# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

# VOLUME III TECHNICAL APPENDICES

**PROPOSED RESIDENTIAL DEVELOPMENT**

**AT**

**BELMOUNT, ACADEMY STREET, NAVAN CO. MEATH**

**On behalf of Coindale Ltd**

**Prepared by**

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## Appendix 13.1: Archaeological Survey of Ireland site descriptions

| | |
|---|---|
| ***Monument No.*** | ME025-030---- |
| ***Townland*** | Dillonstown |
| ***Classification*** | Souterrain |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | Wilde (1850, 134-5) records discovery of souterrain when making railway cutting. It was T-shaped, ending in beehive chambers. |

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|---|---|
| ***Monument No.*** | ME025-031---- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Church |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | Situated on level ground with the top of a SW-facing slope overlooking a SSE-NNW section of the River Boyne c. 100m to the SW, and with the river c. 50m further to the SW. A church at Athlumpny is listed in the ecclesiastical taxation (1302-06) of Pope Nicholas IV (Cal. doc. Ire, 6, 355). According to Ussher's Visitation (1622) the church and chancel were ruinous (Elrington 1864, 1, lxxvii), and according to Dopping's Visitation (1682-5) the church was out of repair since 1641 and the graveyard was not fenced (Ellison 1972, 6). The parish church of Athlumney is within a D-shaped graveyard (ma13. dims c. 63m NW-SE; c. 50m NE-SW) that is curtailed by a WNW-ESE road on the N side. This is an undivided nave and chancel (int. dims 20.9m E-W; 5.75m N-S) structure, but most of the S wall is removed and the other walls are featureless. A rectangular tower (ext. dims 8m N-S; 3.2m E-W) with double-splayed lights in the S, W and N walls is attached to the W end of the nave and entered from the nave by a lintelled doorway. Its floors were wooden and it survives partly to the first floor, with an ivy covered double belfry on its W wall. Another structure, reduced to the foundations (ext. dims 4.3m E-W; 2.8m N-S) is attached to the E end of the N wall.<br>Around 1749 Issac Butler recorded the Latin inscription on the graveslab of William Gough and his mother Ann Cheevers, dated 1692 (1892, 24). It is also described by FitzGerald (1909-10). A rectangular limestone graveslab (dims 2.05m x 1.09m; T 0.12m) in the nave has a raised heater-shaped shield at the centre that is divided by a line of chevrons. At least one goat taken from the Cheevers crest can be distinguished below the chevrons and the items above it could be boars' heads from the Gough crest. There is a skull and cross-bones at the foot, but no inscription is discernible. Cogan (1862-70, 2, 238-9) describes a broken font as 'octagonal and unornamented, and measured in diameter about one foot eight inches (c. 0.45m). The pedestal (base) is a circular stone two feet one inch in diameter (c. 0.64m), the aperture of which measures in diameter eight inches (c. 0.2m).' This is no longer present. Athlumney motte (ME025-033---) is c. 90m to the S and Athlumney tower house (ME024-32001-) is c. 85m to the E. Navan town is across the river c. 500m to the NW. |

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|---|---|
| ***Monument No.*** | ME025-031001- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Grave slab |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | The graveslab is in the nave of the church (ME025-031----) |

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|---|---|
| ***Monument No.*** | ME025-031002- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Grave slab |
| ***Source of Description*** | www.archaeology.ie |
| ***Description*** | Around 1749 Issac Butler recorded the Latin inscription on the graveslab dated 1692 of William Gough and his mother, Ann Cheevers, at Athlumney church, (Butler 1892, 24). It read: Hoc Monumentum est erectum inveri/ Bon AE Vite Boni Gulielmi Gough Memo/ riam./ Et Ejus Sponsae Matronae |

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|---|---|
| | spectassimae/ Anno CHEevers quare hic tumulatur et/ Utr /usque Posteris Anno Domini/ 1692/ Tatu – Disce quis hac lapidum Submole Viator/ Conditur et Coelum Scandere posce Deum.<br>A rectangular limestone graveslab (dims 2.05m x 1.09m; T 0.12m) in the nave has a raised heater-shaped shield at the centre that is divided by a line of chevrons. At least one goat taken from the Cheevers crest can be distinguished below the chevrons and the items above it could be boars' heads from the Gough crest. There is a skull and cross-bones at the foot, but no inscription is discernible. It is also described by FitzGerald (1909-10) who does not provide the inscription, which is now illegible. |

| | |
|---|---|
| ***Monument No.*** | ME025-031003- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Font |
| ***Source of Description*** | www.archaeology.ie |
| ***Description*** | In Athlumney church (ME025-031----). Cogan (1862-70, 2, 238-9) describes a broken font as 'octagonal and unornamented, and measured in diameter about one foot eight inches (c. 0.45m). The pedestal (base) is a circular stone two feet one inch in diameter (c. 0.64m), the aperture of which measures in diameter eight inches (c. 0.2m).' This is no longer present and its original position is not known. |

| | |
|---|---|
| ***Monument No.*** | ME025-032001- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Castle - tower house |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | This is a National Monument consisting of a tower house with a sixteenth or seventeenth century stone house (ME025-032002-) off-set to the NW and SW. There is a small wing between them that may have served as kitchens and servants quarters for the later house. The buildings are situated on a level landscape now within Navan town, with a SE-NW section of the River Boyne c. 200m to the SW. According to the Civil Survey (1654-6) Lawrence Dowdall owned 200 acres at Athlumney in 1640, and the property included 'A castle and a large stone howse, a water mill and a tuck mill, two fishing weares, and a church and two open quarries' (Simington 1940, 62). He also owned almost 180 acres at Allistonread (Alexander Reid) and 40 at Bellis (Bailis) in Athlumney parish (ibid. 62-4). Traditionally, the last occupant was Sir Launcelot Dowdall, who burnt it in despair when he heard the outcome of the Battle of the Boyne in 1690 (Wilde 1850, 11-12), although Isaac Butler writing in the 1740s, attributed the burning to one of the Maguire family in order to prevent Cromwell from utilising it (1892, 24). The parish church of Athlumney (ME025-031----) is c. 80m to the W and the motte (ME025-033----) is c. 140m to the SW.<br><br>The tower-house (ext. dims 10.2m NE-SW; 7.2m NW-SE) has three storeys and an attic with projecting rectangular corner towers. A plain round-headed doorway, now blocked, in the N tower leads directly to a newel stairs that has a cross-loop as a light and rises to a mezzanine level, which has chambers in the NE and NW walls. These are at the level of the NE-SW barrel-vault over the main chamber at the ground floor, but there is no access to the barrel-vault and no evidence that the vault had a loft floor. The original access to the ground floor chamber is by a passage through the W tower that communicates now with a passage in the later house, although a modern doorway in the SW wall leads directly to the ground floor chamber from outside.<br>The newel stairs in the N tower leads through a round-headed doorway to the first floor over the vault that has enlarged windows in each wall except the NW which has none, and a fireplace in the SE wall. The chambers in the W and E towers have lintelled doorways and barrel-vaults, and there is a garderobe in the S chamber. A mural passage in the SW wall leads down to a chamber in the W tower that commands a murder-hole over the entrance to the ground floor chamber. The newel stairs in the N tower leads through a lintelled doorway to the second floor that that was supported on corbels in the SW and NE walls, and has a window in each wall except the SW which has none. The windows in the NE and NW walls have seats, but there is no fireplace. Lintelled doorways lead to the |

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| | chambers in the E, S and W towers, that in the S being a garderobe, and a light in the W tower has an ogee-head. The newel stairs in the N tower continues to the wall-walk but the parapet does not survive. There were look-outs over the stairs housing and over the W and E towers, accessed by external stairs, but gables on the NE and SW walls are secondary as they are built over the wall-walks, as might be the case with a fireplace built against the NE face of the W tower. |

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|---|---|
| ***Monument No.*** | ME025-032002- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | House - 16th/17th century |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | This is a National Monument consisting of a tower house (ME025-032001-) with a sixteenth or seventeenth century house off-set to the NW and SW. There is a small wing between them that may have served as kitchens and servants quarters for the later house. The buildings are situated on a level landscape now within Navan town, with a SE-NW section of the River Boyne c. 200m to the SW. According to the Civil Survey (1654-6) Lawrence Dowdall owned 200 acres at Athlumney in 1640, and the property included 'A castle and a large stone howse, a water mill and a tuck mill, two fishing weares, and a church and two open quarries' (Simington 1940, 62). He also owned almost 180 acres at Allistonread (Alexander Reid) and 40 at Bellis (Bailis) in Athlumney parish (ibid. 62-4). Traditionally, the last occupant was Sir Launcelot Dowdall, who burnt it in despair when he heard the outcome of the Battle of the Boyne in 1690 (Wilde 1850, 11-12), although Isaac Butler writing c. 1740, attributed the burning to one of the Maguire family in order to prevent Cromwell from utilising it (1892, 24). The parish church of Athlumney (ME025-031----) is c. 60m to the W.<br>This is a four bay three storey structure (int. dims c. 23m NE-SW; 6.45m NE-SW) with a stairs return at the S end of the NW wall, which is lit by small rectangular windows with square hood-mouldings. A flat-arched doorway with a round-headed niche above it is in the middle of the SE wall, with two large plain and consolidated window openings on each side. The ground floor is divided by a cross-wall with one pointed doorway through it placed just S of the main entrance. The N chamber (int. dims 13.5m NE-SW; 6.45m NE-SW) may well include an entrance passage from the main doorway. It has a large fireplace that projects on the outside of the wall and two blocked windows on the NW wall, and a passage (int. dims 6.45m NW-SE; 3.15m NE-SW) N of this chamber leads to the ground floor of the tower house and may have housed another stairs. The S chamber also has an externally-projecting fireplace and two blocked windows on the NW wall but it also has a large fireplace with an oven on either side on the SW wall as well as access to the stairs return. The long walls are rebated to support the first floor but the joists appear to have been inserted into the NW and SW walls.<br>At the first floor the SE wall has four large mullion and transom windows, each with six panels (3 over 3) and a square hood-moulding. The NW wall has four destroyed and consolidated windows and two fireplaces, while the SW wall has a magnificent mullion and transom oriel window of eight panels (4 over 4) with a fireplace beside it. The long walls are recessed for the second floor but the joists are set directly into the NE and SW walls. The second floor repeats the lay-out of the first except that the oriel window does not survive, and the large windows in the SE wall are partly within dormer gables that rise over them. In the narrow NE 'passage' there was an oriel window in the NE wall at this level but only the supporting machicolation survives.<br>Abutting the house to the NE and between it and the tower house was a structure (int. dims 15.8m NE-SW; 4.9m NW-SE) of which only the NW and NE walls survive at the ground floor. There is a blocked doorway and three windows in the NW wall, an oven at the N angle and there may have been a fireplace in the NE wall. It had at least two storeys and may have served as a kitchen and servants quarters for the stone house. |

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|---|---|
| ***Monument No.*** | ME025-033---- |
| ***Townland*** | ATHLUMNEY |

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|---|---|
| ***Classification*** | Castle - motte |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | Located at the edge of a plateau overlookng a SE-NW section of the River Boyne c. 50m to the SW and c. 10m lower. Truncated and grass-covered cone of earth (diam. of top 12m; diam. of base 32m; H 4.7m at NW to 5.3m at SE) defined by slight traces of a fosse. The top has been quarried and evidence of a possible bailey was recorded in a trench cut in a 1976 excavation (Kelly 1982-3, 76-80). The parish church of Athlumney (ME025-031----) is c. 90m to the N and Athlumney tower house (ME025-032001-) is c. 140m to the NE. |

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|---|---|
| ***Monument No.*** | ME025-035---- |
| ***Townland*** | BALREASK OLD |
| ***Classification*** | Souterrain |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | Two lengths of passage (L 14m) apparently ending in undifferentiated chamber (RMAHS 1962, 31-40). |

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|---|---|
| ***Monument No.*** | ME025-036---- |
| ***Townland*** | BALREASK OLD |
| ***Classification*** | Church |
| ***Source of Description*** | Archaeological Inventory of County Meath |
| ***Description*** | Situated at the E edge of a plateau overlooking a SSE NNW section of the River Boyne, which is c. 150m to the NE. According to the ecclesiastical taxation (1302-06) of Pope Nicholas IV a chapel at De Baliresk was attached to the church of Navan (Cal. doc. Ire, 5, 256). A house with 2.75 acres called Chapell lands were amongst the possessions of St. Mary's abbey in Navan (ME025 044020 ) at the Suppression in 1540 (White 1943, 252). A church or church land adjacent to the River Boyne at Ballreask is depicted on the Down Survey (1656 8) barony map of Navan, and Dopping's Visitation (1682 5) refers to a church here (Ellison 1972, 11). It is marked as a small feature described as the site of an old chapel on the 1836 ed. of the OS 6-inch map where it is situated towards the N angle of a lightly outlined area (dims c. 40m NE-SW; c. 40m NW-SE) described as a 'Burying Ground' on the same map. The graveyard is depicted as a rectangular hachured feature (dims c. 40m NE-SW; c. 35m NW-SE) on the OS 25-inch map. There are no visible remains of a monument in an area now largely buried under a yard. |

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|---|---|
| ***Monument No.*** | ME025-036001- |
| ***Townland*** | BALREASK OLD |
| ***Classification*** | Graveyard |
| ***Source of Description*** | See above entry for ME025-036---- |
| ***Description*** | See above entry for ME025-036---- |

| | |
|---|---|
| ***Monument No.*** | ME025-049001- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Souterrain |
| ***Source of Description*** | No published inventory description |
| ***Description*** | - |

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|---|---|
| ***Monument No.*** | ME025-049002- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Souterrain |
| ***Source of Description*** | No published inventory description |
| ***Description*** | - |

| | |
|---|---|
| ***Monument No.*** | ME025-049003- |
| ***Townland*** | ATHLUMNEY |
| ***Classification*** | Souterrain |
| ***Source of Description*** | No published inventory description |
| ***Description*** | - |

| | |
|---|---|
| ***Monument No.*** | ME025-049004- |
| ***Townland*** | ATHLUMNEY |

| | |
|---|---|
| ***Classification*** | Souterrain |
| ***Source of Description*** | No published inventory description |
| ***Description*** | - |

**Appendix 13.2: Excavation Database entries**

| Site Name | Licence | Summary |
|---|---|---|
| River Boyne, LIMEKILNHILL | 02D091; 02R151 | The underwater visual assessment and metal-detector survey of the riverbed sediments of the River Boyne, Navan, Co. Meath, in advance of the bridge construction development of the R161-R153, did not reveal any archaeological features or artefacts. Numerous metal-detector hits were recorded, with all identified hits being modern debris. The riverbed was composed of bedrock on the upstream (south-east) and sand and river gravels downstream (north-west). |
| ATHLUMNEY/ LIMEKILNHILL/ BALREASK OLD | 03E0613 | Monitoring of all topsoil clearance associated with the construction of the R161-R153 link road, Navan, Co. Meath, took place over a four-day period in June/July 2004. The proposed road passes through the townlands of Athlumney, Limekilnhill and Balreask Old to its crossing point on the River Boyne. A portion of this road had previously been built during the construction of the IDA industrial estate and neighbouring housing developments. As a result, the portion of the road monitored under the current licence measured just 615m in length, the western 85m of which relates to the construction of a bridge over the River Boyne. The location points of the pier beds and bridge abutments were tested by Graham Hull in 2003 (Excavations 2003, No. 1356, 03E0613) and were found to be archaeologically sterile.<br><br>In total the area of road-take subject to monitoring measured 530m east-west by 17m. The site compound, measuring 100m east-west by 20m, was also monitored. A track machine utilising a flat grading bucket removed the topsoil to an average depth of 0.4m. The underlying subsoil was predominantly composed of a yellow/brown silt clay with occasional pockets of sand. Larger deposits of sand occurred at Chainages 1470-1510 and 1560-1580, supporting the presence of sand quarried in the area. The topsoil on the east wall of the River Boyne valley survived to an average depth of just 0.1m; in this area the underlying subsoil was a leached yellow/blue clay. No artefacts or stratigraphy of an archaeological nature were identified during the course of monitoring ground disturbance works. |
| Beaufort College,<br><br>LIMEKILNHILL | 15E0065 | An impact assessment and test trenching took place at the site of a proposed new extension to Beaufort College located within the townland of Limekilnhill, Navan, County Meath at a pre-planning stage.<br><br>The landscape around Navan and the townlands located alongside the River Boyne in particular have proven to be rich in archaeological features and deposits.<br><br>One of the major landowners in the medieval period within County Meath were the monastic houses. Cartographical and historical sources indicate that the Abbey of St Mary at Navan, established between 1174-84, held large areas of land within the county. Today townland names such as Abbeyland and Abbeyland South serve as indicators of the abbey's land holdings.<br><br>Beaufort College is located within the townland of Limekilnhill. However the Down Survey map of 1656 depicts the site of the college being located upon lands associated with the Abbey. This |

| Site Name | Licence | Summary |
|---|---|---|
| | | association appears to continue until the twentieth century with the site clearly marked as 'Abbeyland' on the first edition (1836) OS map and on the 1910 twenty five inch edition where the map still clearly depicts a large sub-circular field boundary labeled "Abbey Lands". This same sub-circular field boundary is also depicted on the Down Survey map of 1656, suggesting that this field boundary was present within the landscape before 1656.<br><br>This sub-circular field boundary was truncated by the development of the Dublin to Navan railway line in the late 1800s. The site is now occupied by a greyhound racing track developed in the 1950s and Beaufort College which was developed during the 1980s directly upon the line of this sub-circular field boundary.<br><br>On 2 March 2015 a single test trench was excavated across the line of the sub-circular field boundary. The excavation concluded that the boundary was not of an archaeological nature and was merely an agricultural field boundary comprised of a hedgerow and very shallow ditch less than 0.15m in depth that contained sherds of modern pottery and modern domestic waste material. The trench also indicated that during the construction of the college and its associated ground works, the site underwent major landscaping and ground reduction within the area of the current car park and the feature is too shallow to have survived in this area.<br><br>Due to the reduced ground level of the car park within the location of the proposed extension and the fact that the field boundary was found to be of no archaeological significance, no further archaeological investigation is considered necessary. |
| 'Athlumney Castle', ATHLUMNEY | 94E0114 | A housing development is planned for the field encircling Athlumney Castle, a tower house with attached late 16th-century stone house. Test trenching revealed no earthworks associated with the castle. |
| ATHLUMNEY HOUSE, KILCARN, | 97E0322 | Archaeological test-trenching took place at Athlumney House, Kilcarn, Navan, Co. Meath, between 15 and 17 September 1997. The site is in a field above the flood-plain of the River Boyne. Two souterrains were identified exposed within the quarry during an inspection as part of an Environmental Impact Statement (August 1995). The features were recorded and reported to the Sites and Monuments Record. A souterrain had been recorded near Athlumney House by Sir William Wilde in 1895.<br><br>The assessment was undertaken to identify whether there were any indications of Early Christian activity associated with the souterrains.<br><br>Eleven test-trenches were mechanically excavated within the area of maximum disturbance of the proposed development. The trenches ranged from 20m to 50m in length and were opened to a depth of 1.3m, sufficient to reveal natural sand and gravel. Trenches 1 and 2 were located along the line of the eastern perimeter of the field on low ground and had a similar stratigraphy. Trench 1 was located at the north-east quadrant of the field and produced four sherds of medieval pottery found within a grey silt |

| Site Name | Licence | Summary |
|---|---|---|
| | | layer containing occasional flecks of charcoal, at a depth of between 0.4m and 0.55m below the present ground surface.<br><br>Trench 3 was located parallel with the southern field boundary. It contained a compact brown clay (depth 0.35–0.75m) overlying a grey/brown layer of sand with a high stone content (depth 0.75–0.95m), which in turn overlay a compact gravel (depth 0.95–1.20m). No features of archaeological significance were encountered.<br><br>Trenches 4–7 and 10 all contained a similar stratigraphy. They were located on the hillock in the central portion of the field. They failed to produce any structural evidence or artefactual indicators for medieval activity on the site.<br><br>Trenches 8 and 9 were located at a distance of c. 50m away from, but along the line of, the quarry at the north-western quadrant of the field. Both revealed a compact stony clay (depth 0.5–0.7m) which overlay a laminated layer of coarse sand (depth 0.7–1.2m). There were no indications of a souterrain in either of these trenches.<br><br>Trench 11 comprised a fine sandy clay (depth 0.4–0.6m) overlying fine-grained sand and silt with gravel intrusions (depth 0.6–0.95m). No features of archaeological significance were encountered.<br><br>There are no archaeological features associated with the souterrains within the area covered by the test-trenches. The only indication of any medieval activity on the site were the body sherds of pottery which occurred within Trench 1, at the north-eastern quadrant of the field. No further excavation was deemed necessary, but licensed monitoring was recommended should any further ground disturbance occur at the north-east of the site. |
| ATHLUMNEY | 97E0107 | Monitoring of topsoil clearance took place at the site of a proposed IDA Business Park from 7 April to 29 May 1997. No evidence of archaeological activity was found during the earth clearance, but several flint artefacts were found in the vicinity of a nearby disused quarry which was used for infill. The flint was found while field-walking the ploughed field immediately adjacent to the quarry. One blade, one scraper and three other struck flints were found. |
| ATHLUMNEY | 97E0322 ext. | This site was located on a greenfield area upslope and to the east of the River Boyne. It lay at 45m OD. A series of archaeological features were identified during monitoring of topsoil-stripping along the route of a local access road joining the IDA business park to the Athlumney Road. It was subsequently agreed that an area measuring 84m by 18m should be excavated in advance of road construction.<br><br>Three main periods of activity were identified on site. Period 1 was dated to the Final Neolithic/Early Bronze Age. Period 2 was probably Bronze Age, although a precise date was not determined. The third period of occupation was early medieval.<br><br>Period 1 was characterised by three cooking pits, a deposit of fire debris and a large pit/ditch. The cooking pits were scattered across the site and ranged from 0.6m by 0.38m to 1.05m by 0.86m. They |

| Site Name | Licence | Summary |
|---|---|---|
| | | all had charcoal-rich fills which contained fire-heated stone. A date of 2851–2463 cal bc was obtained on charcoal from one of the pits. A large pit or ditch was partially exposed at the western edge of excavation. The exposed portion measured 2m long, 1.84m wide and 0.38m deep. It had a U-shaped profile and was filled with silty clay.<br><br>The second period of occupation was characterised by a large subrectangular ditched enclosure which was partially exposed within the area of excavation. The remains of Structure 3 were uncovered within the enclosure and a circular enclosure joined the northern end of the subrectangular enclosure.<br><br>The eastern side of the subrectangular enclosure was represented by a substantial L-shaped ditch, F23, and a linear ditch, F63, which enclosed an area of at least 27.5m by 15m. The ditch F23 measured 2.1m wide and 0.64m deep. Five different fills were identified within it.<br><br>Structure 3 was defined by three closely set slot-trenches within the north-eastern part of the subrectangular enclosure. These foundation trenches represent the northern (2.2m) and western wall (9m) of a windbreak or some similar type of open-ended structure.<br><br>The remains of the circular enclosure were represented by a curvilinear ditch, F59, which was immediately north of the subrectangular enclosure. The northern end of the curvilinear ditch had been truncated by modern disturbance but the remaining section was 15m long, 1.5m wide and 0.54m deep.<br><br>There was evidence for two phases of activity during Period 3. Phase 1 was represented by Structure 2 and two linear ditches (probable plot boundaries) to the south of the building. The ditches were cut through the ditch (F23) of the Period 2 subrectangular enclosure. During Phase 2, Structure 2 was truncated by a linear ditch which may mark a revised plot boundary and Structure 1 was built. There was also an unused figure-of-eight-shaped kiln on the south of the site. Structure 1 has been dated by radiocarbon analysis to the early medieval period (cal ad 551–643) and it is likely that the other Period 3 features date to in and around the same time.<br><br>Structure 2 was defined by a curvilinear slot-trench which represents its eastern wall. The curvature of the slot-trench indicates that Structure 2 had a diameter of 5m. An entranceway at the south of the structure is suggested by a 2.2m-wide gap between the terminal of the slot-trench and the western limit of excavation and it is likely that further remains of Structure 2 lie beyond that edge of the excavation area. There was no evidence for a hearth or for any form of floor surface within Structure 2.<br><br>The two linear ditches (F17 and F25) were set 8.5m apart and were almost parallel to each other. Both of the ditches were orientated north-east/south-west and extended beyond the limits of excavation. The northern ditch was 0.95m wide and 0.4m deep and the southern ditch was 0.64m wide and 0.38m deep. |

| Site Name | Licence | Summary |
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| | | The revised plot boundary, F45, was 4.8m to the north of the boundary ditch F17 and was similar in size.<br><br>The foundation remains of Structure 1 were located 6m to the south of the boundary ditch F45. The structure was characterised by three adjoining slot-trenches, F15, F31 and F29, and its remains extended beyond the western limit of excavation. It was similar in size to Structure 2 (6m diameter) and there was a porched entrance (2.5m long) at the east. The entrance feature was represented by the linear slot-trench F31 at the east of the structure.<br><br>There was a figure-of-eight-shaped pit on the south of the site. It was 2.44m long, between 0.35m and 0.98m wide and up to 0.2m deep. If this was a kiln there was no indication that it had ever been fired.<br><br>Finds from the excavation included several worked flints and a piece of a stone spindle-whorl. |
| ATHLUMNEY, | - | Monitoring was carried out during excavation for a Telecom Éireann service trench along the public road between Athlumney graveyard and Athlumney Castle, using a very narrow bucket and to a depth of 1m. At all times the machine excavated through fill. At the eastern end, closest to the convent, the fill comprised crushed stone, but going westwards it comprised mixed layers of sand, gravel and clay. At the western end of the trench the level of the road rose substantially above the level of the fields on either side in order to bring it over the railway bridge. The layers of fill had presumably been laid down when the railway bridge and the road approaches on either side were being constructed. |
| ATHLUMNEY | 99E0479 | Monitoring of topsoil clearance took place on the site of a new factory (Stage 1). The site lay 350m south-west of a souterrain complex recently excavated by Carleton Jones. The natural prominence of the site under discussion raised the possibility of an associated (?) settlement. The only features encountered during the stripping operation were associated with old field boundaries and land drains. No features or finds of an archaeological nature were uncovered. |
| IDA Business Park, KILKARN, ATHLUMNEY, | 98E0596 | The site is set on the high east bank of the River Boyne and consists of four souterrains, an overlying occupation layer and several large ditches. A disused sand quarry had removed the north-western portion of the site. Excavations were carried out between 12 January and 15 March 1999.<br><br>Souterrain 1 consisted of two portions truncated by the quarry, a short section of passage and a small portion of a circular chamber. The preserved portion of passage was very short, only 2.1m from the quarry edge to the end of the passage. The passage was 0.94m wide, ended abruptly and did not widen or constrict at its end. The abrupt south-east end of the passage may be a 'drop' entrance.<br><br>Souterrain 2 was almost completely intact. It had a ramped entrance, two right-angled left-hand turns in a gradually descending |

| Site Name | Licence | Summary |
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| | | passage, a drop-creep, another short section of passage and then a T-junction with a passage that terminated at each end in a beehive-shaped chamber. The entrance to the souterrain was deliberately blocked with a fill of midden material and stones.<br><br>Only the very top stones of Souterrain 3 were exposed. It was planned and photographed and then covered again for preservation. The portion exposed was a 6.5m length of straight passage.<br><br>A possible fourth souterrain was encountered in a machine trench and subsequently reburied for preservation. The feature as exposed in the trench was a drystone wall, three courses high. It appeared to be the outside of a souterrain passage wall.<br><br>Where the site had not been disturbed by the quarry there was an occupation soil directly below the topsoil. Two hearths and a shallow ditch segment were associated with the occupation layer.<br><br>Several large ditches were also discovered. All of these ditches contained charcoal and/or domestic animal bones. The ditches do not form an integrated pattern that would suggest a single-phase enclosure. The ditches appear to be the result of several different phases of use of the site but may all be assumed to be roughly contemporary with the souterrains, as there was no evidence of significant activity on the site at other times.<br><br>Ditch A was 1.98m deep and 7.2m wide. Ditch B was 1.38m deep and 5m wide. Ditch C was very irregular in the section revealed, and this section may represent two ditches cut into each other. It was 1.5m deep at its deepest and 8.2m wide. Ditch D was 1.6m deep and 3.8m wide. Ditch E was 0.7m deep and 5.1m wide. Ditch F was at least 0.5m deep and 1.2m wide.<br><br>Finds were very scarce on the site. They are awaiting analysis, but a preliminary list includes two bone pins, a glass bead, fragments of lignite bracelets, a bone bead, a few lithic flakes and some metal finds. Carbonised remains of both domestic and wild plants were recovered. The domestic plants were oats, barley, rye and wheat. |
| ATHLUMNEY, NAVAN | 00E0902 | The development involves topsoil removal and excavation to extend an access road, both north and south, in an area approximately 400m2, for industrial or business units. This report represents Stage 2 of the development of this complex, comprising earth-moving for a northern extension to the access road from the east, terminating in a roundabout for turning vehicles and a southern extension, passing Athlumney House.<br><br>The site lies some 350m south-east of a souterrain complex excavated by Carleton Jones (Excavations 1999, 240–1, 98E0596), where the remains of at least three stone-built souterrains were revealed.<br><br>Monitoring of groundworks for this stage of development did not reveal any features or finds of archaeological significance. |

| Site Name | Licence | Summary |
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| ATHLUMNEY, NAVAN | 02E1178 | Testing was carried out on a proposed development site in Athlumney, Co. Meath. The site was c. 100m south and south-west of three monuments: an Anglo-Norman motte (SMR 25:33), a tower-house and fortified house (SMR 25:32) and a medieval church and graveyard (SMR 25:31). Eight trenches, c. 30m long, were excavated on the site. No archaeological indicators were identified in the excavation. |
| ATHLUMNEY and LIMEKILNHIL | 03E0613 | Test-trenches were excavated on both banks of the River Boyne in advance of construction of a new road bridge. The bridge is 2km east of Navan town and links the R161 to the R153. Modern made ground and alluvial silts were noted, but archaeological deposits or artefacts were not identified. |
| ATHLUMNEY | 05E0353 | An assessment and test excavation was carried out at site of the proposed 'Pump Station (PS) 8' on the proposed Kilcarn to Johnstown sewerage scheme development, Navan, Co. Meath. The development will consist of new sewer pipes running on roads and through greenfield beside the River Boyne, as well as three new pump stations (PS 8, 9 and 10). PS 8 will consist of a building measuring 13.5m by 21.98m and a 50m-long gravity main to the Boyne River. The site of the pump station is immediately east of the River Boyne in a low-lying wet and boggy field within the river's flood-plain.<br><br>Three test-trenches were excavated on 20 April 2005 to assess the archaeological impact of the pump station. The subsoil consists of river-deposited silts and sands; the overlying soil consists primarily of peaty soils covered by a grass sod. Nothing of archaeological significance was found. Trenching revealed features associated with modern land drainage, land improvement and modern dumped deposits likely to be associated with dredging in the River Boyne; all the features appear to be modern. |
| KILCARN | 05E0960 | It is proposed to construct a hotel on the south side of a large field that is bounded by the N3 on the south, the Johnstown/Athlumney link road along the west and by farmland on the north and east sides, at Kilcarn, Navan. The field is located on a rise overlooking the River Boyne. Old Kilcarn bridge (SMR 25:39) is located to the west of the site. Eleven trenches were excavated to test the site, ranging in length between 20 and 130m. They revealed evidence for dumping of modern material in locations all over the field, to a maximum depth of 1.2m. No archaeological material was exposed and no artefacts were recovered. |
| ATHLUMNEY | 05E1227 | An assessment, including testing, was carried out in advance of construction of a PE Hall at St Michael's Loreto School, Athlumney, Navan. Four trenches were excavated, two in the area where the access roadway and roundabout are planned and two on the site for the hall. The trenches revealed no archaeological material. |

| Site Name | Licence | Summary |
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| | | Monitoring of the groundworks for the development was carried out under an extension to the licence. The monitor disclosed no archaeological material. |
| Boyne View, ATHLUMNEY, | 05E0137 | Eight trenches were mechanically excavated on the site on 21 and 22 February 2005 and nothing of archaeological interest was uncovered. |
| ATHLUMNEY | 05E1227 ext. | Monitoring was conducted during groundworks for the construction of a sports hall at St Michael's Loreto School, Athlumney, Navan. The site had been the subject of an assessment under the same licence (Excavations 2005, No. 1221). No material of an archaeological nature was disclosed during test-trenching, but monitoring was recommended during the construction phase. This disclosed no material of an archaeological nature. |
| ATHLUMNEY | 07E0892 | The site is located in the north-west corner of the IDA Navan Business & Technology Park, Dublin Road, Navan, Co. Meath, and is being developed by Quinn Projects as a substantial call centre with associated carpark for the Quinn Direct insurance company.<br><br>The site incorporates an archaeological complex, ME025–049, which consists of three souterrains, a fourth possible souterrain and several large contemporary ditches which were excavated by Carleton Jones (on behalf of Margaret Gowen & Co. Ltd) in 1999 (Excavations 1999, No. 701, 98E0596). Excavation was also carried out by Melanie McQuade (Margaret Gowen & Co. Ltd) in 2006 under licence 97E0322 ext. in an area directly to the east of the current site. The results from this excavation yielded evidence for multi-period settlement which was characterised by a series of cooking pits, a large subrectangular ditched enclosure, the remains of three structures, a circular enclosure and several other pits and linear ditch features. Dating evidence indicates that there were four phases of occupation on the site dating to the Final Neolithic/Early Bronze Age, Bronze Age and early medieval periods (McQuade 2006).<br><br>In association with the current development testing was carried out by Eoin Sullivan (Margaret Gowen & Co. Ltd) under licence 97E0322 (reactivated) which identified a substantial amount of archaeology within the proposed area of development (Sullivan 2006).<br><br>The results of the testing programme initiated a mitigation strategy whereby the development was redesigned to facilitate preservation in situ of the underlying archaeology. This was accomplished by relocating the building away from its proposed location (the call centre was originally designed to be located at the south-western side of the site where the remains of the four souterrains are located) closer to the Athlumney road, to the north-west of the souterrain complex, in an area void of archaeological remains (a disused sand quarry). The proposed carpark was also redesigned; the finished level of the carpark was raised, creating a buffer zone |

| Site Name | Licence | Summary |
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| | | or protective layer between the carpark and the archaeology beneath.<br><br>The programme of preservation in situ was carried out from 10 October to 14 December 2007. Monitoring of the removal of topsoil uncovered an extensive multi-phased complex site which was recorded prior to the construction of the protective buffer zone.<br><br>In general the site can be dated to the Early Christian period but there is also evidence of residual prehistoric activity. The archaeological site presents as a multivallate enclosure with associated field systems, additional rectangular ditched enclosures and a souterrain comple13. The centre of the multivallate enclosure was later reused as an Early Christian graveyard.<br><br>The multivallate enclosure is located centrally within the development site. The most central enclosure (c. 30m in diameter by 3.3m wide by 1.75m deep) is situated on a plateau of high ground on the site. The inner area is characterised by a multitude of intercutting domestic and habitation activity which has been heavily truncated by the later reuse of the enclosure as an Early Christian graveyard. The burials in turn have been truncated by agricultural features which were present throughout the entire site. The secondary enclosure (50m in diameter by 3.4m wide by 1.25m deep) and tertiary enclosure (70m in diameter by 5.7m wide by 1.3m deep) are positioned around the inner enclosure in an elliptical fashion, with a number of radial link ditches connecting the inner ditches to the outer ditch. The area between the inner and secondary enclosure is characterised by domestic activity (pits, ditches, kilns and hearths). Domestic activity was also evident in the space between the second and third enclosures.<br><br>To the east of the enclosure, a series of intercutting rectangular ditched enclosures were identified, which provisionally tie in with the results of McQuade's 2006 excavation. To the south-west of the multivallate enclosure a plethora of intercutting domestic and habitation features were evident (pits, ditches, post-holes and slot-trenches) leading towards the souterrain comple13. The souterrain complex lay in an area heavily disturbed by quarrying activity which resulted in the truncation of features in proximity to the quarry edge.<br><br>The habitation features within the inner enclosure, between the enclosing ditches and the souterrain complex, indicate that the multivallate enclosure functioned primarily in a domestic capacity. The rectangular ditch enclosures to the east point to a series of earlier and later activity having taken place. The enclosure has also been reused as an Early Christian burial-ground with the remains of eighteen east–west inhumation burials identified within the inner enclosure/inner enclosing ditch. A number of individuals have been buried in stone-lined lintel graves within the inner enclosure itself, with seven individuals buried within the inner enclosure ditch.<br><br>On the basis of the recovery of the ring from a ringed pin (Fanning 1994), a bone comb, and a bone pin from within the inner enclosure area, it can be concluded that the site was active in the 9th/10th century ad (although both earlier and later activity was evident).<br><br>References |

| Site Name | Licence | Summary |
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| | | Fanning, T. 1994 Viking Age ringed pins from Dublin. Dublin.<br><br>Jones, C. 1999 Archaeological Excavations of Souterrains (SMR ref. MH025–049) and associated features at the IDA Business Park, Athlumney, Navan (Licence 98E0596). Unpublished report for Margaret Gowen & Co. Ltd.<br><br>Sullivan, E. 2006 Archaeological Test Excavation, Quinn Direct Call Centre, Athlumney Business Park, Navan, Co. Meath (Licence 97E0322 reactivated). Unpublished report for Margaret Gowen & Co. Ltd.<br>McQuade, M. 2006 Archaeological Monitoring and Excavation, Athlumney, Co. Meath. Unpublished report for Margaret Gowen & Co. Ltd. |
| ATHLUMNEY, | 08E0567 | Testing as part of an assessment was carried out in advance of construction of a medical centre. Five test-trenches were excavated to subsoil. No material of archaeological significance was disclosed by the trenches. |
| BALREASKOLD and ATHLUMNEY | 07E1117 | Testing was undertaken in advance of the proposed pipeline crossing of the Boyne River at Kilcarne, Navan. This pipeline will form part of Contract 2 (Kilcarne to Carn Hill Pipelines and Carn Hill and Proudstown Reservoirs) and will be constructed as part of the Navan mid-Meath water supply scheme. This programme of assessment was undertaken as a result of recommendations made within an archaeological assessment by Yvonne Whitty of Contract 2 of the Navan mid-Meath water supply scheme, which incorporated testing results at the site of the proposed Carn Hill reservoir (Excavations 2006, No. 1610, 06E0761). The location of the proposed river crossing at Kilcarne was identified during this assessment as an area of archaeological potential, due to the presence of the River Boyne.<br><br>Test-trenching took place on 19 and 20 February 2008, using a mechanical excavator equipped with a flat, toothless bucket. A total of sixteen trenches were excavated within the area of the proposed pipeline. Although a number of archaeological sites have been recorded along the banks of the River Boyne (ME025–039, ME025–036, ME025–049) in close vicinity to the proposed river crossing at Kilcarne (within the townlands of Balreask Old and Athlumney), no features of archaeological significance were discovered during this programme of testing. |
| ATHLUMNEY | 11E240 | A testing assessment was undertaken as part of a pre-planning application for a proposed residential development at Bailis and Alexander Reid, Athlumney, Co. Meath. Testing followed on from an initial desktop assessment undertaken by Courtney Deery Archaeological Consultancy. A geophysical survey of the site was also undertaken in June 2011 by J.M. Leigh Surveys (Licence Ref.: 11R049). The geophysical survey identified five areas of archaeological potential (Areas A–E). This survey identified a possible rectangular enclosure (Area D1) and possible |

| Site Name | Licence | Summary |
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| | | archaeological activity in the form of parallel linear ditches and pits in the northern half of the site (Areas A and B). Further potential activity was identified in the south-west corner of the site (Area E), possibly representing field boundaries or ditches.<br><br>Test-trenching comprised a total of seventeen trenches excavated at specific locations within the proposed development area to target the anomalies highlighted in the geophysical survey. Two sites of archaeological significance, Area A (a post-medieval farm plot) and Area D (an enclosure), were recorded during the testing programme. The geophysical anomalies in the remaining areas (Areas B, C and E) were proven to derive from modern features/disturbances (Areas B and C) and a townland boundary ditch (Area E).<br><br>Area A<br><br>Four test trenches (Trenches 1–4) excavated in Area A identified the remains of a small post-medieval plot, including the remains of at least one building. The remains of a small stone-built structure (Building A) were identified in Trench 3. This was identified by a large stone wall (C6), which was defined by two regular settings of faced stones (size c. 0.3m x 0.2m) with loose stone and soil matrix infill. The width of the wall was 0.8m and it was encountered at 0.4m below present ground level at 50.8m OD. This wall had a slight curve and was traced in an additional trench (Trench 3 ext.) that was excavated at a right angle to the eastern edge of Trench 3. The northern component of the wall (C7) was less well preserved than C6 and survived as a single alignment of large stones. These walls defined a possible structure c. 4m in diameter although it is possible that this only represents a small section of a larger building, the walls of which may have been robbed out. A single sherd of post-medieval brown-glazed pottery was recovered from the soil matrix of wall C7, giving a tentative 18th–19th-century date for this structure. These walls were not positively indicated by the geophysical survey.<br><br>Immediately south of Wall C6, a deep deposit (ma13. depth 0.5m) of soft dark brown/black clays (C8) was interpreted as garden soils associated with Building A. This deposit extended beyond the limits of the trench to the south but was not present in Trench 4, which was positioned 10m to the south. It is likely to be an isolated deposit, as indicated by the geophysical anomaly at the southern end of the trench. A linear ditch (C9) aligned west–east c. 3.5m to the north of Building A is likely to be a related field ditch.<br><br>A large deposit of rubble stones (C5, 50.5m OD) encountered in the southern half of Trench 2 (adjacent to Building A) may be the remains of another building (Building B), although this could not be determined by testing. This rubble appeared to overlie the projected line (as indicated by the geophysical survey) of two ditches (C3, 50.13m OD at base, and C4, 50.32m OD at base) identified in Trench 1. Post-medieval pottery, similar to that from Building A, and |

| Site Name | Licence | Summary |
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| | | clay pipe[a (i.e. one) clay pipe? Or clay pipe fragments?] were recovered from Ditch C3, indicating a possible 18th–19th-century date for the ditches and rubble deposit.<br><br>Area D<br><br>In Area D the geophysical survey identified a series of linear responses of clear archaeological strength indicative of an enclosure. The presence of this enclosure was confirmed by testing. A ditch (C11, 54.2m OD at base) was identified in Trenches 11, 12 and 13, corresponding to a broad geophysical anomaly in the survey. This was hand-excavated in Trench 11 and was found to be 2.5m wide and 0.8m deep, with steep sides and rounded base. The fills were dark sandy clays with animal bone. No finds were recovered. This ditch seemingly widened in Trench 12, as did the geophysical anomaly at this location. The possible outer enclosure ditch (as identified in the geophysical survey) was identified and hand-excavated in Trench 12. This ditch (C12, 54.6m OD at base) was found to be 1.5m wide and 0.5m deep. The results of the testing in Area D are suggestive of an enclosure c. 35m north–south by at least 60m. The full extent of the enclosure could not be determined by the geophysical survey owing to disturbances of its eastern extent by modern services (confirmed by testing in Trench 14) and owing to magnetic disturbance from an existing farm shed to the west. The date of this enclosure could not be determined by testing but it is potentially of early medieval or medieval date, although an earlier date cannot be discounted. |
| St Martha's College (Sion House), Johnstown/ ATHLUMNEY | 12E037 | A programme of geophysical survey and test-trenching was carried out in February 2012 in the grounds of St Martha's College/Sion House (Protected Structure) to the south-east of Navan. These works were undertaken in advance of a proposed school development (Rapid Schools Delivery 2013) on the site, which is situated in the townland of Alexander Reid and bounded by modern suburban development ('Beechlawn' and 'Birchlawns' in the Johnstown Woods housing estate) to the west and by the L5050 road to the east.<br><br>A desktop study had indicated the site had a high archaeological potential, but the geophysical survey (JM Leigh 12R20) found no evidence of significant sub-surface archaeology.<br><br>Twenty test-trenches identified eighty-four features of possible archaeological interest. These included a large bank and ditch in the south-east of the site, which had been previously highlighted as being of high archaeological potential. The feature was hand-excavated and based on finds under the bank and inside the ditch can be dated approximately to the 18th century and interpreted as a demesne landscape feature or a former townland boundary. The eighty-four identified features were investigated and eighty-three of them were demonstrated to be of no archaeological interest. The eighty-fourth was morphologically interesting but contained no occupation material or dateable evidence; its isolated nature suggests that it should also be interpreted as a non-archaeological feature. |

| Site Name | Licence | Summary |
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| | | The report concludes that the only archaeological material on the site comprises the standing historical buildings of Sion House, St Martha's College, the stable block and a building north of this with a cast-iron roof (the front gates may also be of archaeological interest if they are original, but they are probably not). The first three of these are Protected Structures and the first two are being retained within the new school scheme. As a result, the only further recommendation made was that a drawn and photographic record be made of the stable block and a building north of this with a cast-iron roof prior to demolition. |

**Appendix 13.3: Catalogue of Test Trench Results**

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| 1 | To intersect with Geophysical Feature 18 (possible pit) and adjacent area of ploughing | - | Field not accessible at time of investigations |
| 2 | Investigate area under tall grass and unavailable for geophysical survey | - | Field not accessible at time of investigations |
| 3 | Investigate area under tall grass and unavailable for geophysical survey | - | Field not accessible at time of investigations |
| 4 | To intersect with Geophysical Feature 6 (possible field system) | 40m N-S | The surface of the natural subsoil was truncated by the base of plough furrows on an E-W orientation and spaced at intervals of 1m-3m apart. These averaged 30cm wide and were filled with ploughsoil. No obvious traces of field boundary features were observed but the potential that they were infilled with re-deposited subsoil or masked by the mixed ploughzone soil was noted. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Trench 4 from south |
| 5 | To intersect with Geophysical Feature 6 (possible field system) | 50m E-W | The general stratigraphy and inclusions noted in this trench were broadly similar to that uncovered in Trench 4 to the east. A 40cm wide N-S field drain filled with dark ploughsoil was noted at the west end of the trench in the area adjacent to the west field boundary. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Trench 5 from west |
| 6 | To intersect with Geophysical Feature 6 (possible field system) | 40m N-S | The general stratigraphy and inclusions noted in this trench were broadly similar to that uncovered in Trench 4 to the north and Trench 5 to the west. A 40cm wide E-W field drain filled with dark ploughsoil was noted at the south end of the trench in the area adjacent to the south field boundary. The E-W cultivation features were most evident in the southern half of the trench and were set at average distances of 1m apart. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of furrow in south end of Trench 6 |
| 7 | To intersect with Geophysical Feature 5 (possible north annex to northern enclosure or agricultural plots) | 60m E-W | The ploughsoil in this area averaged 30cm in depth and contained early modern inclusions such as pottery, small coal fragments, occasional iron nails and one horseshoe. Two small fragments of iron slag were noted within the ploughsoil in the trench section. The subsoil was truncated by E-W plough marks which measured 20cm wide and were spaced 20cm-30cm apart. They were infilled with dark ploughsoil and 19th-20th century pottery inclusions were noted on their surfaces during manual cleaning. No obvious traces of annex or land division features were observed but the potential that they were infilled with subsoil or masked by the disturbed subsoil within the ploughzone was noted. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Trench 7 from west |
| 8 | To intersect with Geophysical Feature 5 (possible north annex to northern enclosure or agricultural plots) | 15m N-S | The lower 10cm of the ploughsoil consisted of a mottled light-mid brown sand clay, with occasional bands of light yellow clayed sand. This level represented the ploughzone horizon and contained inclusions of modern and post-medieval pottery shreds, animal bone fragments and occasional brick and coal fragments. The bases of evenly spaced E-W ploughmarks were present on the underlying subsoil surface. A linear feature identified by the geophysical survey at the southeast end of the trench was not identified during a manual clean back of this area, perhaps due to an infill with re-deposited subsoil. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of base of disturbed plough zone in Trench 8 |
| 9 | To intersect with Geophysical Feature 4 (possible rectilinear annex to the east of the north enclosure) | 12m E-W | The ploughsoil in this area averaged 20cm in depth and contained early modern pottery and glass shards. The subsoil surface within the trench was truncated by N-S ploughmarks set 1m apart. A N-S stone trackway, with modern inclusions, was uncovered beneath the sod layer in the east end of the trench and is on the potential line of a feature interpreted as the potential enclosing element of an east annex to the north enclosure identified on the geophysical survey. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Trench 9 from east |
| 10 | To intersect with Geophysical Feature 4 (possible rectilinear annex to the east of the north enclosure) | 10m E-W | The stratigraphy and inclusions noted in this trench were similar to that uncovered in Trench 9 to the north |
| 11 | To intersect with Geophysical Feature 1 (north enclosure ditch) and Feature 4 (possible rectilinear eastern annex to the north enclosure) | 40m E-W | This trench extended eastwards from the inner edge of the eastern side of the enclosing element of the northern enclosure and continued through a possible eastern annex identified in the geophysical survey, which noted that this area appeared to have been noticeably plough damaged. The line of the enclosure ditch (F11:01) was encountered in the western end of the trench while a number of potential external postholes and/or pits were also identified in the external area to the east.<br><br>The upper level of the ploughsoil consisted of a 20cm deep mid-light brown silty clay loam and this overlay a 0.1m-0.15m layer of mixed subsoil which represented the base of the ploughzone horizon. Occasional inclusions of modern and post-medieval pottery shreds, animal bone |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | fragments, flecks of burnt bone, modern glass and nails were noted down to the base of the ploughzone. The subsoil consisted of a mottled light yellowish red sandy clay with frequent inclusions of sub-angular stones and pebbles.<br><br>While no enclosing element of a potential eastern annex, potentially infilled with re-deposited subsoil, was identified on the subsoil surface outside the enclosure, a cluster of possible pits and postholes (F11.02-F11.06) was revealed on the surface of the natural subsoil over an area measuring 7m in width in the eastern end of the trench (between ITM 0687478, 0766871 and 0687471, 0766864). The fills of these potential features generally comprised mottled grey-brown charcoal flecked silty clays and the surface of one example (F11.02) contained a modern nail fragment.<br><br>Feature 11:01 (Enclosure Ditch)<br><br>This was initially exposed as a 4m wide darkened deposit at the location of the enclosure ditch shown on the geophysical survey. A manual clean back of the surface of the deposit revealed an approx. 2m wide area of re-deposited subsoil on the eastern (outer) side with a noticeably higher gravel content than the surrounding natural subsoil. The initial darkened 4m wide extent of the deposit appeared to be the result of differential moisture retention and the potential that it encompasses a recut of the ditch not which was not clearly evident following the clean back of the deposit. No obvious traces of an internal bank base were identified on the inner (west) side of the enclosure ditch fill. Traces of the bank were noted in Trench 22 (north side of the enclosure) and its absence in Trench 11 may be due to plough disturbance in this area. The trench continued for approx. 5m into the interior of the enclosure. No features were noted in this area during the geophysical survey and no obvious traces of features were noted during a manual clean back of the subsoil surface. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of enclosure ditch fill from west<br><br>Feature 11:02<br><br>Circular deposit (0.4m in diameter) uncovered within centre of trench. A modern nail fragment noted during cleaning of surface.<br><br>Feature 11:03<br><br>Circular deposit with charcoal flecks (0.4m in diameter). Located centrally in the trench 1.7m east of F11.02 |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | Feature 11:04<br><br>Circular deposit with charcoal flecks (0.5m in diameter). Located centrally in the trench 2.8m east of F11.03<br><br>Feature 11:05<br><br>Circular charcoal deposit (0.5m in diameter) located against the northern baulk. Small flecks of charcoal and possible burnt bone were noted on the surface<br><br>Feature 11:06<br><br>Circular charcoal deposit (0.65m in diameter) located against the southern baulk. Small flecks of charcoal and possible burnt bone were noted on the surface. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of external features from east |
| 12 | To intersect with Geophysical Feature 10 (possible pit cluster) | 40m E-W | A farm trackway composed of small stones was uncovered immediately under the sod layer near the centre of the trench on the line of breaks in the field boundaries to the north and south and formed a continuation of the trackway uncovered in Trenches 9 and 10 to the north. The surface of the track contained a number of modern inclusions and brick fragments were noted within the makeup material. The bases of a number of N-S cultivation furrows were noted on the subsoil surface (at approx. 2m intervals) in the east end of the trench and these averaged 0.1m wide. Two E-W furrows were uncovered in the west half of the trench and these did not extend east of the trackway, perhaps indicating that it formed part of a land division feature in recent centuries. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of from farm track from south |
| 13 | To intersect with Geophysical Feature 9 (area of magnetic disturbance) | 40m E-W | The area of magnetic disturbance corresponded to a 2m wide band of stones, with modern inclusions, which was uncovered beneath the sod layer and extended under the north and south baulks. While not on the same line as the trackway uncovered to the northeast in Trench 12 it was of similar composition. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of modern stone deposit |
| 14 | To intersect with west end of Geophysical Feature 7 (west end of south annex to north enclosure) | 40m E-W | The ephemeral surface traces of an approx. 2m wide band of potentially re-deposited band of subsoil was noted at the location of the enclosing element of the inner annex to the south end of the enclosure. The potential that this width is the result of soil drift within the base of the plough zone was noted and it is possible that an underlying ditch feature is narrower in extent. The presence of charcoal flecks and a small fragment of slag in the overlying ploughsoil may be the result of some industrial activity within the annex but the presence of inclusions such as chinaware down into the subsoil surface demonstrated the potential for the extent of the intrusion of early modern inclusions within this area. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of annex ditch fill from west (ranging rod located on outer edge) |
| 15 | To intersect with west end of Geophysical Feature 7 (west end of south annex to north enclosure) | 40m E-W | A series of E-W plough marks were found to extent through the trench. A 2.5m wide ephemeral band of mixed subsoil, with a noticeable concentration of more stones inclusions than the surrounding subsoil, was noted at the location of the east side of the potential outer anne13. As with Trench 14 to the north, it is possible that this width represents a drift of upper fill material within the ploughzone and that an underlying ditch feature may be narrower in extent. While no internal annex features were observed, the geophysical survey indicates that features displaying evidence for burning, perhaps associated with an industrial activity, are located within the environs of the trench. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of annex ditch fill from west (ranging rod located on outer edge) |
| 16 | To intersect with Geophysical Feature 13 (possible north annex to south enclosure) and Feature 14 (possible pit) | 80m E-W | This trench was excavated across the north end of a series of linear trends located to the north of the southern enclosure and also extended across the location of a possible pit in the area to the west. The subsoil surface within the trench was found to have been truncated by a series of N-S cultivation furrows. The possible pit (Geo. Ref. 14) in the west end of the trench was identified as a small burnt deposit and assigned Feature No. 16:01. A number of linear deposits and a possible posthole were also uncovered near the centre of the trench.<br><br>Feature 16:01<br><br>Uncovered 11.5m from the west end of the trench, and adjacent to the south baulk, this comprised the fill of a 90cm diameter circular pit. The upper surface of the fill was composed of burnt stones in a charcoal-rich soil matri13. Manual cleaning revealed the edge of a possible surface of small stones (3cm-5cm) beneath the mixed subsoil at the base of the plough zone adjacent to the southeast side of the pit. This feature appeared to extend under the southern baulk and was only |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | partially exposed within the trench in order to prevent dislodging the loosely packed stones. The pit and stone surface may represent a work external industrial area located approx. 40m to the northwest of the southern enclosure.<br><br>  <br>View of Pit 16:01 from west<br><br>Feature 16:02<br><br>A barely perceptible 3m wide band of potentially re-deposited subsoil (extending under the north and south baulks) was noted at the west end of the possible northern annex to the south enclosure, at a distance of 22m from the west end of the trench. The presence of early modern pottery noted on its surface attested to the disturbance created by ploughing and the possibility that the width of the surface expression of this feature may be the result of soil drift was noted. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | Feature 16:03<br><br>Another barely perceptible 2.5m wide band of potentially re-deposited subsoil of similar characteristics to Feature 16:02 was revealed near the centre of the trench (45m from west end) at the location of a N-S linear trend identified in the geophysical survey.<br><br>Feature 16:04<br><br>The fill of a possible posthole/pit was uncovered at a distance of 16.7m from the east end of the trench. It measured 60cm in diameter and was filled with a mid-brown silty clay loam with no evident cultural inclusions or packing material noted on the surface during manual cleaning. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Feature 16:04 (right of trowel) and adjacent furrow |
| 17 | To intersect with north end of Geophysical Feature 11 (south enclosure ditch) and Feature 13 (possible annex or field system to north of south enclosure) | 40m N-S | This trench was excavated across the lines of a number of E-W orientated linear trends to the north of the south enclosure and terminated just inside the inner edge of the enclosure ditch. A series of E-W fills, which extended under the east and west baulks, were uncovered at the locations of the linear trends as was the fill of the north end of the enclosure ditch.<br><br>Feature 17:01<br><br>Located at the north end of the trench this comprised a curvilinear, 1.1m wide deposit that extended from under the east baulk and then turned at a rounded corner in the centre of the trench before |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | continuing for 3.2m and extending under the north baulk. The surface of the fill comprised a mid brown silty clay and small animal bone fragments were noted, although the possibility that these were introduced by ploughing activity was noted. The location of this feature corresponds to a curved corner of a geophysical linear feature that continues to the east and north.<br><br>  <br><br>View of Feature 17:01 from north<br><br>Feature 17:02<br><br>A 0.7m wide fill, composed of a mid brown silty clay with no evident surface inclusions, was uncovered to the south of F17:01. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Feature 17:02 from north<br><br>Feature 17:03<br><br>An ephemeral c.2m wide deposit of possible re-deposited subsoil with medium-sized stones and occasional charcoal flecks was noted near the centre of the trench.<br><br>Feature 17:04<br><br>A 1m wide deposit of mid brown silty clay with moderate inclusions of small stones was uncovered immediately outside the north end of the enclosure. This linear feature is shown intersecting with the enclosure ditch in the area to the east on the geophysical survey. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | Feature 17:05<br><br>This 1.2m wide, dark brown deposit was uncovered at the location of the north end of the enclosure ditch identified in the geophysical survey. It contained surface inclusions of charcoal flecks and was noticeably darker in colour than the external linear features to the north. It was on a slightly different orientation to the adjacent external linear feature (17:04) and their trajectory indicated that the point where they intersect is located just outside the east side of the trench.<br><br>  <br><br>View of Features 17:04 and 17:05 (foreground) from south |
| 18 | To intersect with Geophysical Feature 17 (trackway or levelled field boundary) | 40m N-S | The linear feature identified by the geophysical survey corresponds to the location of a now levelled field boundary shown on the historic OS maps. The base of a levelled field bank was revealed as a 1.5m wide band of re-deposited yellow subsoil with an adjacent infilled field drain on the south side. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Trench 18 from north |
| 19 | To intersect with Geophysical Feature 12 (linear trends to southwest of southern enclosure) | - | Located beneath line of low-hanging overhead ESB wire and not excavated due to safety concerns |
| 20 | To intersect with Geophysical Feature 12 (linear trends to southeast of southern enclosure) | | A number of deposits at the locations linear trends extending southeast from the southern end of the south enclosure were identified and all extended into the north and south baulks. A series of E-W cultivation furrows extended along the length of the trench.<br><br>Feature 20:01 |

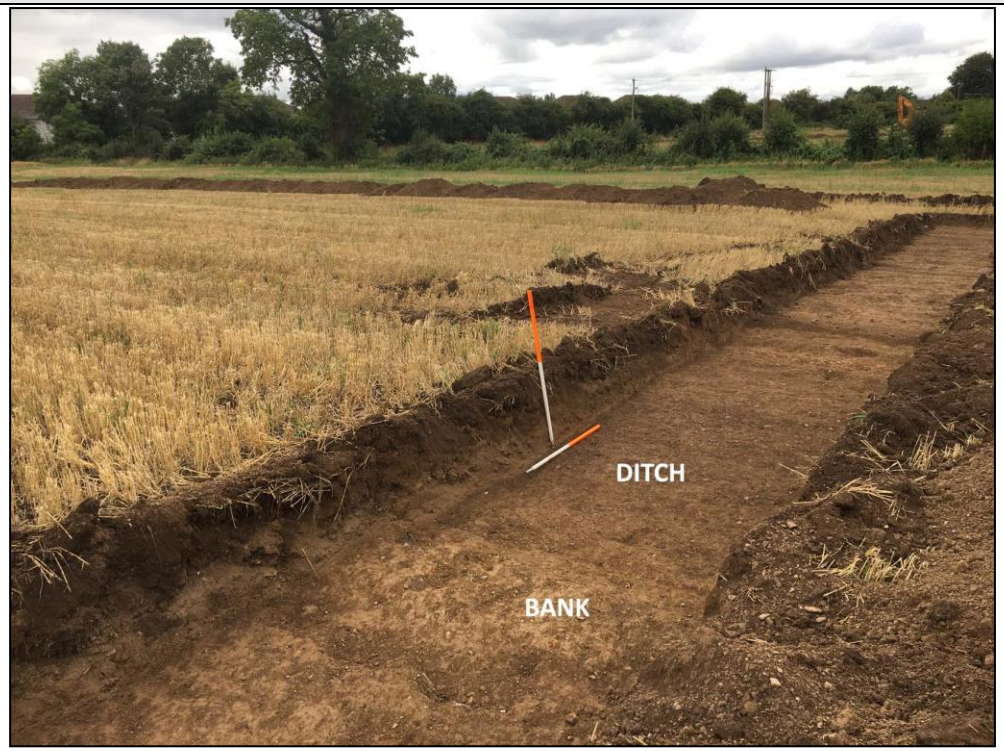
| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | Located 7m from the west end of the trench this comprised a 6m wide deposit of mixed ploughsoil on the subsoil surface which may potentially represent a spread of soil originating from the upper fill of a ditch feature.<br><br>  <br><br>View of Feature 20:01 from west<br><br>Feature 20:02<br><br>Located 23m from the west end of the trench this was a 2.5m wide deposit of mid brown silty loam with no evident cultural inclusions on the surface. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of Feature 20:02 from south<br><br>Feature 20:03<br><br>Located 30m from west end of trench this 2.5m wide deposit was similar in composition to Feature 20:03 |
| 21 | To intersect with Geophysical Feature 15 (features of unknown origin to east of southern enclosure) | 40m EW | This trench was excavated to investigate a potential cluster of features located approx. 60m to the east of the southern enclosure and three features were uncovered within the excavated area.<br><br>Feature 21:01<br><br>Located 21m from the east end of the trench and extending under the north and south baulks this comprised a barely perceptible oblong deposit (3.5m wide EW) of loose stones contained in a |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | slightly dark silty soil matrix containing occasional flecks of charcoal and burnt bone. No traces of burn marks on the surrounding subsoil were noted.<br><br>Feature 21:02<br><br>Located 19m from east end of trench this comprised a curvilinear deposit extending for 1.2m from the south baulk and measuring 1.3m in width (EW). It was composed of a grey brown, stony deposit with occasional flecks of burnt bone and charcoal. As with Feature 21:01 to the east, there were no obvious traces of burning activity on the surrounding natural subsoil.<br><br>  <br><br>View of Feature 21:02 |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | Feature 21:03<br><br>Located 7m from the east end of the trench this circular deposit extended from under the south baulk and its visible extent measured 1.2m in diameter. It was composed of a mid brown sandy clay deposit containing small angular pebbles and, unlike Features 21:01 and 21:02 to the west, there were no inclusions of burnt bone or charcoal noted on the upper surface. Interpreted as fill of possible pit feature.<br><br>  |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | | View of Feature F21:03 |
| 22 | To intersect with Geophysical Feature 1 (north end of northern enclosure ditch) | 20m N-S | The general stratigraphy noted outside the enclosure was similar to that encountered in Trench 8 to the east. Three potential archaeological features were recorded towards the southeast end of the trench. The first consisted of the enclosure ditch F22.01 at the location identified by the geophysical survey. The ditch fill was first identified as a spread of mottled dark, moisture-rich soil approximately 4.5m and was sealed by a 10cm deep spread of re-deposited subsoil perhaps originating from the ploughed out bank. Its inner edge was located at ITM 0687415, 0766896 and its outer edge at ITM 0687411, 0766898. A more intensive, manual clean back of the surface of the ditch fill indicated that it may measure 2m in width while the outer 2.5m section (at north) may potentially indicate a recut or a spread of the upper fill created by ploughing activity. A bank of compact re-deposited subsoil (F22.02) measuring 0.6m wide and 0.1m high was located immediately adjacent to the inner (south) side of the ditch and appeared to represent the basal remains of an internal bank. A possible spread of re-deposited subsoil (F22.03), measuring 1.9m wide, extending south of the identifiable base of the bank may represent a spread of levelled bank material or the lower extent of the plough zone. |

| Trench | Aim of Investigation | Length | Test trenching results |
|---|---|---|---|
| | | |  <br>View of ditch fill and inner bank base from southeast |

**Appendix 13.4: General Photographic Record**


***Plate 13.4.1:*** *Drone view of proposed development site from west showing test trenching in progress with location of northern enclosure indicated*


***Plate 13.4.2:*** *Drone view of proposed development site from south with location of south enclosure indicated*

***Plate 13.4.3:*** *Drone view of proposed development site from north showing test trenching in progress*

***Plate 13.4.4:*** *Drone view of proposed development site from east showing test trenching in progress and Belmount House in foreground*

***Plate 13.4.5:*** *View of location of north enclosure from northeast showing field boundary extending east-west through interior*

***Plate 13.4.6:*** *Drone view of north enclosure from west with arrow indicating approx. central area*

***Plate 13.4.7:*** *Drone view of south enclosure from east with arrow indicating approx. central area*

***Plate 13.4.8:*** *View of the principal entrance to Belmount House (this entrance is from Academy Street and will be unaltered by the development proposal)*

***Plate 13.4.9:*** *View of open grassland along western side of Academy Street*

***Plate 13.4.10:*** *View of open grassland along western side of Academy Street*

***Plate 13.4.11:*** *View of the former southern gateway of Belmount House (accessed from Dublin Road). The gateway is a protected structure but not longer functions as an access point to Belmount House*

***Plate 13.4.12:*** *View of section of the now-redundant southern access lane that led to Belmount House (the majority of this former driveway is located within proposed development site)*

***Plate 13.4.13:*** *Aerial view of the former farmyard complex on the left of the photograph and Belmount House (partially screened by trees) on the right of the photograph. The single-storey farm building that was recorded by the NIAH is heavily overgrown*

## Appendix 13.5 Belmount Geophysical Survey Report

# GEOPHYSICAL SURVEY

# REPORT

Limekiln Hill, Navan,

County Meath

Date:
15/05/2018

Licence: **18R0084**

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# GEOPHYSICAL SURVEY SUMMARY SHEET
## LIMEKILNHILL, NAVAN, COUNTY MEATH

| | | | |
|---|---|---|---|
| **Site Name** | Limekilnhill, Navan, County Meath | **Ref No.** | 18022 |
| **Townland** | Limekilnhill | **Licence No.** | 18-R-0084 |
| **County** | Meath | **Licence Holder** | Joanna Leigh |
| **ITM (centre)** | E587475, N766863 | **Purpose** | Pre-planning investigation |
| **Client** | John Cronin & Associates | **Reference No.** | NA |

| | |
|---|---|
| **Ground Conditions** | Harvested stubble fields in an elevated location. |
| **Survey Type** | Detailed gradiometer survey totalling c.13 hectares was conducted |

**Summary of Results**

The geophysical survey has successfully identified two enclosure sites within 50m of each other. The enclosure sites have a similar orientation and form and are consider to be contemporary.

The northern enclosure, measuring.45m x 68m, comprises of a clear sub-rectilinear enclosure ditch with a possible entranceway in the west of the site. A cluster of responses within the enclosure are indicative of habitation activity, with possible fired features such as hearths. Annexes of the enclosure are evident to the east and south and rectilinear responses to the north may represent a small associated field system.

The southern enclosure is similar in form, measuring c.48m x 56m. It is likely that this would have extended to the south, outside the application area and where modern dwellings are now located. This enclosure appears less distinct, but it appears to also have an annex feature and associated possible small field system.

| | | | |
|---|---|---|---|
| **Report Date** | 15/05/2018 | **Report Author** | Joanna Leigh |

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2. Survey ground conditions and further information 1

3. Survey Methodology 1

4. Data Display 3

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# Geophysical Survey Report
# Limekilnhill, Navan, County Meath

## 1 Introduction

1.1 A geophysical survey has been conducted by J. M. Leigh Surveys Ltd. on behalf of John Cronin & Associates at a site in the townland of Limekilnhill, Navan, County Meath. The geophysical survey has been undertaken as part of a wider archaeological study for a pre-planning site investigation.

1.2 The application area is contained within eight fields, to the south of Navan town and to the west of the R147 road. Eight areas (Areas A-H) of detailed gradiometer survey were conducted. The site location and areas of detailed survey are presented in Figure 1, at a scale of 1:3,000.

1.3 There are no recorded monuments within the application area and the geophysical survey was requested to investigate the potential for unknown archaeology within the study area. Detailed gradiometer survey was conducted in available areas, under licence 18R0084 issued by the Department of Culture, Heritage and the Gaeltacht.

## 2 Survey ground conditions and further information

2.1 The fields under investigation comprised of harvested crop stubble fields. These were suitable for survey and Areas A-G were surveyed.

2.2 Part of the application area was contained within a small wooded area which was not suitable for survey.

2.3 In the west of the application area, adjacent to the road, the field comprised of long grass and overgrown vegetation with uneven ground. Survey here was limited to Area H.

## 3 Survey Methodology

3.1 A detailed gradiometer survey detects subtle variations in the local magnetic field and measurements are recorded in nano-Tesla (nT). Some archaeological features such as ditches, large pits and fired features have an enhanced magnetic signal and can be detected through recorded survey.

3.2 Data was collected with a Bartington Grad 601-2 instrument. This is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective.

3.3 The instrument is calibrated in the field to ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.01nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

3.4 All data was collected in 'zigzag' traverses. Grid orientation remained constant for Areas A, B, C and D. The grid orientation for Areas E, F, G and H was changed to facilitate the ground conditions and the east facing slope which was steep in places.

3.5 Data was collected with a sample interval of 0.25m and a traverse interval of 1m, providing 6400 readings per 40m x 40m grid. The survey grid was set-out using a GPS VRS unit. Survey tie-in information is available upon request.

3.6 The survey methodology, data presentation and report content adheres to the European Archaeological Council (EAC) (2016) '*Guidelines for the use of Geophysics in Archaeology*'.

## 4 Data display

4.1 An overall summary greyscale image, displaying the survey results is presented in Figure 2, with an accompanying annotated interpretation diagram in Figure 3. These diagrams are presented at a scale of 1:2,000 @A3.

4.2 Further greyscale images and interpretation diagrams are presented in Figures 4 to 8, all at a scale of 1:1,250 @A3.

4.3 Numbers in parenthesis in the text refer to specific responses highlighted in the interpretation diagrams.

4.4 Isolated ferrous responses highlighted in the interpretation diagram most likely represent modern ferrous litter and debris and are not of archaeological interest. These are not discussed in the text unless considered relevant.

4.5 The raw gradiometer data is presented in archive format in Appendices A1.01 and A1.02. The raw data is displayed as a greyscale images and xy-trace plots, all at a scale of 1:625@A0. The archive plots are used to aid interpretation of the results and are for reference only. The archive plots are available as PDF images upon request.

4.6 The display formats referred to above and the interpretation categories are discussed in the summary technical information section at the end of this report.

## 5 Survey Results

5.1 The gradiometer survey has successfully identified responses indicative of archaeological activity.

*Areas A-D (Figures 4 & 5)*

5.2 A series of responses (1) extend through Area C into Area D and form a clear sub-rectilinear enclosure, which has a curvilinear shape at the northern extent. The main enclosure ditches measure c.45m x 68m. There is a possible entranceway (2) along the west of the enclosure.

5.3 Within the enclosure there are clusters of responses. Although these have no clear pattern, they are indicative of archaeological features. Isolated responses (3) may represent pits containing burnt material or possible fired features, such as hearths.

5.4 Extending from the main enclosure ditches are series of linear and curvilinear trends and responses. It is likely that these represent annexes to the main enclosure.

5.5 A rectilinear annex to the east of the main enclosure ditches is represented by trends and fragmented responses (4). Plough trends are evident in the data set here and show some correlation with the orientation of the annex responses. Their possible association with the enclosure is unknown.

5.6 A series of responses (5) to the north-east of the main enclosure form a fragmented rectilinear pattern. This may represent an annex to the main enclosure, or represent associated agricultural plots. Extending north from (5), into Area B, are further trends (6). Although these are magnetically weak they form a pattern indicative of a possible field system, perhaps associated with the enclosure (1).

5.7 Another possible annex is located to the south and is represented by curvilinear trends and responses (7). The trends are magnetically weak, perhaps indicative of plough damage. Within the annex there are magnetically strong isolated responses (8). These may represent pits or possible burnt features.

5.8 To the east of the annex (7) there is an area of magnetic disturbance (9). Although this is typical of modern disturbance, it is also possible that a spread of burnt material of archaeological interest is represented here. It is noted that isolated responses (10) are located to the immediate north. These may represent a cluster of pit-type features. Although interpretation of (9) and (10) is tentative, these responses must be considered to be of archaeological potential.

*Areas E-G (Figures 6 & 7)*

5.9 A second enclosure site has been identified by a series of sub-rectilinear responses (11). The responses extend from Area F into Area G.

5.10 This enclosure (11) is similar in shape and form to (1). The main enclosure ditches measure c. 48m x 56m. The enclosure (11) appears more fragmented than (1), perhaps suggesting plough damage has occurred. Nevertheless, the responses present a clear enclosure with linear trends extending to the north and south.

5.11 Linear trends (12) extend to the south and it is speculated that features associated with the enclosure would have continued to the south, where modern housing is now located.

5.12 Trends and responses (13) extend from (11) to the north. These form a rectilinear pattern and perhaps represent another annex feature or associated small field system.

5.13 An isolated response (14) has a broad magnetic signal and may represent a large pit-type feature.

5.14 A cluster of responses (15), in Area G, has no clear pattern or form. It is possible that these represent modern material. However, an archaeological interpretation must be considered. These responses may represent plough damaged ditch-type features or perhaps a cluster of pits. Given the proximity to the enclosure site, an archaeological interpretation must be considered.

5.15 A linear trend (16) crosses through Areas F and G. This is perpendicular with the existing field boundaries and most likely represents a former field division. A further negative trend (17) extends from (16), traversing easterly. This may represent a former trackway or wide field division. Trends (16) and (17) are considered to be agricultural in origin and not related to the enclosure sites.

*Area H (Figure 8)*

5.16 Area H is contained within a level field immediately adjacent to the road. This comprised of overgrown vegetation and long grass with uneven ground. Only Area H was suitable for survey.

5.17 Parallel linear trends orientated west to east traverse the data set. These most likely represent ploughing activity.

5.18 Within the ploughing there is a broad response (18) of archaeological potential. Although there are no further responses in the vicinity, it is possible that a large pit-feature is represented here.

## 6 Conclusion

6.1 The geophysical survey has successfully identified two enclosure sites within 50m of each other. The enclosure sites have a similar orientation and shape and are consider to be contemporary.

6.2 The northern enclosure, measuring.45m x 68m, comprises of a clear sub-rectilinear enclosure ditch with a possible entranceway in the west of the site. A cluster of responses within the enclosure are indicative of habitation activity, with possible fired features such as hearths. Annexes of the enclosure are evident to the east and south and rectilinear responses to the north may represent a small associated field system.

6.3 The southern enclosure is similar in form, measuring c.48m x 56m. It is likely that this would have extended to the south, outside the application area and where modern dwellings are now located. This enclosure appears less distinct, but it appears to also have an annex feature and associated possible small field system.

6.4 Consultation with a licensed archaeologist and with the Department of Culture, Heritage and the Gaeltacht is recommended to establish if any additional archaeological works are required.

## Technical Information Section

### Instrumentation & Methodology

*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 40m x 40m, 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 data set with high resolution.

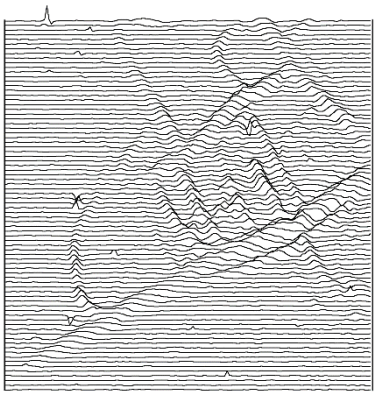
***Bartington GRAD 601-2***

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.

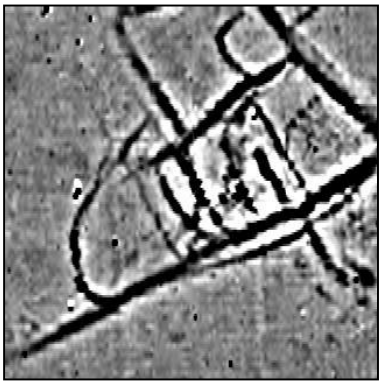
## Gradiometer Data Display & Presentation

### *XY Trace*



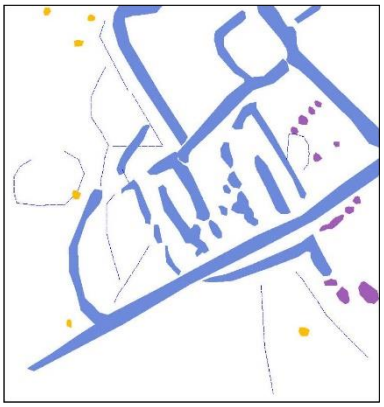
The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot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

***? Natural***

A broad response resulting from localised natural variations in the magnetic background of the subsoil; presenting as broad amorphous responses most likely resulting from geological features.

***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.

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## List of Figures


| Figure | Description | Paper Size | Scale |
|---|---|---|---|
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| Figure 2 | Overall summary greyscale image | A3P | 1:2,000 |
| Figure 3 | Overall summary interpretation diagram | A3P | 1:2,000 |
| Figure 4 | Areas A-D: Summary greyscale image | A3P | 1:1,250 |
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| Figure 8 | Area H: Summary greyscale & interpretation | A3L | 1:1,250 |


***Archive Data Supplied as a PDF Upon Request***


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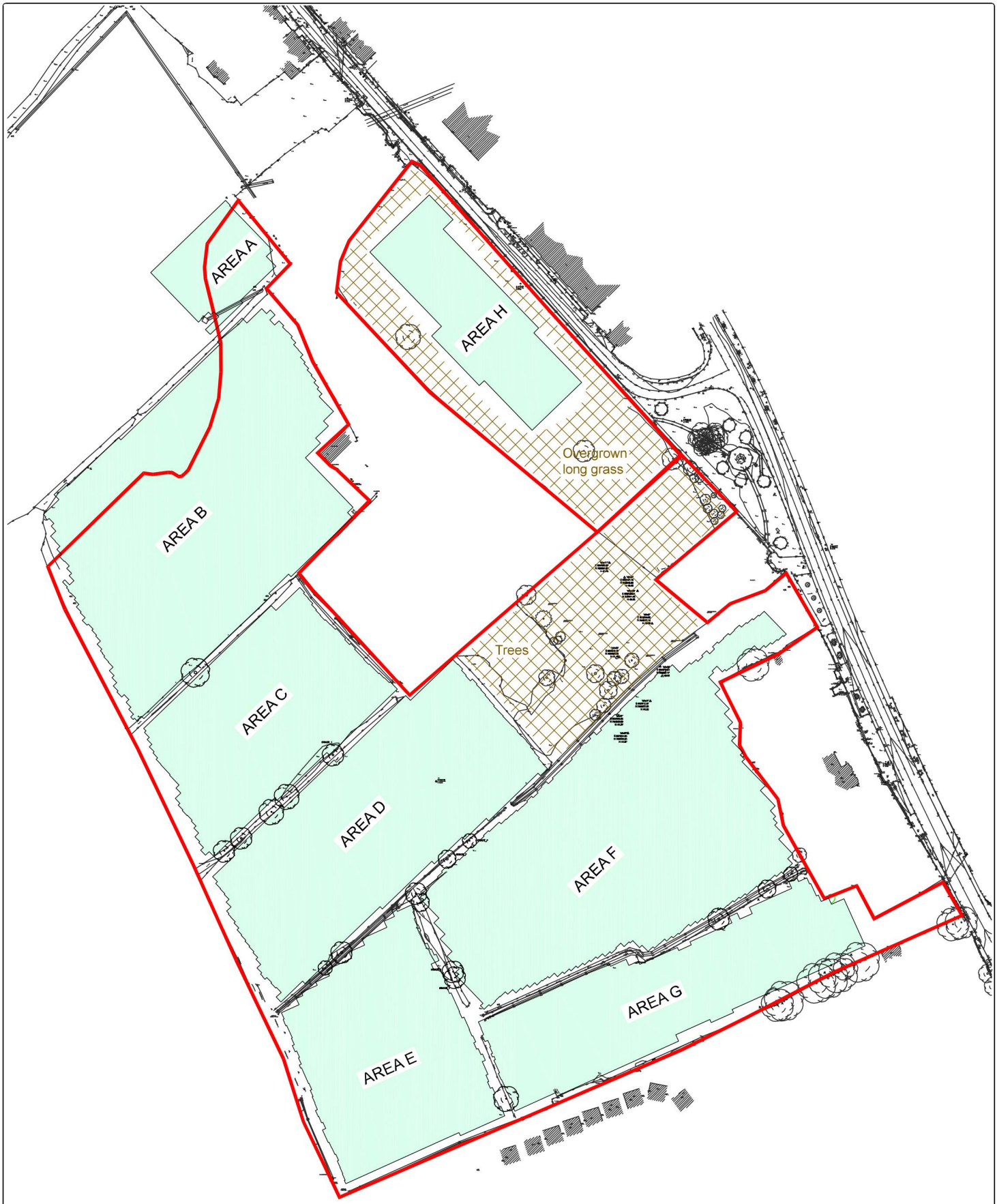
| A1.01 | Raw data XY-Trace plot | A0P | 1:625 |
| A1.02 | Raw data greyscale image | A0P | 1:625 |

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0 metres 120

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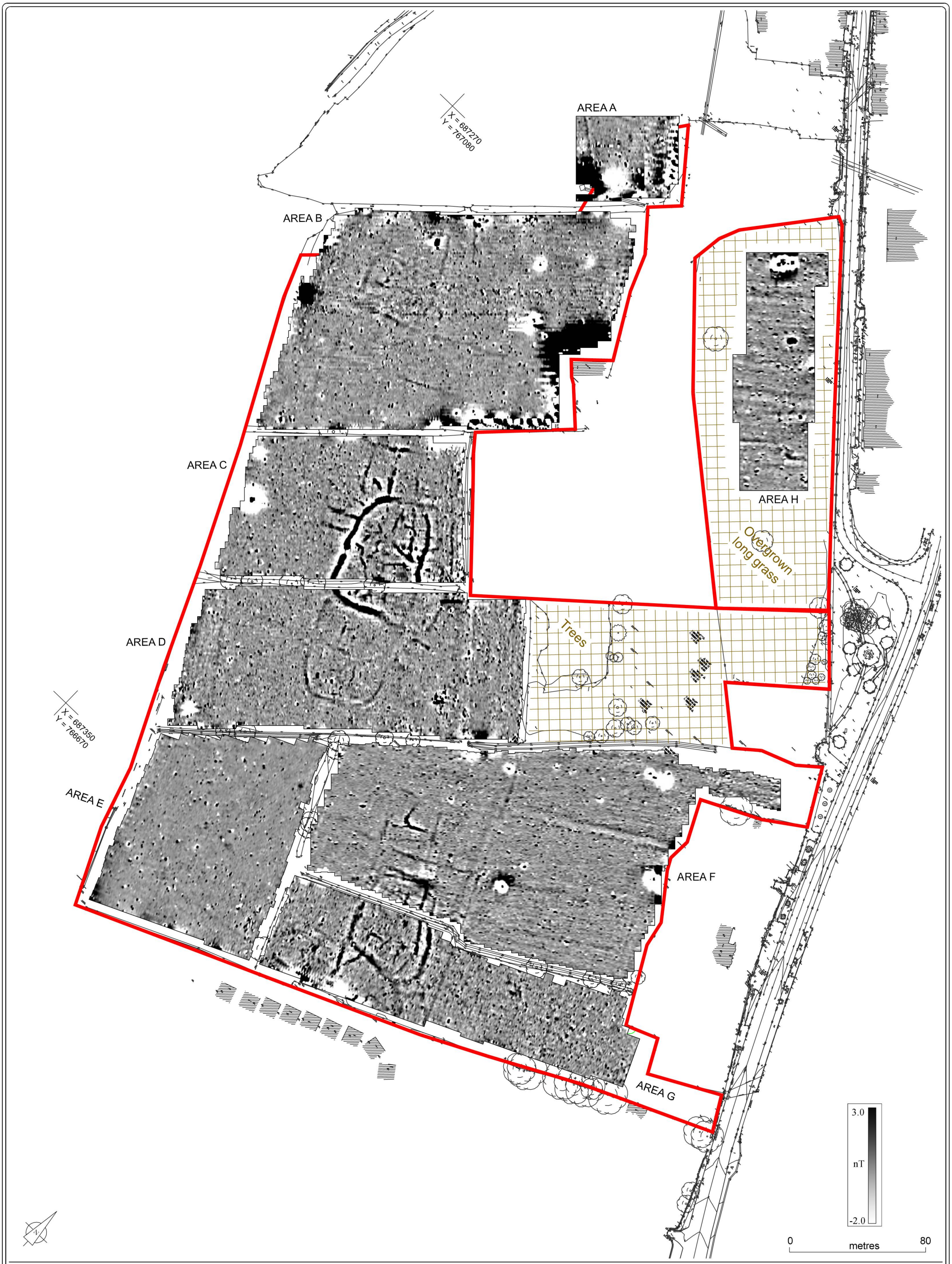


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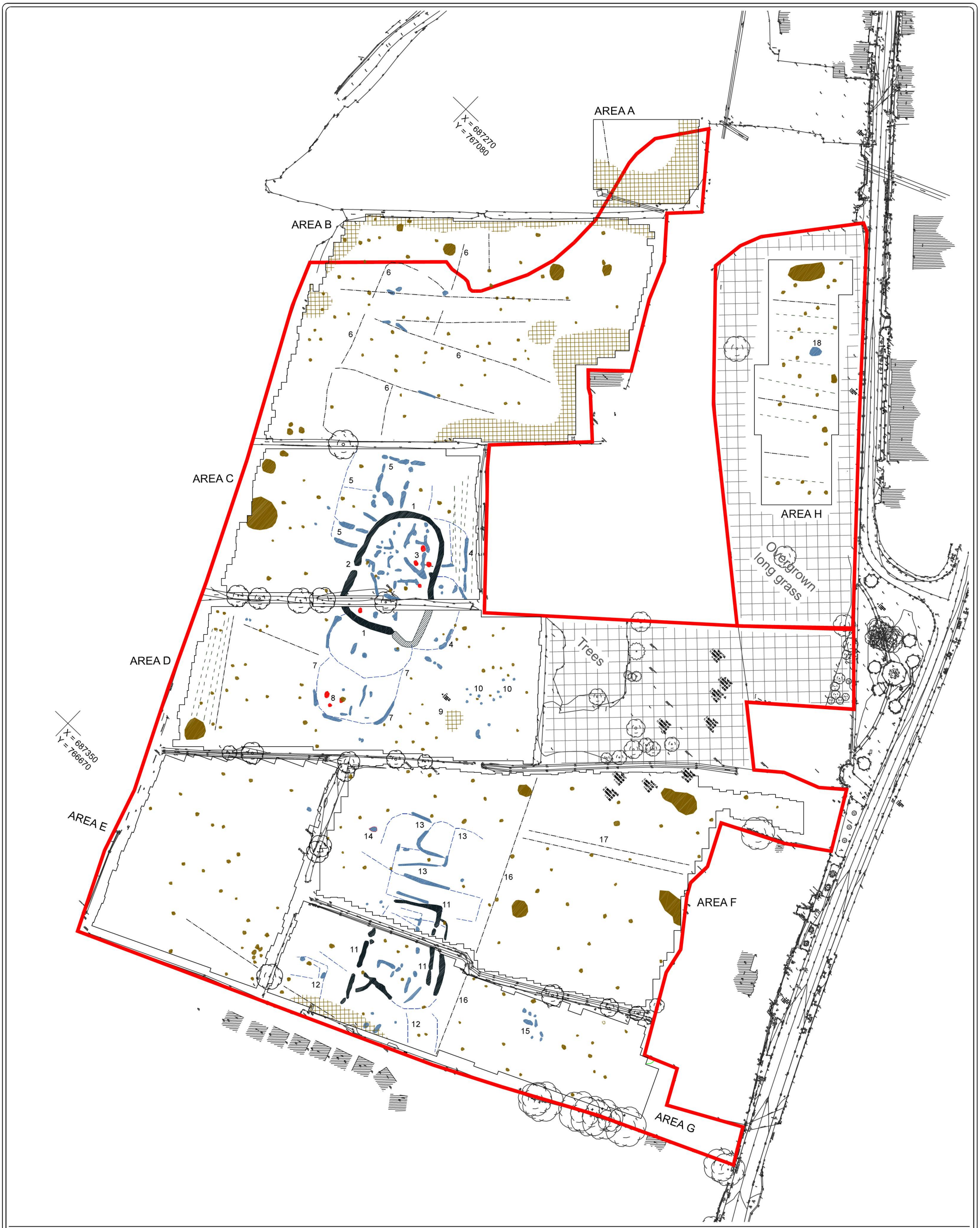


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| Issue Date: | 15.05.2018 |


Client: John Cronin & Associates

Project: Geophysical Survey
Limekilnhill, County Meath

Title: Areas A - D
Summary Greyscale Image

J.M.Leigh surveys
www.jmlsurveys.com

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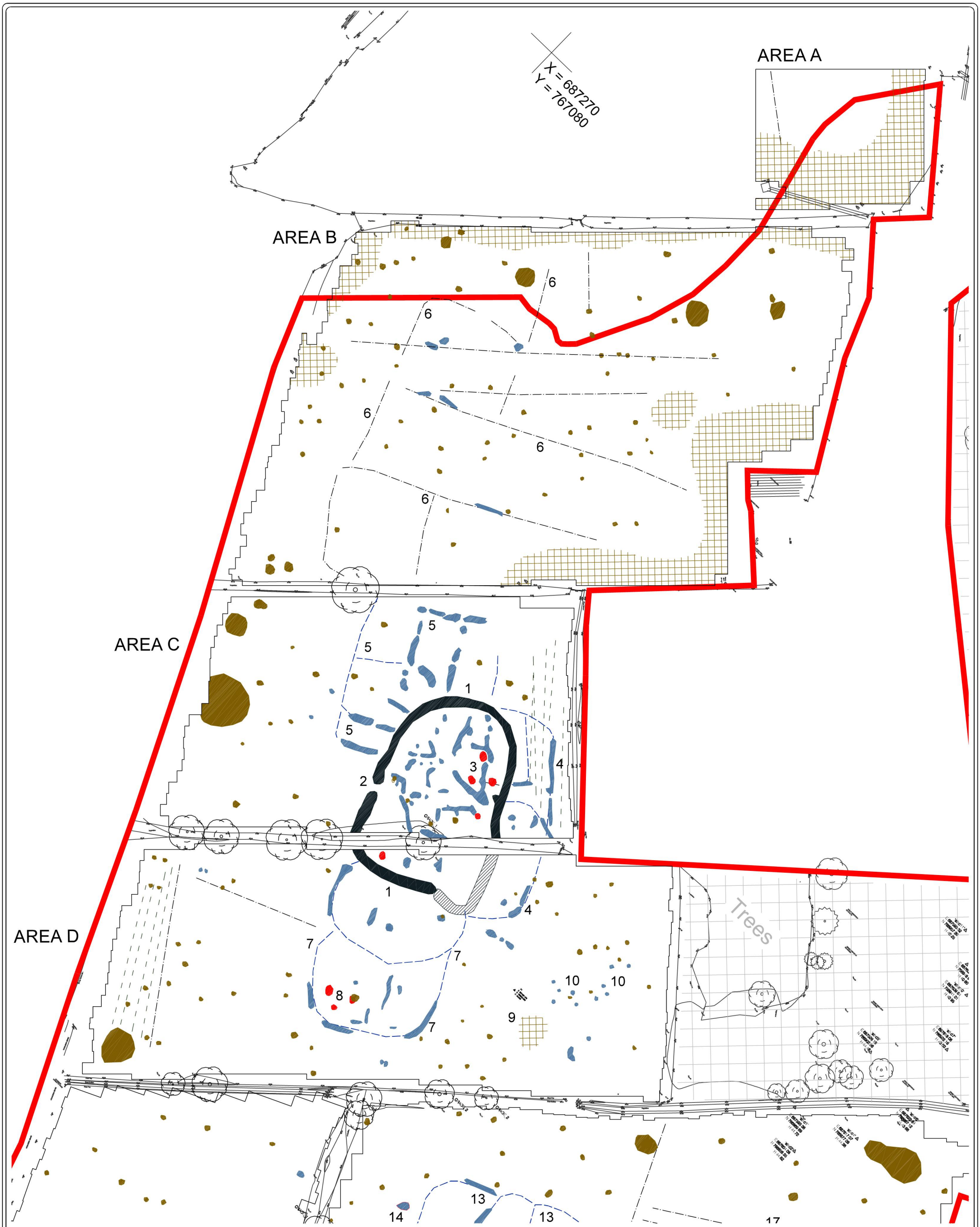


Archaeology - Enclosure ditches

?Archaeology - Pits / ditches

?Archaeology - ?burnt feature

?Archaeology - Positive Trend

Trend

? Agricultural trend

Magnetic disturbance

Modern Ferrous response

0 metres 50

| | | | |
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| Client: John Cronin & Associates | Project: Geophysical Survey Limekilnhill, County Meath | Title: Areas A - D Interpretation | J.M.Leigh surveys www.jmlsurveys.com |

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| Licence No.: | 18R0084 |
| Issue Date: | 15.05.2018 |


0 metres 50

Client: John Cronin & Associates

Project: Geophysical Survey
Limekilnhill, County Meath

Title: Areas E - G
Summary Greyscale Image

J.M.Leigh surveys
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AREA D

AREA E

AREA F

AREA G

= 687350
766670

Archaeology - Enclosure ditches

?Archaeology - Pits / ditches

?Archaeology - ?burnt feature

?Archaeology - Positive Trend

Trend

? Agricultural trend

Magnetic disturbance

Modern Ferrous response

0 metres 50

Client: John Cronin & Associates

Project: Geophysical Survey
Limekilnhill, County Meath

Title: Areas E - G
Summary Interpretation

J.M.Leigh surveys
www.jmlsurveys.com

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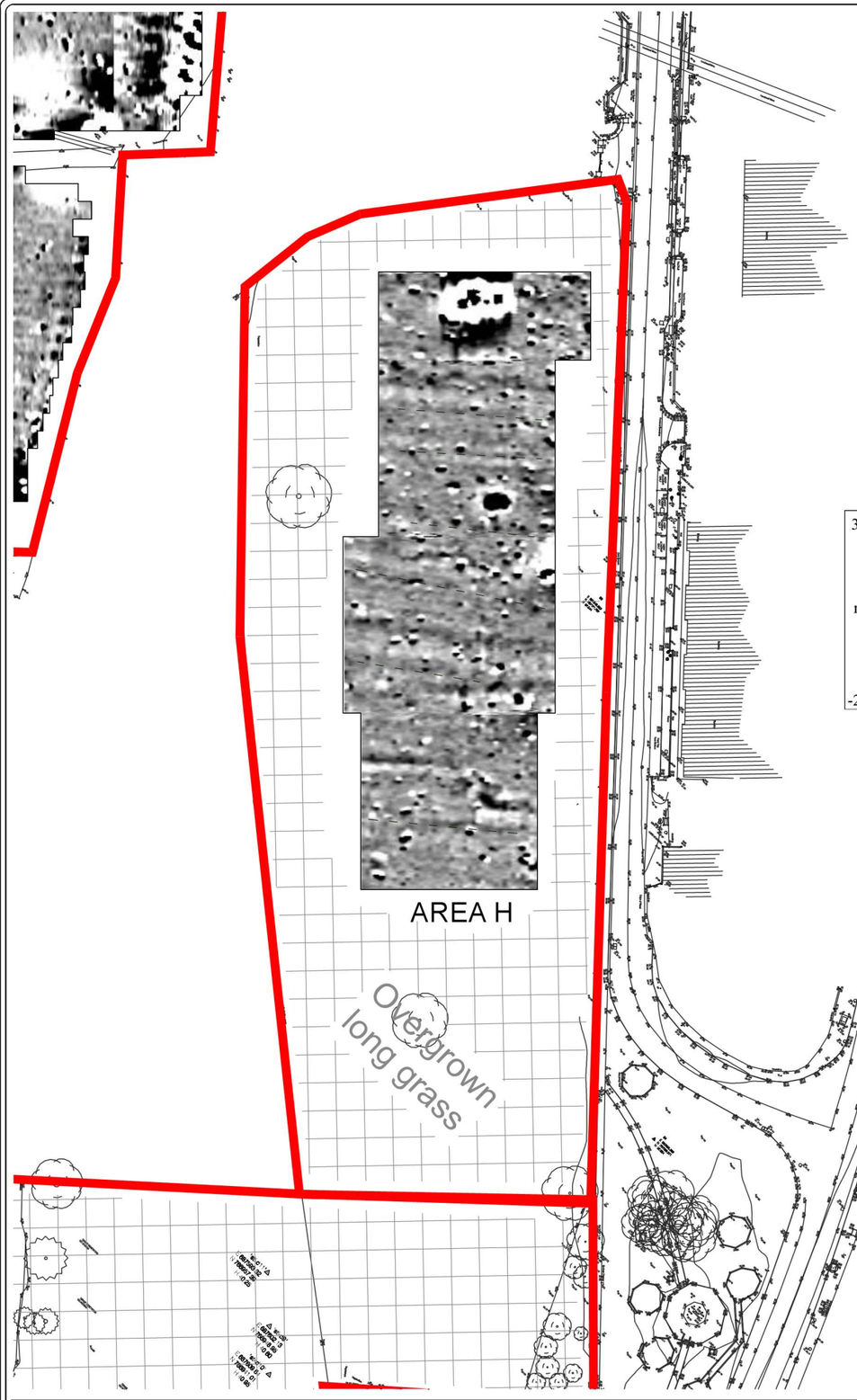



0 metres 50

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Project: Geophysical Survey Limekilnhill, County Meath

Title: Area H Summary Greyscale Image & Interpretation

J.M.Leigh surveys
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| Issue Date: | 15.05.2018 |

## Appendix 13.6 Archaeological Test Trenching Report

JOHN CRONIN & ASSOCIATES
ARCHAEOLOGY | CONSERVATION | HERITAGE | PLANNING

# Limekilnhill Townland, Navan, County Meath
# Archaeological Test Trenching Report

**Excavation Licence: 18E0499**
**Detection Device: 18R0171**


*Prepared by*
**Tony Cummins**
c/o John Cronin & Associates
28 Upper Main Street
Buncrana
Co. Donegal


*On behalf of*
**Coindale Ltd,**
27 Dawson Street,
Dublin 2

**September 2018**

# ABSTRACT

This report presents the results of a preliminary phase of archaeological test trenching undertaken to investigate a number of geophysical anomalies identified as being of archaeological potential within tillage farmland in Limekilnhill townland located in the southern outskirts of Navan town, Co. Meath. The geophysical survey and test trench investigations were carried out as part of a pre-planning application assessment of a proposed housing development within the subject lands.

The geophysical survey of the proposed development area was undertaken by J.M. Leigh Surveys Ltd (Licence **18R0084**) and the results are presented in Section 2 of this report. In summary, the survey revealed the sub-surface remains of two sub-rectilinear enclosures within the tillage fields and these were located c.50m apart. Both enclosures appear to contain internal features and potential external annex features were also identified. Various other external linear trends within their surrounds were interpreted as possible remains of associated field systems.

The archaeological test trench investigations were carried out under an excavation licence (**18E0499**) issued by the National Monuments Service (NMS). A licence for the use of a metal-detector (**18R0171**) was also obtained in order to assist in artefact retrieval. The aim of this preliminary phase of test trenching was to undertake limited investigations of the enclosing elements of the two enclosures, and their associated potential annex features, as well as examining the various external linear trends.

The programme of test trenching demonstrated that the soil profiles within the tillage fields have been extensively impacted by ploughing activity down to the surface of the underlying natural subsoil. This activity has created a mixed layer of disturbed subsoil at the base of the plough zone and the potential that this layer may seal underlying archaeological deposits within areas of the site was noted. The test excavations successfully identified the buried remains of the disturbed, ephemeral upper surfaces of both enclosure ditches as well as traces of two conjoined, sub-circular annexes to the south of the northern enclosure. The surface expression of many of the ditch fills were not clearly defined perhaps due to a combination of plough disturbance, recut activity and the presence of re-deposited subsoil originating from levelled enclosing earthen banks. While a number of linear cut features were noted within the site, including a number to the north of the southern enclosure, no clear pattern was evident within the plough damaged subsoil and the potential exists that some examples may originate from later agricultural activity. It is probable that an open area excavation would be required to establish the full extent of the remains of any external field systems in the vicinity of the enclosures. A small number of possible archaeological features, including pits and/or postholes, were noted within the fields and the possibility that these were associated with external industrial/structural features was noted.

# PROJECT DETAILS

| | |
|---|---|
| ***Archaeologist*** | Tony Cummins |
| ***Project type*** | Test Trenching |
| ***Excavation Licence*** | 18E0499 |
| ***Detection Licence*** | 18R0171 |
| ***Townland*** | Limekilnhill |
| ***County*** | Meath |
| ***OS Sheet*** | ME025 |
| ***ITM*** | 687443, 766868 |
| ***Planning details*** | n/a (pre-planning stage) |
| ***Development Type*** | Proposed housing development (pre-planning stage) |
| ***Client name*** | Coindale Ltd. |

# *Contents*

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*Project Details* ..... *ii*

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2. *Context* ..... *2*
3. *Test Trench Results* ..... *11*
4. *Preliminary Observations* ..... *39*
5. *Conclusions* ..... *42*
6. *References* ..... *43*

# 1. Introduction

This report presents the results of a preliminary phase of test trench investigations undertaken as part of a pre-planning application assessment of a proposed development site which comprises a number of tillage fields located approx. 650m to the south of the historic core of Navan town. The town suburbs have expanded into the surrounding lands in recent decades and the subject site now forms a parcel of farmland surrounded by modern housing developments.

A geophysical survey of the proposed development site was undertaken by Jo Leigh in May 2018 (Licence 18R0084). Details of the results are provided in Section 2 of this report but, in summary, two sub-rectilinear enclosures and a number of potential associated features were identified within the landholding (Figure 4). The programme of test trenching described in this report was undertaken in order to investigate the outer extent of the enclosures and the potential external features identified within their environs. The testing strategy was designed to interrogate the results of the geophysical survey while minimising excavations within the interior of both enclosures as part of the preliminary phase of site investigations. The results of the test trench investigations are presented in Section 3 of this report.

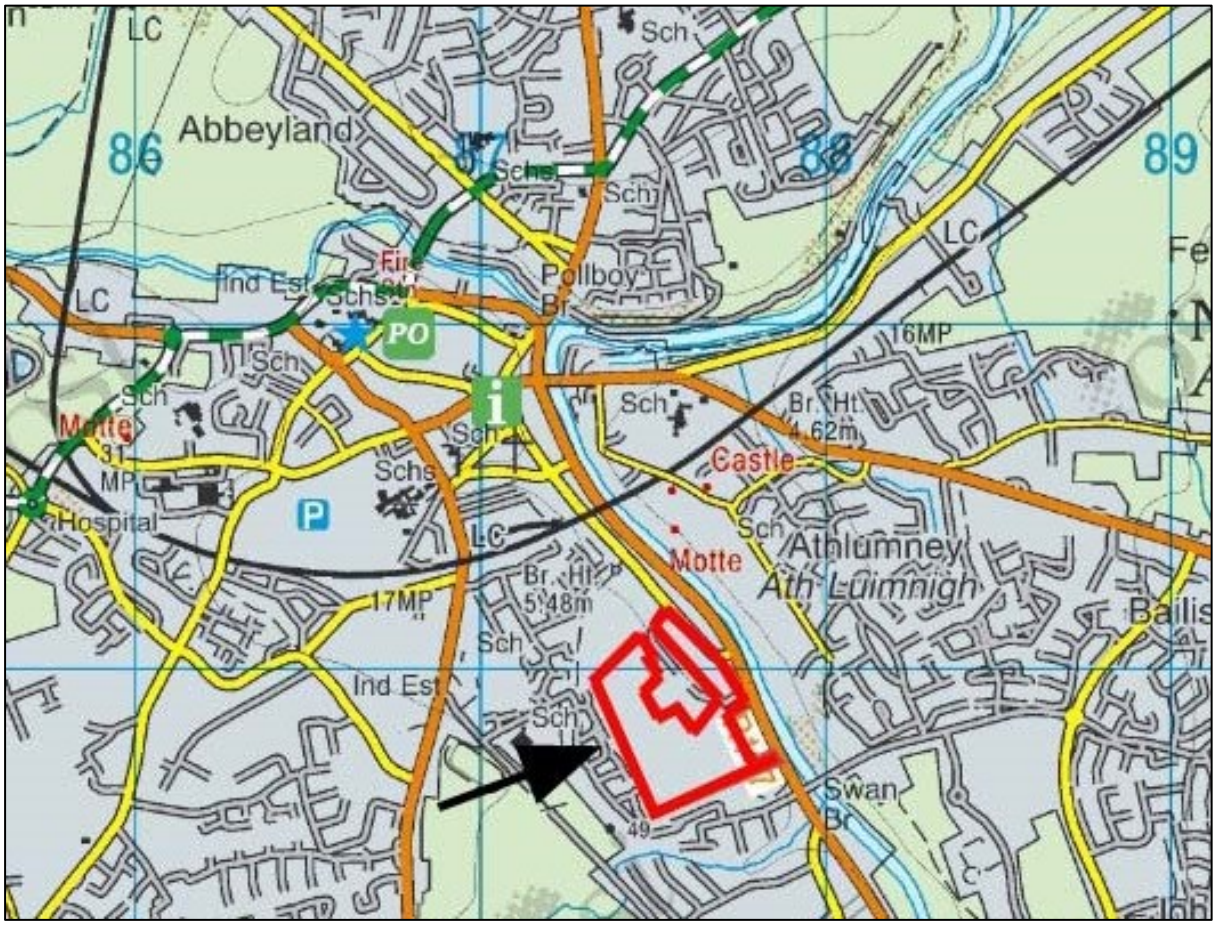



***Figure 1:*** *Discovery series map showing site location [OSI Licence ref. 0003318]*

# 2. Context

***Setting***

The proposed development site is located within tillage farmland on the southern outskirts of Navan town and its eastern boundary is located 70m to the west of the River Boyne at its nearest point. The ground levels within the subject site are broadly level in the western half which is located on an elevated area above the River Boyne and this area includes the locations of two enclosures identified during the geophysical survey (see below). The eastern half of the site is dominated by gentle to moderate downward slope towards the eastern boundary of the landholding which is bounded by the Dublin road which flanks the west bank of the river. Bedrock in this area comprises marine basinal facies (Tobercolleen and Lucan Fms - "Calp"); dark-grey argillaceous and cherty limestone and shale, with soil profiles of fine loamy drift with limestone inclusions.

The lands within the subject site are currently in use as tillage farmland and crops had been harvested in the weeks prior to the test trench investigations. The internal boundaries are formed by tree-lined hedgerows and no visible traces of undulations in the ground surface at the locations of the two enclosures were observed during an inspection carried out prior to the submission of the licence application. A stand of mature trees is located near the centre of the eastern half of the site while a disused field in the northeast corner is under tall grass growth. These areas were not accessible for test trenching at the time of the test trenching excavations.

The two enclosures identified during the geophysical survey are located within areas of barely perceptibly elevated ground within the level terrain in the western half of the landholding. While sited in close proximity to the River Boyne the views directly down to the river are obscured from their locations by the natural terrain. The lands extending in all other directions are broadly level and the setting of the two enclosures afford good views across the landscape in all directions. The central areas of both enclosures have been bisected by single, east-west orientated field boundaries which are present on the 6-inch OS map. These boundary features comprise combinations of heavily overgrown hedgerows with mature trees and both contain drainage ditches that have been obscured with brambles and fallen branches. It is probable that the drainage ditches and tree roots have resulted in localised areas of disturbance extending through the centre of both enclosures.

***Recorded Archaeological Resource***

The Record of Monuments and Places (RMP) and Sites and Monuments Record (SMR) do not list any known archaeological sites within the landholding and the nearest example is the recorded location of a souterrain (ME025-035----), now occupied by a modern housing estate, at a distance of 260m to the south (Figure 2). While there are a number of other souterrains within the lands located within 300m-400m from the boundary of the proposed development site there are no recorded ringforts within 1km of the site, indicating the potential for the presence of unrecorded early medieval settlement activity within the area.


***Figure 2:*** *Location of recorded monuments within environs of subject site (www.archaeology.ie)*

***Excavations Database***

The Excavation Database contains a number of entries for previous archaeological investigations within areas located 300m-400m from the site boundary (see Appendix 2 for full descriptions). Monitoring of the construction of the R161-R153 link road in the area to the north of the subject site uncovered nothing of archaeological significance (E. Dennehy; Licence 03E0613). Archaeological test trenching of a sub-circular field boundary within the grounds of Beaufort College, to the west of the subject site, demonstrated that the feature was not archaeological in origin (D. Murphy; Licence 15E0065). Archaeological investigations at a distance of 340m to the southeast of the subject site in Athlumney townland, on the opposite bank of the river, uncovered four souterrains within the environs of a quarry site (C. Jones; Licence 98E0596).

***Topographical Files***

The topographical files held in the National Museum of Ireland, Kildare Street were reviewed and contain no files recording the discovery of archaeological artefacts within Limekilnhill townland.

***Historical Context***

The subject site is located approx. 650m to the south of the historic core of Navan town which developed as an Anglo-Norman settlement in the period following the late 12th century. Navan town and its environs were described as follows during the 19th century (Lewis 1837):

> *NAVAN, an incorporated market and post-town (formerly a parliamentary borough), and a parish, in the Barony of Lower Navan, county of Meath and province of Leinster, 7 miles from Trim, and 23 from Dublin, on the road to Enniskillen; containing 5292 inhabitants, of which number, 4416 are in the town. It is one of the first boroughs*

*established by the English in the Palatinate of Meath, and appears to have arisen under the patronage of the family of the Nangles Barons of Navan, who, towards the close of the 12th century, founded here an abbey for Canons Regular of the order of St. Augustine. The town is situated in the centre of the county, and at the junction of the rivers Blackwater and Boyne; it consists of three principal streets, from which several smaller branch off in various directions, and contains about 850 houses, many of which are well built; altogether it has a neat, cheerful, and thriving appearance….The chief trade is in provisions, which is extensively carried on with Drogheda, and seems to have been consequent on the opening of the Boyne Navigation from that part to Navan, a line of 15 miles in extent; and its further extension inland, which has been attempted but not yet carried into effect would contribute greatly to its increase and to the general prosperity of the neighbourhood. There is also a considerable retail trade with the surrounding districts. In the immediate vicinity of the town, and closely connected with its trade, though locally within the limits of the adjoining parish of Athlumney, are flax-mills on the river Boyne, affording regular employment, on the average, to about 260 persons, and in the same parish, but close to the bridge of Navan, are some very extensive flour-mills, the property of Mr. Delany… The parish comprises 349 statute acres, of which 2802 are applotted under the tithe act. The land is of middling quality, and about two-thirds of it are under tillage; the system of agriculture is much improved, and there is very little waste land or bog. Limestone of good quality abounds, and is quarried both for burning into lime and for building. The principal seats are Boyne Hill, the residence of Lieutenant Colonel T. Gerrard, beautifully situated on the bank of the river; Belmont, of J. Goggan, Esq.; and a handsome residence recently erected, near the road to Dublin, by L. Byron, Esq., M.D., commanding some pleasing views.*

The subject site is wholly contained within the townland of Limekilnhill which is listed in the 17th-century Down Survey as being in the ownership of James Dillon at that time[1]. The site boundary encompasses a number of fields located adjacent to Belmount House which is located outside the boundary of the proposed development area. This early 19th-century country house was the residence of J. Goggan in the 1830s and it was described as a 'neat house, with a garden and pleasure ground attached' in the Ordnance Survey Field Name Books (1835-6)[2]. By the start of the 20th century the house had come into the ownership of the Spicer family who ran a milling operation in Navan town. The house is listed as a Protected Structure (NT025-177 and NT025-178) and is also included in the National Inventory of Architectural Heritage (NIAH ref. 14013039). The NIAH designates the house as being of Regional significance and describes it as follows:

*Detached five-bay two-storey house over basement, c.1825. Re-orientated, enlarged and porch added, c.1910. Windows refitted c.1994. Double-pitched and hipped roof, natural slates, decorative clay ridge tiles, nap rendered chimneys. Rendered ruled and lined, limestone string course - east façade. Stone cills, uPVC casement windows - except for some basement sash windows, balustraded porch, bay window - west façade. Standing in its own grounds.*

A farm building located to the north of the house, and also outside the proposed development site, is also included in the NIAH (14013035) which describes it as follows:

*Detached four-bay L-plan single-storey farm building, c.1825, set in walled cobbled yard. Double-pitched and hipped roof, corrugated iron. Uncoursed rubble walls - whitewashed. T & G deal double doors, brick dressings, narrow vent loops. Cobbled paving to yard. Rubble stone wall to north-east of yard with brick-dressed openings.*

### *Cartographic and Aerial Images*

The subject site is shown as enclosed fields around an early 19th-century country house (Belmount House) on the 1st edition 6-inch and 25-inch Ordnance Survey (OS) maps. The layout of the fields shown on both editions is broadly similar to the existing layout albeit with a number of boundaries that were levelled during the 20th century. There are no potential unrecorded archaeological sites, buildings, demesne features or townland boundaries indicated within the boundary of the proposed development area on

[1] http://downsurvey.tcd.ie/landowners.php#mc=53.649282,-6.679152&z=14
[2] http://www.navanhistory.ie/index.php?page=belmount

either edition. The absence of any traces of features, such as banks or ditches, associated with the enclosures identified during the geophysical survey indicates that they had been levelled prior to the 19th century. No traces of the enclosures were noted during an inspection of consulted online aerial images.

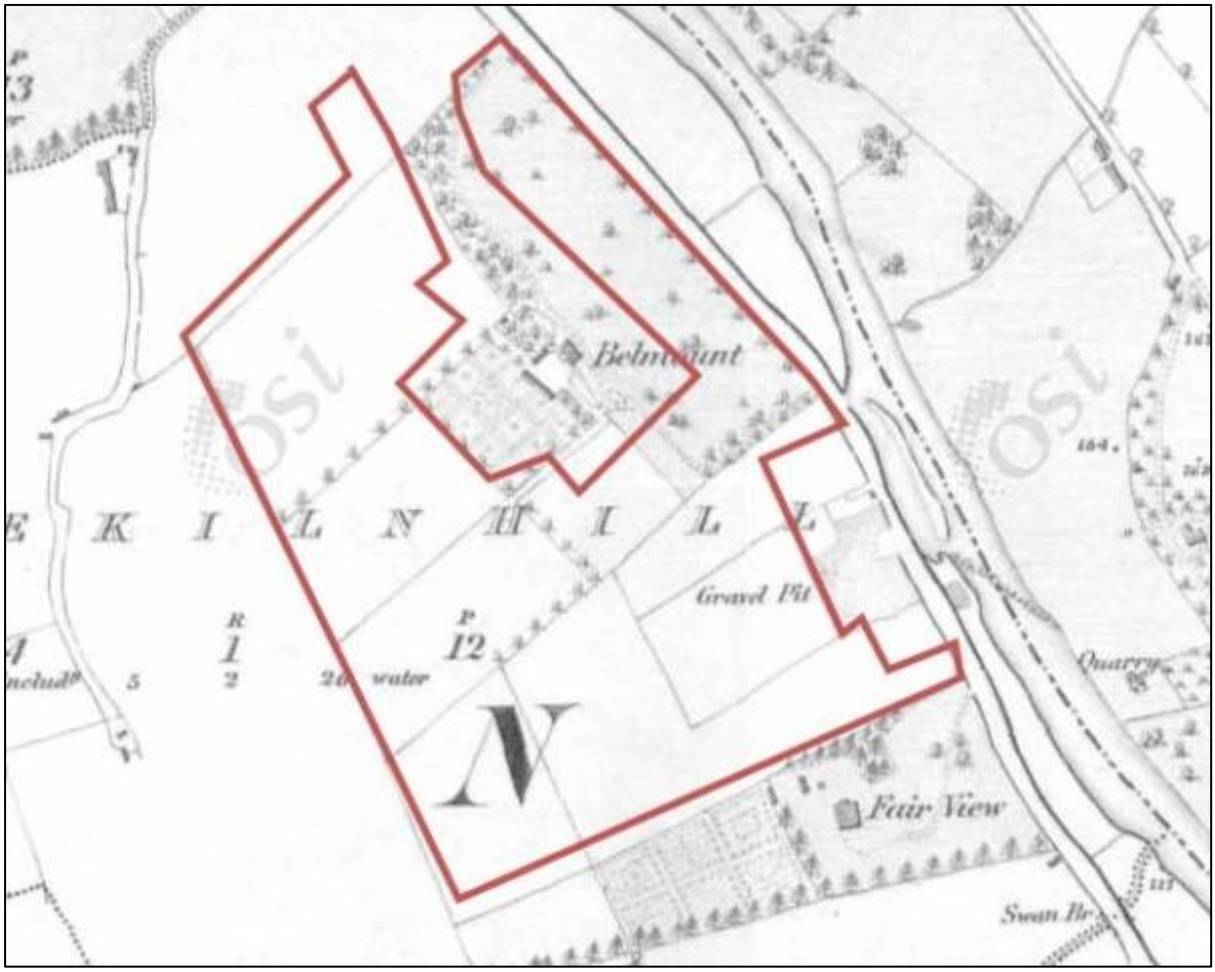



***Figure 3:*** *Extract from 6-inch OS map of c.1842 showing approx. layout of subject site*

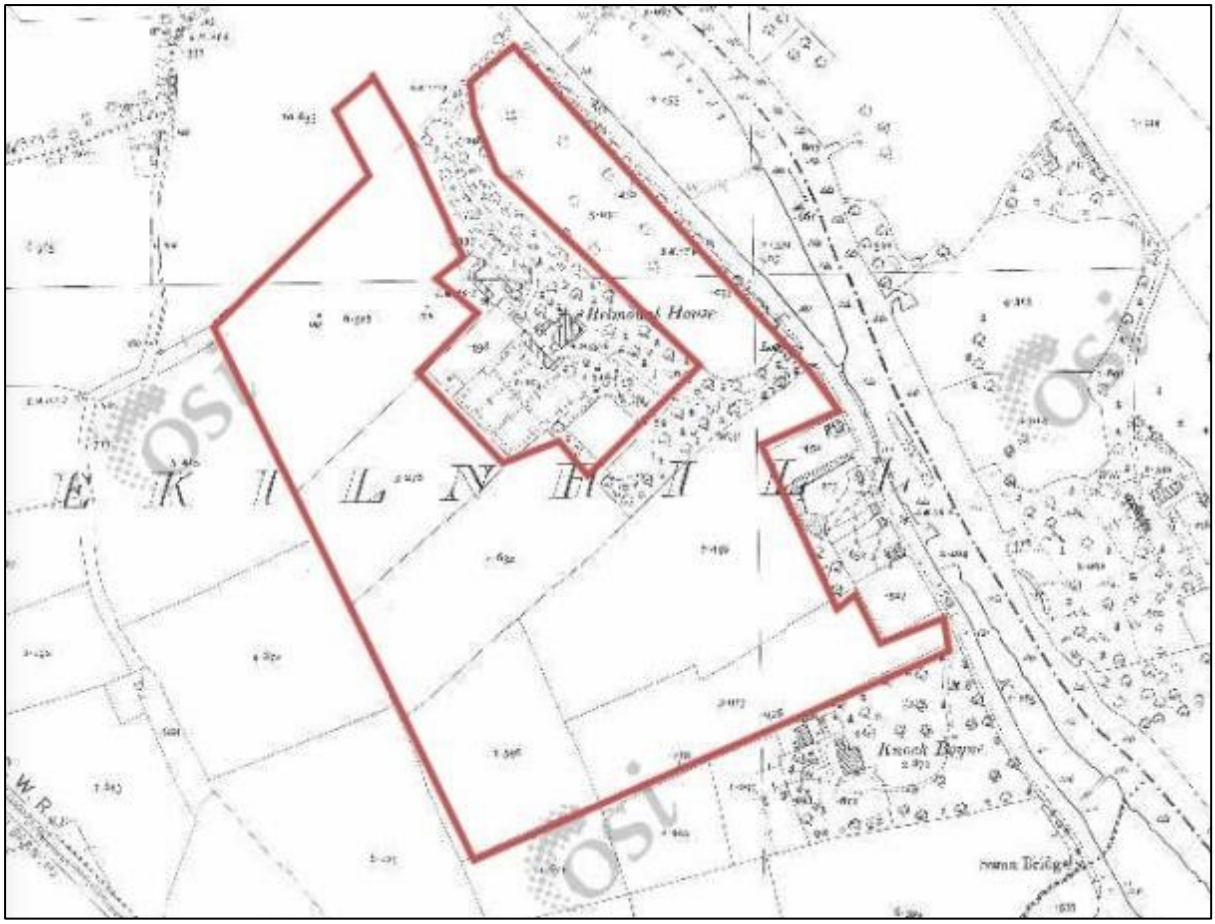



***Figure 4:*** *Extract from 25-inch OS map (1888-1913 series) showing approx. layout of subject site*


***Figure 5:*** *Aerial view of locations of enclosures (www.google.com/maps)*

***Geophysical Survey***

The following section presents direct extracts from the geophysical report (Licence 18R0084).compiled by J. M. Leigh and should be read in conjunction with Figures 6 and 7 (below).

*The geophysical survey has successfully identified two enclosure sites within 50m of each other.*

*Northern Enclosure*

*The northern enclosure, measuring.45m x 68m, comprises of a clear sub-rectilinear enclosure ditch (1) with a possible entranceway in the west of the site (2). A cluster of responses within the enclosure are indicative of habitation activity, with possible fired features such as hearths (3). Annexes of the enclosure are evident to the east and south and rectilinear responses to the north may represent a small associated field system.*

*A rectilinear annex to the east of the main enclosure ditches is represented by trends and fragmented responses (4). Plough trends are evident in the data set here and show some correlation with the orientation of the annex responses. Their possible association with the enclosure is unknown. A series of responses (5) to the north-east of the main enclosure form a fragmented rectilinear pattern. This may represent an annex to the main enclosure, or represent associated agricultural plots. Extending north from (5), into Area B, are further trends (6). Although these are magnetically weak they form a pattern indicative of a possible field system, perhaps associated with the enclosure (1). Another possible annex is located to the south and is represented by curvilinear trends and responses (7). The trends are magnetically weak, perhaps indicative of plough damage. Within the annex there are magnetically strong isolated responses (8). These may represent pits or possible burnt features. To the east of the annex (7) there is an area of magnetic disturbance*

*(9). Although this is typical of modern disturbance, it is also possible that a spread of burnt material of archaeological interest is represented here. It is noted that isolated responses (10) are located to the immediate north. These may represent a cluster of pit-type features. Although interpretation of (9) and (10) is tentative, these responses must be considered to be of archaeological potential.*

*Southern Enclosure*

*This enclosure (11) is similar in shape and form to (1). The main enclosure ditches measure c. 48m x 56m. The enclosure (11) appears more fragmented than (1), perhaps suggesting plough damage has occurred. Nevertheless, the responses present a clear enclosure with linear trends extending to the north and south.*

*Linear trends (12) extend to the south and it is speculated that features associated with the enclosure would have continued to the south, where modern housing is now located. Trends and responses (13) extend from (11) to the north. These form a rectilinear pattern and perhaps represent another annex feature or associated small field system. An isolated response (14) has a broad magnetic signal and may represent a large pit-type feature.*

*A cluster of responses (15), in Area G, has no clear pattern or form. It is possible that these represent modern material. However, an archaeological interpretation must be considered. These responses may represent plough damaged ditch-type features or perhaps a cluster of pits. Given the proximity to the enclosure site, an archaeological interpretation must be considered. A linear trend (16) crosses through Areas F and G. This is perpendicular with the existing field boundaries and most likely represents a former field division. A further negative trend (17) extends from (16), traversing easterly. This may represent a former trackway or wide field division. Trends (16) and (17) are considered to be agricultural in origin and not related to the enclosure sites.*

*Other features*

*Area H is contained within a level field immediately adjacent to the road on the east side of the landholding. Parallel linear trends orientated west to east most likely represent ploughing activity. Within the ploughing there is a broad response (18) of archaeological potential. Although there are no further responses in the vicinity, it is possible that a large pit feature is represented here.*


***Figure 6:*** *Greyscale image of geophysical survey results*

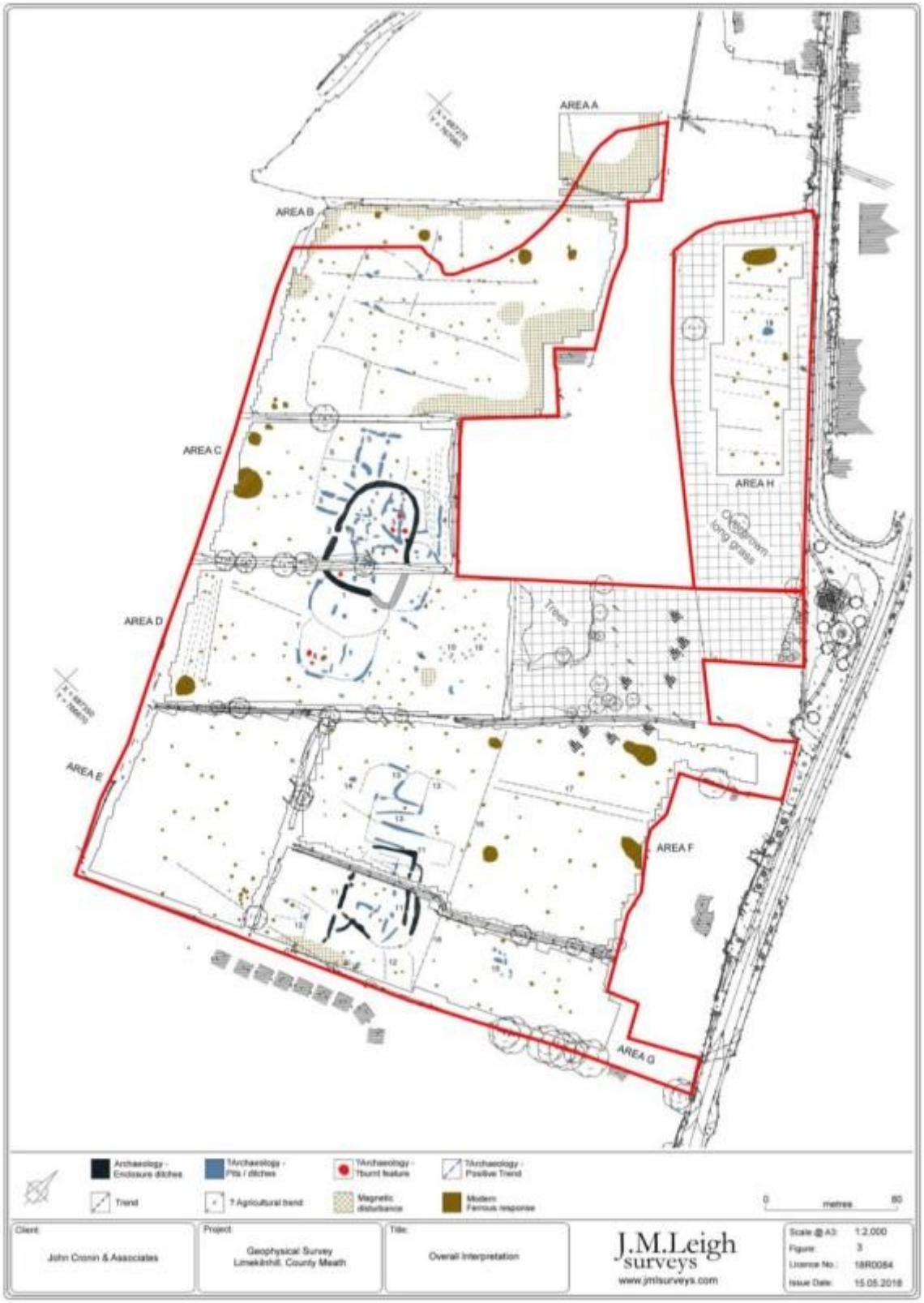



***Figure 7:*** *Interpretation of geophysical survey results*

# 3. Test Trench Results

The archaeological test trench investigations were carried out under a licence issued by the National Monuments Service (**18E0499**) and a detection licence for the use of a metal-detector was also obtained in order to assist in artefact retrieval (**18R0171**). A total of eighteen test trenches were excavated within the proposed development site by a machine operating with a 1.8m wide toothless bucket and their layout was designed to intersect with various geophysical anomalies of archaeological potential. There was no access permitted to the location of three proposed trenches (Trenches 1, 2 and 3) within an overgrown field within a separate plot to the east of Belmount House. One of the trenches within the southern area of the main section of the site was located under a low overhead electricity wire and was also left unexcavated due to safety issues (Trench 19). All excavations were supervised by the author and the locations of all geophysical anomalies of archaeological potential were then manually cleaned by the project team (Colm Chambers, Padraig Dunne and Sean Tiffin).

As stated in the methodology submitted to the NMS as part of the licence application, the excavations were undertaken to the surface of potential archaeological features which were then cleaned, recorded and left to remain *in situ*. All of the trenches were backfilled with the upcast ploughsoil at the completion of works.

The trench layout was designed to concentrate preliminary investigations of the geophysical anomalies within the areas outside the enclosures that have been identified as being of archaeological potential (annexes, field systems, pits, etc.). The aim of this phase of investigation was to result in a balance of an examination of these potential archaeological features while minimising impacts on any potential sub-surface features or deposits. A limited amount of trenching along the outer edges of both enclosures was also undertaken in order to ascertain the widths of the enclosing ditches, the depth of the overlying ploughsoil (and nature of any cultural inclusions within that layer) and the extent of plough disturbance on the surface of the underlying natural subsoil in order to allow some assessment of the potential for the survival of occupation deposits within both enclosures.

A visual inspection of the ploughsoil surface on the footprint of both of the enclosures (and associated annexes) was also carried out during the project. The crops within the fields had been cut in the weeks prior to the commencement of the site investigations and the ploughsoil surface was clearly visible amongst the low stubble. Two sherds of unglazed pottery, both with dark red, gritty fabrics, were identified on the surface of the ploughsoil within the interior of the northern enclosure and are tentatively interpreted as originating from imported early medieval wares. These were both recovered and will be available for specialist analysis as the project progresses. The combination of the visual inspection, and subsequent test trenching, also revealed the widespread presence of pottery and other materials dating from the 18th century onwards with a predominance of inclusions dating to the 19$^{th}$ and 20$^{th}$ centuries. Trenching revealed that these inclusions were present down into the surface of the natural subsoil and clearly demonstrated the extent of disturbance created by ploughing activity. There were occasional metallic inclusions noted during a visual inspections and metal-detecting of the upcast from the test trenches and these comprised modern material such as nails and agricultural tool/machine parts. The range of inclusions was consistent with material originating from farmyard manure periodically spread across the tillage fields during recent centuries. The frequency of these inclusions steadily decreased in the fields furthest from Belmount House, indicating that they may have originated from the farmyard located in this area. Despite the townland name, there were no obvious inclusions of lime fragments noted within the soil profiles although the oyster shell fragments noted throughout the fields appears to have originated as element of manure material.

The ploughsoil within all the trenches was composed of a homogenous dark silty clay loam (average 20cm deep) containing moderate inclusions of small stones as well as cultural inclusions such as 18$^{th}$-20$^{th}$ century

pottery sherds and small fragments of coal and clay tobacco pipes, bricks and oyster shells, the latter perhaps introduced as a manure. The upper ploughsoil overlay a shallow interface layer of disturbed subsoil (average 10cm deep) which formed the base of the plough zone. The surface of this interface layer was truncated by frequent thin ploughmarks which were likely the result of the ongoing modern cultivation activity within the fields. The underlying natural subsoil was composed of a yellowish brown silty clay, the surface of which was also truncated by extensive ploughing activity which had introduced frequent inclusions of buried modern glass and pottery sherds down to this level.

***Test Trench Results***

The following table presents a summary of the results from each trench and includes extracts from the photographic archive.

***Table 1:*** *Summary of test trench results (to be read in conjunction with Figure 8)*

| ***Trench*** | ***Aim of Investigation*** | ***Length*** | ***Test trenching results*** |
|---|---|---|---|
| 1 | To intersect with Geophysical Feature 18 (possible pit) and adjacent area of ploughing | - | Field not accessible at time of investigations |
| 2 | Investigate area under tall grass and unavailable for geophysical survey | - | Field not accessible at time of investigations |
| 3 | Investigate area under tall grass and unavailable for geophysical survey | - | Field not accessible at time of investigations |
| 4 | To intersect with Geophysical Feature 6 (possible field system) | 40m N-S | The surface of the natural subsoil was truncated by the base of plough furrows on an E-W orientation and spaced at intervals of 1m-3m apart. These averaged 30cm wide and were filled with ploughsoil. No obvious traces of field boundary features were observed but the potential that they were infilled with re-deposited subsoil or masked by the mixed ploughzone soil was noted.  *View of Trench 4 from south* |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | | |
| 5 | To intersect with Geophysical Feature 6 (possible field system) | 50m E-W | The general stratigraphy and inclusions noted in this trench were broadly similar to that uncovered in Trench 4 to the east. A 40cm wide N-S field drain filled with dark ploughsoil was noted at the west end of the trench in the area adjacent to the west field boundary.<br>  <br>*View of Trench 5 from west* |
| 6 | To intersect with Geophysical Feature 6 (possible field system) | 40m N-S | The general stratigraphy and inclusions noted in this trench were broadly similar to that uncovered in Trench 4 to the north and Trench 5 to the west. A 40cm wide E-W field drain filled with dark ploughsoil was noted at the south end of the trench in the area adjacent to the south field boundary. The E-W cultivation features were most evident in the southern half of the trench and were set at average distances of 1m apart. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of furrow in south end of Trench 6* |
| 7 | To intersect with Geophysical Feature 5 (possible north annex to northern enclosure or agricultural plots) | 60m E-W | The ploughsoil in this area averaged 30cm in depth and contained early modern inclusions such as pottery, small coal fragments, occasional iron nails and one horseshoe. Two small fragments of iron slag were noted within the ploughsoil in the trench section. The subsoil was truncated by E-W plough marks which measured 20cm wide and were spaced 20cm-30cm apart. They were infilled with dark ploughsoil and 19th-20th century pottery inclusions were noted on their surfaces during manual cleaning. No obvious traces of annex or land division features were observed but the potential that they were infilled with subsoil or masked by the disturbed subsoil within the ploughzone was noted. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Trench 7 from west showing east-west plough marks* |
| 8 | To intersect with Geophysical Feature 5 (possible north annex to northern enclosure or agricultural plots) | 15m N-S | The lower 10cm of the ploughsoil consisted of a mottled light-mid brown sand clay, with occasional bands of light yellow clayed sand. This level represented the ploughzone horizon and contained inclusions of modern and post-medieval pottery shreds, animal bone fragments and occasional brick and coal fragments. The bases of evenly spaced E-W ploughmarks were present on the underlying subsoil surface. A linear feature identified by the geophysical survey at the southeast end of the trench was not identified during a manual clean back of this area, perhaps due to an infill with re-deposited subsoil. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of base of disturbed plough zone in Trench 8* |
| 9 | To intersect with Geophysical Feature 4 (possible rectilinear annex to the east of the north enclosure) | 12m E-W | The ploughsoil in this area averaged 20cm in depth and contained early modern pottery and glass shards. The subsoil surface within the trench was truncated by N-S ploughmarks set 1m apart. A N-S stone trackway, with modern inclusions, was uncovered beneath the sod layer in the east end of the trench and is on the potential line of a feature interpreted as the potential enclosing element of an east annex to the north enclosure identified on the geophysical survey. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Trench 9 from east* |
| 10 | To intersect with Geophysical Feature 4 (possible rectilinear annex to the east of the north enclosure) | 10m E-W | The stratigraphy and inclusions noted in this trench were similar to that uncovered in Trench 9 to the north |
| 11 | To intersect with Geophysical Feature 1 (north enclosure ditch) and Feature 4 (possible rectilinear eastern annex to the north enclosure) | 40m E-W | This trench extended eastwards from the inner edge of the eastern side of the enclosing element of the northern enclosure and continued through a possible eastern annex identified in the geophysical survey, which noted that this area appeared to have been noticeably plough damaged. The line of the enclosure ditch (F11:01) was encountered in the western end of the trench while a number of potential external postholes and/or pits were also identified in the external area to the east.<br><br>The upper level of the ploughsoil consisted of a 20cm deep mid-light brown silty clay loam and this overlay a 0.1m-0.15m layer of mixed subsoil which represented the base of the ploughzone horizon. Occasional inclusions of modern and post-medieval pottery shreds, animal bone fragments, flecks of burnt bone, modern glass and nails were noted down to the base of the ploughzone. The subsoil consisted of a mottled light yellowish red sandy clay with frequent inclusions of sub-angular stones and pebbles.<br><br>While no enclosing element of a potential eastern annex, potentially infilled with re-deposited subsoil, was identified on the subsoil surface outside the enclosure, a cluster of possible pits and postholes (F11.02-F11.06) was revealed on the surface of the natural subsoil over an area measuring 7m in width in the eastern end of the trench (between ITM 0687478, 0766871 and 0687471, 0766864). The fills of these potential features generally comprised mottled grey-brown charcoal flecked silty clays and the surface of one example (F11.02) contained a modern nail fragment. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | | *Feature 11:01 (Enclosure Ditch)*<br>This was initially exposed as a 4m wide darkened deposit at the location of the enclosure ditch shown on the geophysical survey. A manual clean back of the surface of the deposit revealed an approx. 2m wide area of re-deposited subsoil on the eastern (outer) side with a noticeably higher gravel content than the surrounding natural subsoil. The initial darkened 4m wide extent of the deposit appeared to be the result of differential moisture retention and the potential that it encompasses a recut of the ditch not which was not clearly evident following the clean back of the deposit. No obvious traces of an internal bank base were identified on the inner (west) side of the enclosure ditch fill. Traces of the bank were noted in Trench 22 (north side of the enclosure) and its absence in Trench 11 may be due to plough disturbance in this area. The trench continued for approx. 5m into the interior of the enclosure. No features were noted in this area during the geophysical survey and no obvious traces of features were noted during a manual clean back of the subsoil surface.<br>  <br>*View of enclosure ditch fill from west*<br><br>*Feature 11:02*<br>Circular deposit (0.4m in diameter) uncovered within centre of trench. A modern nail fragment noted during cleaning of surface. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | | *Feature 11:03*<br>Circular deposit with charcoal flecks (0.4m in diameter). Located centrally in the trench 1.7m east of F11.02<br><br>*Feature 11:04*<br>Circular deposit with charcoal flecks (0.5m in diameter). Located centrally in the trench 2.8m east of F11.03<br><br>*Feature 11:05*<br>Circular charcoal deposit (0.5m in diameter) located against the northern baulk. Small flecks of charcoal and possible burnt bone were noted on the surface<br><br>*Feature 11:06*<br>Circular charcoal deposit (0.65m in diameter) located against the southern baulk. Small flecks of charcoal and possible burnt bone were noted on the surface.<br><br>  <br>*View of external features from east* |
| 12 | To intersect with Geophysical Feature 10 (possible pit cluster) | 40m E-W | A farm trackway composed of small stones was uncovered immediately under the sod layer near the centre of the trench on the line of breaks in the field boundaries to the north and south and formed a continuation of the trackway uncovered in Trenches 9 and 10 to the north. The surface of the track contained a number of |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | | modern inclusions and brick fragments were noted within the makeup material. The bases of a number of N-S cultivation furrows were noted on the subsoil surface (at approx. 2m intervals) in the east end of the trench and these averaged 0.1m wide. Two E-W furrows were uncovered in the west half of the trench and these did not extend east of the trackway, perhaps indicating that it formed part of a land division feature in recent centuries.<br>  <br>*View of from farm track from south* |
| 13 | To intersect with Geophysical Feature 9 (area of magnetic disturbance) | 40m E-W | The area of magnetic disturbance corresponded to a 2m wide band of stones, with modern inclusions, which was uncovered beneath the sod layer and extended under the north and south baulks. While not on the same line as the trackway uncovered to the northeast in Trench 12 it was of similar composition. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of modern stone deposit* |
| 14 | To intersect with west end of Geophysical Feature 7 (west end of south annex to north enclosure) | 40m E-W | The ephemeral surface traces of an approx. 2m wide band of potentially re-deposited band of subsoil was noted at the location of the enclosing element of the inner annex to the south end of the enclosure. The potential that this width is the result of soil drift within the base of the plough zone was noted and it is possible that an underlying ditch feature is narrower in extent. The presence of charcoal flecks and a small fragment of slag in the overlying ploughsoil may be the result of some industrial activity within the annex but the presence of inclusions such as chinaware down into the subsoil surface demonstrated the potential for the extent of the intrusion of early modern inclusions within this area. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of annex ditch fill from west (ranging rod located on outer edge)* |
| 15 | To intersect with west end of Geophysical Feature 7 (west end of south annex to north enclosure) | 40m E-W | A series of E-W plough marks were found to extent through the trench. A 2.5m wide ephemeral band of mixed subsoil, with a noticeable concentration of more stones inclusions than the surrounding subsoil, was noted at the location of the east side of the potential outer annex. As with Trench 14 to the north, it is possible that this width represents a drift of upper fill material within the ploughzone and that an underlying ditch feature may be narrower in extent. While no internal annex features were observed, the geophysical survey indicates that features displaying evidence for burning, perhaps associated with an industrial activity, are located within the environs of the trench. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of annex ditch fill from west (ranging rod located on outer edge)* |
| 16 | To intersect with Geophysical Feature 13 (possible north annex to south enclosure) and Feature 14 (possible pit) | 80m E-W | This trench was excavated across the north end of a series of linear trends located to the north of the southern enclosure and also extended across the location of a possible pit in the area to the west. The subsoil surface within the trench was found to have been truncated by a series of N-S cultivation furrows. The possible pit (Geo. Ref. 14) in the west end of the trench was identified as a small burnt deposit and assigned Feature No. 16:01. A number of linear deposits and a possible posthole were also uncovered near the centre of the trench.<br><br>Feature 16:01<br>Uncovered 11.5m from the west end of the trench, and adjacent to the south baulk, this comprised the fill of a 90cm diameter circular pit. The upper surface of the fill was composed of burnt stones in a charcoal-rich soil matrix. Manual cleaning revealed the edge of a possible surface of small stones (3cm-5cm) beneath the mixed subsoil at the base of the plough zone adjacent to the southeast side of the pit. This feature appeared to extend under the southern baulk and was only partially exposed within the trench in order to prevent dislodging the loosely packed stones. The pit and stone surface may represent a work external industrial area located approx. 40m to the northwest of the southern enclosure. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Pit 16:01 from west*<br><br>Feature 16:02<br>A barely perceptible 3m wide band of potentially re-deposited subsoil (extending under the north and south baulks) was noted at the west end of the possible northern annex to the south enclosure, at a distance of 22m from the west end of the trench. The presence of early modern pottery noted on its surface attested to the disturbance created by ploughing and the possibility that the width of the surface expression of this feature may be the result of soil drift was noted.<br><br>Feature 16:03<br>Another barely perceptible 2.5m wide band of potentially re-deposited subsoil of similar characteristics to Feature 16:02 was revealed near the centre of the trench (45m from west end) at the location of a N-S linear trend identified in the geophysical survey.<br><br>Feature 16:04<br>The fill of a possible posthole/pit was uncovered at a distance of 16.7m from the east end of the trench. It measured 60cm in diameter and was filled with a mid-brown silty clay loam with no evident cultural inclusions or packing material noted on the surface during manual cleaning. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Feature 16:04 (right of trowel) and adjacent furrow* |
| 17 | To intersect with north end of Geophysical Feature 11 (south enclosure ditch) and Feature 13 (possible annex or field system to north of south enclosure) | 40m N-S | This trench was excavated across the lines of a number of E-W orientated linear trends to the north of the south enclosure and terminated just inside the inner edge of the enclosure ditch. A series of E-W fills, which extended under the east and west baulks, were uncovered at the locations of the linear trends as was the fill of the north end of the enclosure ditch.<br><br>Feature 17:01<br>Located at the north end of the trench this comprised a curvilinear, 1.1m wide deposit that extended from under the east baulk and then turned at a rounded corner in the centre of the trench before continuing for 3.2m and extending under the north baulk. The surface of the fill comprised a mid brown silty clay and small animal bone fragments were noted, although the possibility that these were introduced by ploughing activity was noted. The location of this feature corresponds to a curved corner of a geophysical linear feature that continues to the east and north. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Feature 17:01 from north*<br><br>Feature 17:02<br>A 0.7m wide fill, composed of a mid brown silty clay with no evident surface inclusions, was uncovered to the south of F17:01. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Feature 17:02 from north*<br><br>Feature 17:03<br>An ephemeral c.2m wide deposit of possible re-deposited subsoil with medium-sized stones and occasional charcoal flecks was noted near the centre of the trench.<br><br>Feature 17:04<br>A 1m wide deposit of mid brown silty clay with moderate inclusions of small stones was uncovered immediately outside the north end of the enclosure. This linear feature is shown intersecting with the enclosure ditch in the area to the east on the geophysical survey.<br><br>Feature 17:05<br>This 1.2m wide, dark brown deposit was uncovered at the location of the north end of the enclosure ditch identified in the geophysical survey. It contained surface inclusions of charcoal flecks and was noticeably darker in colour than the external linear features to the north. It was on a slightly different orientation to the adjacent external linear feature (17:04) and their trajectory indicated that the point where they intersect is located just outside the east side of the trench. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Features 17:04 and 17:05 (foreground) from south* |
| 18 | To intersect with Geophysical Feature 17 (trackway or levelled field boundary) | 40m N-S | The linear feature identified by the geophysical survey corresponds to the location of a now levelled field boundary shown on the historic OS maps. The base of a levelled field bank was revealed as a 1.5m wide band of re-deposited yellow subsoil with an adjacent infilled field drain on the south side. |

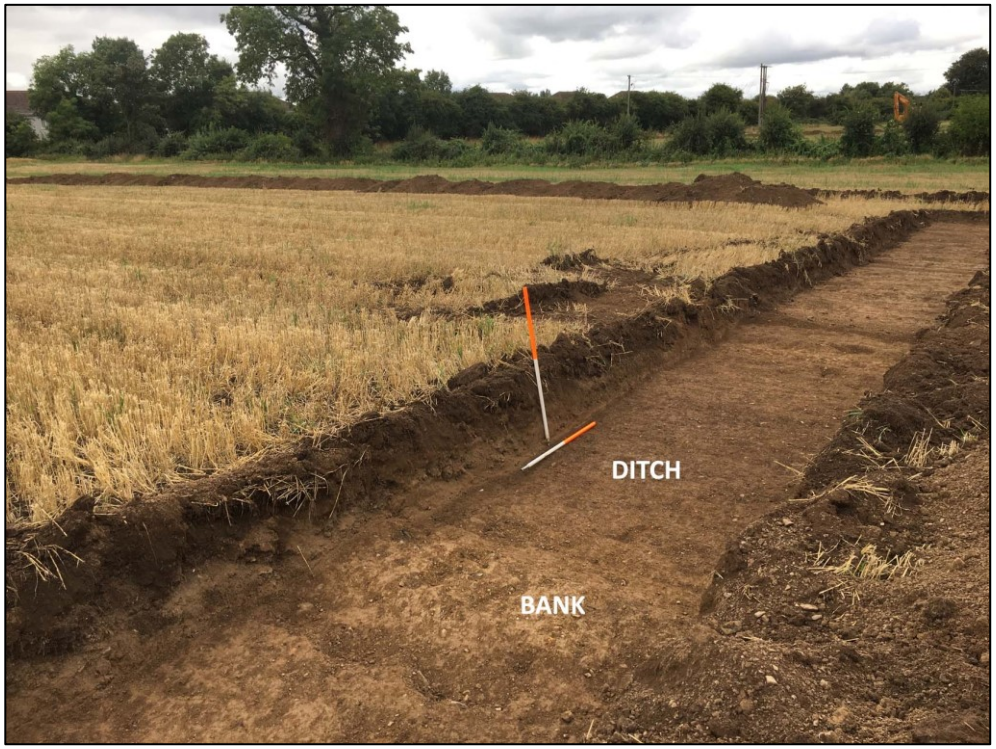
| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Trench 18 from north* |
| 19 | To intersect with Geophysical Feature 12 (linear trends to southwest of southern enclosure) | - | Located beneath line of low-hanging overhead ESB wire and not excavated due to safety concerns |
| 20 | To intersect with Geophysical Feature 12 (linear trends to southeast of southern enclosure) | | A number of deposits at the locations linear trends extending southeast from the southern end of the south enclosure were identified and all extended into the north and south baulks. A series of E-W cultivation furrows extended along the length of the trench.<br><br>Feature 20:01<br>Located 7m from the west end of the trench this comprised a 6m wide deposit of mixed ploughsoil on the subsoil surface which may potentially represent a spread of soil originating from the upper fill of a ditch feature. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Feature 20:01 from west*<br><br>Feature 20:02<br>Located 23m from the west end of the trench this was a 2.5m wide deposit of mid brown silty loam with no evident cultural inclusions on the surface. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Feature 20:02 from south (to left of ranging rod)*<br><br>Feature 20:03<br>Located 30m from west end of trench this 2.5m wide deposit was similar in composition to Feature 20:03 |
| 21 | To intersect with Geophysical Feature 15 (features of unknown origin to east of southern enclosure) | 40m EW | This trench was excavated to investigate a potential cluster of features located approx. 60m to the east of the southern enclosure and three features were uncovered within the excavated area.<br><br>Feature 21:01<br>Located 21m from the east end of the trench and extending under the north and south baulks this comprised a barely perceptible oblong deposit (3.5m wide EW) of loose stones contained in a slightly dark silty soil matrix containing occasional flecks of charcoal and burnt bone. No traces of burn marks on the surrounding subsoil were noted.<br><br>Feature 21:02<br>Located 19m from east end of trench this comprised a curvilinear deposit extending for 1.2m from the south baulk and measuring 1.3m in width (EW). It was composed of a grey brown, stony deposit with occasional flecks of burnt bone and charcoal. As with Feature 21:01 to the east, there were no obvious traces of burning activity on the surrounding natural subsoil. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Feature 21:02*<br><br>Feature 21:03<br>Located 7m from the east end of the trench this circular deposit extended from under the south baulk and its visible extent measured 1.2m in diameter. It was composed of a mid brown sandy clay deposit containing small angular pebbles and, unlike Features 21:01 and 21:02 to the west, there were no inclusions of burnt bone or charcoal noted on the upper surface. Interpreted as fill of possible pit feature. |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | |  <br>*View of Feature F21:03 (to left of trowel)* |
| 22 | To intersect with Geophysical Feature 1 (north end of northern enclosure ditch) | 20m N-S | The general stratigraphy noted outside the enclosure was similar to that encountered in Trench 8 to the east. Three potential archaeological features were recorded towards the southeast end of the trench. The first consisted of the enclosure ditch F22.01 at the location identified by the geophysical survey. The ditch fill was first identified as a spread of mottled dark, moisture-rich soil approximately 4.5m and was sealed by a 10cm deep spread of re-deposited subsoil perhaps originating from the ploughed out bank. Its inner edge was located at ITM 0687415, 0766896 and its outer edge at ITM 0687411, 0766898. A more intensive, manual clean back of the surface of the ditch fill indicated that it may measure 2m in width while the outer 2.5m section (at north) may potentially indicate a recut or a spread of the upper fill created by ploughing activity. A bank of compact re-deposited subsoil (F22.02) measuring 0.6m wide and 0.1m high was located |

| *Trench* | *Aim of Investigation* | *Length* | *Test trenching results* |
|---|---|---|---|
| | | | immediately adjacent to the inner (south) side of the ditch and appeared to represent the basal remains of an internal bank. A possible spread of re-deposited subsoil (F22.03), measuring 1.9m wide, extending south of the identifiable base of the bank may represent a spread of levelled bank material or the lower extent of the plough zone.<br>  <br><br>*View of ditch fill and inner bank base from southeast* |

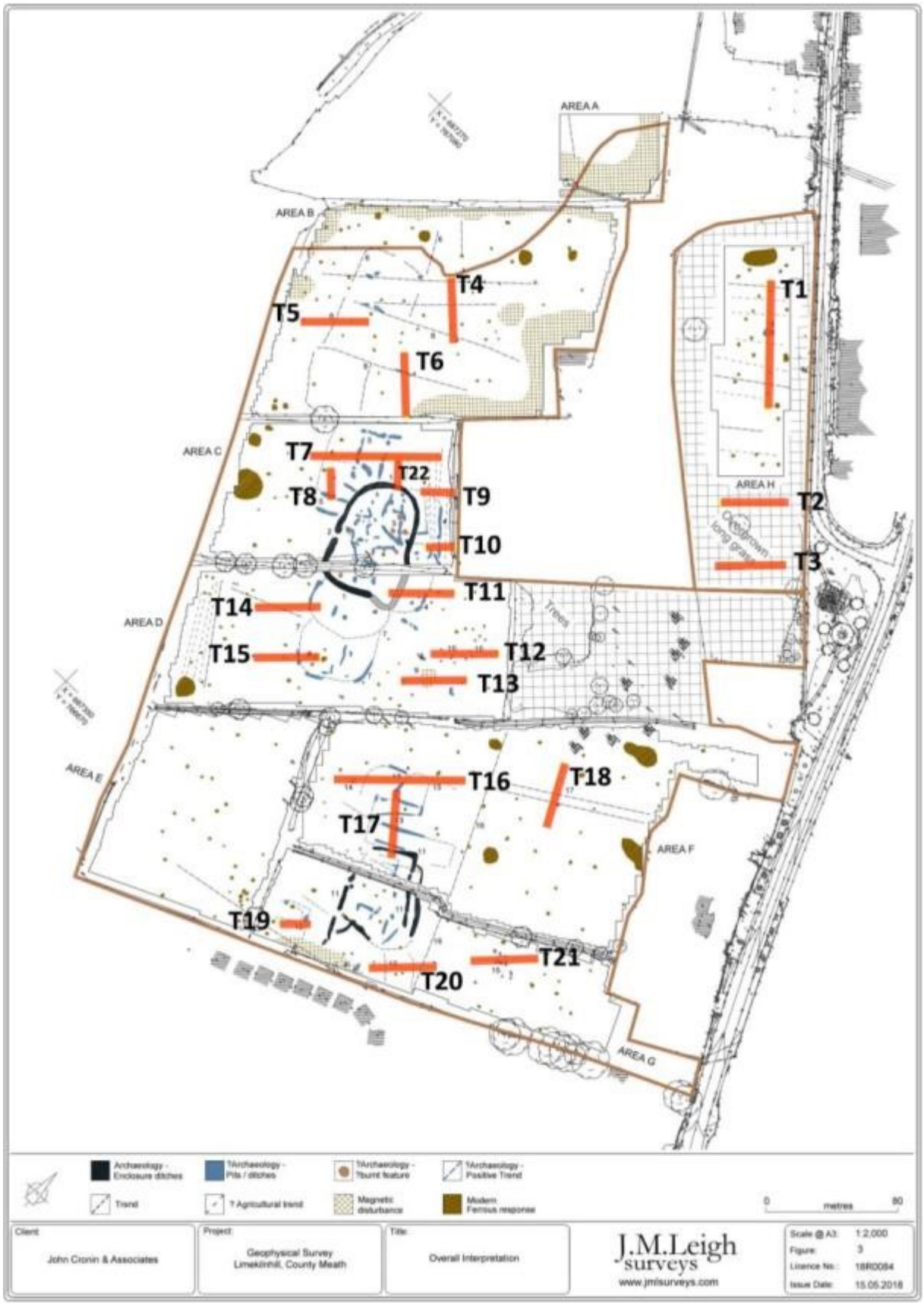



***Figure 8:*** *Location of test trenches (red) superimposed on geophysics interpretation*

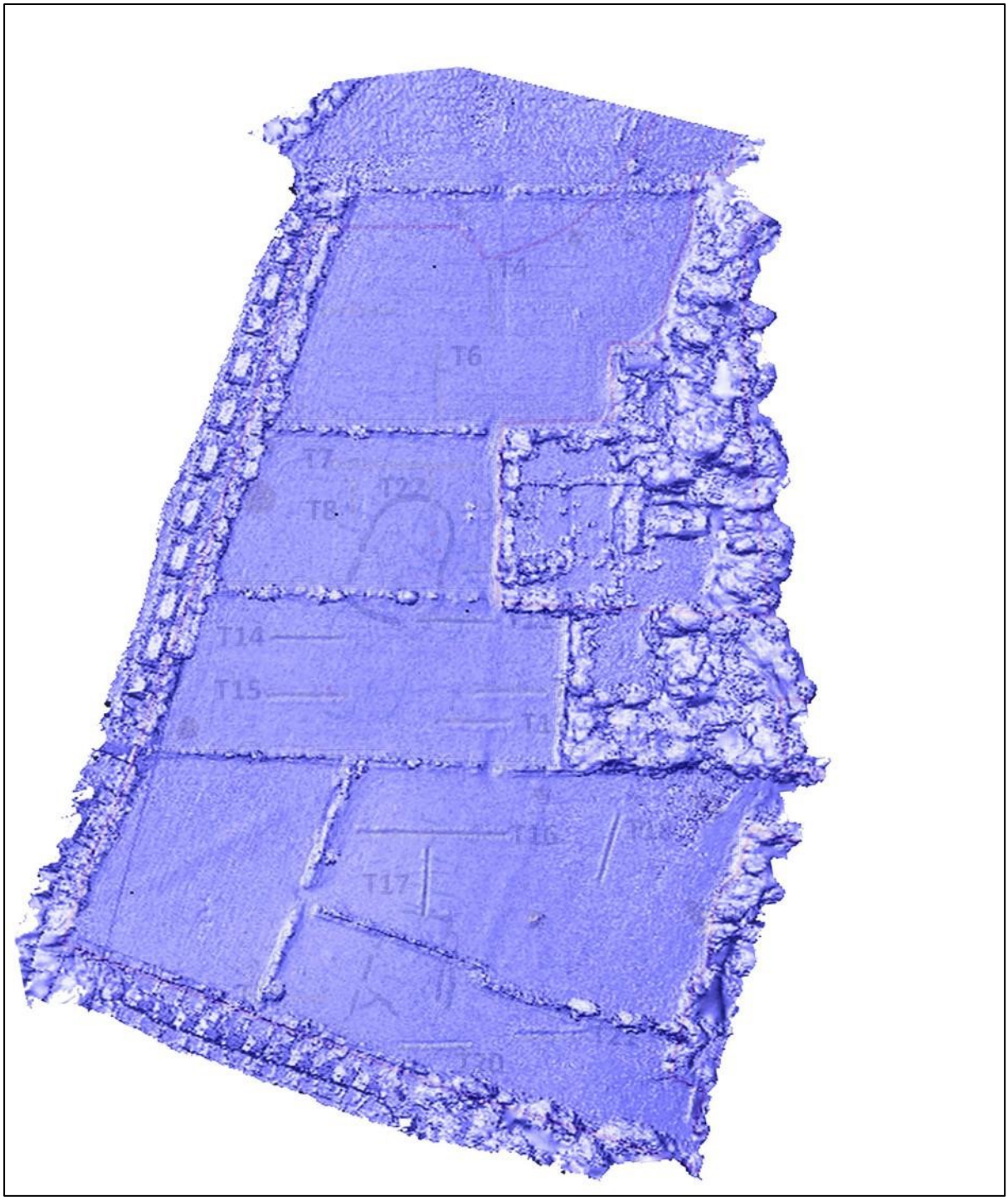



***Figure 9:*** *Location of geophysical survey enclosure responses and test trenches on 3D model*


***Figure 10:*** *Oblique 3D view of test trenching from southwest with central areas of enc*

# 4. Preliminary observations

The combined results of the geophysical survey and test trench excavations have demonstrated the presence of two previously unrecorded archaeological enclosures within the subject site. The fields containing the enclosures were found to have been extensively impacted by ploughing activity and the widespread presence of 18th-20th century inclusions noted down to the level of the natural subsoil indicates that this farming practice has been ongoing during recent centuries. The test trenches were excavated to the surface of geophysical anomalies that are located within a plough zone that is still subject to tillage farming and no excavation of identified deposits or features was carried out during this preliminary phase of investigation. Without recourse to full excavation it was not always possible to establish the extent of features within the disturbed ploughzone and the following general observations are, therefore, based on a combination of their layouts as indicated by the geophysical survey and their visible surface expressions revealed during the test trench investigations.

*The North Enclosure*

As previously noted, the geophysical survey clearly demonstrates that the northern site comprises an irregularly-shaped sub-rectilinear enclosure, measuring.45m x 68m, with a possible entranceway in the west end and a cluster of internal responses indicative of habitation activity, with possible fired features such as hearths. The presence of two sherds of possible imported early medieval pottery noted on the surface of the plough soil during systematic field-walking of the internal area of this enclosure may suggest the period of its construction. The presence of these sherds on top of the modern ground surface also indicates likely movement of material within the ploughzone and the consequential disturbance of underlying archaeological deposits and features. The geophysical survey indicates that this enclosure is univallate and, while conjectural, it is noted that its layout, and that of the second enclosure to the south, is reminiscent of excavated sub-circular and sub-rectangular enclosures that have been dated to the early medieval period, e.g. Colp West, Co. Meath, Cappydonnell Big Co. Offaly and Killickaweeny, Co. Kildare (Corlett & Potterton 2011). These sites may form variants to the ringfort enclosures of that period and has been recorded that, as appears to be the case with the Limekilnhill enclosures, approx. 88% of ringforts in County Meath were univallate (Stout 1997, 17). It is also noted that the geophysical survey indicates that the northern enclosure has an entrance on the west side while many ringforts have eastern entrances in order to provide shelter from prevailing winds. It is may be of some significance that this entrance opens to the south end of the potential field system to the north rather than being orientated to face away from prevailing winds or towards the location of the southern enclosure.

The excavation of two trenches (T11 and T22) extending outwards from the inner edge of the enclosure ditch suggested that this feature may measure up to 4m in total width, although the possibility that this width may encompass at least one 2m wide recut of the ditch was noted. Slight traces of the basal remains of an inner bank were noted on the north side of the enclosure (T22) and the presence of re-deposited subsoil within the ploughzone above the ditch may form a spread of material from the levelled bank. No surface traces of an internal bank were noted along the east side (T11) and the geophysical survey indicates that this area has been subject to an increased amount of plough disturbance. Manual cleaning of both exposed surfaces of the upper ditch fill revealed early modern inclusions which provides another demonstration of the extent of the disturbance of the underlying soil profiles created by ploughing activity.

The geophysical survey clearly shows two conjoined, semi-circular annex-type features located outside the southern line of the enclosure ditch and indicates that these contain a far more limited amount of internal features which may suggest that they may have fulfilled some ancillary agricultural function, such as animal

stockades or work areas. The extents of these annex features respect each other and the adjoining enclosure ditch suggesting that they are likely to be contemporary. The excavation of two test trenches extending westwards from the interior of both features (T14 and 15) did not reveal any obvious traces of internal features on the subsoil surface although the caveat that such features may be concealed within the base of the ploughzone applies. The west ends of both annexes were delimited by bands of barely perceptible re-deposited subsoil (2m wide in T14 and 2.5m wide in T15). The potential that the observed surface widths of both features are the result of soil movement within the base of the ploughzone was noted and it is possible that the underlying ditches are narrower in extent. Test trenching immediately to the east of the enclosure did not uncover obvious remains of a potential rectangular annex identified by the geophysical survey in this area.

*South Enclosure*

While the geophysical survey report notes that the southern enclosure is similar in shape and form to the example to the north it also observes that its responses are more fragmented and are suggestive of more intense plough disturbance in this area. The enclosure ditch encompasses an area measuring c. 48m x 56m and while the survey indicates some internal activity it does not appear to be as widespread as that identified in the northern enclosure, which may perhaps indicate a stockade function. There is also some variance in the layout of the ditch when compared to the broadly curvilinear character of northern example with a sharp right-angled corner in the northeast quadrant and a straight line along the western side. The east side contains both a linear and an (outer) curvilinear response which may be suggestive of at least two phases of ditches in this area.

The trench (T17) excavated northwards from the inner edge of the north line of the ditch revealed the upper fill to be composed of a 1.2m wide dark brown deposit with charcoal inclusions. This was narrower than the ditch feature around the north enclosure and was also quite distinct from the mid-brown fills of the series of east-west orientated ditch features noted within the adjacent potential annex area to the north. The linear layout of the trends forming this potential northern annex is also different to the semi-circular examples identified on the south side of the north enclosure and are more similar in shape to the potential agricultural plots to the north of the northern enclosure rather than an enclosed stockade. While not demonstrable during the preliminary phase of testing, the orientations of the southernmost of the external linear cuts and the adjacent enclosure ditch indicated that they inter-cut in the area to the east of Trench 17 and may, therefore, not be contemporary.

*External Features*

Settlement enclosures of the early medieval period may often form the visible element of wider agricultural centres known as *Airlise* which may contain sub-surface archaeological features such as associated field systems, souterrains, stockades, barns, mills and drying kilns (e.g. Bolger 2012). The linear trends shown extending outwards from the northwest quadrant of the northern enclosure on the geophysical survey (Figure 7; Feature 8) are reminiscent of the petal-shaped fields known to radiate out from ringfort enclosures. It has been suggested that these fields were used as localised areas of tillage within farmlands otherwise primarily devoted to dairy farming (Stout 1997, 37). The test trenches excavated at the locations of the potential field plots in this area did not reveal surface expressions of the boundary features shown on the geophysical survey, perhaps due to a combination of plough disturbance and the potential that they have been backfilled with soils similar in composition to the natural subsoil. While the inclusions within the cultivation furrows noted throughout the site dated exclusively to the 18$^{th}$-20$^{th}$ century the possibility exists that this is the result of later plough disturbance the potential exists that this area may contain relict remains of earlier agricultural activity associated with the occupation of the enclosure.

Test trenching revealed the presence of various small potential pits/postholes within the areas outside the two enclosures including a cluster to the east of the southeast end of the northern enclosure (T11) as well as examples to the west (T16) and east (T21) of the southern enclosure. The geophysical survey does not indicate the presence of any structural features or enclosures within the proximity of these external features and the potential that they represent isolated areas of archaeological activity, perhaps associated with the occupation of the enclosures, is noted.

# 5. Conclusions

The desk-top study, geophysical survey and archaeological test trench investigations described in this report were undertaken as part of a preliminary assessment of the subject lands in advance of planning application for a housing development within the site. This assessment has clearly demonstrated the presence of sub-surface remains of two previously unrecorded archaeological enclosures within the landholding as well as potential external associated features. While conjectural in the absence of excavation of identified features, the potential exists that these sites comprise early medieval enclosures with evidence for conjoined annexes and the potential for the survival of external agricultural activity associated with their occupation.

It is recommended that the National Monuments Service (Department of Culture, Heritage and the Gaeltacht) be consulted in relation to the formulation of agreed archaeological mitigation measures to be incorporated into the proposed housing development as part of the Strategic Housing Development planning process.

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## APPENDIX B – TRAFFIC AND TRANSPORTATION

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Circular Road/Kells Road

**Table 0.1 – Kells Road/Circular Road 2017 LinSig Base Model Result**

| **Kells Road/Circular Road (Base Model AM & PM)** | | | | | |
|---|---|---|---|---|---|
| **Road Name** | **Link** | **Base Model (AM )** | | **Base Model PM** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Circular Road | 1/2 | 64.0% | 3.9 | 74.7% | 5.7 |
| Kells Road Northbound | 2/2 | 70.3% | 8.0 | 76.6% | 9.1 |
| Kells Road Southbound | 3/1 | 40.3% | 4.3 | 30.8% | 3.1 |
| | 3/2 | 30.9% | 1.5 | 24.0% | 1.1 |
| Cycle Time | | 60 | | 60 | |
| PRC (%) | | 28.0% | | 17.4% | |
| Total Delay pcuHr | | 9.1 | | 10.52 | |

**Table 0.2 – Kells Road/Circular Road AM Peak LinSig Results**

| Kells Road/Circular Road AM Peak (08:00 – 09:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Road Name** | **Link** | **2017 AM** | | **AM Opening Year Without Development** | | **AM Opening Year With Development** | | **AM Opening Year + 5 Years Without Development** | | **AM Opening Year + 5 Years With Development** | | **AM Opening Year + 15 Years Without Development** | | **AM Opening Year + 15 Years With Development** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Circular Road | 1/2 | 64.0% | 3.9 | 67.6% | 4.3 | 64.2% | 5.0 | 71.1% | 4.6 | 67.6% | 5.3 | 74.1% | 5.0 | 70.9% | 5.6 |
| Kells Road Northbound | 2/2 | 70.3% | 8.0 | 74.2% | 8.8 | 69.9% | 8.1 | 78.2% | 9.7 | 73.7% | 8.8 | 81.4% | 10.6 | 76.7% | 9.6 |
| Kells Road Southbound | 3/1 | 40.3% | 4.3 | 42.8% | 4.8 | 40.6% | 4.3 | 45.1% | 5.0 | 42.8% | 4.5 | 46.9% | 5.4 | 44.6% | 4.9 |
| | 3/2 | 30.9% | 1.5 | 33.5% | 1.6 | 41.1% | 2.0 | 36.6% | 1.7 | 44.2% | 2.1 | 39.3% | 1.7 | 47.2% | 2.2 |
| Cycle Time | | 60 | | 60 | | 60 | | 60 | | 60 | | 60 | | 60 | |
| PRC (%) | | 28.0% | | 21.3% | | 28.7% | | 15.2% | | 22.2% | | 10.5% | | 17.3% | |
| Total Delay pcuHr | | 9.1 | | 10.06 | | 10.31 | | 11.20 | | 11.32 | | 12.28 | | 12.28 | |

**Table 0.3 – Kells Road/Circular Road PM Peak LinSig Results**

| Kells Road/Circular Road PM Peak (17:00 – 18:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Road Name** | **Lin** | **2017 PM** | | **PM Opening Year Without Development** | | **PM Opening Year With Development** | | **PM Opening Year + 5 Years Without Development** | | **PM Opening Year + 5 Years With Development** | | **PM Opening Year + 15 Years Without Development** | | **PM Opening Year + 15 Years With Development** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Circular Road | 1/2 | 74.7% | 5.7 | 78.8% | 6.3 | 78.8% | 6.3 | 82.8% | 7.2 | 82.8% | 7.2 | 86.4% | 8.1 | 86.4% | 8.1 |
| Kells Road Northbound | 2/2 | 76.6% | 9.1 | 81.7% | 10.5 | 81.7% | 10.5 | 86.0% | 12.1 | 86.0% | 12.1 | 89.5% | 13.9 | 89.5% | 13.9 |
| Kells Road Southbound | 3/1 | 30.8% | 3.1 | 32.6% | 3.3 | 32.6% | 3.3 | 34.4% | 3.6 | 34.4% | 3.6 | 35.8% | 3.8 | 35.8% | 3.8 |
| | 3/2 | 24.0% | 1.1 | 26.3% | 1.2 | 35.1% | 1.6 | 28.8% | 1.3 | 38.0% | 1.7 | 31.3% | 1.3 | 40.9% | 1.9 |
| Cycle Time | | 60 | | 60 | | 60 | | 60 | | 60 | | 60 | | 60 | |
| PRC (%) | | 17.4% | | 10.2% | | 10.2% | | 4.6% | | 4.6% | | 0.% | | 0.5% | |
| Total Delay pcuHr | | 10.52 | | 12.06 | | 12.7 | | 13.95 | | 14.49 | | 16.16 | | 16.73 | |

R161 Circular Road/R896 Bridge Street/Academy Street crossroads

**Table 0.4 – R161 Circular Road/R896 Bridge Street/Academy Street crossroads - 2017 Base Year**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2017 Base Year** | | | | | | | |
| Stream B-ACD | 0.29 | 8.67 | 0.23 | 9.51 | 0.56 | 11.67 | 0.36 | 13.10 |
| Stream A-BCD | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |
| Stream D-AB | 0.71 | 9.92 | 0.42 | | 1.44 | 14.66 | 0.59 | |
| Stream D-BC | 0.17 | 9.71 | 0.14 | | 0.30 | 10.98 | 0.23 | |
| Stream C-ABD | 0.01 | 7.02 | 0.01 | | 0.03 | 7.03 | 0.03 | |
| Stream C-D | - | - | - | | - | - | - | |
| Stream C-A | - | - | - | | - | - | - | |

**Table 0.5 – R161 Circular Road/R896 Bridge Street/Academy Street crossroads - 2022 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2022 Opening Year (With Dev)** | | | | | | | |
| Stream B-ACD | 1.75 | 21.81 | 0.64 | 15.71 | 1.16 | 17.56 | 0.54 | 16.42 |
| Stream A-BCD | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |
| Stream D-AB | 0.83 | 10.83 | 0.46 | | 1.83 | 17.52 | 0.65 | |
| Stream D-BC | 0.20 | 10.68 | 0.17 | | 0.35 | 11.85 | 0.26 | |
| Stream C-ABD | 0.02 | 7.32 | 0.02 | | 0.05 | 7.32 | 0.04 | |
| Stream C-D | - | - | - | | - | - | - | |
| Stream C-A | - | - | - | | - | - | - | |

**Table 0.6 – R161 Circular Road/R896 Bridge Street/Academy Street crossroads Existing Layout - 2022 Opening Year (Without Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2022 Opening Year (Without Dev)** | | | | | | | |
| Stream B-ACD | 0.32 | 8.95 | 0.24 | 9.88 | 0.62 | 12.37 | 0.39 | 14.17 |
| Stream A-BCD | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |
| Stream D-AB | 0.78 | 10.39 | 0.44 | | 1.66 | 16.15 | 0.63 | |
| Stream D-BC | 0.18 | 9.92 | 0.15 | | 0.32 | 11.34 | 0.24 | |
| Stream C-ABD | 0.02 | 7.08 | 0.01 | | 0.03 | 7.10 | 0.03 | |
| Stream C-D | - | - | - | | - | - | - | |
| Stream C-A | - | - | - | | - | - | - | |

**Table 0.7 – R161 Circular Road/R896 Bridge Street/Academy Street crossroads - 2027 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2027 Opening Year (With Dev)** | | | | | | | |
| Stream B-ACD | 1.96 | 24.00 | 0.67 | 16.94 | 1.32 | 19.27 | 0.57 | 18.21 |
| Stream A-BCD | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |
| Stream D-AB | 0.93 | 11.49 | 0.48 | | 2.17 | 19.85 | 0.69 | |
| Stream D-BC | 0.22 | 11.00 | 0.18 | | 0.38 | 12.30 | 0.28 | |
| Stream C-ABD | 0.02 | 7.39 | 0.02 | | 0.05 | 7.40 | 0.05 | |
| Stream C-D | - | - | - | | - | - | - | |
| Stream C-A | - | - | - | | - | - | - | |

**Table 0.8 – R161 Circular Road/R896 Bridge Street/Academy Street crossroads - 2027 Opening Year (Without Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2027 Opening Year (Without Dev)** | | | | | | | |
| Stream B-ACD | 0.35 | 9.26 | 0.35 | 10.34 | 0.70 | 13.24 | 0.41 | 15.63 |
| Stream A-BCD | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |
| Stream D-AB | 0.87 | 10.99 | 0.87 | | 1.96 | 18.23 | 0.67 | |
| Stream D-BC | 0.19 | 10.19 | 0.19 | | 0.35 | 11.77 | 0.26 | |
| Stream C-ABD | 0.02 | 7.15 | 0.02 | | 0.04 | 7.18 | 0.04 | |
| Stream C-D | - | - | - | | - | - | - | |
| Stream C-A | - | - | - | | - | - | - | |

**Table 0.9 – R161 Circular Road/R896 Bridge Street/Academy Street crossroads - 2037 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2037 Opening Year (With Dev)** | | | | | | | |
| Stream B-ACD | 2.15 | 25.95 | 0.69 | 18.03 | 1.49 | 21.11 | 0.61 | 20.23 |
| Stream A-BCD | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |
| Stream D-AB | 1.01 | 12.07 | 0.51 | | 2.55 | 22.51 | 0.73 | |
| Stream D-BC | 0.23 | 11.26 | 0.19 | | 0.41 | 12.73 | 0.29 | |
| Stream C-ABD | 0.02 | 7.45 | 0.02 | | 0.05 | 7.45 | 0.05 | |
| Stream C-D | - | - | - | | - | - | - | |
| Stream C-A | - | - | - | | - | - | - | |

**Table 0.10 – R161 Circular Road/R896 Bridge Street/Academy Street crossroads - 2037 Opening Year (Without Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2037 Opening Year (Without Dev)** | | | | | | | |
| Stream B-ACD | 0.37 | 9.54 | 0.27 | 10.76 | 0.77 | 13.98 | 0.44 | 17.05 |
| Stream A-BCD | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |
| Stream D-AB | 0.95 | 11.52 | 0.49 | | 2.27 | 20.32 | 0.70 | |
| Stream D-BC | 0.20 | 10.41 | 0.17 | | 0.38 | 12.15 | 0.27 | |
| Stream C-ABD | 0.02 | 7.21 | 0.02 | | 0.04 | 7.22 | 0.04 | |
| Stream C-D | - | - | - | | - | - | - | |
| Stream C-A | - | - | - | | - | - | - | |

Academy Street/Site Access

**Table 0.11 – Academy Street/Site Access - 2017 Base Year**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **2017 Base Year** | | | | | | | |
| Stream B-AC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Stream C-AB | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream C-A | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Table 0.12 – Academy Street/Site Access - 2022 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **2022 Opening Year (With Dev)** | | | | | | | |
| Stream B-AC | 1.26 | 15.64 | 0.56 | 13.50 | 0.24 | 8.57 | 0.19 | 7.32 |
| Stream C-AB | 0.15 | 5.97 | 0.12 | | 0.15 | 5.76 | 0.12 | |
| Stream C-A | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Table 0.13 – Academy Street/Site Access 2022 Opening Year (Without Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **2022 Opening Year (Without Dev)** | | | | | | | |
| Stream B-AC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Stream C-AB | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream C-A | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Table 0.14 – Academy Street/Site Access 2027 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **2027 Opening Year (With Dev)** | | | | | | | |
| Stream B-AC | 1.27 | 15.77 | 0.57 | 13.60 | 0.24 | 8.62 | 0.19 | 7.34 |
| Stream C-AB | 0.15 | 5.98 | 0.12 | | 0.15 | 5.76 | 0.12 | |
| Stream C-A | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Table 0.15 – Academy Street/Site Access 2027 Opening Year (Without Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **2027 Opening Year (Without Dev)** | | | | | | | |
| Stream B-AC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Stream C-AB | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream C-A | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Table 0.16 – Academy Street/Site Access 2037 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **2037 Opening Year (With Dev)** | | | | | | | |
| Stream B-AC | 1.28 | 15.86 | 0.57 | 13.65 | 0.24 | 8.66 | 0.19 | 7.36 |
| Stream C-AB | 0.15 | 5.98 | 0.12 | | 0.16 | 5.75 | 0.12 | |
| Stream C-A | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Table 0.17 – Academy Street/Site Access 2037 Opening Year (Without Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **2037 Opening Year (Without Dev)** | | | | | | | |
| Stream B-AC | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Stream C-AB | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | 0.00 | |
| Stream C-A | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Dublin Road / Academy Street Priority Controlled Junction**

**Table 0.18 – Dublin Road / Academy - 2017 Base Year**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2017 Base Year** | | | | | | | |
| Stream B-C | 0.04 | 7.48 | 0.04 | | 0.08 | 7.88 | 0.07 | |
| Stream B-A | 0.14 | 12.74 | 0.13 | | 0.23 | 13.77 | 0.19 | |
| Stream C-AB | 0.03 | 4.04 | 0.02 | | 0.06 | 4.26 | 0.04 | |
| | | | | 9.31 | | | | 9.70 |
| Stream C-A | - | - | - | | | - | - | |
| | - | - | - | | - | - | - | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | - | - | - | |

**Table 0.19 – Dublin Road / Academy - 2022 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2022 Opening Year (With Dev)** | | | | | | | |
| Stream B-C | 0.06 | 9.77 | 0.06 | | 0.09 | 8.92 | 0.09 | |
| Stream B-A | 1.17 | 25.23 | 0.55 | | 0.51 | 17.83 | 0.34 | |
| Stream C-AB | 0.03 | 4.04 | 0.02 | | 0.08 | 4.29 | 0.05 | |
| | | | | 21.58 | | | | 13.03 |
| Stream C-A | - | - | - | | - | - | - | |
| | | | | | | | | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | | | | |

**Table 0.20 – Dublin Road / Academy - 2022 Opening Year (Without Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) |
| | Existing Layout - 2022 Opening Year (Without Dev) | | | | | | | |
| Stream B-C | 0.05 | 7.66 | 0.04 | | 0.09 | 8.92 | 0.04 | |
| Stream B-A | 0.16 | 13.53 | 0.14 | | 0.26 | 17.83 | 0.14 | |
| Stream C-AB | 0.03 | 3.99 | 0.02 | | 0.07 | 4.29 | 0.02 | |
| | | | | | | | | |
| Stream C-A | - | - | - | 9.76 | - | - | - | 10.11 |
| | | | | | | | | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | | | | |

**Table 0.21 – Dublin Road / Academy - 2027 Opening Year (With Dev)**

| | **AM** | | | | **PM** | | | |
|---|---|---|---|---|---|---|---|---|
| | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** | **Queue (PCU)** | **Delay (s)** | **RFC** | **Junction Delay (s)** |
| | **Existing Layout - 2027 Opening Year (With Dev)** | | | | | | | |
| Stream B-C | 0.07 | 10.40 | 0.06 | | 0.10 | 9.26 | 0.09 | |
| Stream B-A | 1.36 | 29.19 | 0.58 | | 0.58 | 19.72 | 0.37 | |
| Stream C-AB | 0.04 | 3.99 | 0.03 | | 0.08 | 4.24 | 0.05 | |
| | | | | 24.40 | | | | 14.12 |
| Stream C-A | - | - | - | | - | - | - | |
| | | | | | | | | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | | | | |

**Table 0.22 – Dublin Road / Academy - 2027 Opening Year (Without Dev)**

| | **AM** | **PM** |
|---|---|---|

| | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) |
|---|---|---|---|---|---|---|---|---|
| | **Existing Layout - 2027 Opening Year (With Dev)** | | | | | | | |
| Stream B-C | 0.05 | 7.88 | 0.05 | | 0.09 | 8.40 | 0.08 | |
| Stream B-A | 0.18 | 14.56 | 0.15 | | 0.30 | 16.00 | 0.23 | |
| Stream C-AB | 0.03 | 3.95 | 0.03 | | 0.07 | 4.18 | 0.05 | |
| | | | | 10.12 | | | | 10.74 |
| Stream C-A | - | - | - | | - | - | - | |
| | | | | | | | | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | | | | |

**Table 0.23 – Dublin Road / Academy - 2037 Opening Year (With Dev)**

| | AM | | | | PM | | | |
|---|---|---|---|---|---|---|---|---|
| | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) |
| | **Existing Layout – 2037 Opening Year (With Dev)** | | | | | | | |
| Stream B-C | 0.07 | 11.03 | 0.07 | | 0.11 | 9.61 | 0.10 | |
| Stream B-A | 1.54 | 33.06 | 0.62 | | 0.65 | 17.19 | 0.40 | |
| Stream C-AB | 0.04 | 3.95 | 0.03 | | 0.09 | 4.15 | 0.06 | |
| | | | | 27.34 | | | | 15.09 |
| Stream C-A | - | - | - | | - | - | - | |
| | | | | | | | | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | | | | |

**Table 0.24 – Dublin Road / Academy - 2037 Opening Year (Without Dev)**

| | AM | PM |
|---|---|---|

| | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) | Queue (PCU) | Delay (s) | RFC | Junction Delay (s) |
|---|---|---|---|---|---|---|---|---|
| | **Existing Layout – 2037 Opening Year (With Dev)** | | | | | | | |
| Stream B-C | 0.05 | 8.06 | 0.05 | | 0.10 | 8.64 | 0.09 | |
| Stream B-A | 0.20 | 15.50 | 0.17 | | 0.33 | 17.19 | 0.25 | |
| Stream C-AB | 0.04 | 3.91 | 0.03 | | 0.09 | 4.15 | 0.06 | |
| | | | | 10.63 | | | | 11.16 |
| Stream C-A | - | - | - | | - | - | - | |
| | | | | | | | | |
| Stream A-B | - | - | - | | - | - | - | |
| Stream A-C | - | - | - | | | | | |

**Table 0.25 – Dublin Road/ Academy Street/Site Access AM Peak**

| Dublin Road/Academy Street/Site Access AM Peak (08:00 – 09:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Road Name** | **Lin** | **2017 AM** | | **AM Opening Year Without Development** | | **AM Opening Year With Development** | | **AM Opening Year + 5 Years Without Development** | | **AM Opening Year + 5 Years With Development** | | **AM Opening Year + 15 Years Without Development** | | **AM Opening Year + 15 Years With Development** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Dublin Road Northbound Ahead Left | 1/1 | 57.3% | 8.3 | 60.5% | 9.3 | 76.8% | 16.6 | 63.6% | 10.1 | 79.0% | 17.8 | 66.2% | 11.2 | 82.0% | 19.7 |
| Dublin Road Southbound Ahead Right | 2/1 | 46.5% | 5.9 | 49.4% | 6.5 | 56.3% | 9.3 | 51.9% | 7.1 | 58.5% | 9.9 | 54.1% | 7.6 | 60.8% | 10.6 |
| Academy Street Right Left | 3/1 | 21.3% | 1.0 | 22.9% | 1.1 | 41.7% | 1.5 | 23.9% | 1.1 | 44.8% | 1.7 | 25.0% | 1.2 | 45.1% | 1.8 |
| Academy Street Right Left | 6/1 | 7.3% | 0.2 | 7.7% | 0.2 | 15.4% | 0.3 | 8.0% | 0.2 | 15.7% | 0.4 | 8.3% | 0.2 | 16.1% | 0.4 |
| Primary Access Right Left | 7/1 | 0.0% | 0.0 | 0.0% | 0.0 | 72.7% | 7.0 | 0.0% | 0.0 | 77.5% | 7.5 | 0.0% | 0.0 | 77.2% | 7.4 |
| Academy Street Left Right | 8/1 | 2.6% | 0.2 | 2.8% | 0.2 | 12.3% | 0.9 | 2.9% | 0.2 | 12.2% | 0.9 | 3.1% | 0.3 | 12.3% | 0.9 |
| Academy Street | 9/1 | 6.0% | 0.0 | 6.3% | 0.0 | 13.8% | 0.1 | 6.6% | 0.0 | 14.2% | 0.1 | 6.8% | 0.0 | 14.4% | 0.1 |
| Primary Access | 10/1 | 0.0% | 0.0 | 0.0% | 0.0 | 8.9% | 0.0 | 0.0% | 0.0 | 8.9% | 0.0 | 0.0% | 0.0 | 8.9% | 0.0 |
| Cycle Time | | 82 | | 82 | | 82 | | 82 | | 82 | | 82 | | 82 | |
| PRC (%) | | 57.0% | | 48.9% | | 17.5% | | 41.5% | | 13.9%% | | 35.9% | | 9.8% | |
| Total Delay pcuHr | | 3.2 | | 3.6 | | 11.1 | | 3.9 | | 12.1 | | 4.2 | | 12.8 | |

**Table 0.26 – Dublin Road/ Academy Street/Site Access PM Peak**

| Dublin Road/Academy Street/Site Access PM Peak (17:00 – 18:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Road Name | Lin | 2017 AM | | AM Opening Year Without Development | | AM Opening Year With Development | | AM Opening Year + 5 Years Without Development | | AM Opening Year + 5 Years With Development | | AM Opening Year + 15 Years Without Development | | AM Opening Year + 15 Years With Development | |
| | | DoS (%) | MMQ (PCU) | DoS (%) | MMQ (PCU) | DoS (%) | MMQ (PCU) | DoS (%) | MMQ (PCU) | DoS (%) | MMQ (PCU) | DoS (%) | MMQ (PCU) | DoS (%) | MMQ (PCU) |
| Dublin Road Northbound Ahead Left | 1/1 | 60.0% | 9.0 | 63.7% | 10.1 | 71.5% | 13.0 | 67.1% | 11.3 | 74.9% | 14.7 | 69.9% | 12.5 | 77.6% | 16.1 |
| Dublin Road Southbound Ahead Right | 2/1 | 42.1% | 5.0 | 44.4% | 5.4 | 44.3% | 5.4 | 46.6% | 5.9 | 46.6% | 5.9 | 48.6% | 6.4 | 48.6% | 6.2 |
| Academy Street Right Left | 3/1 | 43.7% | 2.2 | 45.8% | 2.3 | 63.9% | 3.0 | 48.4% | 2.4 | 66.5% | 3.2 | 50.5% | 2.6 | 69.1% | 3.5 |
| Academy Street Right Left | 6/1 | 9.3% | 0.2 | 9.8% | 0.2 | 16.3% | 0.4 | 10.2% | 0.3 | 16.8% | 0.4 | 10.7% | 0.3 | 17.2% | 0.4 |
| Primary Access Right Left | 7/1 | 0.0% | 0.0 | 0.0% | 0.0 | 48.3% | 2.4 | 0.0% | 0.0 | 48.3% | 2.4 | 0.0% | 0.0 | 48.3% | 2.4 |
| Academy Street Left Right | 8/1 | 5.3% | 0.4 | 5.6% | 0.5 | 12.7% | 0.9 | 5.9% | 0.5 | 13.1% | 0.9 | 6.2% | 0.5 | 13.5% | 0.9 |
| Academy Street | 9/1 | 7.6% | 0.0 | 8.0% | 0.0 | 10.7% | 0.1 | 8.4% | 0.0 | 11.1% | 0.1 | 8.8% | 0.0 | 11.5% | 0.1 |
| Primary Access | 10/1 | 0.0% | 0.0 | 0.0% | 0.0 | 9.0% | 0.0 | 0.0% | 0.0 | 9.0% | 0.0 | 0.0% | 0.0 | 9.0% | 0.0 |
| Cycle Time | | 82 | | 82 | | 82 | | 82 | | 82 | | 82 | | 82 | |
| PRC (%) | | 50.1% | | 41.2% | | 25.8% | | 34.0% | | 20.2% | | 28.8% | | 15.9% | |
| Total Delay pcuHr | | 3.9 | | 4.3 | | 7.2 | | 4.8 | | 7.9 | | 5.2 | | 8.5 | |

**Table 0.27 – Unnamed Junction AM Peak**

| Unnamed Junction AM Peak (08:00 – 09:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Road Name** | **Lin** | **2017 AM** | | **AM Opening Year Without Development** | | **AM Opening Year With Development** | | **AM Opening Year + 5 Years Without Development** | | **AM Opening Year + 5 Years With Development** | | **AM Opening Year + 15 Years Without Development** | | **AM Opening Year + 15 Years With Development** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Dublin Road Southbound Ahead Right | 1/1 | 37.3% | 0.3 | 39.6% | 0.3 | 45.4% | 0.4 | 38.5% | 0.3 | 38.8% | 0.3 | 43.5% | 0.3 | 49.2% | 0.5 |
| Dublin Road Northbound Ahead Left | 2/1 | 44.2% | 0.4 | 46.6% | 0.4 | 51.4% | 0.5 | 54.6% | 0.6 | 51.6% | 0.5 | 51.0% | 0.7 | 55.9% | 0.6 |
| Local Access Left Right | 3/1 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 |
| Cycle Time | | - | | - | | - | | - | | - | | - | | - | |
| PRC (%) | | - | | - | | - | | - | | - | | - | | - | |
| Total Delay pcuHr | | 0.7 | | 0.8 | | 0.9 | | 0.9 | | 0.8 | | 0.9 | | 1.1 | |

**Table 0.28 – Unnamed Junction PM Peak**

| Unnamed Junction PM Peak (17:00 – 18:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Road Name** | **Lin** | **2017 AM** | | **AM Opening Year Without Development** | | **AM Opening Year With Development** | | **AM Opening Year + 5 Years Without Development** | | **AM Opening Year + 5 Years With Development** | | **AM Opening Year + 15 Years Without Development** | | **AM Opening Year + 15 Years With Development** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Dublin Road Southbound Ahead Right | 1/1 | 34.9% | 0.3 | 36.9% | 0.3 | 38.5% | 0.3 | 38.8% | 0.3 | 40.6% | 0.3 | 40.4% | 0.3 | 42.2% | 0.4 |
| Dublin Road Northbound Ahead Left | 2/1 | 46.1% | 0.4 | 49.0% | 0.5 | 54.6% | 0.6 | 51.6% | 0.5 | 57.2% | 0.7 | 53.8% | 0.6 | 59.3% | 0.7 |
| Local Access Left Right | 3/1 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 | 0.0% | 0.0 |
| Cycle Time | | - | | - | | - | | - | | - | | - | | - | |
| PRC (%) | | - | | - | | - | | - | | - | | - | | - | |
| Total Delay pcuHr | | 0.7 | | 0.8 | | 0.9 | | 0.8 | | 1.0 | | 0.9 | | 1.1 | |

**Table 0.29 – Dublin Road/Bothar Sion/Springfield Glen AM Peak**

| Dublin Road/Bothar Sion/Springfield Glen AM Peak (08:00 – 09:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Road Name** | **Lin** | **2017 AM** | | **AM Opening Year Without Development** | | **AM Opening Year With Development** | | **AM Opening Year + 5 Years Without Development** | | **AM Opening Year + 5 Years With Development** | | **AM Opening Year + 15 Years Without Development** | | **AM Opening Year + 15 Years With Development** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Dublin Road Northbound | 1/1 | 49.8% | 20.6 | 53.1% | 22.1 | 48.3% | 21.6 | 57.4% | 23.5 | 52.7% | 23.4 | 61.7% | 24.9 | 56.2% | 24.5 |
| Dublin Road Southbound | 2/1 | 56.3% | 26.8 | 59.8% | 28.9 | 58.2% | 30.8 | 62.9% | 30.9 | 61.8% | 33.1 | 65.6% | 32.8 | 64.0% | 34.8 |
| Bothar Sion | 3/2 | 56.8% | 15.0 | 60.3% | 16.3 | 76.6% | 20.9 | 63.5% | 17.5 | 79.0% | 22.3 | 66.0% | 18.6 | 81.8% | 23.6 |
| Springfield Glen | 4/1 | 53.1% | 3.3 | 55.7% | 3.5 | 67.8% | 4.1 | 59.1% | 3.7 | 70.6% | 4.4 | 61.7% | 4.0 | 74.5% | 4.8 |
| Cycle Time | | 164 | | 164 | | 164 | | 164 | | 164 | | 164 | | 164 | |
| PRC (%) | | 58.5 | | 49.3% | | 15.5 | | 41.8 | | 13.9 | | 36.3 | | 10.1 | |
| Total Delay pcuHr | | 23.0 | | 24.9 | | 26.6 | | 26.8 | | 29.0 | | 28.6 | | 30.9 | |

**Table 0.30 – Dublin Road/Bothar Sion/Springfield Glen PM Peak**

| Dublin Road/Bothar Sion/Springfield Glen PM Peak (17:00 – 18:00) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Road Name** | **Link** | **2017 AM** | | **AM Opening Year Without Development** | | **AM Opening Year With Development** | | **AM Opening Year + 5 Years Without Development** | | **AM Opening Year + 5 Years With Development** | | **AM Opening Year + 15 Years Without Development** | | **AM Opening Year + 15 Years With Development** | |
| | | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** | **DoS (%)** | **MMQ (PCU)** |
| Dublin Road Northbound Ahead Left Right | 1/1+1/2 | 48.4% | 21.9 | 52.4% | 23.7 | 48.3% | 21.6 | 57.4% | 23.5 | 52.7% | 23.4 | 58.6% | 27.8 | 60.8% | 29.4 |
| Dublin Road Southbound Right Left Ahead | 2/1+2/2 | 48.1% | 23.0 | 52.3% | 25.1 | 58.2% | 30.8 | 62.9% | 30.9 | 61.8% | 33.1 | 56.7% | 28.2 | 58.9% | 29.8 |
| Bothar Sion Right Ahead Left | 3/2+3/1 | 59.7% | 15.3 | 63.7% | 17.1 | 76.6% | 20.9 | 63.5% | 17.5 | 79.0% | 22.3 | 74.2% | 21.4 | 77.2% | 22.9 |
| Springfield Glen Left Ahead Right | 4/1 | 31.4% | 1.5 | 31.4% | 1.5 | 67.8% | 4.1 | 59.1% | 3.7 | 70.6% | 4.4 | 39.0% | 1.9 | 39.0% | 1.9 |
| Cycle Time | | 164 | | 164 | | 164 | | 164 | | 164 | | 164 | | 164 | |
| PRC (%) | | 50.8 | | 41.4 | | 17.5 | | 41.8 | | 13.9 | | 21.3 | | 16.9 | |
| Total Delay pcuHr | | 20.4 | | 22.6 | | 26.6 | | 26.8 | | 29.0 | | 26.8 | | 30.9 | |

# APPENDIX C – LAND AND SOILS

## IGSL Report

**PROPOSED HOUSING DEVELOPMENT**
**ACADEMY STREET**
**NAVAN CO. MEATH**

**CRONIN SUTTON**
**CONSULTING ENGINEERS**

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*e. BRE Digest 365 Soakaway*

A total of three percolation tests were scheduled 0ver the site area.

Infiltration testing was performed in accordance with BRE Digest 365 'Soakaway Design'. 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. This operation is generally performed over two cycles of soakage and dispersion 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 pit sides over the test duration.

Records for each trial pit and test are presented in Appendix V. The stratification and water table in each test pit is noted and a record of fall in water level with time is made.

Designs are based on the slowest infiltration rate, which is generally calculated from the final cycle. The infiltration rate (f) is calculated and the results for the individual tests are shown below.

| **Test No.** | **Soil Type** | **Infiltration Rate (f)** |
|---|---|---|
| STP 01 | Gravelly CLAY / SILT | 0.00 |
| STP 02 | Clayey gravelly SAND | 0.00049 metres/minute |
| STP 03 | Gravelly CLAY | 0.00 |

Tests 01 and 03 were failures and very low permeability was noted in test 02. The results would be regarded as typical for the glacial till or boulder clay of the general area.

## III Testing

***(a) In-Situ* :**

Standard penetration tests were carried out at approximate 1.00 metre intervals in the geotechnical boreholes to measure relative in-situ soil strength. N values are noted in the right hand column of the boring records, representing the blow count required to drive the standard sampler 300mm into the soil, following initial seating blows. Where full test penetration was not achieved the blow count for a specific penetration is recorded, or refusal is indicated where appropriate

The results of the tests are summarised as follows:

| **Depth** | **Stratum** | **N Values** | **Comment** |
|---|---|---|---|
| 1.00 | Gravelly Silt/Clay | 4 to 23 | Soft to Stiff |
| 2.00 | Clay / Gravel | 14 to 45 | Firm to Stiff |
| 3.00 | Black Boulder Clay | 31 to 47 | Stiff to Hard |
| 4.00 | Black Boulder Clay | 38 to 63 | Hard |

At the base of the boreholes refusal of SPT apparatus was noted and results are presented as blows for specific penetration and refusal.

# Appendix V BRE Digest 365 Tests

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

Contract: Academy Street, Navan Contract No. 20570
Test No. STP01
Client CS Consulting
Date: 21/11/2017

Summary of ground conditions

| from | to | Description | Ground water |
|---|---|---|---|
| 0.00 | 0.20 | TOPSOIL | Dry |
| 0.20 | 0.80 | Soft brown very clayey SILT | |
| 0.80 | 1.65 | Firm brown sandy gravelly very clayey SILT with cobbles | |
| 1.65 | 2.00 | Firm brown sandy gravelly very clayey SILT with cobbles and boulders | |

Notes:

Field Data

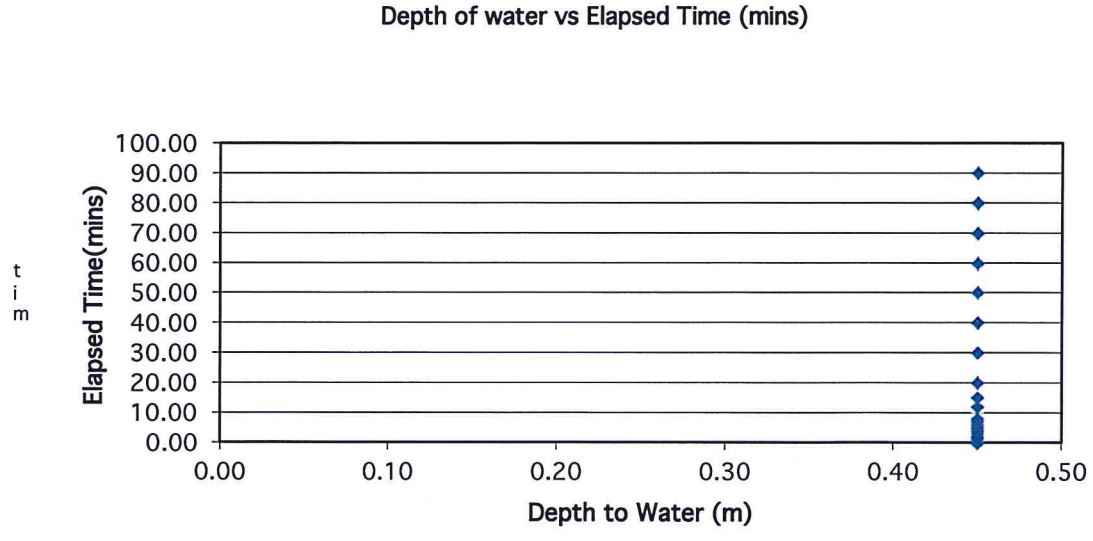
| Depth to Water (m) | Elapsed Time (min) |
|---|---|
| 0.45 | 0.00 |
| 0.45 | 1.00 |
| 0.45 | 2.00 |
| 0.45 | 3.00 |
| 0.45 | 4.00 |
| 0.45 | 5.00 |
| 0.45 | 6.00 |
| 0.45 | 7.00 |
| 0.45 | 8.00 |
| 0.45 | 12.00 |
| 0.45 | 15.00 |
| 0.45 | 20.00 |
| 0.45 | 30.00 |
| 0.45 | 40.00 |
| 0.45 | 50.00 |
| 0.45 | 60.00 |
| 0.45 | 70.00 |
| 0.45 | 80.00 |
| 0.45 | 90.00 |

Field Test

| | | |
|---|---|---|
| Depth of Pit (D) | 2.00 | m |
| Width of Pit (B) | 0.35 | m |
| Length of Pit (L) | 1.50 | m |
| Initial depth to Water = | 0.45 | m |
| Final depth to water = | 0.45 | m |
| Elapsed time (mins)= | 90.00 | |
| Top of permeable soil | | m |
| Base of permeable soil | | m |
| Base area= | 0.525 | m2 |
| *Av. side area of permeable stratum over test period= | 5.735 | m2 |
| Total Exposed area = | 6.26 | m2 |

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

f= 0 m/min or 0 m/sec



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

Contract: Academy Street, Navan Contract No. 20570
Test No. STP02
Client CS Consulting
Date: 21/11/2017

Summary of ground conditions

| from | to | Description | Ground water |
|---|---|---|---|
| 0.00 | 0.30 | TOPSOIL | Dry |
| 0.30 | 0.70 | Stiff brown sandy silty gravelly CLAY with cobbles | |
| 0.70 | 1.70 | Soft brown sandy gravelly very silty CLAY with cobbles | |
| 1.70 | 1.90 | Brown silty clayey very gravelly SAND with cobbles | |

Notes:

Field Data

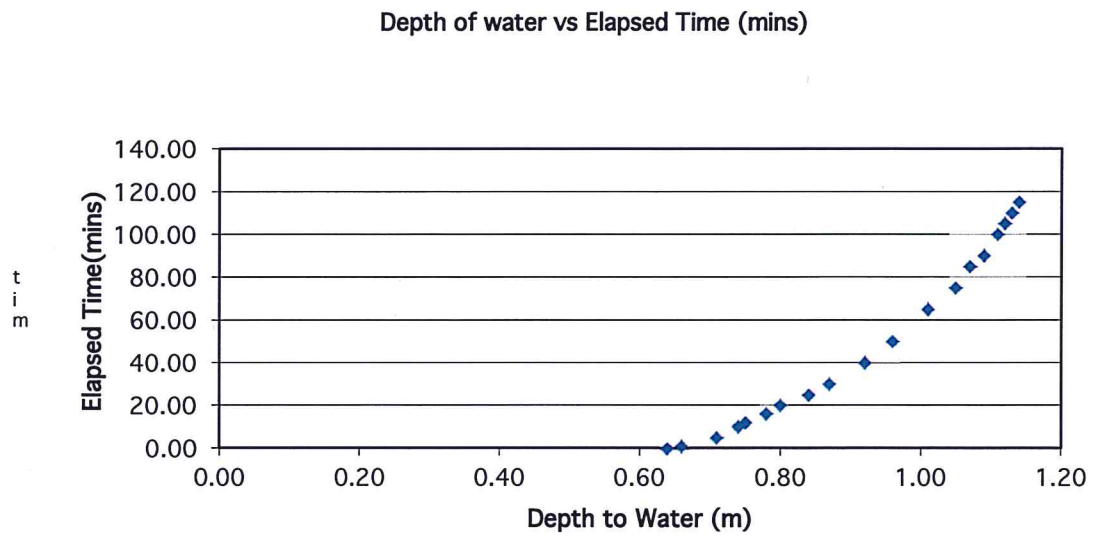
| Depth to Water (m) | Elapsed Time (min) |
|---|---|
| 0.64 | 0.00 |
| 0.66 | 1.00 |
| 0.71 | 5.00 |
| 0.74 | 10.00 |
| 0.75 | 12.00 |
| 0.78 | 16.00 |
| 0.80 | 20.00 |
| 0.84 | 25.00 |
| 0.87 | 30.00 |
| 0.92 | 40.00 |
| 0.96 | 50.00 |
| 1.01 | 65.00 |
| 1.05 | 75.00 |
| 1.07 | 85.00 |
| 1.09 | 90.00 |
| 1.11 | 100.00 |
| 1.12 | 105.00 |
| 1.13 | 110.00 |
| 1.14 | 115.00 |

Field Test

| | | |
|---|---|---|
| Depth of Pit (D) | 2.00 | m |
| Width of Pit (B) | 0.35 | m |
| Length of Pit (L) | 1.50 | m |
| Initial depth to Water = | 0.64 | m |
| Final depth to water = | 1.14 | m |
| Elapsed time (mins)= | 115.00 | |
| Top of permeable soil | | m |
| Base of permeable soil | | m |
| Base area= | 0.525 | m2 |
| *Av. side area of permeable stratum over test period= | 4.107 | m2 |
| Total Exposed area = | 4.632 | m2 |

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

**f= 0.00049 m/min or 8.2132E-06 m/sec**



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

Contract: Academy Street, Navan Contract No. 20570
Test No. STP03
Client CS Consulting
Date: 27/11/2017

Summary of ground conditions

| from | to | Description | Ground water |
|---|---|---|---|
| 0.00 | 0.30 | TOPSOIL | Dry |
| 0.30 | 2.00 | Firm brown sandy silty gravelly CLAY with cobbles and boulders | |
| | | | |
| | | | |

Notes:

Field Data

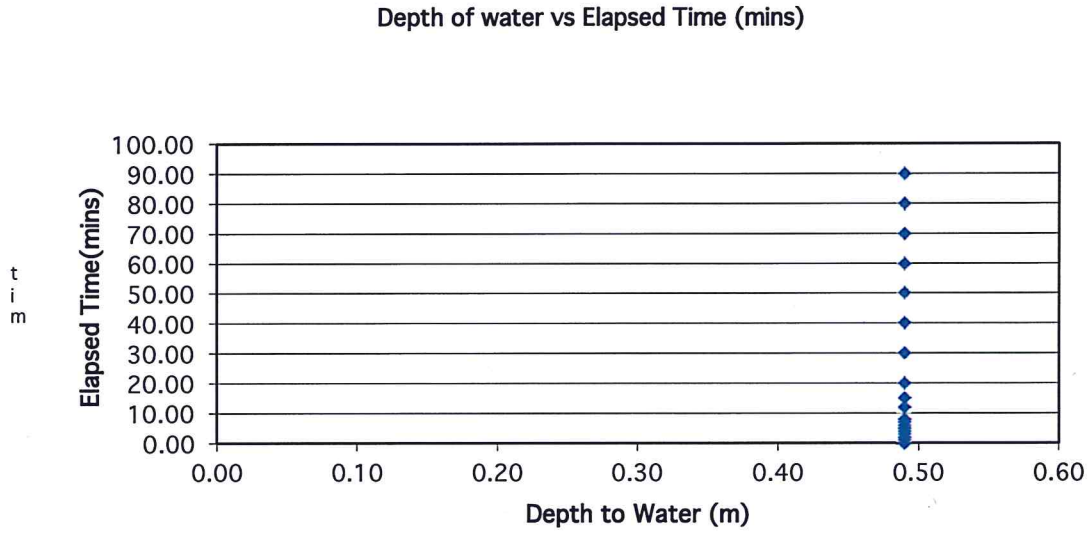
| Depth to Water (m) | Elapsed Time (min) |
|---|---|
| 0.49 | 0.00 |
| 0.49 | 1.00 |
| 0.49 | 2.00 |
| 0.49 | 3.00 |
| 0.49 | 4.00 |
| 0.49 | 5.00 |
| 0.49 | 6.00 |
| 0.49 | 7.00 |
| 0.49 | 8.00 |
| 0.49 | 12.00 |
| 0.49 | 15.00 |
| 0.49 | 20.00 |
| 0.49 | 30.00 |
| 0.49 | 40.00 |
| 0.49 | 50.00 |
| 0.49 | 60.00 |
| 0.49 | 70.00 |
| 0.49 | 80.00 |
| 0.49 | 90.00 |

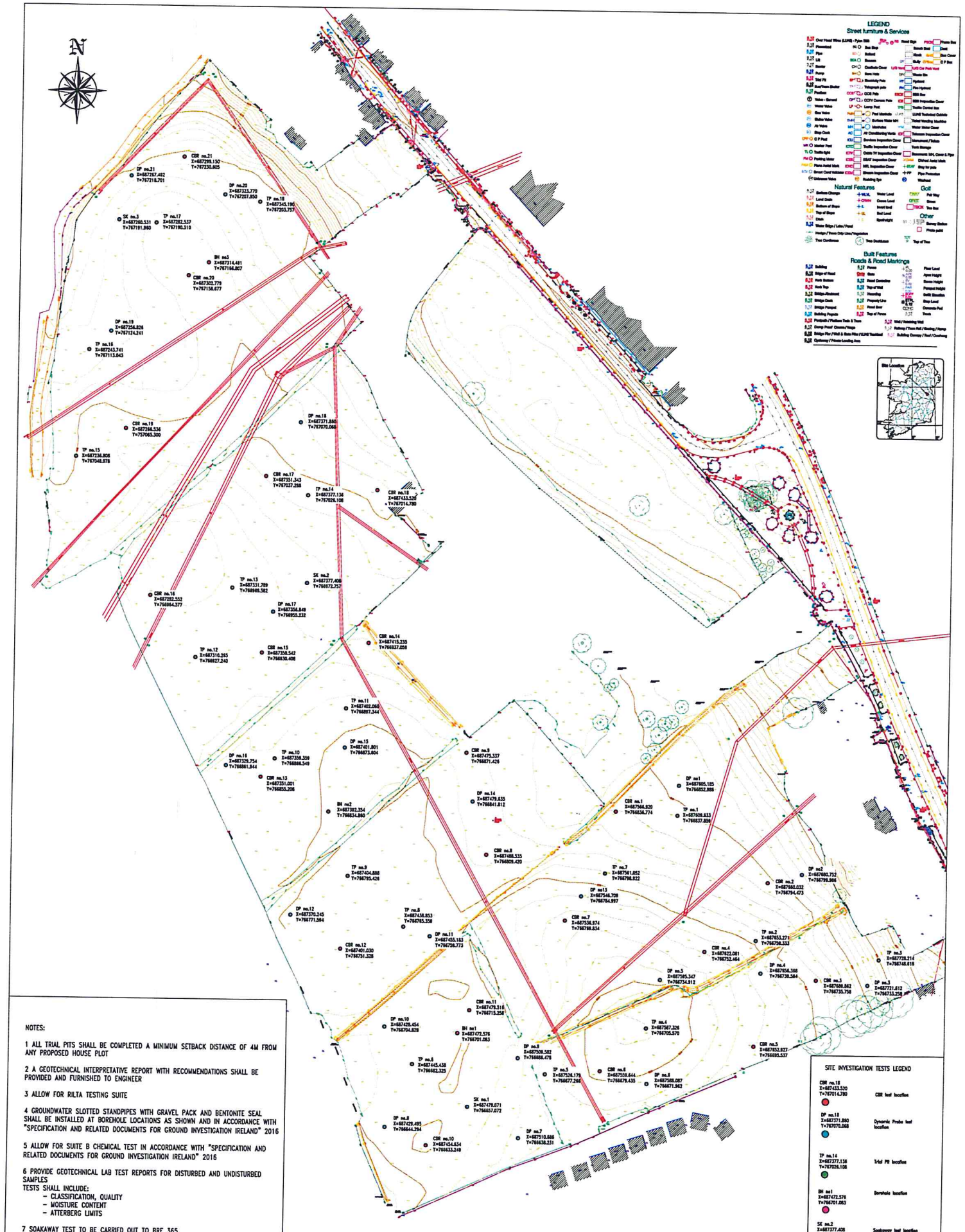
Field Test

| | | |
|---|---|---|
| Depth of Pit (D) | 2.00 | m |
| Width of Pit (B) | 0.35 | m |
| Length of Pit (L) | 1.50 | m |
| Initial depth to Water = | 0.49 | m |
| Final depth to water = | 0.49 | m |
| Elapsed time (mins)= | 90.00 | |
| Top of permeable soil | | m |
| Base of permeable soil | | m |
| Base area= | 0.525 | m2 |
| *Av. side area of permeable stratum over test period= | 5.587 | m2 |
| Total Exposed area = | 6.112 | m2 |

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

**f= 0 m/min or 0 m/sec**






NOTES:

1 ALL TRIAL PITS SHALL BE COMPLETED A MINIMUM SETBACK DISTANCE OF 4M FROM ANY PROPOSED HOUSE PLOT

2 A GEOTECHNICAL INTERPRETATIVE REPORT WITH RECOMMENDATIONS SHALL BE PROVIDED AND FURNISHED TO ENGINEER

3 ALLOW FOR RILTA TESTING SUITE

4 GROUNDWATER SLOTTED STANDPIPES WITH GRAVEL PACK AND BENTONITE SEAL SHALL BE INSTALLED AT BOREHOLE LOCATIONS AS SHOWN AND IN ACCORDANCE WITH "SPECIFICATION AND RELATED DOCUMENTS FOR GROUND INVESTIGATION IRELAND" 2016

5 ALLOW FOR SUITE B CHEMICAL TEST IN ACCORDANCE WITH "SPECIFICATION AND RELATED DOCUMENTS FOR GROUND INVESTIGATION IRELAND" 2016

6 PROVIDE GEOTECHNICAL LAB TEST REPORTS FOR DISTURBED AND UNDISTURBED SAMPLES
TESTS SHALL INCLUDE:
- CLASSIFICATION, QUALITY
- MOISTURE CONTENT
- ATTERBERG LIMITS

7 SOAKAWAY TEST TO BE CARRIED OUT TO BRE 365

NOTES
1. For setting out refer to Architect's drawings.
2. This drawing to be read in conjunction with all other Architectural and Engineering drawings and all other relevant drawings and Specifications.
3. DO NOT SCALE THIS DRAWING. Use figured dimensions only.
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| Rev. No. | Date | REVISION NOTE | Des. By | Chkd. By |
|---|---|---|---|---|

| | |
|---|---|
| Architect | NDBA Architects |
| Project | Academy Street, Navan Co. Meath |
| Title | Site Investigation Test Locations |
| Des by AJ | Chkd by NB |
| Apvd by NB | Dwg. No. D061-SK019 |
| Date 19.10.2017 | Scale 1/1000@A1 |
| | Revision |

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Environment LS. EN ISO 14001:2004
Energy LS. EN ISO 50001:2011
Health & Safety OHSAS 18001:2007

## APPENDIX D – BIODIVERSITY

Species List

**Species List**

The nomenclature for vascular plants is taken from the New Flora of the British Isles (Stace, 2010).

Scientific names for mosses comes from A Checklist and Census Catalogue of British and Irish Bryophytes (Hill et al., 2008) while common names are taken from Mossess and Liverworts of Britain and Ireland (Atherton et al. eds., 2010).

Species indicated with an asterisk '*' are known to have been introduced to Ireland by humans.

Species indicated with an asterisk '*' are known to have been introduced to Ireland by humans.

| **Treeline - WL2/Hedgerow - WL1** | | **DAFOR** |
|---|---|---|
| *Acer pseudoplatanus** | Sycamore | O |
| *Aesculus hippocastanum** | Horse-chestnut | R |
| *Anthriscus sylvestris* | Cow Parsley | O |
| *Asplenium scolopendrium* | Hart's-tongue | O |
| *Cotoneaster sp.** | Cotoneaster | R |
| *Crataegus monogyna* | Hawthorn | F |
| *Cuprocyparis leylandii** | Leyland Cypress | R |
| *Fagus sylvatica** | Beech | O |
| *Fraxinus excelsior* | Ash | A |
| *Galium aparine* | Cleavers | F |
| *Geranium robertianum* | Herb-Robert | O |
| *Hedera helix* | Common Ivy | A |
| *Ilex aquifolium* | Holly | O |
| *Petasites fragrans** | Winter Heliotrope | R |
| *Polystichum setiferum* | Soft Shield-fern | O |
| Prunus spinosa | Blackthorn | O |
| *Rubus fruticosus agg.* | Brambles | A |
| *Sambucus nigra* | Elder | O |
| *Symphoricarpos albus** | Snowberry | R |
| *Urtica dioica* | Common Nettle | F |

| **Arable crops - BC1** | | **DAFOR** |
|---|---|---|
| *Cirsium vulgare* | Spear Thistle | O |
| *Lamium purpureum* | Red Dead-nettle | O |
| *Ranunculus repens* | Creeping Buttercup | F |
| *Stellaria media* | Common Chickweed | O |
| *Stubble* | | A |
| *Tortula truncata* | Common pottia | O |

| **Dry meadow - GS2** | | **DAFOR** |
|---|---|---|
| *Cerastium fontanum* | Common Mouse-ear | O |
| *Dactylis glomerata* | Cock's-foot | A |
| *Plantago lanceolata* | Ribwort Plantain | O |
| *Rumex crispus* | Curled Dock | F |
| *Taraxacum sp.* | Dandelions | O |
| *Veronica persica* | Common Field-speedwell* | O |

| **Broadleaved woodland - WD1** | | **DAFOR** |
|---|---|---|
| *Anthriscus sylvestris* | Cow Parsley | O |

| | | |
|---|---|---|
| *Crataegus monogyna* | Hawthorn | O |
| Fagus sylvatica* | Beech | F |
| *Fraxinus excelsior* | Ash | F |
| *Hedera helix* | Common Ivy | F |
| *Pinus sp.** | Pine | O |
| *Pinus sylvestris* | Scots Pine | O |
| *Prunus laurocerasus** | Cherry Laurel | O |
| *Rosa sp.* | Roses | R |
| *Rubus fruticosus agg.* | Brambles | F |
| *Salix sp.* | Willow | F |
| *Ulmus glabra* | Wych Elm | O |