientated ditch with gently sloping sides that broke imperceptibly to a concave base.	L:2.4m exp., W:1m & D:0.32m

Finds list

Find #	Material	Description	Context/Location
1401	Lead	1 piece of lead	1401

Archive list

Context sheets	2

Logs	5
Plans	1
Sections	1
Photos	6

Licence: **08E0506**
Field: **1**
Trench: **15**

Trench summary

Trench 15 was traversed by 4 north south orientated ditches, 2 of which (1503 & 1505) were visible as geophysical anomalies. The furthest west of the ditches (1503) was part of the rectangular field system also recorded in trenches 65, 16, 13, 64 and 15. The second furthest east (1505) was the modern ditch that also traversed trenches 2, 57, 8, 58, 59 and 23. No dating evidence was retrieved from either of the other 2 ditches.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 5-6/06/08
Metal detecting archaeologist: Garret Sheehan
Date spoil metal detected: 16/06/08
Recorded by: Garret Sheehan and Rhiannon Mann
Date excavated and recorded: 13/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
1501	Dep	Topsoil	
1502	Dep	Loosely compacted orangey brown clayey silt containing v. occasional flecks of charcoal. Fill of north south orientated linear 1503.	L:1.6m exp., W:1.34m & D:0.48m
1503	Cut	North south orientated ditch with moderately sloping sides that broke gradually to a concave base. Part of the rectangular field system also recorded in trenches 65, 16, 13, 64 and 15.	L:1.6m exp., W:1.34m & D:0.48m
1504	Dep	Loosely compacted dark greyish brown silty clay containing occasional flecks of charcoal. Fill of north south linear 1505.	L:1.6m exp., W:1.2m & D:? (excavated in T59 & T23)
1505	Cut	Cut of north south linear. Not excavated in this trench.	L:1.6m exp., W:1.2m & D:? (excavated in T59 & T23)
1506	Dep	Loosely compacted light brown silty clay containing v. occasional flecks of charcoal. Fill of north south linear 1507.	L:1.6m exp., W:1.5m & D:0.42m

1507	Cut	North south linear with moderately to gently sloping sides that broke imperceptibly to a concave base.	L:1.6m exp., W:1.5m & D:0.42m
1508	Dep	Firmly compacted mid yellowish brown silty clay. Upper fill of north south ditch 1510.	L:1.6m exp., W:1.02m & D:0.19m
1509	Dep	Loosely compacted orangey brown sandy silt. Basal fill of north south ditch 1510.	L:1.6m exp., W:1.02m & D:0.44m
1510	Cut	Cut of north south orientated ditch moderate to steeply sloping sides that broke sharply to a flat base.	L:1.6m exp., W:1.02m & D:0.44m

Finds list

Find #	Material	Description	Context/Location
1501	Fe	Unidentifiable piece of corroded iron	1501

Archive list

Context sheets	9
Logs	3
Plans	2
Sections	3
Photos	C1:39-43 & F1:13-16

Licence: **08E0506**
Field: **1**
Trench: **16**

Trench summary

4 features were tagged during the monitoring of trench 16. Excavation proved 3 of these natural. The remaining feature (1603) comprised an east west orientated ditch that was also visible as a geophysical anomaly. It forms part of an enclosure also encountered in trenches 15, 64 and 13. 2 flint flakes were retrieved from its basal fill.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 06/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 20/06/08
Recorded by: Daire Leahy & Tara Clarke
Date excavated and recorded: 13/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
1601	Fill	Moderately compact mid greyish brown sandy silt containing occasional flecks of charcoal. Upper fill of 1603.	L:exp., W:0.62m & D:0.1m
1602	Fill	Firmly compacted mid yellowish grey sandy clay containing occasional charcoal flecks. Basal fill of 1603.	L:6m exp., W:0.6m & D:0.52m
1603	Cut	East west orientated curvelinear ditch with steeply sloping sides tapering to a rounded base.	L:6m exp., W:0.62m & D:0.5m
1604	Dep	Topsoil	D:0.3m
1605	Dep	Yellowish brown compact clay non natural subsoil.	D:0.2m
1606	Dep	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
1601	Flint	2 flakes	1602

Archive list

Context sheets	3
Logs	5
Plans	1
Sections	3

Licence: **08E0506**
Field: **1**
Trench: **17**

Trench summary

1 feature was tagged in trench 17 during monitoring. Excavation revealed it to constitute a north south linear ditch. No artefacts were retrieved from its fill. 1 piece of corroded iron was retrieved from the metal detecting of the spoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 06/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 06/06/08
Recorded by: Bartosz Duszynski
Date excavated and recorded: 17/06/08
Date signed off: 17/06/08

Context Register

Context No	Type	Description	Dimensions
1701	Layer	Topsoil	
1702	Layer	Subsoil	
1703	Cut	North south linear with gently sloping sides that broke gradually to a concave base.	L:2m exp., W:1.85 & D:0.39m
1704	Fill	Loosely compacted yellowish brown silty sand. Fill of 1703	L:2m exp., W:1.85 & D:0.39m

Finds list

Find #	Material	Description	Context/Location
1701	Fe	1 piece of corroded iron	1701

Archive list

Context sheets	2
Logs	5
Plans	1
Sections	1

Photos	F6:20 & 22 C6:24

Licence: **08E0506**
Field: **1**
Trench: **18**

Trench summary

7 potential features were tagged during the monitoring. Through excavation 2 were proved of natural origin and the remainder comprised a pit (1805), a north south linear (1803) and 2 patches of *in-situ* burning. A fragment of brick and an iron nail were retrieved from the north south linear, but no artefacts were retrieved from the pit.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 05/06/08
Metal detecting archaeologist: Aaron Johnston
Date spoil metal detected: 20/06/08
Recorded by: Rhiannon Mann
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
1801	Layer	Topsoil	
1802	Fill	Firmly compacted orange brown silty clay containing occasional charcoal flecks. Fill of 1803	L:1.6m exp., W:1m & D:0.24m
1803	Cut	North south orientated linear feature with gently sloping sides that broke gradually to a flat base.	L:1.6m exp., W:1m & D:0.24m
1804	Fill	Moderately compact dark purplish brown silty clay containing charcoal and possible *in-situ* burning. Fill of 1805.	Diam:0.7m & D:0.22m
1805	Cut	Circular pit with steep sides that broke gradually to a flat base.	Diam:0.7m & D:0.22m
1806		Patch of *in-situ* burning	
1807		Patch of *in-situ* burning	

Finds list

Find #	Material	Description	Context/Location
1801	Brick	Post-medieval red brick	1802

1802	Fe	Iron nail	1802

Archive list

Context sheets	4
Logs	1
Plans	1
Sections	2
Photos	F2:23-25 & C2:88-93

Licence: **08E0506**
Field: **1**
Trench: **19**

Trench summary

5 features were tagged in trench 19 during monitoring. Excavation revealed 2 to be of natural origin and a 3rd to be a modern drain. The 2 remaining features were north south orientated linear features. The furthest west (1905) was a ditch forming the field system also picked up in trenches 13, 16, 64, 65 & 15. No artefacts were retrieved from the fills of the ditches or through metal detecting of the topsoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 5/06/08
Metal detecting archaeologist: Aaron Johnston
Date spoil metal detected: 20/06/08
Recorded by: Tara Clarke
Date excavated and recorded: 16/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
1901	Layer	Topsoil	
1902	Layer	Orangey brown subsoil (not natural)	
1903	Layer	Natural Subsoil	
1904	Dep	Moderately compacted mid orangey brown clayey silt containing occasional small sub-angular stones. Fill of north south linear 1905.	L:1.6m exp., W:0.66m & D:0.4m
1905	Cut	North south linear with steep tapering sides that broke gently to a concave base.	L:1.6m exp., W:0.66m & D:0.4m
1906	Dep	Moderately compacted light yellowish brown silty clay containing occasional charcoal flecks. Upper fill of north south linear 1908.	L:1.6m exp., W:0.45m & D:0.13m
1907	Dep	Firmly compacted light orangey brown silty clay containing occasional charcoal flecks. Basal fill of north south linear 1908.	L:1.6m exp., W:0.06m & D:0.13m
1908	Cut	North south orientated linear ditch	L:1.6m exp.,

		with gently sloping sides that broke gradually to a flat base.	W:0.52m & D:0.13m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	5
Logs	4
Plans	2
Sections	2

Licence: **08E0506**
Field: **1**
Trench: **20**

Trench summary

3 features were tagged in trench 20 during monitoring but through excavation 2 were proved of natural origin. The remaining feature was a northeast southwest orientated linear that produced no finds. No finds were retrieved through metal detecting the spoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 05/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 20/06/08
Recorded by: Bartosz Duszynski
Date excavated and recorded: 11/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
2001	Dep	Topsoil	D:0.5 - 0.8m
2002	Dep	Subsoil	
2003	Fill	Friable light grey silty sand. Fill of northeast southwest linear 2004.	L: 1.6m exp., W:1.25 & D:0.36
2004	Cut	Northeast southwest orientated linear with moderately sloping sides that broke gradually to a concave base.	L: 1.6m exp., W:1.25 & D:0.36

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	4
Plans	1
Sections	1

Licence: **08E0506**
Field: **1**
Trench: **21**

Trench summary

One potential linear was tagged during monitoring but excavation proved it of natural origin.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 06/06/08
Metal detecting archaeologist: Aaron Johnston
Date spoil metal detected: 20/06/08
Recorded by: Bartosz Duszynski
Date excavated and recorded: 17/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
2101	Layer	Topsoil	D:0.5m
302	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	C6:25

Licence: **08E0506**
Field: **1**
Trench: **22**

Trench summary

Trench 22 contained 1 north south orientated linear ditch (2202). No artefacts were retrieved from its fill or the metal detecting of the spoil.

Monitoring archaeologist: BD
Date stripped: 04/06/08
Metal detecting archaeologist: GS
Date spoil metal detected: 20/06/08
Recorded by: AC
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
2201	Fill	Mid brown sandy clay containing occasional charcoal flecks	L:2m exp., W:1.82m & D:0.75m
2202	Cut	North south linear ditch with moderately sloping sides that broke gradually to a concave base.	L:2m exp., W:1.82m & D:0.75m
2203	Layer	Topsoil	D:0.18m
2204	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	3
Plans	1
Sections	1

Photos	3

Licence: **08E0506**
Field: **1**
Trench: **23**

Trench summary

Trench 23 contained 3 features, a cremation pit and 2 north south linear ditches. Plastic was found within the fill of 1 ditch (2309), proving it of modern origin. No finds were retrieved from the other ditch (2305), but it was sealed beneath the non-natural subsoil, suggesting some antiquity.

The cremation pit (2315) was oval (2.4 by 1.4m) in plan and 0.8m deep. Where the cremation deposit was located, in the northern end of the feature, the pit was at its deepest and had noticeably steeper sides. Extensive *in-situ* burning was evident in the northern end, suggesting the cremation may have taken place *in-situ*. Elsewhere, the sides were less steep and the large southern portion of the pit may have served as an access to the cremation's location.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 04/06/08
Metal detecting archaeologist: Daire Leahy
Date spoil metal detected: 11/06/08
Recorded by: Tara Clarke
Date excavated and recorded: 11/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
2301		Topsoil	D:
2302		Non natural subsoil	D:?
2303		Natural subsoil.	
2304	Str	North south alignment of large cut stones alongside cut 2309.	L:1.6m exp., W:0.25m & H:0.25m
2305	Cut	North south ditch with gently sloping that broke gradually to a flat base. Sealed by subsoil layer 2302.	L:1.6m exp., W:1.5m & D:0.34m
2306	Fill	Moderately compacted dark greyish brown silty clay containing occasional charcoal flecks. Fill of 2305.	L:1.6m exp., W:1.5m & D:0.34m
2307	Fill	Small to medium sub-angular stones and loosely compacted brownish grey sandy silt	L:1.6m exp., W:1.48m & D:0.3m

		containing occasional charcoal flecks. Upper fill of 2309.	
2308	Fill	Loosely compacted mid orangey brown sandy silt containing occasional flecks of charcoal. Basal fill of 2309.	L:1.6m exp., W:1.34m & D:0.56m
2309	Cut	North south linear with steeply sloping sides breaking gradually to a concave base.	L:1.6m exp., W:1.48m & D:0.86m
2310	Fill	Moderately compact mid reddish brown silty clay containing frequent pieces of charcoal, burnt twigs and occasional sub-angular stones. Upper fill of cremation pit 2315.	L:2.4m, W:1.4m & D:0.4m
2311	Fill	Firmly compacted light yellowish brown sandy clay containing occasional flecks of charcoal. Upper fill of cremation pit 2315.	Variation within 2310. See above for dimensions
2312	Fill	Loosely compacted mid reddish brown silty clay containing moderate amounts of charcoal flecks and burnt bone. Secondary fill of cremation pit 2315.	L:0.98m, W:0.72m & D:0.16m
2313	Fill	Loosely compacted dark blackish brown clayey silt containing frequent charcoal flecks and pieces of burnt bone. Cremation deposit within pit 2315.	L:0.84m W:0.72m & D:0.18m
2314	Dep	Curved alignment of stone placed on cremation in pit 2315. Single layer	L:0.48m, W:0.34m & D:12m
2315	Cut	North south orientated oval pit, considerably deeper to the northern end. Moderate to steeply sloping sides breaking gradually to a concave base, except at the north where the sides were vertical and broke suddenly to a flat base. In-situ burning in the northern end.	L:2.4m, W:1.4m & D:0.8m
2316	Fill	Firmly compacted mid greyish brown silty clay containing occasional burnt stone and charcoal. Secondary fill of 2315.	L:1.56m, W:0.9m & D:0.36m
2317	Fill	Moderately compact reddish grey silty clay containing frequent pieces of charcoal and fire cracked stone. Basal fill of 2315.	L:1m, W:1m & D:0.4m

Finds list

Find #	Material	Description	Context/Location

2301	Fe	4 pieces of corroded iron	2301
2302	Flint	Burnt struck flake	2310
2303	Pottery?	Possible crumb of prehistoric pottery	2310

Archive list

Context sheets	14
Logs	6
Plans	5
Sections	5
Photos	F6:1-5,8,9,15,16,19-21 C6:25,26,46-53 & 57-60

Licence: **08E0506**
Field: **1**
Trench: **24**

Trench summary

3 features were tagged in trench 24 during monitoring. Through excavation 2 were proved of natural origin. The remaining feature comprised a pit or ditch terminal that extended out of the trench, under the southern baulk. No finds were retrieved from the pit or from metal detecting the spoil.

Monitoring archaeologist: Bartosz Dusynski
Date stripped: 04/06/08
Metal detecting archaeologist: Ros Ó'Maoldúin
Date spoil metal detected: 06/06/08
Recorded by: Daire Leahy
Date excavated and recorded: 06/06/08
Date signed off: 06/06/08

Context Register

Context No	Type	Description	Dimensions
2401	Cut	Cut of pit or terminal of linear feature with steep to gradually sloping sides breaking gradually to a concave base.	L: 0.8m exp., W:1.3m & D:0.34m
2402	Dep	Moderately compact mid to light brown silty clay containing v. occasional flecks of charcoal. Fill of cut 2401.	L: 0.8m exp., W:1.3m & D:0.34m
2403	Layer	Moderately compact mid to light brown sandy clay and silt. Subsoil layer	D:0.27m
2404	Layer	Topsoil	D:0.2m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context	4

sheets	
Logs	4
Plans	1
Sections	1

Licence: **08E0506**
Field: **2**
Trench: **26**

Trench summary

Trench 26 was traversed by one north south linear (2604) that had previously been noted as a geophysical anomaly. A second parallel linear was visible on the geophysical results *c.*15m to the east. Although no artefactual evidence was retrieved 2604 was cut from the topsoil and probably represents a relatively modern field division. 2 unidentifiable pieces of corroded iron were retrieved during the metal detecting.

Monitoring archaeologist: Jim Kent
Date stripped: 04/06/08
Metal detecting archaeologist: Jim Kent
Date spoil metal detected: 10/06/08
Recorded by: Garret Sheehan and Rhiannon Mann
Date excavated and recorded: 10/06/08
Date signed off: 10/06/08

Context Register

Context No	Type	Description	Dimensions
2601	Layer	Topsoil	D:0.3-0.4m
2602	Layer	Mid orangey brown clay subsoil	D:0.1m
2603	Dep	Firmly compacted mid orangey brown silty clay containing v. occasional flecks of charcoal. Fill of north south ditch 2604.	L:2m exp., W:3m & D:0.5m
2604	Cut	North south ditch with gently sloping sides that broke gradually to a flat base. A wide 'lip' ran along the western side of the cut.	L:2m exp., W:3m & D:0.5m

Finds list

Find #	Material	Description	Context/Location
2601	Fe	Piece of unidentifiable corroded metal	2601
2602	Fe	Piece of unidentifiable corroded metal	2601

Archive list

Context sheets	4
Logs	6
Plans	1
Sections	1

Licence: **08E0506**
Field: **2**
Trench: **27**

Trench summary

2 potential features were tagged within trench 27, but through excavation both were proved of natural origin. No artefacts were recovered through metal detecting the topsoil.

Monitoring archaeologist: Jim Kent
Date stripped: 04/06/08
Metal detecting archaeologist: Garrett Sheehan
Date spoil metal detected: 05/06/08
Recorded by: Garret Sheehan and Rhiannon Mann
Date excavated and recorded: 05/06/08
Date signed off: 13/06/08

Context Register

Context No	Type	Description	Dimensions
2701	Layer	Topsoil	D:0.3m
2702	Layer	Subsoil	D:0.3m
2703	Layer	Natural subsoil	

Archive list

Context sheets	0
Logs	1
Plans	0
Sections	0
Photos	C1:8-12

Licence: **08E0506**
Field: **1**
Trench: **28**

Trench summary

4 features were tagged in trench 28 during monitoring, through excavation 3 were proven of natural origin. The remaining feature comprised a north northwest south southeast orientated ditch (2804) that appears to coincide with a geophysical anomaly which may be part of the field system noted in Field 1 (trenches 15, 64, 87, 13, 16 & 65). The trench was extended southward to attempt retrieval of dating evidence. No dating evidence was retrieved from 2804, but an east west orientated ditch (2806), which cut it, was recorded in the extension. A sherd of post-medieval blackware was retrieved from the fill of 2806. No finds were retrieved through metal detecting the spoil.

Monitoring archaeologist: Jim Kent
Date stripped: 04/06/08
Metal detecting archaeologist: Jim Kent
Date spoil metal detected: 04/06/08
Recorded by: Garret Sheehan and Rhiannon Mann
Date excavated and recorded: 05/06/08
Date signed off: 13/06/08

Context Register

Context No	Type	Description	Dimensions
2801	Dep	Topsoil	D:0.32m
2802	Dep	Mid orangey greyish brown silty clay subsoil.	D:0.53m
2803	Dep	Natural subsoil	
2804	Cut	North northwest to south southeast orientated linear with moderately sloping sides that broke sharply to a flat base.	L:4.5m exp., W:1.18m & D:0.4m
2805	Fill	Moderately compact orangey brown silty clay. Fill of ditch 2804.	L:4.5m exp., W:1.18m & D:0.4m
2806	Cut	East west linear with moderately sloping sides that tapered to a v-shaped base.	L:2m exp., W:0.4m & D:0.14m.
2807	Fill	Moderately compact light yellowish brown silty clay. Fill of linear 2806.	L:2m exp., W:0.4m & D:0.14m.

Finds list

Find #	Material	Description	Context/Location
2801	Pottery	Sherd of post-medieval blackware	2807

Archive list

Context sheets	7
Logs	9
Plans	1
Sections	2

Licence: **08E0506**
Field: **2**
Trench: **29**

Trench summary

3 features were tagged in trench 29 during monitoring. Excavation proved 1 of natural origin. The remaining 2 features comprised two north south linear ditches. Post-medieval pottery was retrieved from both ditch fills. A flint core, flake and 2 pieces of debitage were also retrieved and while they are probably residual still suggest prehistoric activity in the vicinity. 2 pieces of corroded iron were retrieved through metal detecting the spoil.

Monitoring archaeologist: Jim Kent
Date stripped: 04/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 10/06/08
Recorded by: Garret Sheehan and Rhiannon Mann
Date excavated and recorded: 09/06/08
Date signed off: 10/06/08

Context Register

Context No	Type	Description	Dimensions
2901	Dep	Topsoil	D:0.34 - 0.4m
2902	Dep	Natural subsoil	
2903	Fill	Firmly compacted mid brown silty clay containing frequent stones and very occasional flecks of charcoal. Fill of cut 2904.	L:1.6m exp., W:0.6m & D:0.35m
2904	Cut	North south orientated linear with steep sides breaking gently to a U shaped base.	L:1.6m exp., W:0.6m & D:0.35m
2905	Dep	Loosely compacted mid brown sandy silt containing occasional stones and very occasional charcoal flecks. Upper fill of north south linear 2907.	L:1.6m exp., W:1.26m & D:0.27m
2906	Dep	Firmly compacted mid orangey brown silty clay containing a moderate amount of large stones, occasional small stones and very	L:1.65m exp., W:1.95m & D:0.16m

		occasional charcoal flecks. Secondary fill of north south linear 2907.	
2907	Cut	North south orientated linear with moderately sloping sides breaking gently to a concave base.	L:1.65m exp., W:1.95m & D:0.45m
2908	Dep	Firmly compacted light greyish brown silty clay containing moderate to frequent small stones. Basal fill of north south linear 2907.	L:1.65m exp., W:1.95m & D:0.08m

Finds list

Find #	Material	Description	Context/Location
2901	Flint	Possible flint core	2901
2902	Pottery	Sherd of post-medieval blackware	2901
2903	Flint	Flake	2905
2904	Glass	Sherd of post-medieval green glass	2905
2905	Flint	Potential debitage	2906
2906	Pottery	4 sherds of post-medieval brownware	2908
2907	Pottery	1 sherd of post-medieval white glazed pottery	2908
2908	Pottery	1 sherd of post-medieval blackware pottery	2903
2909	Flint	Possible debitage	2903
2910	Fe	Unidentifiable corroded piece of iron	2901
2911	Fe	Unidentifiable corroded piece of iron	2901

Archive list

Context sheets	6
Logs	17
Plans	1
Sections	2

Licence: **08E0506**
Field: **4**
Trench: **30**

Trench summary

Trench 30 contained 3 features of archaeological potential, a large oblong pit or depression containing a mettled surface, a possible posthole and a north south orientated linear ditch. A piece of potentially prehistoric pottery and a struck flake were retrieved from the surface of the metteling. 2 other worked flints were retrieved from the topsoil. 2 pieces of corroded iron were retrieved from metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 09/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 12/06/08
Recorded by: AB
Date excavated and recorded: 12/06/08
Date signed off: 12/06/08

Context Register

Context No	Type	Description	Dimensions
3001	Fill	Moderately compact sandy silt containing frequent flecks of charcoal and evidence of *in-situ* burning. Upper fill within 3009.	Diam:0.26m
3002	Fill	Moderately compact mid orangey brown sandy clay containing occasional charcoal flecks. Upper fill within 3308.	L:3.5m, W:2.6m & D:0.19m
3003	Fill	Layer of mettling comprising of small rounded stones varying from 0.02-0.07m in diameter within 3008.	L:3.5m, W:2.6m & D:0.02-0.03m
3004	Fill	Moderately compact mid orangey brown sandy clay. Upper fill of 3007	L:1.1m exp., W:0.8m & D:??
3005	Fill	Firmly compact mid orangey brown sandy clay. Fill of 3006.	L:2.15m exp., W:0.76m & D:0.25m
3006	Cut	North south slightly curvilinear ditch with moderately sloping sides that broke gradually to a flat base.	L:2.15m exp., W:0.76m & D:0.25m
3007	Cut	Possible curvilinear feature located in the northern extension of	L:1.1m exp., W:0.8m & D:Not

		trench 30	excavated
3008	Cut	Oval depression or cut, with gently sloping sides that broke gradually to a flat base. Contained mettled surface 3003.	L:3.5m, W:2.6m & D:0.1-0.21m
3009	Cut	Rectangular in plan, not excavated, probable posthole.	Diam: 0.26m
3010	Layer	Subsoil	
3011	Layer	Topsoil	D:0.3-0.4m

Finds list

Find #	Material	Description	Context/Location
3001	Flint	1 struck flake	3002
3002	Pottery	1 sherd of potentially prehistoric pottery	3002
3003	Fe	1 corroded piece of iron	3011
3004	Fe	1 corroded piece of iron	3011
3005	Flint	1 struck flake	3011
3006	Flint	1 struck flake	3011

Archive list

Context sheets	9
Logs	1
Plans	4
Sections	5
Photos	6

Licence: **08E0506**
Field: **2**
Trench: **31**

Trench summary

The monitoring of trench 3 revealed 3 ditches. 2 were orientated northeast southwest and the 3rd was orientated north south. No artefacts were retrieved from their fills or from the metal detecting of the spoil.

Monitoring archaeologist: AB
Date stripped: 04/06/08
Metal detecting archaeologist: TBJ
Date spoil metal detected: 04/06/08
Recorded by: AJ & LB
Date excavated and recorded: 04/06/08
Date signed off: 06/06/08

Context Register

Context No	Type	Description	Dimensions
3101	Fill	Firmly compacted light to mid orangish brown silty clay. Fill of 3102.	L:2.3m exp., W:0.4m & D: 0.3m
3102	Cut	North south orientated ditch with moderately sloping sides that broke sharply to a U shaped base.	L:2.3m exp., W:0.4m & D: 0.3m
3103	Layer	Topsoil	D:0.2m
3104	Layer	Natural	--
3105	Layer	Non natural subsoil	D:0.3m
3106	Fill	Firmly compacted mid brown silty clay. Fill of 3107.	L:?., W:0.7m & D:0.5m
3107	Cut	Irregularly shaped northeast southwest orientated ditch with moderately sloping sides that broke gradually to a flat base.	L:?., W:0.7m & D:0.5m
3108	Fill	Firmly compacted light to mid brown silty clay. Fill of 3109.	L:3m exp., W:0.95m & D:0.2m
3109	Cut	Northeast southwest orientated ditch with moderately sloping sides that broke imperceptibly to a concave base.	L:3m exp., W:0.95m & D:0.2m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	6
Logs	2
Plans	3
Sections	3
Photos	16

Licence: **08E0506**
Field: **2**
Trench: **32**

Trench summary

Trench 32 contained 1 north south linear. No artefacts were retrieved from the fill or the metal detecting of the spoil.

Monitoring archaeologist: AB
Date stripped: 04/06/08
Metal detecting archaeologist: TBJ
Date spoil metal detected: 04/06/08
Recorded by: AJ & LB
Date excavated and recorded: 04/06/08
Date signed off: 06/06/08

Context Register

Context No	Type	Description	Dimensions
3201	Fill	Firmly compacted mid brown silty clay. Fill of 3203.	L:2.3m exp., W:1.8m & D:0.72m
3203	Cut	North south orientated ditch with moderately sloping sides that broke gradually to a flat base.	L:2.3m exp., W:1.8m & D:0.72m
3203	Layer	Topsoil	D:0.3m
3204	Layer	Subsoil	
3205	Layer	Non natural subsoil	D0.3-0.4m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	3
Plans	1
Sections	1

Photos	7

Licence: **08E0506**
Field: **1**
Trench: **33**

Trench summary

Trench 33 was traversed by 3 north south linear ditches. No artefacts were retrieved from the test excavation of their fills. One piece of corroded iron was retrieved from the metal detecting of the spoil.

Monitoring archaeologist: Jim Kent
Date stripped: 05/06/08
Metal detecting archaeologist: Aaron Johnston
Date spoil metal detected: 11/06/08
Recorded by: Anna Backiewicz and Aaron Johnston
Date excavated and recorded: 11/06/08
Date signed off: 13/06/08

Context Register

Context No	Type	Description	Dimensions
3301	Layer	Topsoil	
3302	Layer	Natural subsoil	
3303	Fill	Firmly compacted light orangey brown clayey sand. Fill of north south linear 3304.	L:1.6m exp., W:0.8m & D:0.02m
3304	Cut	North south orientated linear with moderately sloping sides that broke gradually to a flat base.	L:1.6m exp., W:0.8m & D:0.02m
3305	Fill	Firmly compacted mid orangey brown silty sand. Fill of north south orientated linear 3306.	L:1.6m exp., W:0.45m & D:0.25m
3306	Cut	North south orientated linear with steeply sloping sides that broke gradually to a concave base.	L:1.6m exp., W:0.45m & D:0.25m
3307	Fill	Firmly compacted mottled mid orangey brown and light yellowish brown sandy clay. Fill of north south linear 3308.	L:1.6m exp., W:1.2m & D:0.15m
3308	Cut	North south orientated linear with gently sloping sides that broke gradually to a concave base.	L:1.6m exp., W:1.2m & D:0.15m

Finds list

Find #	Material	Description	Context/Location
3301	Fe	1 piece of corroded iron	3301

Archive list

Context sheets	6
Logs	2
Plans	3
Sections	3
Photos	10

Licence: **08E0506**
Field: **4**
Trench: **34**

Trench summary

6 features were tagged in trench 34 during monitoring. Through excavation 3 were proved of natural origin. The remaining 3 comprised north south orientated ditches (3404, 3405 & 3406). Modern pottery was retrieved from the fills of 2 ditches (3404 & 3406) and while it was not the basal fill in either case, it is probably indicative of a recent date for both features. A possible flint blade was retrieved from the topsoil and an iron nail was found during the metal detecting of the spoil.

Monitoring archaeologist: TBJ
Date stripped: 09/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 17/06/08
Recorded by: AB
Date excavated and recorded: 17/06/08
Date signed off: 17/06/08

Context Register

Context No	Type	Description	Dimensions
3401	Fill	Firmly compacted mid to dark brown sandy clay. Upper fill of 3404.	L:2.2m exp., W:1.65m & D:0.55m
3402	Fill	Moderately compact mid orangey brown sandy clay. Secondary fill of 3405.	L:2.2m exp., W:2.24m & D:1.2-0.4m
3403	Fill	Firmly compacted mid to dark orangey brown sandy clay. Secondary fill of 3406.	L:2.4, W:1.98 & D:0.89
3404	Cut	North south orientated linear ditch with steeply sloping sides. Not bottomed.	L:2.2m exp., W:2.2m & D:??
3405	Cut	North south orientated linear ditch with steeply sloping sides that broke gradually to a flat base.	L:2.4m exp., W:2.48m & D:1.4m
3406	Cut	North south orientated linear ditch with gently sloping sides that broke gradually to a flat base.	L:2.4m exp., W:1.98m & D:0.89m
3407	Fill	Loosely compacted light yellow sandy silt. Upper fill of 3405.	L:2.4m exp., W:1.7m & D:0.4m
3408	Fill	Loosely compacted dark bluish grey silty clay.	L:2.4m, W:1.54m & D:0.4m

3409	Fill	Moderately compacted mid orangey brown to light yellow sandy clay.	L2.2m, W:1.4m & D:0.7m
3410	Fill	Deposit of stone along either side of the cut (Diam:0.15-0.25m), not bottomed.	L:2.2m exp., W:1.2m & D:0.43m+
3411	Layer	Subsoil	
3412	Layer	Topsoil	0.4m

Finds list

Find #	Material	Description	Context/Location
3401	Pottery	5 sherds of 19-20th Century pot	3402
3402	Pottery	2 sherds of 19-20th Century pot	3401
3403	Flint	1 struck flake	3401
3404	Fe	Iron Nail	3412
3405	Flint	Possible blade	3412

Archive list

Context sheets	10
Logs	3
Plans	2
Sections	3
Photos	113-121

Licence: **08E0506**
Field: **2**
Trench: **35**

Trench summary

Trench 35 contained 2 north south linear ditches. Modern pottery was retrieved from the base of one (3506). The other had a similar morphology and orientation, and may be of similar modern origin. One iron nail was retrieved from the metal detecting of the spoil.

Monitoring archaeologist: AB
Date stripped: 04/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 06/06/08
Recorded by: AJ & LB
Date excavated and recorded: 05/06/08
Date signed off: 06/06/08

Context Register

Context No	Type	Description	Dimensions
3501	Fill	Firmly compacted mid brown silty clay. Fill of 3502.	L:2.3m exp., W:1.1m & D:0.2m
3502	Cut	North south ditch with moderately sloping sides that broke gradually to a flat base.	L:2.3m exp., W:1.1m & D:0.2m
3503	Layer	Topsoil	
3504	Layer	Subsoil	
3505	Fill	Firmly compacted mid greyish brown silty clay. Fill of 3506.	L:2.3m exp., W:1.8m & D:1m +
3506	Cut	North south orientated ditch with steeply sloping sides, not bottomed	L:2.3m exp., W:1.8m & D:1m +
3507	Layer	Non natural subsoil	

Finds list

Find #	Material	Description	Context/Location
3501	Fe	Iron nail	3503
3502	Pottery	19-20th Century pottery	3505

Archive list

Context sheets	4
Logs	3
Plans	2
Sections	2
Photos	12-27

Licence: **08E0506**
Field: **2**
Trench: **36**

Trench summary

Trench 36 contained one north south orientated linear ditch. No datable artefacts were retrieved from the intervention excavated. An iron ring was retrieved from metal detecting the spoil.

Monitoring archaeologist: AB
Date stripped: 05/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 07/06/08
Recorded by: AJ & LB
Date excavated and recorded: 06/06/08
Date signed off: 06/06/08

Context Register

Context No	Type	Description	Dimensions
3601	Fill	Moderately compact mid-brown silty clay. Fill of 3602.	L:2.3m exp., W1.1m & D:0.5m
3602	Cut	North south orientated linear ditch with moderate to steeply sloping sides that broke gradually to a concave base.	L:2.3m exp., W1.1m & D:0.5m
3603	Layer	Topsoil	D:0.3m
3604	Layer	Natural	--
3605	Layer	Non natural subsoil	D:0.15m

Finds list

Find #	Material	Description	Context/Location
3601	Fe	Iron ring	3601

Archive list

Context sheets	2
Logs	3
Plans	1

Sections	1
Photos	3

Licence: **08E0506**
Field: **2**
Trench: **37**

Trench summary

3 features were tagged in trench 37 during monitoring but through excavation 1 was proved of natural origin. The remaining features comprised 2 north south orientated linear ditches. No artefactual evidence was retrieved from the interventions excavated. An iron horseshoe fragment was retrieved from the metal detecting of the spoil.

Monitoring archaeologist: AB
Date stripped: 05/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 09/06/08
Recorded by: AJ & LB
Date excavated and recorded: 09/06/08
Date signed off: 09/06/08

Context Register

Context No	Type	Description	Dimensions
3701	Fill	Firmly compacted mid brown silty clay. Fill of 3702.	L:2.3m exp., W:1.2m & D:0.7m
3702	Cut	North south orientated ditch with steeply sloping sides that broke imperceptibly to a concave base.	L:2.3m exp., W:1.2m & D:0.7m
3703	Layer	Topsoil	D:0.3m
3704	Layer	Natural	--
3705	Layer	Non natural subsoil	D:0.2m
3706	Fill	Moderately compact mid brown silty clay. Fill of 3707.	L:2.3m exp., W:1.1m & D:0.4m
3707	Cut	North south orientated linear ditch with moderately sloping sides that broke imperceptibly to a concave base.	L:2.3m exp., W:1.1m & D:0.4m

Finds list

Find #	Material	Description	Context/Location
3701	Fe	Fragment of an iron horseshoe	3701

Archive list

Context sheets	4
Logs	3
Plans	2
Sections	2
Photos	67-70

Licence: **08E0506**
Field: **4**
Trench: **38**

Trench summary

Trench 38 uncovered 2 north south orientated ditches. No artefacts were retrieved from the interventions excavated. 1 sherd of modern glass and 3 pieces of worked flint were retrieved when walking the spoil. No metal artefacts were retrieved from metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 16/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 06/06/08
Recorded by: AJ
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
3801	Fill	Firmly compacted mid greyish brown silty clay. Fill of 3802.	L:2.3m exp., W:0.7m & D:0.32m
3802	Cut	North south orientated linear ditch with moderate to steeply sloping sides that broke gradually to a U shaped base.	L:2.3m exp., W:0.7m & D:0.32m
3803	Fill	Firmly compacted mid brown silty clay. Fill of 3804.	L:2.3m exp., W:1m & D:0.4m
3804	Cut	North south orientated linear with moderately sloping sides that broke gradually to a concave base.	L:2.3m exp., W:1m & D:0.4m
3805	Layer	Topsoil	D:0.3m
3806	Layer	Non natural subsoil	D:0.2m
3807	Layer	Natural	

Finds list

Find #	Material	Description	Context/Location
3501	Glass	1 sherd of post-med glass	3505

3502	Flint	Possible core	3505
3503	Flint	Possible core	3505
3504	Flint	Possible scraper	3505

Archive list

Context sheets	4
Logs	3
Plans	2
Sections	2
Photos	109-112

Licence: **08E0506**
Field: **3**
Trench: **40**

Trench summary

1 feature was tagged in trench 40 but proved of natural origin through excavation. No artefacts were recovered when metal detecting the spoil.

Monitoring archaeologist: Toril Bergsvick Johnston
Date stripped: 05/06/08
Metal detecting archaeologist: Toril Bergsvick Johnston
Date spoil metal detected: 05/06/08
Recorded by: Elzbetha Zelmanska
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
4001	Dep	Topsoil	D:0.2m
4002	Dep	Non natural subsoil	D:0.4m
4003	Dep	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	C7:151 & 152

Licence: **08E0506**
Field: **3**
Trench: **41**

Trench summary

One potential feature was tagged during monitoring but proven natural in origin through excavation. 2 iron nails were recovered from metal detecting the spoil.

Monitoring archaeologist: Toril Bergsvik Johnston
Date stripped: 05/06/08
Metal detecting archaeologist: Toril Bergsvik Johnston
Date spoil metal detected: 05/06/08
Recorded by: Elzbetha Zelmanska
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
4101	Layer	Topsoil	D: 0.15m
4102	Layer	Non natural subsoil	D: 0.4m
4103	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
4101	Fe	Iron nail	4101
4102	Fe	Iron nail	4101

Archive list

Context sheets	0
Logs	1
Plans	0
Sections	0
Photos	C7:145&146

Licence: **08E0506**
Field: **3**
Trench: **42**

Trench summary

Trench 42 was traversed by 2 north south orientated linear ditches. No artefacts were retrieved from either ditch. The eastern ditch (4208) was revealed directly beneath the topsoil, cut through a layer of non-natural subsoil and contained a single fill. The western ditch was sealed beneath the subsoil and contained two fills. 4 lumps of corroded iron were retrieved from the spoil during metal detecting.

Monitoring archaeologist: Toril Bergsvick Johnston
Date stripped: 05/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: Elzbetha Zelmanska
Date excavated and recorded: 13/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
4201	Layer	Topsoil	D:0.25m
4202	Layer	Natural subsoil	--
4203	Layer	Subsoil	D:0.40
4204	Dep	Firmly compacted mid brown silty clay containing occasional charcoal flecks. Upper fill of ditch 4205.	L:2m exp., W:0.4m & D:0.2m
4205	Cut	North south orientated ditch moderate to steeply sloping sides that broke gradually to a concave base. Sealed by subsoil layer 4202.	L:2m exp., W:0.8m & D:0.35m
4206	Dep	Firmly compacted mid reddish brown silty clay containing occasional charcoal flecks. Basal fill of ditch 4205.	L:2m exp., W:0.6m & D:0.15m
4207	Dep	Firmly compacted light reddish brown silty clay containing very occasional flecks of charcoal. Fill	L:2m exp., W:0.8m & D:0.3m

		of ditch 4208.	
4208	Cut	North south orientated ditch with moderately sloping sides that broke gradually to a concave base. Cut through subsoil 4202.	L:2m exp., W:0.8m & D:0.3m

Finds list

Find #	Material	Description	Context/Location
4201	Fe	1 piece of corroded iron	4201
4202	Fe	1 piece of corroded iron	4201
4203	Fe	1 piece of corroded iron	4201
4204	Fe	1 piece of corroded iron	4201

Archive list

Context sheets	5
Logs	4
Plans	2
Sections	2
Photos	F6:16, 6 & 2 C6:125, 136 & 140

Licence: **08E0506**
Field: **3**
Trench: **43**

Trench summary

No archaeological remains were recorded in trench 43. No finds were retrieved from the metal detecting of the topsoil.

Monitoring archaeologist: Camilla Brannstrom
Date stripped: 06/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 20/06/08
Recorded by: Camilla Brannstrom
Date excavated and recorded: 06/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
4301	Layer	Topsoil	D:0.15m
4302	Layer	Non natural subsoil	D:0.4m
4303	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	0

Licence: **08E0506**
Field: **3**
Trench: **44**

Trench summary

Trench 44 was contained 2 ditches. The furthest east (4403) was a northeast southwest orientated ditch and contained a flint flake, a potential core and a substantial amount of prehistoric pottery. The pots appear to have been broken prior to deposition and judging by the decoration at least 3 vessels are represented in the material retrieved. The ditch was also picked up in trenches 50, 98, 97, and 95. The other ditch (4409) was also orientated northeast southwest, but produced no datable artefactual evidence. 1 piece of corroded iron was retrieved through metal detecting the spoil.

Monitoring archaeologist: Camilla Brannstrom
Date stripped: 05/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 19/06/08
Recorded by: Camilla Brannstrom
Date excavated and recorded: 10/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
4401	Layer	Topsoil	
4402	Layer	Natural subsoil	
4403	Cut	Northeast southwest orientated ditch with moderate to steeply sloping sides breaking gradually to a flat base.	
4404	Fill	Firmly compacted grey sandy clay containing prehistoric pottery, heat affected stones and frequent charcoal flecks. Secondary fill of 4403.	L: ??m exp., W:0.85m & D:0.32m
4405	Fill	Firmly compacted grey clay containing occasional charcoal flecks and rounded stones. Basal fill of 4403	L:??m exp., W:0.74m & D:0.25m
4406	Layer	Natural subsoil	
4407	Fill	Moderatedly compact mid brown silty clay containing occasional charcoal flecks and oyster shell.	L:??m exp., W:??, & D:0.32m

		Upper fill of 4403.	
4408	Fill	Firmly compacted dark greyish brown sandy clay containing frequent small stones and charcoal flecks. Secondary fill of ditch 4403.	L:?? exp., W:??, & D:
4409	Cut	Northeast southwest orientated ditch with moderately sloping sides that tapered gradually to a v-shaped base.	L:?? exp., W:1.06m & D:0.58m
4410	Fill	Firmly compacted dark greyish brown sandy clay. Fill of 4409.	L:?? exp., W:1.06m & D:0.58m

Finds list

Find #	Material	Description	Context/Location
4401	Flint	Possible core	4404
4402	Flint	Flake	4405
4403	Fe	1 piece of corroded iron	4401
4404	Pottery	4 trays of prehistoric pottery at least 3 large vessels. Probably middle Bronze Age.	4404

Archive list

Context sheets	8
Logs	6
Plans	1
Sections	3
Photos	F6:21, 23, 24, 25, 27 & 28 C6: 106, 107, 108, 110, 111, 112 & 119

Licence: **08E0506**
Field: **3**
Trench: **45**

Trench summary

Trench 45 contained an irregularly shaped potential ditch terminus (4504). A flint flake was retrieved from its fill. A second flint flake was retrieved from walking the spoil.

Monitoring archaeologist: CB
Date stripped: 19/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 19/06/08
Recorded by: CB
Date excavated and recorded: 16/06/08
Date signed off: 19/06/08

Context Register

Context No	Type	Description	Dimensions
4501	Layer	Topsoil	D0.2m
4502	Layer	Subsoil	
4503	Layer	Non natural subsoil (Coluvium)	D:0.4m
4504	Cut	Irregular shaped north south orientated potential ditch terminus with moderately sloping sides that broke gradually to a concave base.	L:0.6m, W:0.49m & D:0.37m
4505	Fill	Moderately compact greyish brown sandy clay containing occasional flecks of charcoal. Fill of 4504	L:0.6m, W:0.49m & D:0.37m
4506	Cut	Northwest southeast orientated plough furrow with gently sloping sides that broke imperceptibly to a concave base.	L:2m exp., W:0.49m & D:0.08m
4507	Fill	Moderately compact yellow grey silty sand. Fill of 4506.	L:2m exp., W:0.49m & D:0.08m

Finds list

Find #	Material	Description	Context/Location

4501	Flint	1 flint flake	4505
4502	Flint	1flint flake	4501

Archive list

Context sheets	6
Logs	5
Plans	1
Sections	2
Photos	F7:30, 31 & 33 C7:150, 155 & 156

Licence: **08E0506**
Field: **3**
Trench: **46**

Trench summary

4 potential features were tagged with trench 46 during monitoring. Upon further investigation 3 of these proved were genuine. The 3 features comprised 2 pits and a charcoal rich spread. Two struck flint flakes were retrieved from the basal fill one of the pits (4605) and a burnt flint flake was retrieved from the spoil. 6 pieces of corroded iron were retrieved from the spoil through metal detecting.

Monitoring archaeologist: TBJ
Date stripped: 06/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 06/06/08
Recorded by: CB & RC
Date excavated and recorded: 18/06/08
Date signed off: 19/06/08

Context Register

Context No	Type	Description	Dimensions
4601	Layer	Topsoil	
4602	Layer	Subsoil	
4603	Fill	Firmly compacted dark brown silty clay containing frequent charcoal flecks. Upper fill of 4605.	L:0.47m, W:0.3m & D:0.06m
4604	Fill	Moderately compact mid to dark brown silty clay containing occasional flecks of charcoal. Basal fill of 4605.	L:0.52m, W:0.42m & D:0.26m
4605	Cut	Oval pit with steep to vertical sides that broke gradually to a concave base.	L:0.52m, W:0.42m & D:0.27m
4606	Fill	Moderately compact dark greyish brown sandy silt containing frequent patches of charcoal. Fill of 4607.	L:
4607	Cut	Northwest southeast orientated irregular shaped pit with moderately sloping sides that broke gradually to a concave base.	L:
4608	Dep	Loosely compacted dark greyish black sandy silt containing frequent charcoal flecks.	Diam: 0.5m

Finds list

Find #	Material	Description	Context/Location
4601	Flint	1 flint flake	4604
4602	Flint	1 flint flake	4604
4603	Fe	1 piece of corroded iron	4601
4604	Fe	1 piece of corroded iron	4601
4605	Fe	1 iron nail	4601
4606	Fe	1 iron nail	4601
4607	Flint	1 burnt flint flake	4601
4608	Fe	1 fragment of a horseshoe	4601
4609	Fe	1 iron bolt	4601

Archive list

Context sheets	6
Logs	7
Plans	1
Sections	2
Photos	---

Licence: **08E0506**
Field: **1**
Trench: **47**

Trench summary

6 features were tagged in trench 47 during monitoring but on further investigation 5 were proven of natural origin. The remaining feature was a northeast southwest orientated ditch from which no artefactual material was received.

Monitoring archaeologist: JK
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 09/06/08
Recorded by: EZ
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
4701	Layer	Topsoil	D:0.3m
4702	Layer	Non natural subsoil	D:0.2m
4703	Layer	Natural subsoil	
4704	Fill	Mid to dark brown silty clay. Fill of 4705.	L:2m exp., W:1m & D:0.4m
4705	Cut	Northeast southwest orientated ditch with moderately sloping sides that broke gradually to a concave base.	L:2m exp., W:1m & D:0.4m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	1
Plans	1

Sections	1
Photos	F2:26 C:83-85

Licence: **08E0506**
Field: **2**
Trench: **48**

Trench summary

Trench 48 contained 2 features, an east west orientated linear and an irregular shaped pit or linear terminus. No artefactual evidence was retrieved from either intervention. An iron sledge hammer head was the only artifact retrieved from the metal detecting of the spoil.

Monitoring archaeologist: AB
Date stripped: 05/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 18/06/08
Recorded by: AB
Date excavated and recorded: 18/06/08
Date signed off: 18/06/08

Context Register

Context No	Type	Description	Dimensions
4801	Fill	Loosely compacted light orange silty sand. Fill of 4803.	L:2.4m exp., W:0.42m & D:0.36m
4802	Fill	Loose to moderately compacted light orange silty sand. Fill of 4804.	L:1.6m exp., W:0.85m & D:0.64m
4803	Cut	East west orientated linear feature with steeply sloping sides that broke gradually to a concave base.	L:2.4m exp., W:0.42m & D:0.36m
4804	Cut	East west orientated irregular shaped pit or linear terminus extending out under the western baulk.	L:1.6m exp., W:0.85m & D:0.64m
4805	Layer	Subsoil	
4806	Layer	Topsoil	

Finds list

Find #	Material	Description	Context/Location
4801	Fe	Sledge hammer head	4801

Archive list

Context sheets	4
Logs	4
Plans	1
Sections	2
Photos	151-158

Licence: **08E0506**
Field: **2**
Trench: **49**

Trench summary

3 features were tagged during the monitoring of trench 49 however through excavation 2 were proved of natural origin. The remaining feature was an east west orientated ditch terminus or elongated pit from which one piece of burnt bone was retrieved.

Monitoring archaeologist: AB
Date stripped: 06/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 18/06/08
Recorded by: LB
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
4901	Fill	Moderately compact mid to light greyish brown silty clay. Fill of 4902	L:1.52m exp., W:1.2m & D:0.76m
4902	Cut	East west orientated linear terminus or oblong pit steeply sloping sides that tapered to a blunt V shaped base.	L:1.52m exp., W:1.2m & D:0.76m
4903	Layer	Topsoil	D:0.3m
4904	Layer	Subsoil	D:0.2-0.3m

Finds list

Find #	Material	Description	Context/Location
4901	Flint	Struck flake	4903
4902	Fe	Nail	4901
4903	Bone	Burnt Bone	4903
4904	Fe	Horse shoe	4903

Archive list

Context	2

sheets	
Logs	3
Plans	1
Sections	1
Photos	149, 150 & 157

Licence: **08E0506**
Field: **3**
Trench: **50**

Trench summary

2 features were tagged in trench 50 during monitoring. One proved to be of natural origin and the other was the reoccurrence of the prehistoric ditch previously investigated in trench 44. It was excavated to a depth of 0.4m until a fragment of prehistoric pottery and a flint flake were recovered. A second flint flake was also retrieved from the topsoil. A copper coin, two nails and an unidentifiable piece of iron were retrieved from metal detecting the spoil.

Monitoring archaeologist: Toril Bergsvick
Date stripped: 06/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: Toril Bergsvick
Date excavated and recorded: 13/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
5001	Layer	Topsoil	
5002	Layer	Natural subsoil	
5003	Layer	Non natural subsoil	
5004	Dep	Loosely compacted greyish brown sandy clay. Upper fill of east west ditch 5005	L:2m exp., W:2m & D:??
5005	Cut	East west orientated ditch. Not fully sectioned because it was picked up in other trenches. See T44.	L:2m exp., W:2m & D:??

Finds list

Find #	Material	Description	Context/Location
5001	Pottery	1 body sherd of prehistoric pottery	5004
5002	Flint	1 flake	5004
5003	Flint	1 flake	5001
5004	Fe	1 iron nail	5001
5005	Fe	1 fragment of iron	5001

5006	Fe	1 iron nail	5001
5007	Cu	1 coin	5001

Archive list

Context sheets	5
Logs	5
Plans	1
Sections	0
Photos	F6:8-7 & C6:134-135

Licence: **08E0506**
Field: **1**
Trench: **51**

Trench summary

2 features were tagged during monitoring but both were proved natural through excavation. 1 piece of iron was retrieved when metal detecting the topsoil.

Monitoring archaeologist: Jim Kent
Date stripped: 09/06/08
Metal detecting archaeologist: Rhiannon Mann
Date spoil metal detected: 16/06/08
Recorded by: Rhiannon Mann
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
5101	Layer	Topsoil	D:0.3-0.35m
5102	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
5101	Fe	1 flat piece of curved iron.	1501

Archive list

Context sheets	0
Logs	1
Plans	0
Sections	0
Photos	2

Licence: **08E0506**
Field: **1**
Trench: **52**

Trench summary

5 features were tagged during the monitoring of trench 52. Through excavation 2 were proven of natural origin and the remaining 3 comprised modern stone filled drains. 1 iron nail and 2 pieces of unidentifiable corroded iron were retrieved through metal detecting the spoil.

Monitoring archaeologist: Jim Kent
Date stripped: 09/06/08
Metal detecting archaeologist: Anna Czaplicka
Date spoil metal detected: 18/06/08
Recorded by: Anna Czaplicka
Date excavated and recorded: 17/06/08
Date signed off: 18/06/08

Context Register

Context No	Type	Description	Dimensions
5201	Dep	Fill of modern drain 5204	
5202	Dep	Fill of modern drain 5205	
5203	Dep	Fill of modern drain 5206	
5204	Cut	Modern drain	
5205	Cut	Modern drain	
5206	Cut	Modern drain	
5207	Layer	Topsoil	

Finds list

Find #	Material	Description	Context/Location
5201	Fe	Corroded piece of iron	5201
5202	Fe	Iron nail	5201
5203	Fe	Corroded piece of iron	5201

Archive list

Context	0

sheets	
Logs	4
Plans	0
Sections	0
Photos	C :52-53

Licence: **08E0506**
Field: **1**
Trench: **53**

Trench summary

6 features were tagged during the monitoring of trench 53 but only 1 proved of potential archaeological interest. It was a curvilinear ditch (5303) that traversed the trench in on an east west orientation. No finds were retrieved from its fill or from the metal detecting of the spoil.

Monitoring archaeologist: JK
Date stripped: 09/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 20/06/08
Recorded by: RM
Date excavated and recorded: 19/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
5301	Layer	Topsoil	
5302	Fill	Loosely compacted brownish orange silty clay containing occasional flecks of charcoal. Fill of 5303.	L:1.6m exp., W:1.28m & D:0.38m
5303	Cut	Curve-linear east west orientated ditch moderate to steeply sloping sides that broke imperceptibly to a concave base.	L:1.6m exp., W:1.28m & D:0.38m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	3
Plans	1

Sections	1
Photos	F2:34 & C2:67-70

Licence: **08E0506**
Field: **1/2**
Trench: **54**

Trench summary

Monitoring of trench 54 revealed east west orientated ditches. No artefactual evidence was retrieved from the interventions excavated, however a flint core was retrieved from the spoil. No metal artefacts were retrieved from the metal detecting of spoil.

Monitoring archaeologist: Jim Kent/Anna Bakiewicz
Date stripped: 09&08/06/08
Metal detecting archaeologist: Garrett Sheehan
Date spoil metal detected: 16/06/08
Recorded by: Garret Sheehan & Rhiannon Mann
Date excavated and recorded: 13/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
5401	Dep	Topsoil	
5402	Dep	Loosely compacted reddish brown clayey silt containing v. occasional charcoal flecks. Basal fill of 5408.	L:2m exp., W:1.7m & D:0.5m
5403	Dep	Firmly compacted light yellowish brown silty clay containing occasional flecks of charcoal. Upper fill of 5407	L:2m exp., W:0.66m & D:0.18m
5404	Dep	Firmly compacted orangey pink to near white silty sand containing frequent flecks of charcoal. Secondary fill of 5407.	L:2m exp., W:0.83m & D:0.15m
5405	Dep	Loosely compacted dark yellowish brown silty clay containing occasional charcoal flecks. Basal fill of 5407.	L:2m exp., W:0.4m & D:0.1m
5406	Dep	Firmly compacted yellowish brown silty clay. Upper fill of 5408.	L:2m exp., W:1.9m & D:0.32m
5407	Cut	East west orientated ditch with steep sides that broke gradually to a concave base.	L:2m exp., W:1.12m & D:0.51m
5408	Cut	East west orientated ditch with moderately sloping sides that broke to a steeper gradient and subsequently broke gradually to a	L:2m exp., W:2.48m & D:0.78m

		concave base.	

Finds list

Find #	Material	Description	Context/Location
5401	Flint	Possible core	5401

Archive list

Context sheets	7
Logs	7
Plans	3
Sections	2
Photos	F1:17-19 & C1:34-38

Licence: **08E0506**
Field: **2**
Trench: **55**

Trench summary

3 potential features were tagged when monitoring trench 55, but through excavation, all were proved of natural origin. An iron horseshoe was retrieved from metal detecting the topsoil.

Monitoring archaeologist: Anna Bakiewicz
Date stripped: 09/06/08
Metal detecting archaeologist: Aaron Johnson
Date spoil metal detected: 15/06/08
Recorded by: Anna Bakiewicz
Date excavated and recorded: 19/06/08
Date signed off: 19/06/08

Context Register

Context No	Type	Description	Dimensions
5501	Layer	Topsoil	D:0.3m
5502	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
5501	Fe	1 Horseshoe	5501

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	

Licence: **08E0506**
Field: **3/2**
Trench: **56**

Trench summary

No archaeological remains were uncovered in trench 56. 3 potential features were tagged, but through excavation, all were proved of natural origin. Two iron nails and a copper coin were retrieved from metal detecting the spoil.

Monitoring archaeologist: Toril Bergsvick Johnston
Date stripped: 06/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 19/06/08
Recorded by: Toril Bergsvick Johnston
Date excavated and recorded: 17/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
5601	Layer	Topsoil	D:0.25m
5602	Layer	Natural subsoil	--
5603	Layer	Subsoil	D:0.20
5604	Dep	Non archaeological	--
5605	Cut	Non archaeological	--

Finds list

Find #	Material	Description	Context/Location
5601	Fe	Iron nail	5601
5602	Fe	Iron nail	5601
5603	Cu	Coin	5601

Archive list

Context sheets	2
Logs	4

Plans	1
Sections	1
Photos	F7:11,12,14 & 15 C7:174,175,177 & 178

Licence: **08E0506**
Field: **1**
Trench: **57**

Trench summary

Trench 57 contained only one feature. It ran the length of the trench and was the reoccurrence of the modern linear also picked up in trenches 8, 15, 2, 58, 23 & 59.

Monitoring archaeologist: BD
Date stripped: 10/06/08
Metal detecting archaeologist: GS
Date spoil metal detected: 16/06/08
Recorded by: RH
Date excavated and recorded: 16/06/08
Date signed off: 16/06/08

Context Register

Context No	Type	Description	Dimensions
5701	Layer	Topsoil	D:0.3-0.4m
5702	Fill	Loosely compacted dark greyish brown silty clay containing metal and plastic rubbish. Fill of 5703	Not excavated see trenches 8, 15, 2, 58, 23 & 59.
5703	Cut	North south orientated modern linear.	Not excavated see trenches 8, 15, 2, 58, 23 & 59.
5704	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	3
Plans	1
Sections	0
Photos	C:47 & 48

Licence: **08E0506**
Field: **1**
Trench: **58**

Trench summary

Trench 58 contained only one feature. It was a north south orientated linear also picked up within trenches 23, 59, 15 8 and 2. Interventions elsewhere had proven this feature of modern origin so no hand excavation was deemed necessary. A relatively modern composite object of metal and wood and a fragment of animal bone were retrieved from the surface of the fill and an iron horseshoe was retrieved from the spoil when metal detecting.

Monitoring archaeologist: JK
Date stripped: 09/06/08
Metal detecting archaeologist: GS
Date spoil metal detected: 11/06/08
Recorded by: GS & RM
Date excavated and recorded: 11/06/08
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
5801	Layer	Topsoil	
5802	Layer	Subsoil	
5803	Fill	North south orientated ditch also visible in trenches 23, 59, 15, 8 and 2.	Not excavated in this trench see T59
5804	Cut	North south orientated ditch also visible in trenches 23, 59, 15, 8 and 2.	Not excavated in this trench see T59

Finds list

Find #	Material	Description	Context/Location
5801	Bone	Fragment of animal bone	5803
5802	Wood + Fe	Peg or fence post	5803
5803	Fe	Horseshoe	5801

Archive list

Context sheets	2
Logs	7
Plans	1
Sections	0
Photos	C1:31-33

Licence: **08E0506**
Field: **1**
Trench: **59**

Trench summary

Trench 59 contained two features. The north south orientated linear ditch (5904) also observed in trenches 8, 15, 2, 58, 23 57 & 58 was sectioned and recorded. Modern plastic was retrieved from the basal fill proving its modern origin. The second feature (5906) was a potential east west linear just clipped by the north of the trench. No datable artefacts were retrieved from its fill. 4 iron object, 3 sherds of 19-20th century pottery and 13 fragments of animal bone were retrieved from the spoil when metal detecting.

Monitoring archaeologist: JK
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 11/06/08
Recorded by: GS & RM
Date excavated and recorded: 11/06/08
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
5901	Layer	Topsoil	
5902	Fill	Firmly compacted orangey brown sandy clay containing occasional charcoal flecks. Fill of 5906.	?? Only clipped in section
5903	Fill	Loosely compacted dark greyish brown silty clay containing pieces of plastic. Upper fill of 5904.	L:50m exp., W:1m & D:0.16m
5904	Cut	North south orientated linear with moderately sloping sides that broke gradually to a concave base. Also observed in trenches 23, 2, 57, 8, 58	L:50m exp., W:1m & D:0.30m
5905	Fill	Firmly compacted light brown silty clay containing plastic. Basal fill of 5904.	L:50m exp., W:0.6m & D:0.23m
5906	Cut	Potential east west linear only partially exposed.	?? Only clipped in section
5907	Fill	Loosely compacted dark greyish brown silty clay. Secondary fill of 5904.	L:1m exp., W:1.25m & D:0.15m

Finds list

Find #	Material	Description	Context/Location
5901	Fe	5 fragments of corroded iron	5901
5902	Fe	1 corroded lump of iron	5902
5903	Fe	1 pointed piece of iron	5903
5904	Fe	1 flat corroded piece of iron	5904
5905	Pottery	3 sherds of 19-20th Century pottery	5905
5906	Bone	13 animal bone fragments	5906

Archive list

Context sheets	6
Logs	12
Plans	2
Sections	1
Photos	F1:20-23 & C1:27-30

Licence: **08E0506**
Field: **2**
Trench: **60**

Trench summary

Trench 60 traversed a high ferrous response noted during the geophysical survey and a cropmark visible on google earth. This was revealed to be a dump of modern construction material during monitoring. No metal detecting was carried out because of all the modern material. No remains of an archaeological nature were revealed.

Monitoring archaeologist: Anna Bakiewicz
Date stripped: 05/06/08
Metal detecting archaeologist: N/A
Date spoil metal detected: N/A
Recorded by: N/A
Date excavated and recorded: N/A
Date signed off: 05/06/08

Context Register

Context No	Type	Description	Dimensions
6001	Layer	Topsoil	
6002	Layer	Subsoil	
6003	Dep	Modern dump of building material.	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	---

Licence: **08E0506**
Field: **2**
Trench: **61**

Trench summary

2 features were tagged in trench 61 during monitoring. Through excavation 1 was proved to be a variation in the natural subsoil. The remaining feature comprised the terminus of a linear feature. A piece of 19th-20th century pottery was retrieved from its fill. A piece of lead was retrieved from metal detecting the spoil.

Monitoring archaeologist: AB
Date stripped: 06/06/08
Metal detecting archaeologist: 18/06/08
Date spoil metal detected: 20/06/08
Recorded by: LB
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
6101	Fill	Moderately compact mid to dark brown silty clay containing occasional flecks of charcoal. Fill of 6102.	L:1.8m exp., W:1.4m & D:0.8m
6102	Cut	Terminus of an east west orientated linear feature with moderately sloping sides that broke gradually to a concave base.	L:1.8m exp., W:1.4m & D:0.8m
6103	Layer	Topsoil	D:0.5-0.6m
6104	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
6101	Pb	Piece of lead	6103
6102	Pottery	Sherd of 19th-20th Century pottery	6101

Archive list

Context sheets	2

Logs	3
Plans	1
Sections	1
Photos	145, 146 & 159

Licence: **08E0506**
Field: **3**
Trench: **62**

Trench summary

Trench 62 contained 4 postholes, 1 pit and a northwest southeast orientated linear. Interventions were excavated across all features but no artefactual evidence was retrieved. An iron nail and a horseshoe were retrieved through metal detecting of the spoil.

Monitoring archaeologist: TBJ
Date stripped: 06/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 06/06/08
Recorded by: CB
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
6201	Layer	Topsoil	
6202	Layer	Subsoil	
6203	Cut	Circular posthole with vertical sides that broke gradually to a concave base.	Diam:0.2m & D:0.17m
6204	Fill	Firmly compacted dark grey sandy clay. Upper fill of 6203.	Diam :0.2m & D:0.05m
6205	Fill	Firmly compacted light grey sandy clay. Basal fill of 6203.	Diam:0.12 & D:0.12m
6206	Cut	Probable oval posthole with moderately sloping sides that broke imperceptibly to a concave base.	L:0.32m, W:0.29m & D:0.08m
6207	Fill	Moderately compact dark grey sandy silt. Fill of 6206.	L:0.32m, W:0.29m & D:0.08m
6208	Cut	Circular posthole with moderately sloping sides that broke gradually to a concave base.	Diam:0.2m & D:0.08m
6209	Fill	Moderately compact greyish yellow clayey sand. Fill of 6208.	Diam:0.2m & D:0.08m
6210	Cut	Irregular shaped possible posthole with rounded corners and moderately sloping sides that broke imperceptibly to an uneven base.	Diam:0.38m & D:0.07m

6211	Fill	Moderately compact light yellowish grey clayey sand. Fill of 6210.	Diam:0.38m & D:0.07m
6212	Cut	Oval pit with moderately sloping sides that broke imperceptibly to a concave base.	L:3.8m, W:1.05m & D:0.42m
6213	Fill	Firmly compacted mid to light yellowish brown silty clay containing occasional charcoal flecks. Fill of 6212	L:3.8m, W:1.05m & D:0.42m
6214	Cut	Northwest southeast orientated linear ditch with moderately sloping sides that broke gradually to a concave base.	L:3m exp., W:1.85m & D:0.45m
6215	Fill	Firmly compacted dark greyish brown sandy clay. Fill of 6214.	L:3m exp., W:1.85m & D:0.45m

Finds list

Find #	Material	Description	Context/Location
6201	Fe	1 Horse shoe	6201
6202	Fe	1 iron nail	6201

Archive list

Context sheets	15
Logs	5
Plans	1
Sections	6
Photos	F6:10,11,12,13,14 & 3 C6:131,130,129,128,127 & 139

Licence: **08E0506**
Field: **1**
Trench: **63**

Trench summary

No archaeological remains were uncovered during monitoring. 8 iron objects were retrieved through metal detecting the topsoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 06/06/08
Metal detecting archaeologist: Jim Kent
Date spoil metal detected: 11/06/08
Recorded by: N/A
Date excavated and recorded: N/A
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
6301	Layer	Topsoil	0.4m
6302	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
6301	Fe	Corroded iron	6301
6302	Fe	Corroded iron	6301
6303	Fe	Corroded iron	6301
6304	Fe	Corroded iron	6301
6305	Fe	Corroded iron	6301
6306	Fe	Corroded iron	6301
6307	Fe	Corroded iron	6301
6308	Fe	Corroded iron	6301

Archive list

Context sheets	0
Logs	4

Plans	0
Sections	0
Photos	2

Licence: **08E0506**
Field: **1**
Trench: **64**

Trench summary

Trench 64 contained 2 features. The furthest north was the reoccurrence of the ditch forming the enclosure also picked up in trenches 13, 16, 65 & 15. It was not excavated in this trench. The second feature (6404) was an east west orientated ditch or pit. The intervention excavated produced a cache of prehistoric worked flints that included a blade and scraper.

Monitoring archaeologist: AB
Date stripped: 09/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 20/06/08
Recorded by: JK
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
6401	Layer	Topsoil	
6402	Layer	Subsoil	
6403	Cut	East west orientated large pit or ditch with moderately sloping sides that broke imperceptibly to an irregular base.	L:2m exp., W:2m & D:0.35m
6404	Fill	Moderately compact light brown silty sand containing occasional flecks of charcoal and flint debitage. Fill of 6403	L:2m exp., W:2m & D:0.35m
6405	Cut	Ditch forming part of the enclosure also picked up in trench 13, 16, 65 & 15.	Not excavated in this trench
6406	Fill	Ditch forming part of the enclosure also picked up in trenches 13, 16, 65 & 15.	Not excavated in this trench

Finds list

Find #	Material	Description	Context/Location
6401	Flint	Cache of worked flint, including one blade	6404

		and one scraper.	

Archive list

Context sheets	2
Logs	3
Plans	1
Sections	1
Photos	F6:6 & C6:56

Licence: **08E0506**
Field: **1**
Trench: **65**

Trench summary

2 potential features were tagged during the monitoring of trench 65. Through excavation 1 was proved to be a natural variation in the subsoil. The remaining feature comprised a west northwest east southeast orientated ditch that was visible on the geophysics and formed the field system also picked up in trenches 16, 13, 64 and 15. No finds were retrieved from the intervention excavated or the metal detecting of spoil.

Monitoring archaeologist: DL
Date stripped: 06/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 20/06/08
Recorded by: JK
Date excavated and recorded: 18/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
6501	Layer	Topsoil	
6502	Cut	West northwest east southeast orientated ditch with steeply sloping sides that tapered and then broke gradually to a concave base. Ditch part of the field system also picked up in trenches 16, 13, 64 & 15.	L:1.65m exp., W:0.48m & D:0.35m
6503	Fill	Moderately compact mid grey silty clay containing occasional flecks of charcoal. Basal fill of 6502.	L:1.65m exp., W:0.48m & D:0.16m
6504	Fill	Moderately compact mid greyish brown silty clay containing occasional flecks of charcoal. Upper fill of 6502.	L:1.65m exp., W:0.47m & D:0.31m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	3
Logs	3
Plans	1
Sections	1
Photos	4

Licence: **08E0506**
Field: **1/2**
Trench: **66**

Trench summary

Trench 66 contained an oval pit. A crumb of probable prehistoric pottery was retrieved from its fill. No further artefacts were retrieved from walking or metal detecting the spoil.

Monitoring archaeologist: DL & AB
Date stripped: 6/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 17/06/08
Recorded by: JK
Date excavated and recorded: 16/06/08
Date signed off: 17/06/08

Context Register

Context No	Type	Description	Dimensions
6601	Layer	Topsoil	0.28m
6602	Cut	Oval pit with moderate to gently sloping sides that broke gradually to a flat base.	L:1.18m, W:0.99m & D:0.38m
6603	Fill	Moderately compact mid brown silty clay containing occasional flecks of charcoal.	L:1.18m, W:0.99m & D:0.38m
6604	Layer	Non natural subsoil	0.12m
6604	Layer	Natural	

Finds list

Find #	Material	Description	Context/Location
6601	Pottery	1 crumb of potentially prehistoric archaeology	6601

Archive list

Context sheets	2
Logs	6
Plans	1

Sections	1
Photos	F6:26 & C6:16

Licence: **08E0506**
Field: **2**
Trench: **67**

Trench summary

2 features were tagged during the monitoring of trench 67, but through excavation both were proved of natural origin. No artefacts were retrieved from metal detecting the spoil.

Monitoring archaeologist: Anna Bakiewicz
Date stripped: 06/06/08
Metal detecting archaeologist: Aaron Johnson
Date spoil metal detected: 11/06/08
Recorded by: Anna Bakiewicz
Date excavated and recorded: 11/06/08
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
6701	Layer	Topsoil	0.3m
6702	Layer	Non natural subsoil	0.3m
6703	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	2

Licence: **08E0506**
Field: **2/3**
Trench: **68**

Trench summary

3 features were tagged in trench 68 during monitoring but upon further investigation only 2 were of archaeological interest. The furthest north of these (6805) was a northwest southeast orientated ditch terminus or elongated pit. 4 pieces of struck flint some animal bone and 9 fragments of burnt bone were retrieved from its fill. The second feature was an east west orientated ditch, 2 pieces of struck flint were retrieved from its fill. No metal artefacts were retrieved through metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 06/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 19/06/08
Recorded by: TBJ
Date excavated and recorded: 19/06/08
Date signed off: 19/06/08

Context Register

Context No	Type	Description	Dimensions
6801	Layer	Topsoil	D:0.1-0.2m
6802	Layer	Subsoil	
6803	Layer	Non natural subsoil	D:0.2m
6804	Fill	Moderately compacted greyish brown dark grey sandy clay containing occasional charcoal pieces. Fill of 6805.	L:1.7m exp., W:1.26m & D:0.4m
6805	Cut	Northwest southeast orientated ditch terminus or elongated pit with steeply sloping sides that broke gradually to a concave base.	L:1.7m exp., W:1.26m & D:0.4m
6806	Fill	Loosely compacted greyish brown silty clay and sand containing occasional charcoal flecks. Upper fill of east west orientated ditch 6808.	L:2.5m exp., W:1.56m & D:0.36m
6807	Fill	Moderately compacted mottled grey and brown clay containing charcoal flecks. Basal fill of ditch 6808.	L:0.5m exp., W:0.52m & D:0.14m
6808	Cut	East west orientated ditch with	L:2.5m exp.,

		moderate to steeply sloping sides that tapered and broke gradually to a rounded V shaped base.	W:1.56m & D:0.5m

Finds list

Find #	Material	Description	Context/Location
6801	Flint	4 pieces of struck flint	6804
6802	Bone	Small fragments of animal bone and teeth	6804
6803	Bone	9 fragments of burnt bone	6804
6804	Flint	2 pieces of struck flint	6806

Archive list

Context sheets	8
Logs	6
Plans	2
Sections	2
Photos	F6:19, 20 & 26 C6:109,120 & 121

Licence: **08E0506**
Field: **1**
Trench: **69**

Trench summary

4 potential archaeological features were tagged during the monitoring of trench 69. Through excavation 1 was proved modern and the remaining 3 were proved of natural origin. No artefacts were retrieved through metal detecting the spoil.

Monitoring archaeologist: Bartosz Duszynski
Date stripped: 09/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 20/06/08
Recorded by: Daire Leahy
Date excavated and recorded: 11/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
6901	Layer	Topsoil	D:0.25-0.3m
6902	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	4

Licence: **08E0506**
Field: **1**
Trench: **70**

Trench summary

4 potential features were tagged during the monitoring of trench 70, but through excavation, all were proved of natural origin. 1 iron nail was retrieved through metal detecting.

Monitoring archaeologist: BD
Date stripped: 09/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: DL
Date excavated and recorded: 12/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
7001	Layer	Topsoil	D:0.25-0.3m
7002	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
7001	Fe	1 iron nail	7001

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	C6:8

Licence: **08E0506**
Field: **1**
Trench: **71**

Trench summary

1 feature was tagged during monitoring but through excavation was proved of natural origin. 13 pieces of corroded iron were recovered from metal detecting the spoil.

Monitoring archaeologist: BD
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 06/06/08
Recorded by: DL
Date excavated and recorded: 12/06/08
Date signed off: 12/06/08

Context Register

Context No	Type	Description	Dimensions
7101	Layer	Topsoil	D:0.25-0.3m
7102	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
7101	Fe	Corroded iron	7101
7102	Fe	Corroded iron	7101
7103	Fe	Corroded iron	7101
7104	Fe	Corroded iron	7101
7105	Fe	Corroded iron	7101
7106	Fe	Corroded iron	7101
7107	Fe	Corroded iron	7101
7108	Fe	Corroded iron	7101
7109	Fe	Corroded iron	7101
7110	Fe	Corroded iron	7101
7111	Fe	Corroded iron	7101
7112	Fe	Corroded iron	7101
7113	Fe	Corroded iron	7101

Archive list

Context sheets	0
Logs	4
Plans	0
Sections	0
Photos	C6:7

Licence: **08E0506**
Field: **2**
Trench: **72**

Trench summary

Trench 72 contained 2 east west orientated ditches. 1 sherd of modern (19^{th}-10^{th} Century) pottery was recovered from the fill of one (7204) but no artefacts were retrieved from the other (7202). 3 pieces of corroded iron were retrieved from metal detecting the spoil.

Monitoring archaeologist: AB
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 06/06/08
Recorded by: AB
Date excavated and recorded: 11/06/08
Date signed off: 12/06/08

Context Register

Context No	Type	Description	Dimensions
7201	Fill	Moderately compact mid orangey brown clayey sand. Fill of 7202.	L:2.4m exp., W:0.78m & D:0.6m
7202	Cut	East west running ditch with steeply sloping sides that broke gradually to a concave base.	L:2.4m exp., W:0.78m & D:0.6m
7203	Fill	Moderately compacted mid orangey brown silty clay containing occasional charcoal flecks. Fill of 7204.	L:2.4m exp., W:0.8m & D:0.22m
7204	Cut	East west running ditch with moderately sloping sides that broke gradually to a concave base.	L:2.4m exp., W:0.8m & D:0.22m
7205	Layer	Subsoil	
7206	Layer	Topsoil	D:0.4m
7207	Layer	Non natural subsoil	D:0.2m

Finds list

Find #	Material	Description	Context/Location
7201	Fe	1 corroded piece of iron	7201
7202	Fe	1 corroded piece of iron	7201

7203	Fe	1 corroded piece of iron	7201
7204	Pottery	1 sherd of 19th-20th Century pottery	7203

Archive list

Context sheets	4
Logs	3
Plans	1
Sections	1
Photos	C 86-90

Licence: **08E0506**
Field: **2/4**
Trench: **73**

Trench summary

Trench 73 contained 6 linear features, 4 orientated northwest southeast and 2 orientated east west. The northwest southeast orientated features are likely to be associated with the post-medieval trackway traversing this area on the same orientation. An intervention was excavated into each feature but the only artefactual evidence retrieved comprised 2 flint flakes. A further 2 flint flakes were retrieved from walking the spoil. No metal artefacts were retrieved from metal detecting the spoil.

Monitoring archaeologist: AB
Date stripped: 06/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 09/06/08
Recorded by: AJ, LB & AB
Date excavated and recorded: 09/06/08
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
7301	Fill	Moderately compact mid brown silty clay and large angular limestone fragments. Fill of 7302	L:2.30m exp., W:1.2m & D:0.3m
7302	Cut	Northwest southeast orientated ditch with moderately sloping sides that broke gradually to a flat base.	L:2.30m exp., W:1.2m & D:0.3m
7303	Fill	Moderately compact mid brown silty clay. Fill of 7304.	L:2.3m exp., W:0.9m & D:0.4m
7304	Cut	East west orientated ditch with moderate to steeply sloping sides that broke gradually to a concave base.	L:2.3m exp., W:0.9m & D:0.4m
7305	Layer	Topsoil	
7306	Layer	Natural	
7307	Layer	Non natural subsoil	
7308	Fill	Firmly compacted mid brown silty clay. Fill of 7316.	L:7m exp., W:0.6m & D:0.32m
7309	Fill	Moderately compacted mid brown silty clay. Fill of 7310.	L:2.3m exp., W:4.25m & D:0.15

7310	Cut	Northwest southeast orientated ditch with moderately sloping sides that broke gradually to a flat base.	L:2.3m exp., W:4.25m & D:0.15
7311	Fill	Moderately compact mid orangey brown silty clay. Upper fill of 7312.	L:2.3m exp., W:0.55m & D:0.17m
7312	Cut	Northwest southeast orientated ditch with steeply sloping sides that broke sharply to a concave base.	L:2.3m exp., W:0.6m & D:0.55m
7313	Fill	Moderately compact mid greyish brown silty clay. Basal fill of 7312.	L2.3m exp., W:0.4m & D:0.35m
7314	Fill	Firmly compacted mid brown silty clay. Fill of 7315.	L2.3m exp., W:0.5m & D:0.18m
7315	Cut	East west orientated ditch with gently sloping sides that broke gradually to a flat base.	L:2.3m exp., W:0.5m & D:0.18m
7316	Cut	Northwest southeast orientated ditch with moderately sloping sides that broke imperceptibly to a concave base.	L7m, W0.6m & D:0.32

Finds list

Find #	Material	Description	Context/Location
7301	Flint	2 struck flint flakes	7311
7302	Flint	1 piece of struck flint (possible blade)	7305
7303	Flint	1 piece of struck flint	7305

Archive list

Context sheets	13
Logs	3
Plans	5
Sections	6
Photos	71-78

Licence: **08E0506**
Field: **2**
Trench: **74**

Trench summary

No archaeological remains were uncovered within trench 74. 3 iron artefacts were retrieved from metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 11/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 11/06/08
Recorded by: N/A
Date excavated and recorded: N/A
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
7401	Layer	Topsoil	D:0.35m
7402	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
7401	Fe	Small metal rod	7401
7402	Fe	3 fragments of corroded iron	7401
7403	Fe	3 fragments of corroded iron	7401

Archive list

Context sheets	0
Logs	4
Plans	0
Sections	0
Photos	4

Licence: **08E0506**
Field: **1**
Trench: **75**

Trench summary

No archaeological remains were uncovered within trench 75. No artefacts were retrieved from metal detecting the spoil.

Monitoring archaeologist: DL
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 11/06/08
Recorded by: BD
Date excavated and recorded: 09/06/08
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
7501	Layer	Topsoil	0.35m
7502	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	F6:19

Licence: **08E0506**
Field: **1**
Trench: **76**

Trench summary

2 potential features were tagged in trench 76 during monitoring. Through excavation 1 was proven a natural variation in the natural and the other an east west orientated ditch. Neither the ditch nor the metal detecting of the spoil produced any artefactual evidence.

Monitoring archaeologist: BD
Date stripped: 10/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: RC
Date excavated and recorded: 19/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
7601	Layer	Topsoil	D:0.55m
7602	Layer	Subsoil	
7603	Cut	East west orientated ditch with moderately sloping sides that broke gradually to a concave base.	L:2m exp., W:0.92m & D:0.25m
7604	Fill	Loosely compacted mid greyish brown silty clay. Fill of 7603.	L:2m exp., W:0.92m & D:0.25m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	3
Plans	1

Sections	1
Photos	F6:13&14 C6:34& 35

Licence: **08E0506**
Field: **1**
Trench: **77**

Trench summary

No archaeological remains were uncovered within trench 77. An iron nail, a copper button and 2 pieces of corroded iron were retrieved during the metal detecting of the spoil.

Monitoring archaeologist: DL
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 11/06/08
Recorded by: DL
Date excavated and recorded: 11/06/08
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
7701	Layer	Topsoil	D:0.4m
7702	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
7701	Fe	Iron nail	7701
7702	Cu	Copper button	7701
7703	Fe	Corroded piece of iron	7701
7704	Fe	Corroded piece of iron	7701

Archive list

Context sheets	0
Logs	4
Plans	0
Sections	0
Photos	C6:18

Licence: **08E0506**
Field: **1/2**
Trench: **78**

Trench summary

Trench 78 contained 2 east west orientated ditches and a pit containing a modern dog burial. Both ditches were sectioned but neither intervention produced any artefacts. 11 pieces of corroded iron were recovered from metal detecting the spoil. This is not surprising considering the vicinity of the farmyard.

Monitoring archaeologist: AB
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 06/06/08
Recorded by: DL
Date excavated and recorded: 10/06/08
Date signed off: 12/06/08

Context Register

Context No	Type	Description	Dimensions
7801	Layer	Topsoil	D:0.3m
7802	Layer	Non natural subsoil	D:0.3m
7803	Cut	East west orientated ditch with moderately sloping sides that broke gradually to a concave base.	L:1.6m exp, W:1.2m & D:0.36m
7804	Fill	Moderately compact light brown sandy clay containing occasional charcoal flecks. Fill of 7803	L:1.6m exp, W:1.2m & D:0.36m
7805	Cut	East west orientated ditch just clipped by the very southern extent of the trench.	??
7806	Fill	Fill of 7805	??
7807	Cut	Cut of pit containing dog skull, not excavated-modern	L:0.78m, W:0.5m & D:??
7809	Fill	Firmly compacted mid brown silty clay, stone and occasional charcoal flecks. Fill of 7807	L:0.78m, W:0.5m & D:??

Finds list

Find #	Material	Description	Context/Location

7801	Fe	Piece of corroded iron	7801
7802	Fe	Piece of corroded iron	7801
7803	Fe	Piece of corroded iron	7801
7804	Fe	Piece of corroded iron	7801
7805	Fe	Piece of corroded iron	7801
7806	Fe	Piece of corroded iron	7801
7807	Fe	Piece of corroded iron	7801
7808	Fe	Piece of corroded iron	7801
7809	Fe	Piece of corroded iron	7801
7810	Fe	Piece of corroded iron	7801
7811	Fe	Piece of corroded iron	7801

Archive list

Context sheets	5
Logs	7
Plans	1
Sections	1
Photos	12

Licence: **08E0506**
Field: **2/4**
Trench: **79**

Trench summary

Trench 79 contained 1 east west oriented curve-linear gully terminus or elongated pit. No artefactual evidence was retrieved from its fill. 1 relatively modern iron peg was retrieved from the spoil through metal detecting.

Monitoring archaeologist: AB
Date stripped: 6/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 12/06/08
Recorded by: AJ
Date excavated and recorded: 12/06/08
Date signed off: 12/06/08

Context Register

Context No	Type	Description	Dimensions
7901	Fill	Firmly compacted mid orangey brown silty clay. Fill of 7902.	L:0.6m exp., W:0.4m & D:0.2m
7902	Cut	Curve-linear east west orientated gully terminus or elongated pit with moderately sloping sides that broke imperceptibly to a concave base.	L:0.6m exp., W:0.4m & D:0.2m
7903	Layer	Topsoil	D:0.4m
7904	Layer	Subsoil	--
7905	Layer	Non natural subsoil	D:0.2m

Finds list

Find #	Material	Description	Context/Location
7901	Fe	Iron peg	7903

Archive list

Context sheets	2
Logs	1

Plans	1
Sections	1
Photos	98-100

Licence: **08E0506**
Field: **3/4**
Trench: **80**

Trench summary

1 archaeological feature was tagged during the monitoring of trench 80 but through excavation was proved of natural origin. An iron nail was retrieved from the metal detecting of the spoil.

Monitoring archaeologist: TBJ
Date stripped: 06/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: N/A
Date excavated and recorded: 11/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
8001	Layer	Topsoil	
8002	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
8001	Fe	1 iron nail	8001

Archive list

Context sheets	0
Logs	1
Plans	0
Sections	0
Photos	C7:147 & 148 F7:153

Licence: **08E0506**
Field: **1**
Trench: **81**

Trench summary

No archaeological remains were uncovered within trench 81. An iron nail and a piece of corroded iron were retrieved from metal detecting the spoil.

Monitoring archaeologist: BD
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 11/06/08
Recorded by: N/A
Date excavated and recorded: N/A
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
8101	Layer	Topsoil	
8102	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
8101	Fe	Iron nail	8101
8102	Fe	Piece of corroded iron	8101

Archive list

Context sheets	0
Logs	2
Plans	0
Sections	0
Photos	---

Licence: **08E0506**
Field: **1**
Trench: **82**

Trench summary

4 features were tagged within trench 82 but through excavation 2 were proved to be variations in the natural subsoil. The 2 remaining features were east west orientated linear ditches from which no artefactual evidence was retrieved. No artefacts were retrieved from metal detecting the spoil.

Monitoring archaeologist: AB
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 20/06/08
Recorded by: BD
Date excavated and recorded: 18/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
8201	Layer	Topsoil	
8202	Layer	Subsoil	
8203	Cut	East west orientated linear ditch with steeply sloping sides that broke gradually to a rounded base.	L:2m exp., W:1.4m & D:0.4m
8204	Fill	Loosely compacted mid brown silty sand. Upper fill of 8203.	L:2m exp., W:1.4m & D:0.3m
8205	Fill	Firmly compacted dark brown silty clay. Secondary fill of 8203.	L:??, W:0.4m & D:0.2m
8206	Fill	Moderately compact yellowish brown silty clay . Basal fill of 8203.	L??, W:0.7m & D:0.1m
8207	Cut	East west orientated linear ditch with moderately tapering sides that broke imperceptibly to a rounded base.	L:2m exp., W:0.7m & D:0.2m
8208	Fill	Moderately compact light brown silty sand. Fill of 8207.	L:2m exp., W:0.7m & D:0.2m

Finds list

Find #	Material	Description	Context/Location

None			

Archive list

Context sheets	
Logs	
Plans	
Sections	
Photos	

Licence: **08E0506**
Field: **4**
Trench: **84**

Trench summary

2 features were tagged during the monitoring of trench 84, but through excavation both were proved of natural origin. An iron nail and blade were retrieved through metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 06/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 17/06/08
Recorded by: AB
Date excavated and recorded: 17/06/08
Date signed off: 17/06/08

Context Register

Context No	Type	Description	Dimensions
8401	Layer	Topsoil	D:0.3m
8402	Layer	Non natural subsoil	D:0.2m
8403	Layer	Natural	

Finds list

Find #	Material	Description	Context/Location
8401	Fe	Iron blade probably agricultural	8401
8402	Fe	Iron nail	8402

Archive list

Context sheets	0
Logs	1
Plans	0
Sections	0
Photos	5

Licence: **08E0506**
Field: **4**
Trench: **85**

Trench summary

No archaeological remains were uncovered in trench 85. 3 pieces of corroded iron were retrieved through metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 09/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 11/06/08
Recorded by: N/A
Date excavated and recorded: N/A
Date signed off: 11/06/08

Context Register

Context No	Type	Description	Dimensions
8501	Layer	Topsoil	D:0.4m
8502	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
8501	Fe	Piece of corroded iron	8501
8502	Fe	Piece of corroded iron	8501
8503	Fe	Piece of corroded iron	8501

Archive list

Context sheets	0
Logs	4
Plans	0
Sections	0
Photos	----

Licence: **08E0506**
Field: **4**
Trench: **86**

Trench summary

3 features were tagged in trench 4 during monitoring. Through excavation 2 were proved of natural origin. The remaining feature was an east west linear ditch. No artefacts were retrieved from the intervention excavated or the metal detecting of spoil.

Monitoring archaeologist: TBJ
Date stripped: 09/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 17/06/08
Recorded by: AJ
Date excavated and recorded: 17/06/08
Date signed off: 17/06/08

Context Register

Context No	Type	Description	Dimensions
8601	Fill	Northwest southeast orientated linear ditch with steep to moderately sloping sides that broke imperceptibly to a concave base.	L:2.3m, W:1.6m & D:0.8m
8602	Cut	Mid to dark brown silty clay. Fill of 8601.	L:2.3m, W:1.6m & D:0.8m
8603	Layer	Topsoil	
8604	Layer	Natural subsoil	
8605	Layer	Non natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	3

Plans	1
Sections	1
Photos	124-127

Licence: **08E0506**
Field: **1**
Trench: **87**

Trench summary

Trench 87 was added to the original trenches to test a circular geophysical anomaly and its relationship with the field system also observed as a geophysical anomaly. It was picked up twice (8702 & 8707) as predicted by the geophysics and the field system (8704) was shown to cut or post-date it. Burnt bone and a potential crumb of prehistoric pottery were retrieved from its fill and a concentration of stone along its external edge, in both cases, may be evidence of a collapsed stone filled external bank. It is most likely to constitute a ring ditch/barrow of the later prehistoric period. No artefacts were retrieved through metal detecting the spoil.

Monitoring archaeologist: RO'M
Date stripped: 16/06/08
Metal detecting archaeologist: JK
Date spoil metal detected: 20/06/08
Recorded by: JK
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
8701	Layer	Topsoil	
8702	Cut	Curvelinear ditch with moderately sloping sides that broke gently to a concave base. Truncated by 8704 on its north eastern extent.	L:2.5m exp., W:1.35m & D:0.4m
8703	Fill	Moderately compact mid greyish brown silty clay containing occasional flecks of charcoal and frequent large stones along its eastern edge. Fill of 8702.	L:2.5m exp., W:1.35m & D:0.4m
8704	Cut	East west ditch with moderately sloping sides. Only partially excavated to determine relationship with 8702. Part of the field system investigated in trench 13etc.	L:3.5m exp., W:1.5m & D??
8705	Fill	Moderately compact mid yellowish brown silty clay containing occasional charcoal flecks. Basal fill of 8704.	Only partially excavated to determine relationship with

			8702.
8706	Fill	Moderately compact mid brown silty clay containing occasional charcoal flecks. Upper fill of 8704.	L:3.5m exp., W:1.5m & D:0.18m
8707	Cut	Curvelinear ditch with moderately sloping sides that broke gently to a concave base.	L:2.5m exp., W:1.5m & D:0.63m
8708	Fill	Loosely compacted mid to dark brownish grey silty clay containing occasional charcoal flecks and and frequent large stones along its western edge. Basal fill of 8707.	L:2.5m exp., W:1.5m & D:0.63m
8709	Fill	Moderately compact mid to dark brown silty clay containing occasional charcoal flecks. Upper fill of 8707.	L:2.5m exp., W:1.5m & D:0.43m

Finds list

Find #	Material	Description	Context/Location
8701	Pottery	1 crumb of probable prehistoric pottery	8703
8702	Bone	1 bag of burnt bone	8703
8703	Bone	1 piece of bone	8703

Archive list

Context sheets	8
Logs	6
Plans	1
Sections	2
Photos	…….

Licence: **08E0506**
Field: **1**
Trench: **88**

Trench summary

2 potential features were uncovered in trench 88 but through excavation both were proved of natural origin. No finds were retrieved through metal detecting the spoil.

Monitoring archaeologist: RO'M
Date stripped: 16/06/08
Metal detecting archaeologist: RO'M
Date spoil metal detected: 20/06/08
Recorded by: N/A
Date excavated and recorded: N/A
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
8801	Layer	Topsoil	D:0.3m
8802	Layer	Subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	2

Licence: **08E0506**
Field: **2**
Trench: **89**

Trench summary

Along with trench 90, trench 89 was added to the original trench plan, to comprehensively test and attempt to date a field system evident in field 2 on the geophysical survey. The expected ditches were uncovered and intersections were excavated across their breadth. No artefactual evidence was retrieved but these features were dated to the post-medieval period in trench 90. No artefacts were retrieved from metal detecting the spoil.

Monitoring archaeologist: AB
Date stripped: 16/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 17/06/08
Recorded by: AJ
Date excavated and recorded: 17/06/08
Date signed off: 17/06/08

Context Register

Context No	Type	Description	Dimensions
8901	Fill	Firmly compacted mid orangey brown sandy clay containing occasional flecks of charcoal. Fill of 8902.	L:2.4m exp., W:2.28m & D:0.68m
8902	Cut	East west orientated linear ditch with gradually sloping south side and a steeply sloping north side that both broke gradually to a flat base.	L:2.4m exp., W:2.28m & D:0.68m
8903	Fill	Moderately compact mid to light orangey brown sandy clay. Fill of 8904.	L:2.4m exp., W:3.25m & D:0.82m
8904	Cut	North south orientated linear ditch with moderately sloping sides that broke gradually to a flat base.	L:2.4m exp., W:3.25m & D:0.82m
8905	Fill	Moderately compact light orangey brown sandy clay. Fill of 8906.	L:2.4m exp., W:1.76m & D:0.54m
8906	Cut	Northeast southwest orientated linear ditch with moderately sloping sides that broke gradually to a concave base.	L:2.4m exp., W:1.76m & D:0.54m
8907	Layer	Subsoil	
8908	Layer	Topsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	6
Logs	3
Plans	1
Sections	3
Photos	129-130

Licence: **08E0506**
Field: **2**
Trench: **90**

Trench summary

Trench 90 was added to the original trench layout to comprehensively test and attempt to date a field system evident in field 2 on the geophysical survey. 2 linear ditches were expected and located. A fragment of clay pipe stem was retrieved from one (9004) and a sherd of post-medieval blackware were retrieved from the other (9003), suggesting a post-medieval origin for this field system. A flint blade was retrieved from walking the spoil. No metal artefacts were retrieved through metal detecting.

Monitoring archaeologist: AB
Date stripped: 16/06/08
Metal detecting archaeologist: AJ
Date spoil metal detected: 18/06/08
Recorded by: AB
Date excavated and recorded: 17/06/08
Date signed off: 18/06/08

Context Register

Context No	Type	Description	Dimensions
9001	Fill	Moderately compact mid orangey brown sandy clay containing occasional charcoal flecks. Fill of 9003.	L:2.4m exp., W:2.3m & D:0.74m
9002	Fill	Moderately compact light orangey brown sandy silt. Fill of 9004	L:3.5m exp., W:0.38m & D:0.28m
9003	Cut	North south orientated linear ditch with gently sloping sides that broke gradually to a concave base.	L:2.4m exp., W:2.3m & D:0.74m
9004	Cut	East west orientated linear ditch with moderately sloping sides that broke gradually to a concave base.	L:3.5m exp., W:0.38m & D:0.28m
9005	Layer	Topsoil	D:0.3-0.5m

Finds list

Find #	Material	Description	Context/Location
9001	Pottery	Post-medieval blackware	9001

9002	Ceramic	Clay Pipe stem	9002
9003	Flint	Flint blade	9005

Archive list

Context sheets	4
Logs	3
Plans	3
Sections	2
Photos	140, 141 & 154-155

Licence: **08E0506**
Field: **3**
Trench: **91**

Trench summary

Trench 91 was added to the original trench list to test a potential feature noted as a linear anomaly on the geophysical survey. A linear feature was uncovered during monitoring but was not placed where the geophysics had noticed an anomaly. The linear feature comprised a north south orientated gully from which no artefactual evidence was retrieved. 2 iron nails were retrieved through metal detecting the spoil.

Monitoring archaeologist: RO'M
Date stripped: 13/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: RC
Date excavated and recorded: 16/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
9101	Layer	Topsoil	
9102	Layer	Subsoil	
9103	Fill	Firmly compacted mid greyish brown silty clay containing occasional flecks of charcoal. Fill of 9104.	L:2m exp., W:0.53m & D:0.18m
9104	Cut	North south orientated linear ditch with moderately sloping sides that broke gradually to a concave base.	L:2m exp., W:0.53m & D:0.18m

Finds list

Find #	Material	Description	Context/Location
9101	Fe	Iron nail	
9102	Fe	Iron nail	

Archive list

Context sheets	2
Logs	5
Plans	1
Sections	1
Photos	F7:29, 34 & 35 & C7:144, 149 & 157

Licence: **08E0506**
Field: **3**
Trench: **92**

Trench summary

One potential archaeological feature was tagged during the monitoring of trench 92 but through excavation was proved of natural origin. No artefacts were recovered through metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 16/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 06/06/08
Recorded by: TBJ/CB
Date excavated and recorded: 18/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
9201	Layer	Topsoil	D:0.2m
9202	Layer	Non natural subsoil	D:0.15m
9203	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
9201	Flint	1 flint flake	9201

Archive list

Context sheets	0
Logs	1
Plans	0
Sections	0
Photos	2

Licence: **08E0506**
Field: **3**
Trench: **93**

Trench summary

Trench 93 was added to the original trench list to assess the density and extent of features encountered in trench 68 and further test potential geophysical anomalies. 3 potential features were tagged during monitoring but excavation proved 2 of natural origin. The remaining feature comprised a northwest southeast orientated ditch. No artefactual evidence was retrieved from its fill. No metal artefacts were retrieved through metal detecting the spoil.

Monitoring archaeologist: TBJ
Date stripped: 13/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 18/06/08
Recorded by: RC
Date excavated and recorded: 17/06/08
Date signed off: 18/06/08

Context Register

Context No	Type	Description	Dimensions
9301	Layer	Topsoil	
9302	Layer	Subsoil	
9303	Fill	Firmly compacted mid brown silty clay. Fill of 9304.	L:2m exp., W:1.08m & D:0.3m
9304	Cut	Northwest southeast orientated linear ditch with moderately sloping sides that broke gradually to a concave base.	L:2m exp., W:1.08m & D:0.3m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	2
Logs	4

Plans	1
Sections	1
Photos	C7:154, 170 & 171

Licence: **08E0506**
Field: **3**
Trench: **94**

Trench summary

Trench 94 was added to the original trench plan to test 2 parallel geophysical anomalies that were orientated north northwest south southeast. 3 features, 1 linear and 2 potentially fire reddened patches of soil, were tagged during monitoring. Both reddened patches of earth proven through excavation to be variations in the natural subsoil. An intervention placed into the remaining feature revealed it to represent 2 intercutting north northwest south southeast linear features (9405 & 9407). No artefacts were retrieved from the fills encountered or from metal detecting the spoil.

Monitoring archaeologist: RO'M
Date stripped: 13/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 19/06/08
Recorded by: 17/06/08
Date excavated and recorded: 17/06/08
Date signed off: 19/06/08

Context Register

Context No	Type	Description	Dimensions
9401	Layer	Topsoil	
9402	Layer	Subsoil	
9403	Layer	Non natural subsoil	
9404	Fill	Loosely compacted brown clayey and sandy silt. Fill of 9405	L:2.4m exp., W:0.6m & D:0.24m
9405	Cut	North northwest south southeast orientated linear feature with gently sloping sides that tapered and broke gradually to a rounded v shaped base.	L:2.4m exp., W:0.6m & D:0.24m
9406	Fill	Loosely compacted greyish brown clayey silt. Fill of 9407.	L:2.4m exp., W:0.4m & D:0.18m
9407	Cut	North northwest south southeast linear feature with steeply sloping sides that broke gradually to a concave base. Truncated by 9405.	L:2.4m exp., W:0.4m & D:0.18m

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	4
Logs	4
Plans	1
Sections	1
Photos	F7:25-27 & C7:159-161

Licence: **08E0506**
Field: **3**
Trench: **95**

Trench summary

Trench 95 was added to the original trench plan, to assess the extent and line of the discovered Bronze Age enclosure. The line of the ditch (9513) was uncovered but not excavated at this location. 1 other ditch and 2 pits were also revealed in trench 95. The ditch (9504) was orientated southwest northeast and no artefactual evidence was retrieved from its fill. One pit contained an animal burial and the intervention placed in the other produced no artefactual evidence. No artefacts were retrieved through the metal detecting of the spoil.

Monitoring archaeologist: RO'M
Date stripped: 13/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: EZ
Date excavated and recorded: 17/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
9501	Layer	Topsoil	
9502	Layer	Subsoil	
9503	Fill	Firmly compacted mid darkish brown sandy clay containing occasional flecks of charcoal. Upper fill of 9504	L:2m exp., W:0.9m & D:0.15m
9504	Cut	Southwest northeast linear ditch with moderately sloping sides that broke gradually to a concave base.	L:2m exp., W:1m & D:0.45m
9505	Fill	Firmly compacted yellowish brown silty clay containing occasional pieces of charcoal. Secondary fill of 9504.	L:2m exp., W:0.65m & D:0.35m
9506	Fill	Firmly compacted mid brownish yellow silty clay. Basal fill of 9504.	L:2m exp., W:0.1m & D:0.45m
9507	Fill	Firmly compacted mid reddish brown silty sand. Upper fill of 9508	L:1.1m, W:1m & D:0.25m
9508	Cut	Southwest northeast orientated	L:1.1m, W:1m &

		oval pit with moderately sloping sides that broke imperceptibly to a concave base.	D:0.35m
9509	Fill	Firmly compacted mid darkish brown silty clay. Basal fill of 9508	L:0.95m, W:0.6m & D:0,13m
9510	Fill	Loosely compacted mid brownish yellow silty clay containing animal burial. Fill of 9511	L:1.25m, W:0.9m exp. & D:0.3m
9511	Cut	Northwest southeast orientated pit with moderately sloping sides that broke gradually to a flat base.	L:1.25m, W:0.9m exp. & D:0.3m
9512	Fill	Upper fill of prehistoric ditch previously recorded in trenches 44, 50 & 97. Fill of 9513	Not excavated in this trench
9513	Cut	Cut of prehistoric ditch previously recorded in trenches 44, 50 & 97.	Not excavated in this trench

Sample list

Sample #	Material	Description	Context/Location
9501	Bone	Animal bone	9510

Archive list

Context sheets	12
Logs	5
Plans	3
Sections	3
Photos	F7:28&13 C7:158&176

Licence: **08E0506**
Field: **3**
Trench: **96**

Trench summary

Trench 96 was added to the original trench list to test the limit and extent of the Bronze Age enclosure discovered in field 3. One potential feature was tagged during monitoring but through excavation was proven a variation in the natural subsoil. A roughly mettled that extended over most of field 3 was recorded in trench 96. It was located in the topsoil just beneath the sod. Judging from the artefacts retrieved from its surface, it is likely to date from the 19th-20th Century.

Monitoring archaeologist: RO'M
Date stripped: 13/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 20/06/08
Recorded by: TBJ
Date excavated and recorded: 17/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
9601	Layer	Topsoil	D:0.2m
9602	Layer	Subsoil	D:0.2m
9603	Layer	Non natural subsoil	
9604	Dep	Post-medieval gravel layer/roughly mettled surface	D:0.02m

Finds list

Find #	Material	Description	Context/Location
9601	Pottery	4 sherds of 19-20th Century pottery	9604
9602	Glass	3 sherds of glass	9604
9603	Fe	1 piece of corroded iron	9604

Archive list

Context sheets	1
Logs	2

Plans	0
Sections	0
Photos	F6:9 & C6:132-133

Licence: **08E0506**
Field: **3**
Trench: **97**

Trench summary

Trench 97 was added to the original list to define the line and extent of the Bronze Age enclosure. 2 features were tagged during monitoring. Excavation proved 1 to be a variation in the natural. The second feature was recognisable as the continuation of the prehistoric ditch also recorded in trench 44, 50 and 95. It was not excavated within this trench. 4 pieces of corroded iron were retrieved from the topsoil during the metal detecting of the spoil.

Monitoring archaeologist: RO'M
Date stripped: 12/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 19/06/08
Recorded by: TBJ
Date excavated and recorded: 18/06/08
Date signed off: 19/06/08

Context Register

Context No	Type	Description	Dimensions
9701	Layer	Topsoil	
9702	Layer	Subsoil	
9703	Layer	Non natural subsoil	
9704	Fill	Upper fill of prehistoric ditch recorded in trench 44, 50 & 95.	
9705	Cut	Cut of prehistoric ditch recorded in trench 44, 50 & 95.	

Finds list

Find #	Material	Description	Context/Location
9701	Fe	Corroded piece of iron	9701
9702	Fe	Corroded piece of iron	9701
9703	Fe	Corroded piece of iron	9701
9704	Fe	Corroded piece of iron	9701

Archive list

Context sheets	2
Logs	2
Plans	1
Sections	0
Photos	F7:9-10 & C7:181-183

Licence: **08E0506**
Field: **3**
Trench: **98**

Trench summary

Trench 98 was placed in the interior of the Bronze Age enclosure to assess the density of features. No archaeological features were uncovered and no artefacts were retrieved through metal detecting the spoil. A series of post-medieval plough furrows were noted.

Monitoring archaeologist: RO'M
Date stripped: 12/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 18/06/08
Recorded by: CB
Date excavated and recorded: 18/06/08
Date signed off: 18/06/08

Context Register

Context No	Type	Description	Dimensions
9801	Layer	Topsoil	D:0.15m
9802	Layer	Non natural subsoil	D:0.15m
9803	Layer	Natural subsoil	

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	
Logs	
Plans	
Sections	
Photos	

Licence: **08E0506**
Field: **3**
Trench: **99**

Trench summary

Trench 99 was added to the original trenches in north field to further test the area in the vicinity of the Bronze Age enclosure. 8 pits and 1 northwest southeast linear feature were tagged during monitoring. 2 pits were sample excavated. No artefacts were retrieved from those interventions, however the morphology and charcoal rich fills suggest these and the other features within the trench are of definite archaeological significance. An iron hook, 1 flint flake and a copper coin were retrieved from walking and metal detecting the spoil.

Monitoring archaeologist: RO'M
Date stripped: 13/06/08
Metal detecting archaeologist: CB
Date spoil metal detected: 19/06/08
Recorded by: CB
Date excavated and recorded: 17/06/08
Date signed off: 19/06/08

Context Register

Context No	Type	Description	Dimensions
9901	Layer	Topsoil	
9902	Layer	Subsoil	
9903	Cut	Circular pit with moderately sloping sides that broke gradually to a concave base.	Diam:0.8m & D:0.32m
9904	Fill	Moderately compact brownish grey clayey silt containing occasional charcoal flecks. Fill of 9903.	Diam:0.8m & D:0.32m
9905	Cut	Circular pit with moderately sloping sides that broke gradually to a concave base.	Diam:0.77m & D:0.24m
9906	Fill	Moderately compact mid brown silty sand containing occasional charcoal flecks. Upper fill of 9905	Diam:0.77m & D:0.08m
9907	Fill	Moderately compact light greyish brown silty sand. Basal fill of 9905	W:0.687m & D:0.12m
9908	Fill	Moderately compact dark greyish brown silty sand containing occasional charcoal flecks. Fill of exposed circular pit	Diam:0.40m Not excavated
9909	Fill	Moderately compact mid brown	Diam:0.35m

		sandy clay. Fill of exposed circular pit	Not excavated
9910	Fill	Moderately compact dark grey sandy clay containing charcoal and fragments of burnt bone. Fill of exposed circular pit	Diam:0.65m Not excavated
9911	Fill	Moderately compact yellowish brown sandy clay containing occasional charcoal flecks. Fill of exposed circular pit	L:0.85m & W:0.45m Not excavated
9912	Fill	Moderately compact greyish brown sandy clay. Fill of exposed linear, extends under baulk.	L:1.1m & W:0.55m Not excavated
9913	Fill	Moderately compact greyish brown sandy clay. Fill of oval pit	L:0.9m & W:0.65m Not excavated
9914	Fill	Moderately compact sandy silt containing occasional charcoal flecks and burnt stone. Fill of oval pit, extends under the baulk.	L:0.7m & W:0.25m exp. Not excavated

Finds list

Find #	Material	Description	Context/Location
9901	Fe	Iron hook	9901
9902	Flint	1 flint flake	9901
9903	Cu	Copper coin (corroded)	9901

Archive list

Context sheets	12
Logs	5
Plans	1
Sections	2
Photos	F7:16,17,21, 22 C7:164, 165,172,173

Licence: **08E0506**
Field: **1**
Trench: **100**

Trench summary

Trench 100 was a north south extension of trench 13 stripped to trace the extent of north south ditch 1305 and attempt to retrieve datable artefacts from same. 2m of the ditch were excavated but no artefacts were retrieved.

Monitoring archaeologist: Toril Bergsvik Johnson
Date stripped: 20/06/08
Metal detecting archaeologist: Camilla Brannstrom
Date spoil metal detected: 20/06/08
Recorded by: Robert Cwik
Date excavated and recorded: 20/06/08
Date signed off: 20/06/08

Context Register

Context No	Type	Description	Dimensions
1301	Layer	Topsoil	
1302	Layer	Non natural subsoil	
1303	Layer	Natural subsoil	
1304	Fill	Fill of 1305	See T13
1305	Cut	North south linear	See T13

Finds list

Find #	Material	Description	Context/Location
None			

Archive list

Context sheets	0
Logs	0
Plans	0
Sections	0
Photos	0

APPENDIX I GEOPHYSICS

GEOPHYSICAL SURVEY REPORT

OLDBRIDGE / RATHMULLAN

COUNTY MEATH

LICENCE NO. 07-R-190

23.06.2008

FOR

ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.

J.M.Leigh surveys

11 Our Ladys Road, Maryland, Dublin 8. Tel. 01 5210385. info@jmlsurveys.com

Oldbridge / Rathmullan, Co. Meath
Geophysical Survey Summary

Introduction

The geophysical survey was conducted for Archaeological Development Services Ltd. as part of a wider archaeological investigation of the proposed housing development in the townland of Oldbridge, County Meath. The proposed development area was subject to preliminary gradiometer scanning, totalling 20.3 hectares. Anomalies located during the preliminary gradiometer scan were targeted with detailed survey totalling 5.7 hectares.

Location Topography & Geology

The proposed development encompasses four fields to the east of Drogheda town and to the north of Rathmullan townland. The site is bound to the west by the M1 Motorway and to the north by the River Boyne. To the south of the proposed development is a local road which bridges the M1 Motorway.

The soils of the locality consist of grey brown podzols with associated gleys, over a parent material of till of Irish Sea origin, and limestone shale (Soil survey of Ireland 1980).

Archaeological Background

The proposed development is located within a rich archaeological environment, although no recorded monuments are located within the application area. Archaeological assessments, including an impact assessment report (Moraghan, M. 2007), and a cultural and heritage assessment (Whitaker, J. 2004) have been undertaken by Archaeological Development Services Ltd as part of the pre-development investigation of the site.

Archaeological investigations as part of the M1 Motorway Scheme identified two sites within close proximity to the south west corner of the current application area. These were a Neolithic pit (RMP ME020:034) and a pit of undetermined date (RMP ME020:054). Similarly, to the north of the application area another prehistoric pit (RMP ME020:035) was identified.

Southwest of the application area two enclosure sites (RMP ME020:008, ME020:030) have been identified. Further evidence of prehistoric activity within the townland of Oldbridge includes two recorded lithic scatters RMP ME020:025019, ME020:0250023),

two standing stones (RMP ME020:030 and ME020:00401) and a souterrain site (RMP ME020:004).

The location of the historic Battle of the Boyne is located to the west of the application area. Several fords running across the Boyne are located in the townland of Oldbridge. It is possible these fords were used during the famous battle and there is a recorded ford site (ME020-039) to the north of the study area.

In addition to the recorded monuments to the west of the application area, an archaeological complex (LH024:012) is located in the townland of Mell, north of the River Boyne in County Louth. The archaeological complex is less than 1km from the application area and includes two souterrain sites, a cemetery, an enclosure and a holy well.

*Summary of Results

Gradiometer scanning and targeted detailed gradiometer survey has highlighted several magnetic responses of potential archaeological origin.

Broad responses in Field 1 may represent natural variations in the sub-soil. However, a possible curvilinear ditch type response in the south east of the detailed survey Area 1 may represent a plough damaged archaeological ditch. A curvilinear trend and series of responses may equally represent plough damaged archaeology, perhaps suggestive of the remains of an enclosure. However, the responses are incoherent and no clear archaeological pattern is evident. It is equally possible that natural features are represented here.

A large ferrous spread of responses has been identified in Field 2 and is most likely modern in origin. In the south west of Field 2, Area 3A, parallel linear responses may represent a former track way or possibly drainage features. An archaeological interpretation is unclear.

In the southern most field (Field 4) a series of weak responses forms a large rectilinear boundary or enclosure ditch c125m x 85m. It is possible a field system extending north into Field 2 has been identified. The potential enclosure or field system is interposed by a circular response approximately 7.5m in diameter. It can be speculated that a ditched feature, possibly the remains of a habitation site, and associated pit features is located in Field 4, forming part of a large field system which extends into Field 2. Although this is speculative the responses are of archaeological strength and form and it is possible that archaeological remains are represented here.

Geophysical Survey Report
Oldbridge / Rathmullan, Co. Meath

1 Introduction

1.1 A geophysical survey has been conducted at a site in the townland of Oldbridge, County Meath, as part of a wider archaeological study conducted by Archaeological Development Services Ltd for a proposed housing development.

1.2 Geophysical survey was conducted with the aim of locating and identifying magnetic responses within the study area that may result from buried archaeological remains. The nature and extent of magnetic anomalies and areas of potential archaeological interest were identified and investigated with gradiometer scanning and targeted detailed gradiometer survey.

2 Survey Methodology

2.1 The geophysical survey consisted of a preliminary gradiometer scan of the proposed development area. A total of 20.3 hectares was subject to gradiometer scanning. Subsequent recorded detailed survey of 5.7 hectares was conducted in five areas (Areas 1-5) to investigate the scanned anomalies.

2.2 The preliminary scan was conducted with the gradiometer instrument in scanning mode and 10m traverses of the assessment area were undertaken. The magnetic variations along each 10m traverse were monitored by the instrument operator. Any magnetic responses that were thought to be of potential interest were marked in the field, for further investigation with a detailed gradiometer survey.

2.3 The detailed gradiometer survey was conducted with 20m x 20m survey grids with a sample interval of 0.25m and a traverse interval of 1m. Survey was undertaken with a Bartington GRAD-601 dual sensor instrument.

2.4 The site location is presented in Figure 1 at a scale of 1:20,000. Figure 2 is at a scale of 1:2,500 and presents the location of scanned anomalies and the subsequent areas of detailed survey (Areas 1-5). Detailed survey Areas 3 and 4 have been sub-divided for ease of display but are discussed as a whole within the text of this report.

2.5 Survey grids were set out by the staff of J. M. Leigh Surveys using *in situ* grid points established by the staff of Archaeological Development Services Ltd. All survey was

conducted with reference to the geo-referenced master grid. The survey location information is presented on the attached CD as Appendix A2.01.

2.6 Further information regarding the magnetometer instrument, the site methodology and terminology used can be found in the technical information section at the back of this report.

3 Data Display

3.1 The results of the detailed gradiometer survey are presented as an overall summary greyscale image and accompanying interpretation diagram in Figures 3 and 4, both at a scale of 1:1,750. Figures 5 to 9 present greyscale images and interpretations of survey Areas 1 to 5 at a scale of 1:1,000. All the summary diagrams (Figures 3 to 9) present processed data as greyscale images with a display range of -1nT to 2nT.

3.2 The raw data is presented as a series of archive plots in A1.01 to A1.17 The unprocessed data is presented as xy-trace plots, greyscale images and interpretation diagrams, all at a scale of 1:500 and can be viewed in PDF file format on the attached CD.

3.3 The display formats and the interpretation categories are discussed further in the technical information section.

4 Further Information & Ground Conditions

4.1 Geophysical survey was undertaken by Joanna Leigh between the 20th and 29th of May 2008. Survey fieldwork was conducted under licence 07-R-190 from the Department of the Environment, Heritage & Local Government.

4.2 At the time of fieldwork, Field 1 and 3 consisted of recently cut pasture. Fields 2 and 4 contained the remains of a harvested rapeseed crop.

4.3 Disused farm buildings were located in the south of Field 4, and in between Fields 2 and 3. The farm buildings consisted of concrete structures with corrugated iron roofs. The corrugated roofing produces strong magnetic disturbance that may mask more subtle responses, and no survey or interpretation of the areas immediately adjacent to the farm buildings could be undertaken. Localised magnetic disturbances caused by electricity pylons and telegraph poles within the application area are evident in some of the data sets.

4.4 A rectangular area in the north-east of Field 1 is part of the application area, however no survey could be undertaken here due to the location of a large spoil heap consisting of modern rubbish.

4.5 Numerous isolated ferrous-type responses are apparent throughout the data sets. These anomalies are usually caused by the presence of modern ferrous debris within the topsoil and are not referred to in the text unless considered relevant.

4.6 Letters in parentheses in the text of the report refer to specific responses highlighted on the interpretation diagrams.

5 Results of Gradiometer Scanning (Figure 2)

5.1 Gradiometer scanning throughout the application area identified multiple isolated scanned anomalies of potential archaeological origin. A natural background variation of ±1nT was observed throughout the application area. Variations from this background were marked in the field and further investigated. Detailed survey blocks (Areas 1-5) were located to investigate the anomalies identified during gradiometer scanning.

Field 1

5.2 Gradiometer scanning in Field 1 identified limited magnetic responses in the west of the field. As scanning continued in the east of the field, numerous isolated anomalies of some magnetic strength ±0.5nT were identified. The magnetic response in the east of this field was notably increased and detailed survey Area 1 was positioned along the southern boundary of Field 1 to investigate the anomalies identified.

Field 2

5.3 There was little variation in the background magnetic response of ±0.5nT in Field 2, although anomalies of potential along the southern half of the field were identified.

5.4 Broad isolated anomalies were identified, and a large spread of approximately 20m^2 of a large magnetic signature was noted. The spread of anomalies consisted of magnetic values in excess of the instruments detection range suggesting a modern origin. However, the spread of ferrous anomalies appeared well defined and no modern cause for the ferrous anomalies could be surmised. Detailed survey Area 3 was positioned to investigate the spread of ferrous responses.

5.5 The isolated anomalies identified were located predominantly in the south western corner of Field 2, and two further isolated anomalies were detected to the north of the ferrous anomalies. Detailed survey Area 2 and an extension of Area 3 was undertaken to investigate the remaining isolated anomalies.

Field 3

5.6 Gradiometer scanning in Field 3 was limited by the disturbance produced from modern features within the field. Fields 2 and 3 were subdivided by the remains of a sunken/banked track way. Along the edge of the former track way was a barbed wire fence. The track way and the fence caused magnetic disturbance along the eastern

edge of Field 3. A series of farm buildings in the south of Field 3 resulted in significant magnetic disturbance a minimum of 30m from the buildings. There was also a bore hole located in the centre of Field 3. The modern features within Field 3 produce magnetic disturbance and would mask any small magnetic anomalies of potential interest. No anomalies of potential interest were identified in Field 3 and no detailed survey was conducted here.

Field 4

5.7 Gradiometer scanning in Field 4 revealed a limited variation in natural background response. Clusters of isolated responses were identified in the north west of the field, and broad amorphous spreads of anomalies were concentrated in the central eastern section. In addition, some magnetically strong anomalies in the western half of the field were identified, and archaeological potential was unclear. A large detailed survey area was located in Field 4 to fully investigate the archaeological potential of the anomalies identified.

5.8 The enclosure site ME020:008 is located to the southwest of the application area. Detailed survey Area 5 was located in the southwest corner of the application area to confirm the absence of scanned anomalies here, and investigate any archaeological potential, given the close proximity of the enclosure site.

6 Results of Detailed Gradiometer Survey

Area 1 (Field 1) Figures 5 & 6

6.1 The detailed gradiometer survey in Area 1 has confirmed the scanning results and identified numerous isolated responses. The responses identified have a broad and amorphous appearance and an archaeological pattern is hard to discern. This is suggestive of natural variations and an archaeological interpretation is unclear.

6.2 In the east of Area 1, a curvilinear series of broad responses (A) may be of interest. The responses are located at the bottom of a slope and the natural topography may be reflected in the response. However, it is possible that a plough damaged boundary or ditch feature has been identified. An archaeological interpretation is tentative but must be considered.

6.3 In the centre of Area 1, several responses (B) and a series of faint linear trends may be of interest. It is possible that natural variations in the sub-soil are represented, however a curvilinear form is discernable from the surrounding broad amorphous responses. It is possible that plough damaged archaeological remains are present. The responses may represent an ephemeral archaeological ditch or enclosure feature. This is speculative and it is equally possible that the responses are the result of further natural variations. An archaeological interpretation is possible but tentative.

6.4 In the west of Area 1 several responses (C) are identified. Archaeological interpretation of the responses is tentative as no clear archaeological pattern is evident. The responses may represent further natural variations in the sub-soil.

Area 2 (Field 2) Figures 5 & 6

6.5 Area 2 is located in the central northern part of Field 2. Isolated responses (D) are similar in shape and form to the responses (C) identified in Area 1. The responses are of archaeological strength although no clear archaeological pattern is evident, and a natural origin is possible.

6.6 In the south of Area 2, faint linear trends (E) are evident. The trends most likely represent plough damaged field divisions, which continue into Area 3B. It is possible that a field system is represented here.

Area 3A & 3B (Field 2)

6.7 Areas 3A and 3B are located along the southern boundary of Field 2. The survey areas were positioned to investigate clusters of scanned anomalies located throughout the southern edge of the field.

6.8 In the west of Area 3A, two parallel linear responses (F) have been identified. The linear responses appear to be approximately 15m apart and are orientated perpendicular to the existing field boundary. It is possible that a former track way, or drainage feature has been identified. The responses in the south of the survey area are masked by the magnetic disturbance caused by the electricity pylon, located within the field boundary.

6.9 To the east of the linear responses (F) are several isolated responses (G) of archaeological strength and it is possible that a cluster of pit features is represented here. However, the field has been heavily ploughed and it is equally possible that the responses originate from the recent modern ploughing activity.

6.10 A weak linear response (H) in Area 3A may represent the remains of a former field division, or field drain.

6.11 An unusual ferrous response (I) has been identified in Area 3B. The response appears to be composed of multiple ferrous anomalies forming a rectilinear area of magnetic disturbance approximately 23m x 23m. The shape of the disturbance is curious and although the ferrous nature of the response is typical of modern disturbance, interpretation is unclear.

6.12 North of the ferrous disturbance (I), a cluster of responses (J) is evident. They may represent a continuation of the probable modern ferrous disturbance; however, it is possible that the responses (J) are of archaeological origin. The strength of the responses is less suggestive of a modern origin and a cluster of archaeological pits may be represented here.

6.13 Parallel linear responses (K) in the east of Area 3B are suggestive of former field divisions. They appear fragmented, perhaps as a result of modern ploughing. Perpendicular to (K) are several linear trends (L) approximately 12m apart. The responses (K) and (L) appear to form a ladder shaped series of field divisions. The field divisions may represent a field system, possibly continuing north into Area 2.

6.14 Further faint trends in Area 3B may represent a continuation of the possible field system, or the trends may represent more recent ploughing activity.

Areas 4A – 4D and Area 5 (Field 4) Figures 7, 8 & 9

6.15 A series of linear responses and trends (M) in Areas 4A, 4B, 4C and 4D appears to form a large rectilinear enclosure or boundary feature measuring c.125m east-west and c.85m north-south. The responses (M) may represent part of a former field system, which extends north into Field 2.

6.16 In the southeast of survey Area 4D, the potential boundary enclosure (M) is intersected by a circular response (N) of c. 7.5m diameter that is interpreted as of archaeological interest. A possible opening or entranceway is located in the south of the circular response. Several isolated responses of archaeological strength are located in close proximity to (M) and it is possible that a small enclosure or habitation site consisting of a ditched feature and pits is located here. It seems likely that the circular response (N) is associated with the possible enclosure / field system (M).

6.17 Isolated responses within the boundary enclosure (M) have been identified; however no clear archaeological pattern is evident. Although it is possible that ephemeral archaeological features are located here, archaeological interpretation is cautious.

6.18 Broad amorphous responses (O) in survey Areas 4B and 4D are evident. They do not appear to have any correlation or association with the boundary enclosure (M) and have no clear archaeological shape or form. The responses are interpreted as natural in origin.

6.19 Linear negative trends have been identified in the west of Area 4A. The trends appear to be orientated with the modern ploughing and it is likely that a track way for farm vehicle use s is represented here.

6.20 A spread of increased magnetic response (P) appears to run through survey Areas 4A, 4C and Area 5. The spread is orientated north south and is has a width of approximately 14m. It is probable that a former field division has been repeatedly ploughed out, forming the broad spread of increased magnetic response. No archaeological explanation for such a broad spread can be provided and a ploughed out former field boundary is the preferred interpretation.

6.21 In survey Area 4A several curvilinear and isolated responses (Q) are of potential interest. The responses appear magnetically strong and it is possible that they represent modern features and may be associated with the probable plough damaged former field boundary (P). However, their shape and form is curious and it is possible that short ditched features, in-filled with burnt material are represented here.

6.22 Ploughing trends in Field 4 are evident throughout the survey Areas 4A – 4D and Area 5. The trends correlate with the modern ploughing and are not considered to be of archaeological interest.

6.23 Broad ferrous responses in Area 4A and Area 5 are most likely of modern origin and interpreted as of archaeological interest.

7 Discussion & Conclusion

7.1 The geophysical survey has identified the remains of a large rectilinear enclosure ditch or field boundary remains located in Field 3. The responses appear fragmented and magnetically weak, and the possible antiquity of the feature is unclear. Nevertheless, the rectilinear responses suggest a ditched enclosure or field boundary feature approximately 125m x 85m.

7.2 A circular response c.7.5m in diameter has been identified in the southeast of the probable boundary ditch. It seems likely that the response is contemporary with the large boundary ditch and it is possible a small habitation site and associated field boundary or field enclosure have been identified. This is speculative but an archaeological interpretation must be considered.

7.3 In Field 1 amorphous responses have been detected and no clear archaeological pattern is evident. However, a faint curvilinear trend and series of responses may represent the plough damaged remains of an archaeological ditch feature. It is possible that the remains of a curvilinear enclosure ditch are represented here, although this is speculative.

7.4 In the south-west corner of Field 2, two parallel linear responses have been identified, and may represent a former track way or drainage features.

7.5 A rectilinear spread of ferrous responses in Field 2 is most likely modern in origin. Next to the ferrous responses are a series of responses and trends which form a ladder shape of field divisions and sub-divisions. The series of responses may represent a field system and is considered to be of archaeological potential. It is possible these responses are associated with the possible field enclosure and circular response to the south.

7.6 Through the centre of Field 4 a broad spread of increased magnetic response orientated north-south has been detected. It is possible a plough damaged former field boundary is represented here.

7.7 Although no substantial archaeological site or complex has been identified the geophysical survey results suggest the lands within the application area have been under agricultural use for some time. The modern ploughing resulted in some disturbance, particularly visible in Field 4 as series of linear trends running through the data sets. However, responses of potential interest have been identified and it is

possible former field divisions or field system and a potential habitation site have been identified. Although speculative, it is possible that prehistoric activity is represented here.

7.8 A test trenching strategy undertaken by Archaeological Development Services Ltd. is currently underway, at the time of this report, and is designed to establish the archaeological potential of the proposed development site. The test trenching strategy will also target the potential archaeology highlighted in this report, and clarify the true nature of the geophysical responses.

8 Technical Information Section

Instrumentation & Methodology

Fluxgate Gradiometer Survey

Gradiometer survey is the most frequently applied survey instrument as it can be used in 'Scanning' or detailed survey mode.

Scanning

This is a fast and effective reconnaissance technique. The instrument is set in scanning mode and regular traverses of the investigation area are made, usually at 10m intervals. This allows a fast and effective scan of the application area, looking for any responses which may be of archaeological potential. As the traverses are made, the operator observes the instrument readout, and any magnetic anomalies are marked for further investigation.

Detailed Gradiometer Survey

This is conducted to clearly define any responses detected during scanning, or can be applied as a stand alone methodology. Detailed survey is often applied with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is collected in grids 20m x 20m, and data is displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. A survey with a grid size of 10m x 10m and a traverse interval of 0.5m will provide a dataset with high resolution.

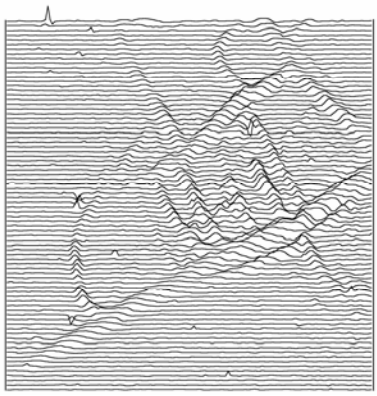
Bartington GRAD 601-2

The Bartington *Grad* 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey very fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

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.

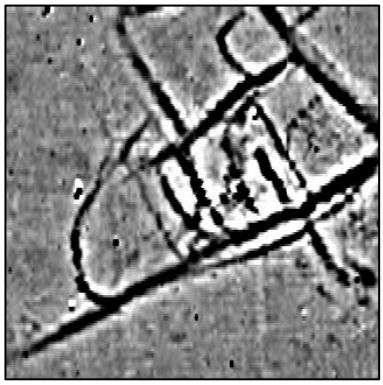
Data Display & Presentation

*XY Trace**



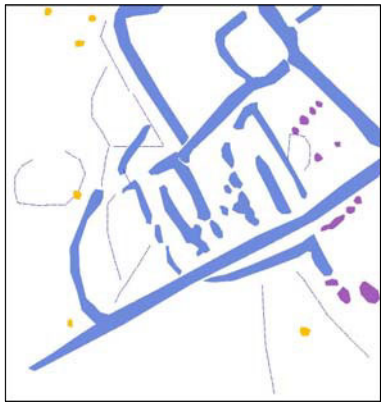
The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot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

*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 dataset. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.

Interpretation



An interpretation of the data is made using many of the plots presented in the final report, in addition to examination of the raw and processed data. The project managers' knowledge and experience allows a detailed interpretation of the survey results with respect to archaeological potential.

**XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation.*

Glossary of Interpretation Terms

Archaeology

This category refers to responses which are interpreted as of clear archaeological potential, and are supported by further archaeological evidence such as aerial photography or excavation. 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 material.

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 or archaeological cultivation trends.

?Natural

A natural variation in the magnetic background of the subsoil identified as a broad amorphous response. This may result from geological features or variations in the underlying soil.

Ferrous Response

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 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.

References

Keogh, C. (2001) *'Archaeological Impact Assessment of a Proposed Development at Oldbridge, Co. Meath'* Unpublished Report, ADS Ltd.

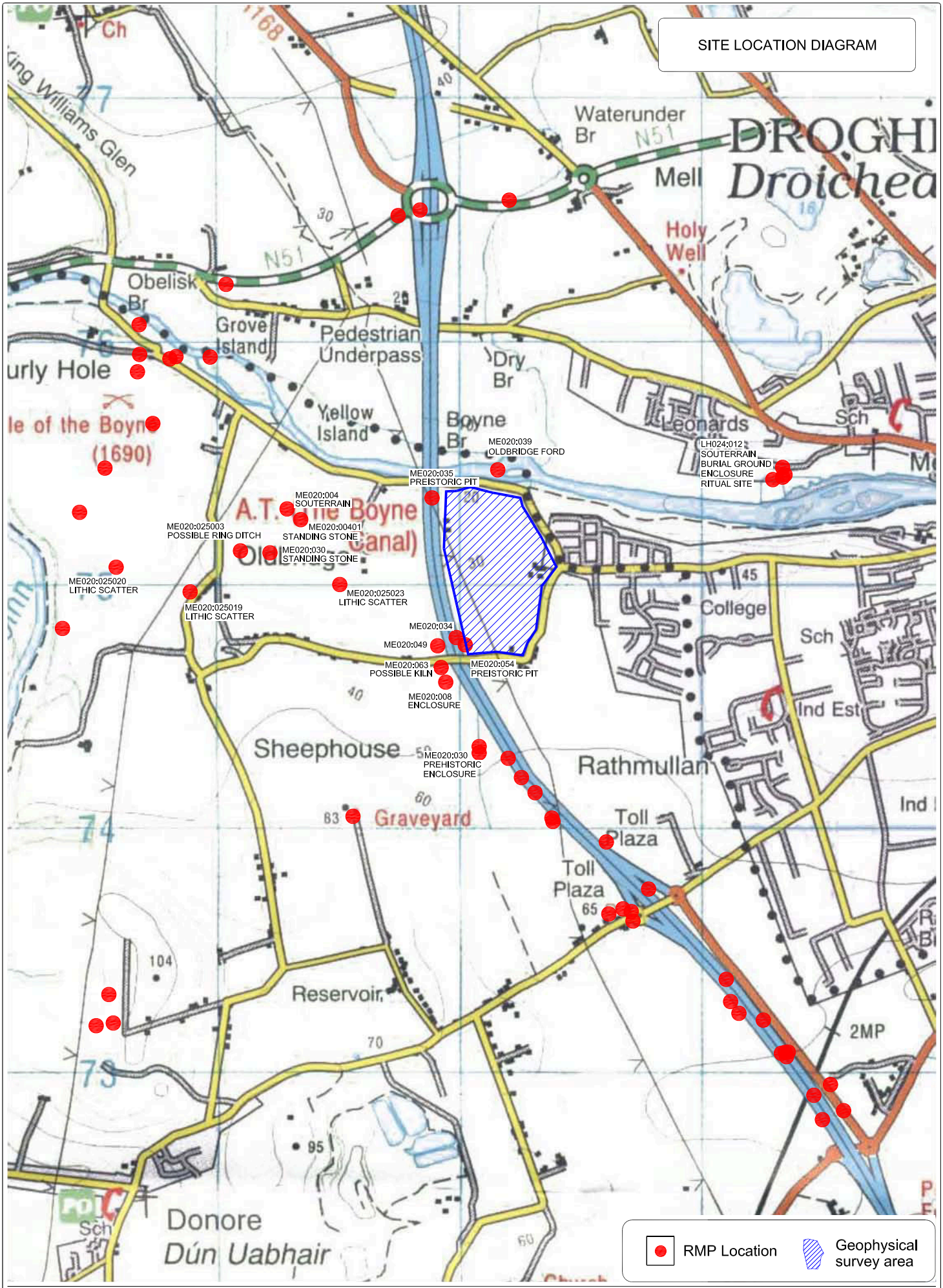
Moraghan, M. (2007) 'Impact Assessment Report for a Proposed Housing Development Oldbridge/Rathmullan, County Meath' Unpublished Report, ADS Ltd.

National Soil Survey of Ireland (1980) General soil map second edition (1:575,000). *An Foras Taluntais*

Whitaker, J. (2004) '*Cultural and Heritage Assessment of a Proposed residential Development Site at Rathmullan, Co. Meath*' Unpublished Report, ADS Ltd.

List of Figures

Archive diagrams on attached CD



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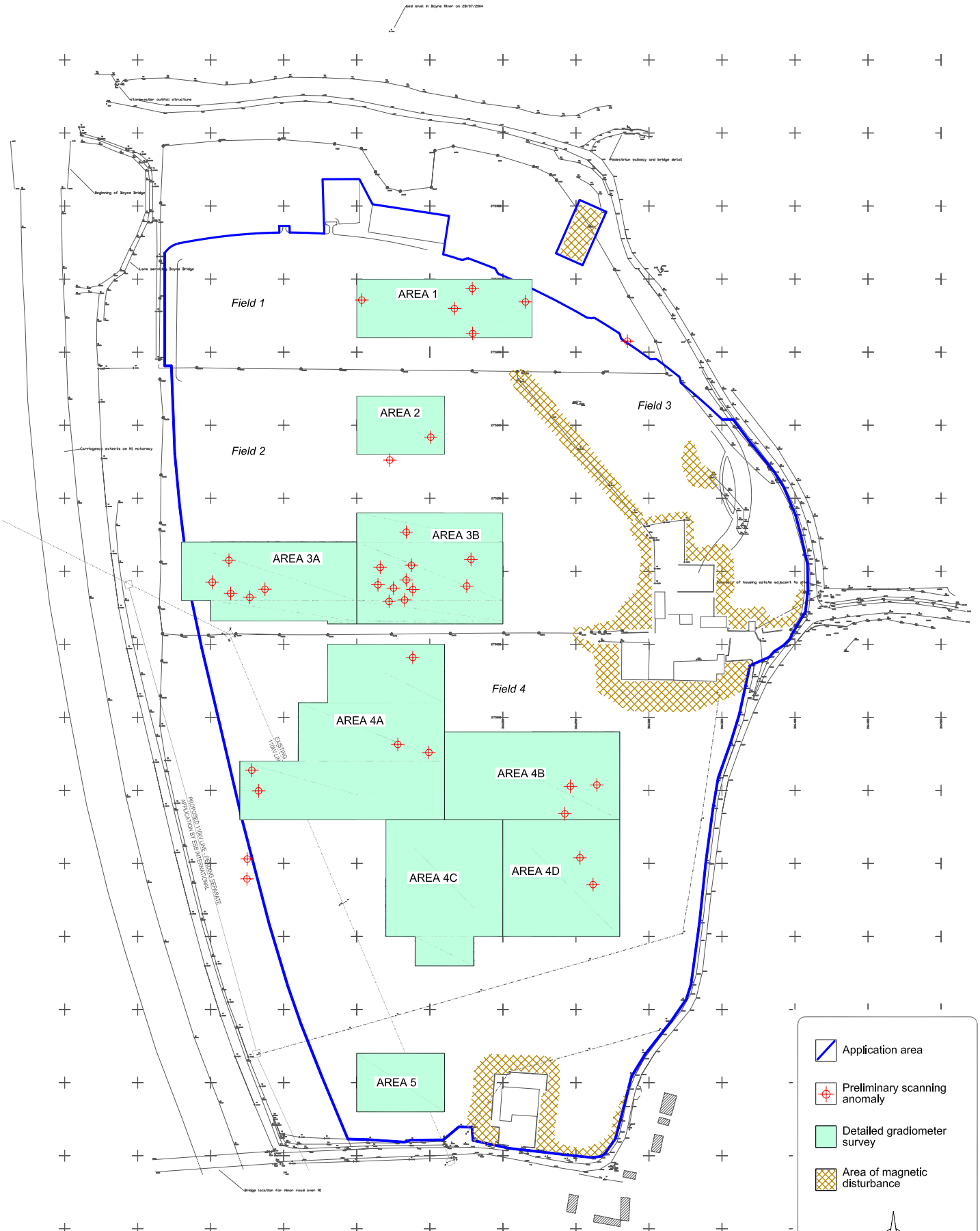
SURVEY LOCATION DIAGRAM



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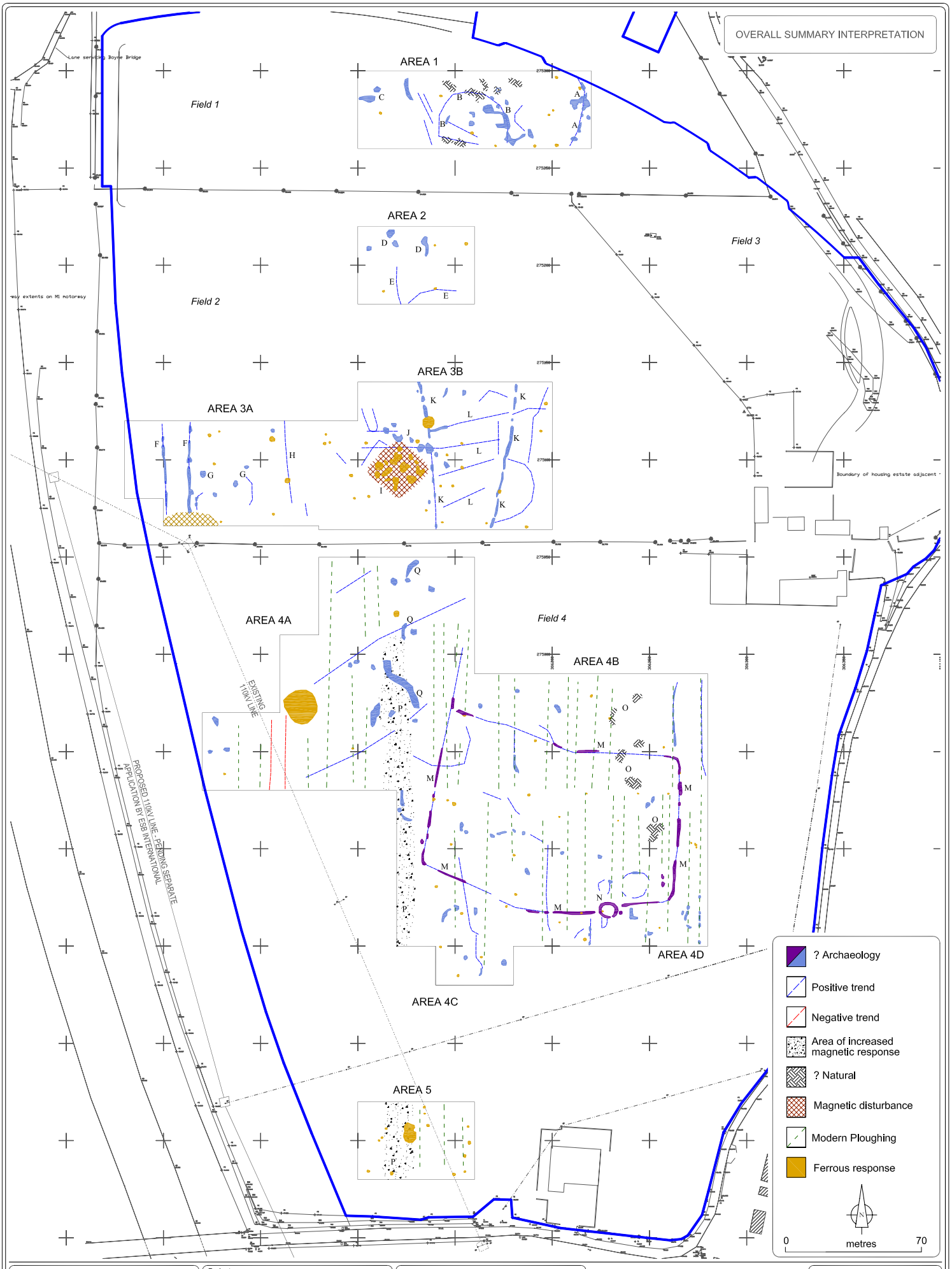
Issue Date:	23.06.2008



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Scale @ A3:	1:1,750
Figure:	4
Licence No.:	07 - R - 190
Issue Date:	23.06.2008

AREAS 1, 2 & 3: GREYSCALE IMAGE

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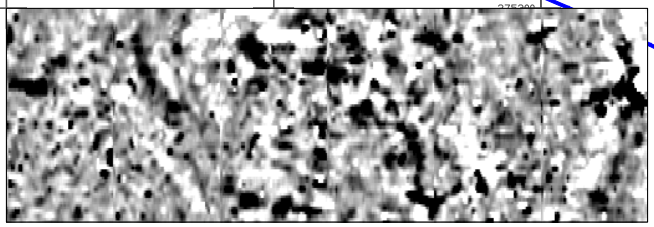
0 metres 40

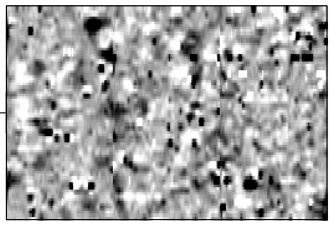
Boyne Bridge

AREA 1



Field 1

AREA 2



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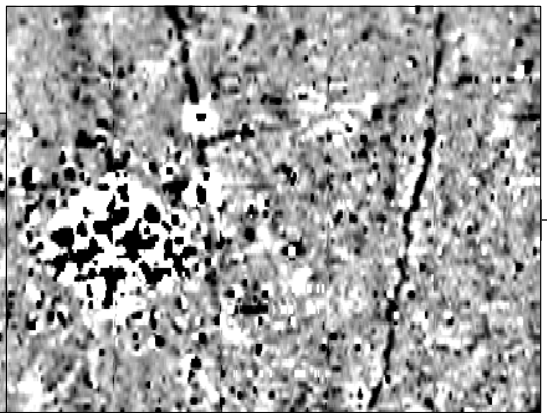

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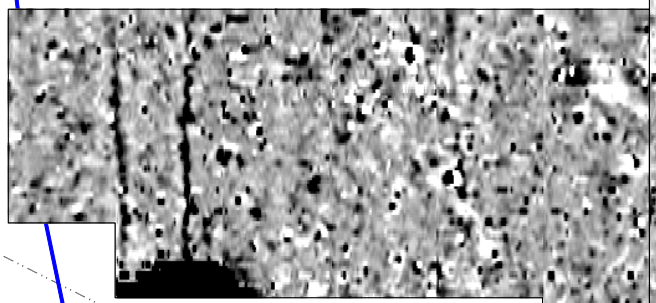

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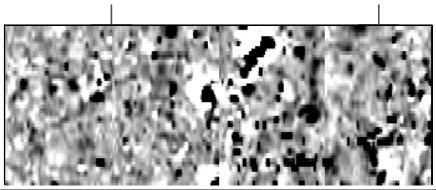
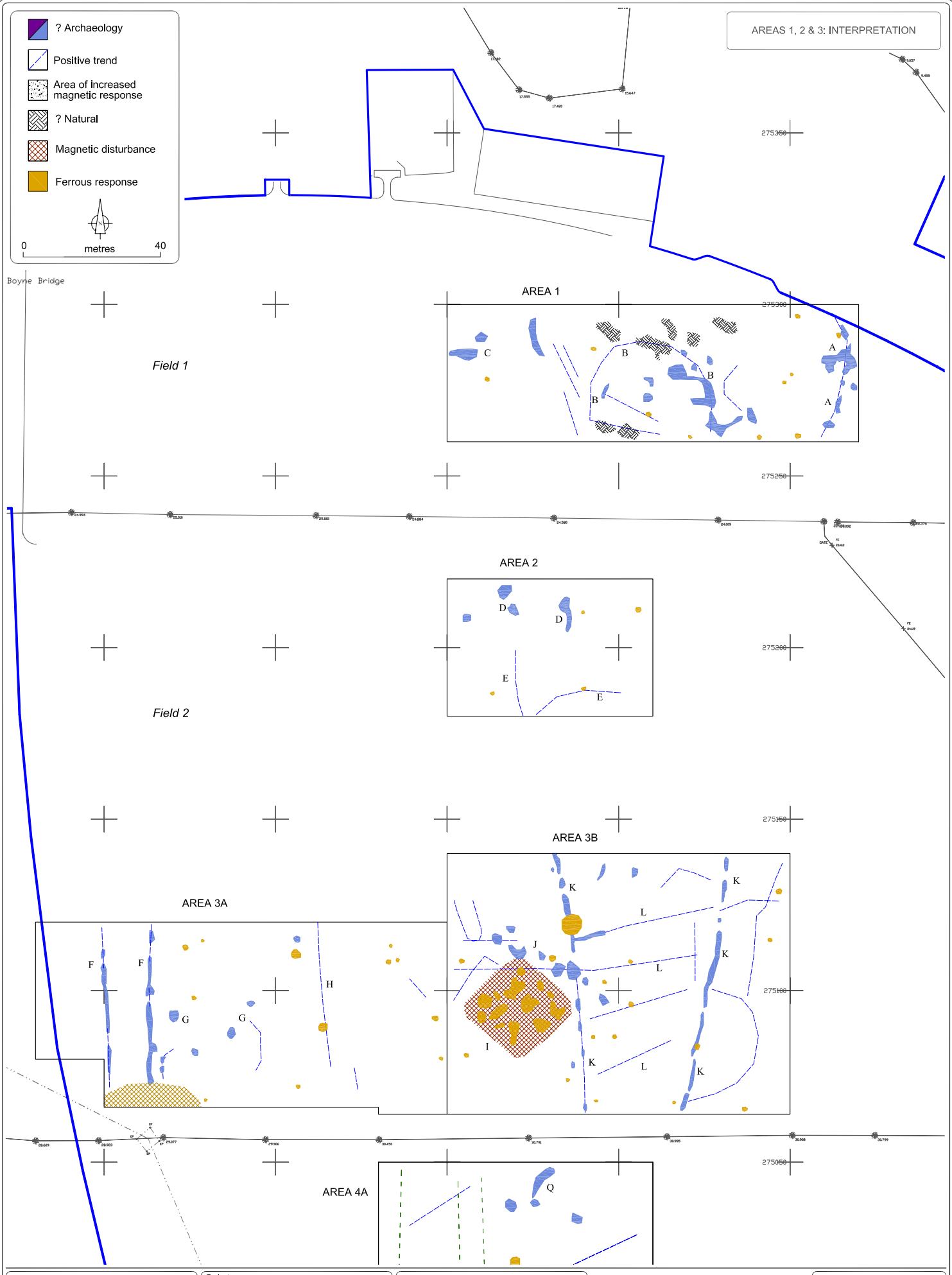
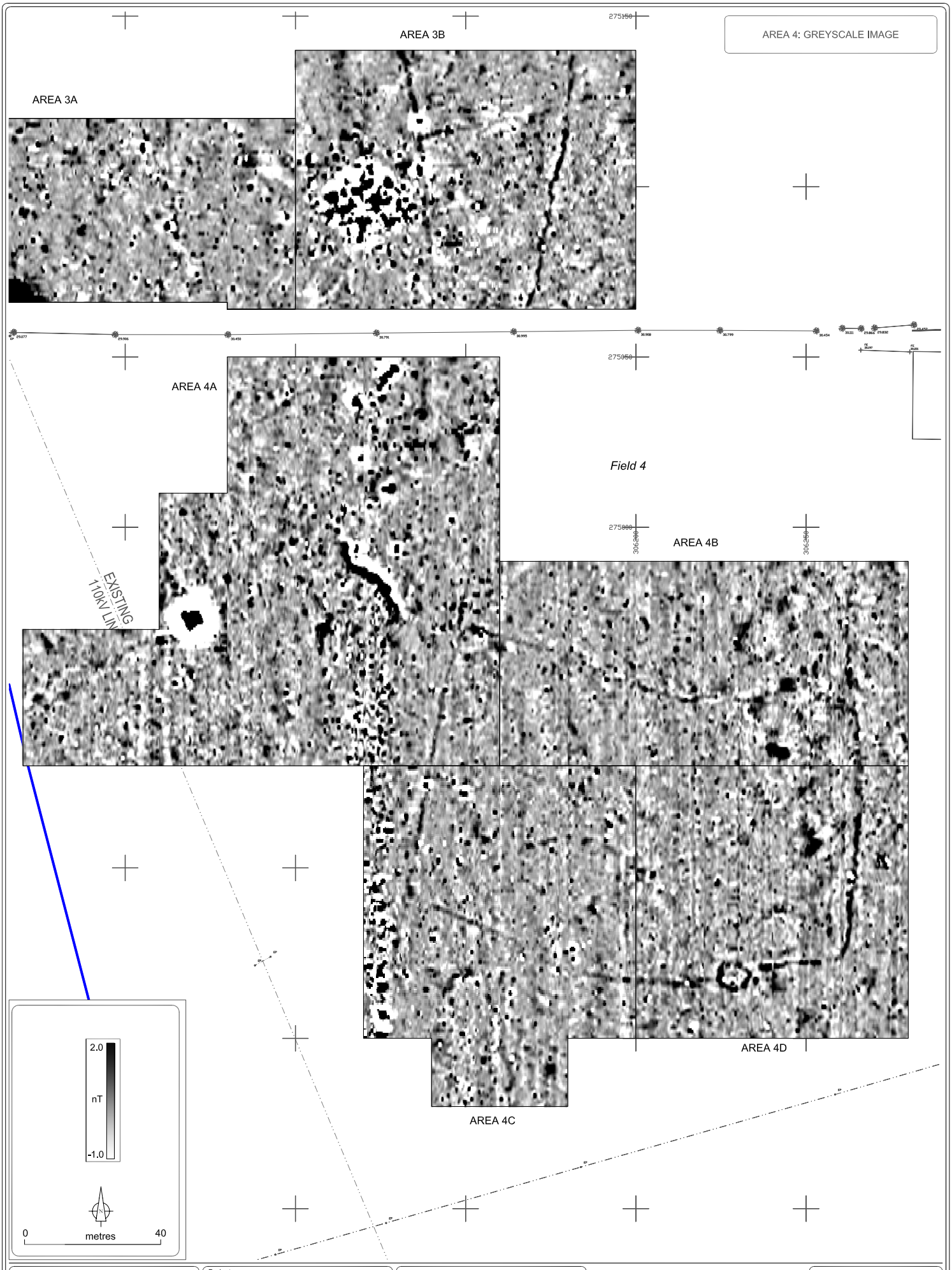


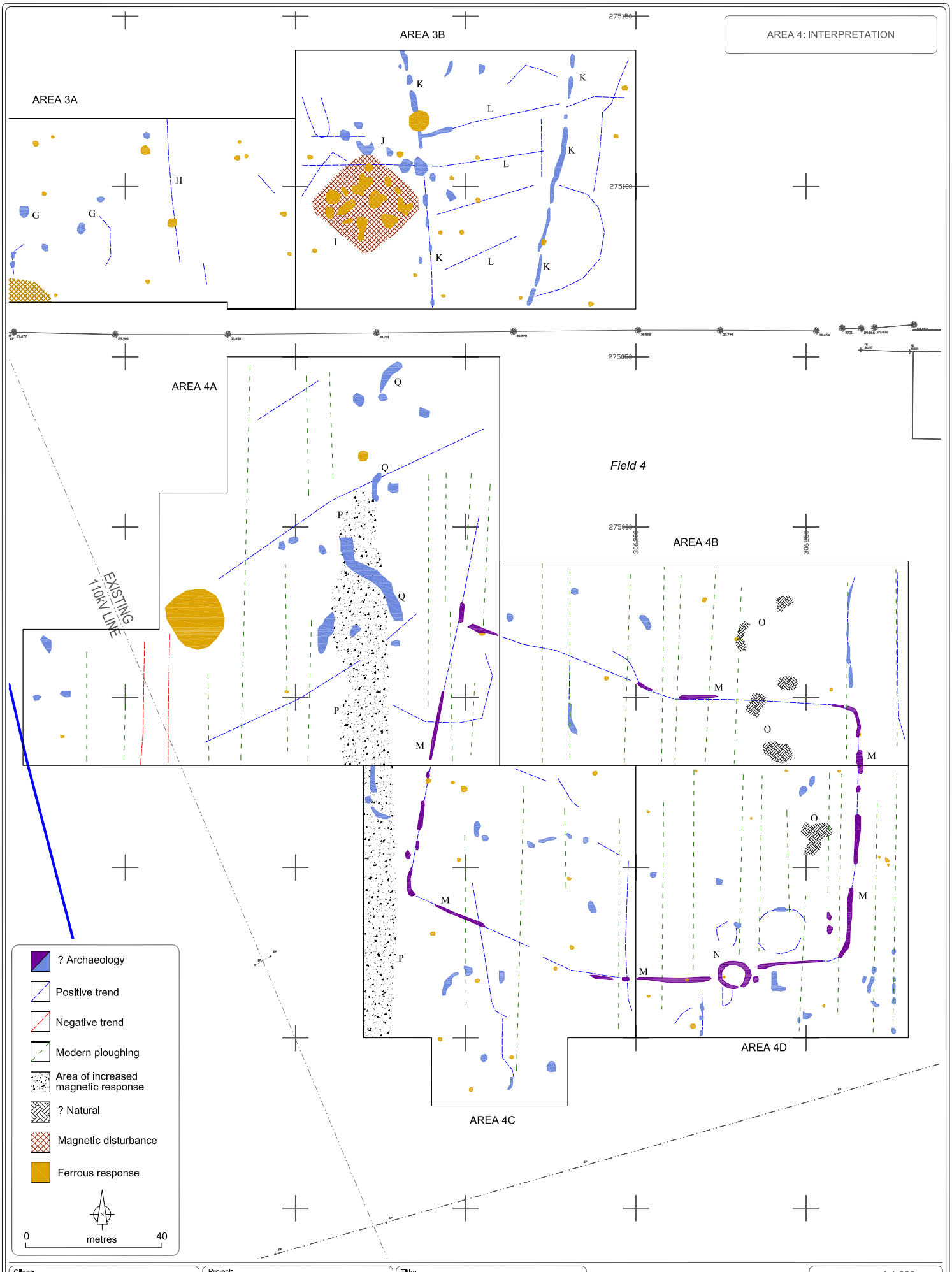
Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREAS 1, 2 & 3: GREYSCALE IMAGE	J.M.Leigh surveys www.jmlsurveys.com	Scale @ A3: 1:1,000 Figure: 5 Licence No.: 07 - R - 190 Issue Date: 23.06.2008



Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREAS 1, 2 & 3: INTERPRETATION	J.M.Leigh surveys www.jmlsurveys.com	Scale @ A3: 1:1,000 Figure: 6 Licence No.: 07 - R - 190 Issue Date: 23.06.2008



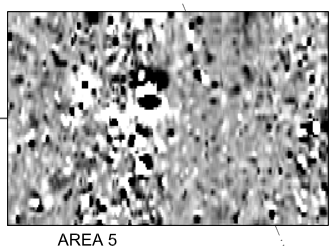
Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREA 4: GREYSCALE IMAGE	J.M.Leigh surveys www.jmlsurveys.com	Scale @ A3: 1:1,000 Figure: 7 Licence No.: 07 - R - 190 Issue Date: 23.06.2008



Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREA 4: INTERPRETATION	J.M.Leigh surveys www.jmlsurveys.com

Scale @ A3:	1:1,000
Figure:	8
Licence No.:	07 - R - 190
Issue Date:	23.06.2008

AREA 5: GREYSCALE IMAGE



AREA 5

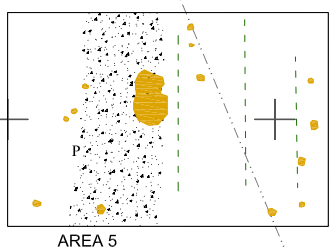
Field 4

2.0
nT
-1.0

for minor road over M1

0 metres 40

AREA 5: INTERPRETATION



AREA 5

Field 4

Area of increased magnetic response

Modern ploughing

Ferrous response

for minor road over M1

0 metres 40

Client: ARCHAEOLOGICAL DEVELOPMENT SERVICES LTD.	Project: GEOPHYSICAL SURVEY: OLDBRIDGE / RATHMULLAN COUNTY MEATH	Title: AREA 5: GREYSCALE IMAGE & INTERPRETATION	J.M.Leigh surveys www.jmlsurveys.com	Scale @ A3: 1:1,000 Figure: 9 Licence No.: 07 - R - 190 Issue Date: 23.06.2008

Fig. 1 Extract from O.S. Discovery Series Map, Sheet 43, showing site location.

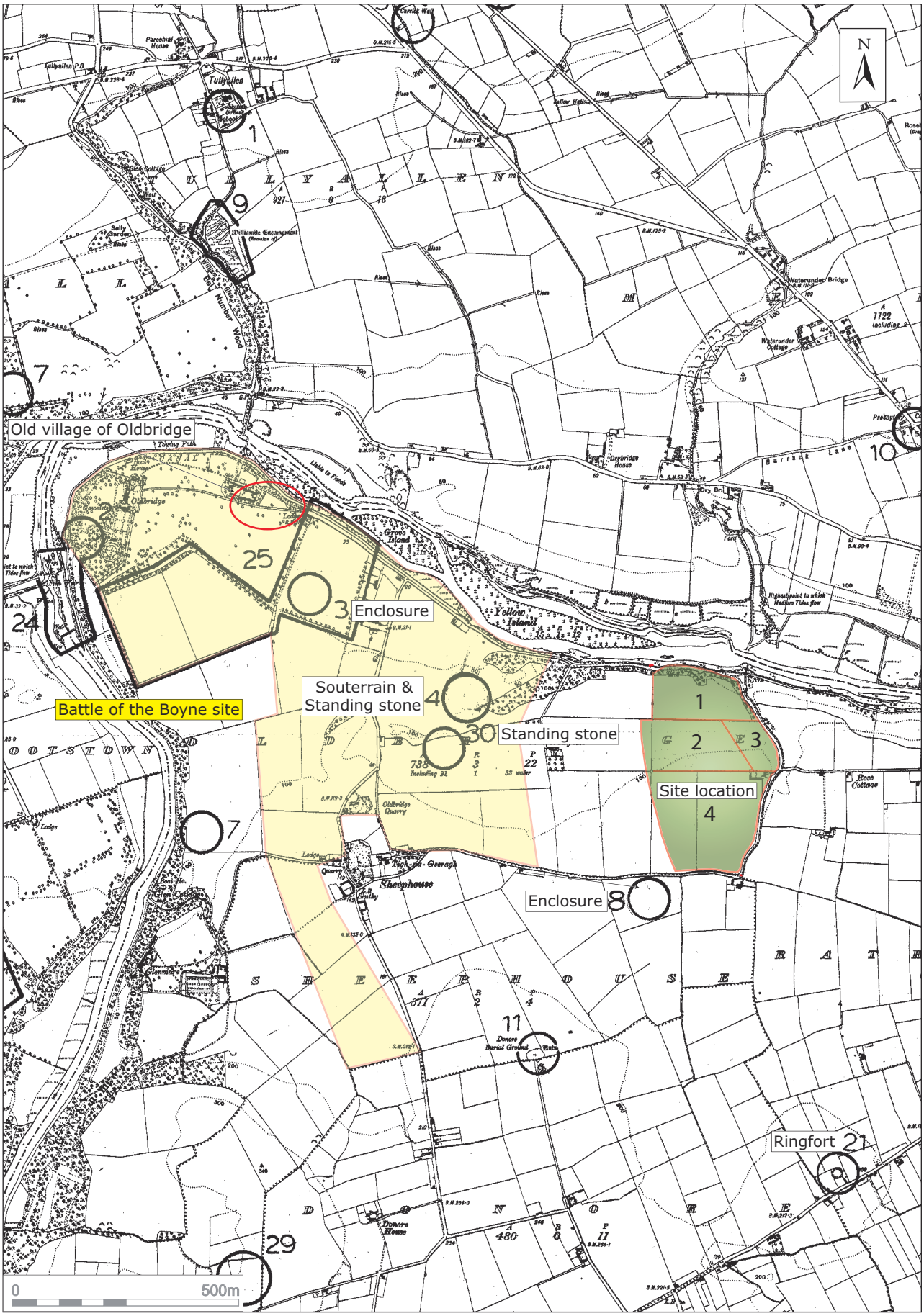


Fig. 2 Extract from Record of Monuments and Places (RMP) Maps Co. Meath, Sheet 20 and Co. Louth, Sheet 24 with location of nearby sites.

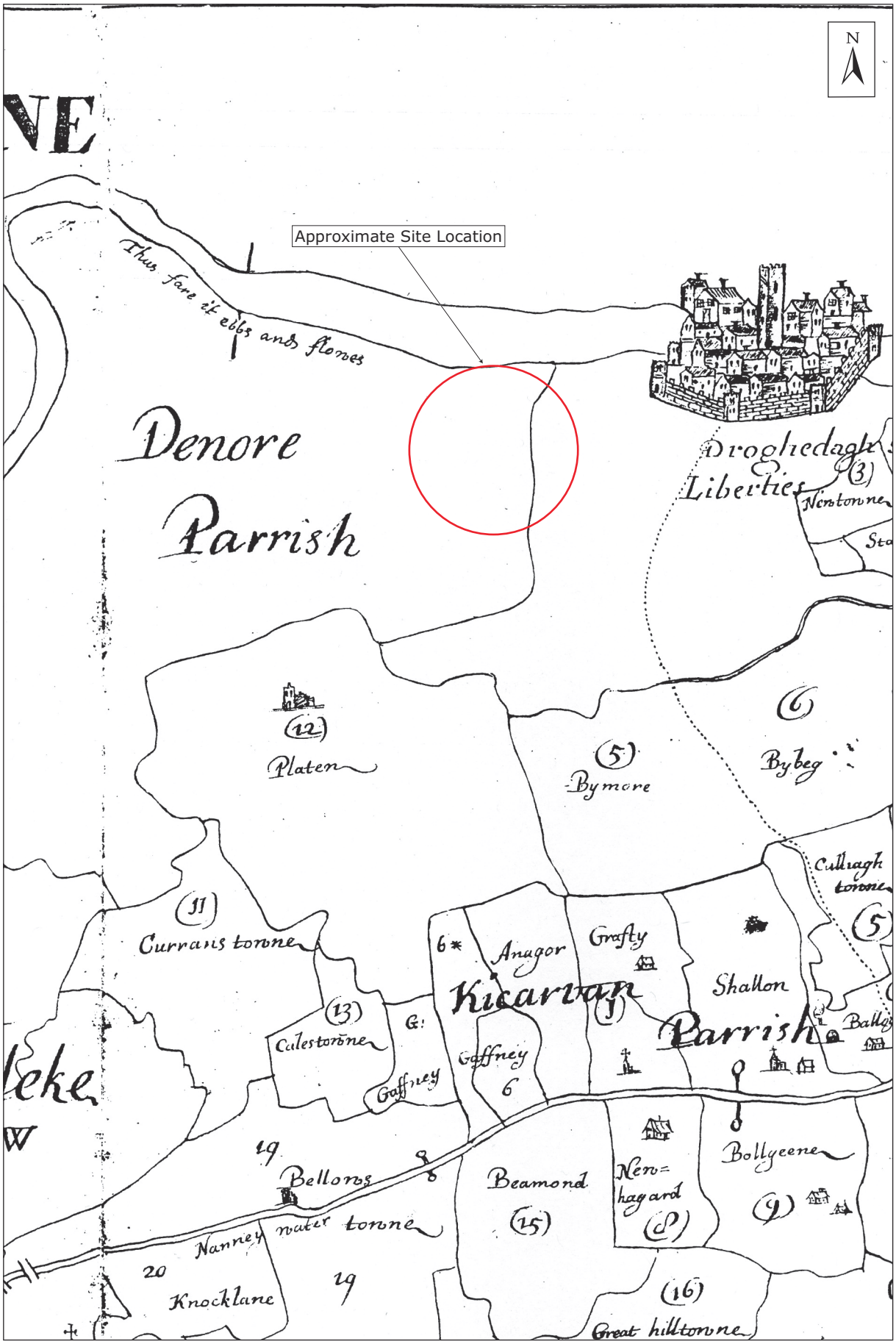


Fig. 3 Extract from Down Survey, Barony of Lower Duleek (1654) showing approx site location.

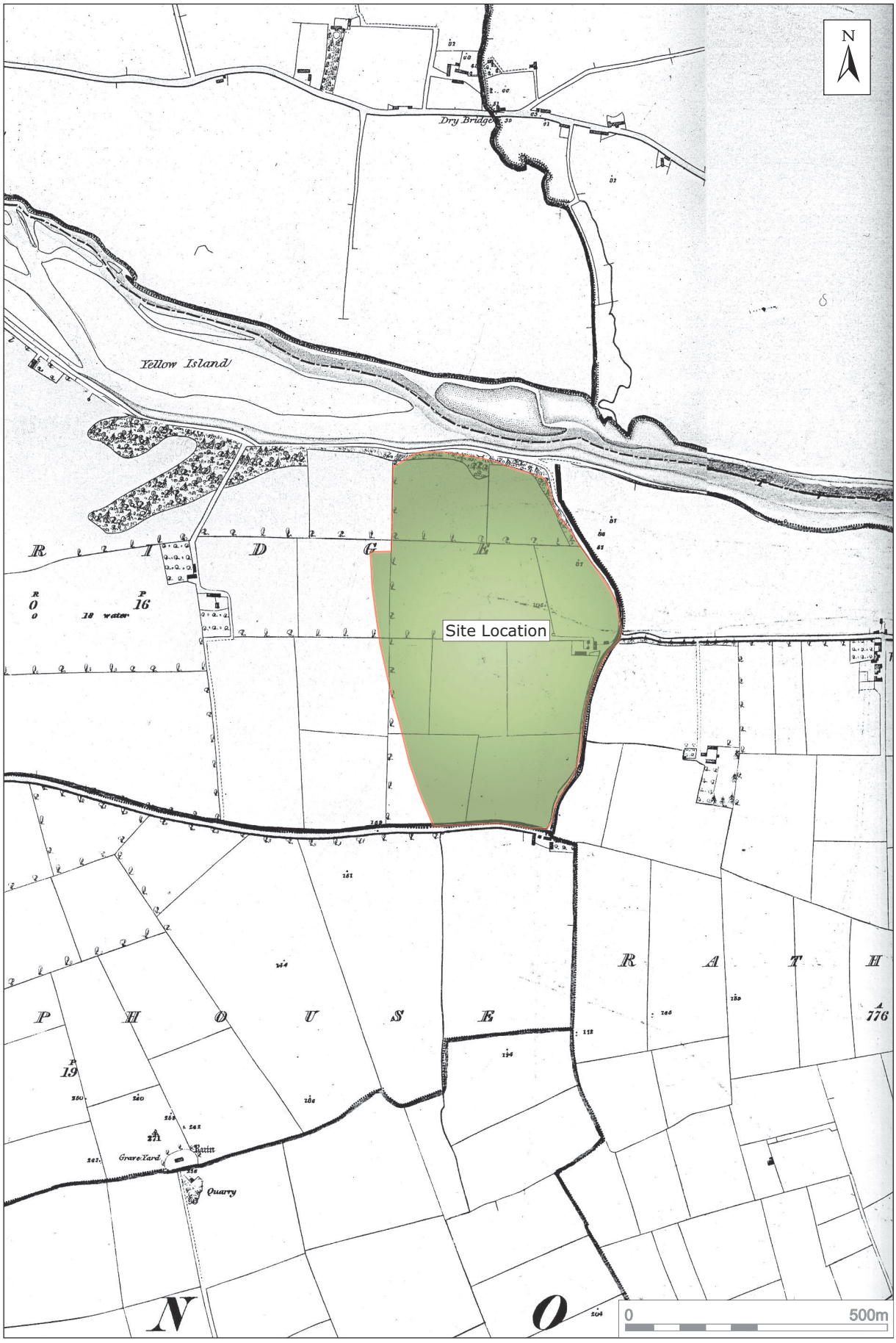


Fig. 4 Extract from O.S. 1st edition (1836) Maps of Co. Meath, Sheet 20 and Co. Louth, Sheet 24.

Fig. 5 Extract from O.S. revised edition (1909) Maps of Co. Meath, Sheet 20 and Co. Louth, Sheet 24.

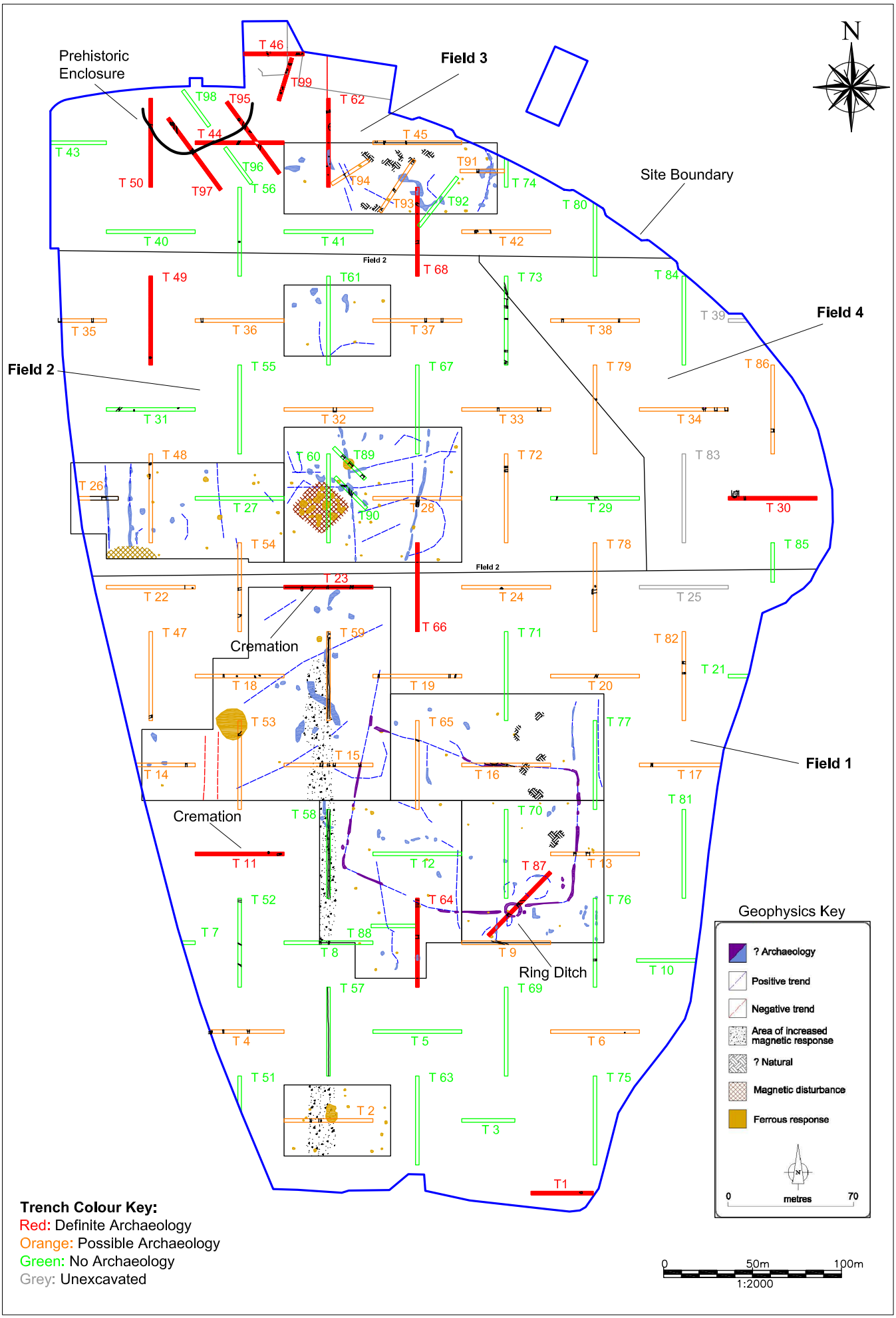
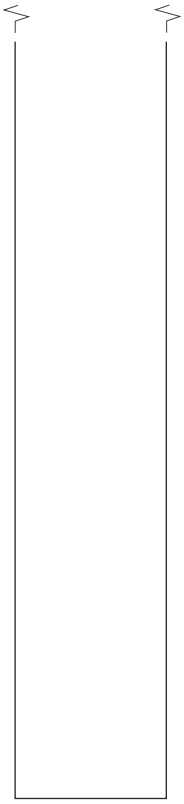
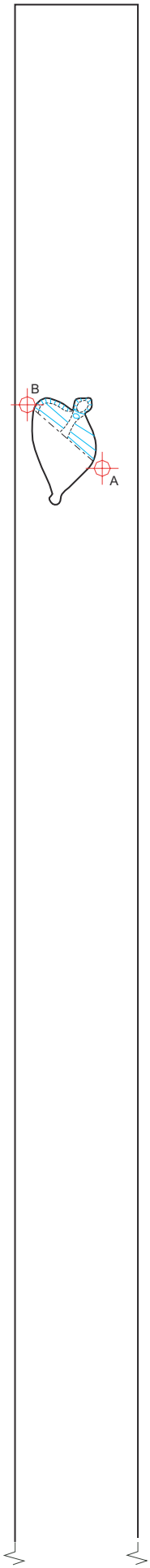


Fig. 6 Trench plan illustrating areas of archaeological significance. Scale 1:2000

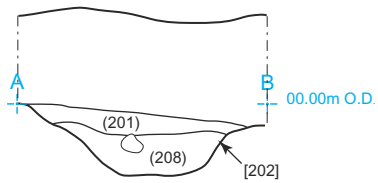
Trench 1

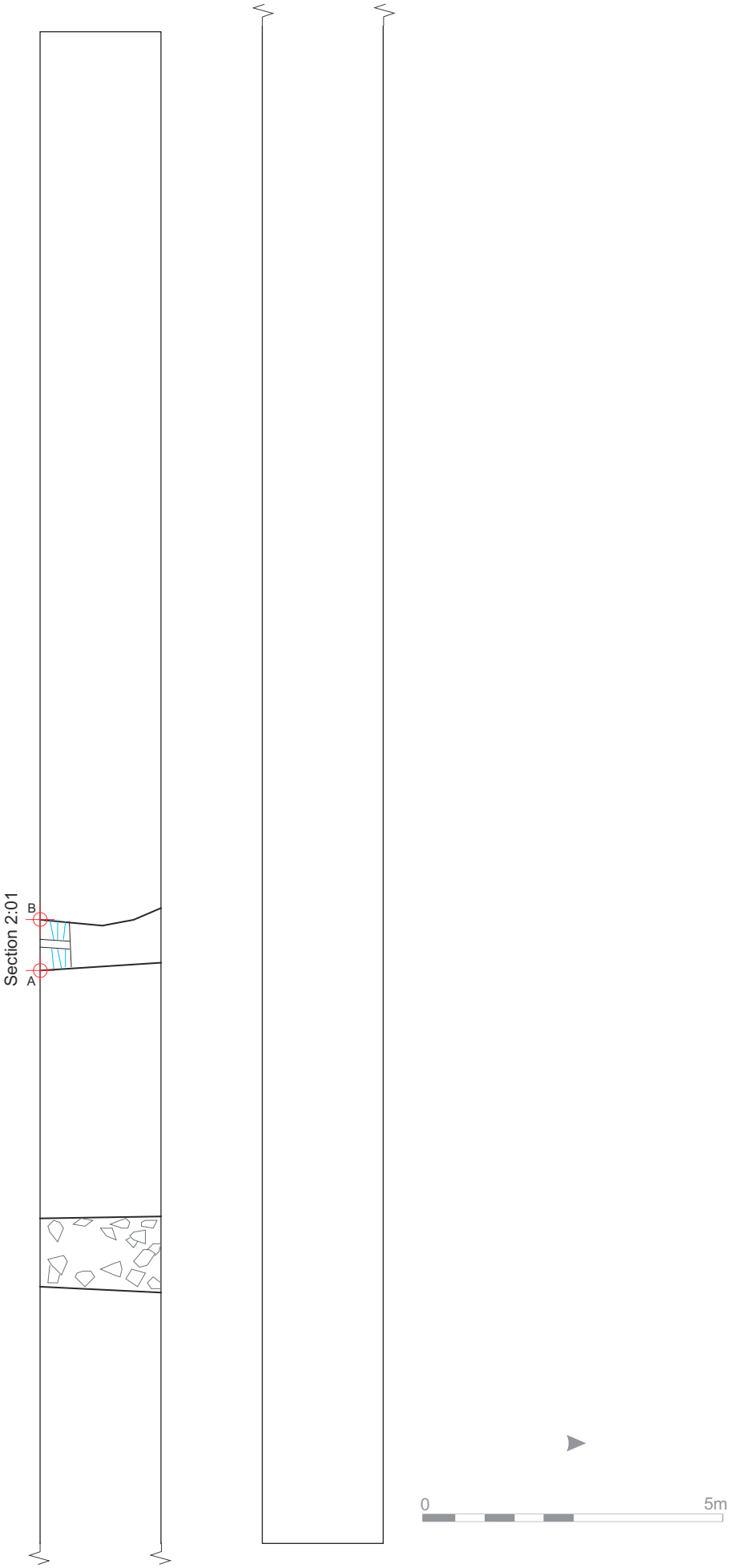




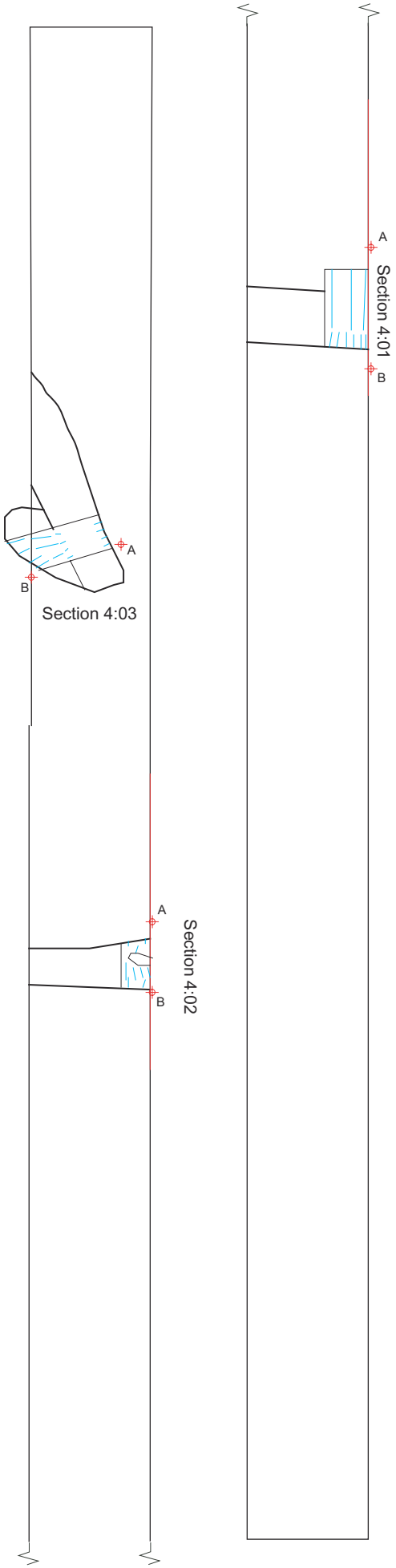
Trench 2

Section 2:01

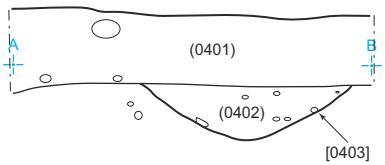




Trench 4



Section 4:01



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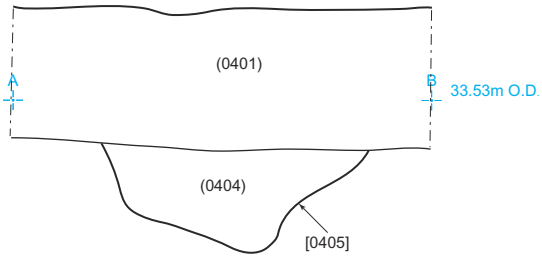

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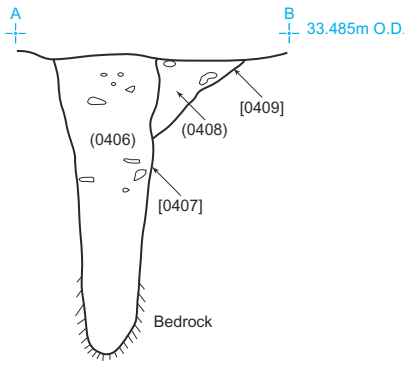
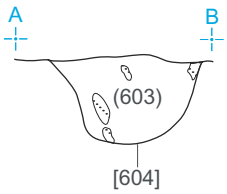
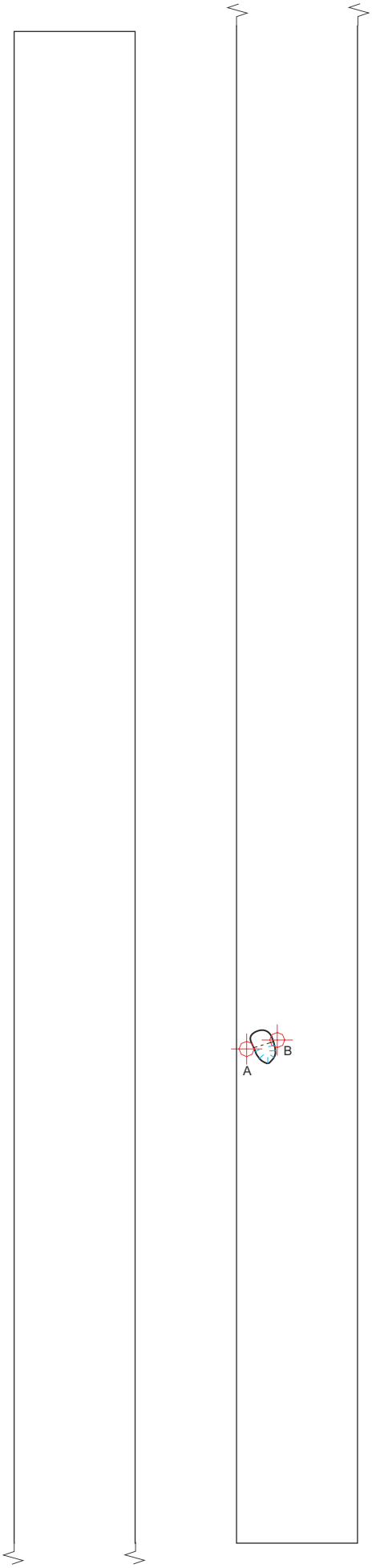


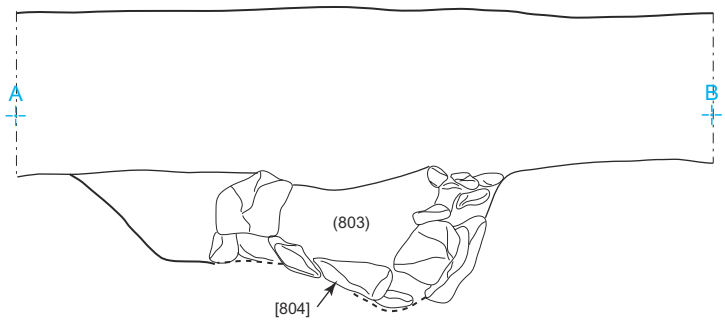
Trench 6

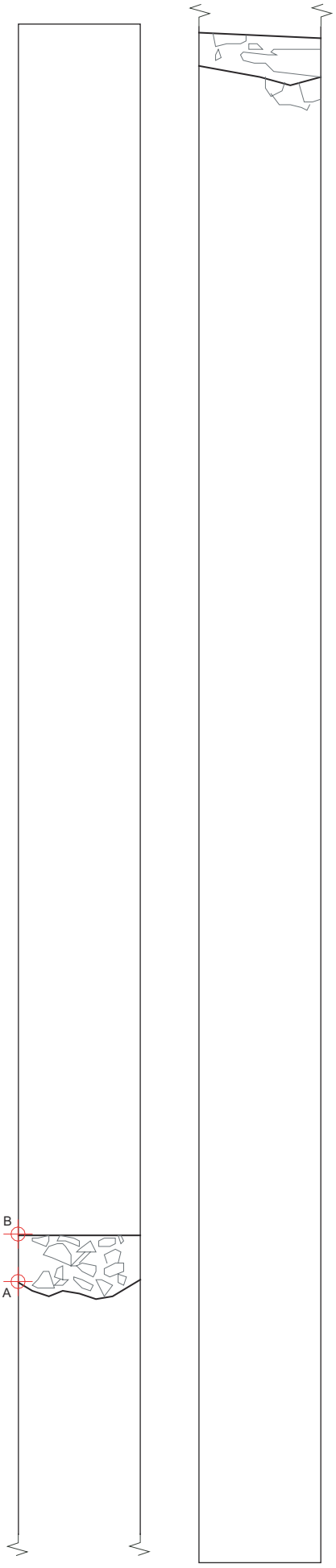




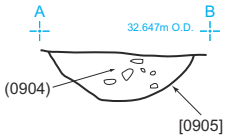
Trench 8

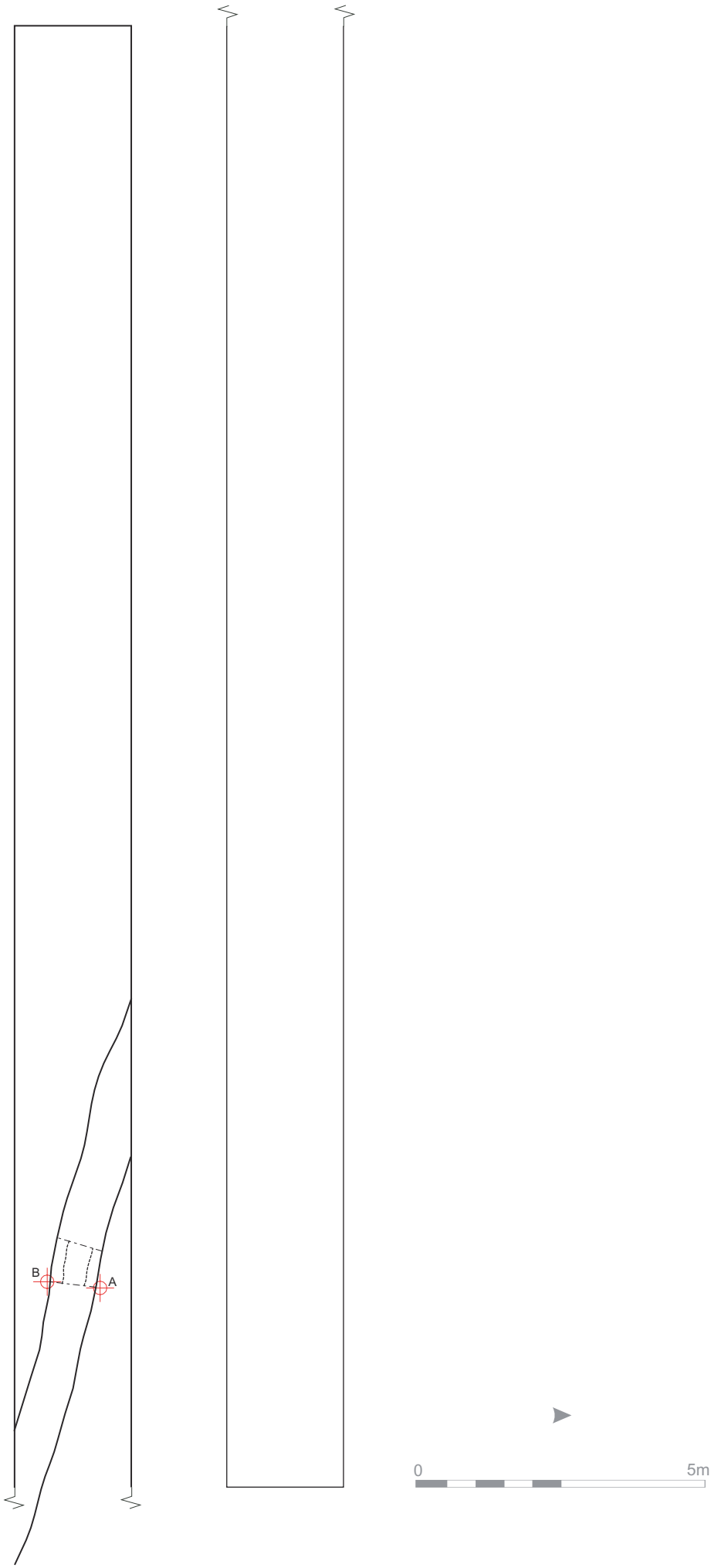
Section 8:01



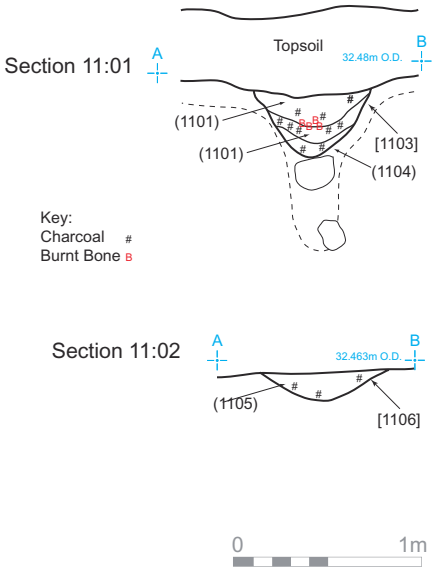


Trench 9



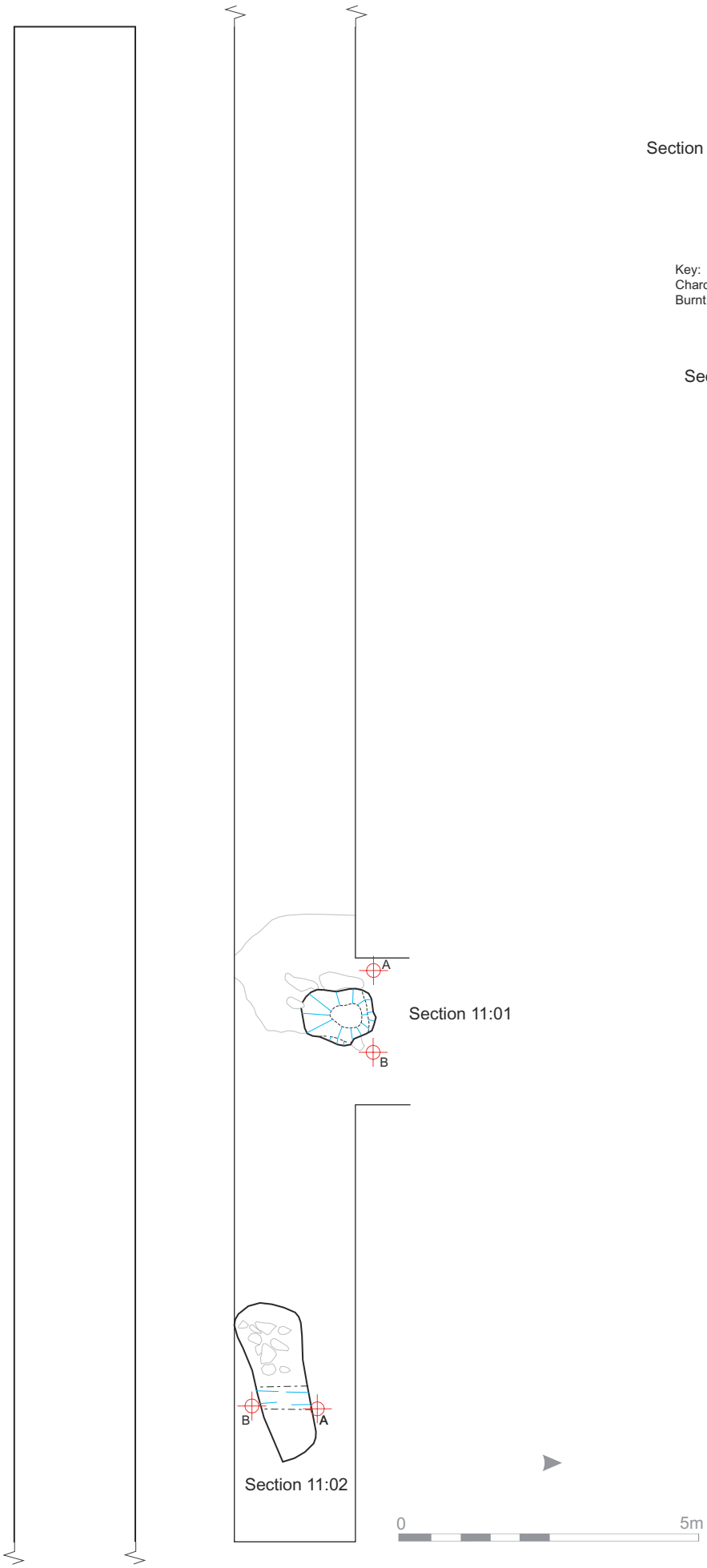


Trench 11

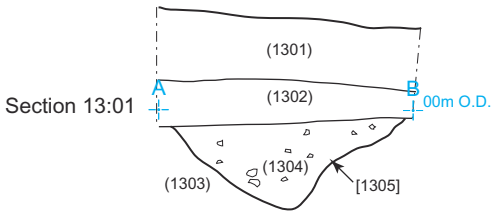


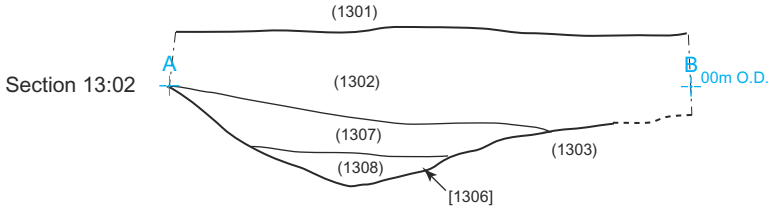
Section 11:01

Section 11:02

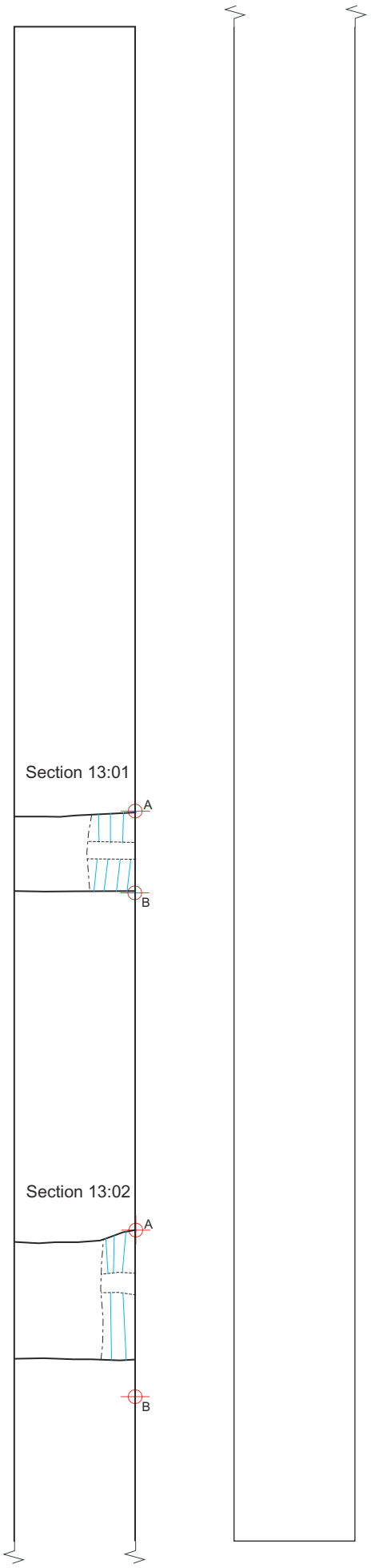


Trench 13


Section 13:01
(1301)
A
(1302)
B
00m O.D.
(1303)
(1304)
[1305]

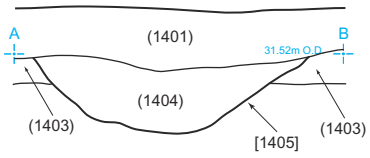

(1301)
Section 13:02
A
(1302)
B
00m O.D.
(1307)
(1303)
(1308)
[1306]

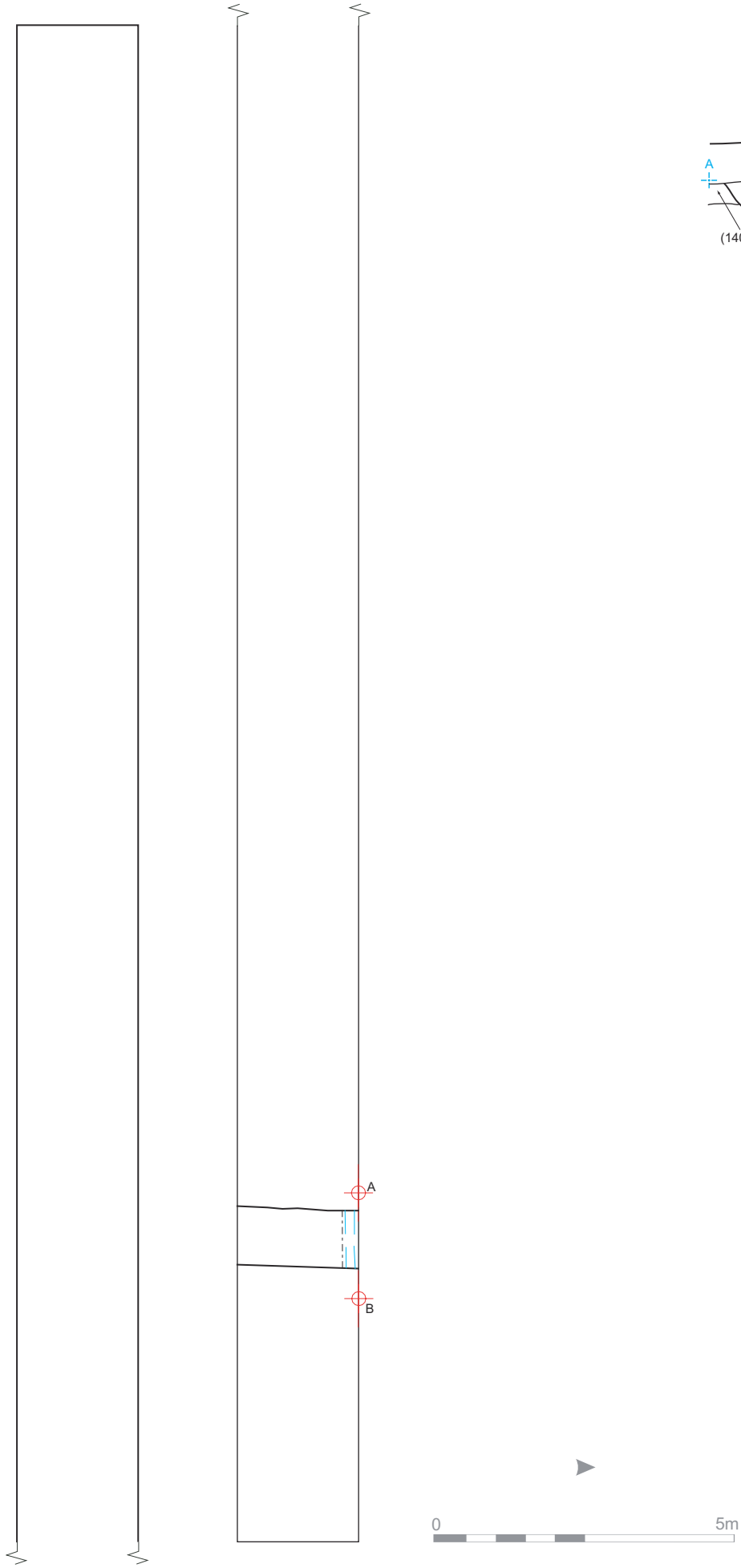

0
1m


Section 13:01
A
B
Section 13:02
A
B

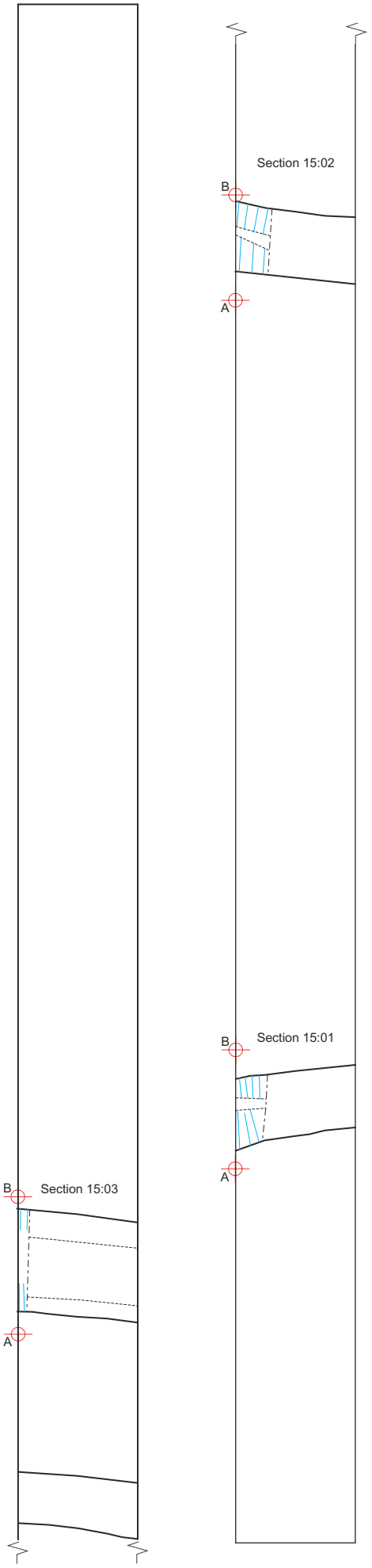

0
5m

Trench 14





Trench 15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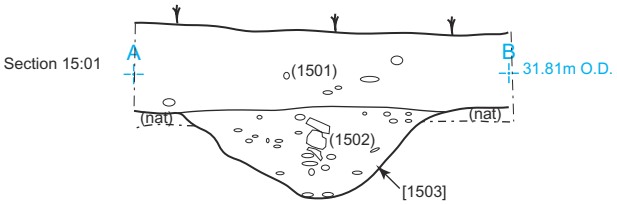
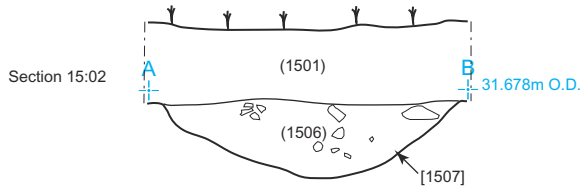
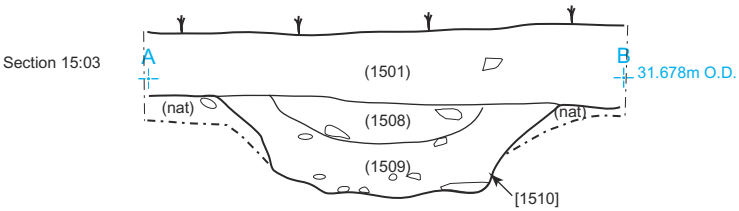
B
A
Section 15:01
B
A
Section 15:03
B
A


Section 15:01
A
B
31.81m O.D.
(1501)
(nat)
(nat)
(1502)
[1503]

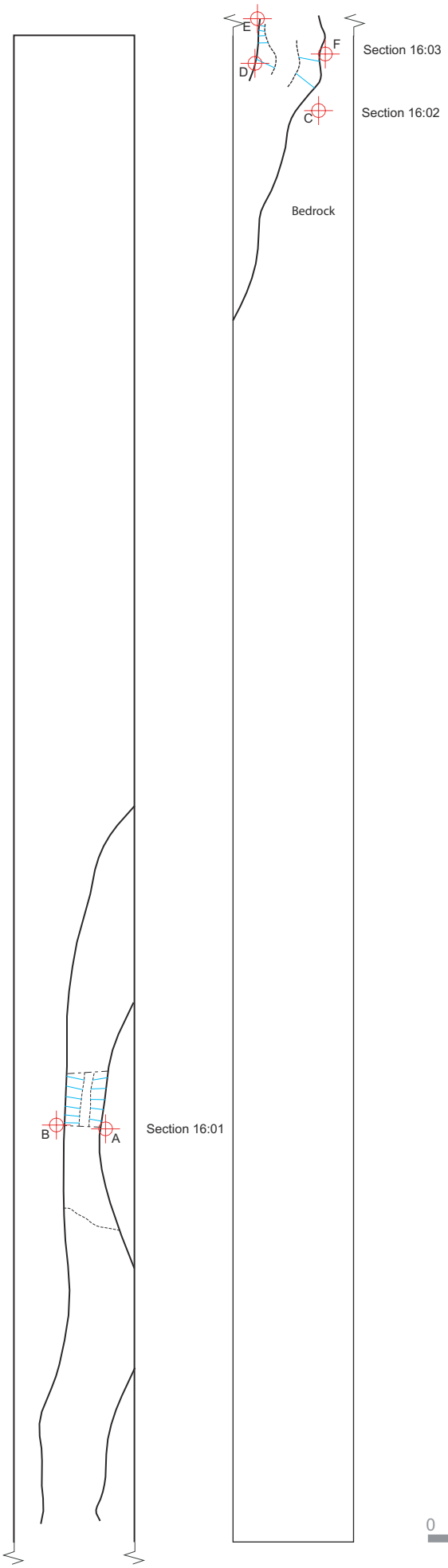

Section 15:02
A
B
31.678m O.D.
(1501)
(1506)
[1507]

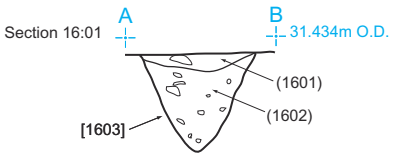

Section 15:03
A
B
31.678m O.D.
(1501)
(nat)
(nat)
(1508)
(1509)
[1510]


0
1m


0
5m

Trench 16


E
F
D
C
Section 16:03
Section 16:02
Bedrock
B
A
Section 16:01
0
5m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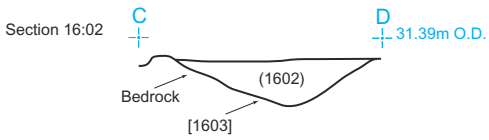
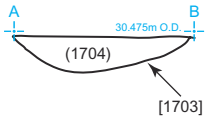
A
B
31.434m O.D.
(1601)
(1602)
[1603]

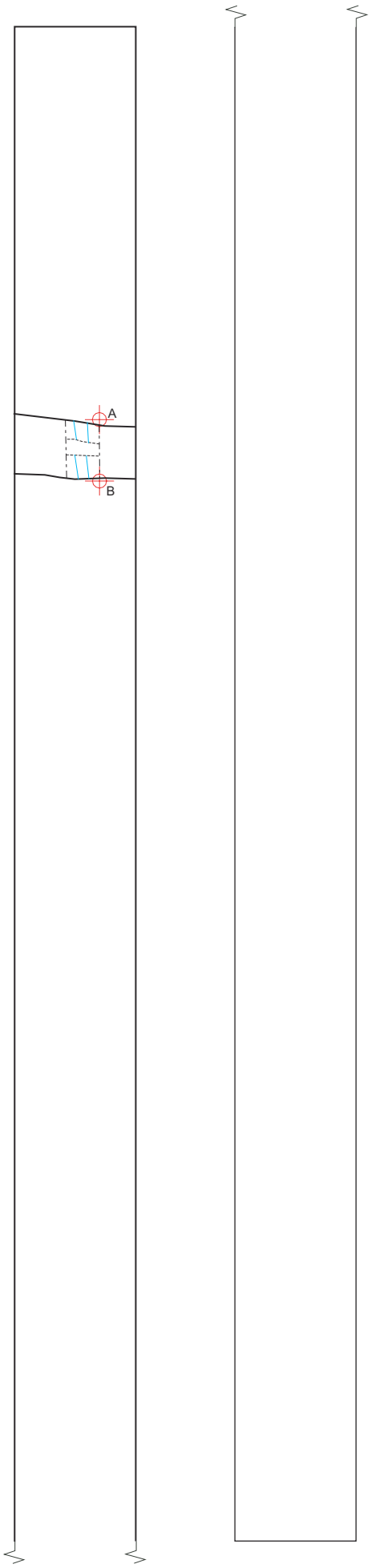

Section 16:02
C
D
31.39m O.D.
(1602)
Bedrock
[1603]


Section 16:03
C
D
31.39m O.D.
Bedrock

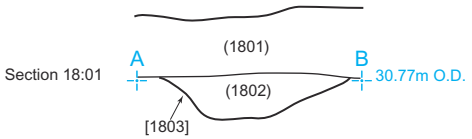

0
1m

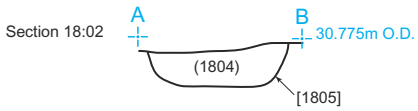
Trench 17



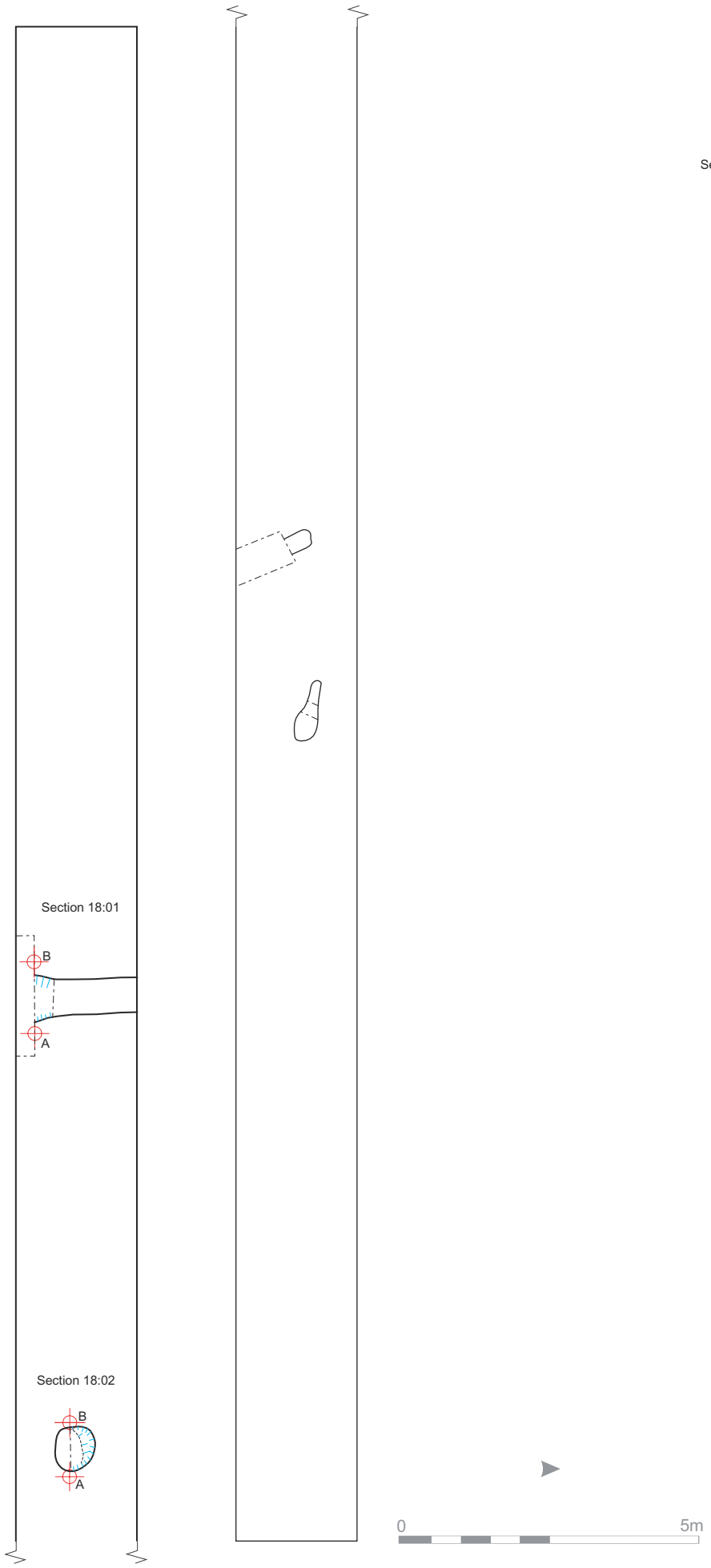


Trench 18

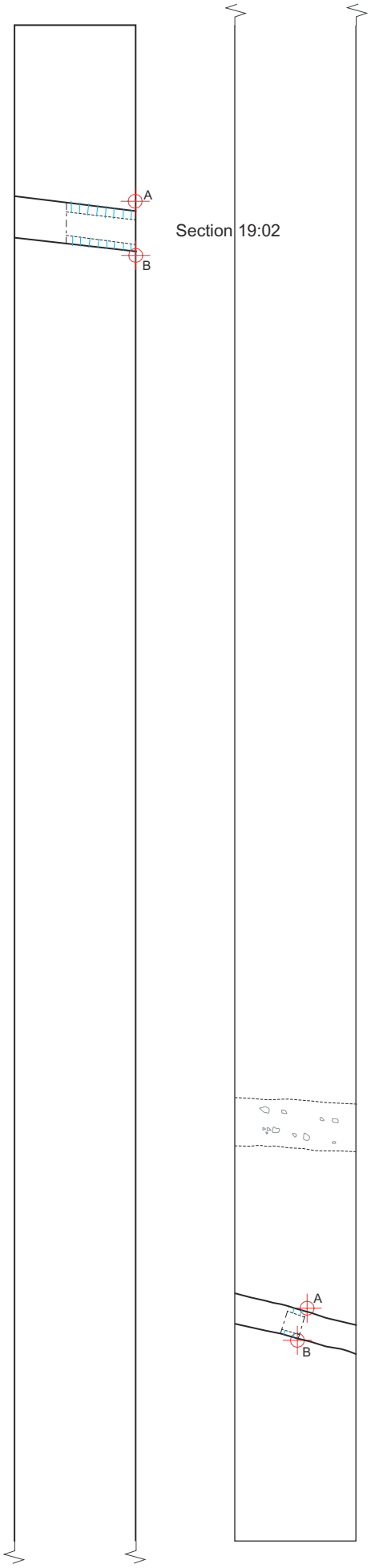

Section 18:01
(1801)
A
B
30.77m O.D.
(1802)
[1803]


Section 18:02
A
B
30.775m O.D.
(1804)
[1805]


0
1m


Section 18:01
B
A
Section 18:02
B
A
0
5m

Trench 19



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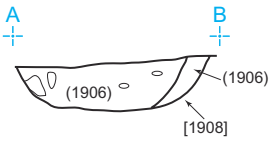

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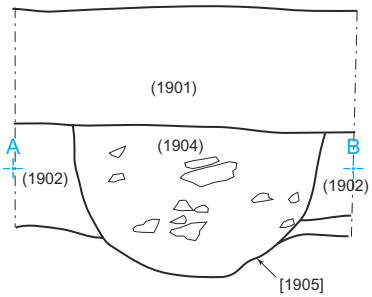
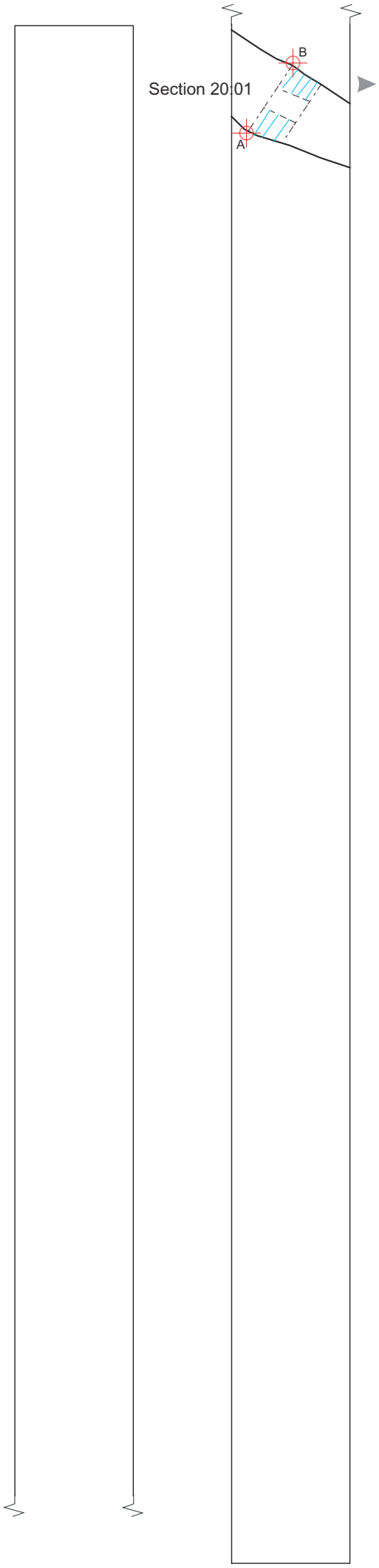


Trench 20



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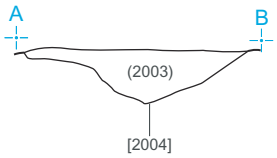
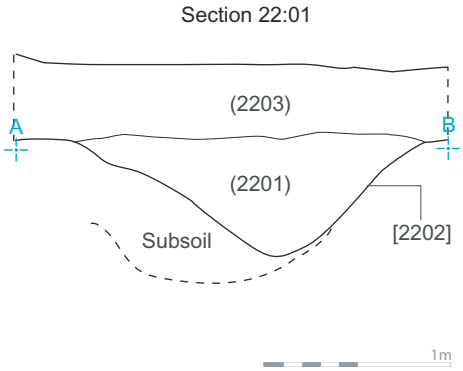
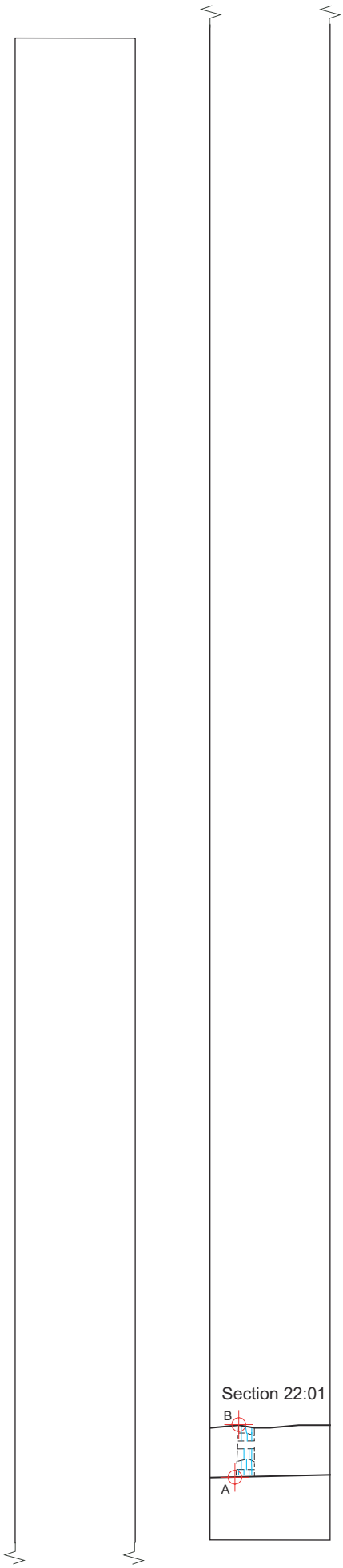


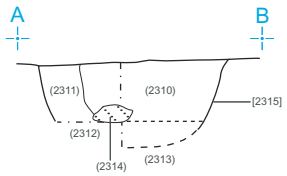
Trench 22


Section 22:01
(2203)
A
B
(2201)
Subsoil
[2202]
1m

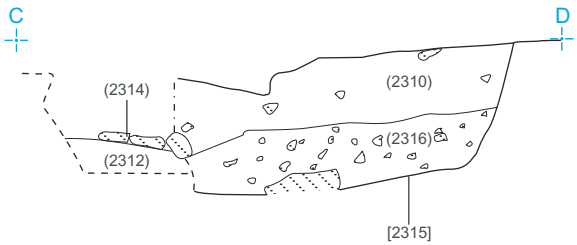

Section 22:01
B
A
[2202]
[2201]
0
5m

Trench 23

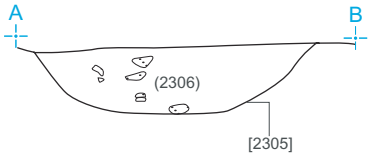
Section 23:01

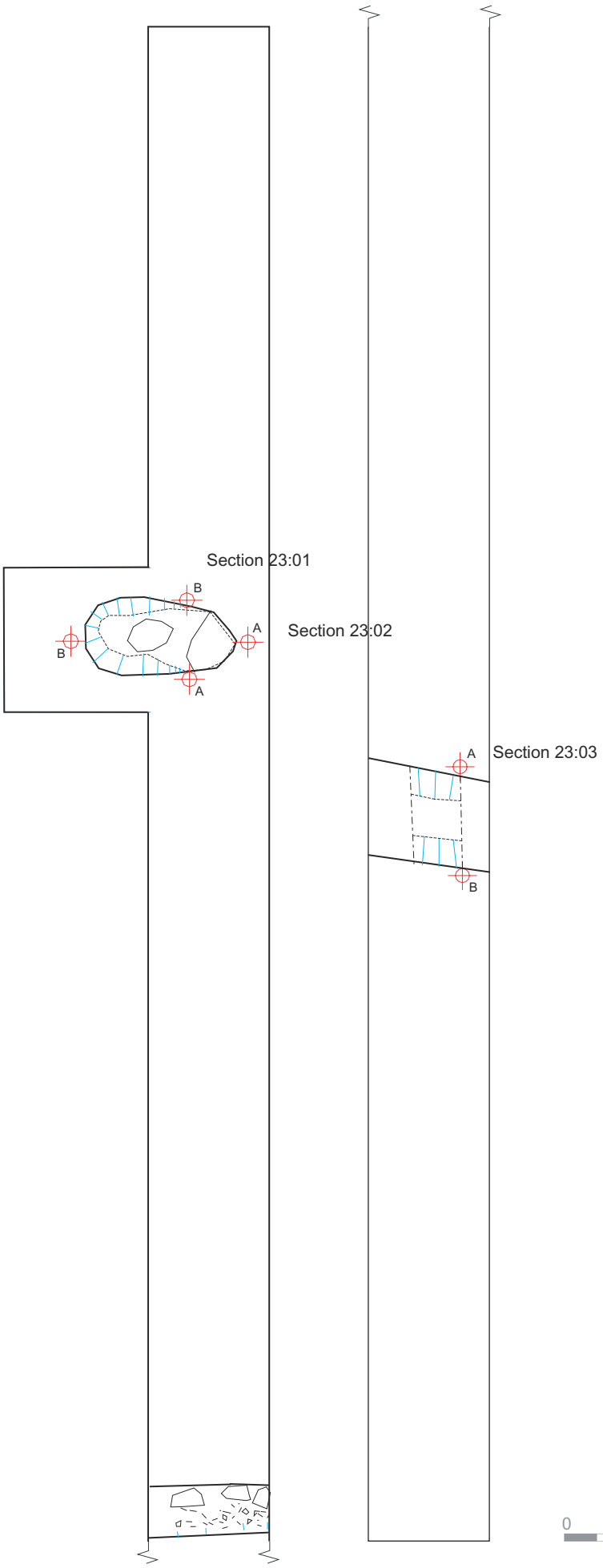


Section 23:02



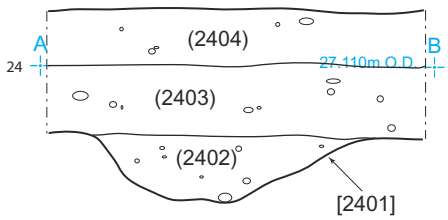
Section 23:03

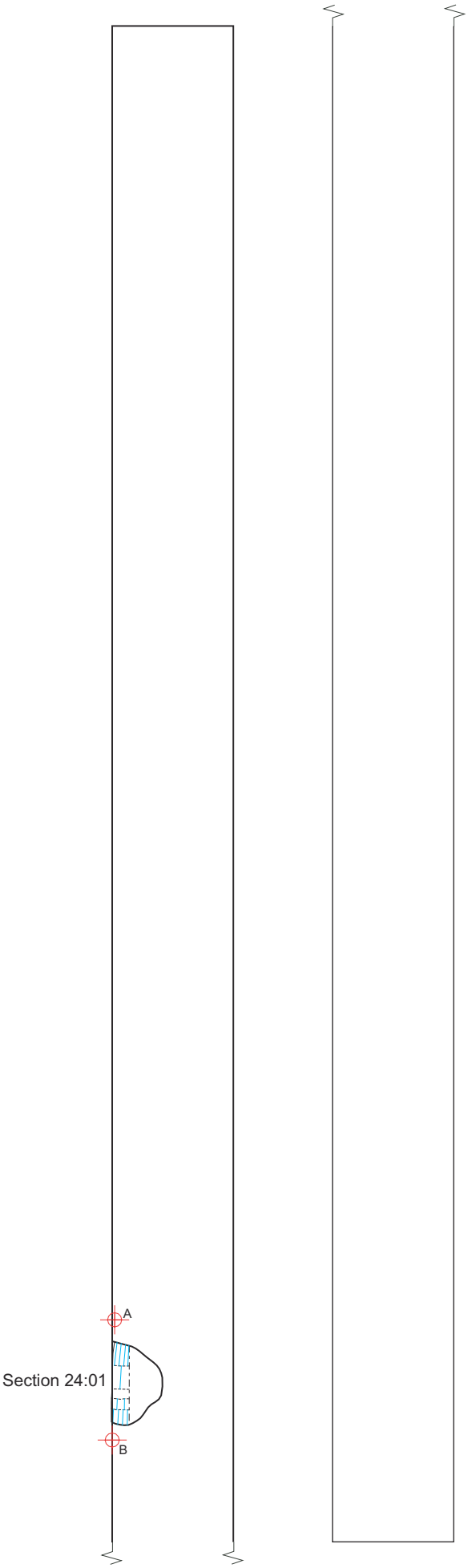




Trench 24

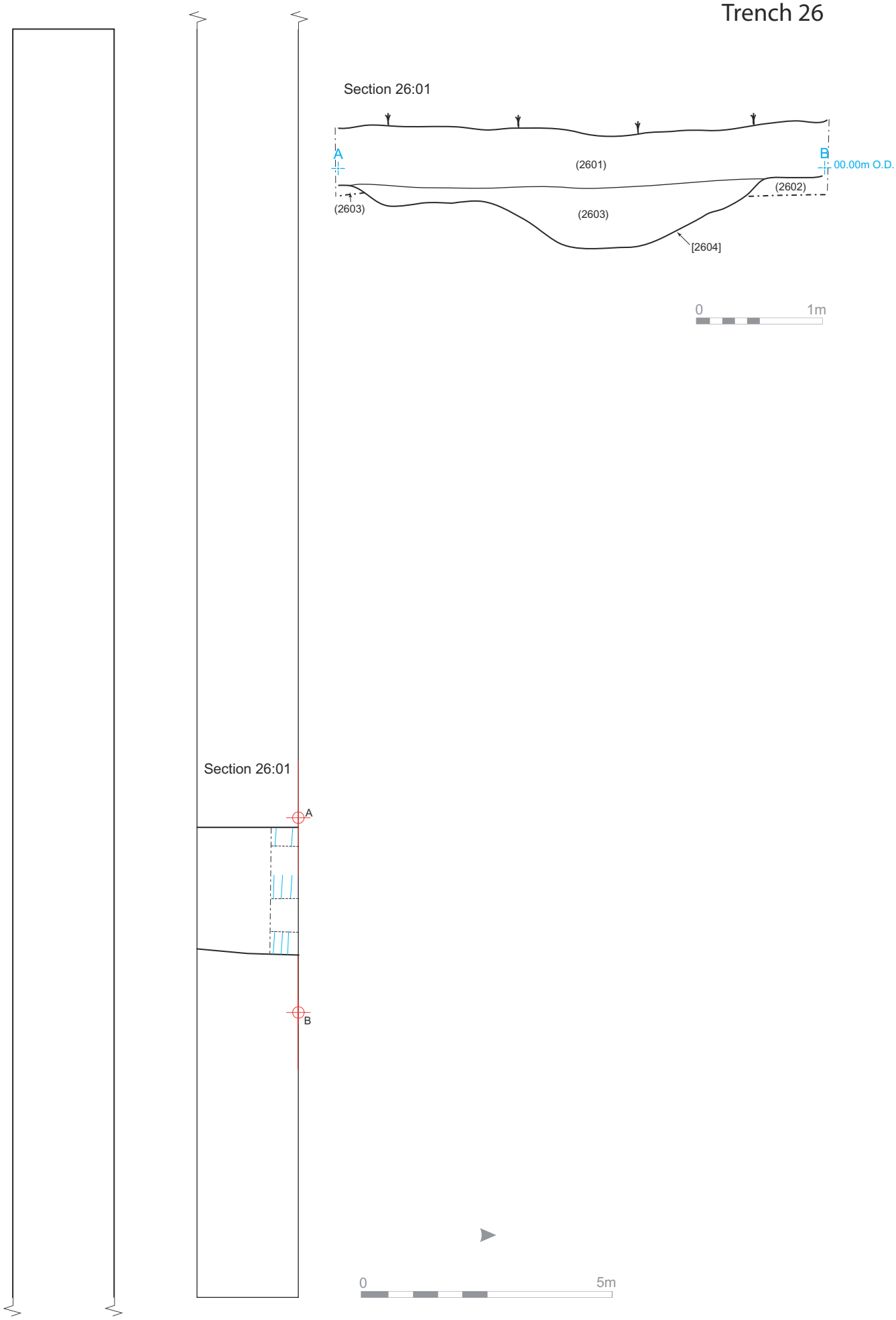
Section 24:01





Section 24:01

Trench 26


Section 26:01
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(2601)
(2602)
(2603)
(2603)
[2604]
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1m
Section 26:01
A
B
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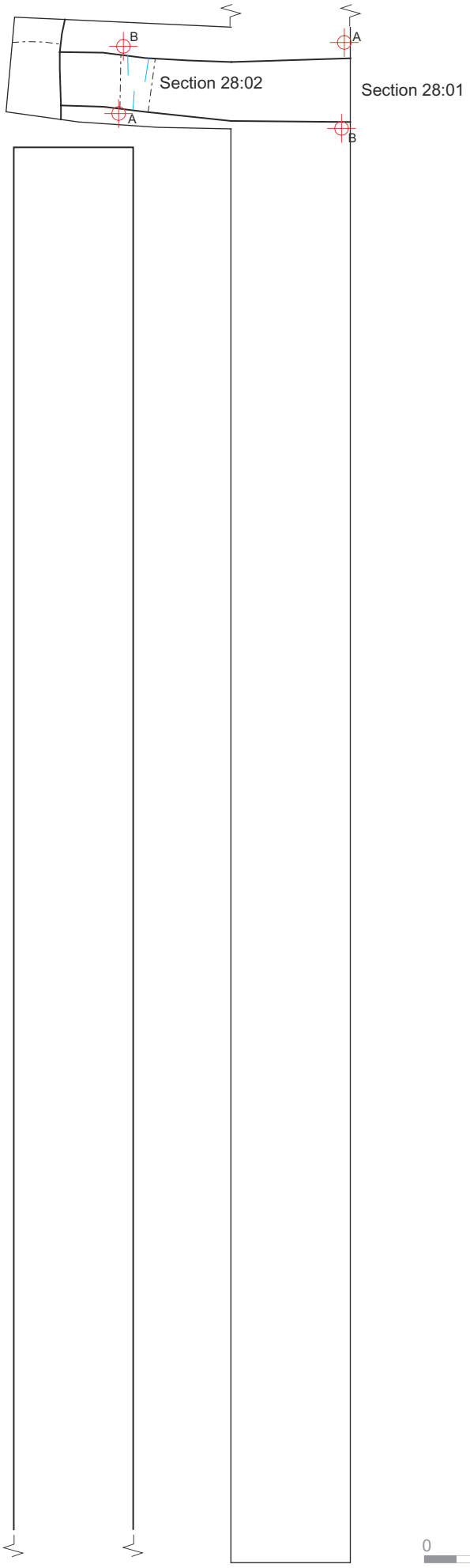
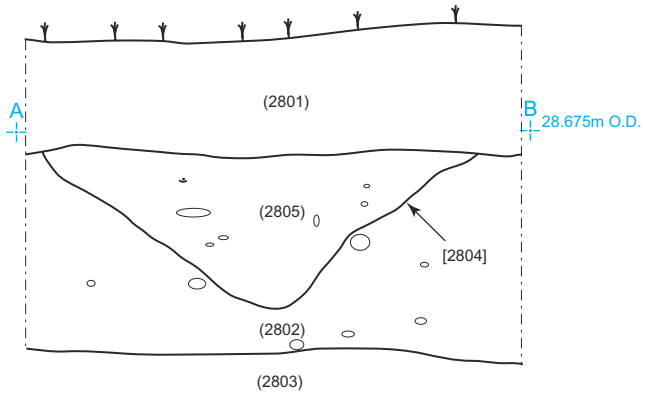
5m

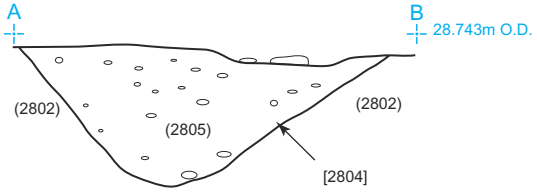
Trench 28



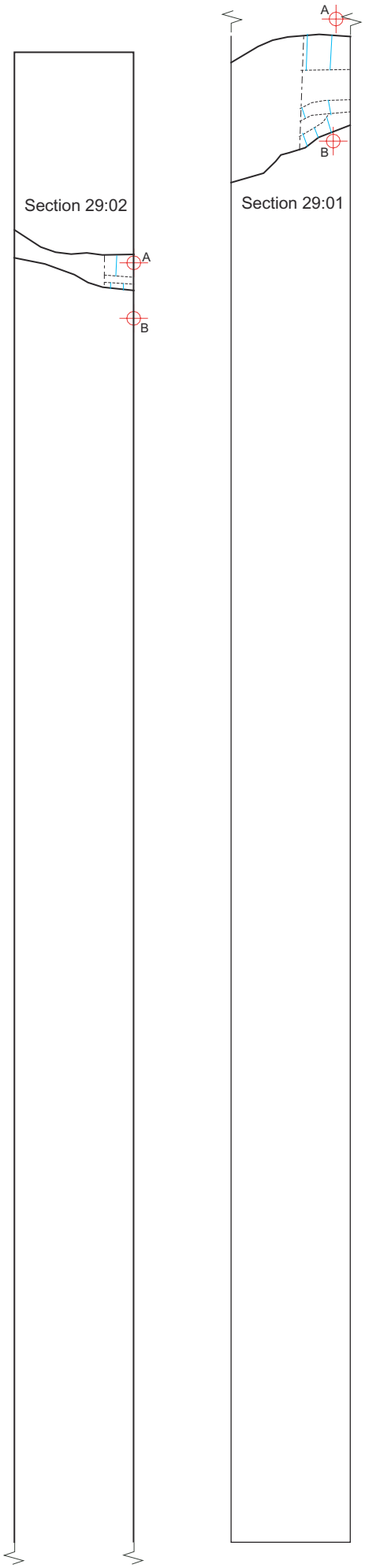
Section 28:01



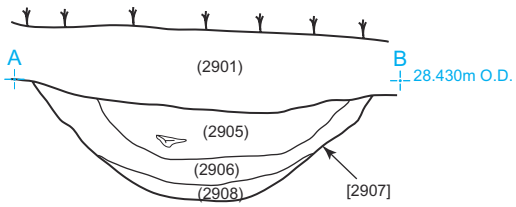
Section 28:02



Trench 29



Section 29:01



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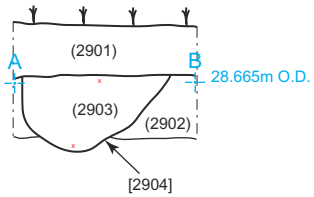
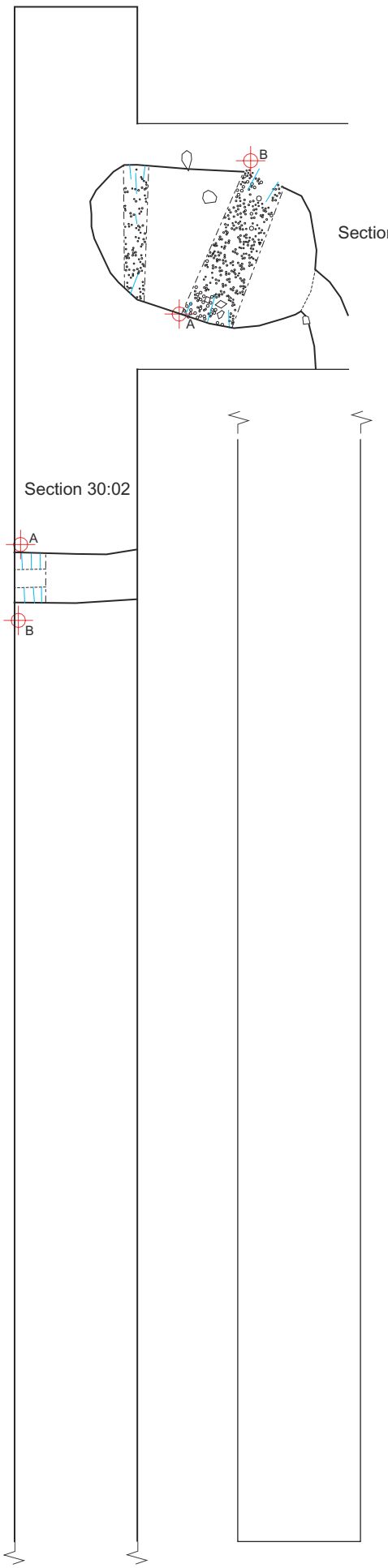


Trench 30

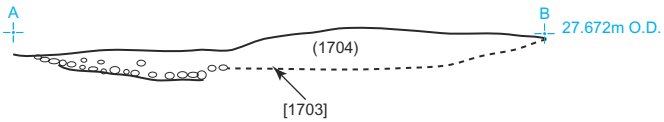
Section 30:01

Section 30:02

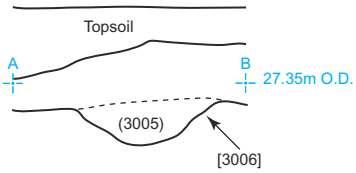


0 5m

Section 30:01

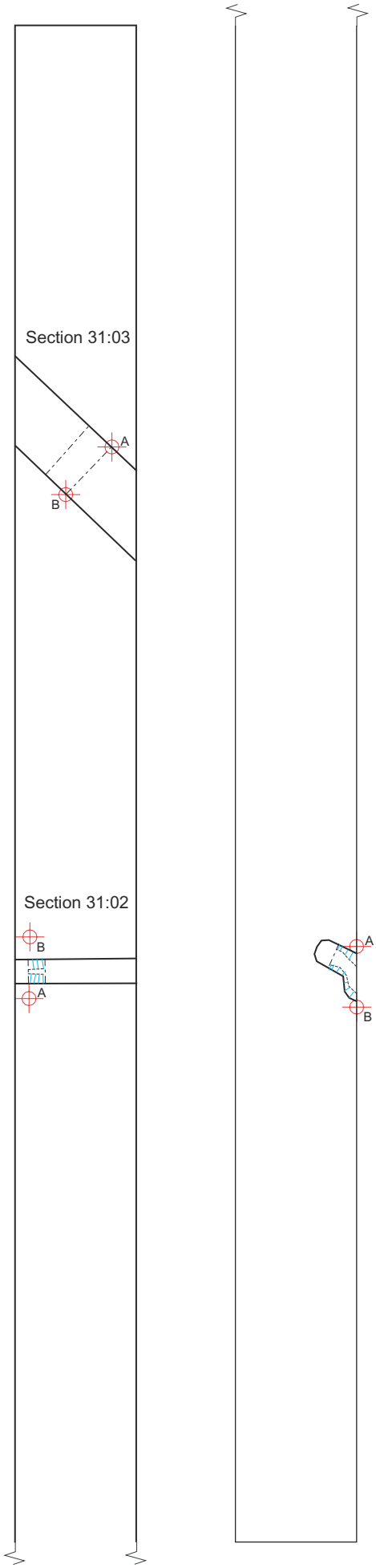


Section 30:02

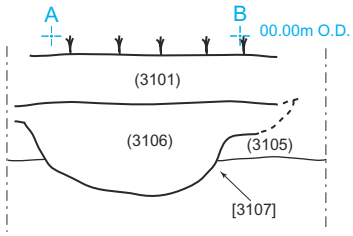


0 1m

Trench 31



Section 31:01



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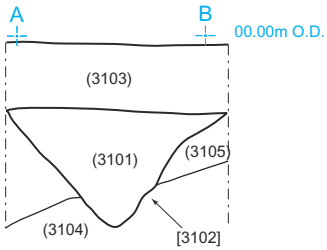
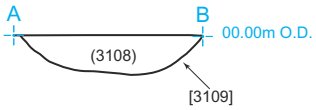
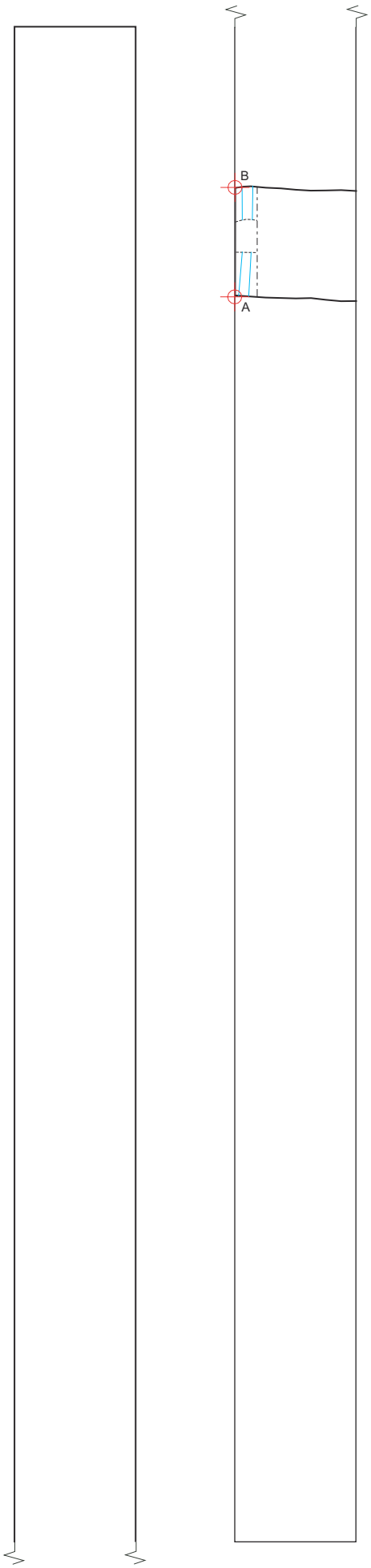
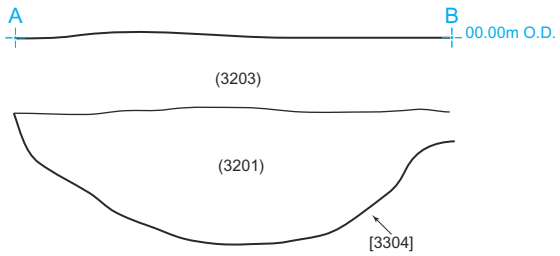


Section 31:03

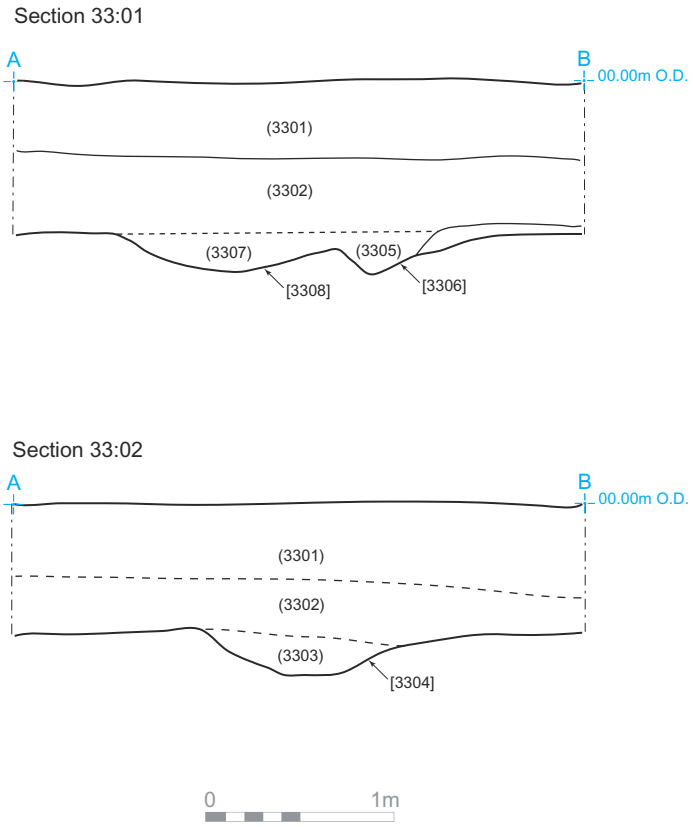


Trench 32





Trench 33


Section 33:01
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(3301)
(3302)
(3307)
(3305)
[3308]
[3306]
Section 33:02
A
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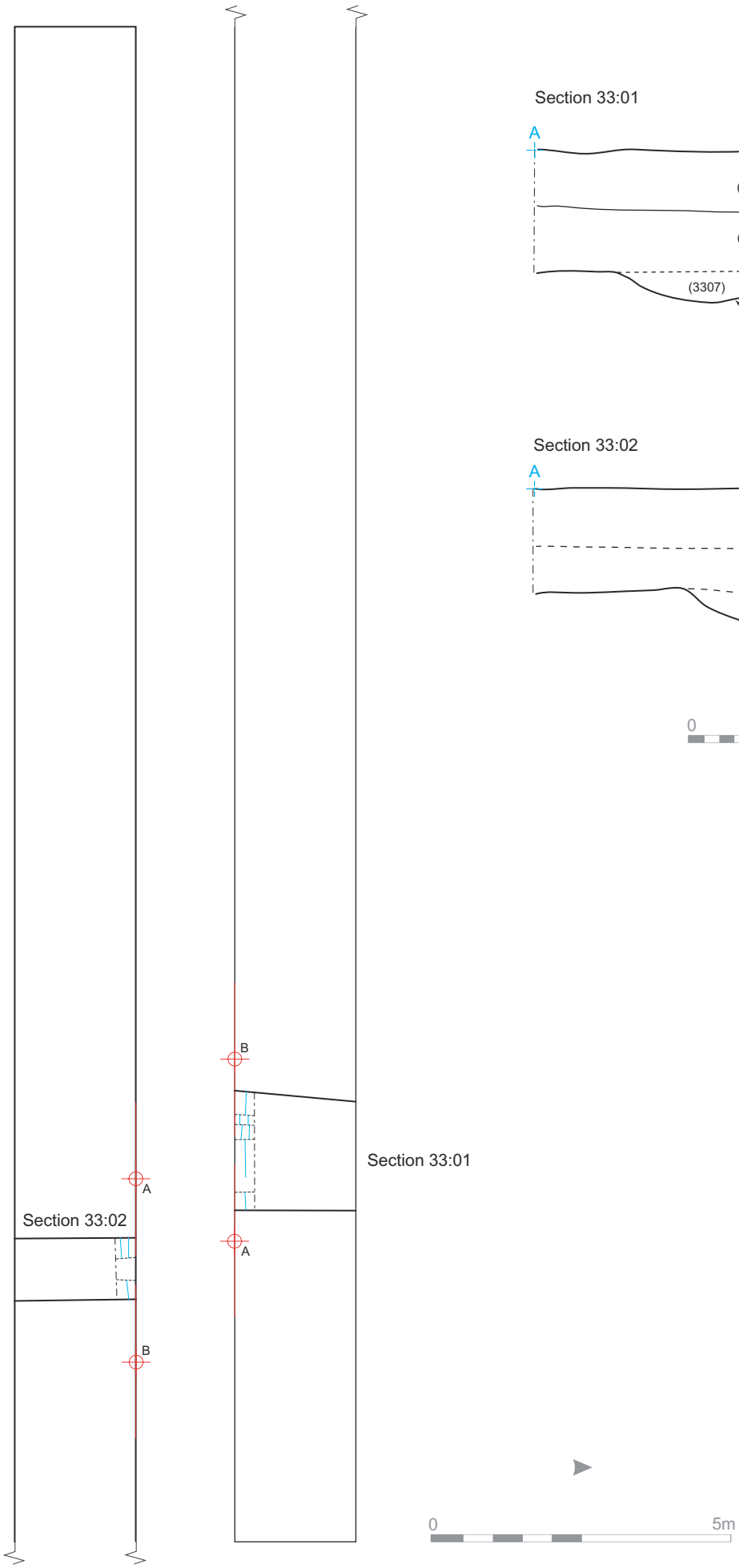
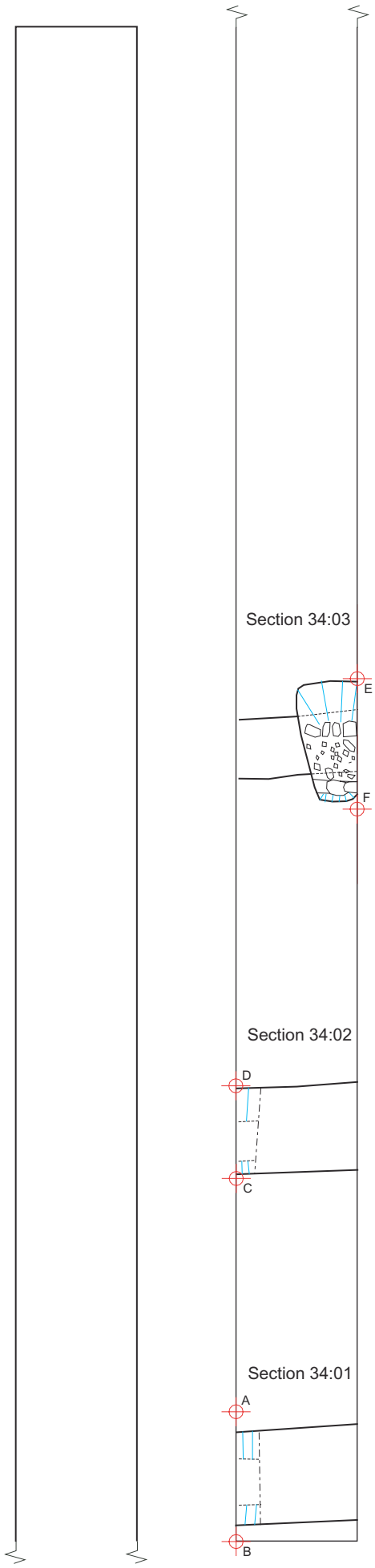
(3301)
(3302)
(3303)
[3304]
0
1m


B
A
Section 33:01
Section 33:02
A
B
0
5m

Trench 34



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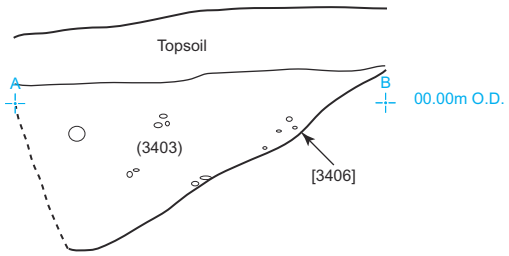
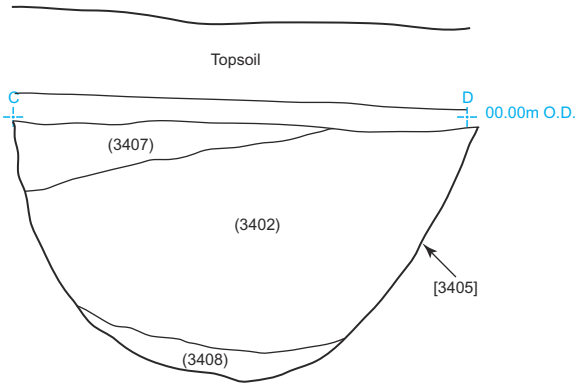
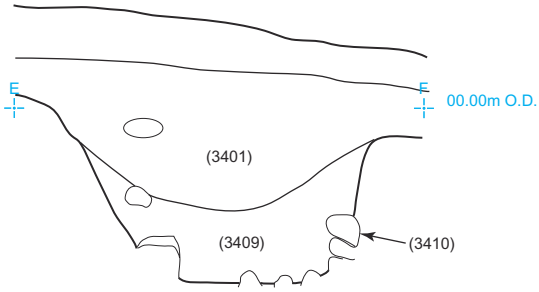


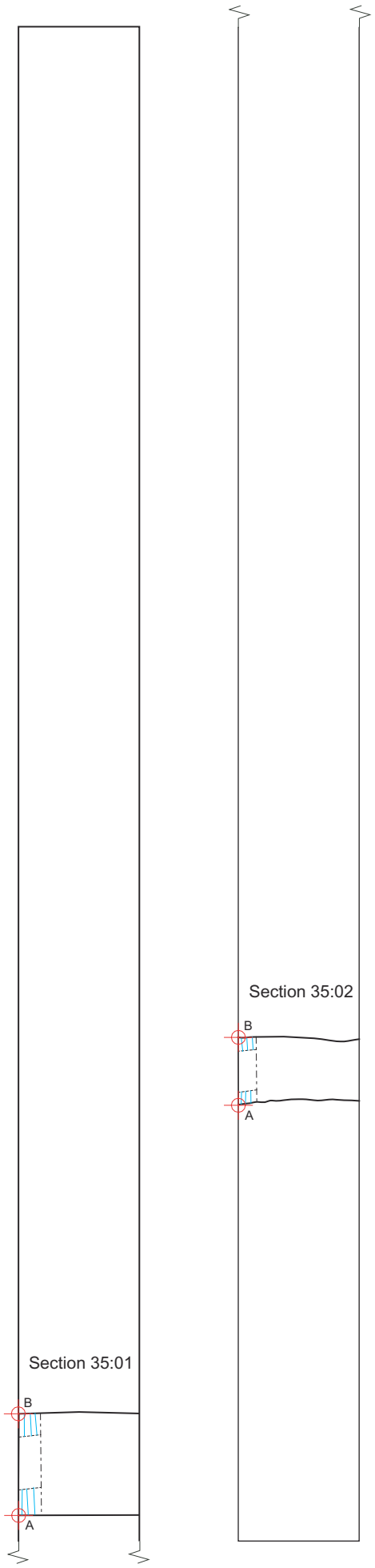
Section 34:02



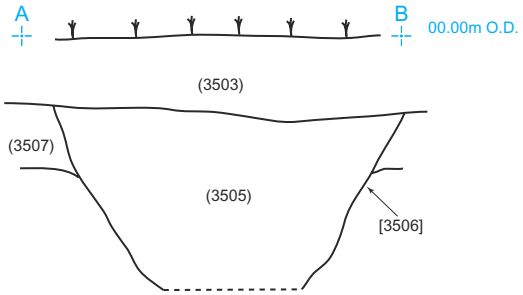
Section 34:03



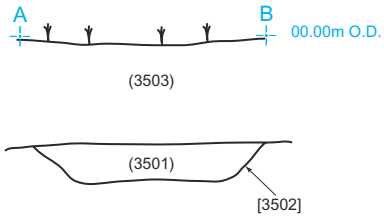
Trench 35



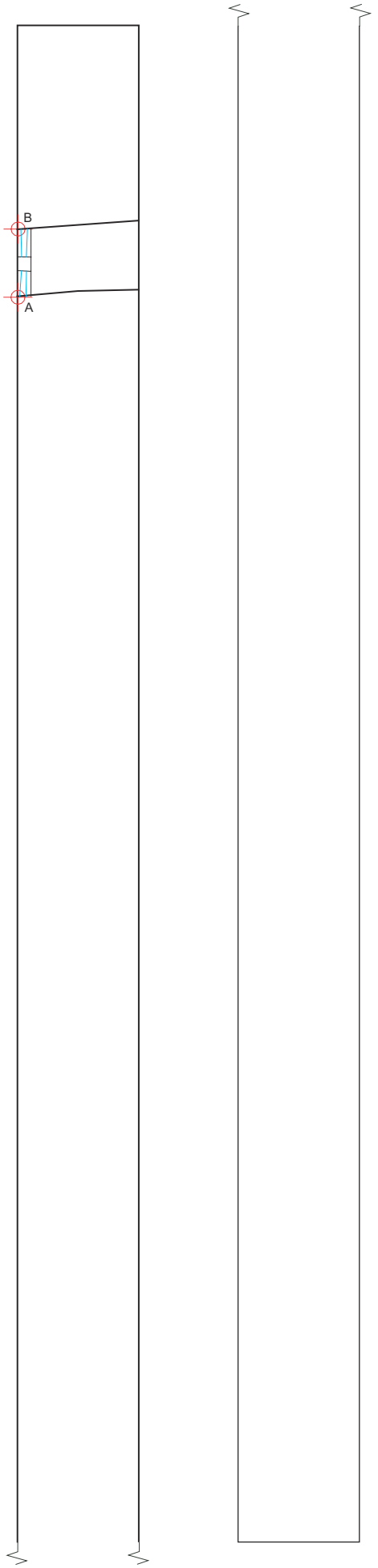
Section 35:01

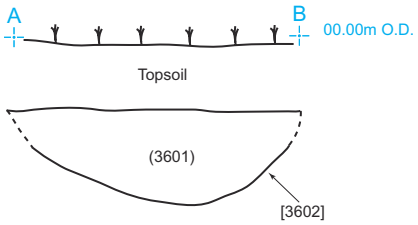


Section 35:02

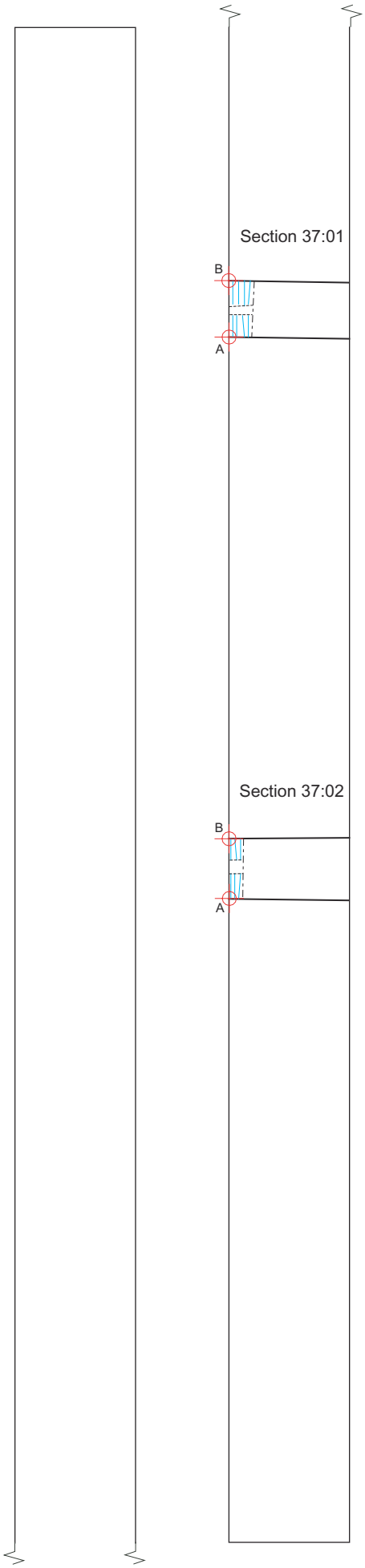


Trench 36

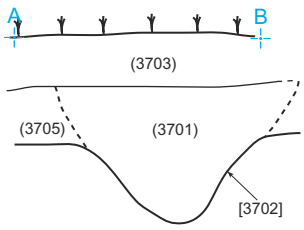




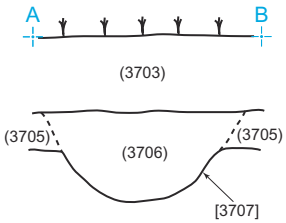
Trench 37



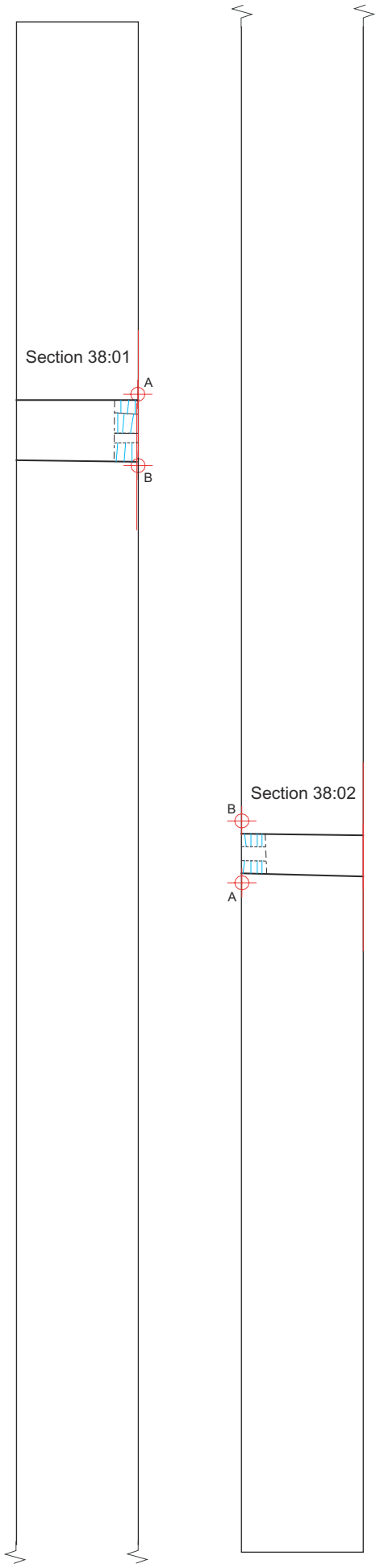
Section 37:01



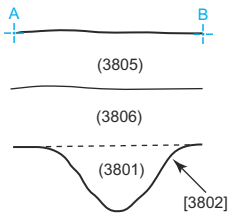
Section 37:02



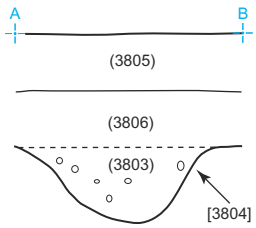
Trench 38



Section 38:01

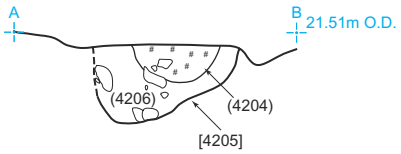


Section 38:02

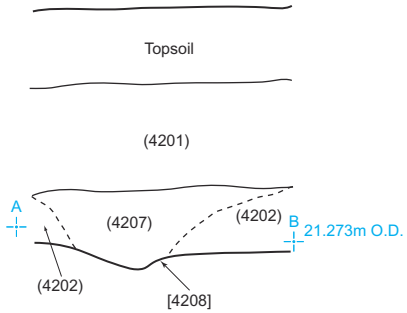


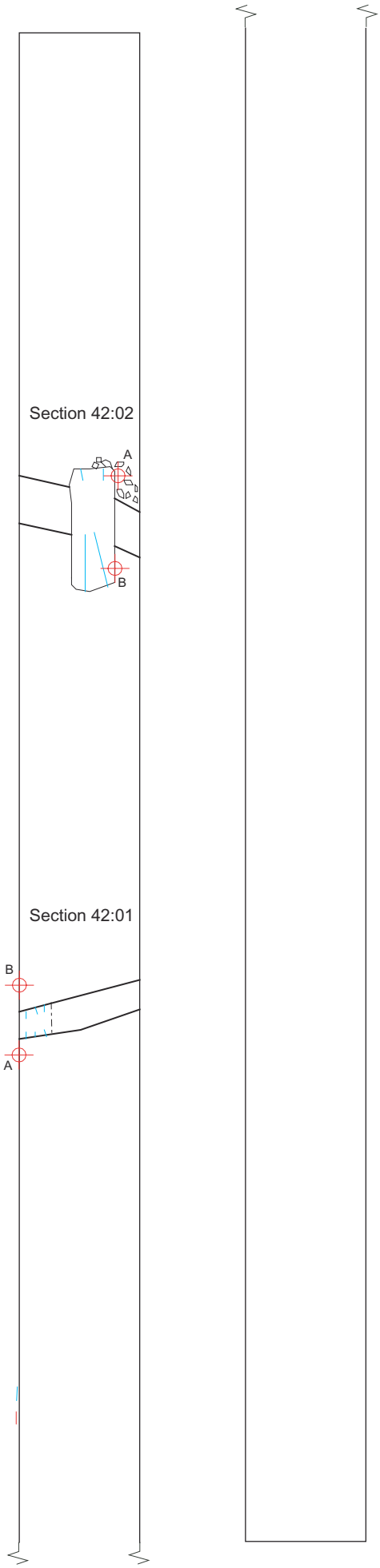
Trench 42

Section 42:01

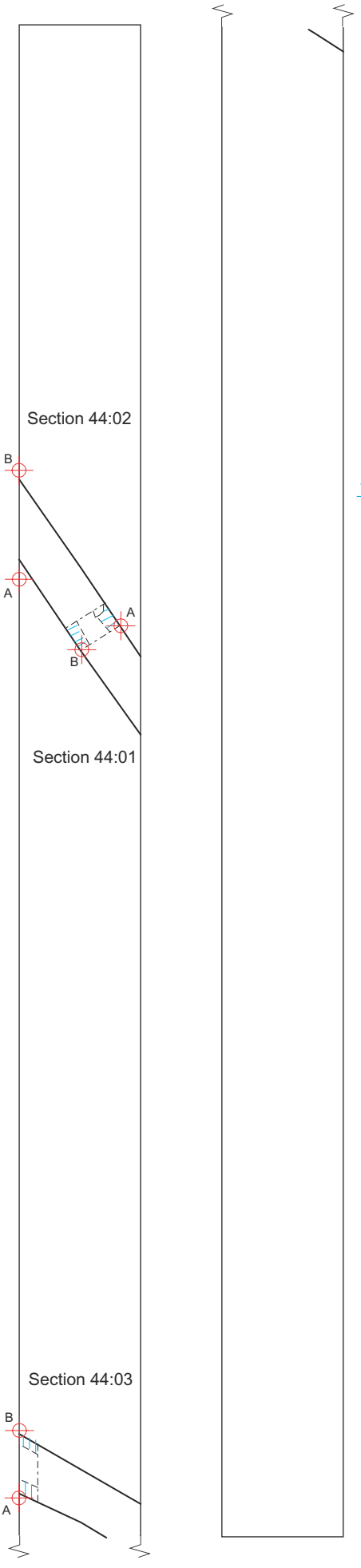


Section 42:02

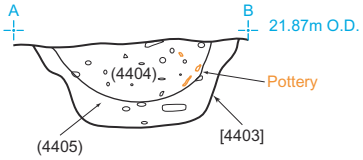




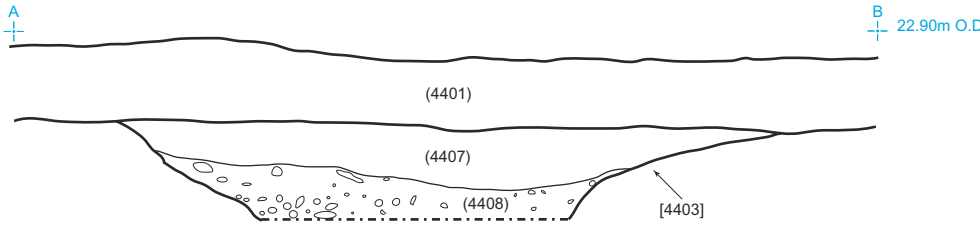
Trench 44



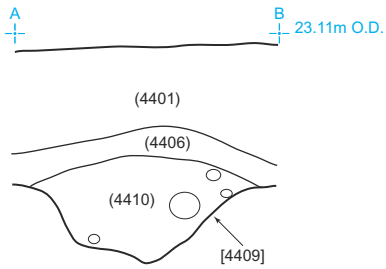
Section 44:01



Section 44:02



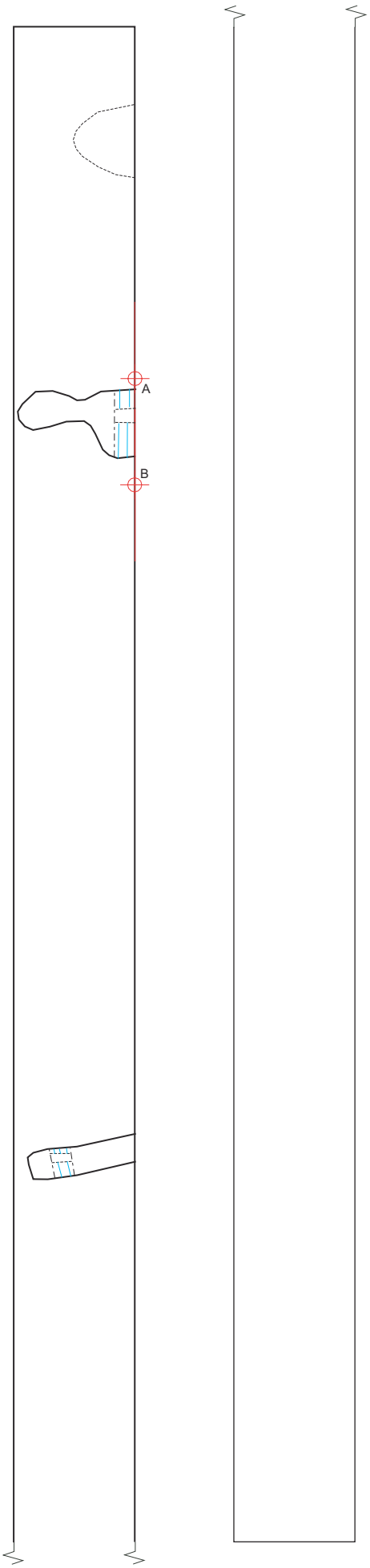
Section 44:03

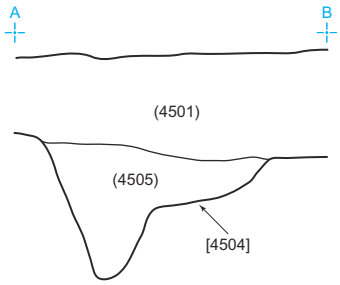


44 1:40

0 1m

Trench 45

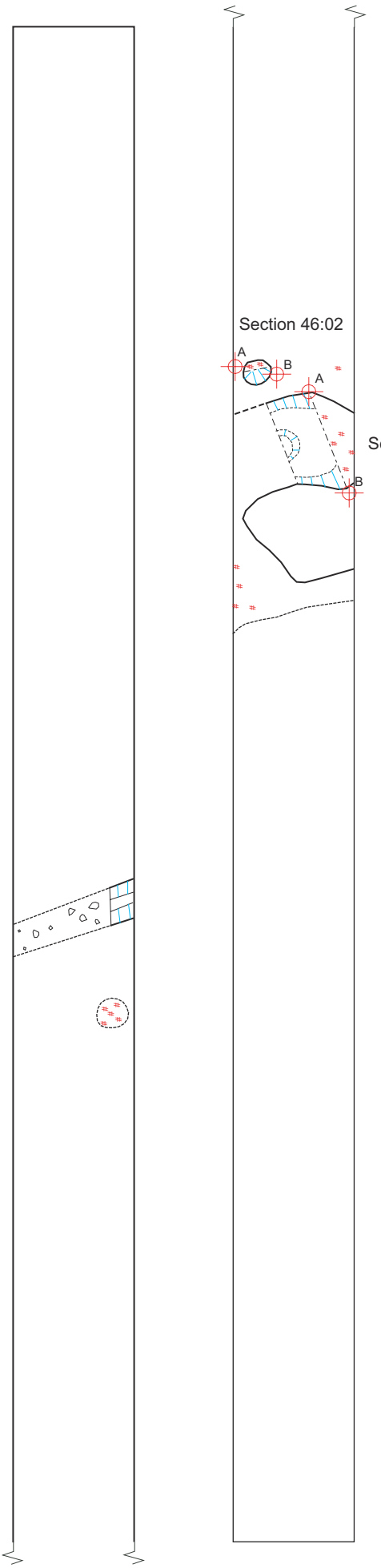




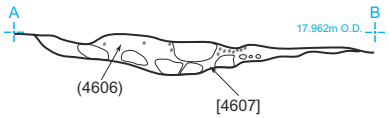
0 1m

0 5m

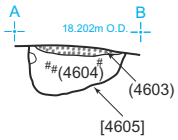
Trench 46



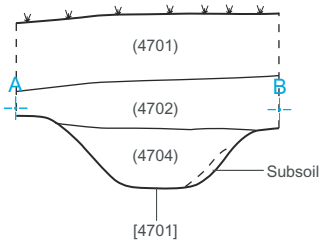
Section 46:01

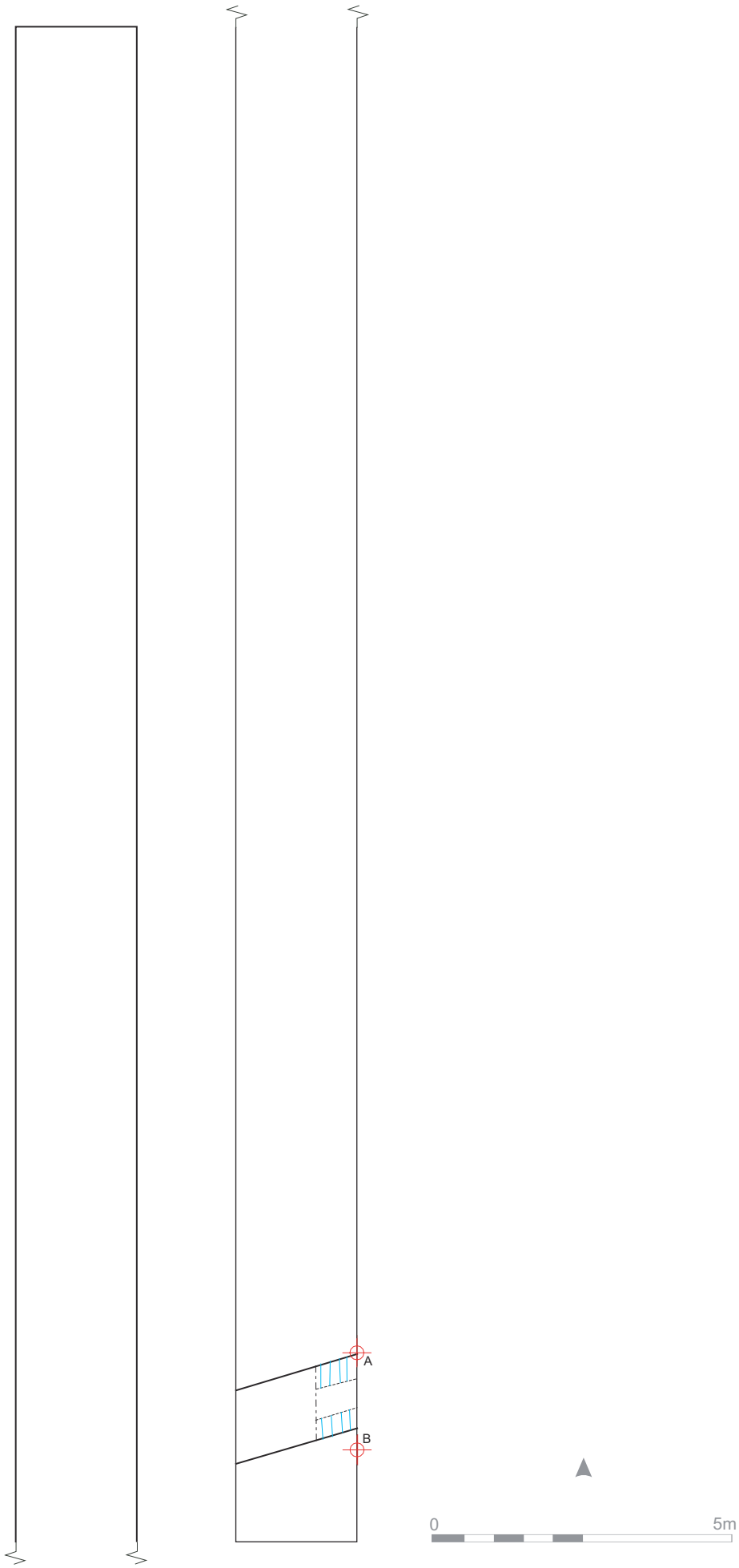


Section 46:02

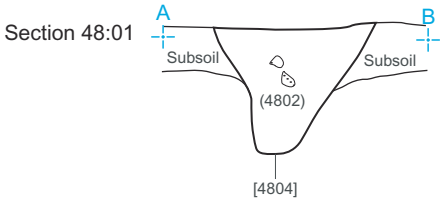


Trench 47





Trench 48


Section 48:01
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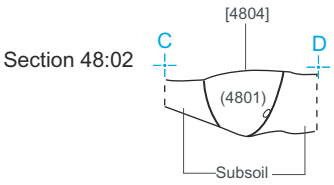
Subsoil
Subsoil
(4802)
[4804]


Section 48:02
[4804]
C
D
(4801)
Subsoil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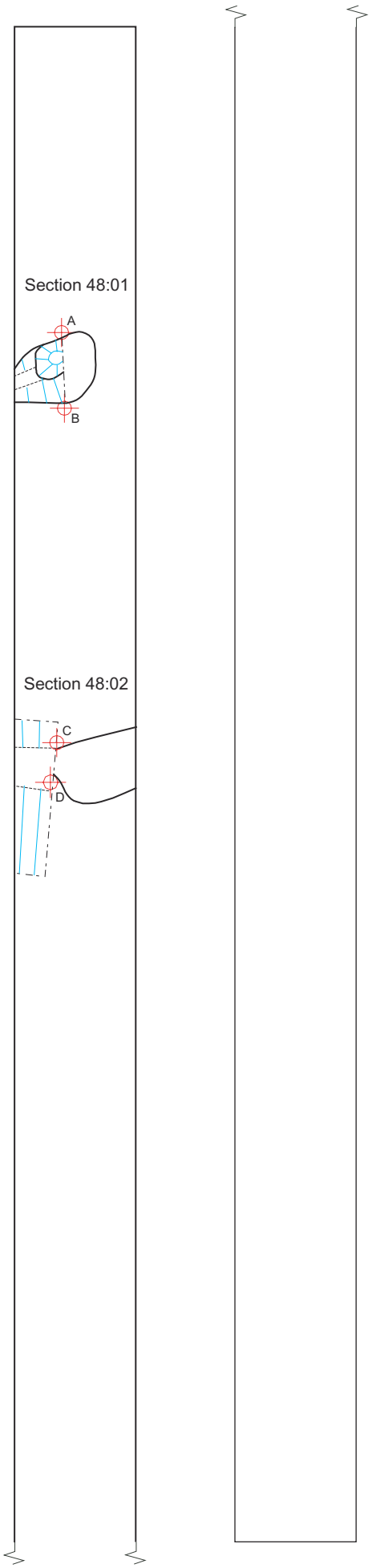
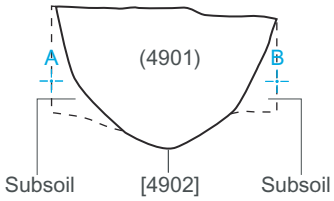
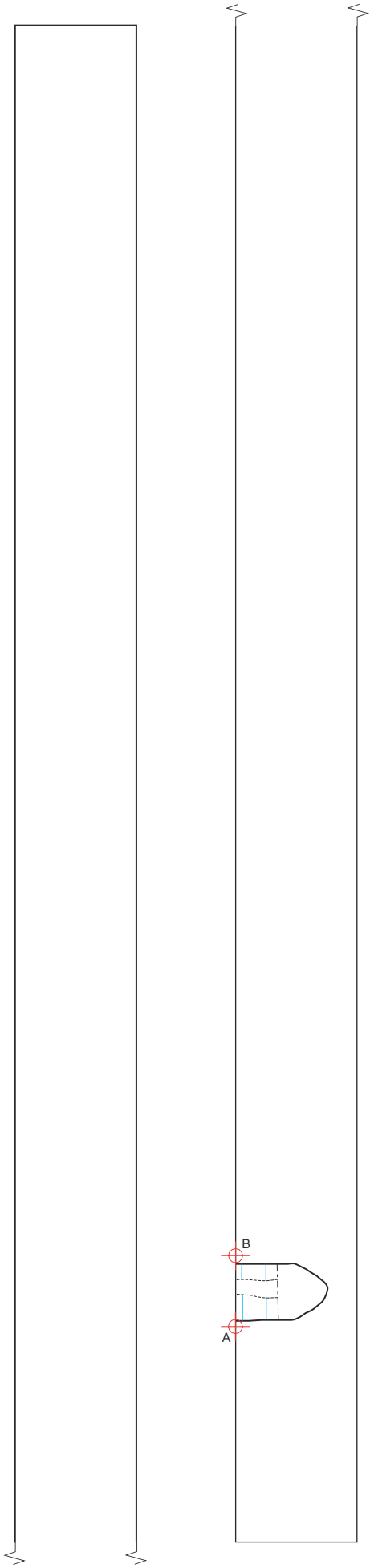
1m


Section 48:01
A
B
Section 48:02
C
D


0
5m

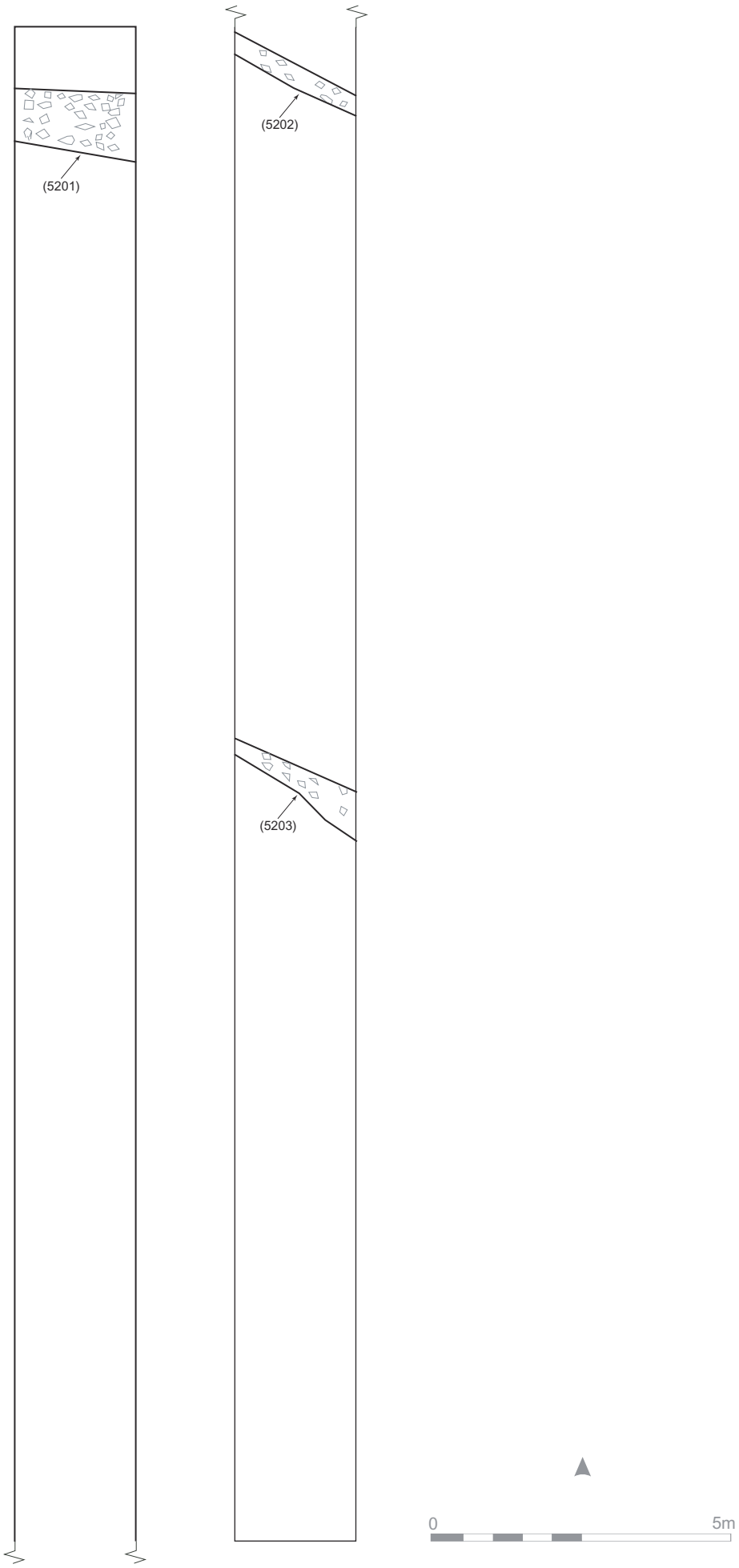
Trench 49



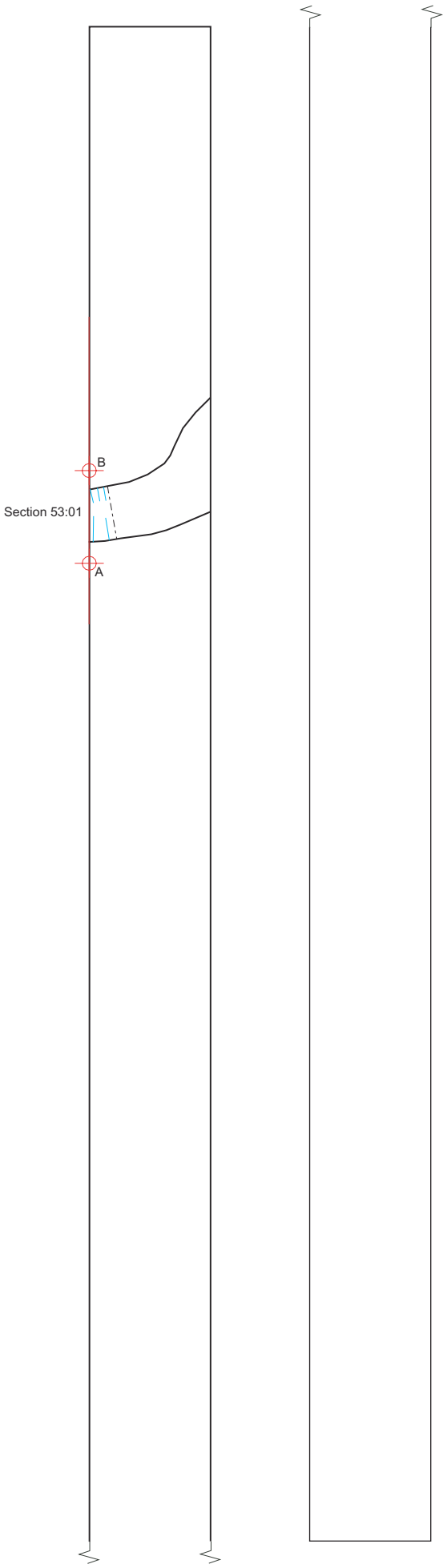


Trench 50

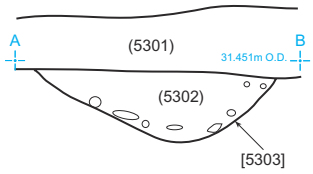
Trench 52



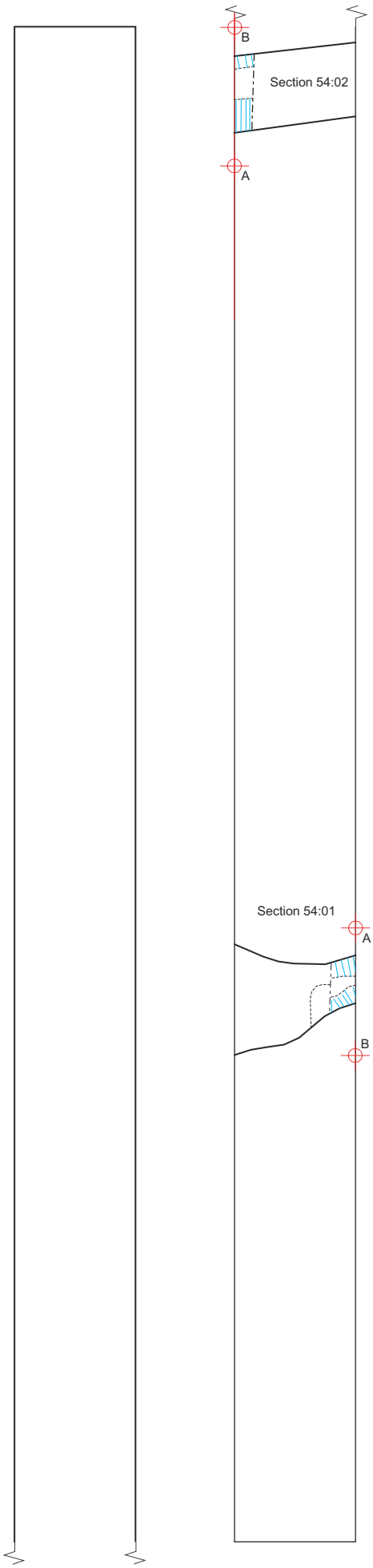
Trench 53



Section 53:01



Trench 54



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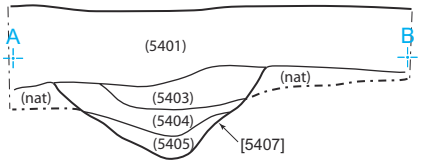
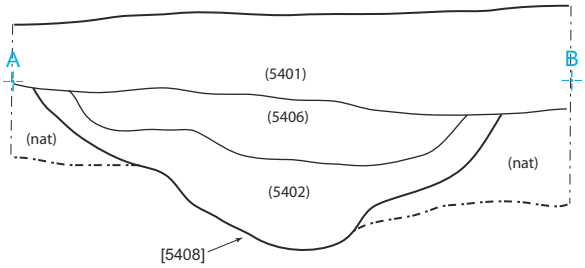


Section 54:02



0 1m

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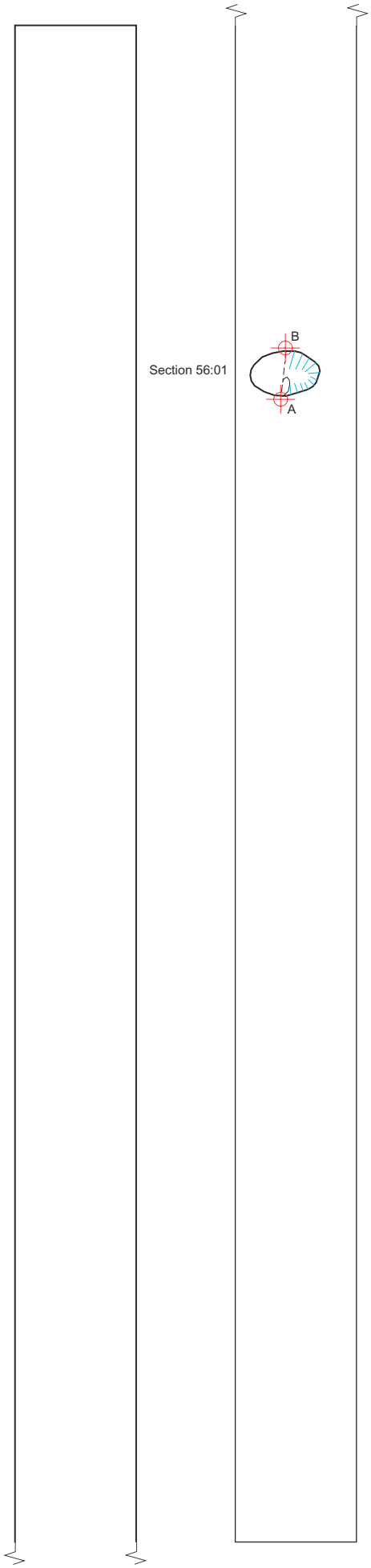
Trench 56



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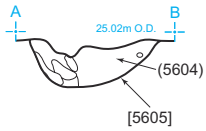
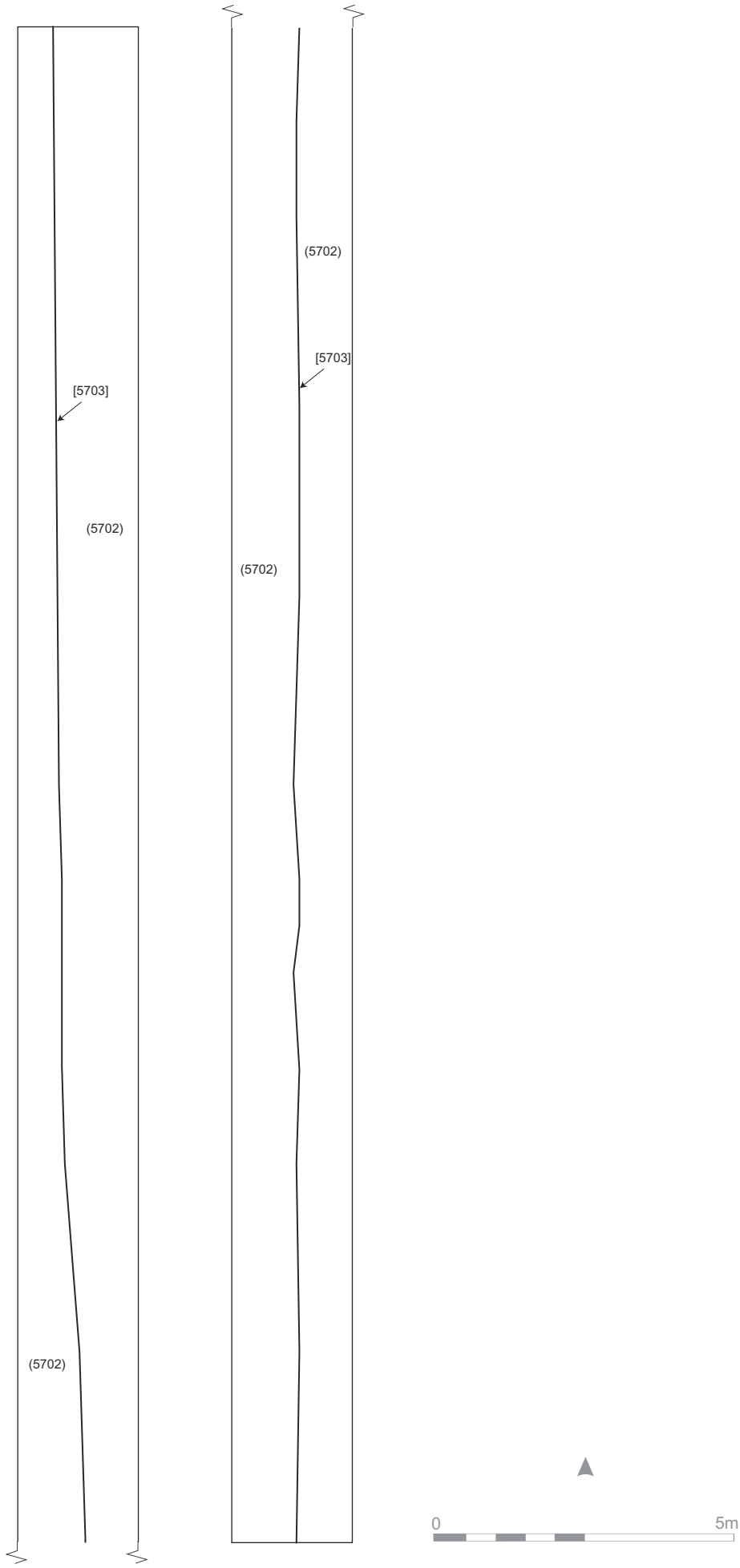
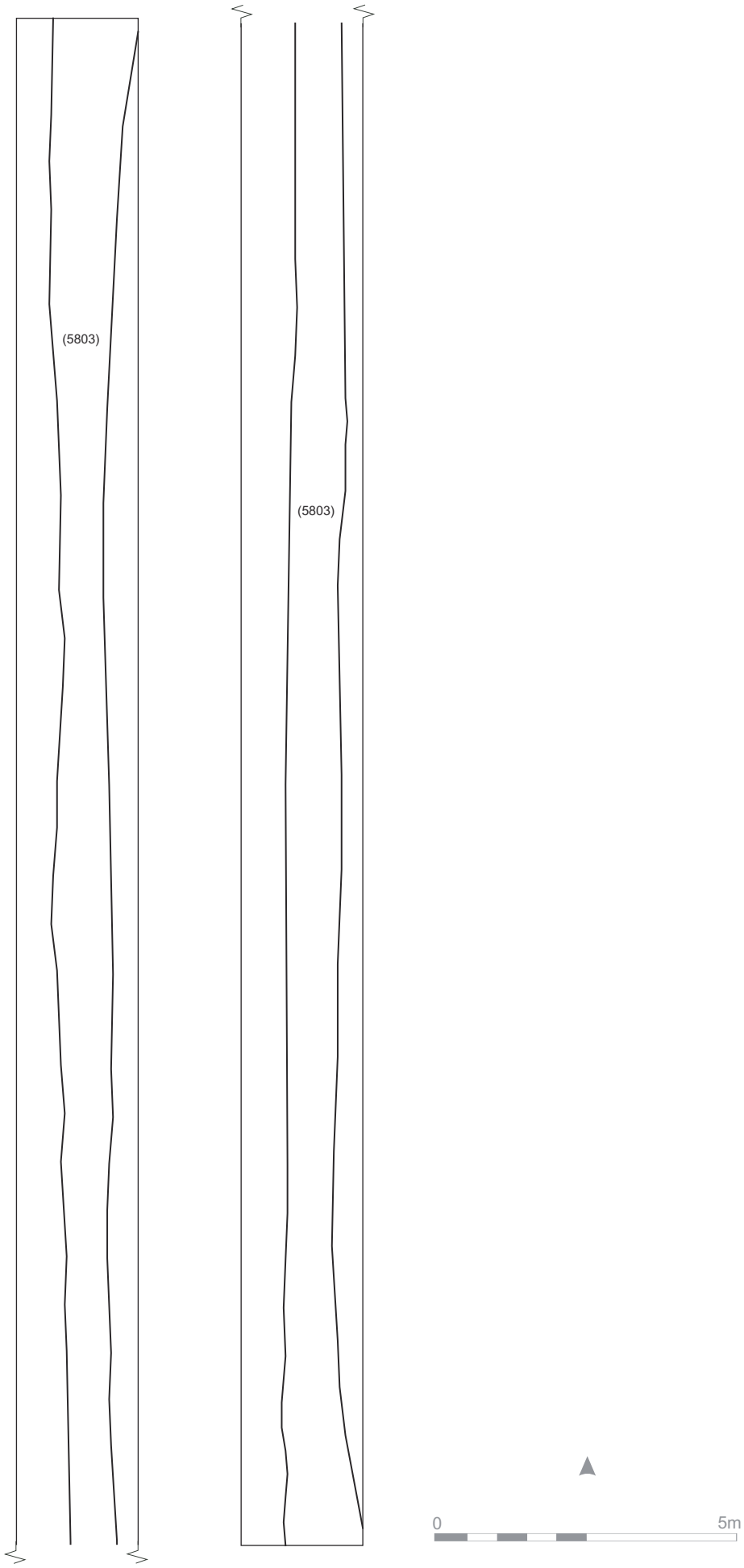


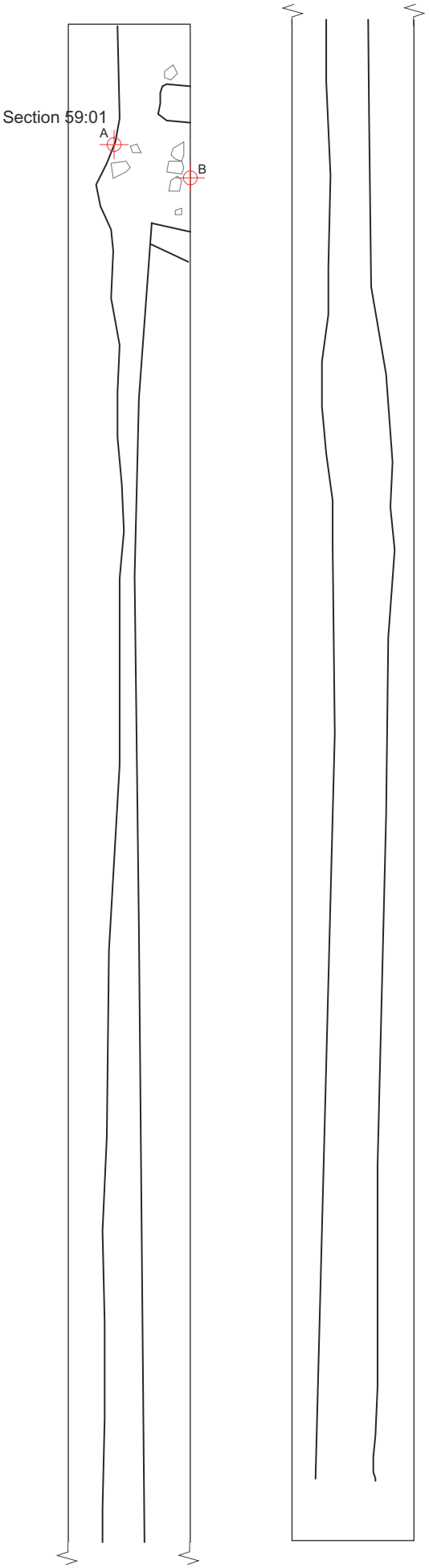
Trench 57



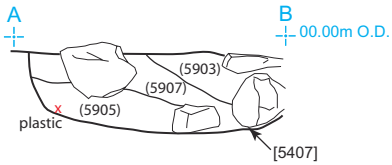
Trench 58



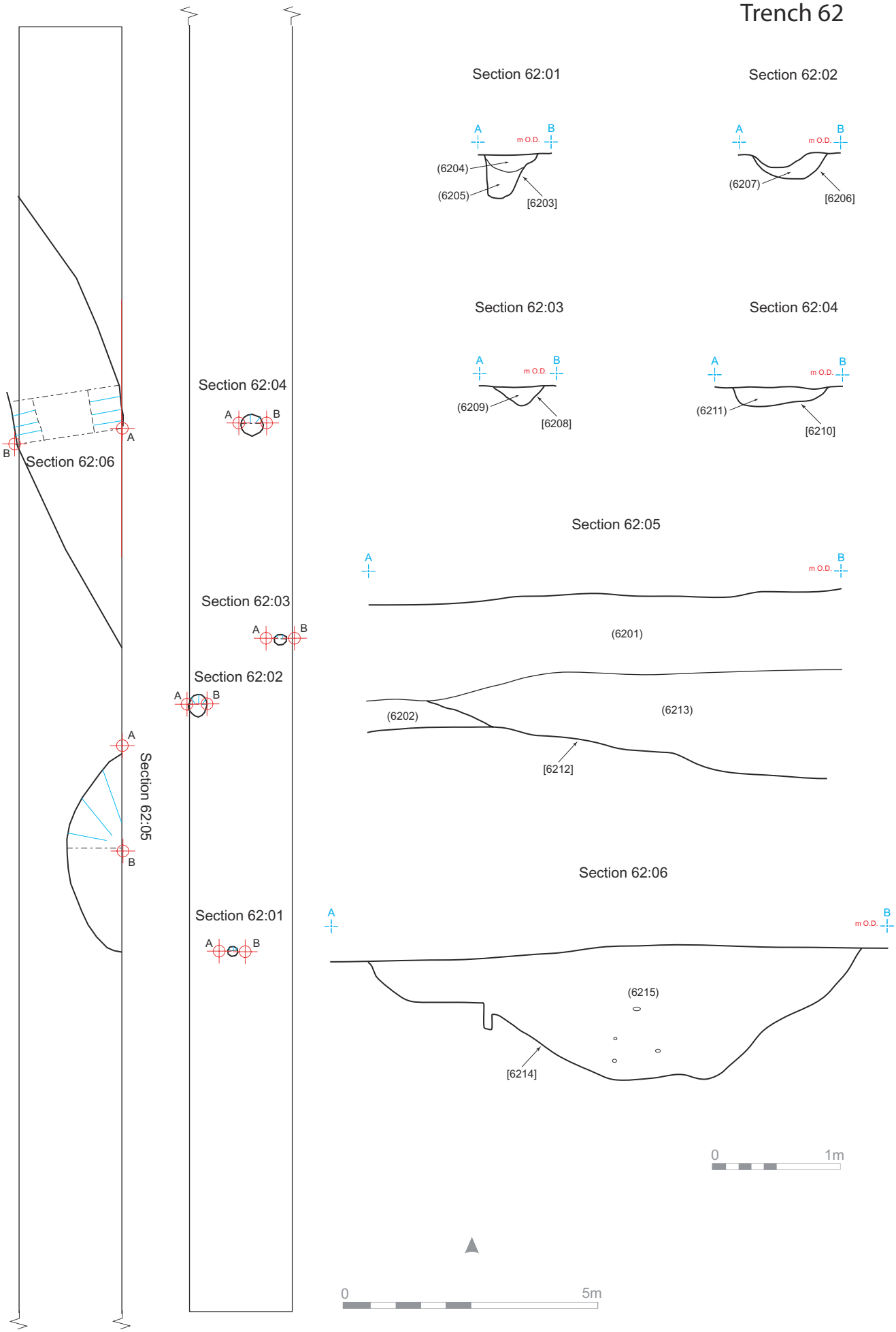
Trench 59



Section 59:01



Trench 62


Section 62:01
A
B
m O.D.
(6204)
(6205)
[6203]
Section 62:02
A
B
m O.D.
(6207)
[6206]
Section 62:03
A
B
m O.D.
(6209)
[6208]
Section 62:04
A
B
m O.D.
(6211)
[6210]
Section 62:04
A
B
Section 62:06
A
B
Section 62:03
A
B
Section 62:02
A
B
Section 62:05
A
B
Section 62:01
A
B
Section 62:05
A
B
m O.D.
(6201)
(6202)
(6213)
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(6215)
[6214]
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1m
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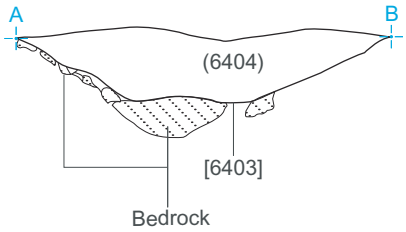
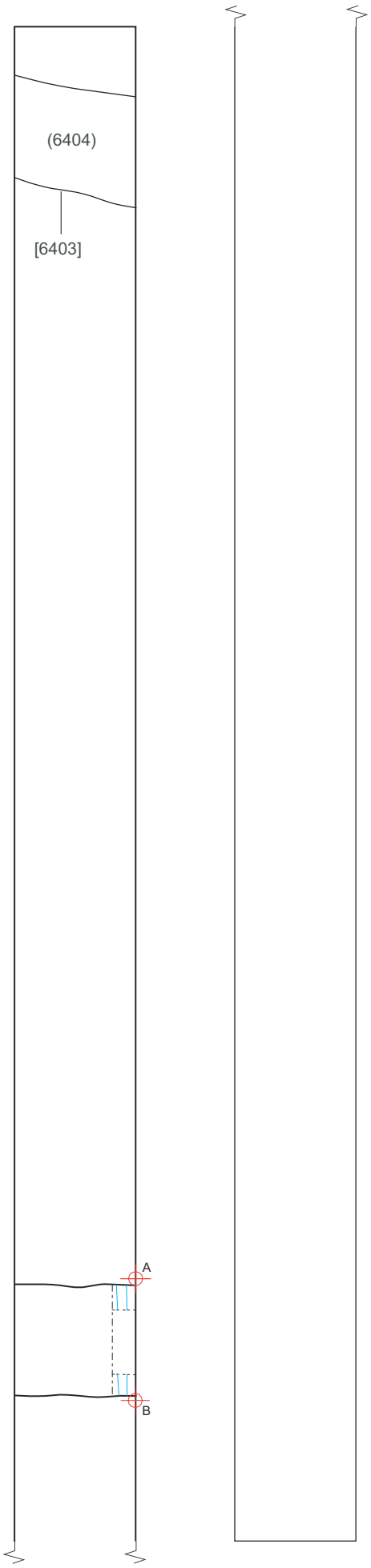
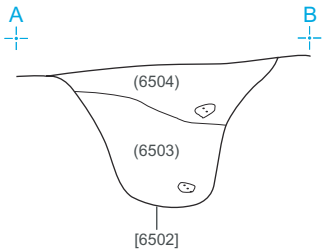
5m

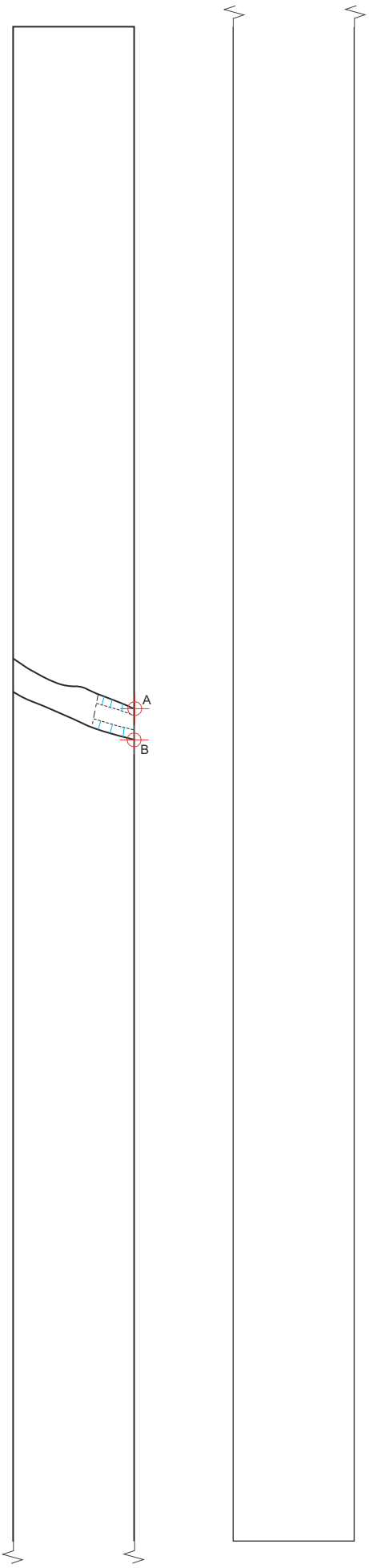
Trench 64

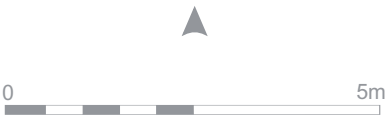




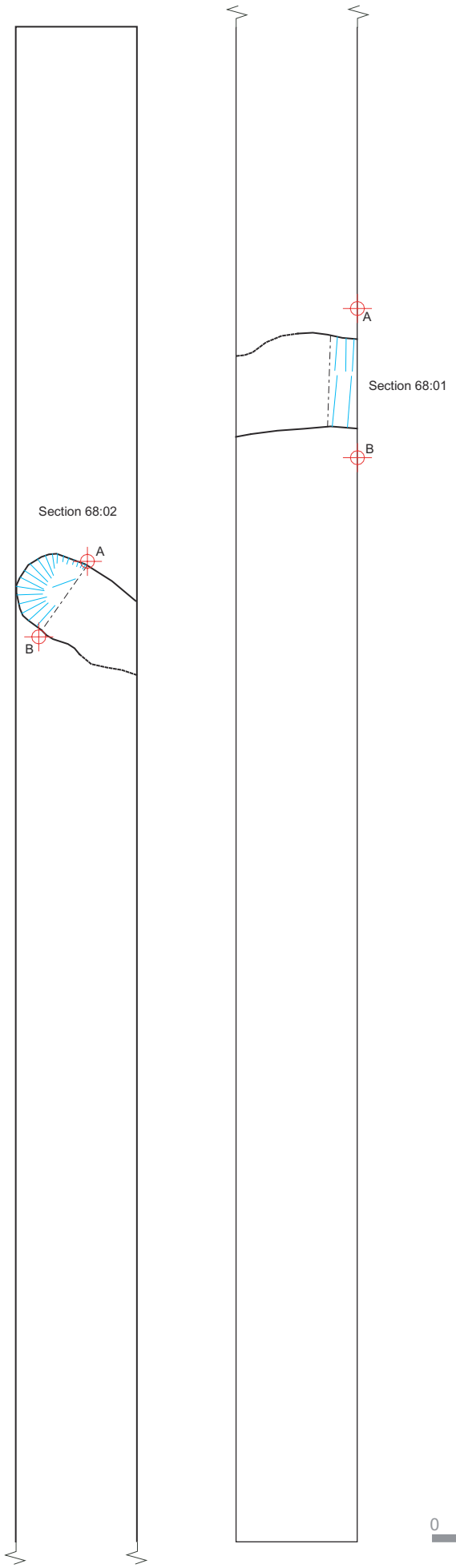
Trench 65

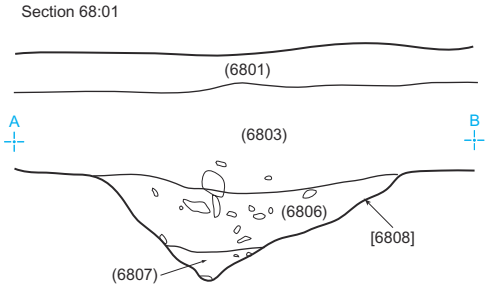






Trench 68


Section 68:02
A
B
A
Section 68:01
B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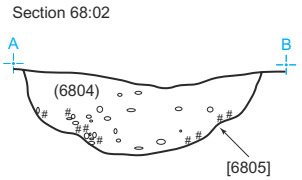
A
B
(6803)
(6806)
[6808]
(6807)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0
1m


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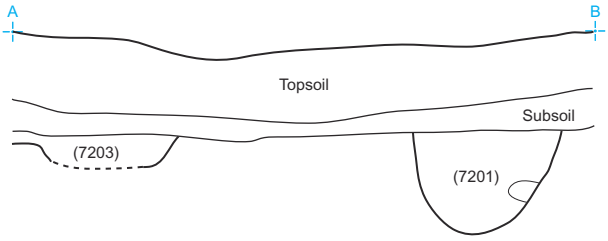
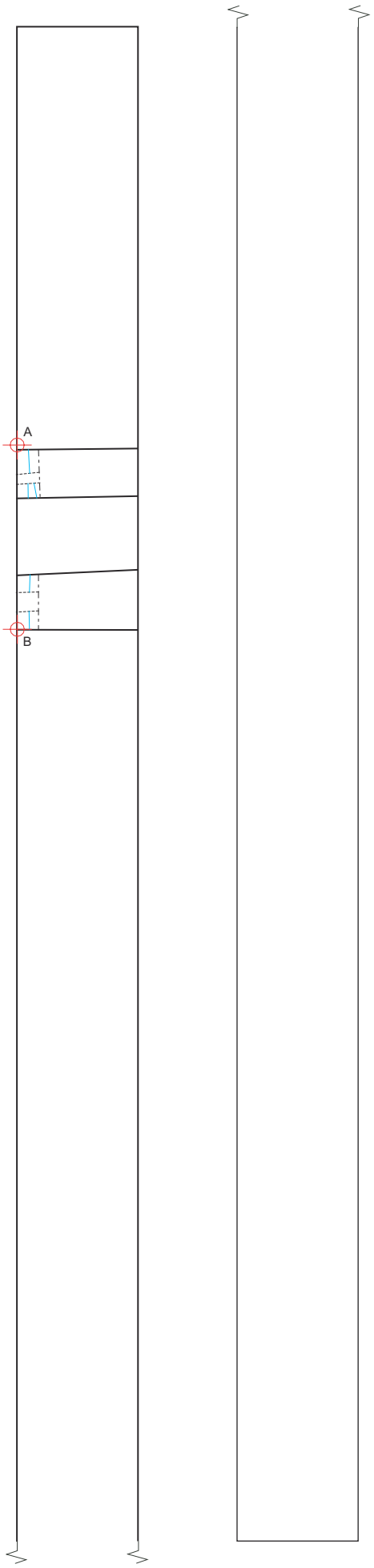
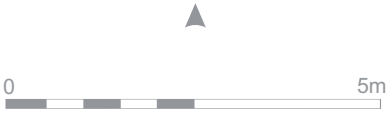
5m

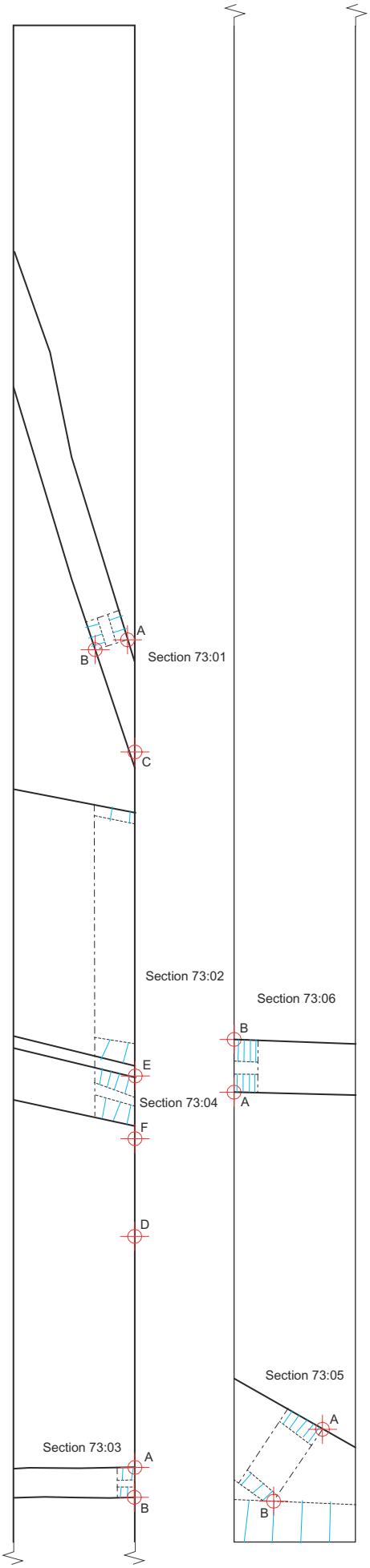
Trench 72



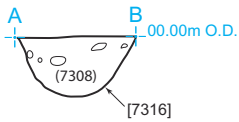




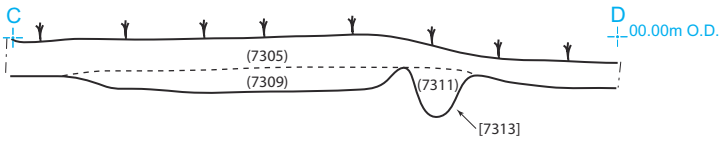
Trench 73



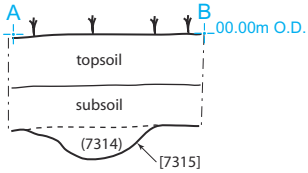
Section 73:01



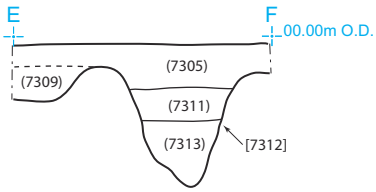
Section 73:02



Section 73:03

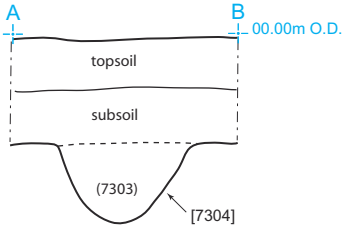


Section 73:04

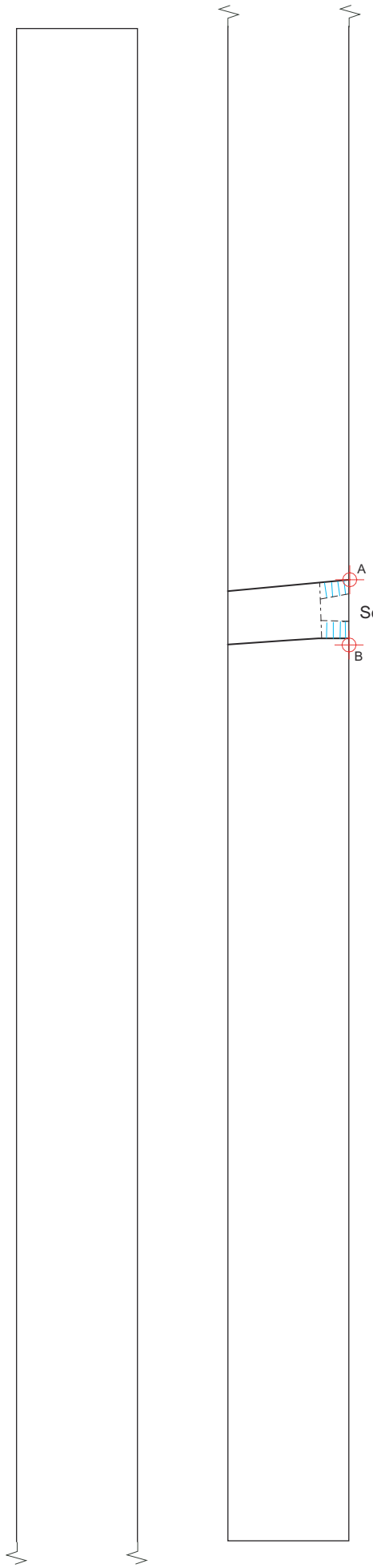


Section 73:05

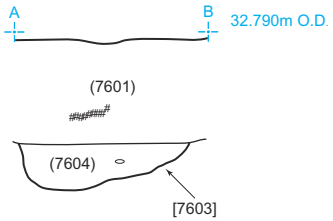
Section 73:06



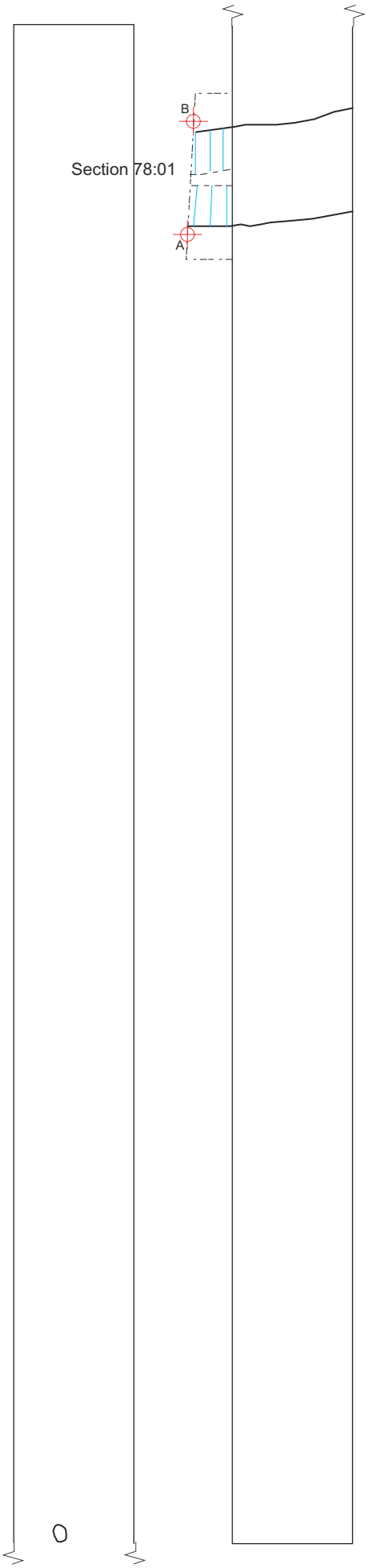
Trench 76



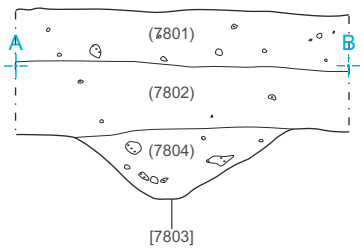
Section 76:01



Trench 78



Section 78:01



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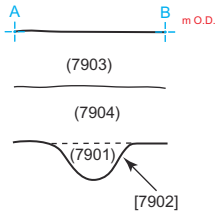
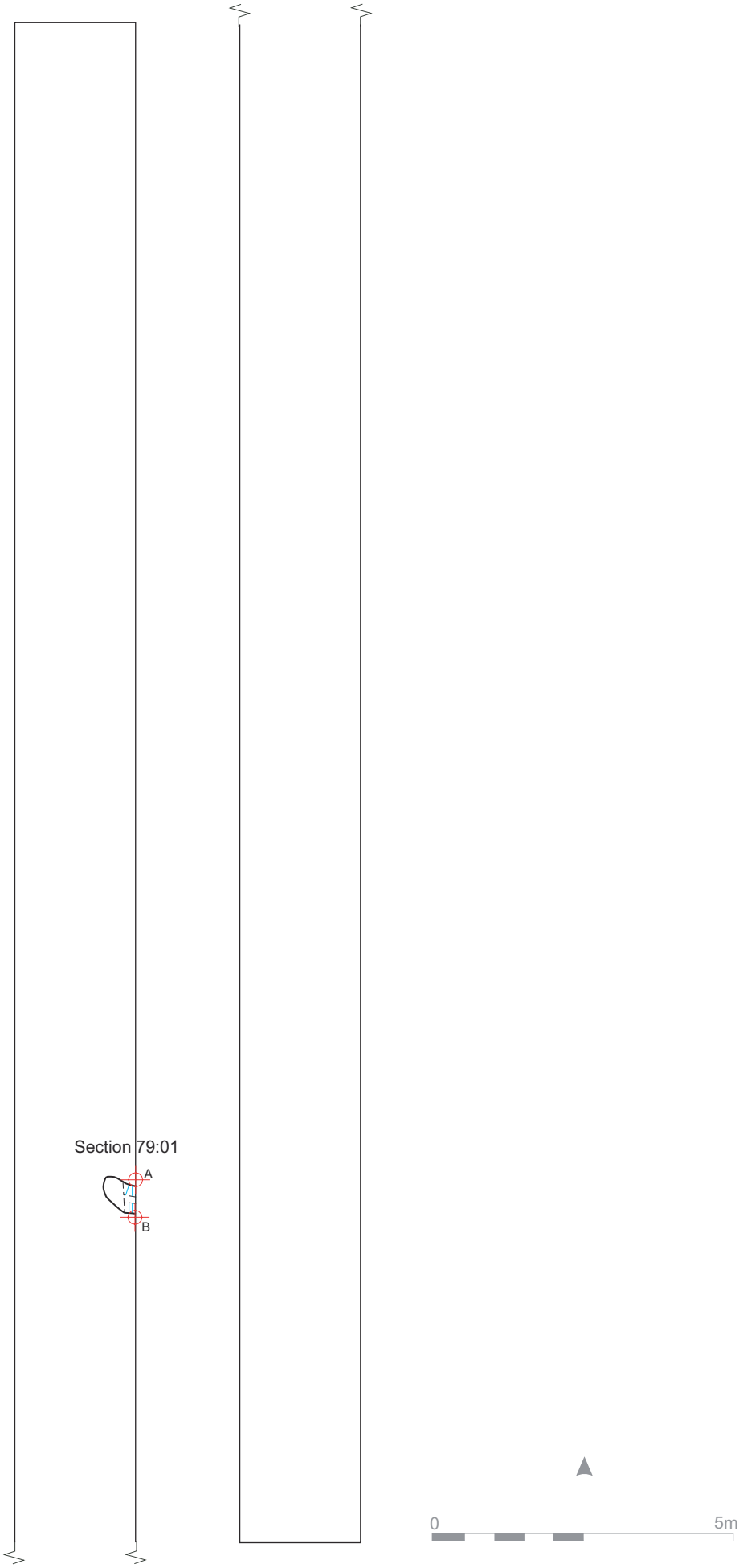
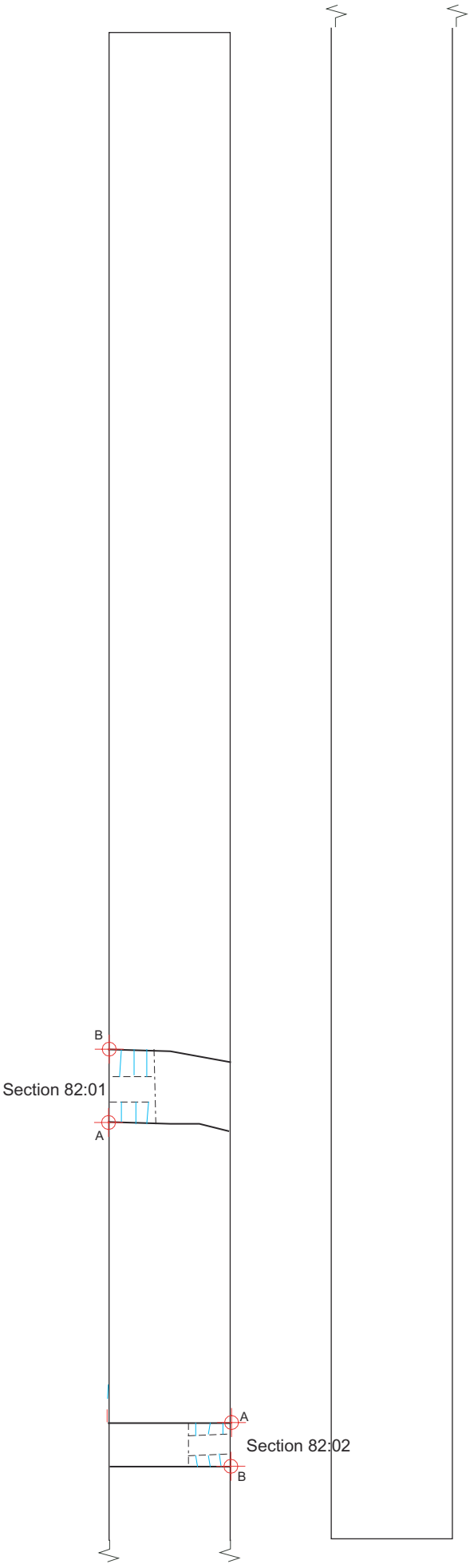
Trench 79

Section 79:01

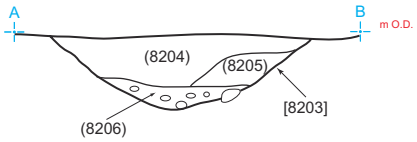




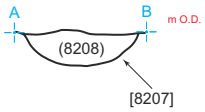
Trench 82



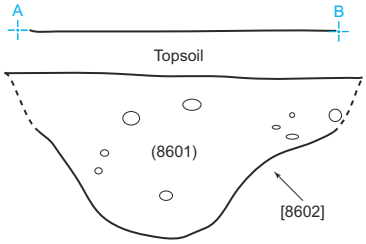
Section 82:01

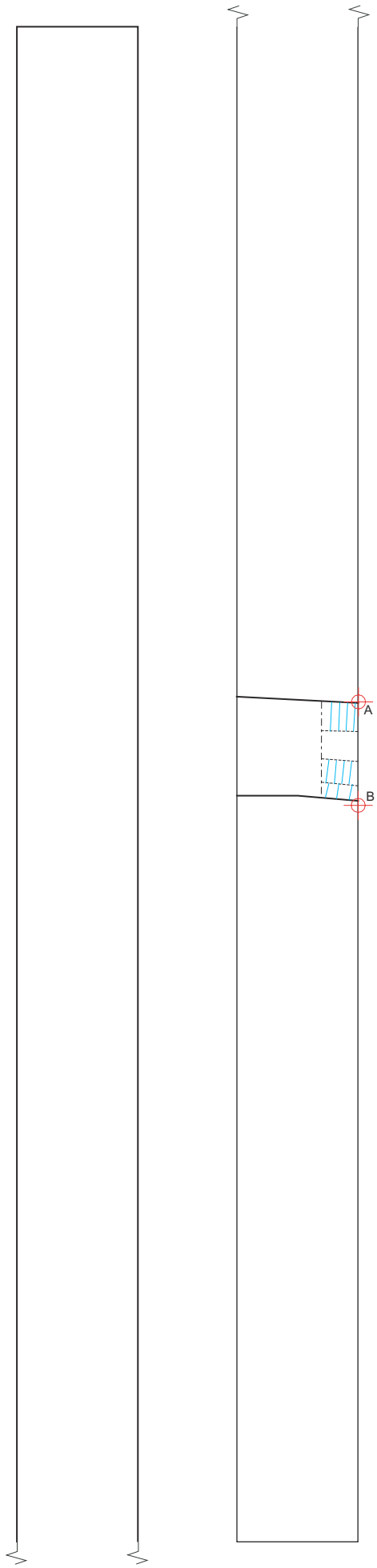


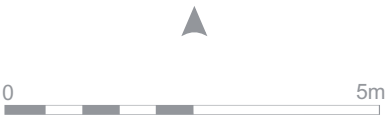
Section 82:02



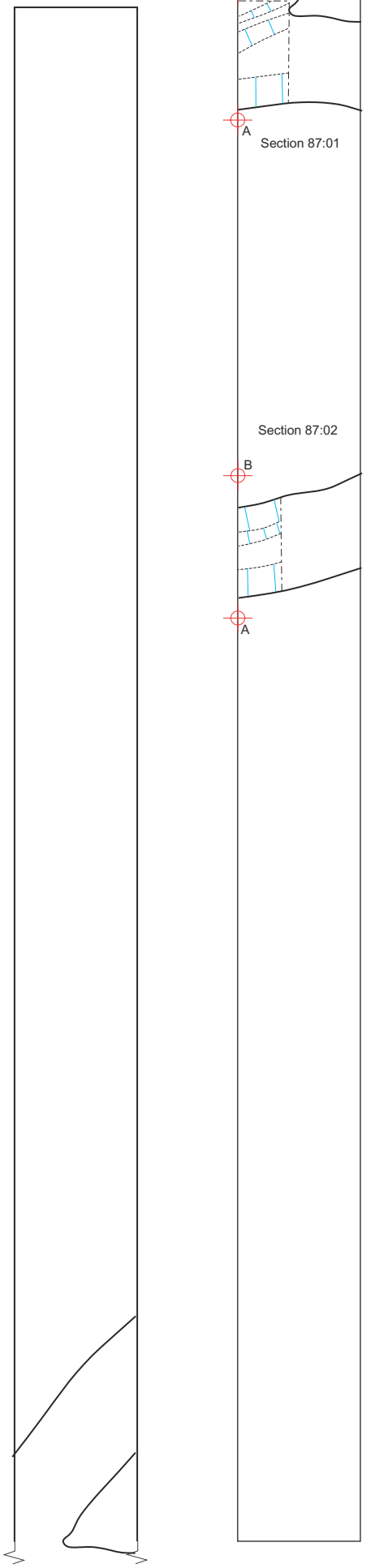
Trench 86



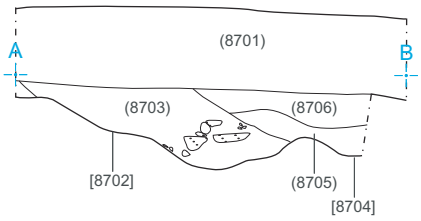




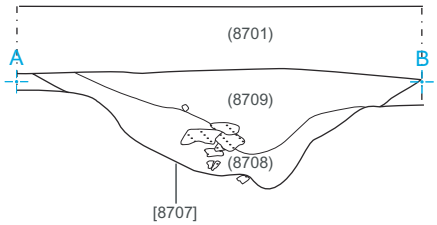
Trench 87



Section 87:01



Section 87:02



0 1m

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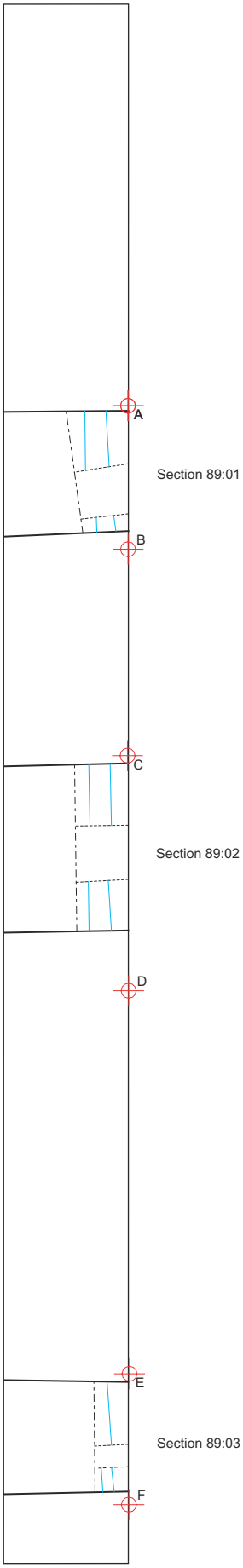
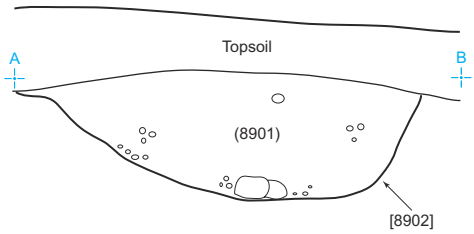
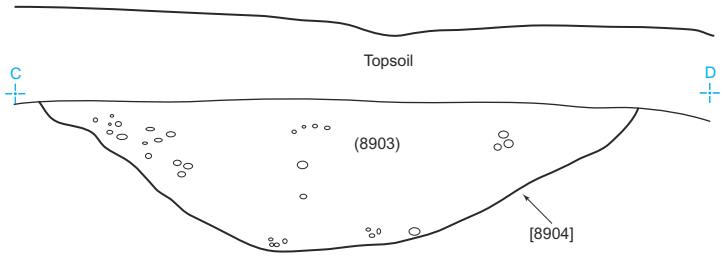
Trench 89



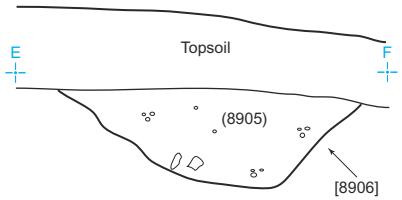
Section 89:01



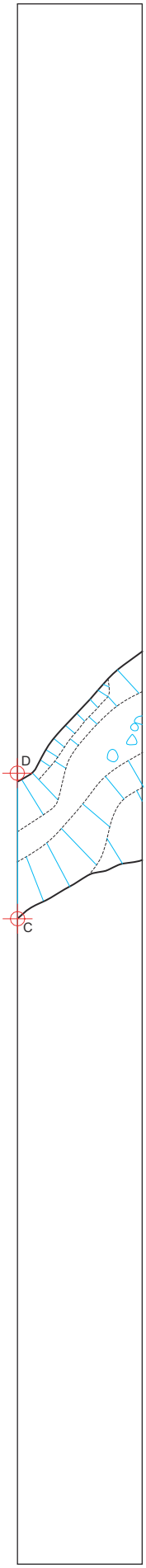
Section 89:02

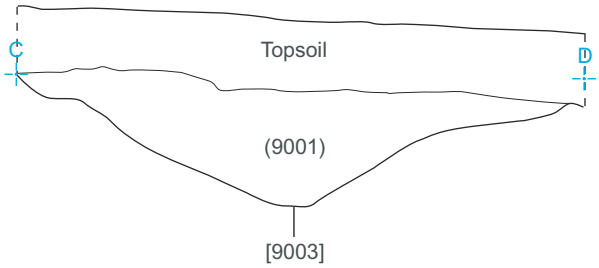


Section 89:03



Trench 90

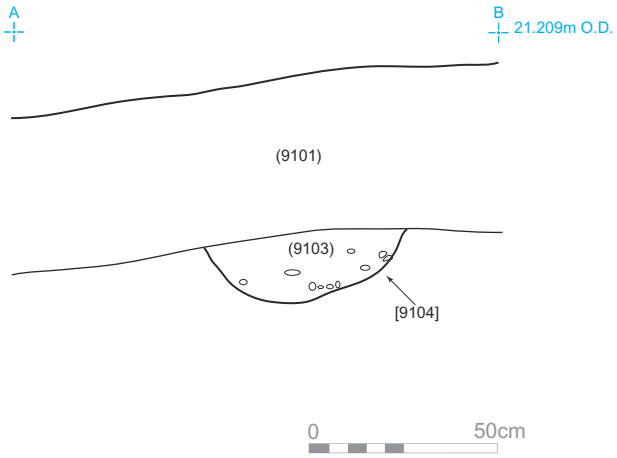


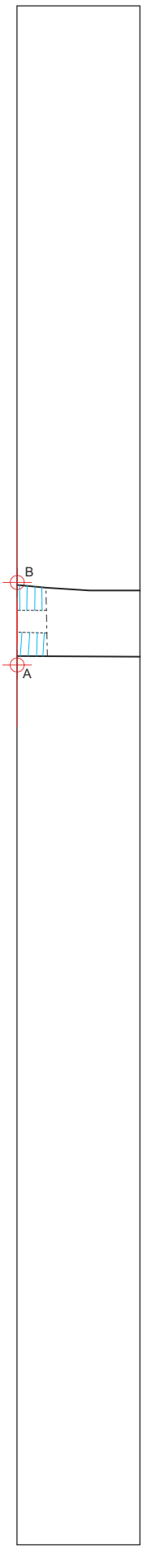


0 1m

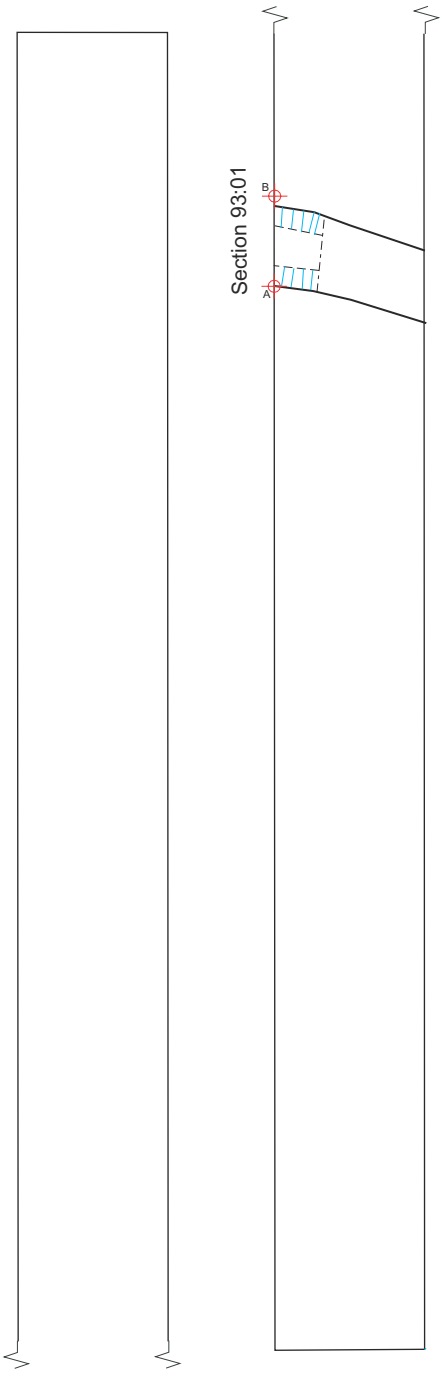
0 5m

Trench 91

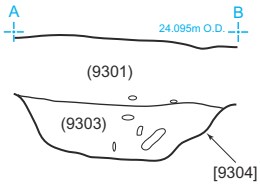




Trench 93

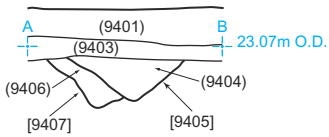


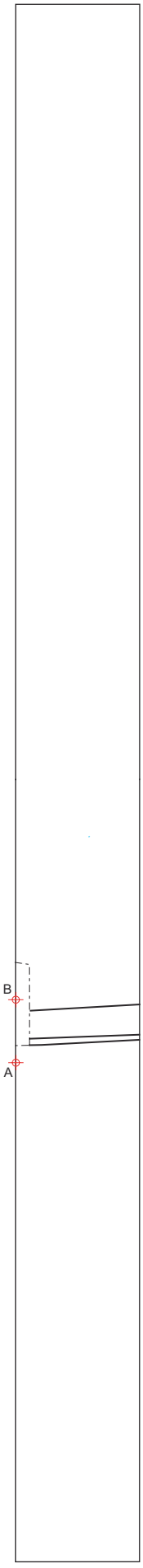
Section 93:01



Trench 94

Section 94:01





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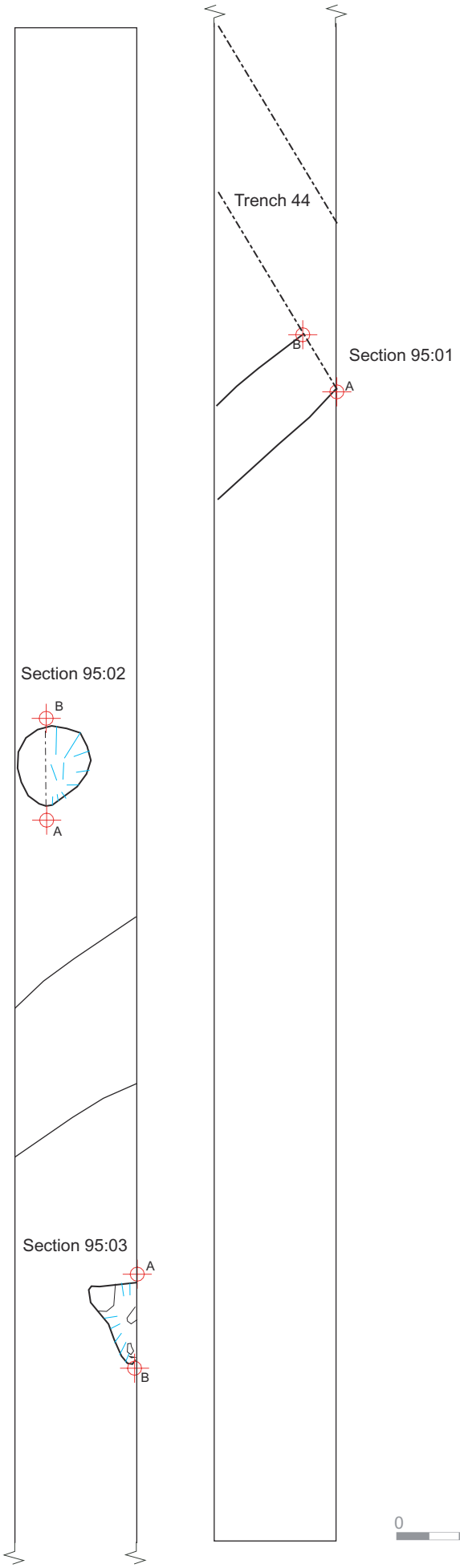
Trench 95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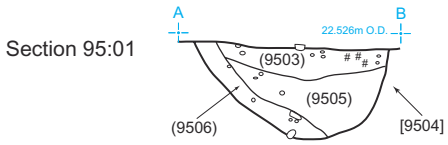
Section 95:02
B
A
Section 95:03
A
B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(9505)
(9506)
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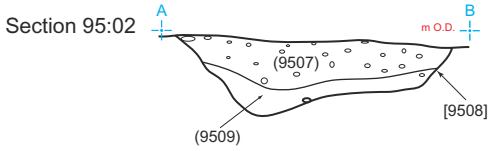
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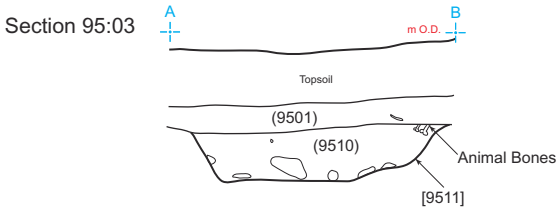
(9509)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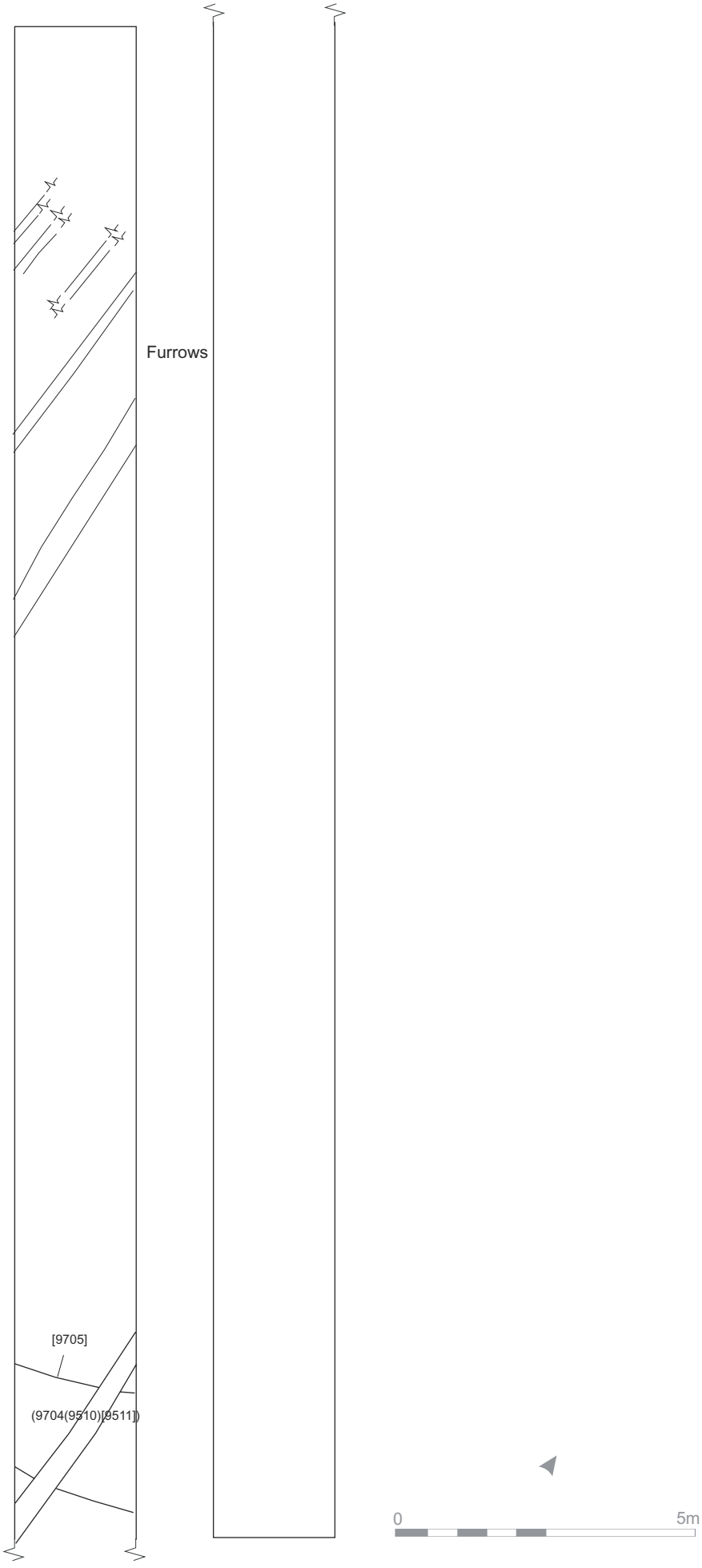
(9510)
Animal Bones
[9511]

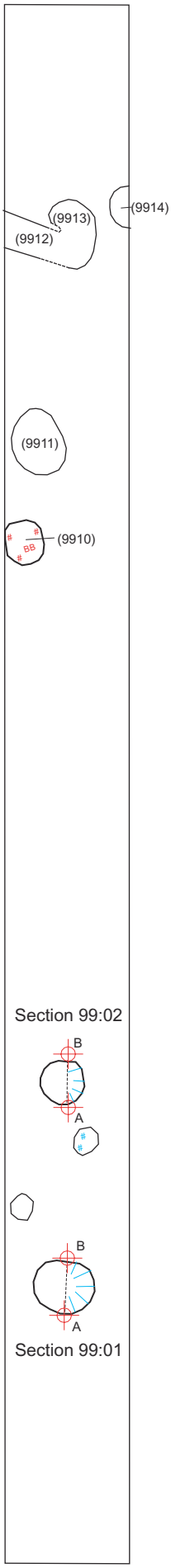

0
1m


0
5m

Trench 97



Trench 99



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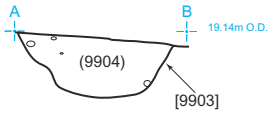

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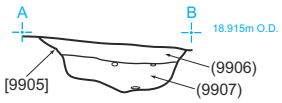

PLATES

Plate 1: Mid ex of cremation 1103: Trench 11: Looking north

Plate 2: Mid-ex of cremation 2315: Trench 23: Looking north

Plate 3: Post-ex of cremation 2315: Trench 23: Looking north

Plate 4: Working shot of cremation 2315: Trench 23: Looking north

Plate 5: Mid-ex of ring ditch 8702: Trench 87: Looking north

Plate 6: Pottery from 4404: Decorated rimsherd.

Plate 7: Pottery from 4404: Decorated rimsherd.

Plate 8: Pottery from 4404: Decorated rimsherd.

Appendix 11.4 Excavations in the vicinity of the subject site

Oldbridge, Co. Meath N/A
1999:706; 99D013 & 99R034 (dive survey and detection licences)
Meath County Council commissioned an underwater inspection and metal detector survey to be carried out along the southern shore of the River Boyne at the site of the new bridge pylon for the M1 motorway in Oldbridge, Co. Meath. This work was carried out by Niall Brady, VJK Ltd but nothing of archaeological significance was recorded.

Oldbridge, Co. Meath ME020-034---
2000:0769; 00E0929
Neolithic Pit. A single pit was uncovered on the access road route of the M1, 50m north of its junction with the Sheephouse Road by Kieran Campbell, VJK Ltd. The pit, 1 m in diameter, produced sherds of a Western Neolithic shouldered bowl.

Oldbridge, Co. Meath ME020-035---
2000:0770; 00E0938
Prehistoric Pit. A small quantity of struck flint was recovered from a pit uncovered on the motorway approach to the Boyne Bridge route of the M1 by Kieran Campbell, VJK Ltd.

Oldbridge, Co. Meath ME020-049---
2000:0771; 00E0939
A two-day excavation was carried out on a 4m x 4m area of loose stone and associated deposits containing animal bone on the route of the M1 by Kieran Campbell, VJK Ltd. No dating evidence recovered.

Donore, Co. Meath ME020-040---
2000:0775; 00E0813
The site is one of a series of potential prehistoric sites identified during pre-development testing along the route of the Northern Motorway, Contract 7. This site is located approximately 500m to the south of the Donore Road, south-west of the town of Drogheda. The site is on a low ridge, with a good view of the surrounding countryside. The site comprises a series of small pits and post-holes, with no obvious delimiting feature or structure. Identification of any structures is hampered by the site being transected by a modern field boundary ditch that cuts through what appears to be its central focus. Activity at the site appears to span a broad period of the earlier Bronze Age. To date, over 700 sherds of Bronze Age pottery have been recovered. Provisional identification suggests the presence of Beaker, Food Vessel, and Collared or Cordoned Urn pottery. Of particular interest are what appear to be the remains of several polypod bowls or similar, footed vessels. Five feet have been identified to date, in two distinct sizes, suggesting the presence of at least two vessels of this type. The function of the site is still unclear. It is least likely to be a funerary site. While cremated bone is present in many contexts, only small amounts are found, and there is no deliberation to their deposition. The absence of any hearths or clear structures at the site would appear to mitigate against a domestic function. However, the richest area of the site comprises a series of occupation-type layers delimited on the east side by a row of deep post-holes. Unfortunately, both these layers and the row of post-holes have been truncated by the field boundary ditch. Given the wealth of artefacts, and the span of time that they indicate, a ritual function for the site cannot be ruled out.

Sheephouse, Co. Meath ME020-036---
2000:0778; 00E0811
Prehistoric enclosure. An oval enclosure, situated on a gentle north-facing slope and measuring c. 30m x 30m, was discovered during test-trenching carried out by Valerie J. Keely Ltd. Topsoil stripping began in November 2000, revealing the extent of the enclosure, long with internal post holes and pits and additional peripheral material including cremation pits. Excavated by Dermot Neilis, IAC Ltd.

Donore, Co. Meath ME020-042---
2001:0960; 01E0399
The site was discovered during monitoring along the line of the Northern Motorway, Contract 7 (Drogheda Bypass). The distribution of archaeological features across the site formed no discernible pattern. Two groups of features, which in the absence of artefactual evidence cannot be identified as

contemporary, were excavated. These two groups were situated in the north-eastern and south-western corners of the site. A minimum distance of over 10m separated the two groups of features.
The south-western group consisted of ten subsoil-cut features grouped within an area approximately 15m east–west by 10m. The stratigraphy of their fills did not support a structural interpretation, nor was there any other surviving structural evidence in the immediate vicinity.

The north-eastern group consisted of sixteen subsoil-cut features grouped within an area measuring approximately 30m north–south by 20m. In common with the features in the south-western group, the fills of over half of these features contained varying amounts of charcoal. None of them, however, contained traces of burnt or heat-shattered stone such as that removed from features in the south-western group. This group of features was artefactually richer than those to the south-west. Traces of burnt bone were recovered from the fill of a shallow possible rubbish-pit situated at the south-east of the group. A flake of struck flint was recovered from the upper fill of an irregular, steep-sided slot feature.

The presence of an apparently structural slot combined with randomly scattered subsoil cuts, some containing burnt bone, charcoal, burnt and heat-shattered stone with some flakes of struck flint and sherds of prehistoric pottery, suggests that the site may have been an occupation site at one or several stages in prehistory.

Oldbridge Co Meath ME020-054---
2001:1017 01E0267
This site was identified during monitoring along the route of the Northern Motorway, Gormanston–Monasterboice, Contract 7, approximately 500m south of the River Boyne. It was on gently sloping, northerly-facing ground. The excavation revealed a series of inter-cutting narrow linear ditches, a curvilinear ditch, a U-shaped ditch and several possible post-holes. No dating evidence was recovered to help aid interpretation.

Sheephouse, Co. Meath ME020-036-
2001 :1055, 00E0810
Multi-phase habitation site, located 1 km west of Drogheda on the Rathmullan road and overlooked the Boyne to the north. It consisted of a line of post holes containing Neolithic Pottery, enclosure ditches, an oval enclosure, a circular ditch feature, a large enclosure. Throughout the site there was evidence of hearths, pits and post holes as well as a number of kilns.

Donore, Co Meath
2001:962: 01E0373
The site consisting of pre-historic activity, was discovered during testing along the line of the Northern Motorway, Contract 7 (Drogheda Bypass). It was in an area of firm ground toward the ridge of a north-facing slope rising up from the River Boyne. When first uncovered by mechanical excavator the site appeared as a scattering of small subsoil-cut features grouped within an area measuring 11m north–south by 10m.

The site consisted of a series of four small to medium-sized pits, grouped in an apparently random manner. The largest of these features was an irregularly cut, steep-sided pit with an average width of over 1m and a maximum depth of 0.59m. The pit was filled by one deposit, which contained a large quantity of prehistoric pottery, charcoal, flint and burnt bone. These would appear to suggest that the feature functioned as a domestic refuse-pit.

Approximately 0.55m to the south a second, smaller pit was excavated. The morphology of this feature suggested that it may have been the result of the removal of a natural stone by modern ploughing activity, and although its fill contained inclusions of charcoal these may have originated in the larger feature to the north.

The other features excavated on the site were uncovered at some distance from these pits. A subcircular bowl-shaped pit, 0.15m in depth with a maximum diameter of 0.8m, was situated approximately 6.2m to the south. Its fills contained no direct evidence of its function.

A subcircular flat-based pit, 0.13m in depth with a maximum diameter of 0.44m, was situated approximately 4.1m to the south-east of the first feature discussed. This pit also contained flint, some

apparently burnt stones and a large proportion of charcoal, which appeared to suggest its use as a refuse-pit.

No other deposits or features were identified during the excavation of Site 6. It is likely that the features excavated on the site represent an area of prehistoric domestic activity. These pits may have been the last remaining features of a more extensive occupation site almost completely destroyed by modern agricultural practices. However, given the situation of the site at the extreme western edge of the area of archaeological investigation along the road-line, it is possible that these features represent the eastern limit of a settlement site still preserved immediately outside the line of the road.

Donore, Co Meath
2001:959: 01E0398
The site, consisting of possible burnt mound activity, was discovered during monitoring along the line of the Northern Motorway, Contract 7 (Drogheda Bypass). It was in an area of firm ground on a north-facing slope rising up from the River Boyne. When first uncovered by mechanical excavator the site appeared as a scattering of small subsoil-cut features and a pair of large pits grouped within an area measuring 20m north–south by 10m.

The pair of large pits appeared to form the focus of the site. Both were filled with a loose, darkish grey soil with a high composition of burnt stone in a charcoal-rich matrix. This burnt mound-like material also filled a depression which formed a link between the two features. The morphology of the pits was similar; both were roughly suboval in plan with gently sloping, rounded sides leading to undulating rounded bases. The larger of the two pits measured 2.4m by 1.55m by 0.36m deep. The smaller was 1.62m by 0.6m by 0.1m deep. The site overall was heavily truncated by machine activity and any possible archaeology which may have been present to the east of these pits would have been removed by bulldozer in the topsoil-stripping process.

Three other subsoil-cut features were excavated. The morphology and sterile fills of these features did not support any particular interpretation of the site's date or function.

Donore, Co Meath
2001:961: 01E0400
The site consisting of an isolated pit was discovered during monitoring along the line of the Northern Motorway, Contract 7 (Drogheda Bypass). It was in an area of firm ground on a north-facing slope rising up from the River Boyne. When first uncovered by mechanical excavator the site appeared as a scattering of small subsoil-cut features grouped within an area measuring 6m east–west by 9m.

During the initial site clearance and investigation it became apparent that the majority of features initially identified as possibly archaeological were actually of modern origin, most being the result of recent machine activity. Only one feature was of an archaeological nature.

This was a circular pit with a maximum depth of 0.28m and a diameter of 0.73m. It had steep sides and a flat base, giving it a broad 'U' shape in profile. The feature was filled with three deposits, all of which contained inclusions of burnt bone and charcoal, suggesting that it may have served as a domestic refuse-pit or even as a token cremation pit.

No other archaeological features or deposits were discovered during the investigation of this site. The pit may represent the remains of a phase of prehistoric activity, the majority of which has not survived in the archaeological record. It is possibly more likely, however, that the pit is related to the large prehistoric enclosure, Site 3 Sheephouse (see para 11.7.7 above 00E0811), excavated by Dermot Nelis approximately 40m to the north.

Sheephouse, Co. Meath ME020-036---
2001: 1056; 01E0449
The area of prehistoric activity was discovered during monitoring of topsoil stripping during the construction of the M 1 motorway.It contained a scattering of typical subsoil cut features such as refuse pits, hearths, stakes and post holes. The site produced very few artefacts.

Sheephouse, Co. Meath ME020-063---
2001:1058; 01E0907
A prehistoric identified during monitoring of the M1 motorway. It was located in the southern end of a field close to the road between Oldbridge and Sheephouse town lands and the area of excavation measured approximately 130m x 10m. A bowl shaped feature that may represent the remains of a kiln along with a series of irregularly shaped pits.

Appendix 11.5 Notes on key data sources

Record of Monuments and Places (RMP)

Section 12(1) of the National Monuments (Amendment) Act 1994 provides that the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for Culture, Heritage and the Gaeltacht) shall establish and maintain a record of monuments and places where they believe there are monuments. The record comprises of a list of monuments and relevant places and mapping showing each monument and relevant place in respect of each county in the State. Sites recorded on the RMP all receive statutory protection under the National Monuments Act.

Sites and Monuments Record (SMR)

The SMR holds documentary evidence and records of field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection. As a result these are omitted from the RMP. SMR sites are also listed on a website maintained by the DCHG.

National Monuments in the State Care Database

This is a list of all the National Monuments in the State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of each monument. A National Monument receives statutory protection and is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act, 1930, Section 2).

The Minister for the Department of Environment, Heritage and Local Government (now the Minister for Culture, Heritage and the Gaeltacht) may acquire National Monuments by agreement or by compulsory order. The State or Local Authority may assume guardianship of any National Monument (other than dwellings). The owners of National Monuments (other than dwellings) may also appoint the Minister or the Local Authority as guardian of that monument if the State or Local Authority agrees. Once the site is in ownership or guardianship of the State, it may not be interfered with without the written consent of the Minister.

Preservation Orders List

Preservation Orders and/or Temporary Preservation Orders, can be assigned to a site or sites that are deemed to be in danger of injury or destruction. Orders are allocated under the National Monuments Act, 1930. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the National Monuments Act, 1954. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister (DCHG).

Register of Historic Monuments

This register was established under Section 5 of the National Monuments (Amendment) Act 1987 and requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas included in the register are afforded statutory protection pursuant to the regime under the National Monuments Acts 1930 to 2014. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the RMP.

Topographical files of the National Museum of Ireland

This is the national archive of all known finds recorded by the National Museum of Ireland. This archive relates primarily to artefacts but also includes references to monuments and unique records of

previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources

These are important in tracing land use development within the receiving environment of the proposed development as well as providing important topographical information on areas of archaeological potential and the construction of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

The cartographic sources consulted include:

- Down Survey Map, Barony Map of 'Duleek' c. 1655;
- William Larkin's, Map of the County of Meath, 1812; and
- Ordnance Survey 6-inch and 25-inch maps of Meath (1836 and 1909).

Documentary Sources

Documentary sources (as identified above) were consulted to compile background information on the archaeological, architectural and Cultural Heritage receiving environment of the proposed development.

Development Plan

Development Plans contain a catalogue of all the Protected Structures, archaeological sites and Architectural Conservation Areas within every county. The development plan of relevance that was examined as part of this assessment is the Meath County Development Plan 2013–2019.

The National Inventory of Architectural Heritage (NIAH)

The NIAH is a government based organisation tasked with making a nationwide record of locally, regionally, nationally and internationally significant structures, which in turn provides county councils with a guide as to what structures to list within the Record of Protected Structures. The NIAH have also carried out a nationwide desk based survey of historic gardens, including demesnes that surround large houses.

Aerial Photographic Coverage

This is an important source of information regarding the precise location of sites and their extent. It also provides information on the terrain and its likely potential for archaeology. Ordnance Survey aerial photographs (1995, 2000, and 2005), Google Earth coverage (2003–2018) and Bing Maps were examined for this assessment.

Excavations Bulletin

This is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is also available online from 1970–2018. Information from this resource is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files.

Appendix 11.6 ICOMOS Guide for assessing magnitude of impact

Grading	Historic Landscape
Major	Change to most or all key historic landscape elements, parcels or components; extreme visual effects; gross change of noise or change to sound quality; fundamental changes to use or access; resulting in total change to historic landscape character unit and loss of Outstanding Universal Value (OUV).
Moderate	Change to many key historic landscape elements, parcels or components; visual change to many key aspects of the historic landscape; noticeable differences in noise or sound quality; considerable changes to use or access; resulting in moderate changes to historic landscape character.
Minor	Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; limited changes to noise levels or sound quality; slight changes to use or access; resulting in limited change to historic landscape character.
Negligible	Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes in noise levels or sound quality; very slight changes to use or access; resulting in a very small change to historic landscape character.
No change	No change to elements, parcels or components; no visual or audible changes; no changes in amenity or community factors.

Appendix 12.1 Photomontage Method Statement

Chris Shackleton Consulting **Rev: Feb 2018**

Photomontage Method Statement

- Photographs shall be taken on site at locations specified by the Client / Design Team. Images are taken using a high-resolution professional digital camera. This camera will be full frame format (which corresponds to a traditional 35mm film format) as recommended by best practice guidelines.
- Images will be taken in RAW format which provides the maximum flexibility in adjustment along with the best quality available. All images will include embedded camera/photo exif data.
- Typically the lens used shall be a prime (fixed) 50mm or normal lens. The 50mm lens provides a similar perspective to the human eye and will provide an image which can be clearly understood. While the field of view may be narrow the image is no less valid. For wider landscapes additional images may be stitched to the left and right to provide context.
- All site measurement shall be completed using survey grade equipment. Most typically this is GPS, however, for internal or narrow street based montages total-station may represent a better option. We survey the following information:
  - The camera position, plan and height
  - The photographs will be orientated using measured points of detail, which are visible on the photograph. On streetscape scenes points of detail (corners of buildings, poles, white lines, structures, etc) may be surveyed to provide an accurate base for information. In more rural settings it may be necessary to supplement visible detail with a series of small marker cones or standard red/white ranging rods into the camera's field of view while taking the photograph.
- Regardless of the type of control the layout configuration of the control will be non-collinear with a good photogrammetric geometry. This ensures that computational solution to the analysis to establish the correct orientation is convergent.
- A virtual camera and lens is created to match the physical one used to capture the image. Using in-built software algorithms the virtual camera is adjusted so the points of detail on the photograph and the surveyed points in real-life coalesce in the camera viewport. The position of the camera which was surveyed is locked and the lens is also fixed and known so only the orientation needs to be solved for. Once complete the virtual camera will be orientated so that it is identical to the physical camera that took the base photograph.

- A daylight system is then introduced into the scene at the correct geo-referenced spatial coordinates. Once the time/date and time zone is set the digital sky will match the position of the sun and shadows created by the same in the base photograph.
- The proposed development, earthworks and any associated landscaping is modeled up in 3D from the drawings provided by the Client / Design Team.
- The Landscape design is also modeled and the planting is adjusted to match the desired growth maturity period selected for the imagery. Foliage is set to match that of the base photography.
- True life digital materials are designed and assigned to the 3D model elements for the structure using reference imagery provided by the client. Sophisticated real world rendering shaders are used in conjunction with the daylight system to produce final renders which will react in a verifiable manner to match the reference photographic base images.
- Finally, the new development image and the existing original photograph are merged with due care for any demolitions/removals, foreground / background existing objects, landscaping, lighting, shadows, etc. to produce a single believable and verifiable composite image.

Images are provided with detailed information regarding their location and orientation. Instructions on the use of the same is also provided on each image.

- Typically photomontages are provided in A3 digital PDF book format.
  - Prefixed with a Title Sheet, Contents Page and Location Map
  - A technical explanation of the process and methodology is sometimes added to the package.
  - For each image location the following will be typically provided:
    - Existing – The original photograph
    - Proposed with matured landscaping
    - Sometime phased landscaping or development also be required.
  - Images may be provided with or without redlining and/or panoramic images
- All work shall be performed in accordance with best current practice and guidelines.