

**Ballyalbany Bridge and Horseshoe Bridge,
Co. Monaghan**
Archaeological Impact Assessment

CLIENT: Monaghan County Council

DATE: 27/10/23

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Licence No: n/a

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SITE NAME	Ballyalbaney Bridge and Horseshoe Bridge
CLIENT	Monaghan County Council
INVESTIGATION TYPE	Archaeological Impact Assessment
LICENCE NO	N/A
PLANNING REF	Pre-Planning
TOWNLANDS	Coolshannagh, Mullaghcroghery
IRISH TRANSVERSE MERCATOR	667441, 835229 Ballyalbaney Bridge 666401, 833149 Horseshoe Bridge
RMP NO	N/A
RPS NO	Ballyalbaney Bridge MCC Ref 41400943 Horseshoe Bridge MCC Ref Local 18
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ARCHAEOLOGIST	Bart Korfanty, Maeve McCormick
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SUMMARY

This archaeological impact assessment was undertaken on the Ballyalbaney Bridge (Mullaghmore East Td, Tedavnet Parish, Barony of Monaghan, ITM 667441, 835229; Figure 1) and Horseshoe Bridge (Mullaghcroghery Td, Monaghan Parish, Barony of Monaghan, ITM 666401, 833149; Figure 1), Co. Monaghan. The assessment was prepared in March 2023 for Monaghan County Council by Maeve McCormick and Bart Korfanty of Archer Heritage Planning Ltd. The GPR survey was carried out by Scantech Geoscience Ltd. on the 3rd of February 2023. The Architectural Survey was carried out by Molloy Associated in March 2023. It aims to identify and describe known and potential archaeological and cultural heritage constraints in surrounding areas of the bridges and their approaches and offer recommendations for the mitigation of such impacts.

The subject sites of this assessment are restricted to immediate surroundings of both bridges. There are no RMPs near to either of the bridges. There was no increased archaeological potential noted during analysis of cartographic sources or aerial photography. There were two records in the topographical files from the townlands surrounding Ballyalbaney bridge; A tool or forklike object (1942:1898), recovered from Billises and Human Remains (2013:376), recovered in the townland of Kilnacloy. There are no entries from the townland surrounding Horseshoe bridge. There were no previous archaeological excavations near either of the bridges. There was no clear archaeological potential identified in the site visit.

Ballyalbaney Bridge (MCC Ref 41400943, NIAH Reg. No. 41302007) and Horseshoe Bridge (MCC Ref Local 18, NIAH Reg. No. 41303015) are recorded on both Monaghan County Council RPS and on the NIAH register. Neither of the bridges are located within an ACA.

The GPR Survey was carried out Scantech Geoscience Ltd. on the 3rd of February 2023 at the Ballyalbaney Presbyterian Church in Ballyalbaney, Co. Monaghan. The GPR survey has not identified any strong evidence of unmarked burial within the area surveyed however two main anomalies have been located with a cluster of smaller anomalies that could potentially indicate the presence of grave.

The Architectural Survey was carried out by Molloy & Associates Conservation Architects in March 2023. It was determined that both bridges were of significant heritage interest and contributed to a wider urban character of heritage interest. They both have the capacity to accommodate proposed secondary bridges as initially proposed. Each bridge has heritage buildings in proximity. The design is required to respect the character of these buildings and their enclosures. It is further recommended that conservation of vulnerable masonry of each bridge is in the design.

Considering all these factors, it is deemed that;

- There is **low** potential for the survival of archaeological remains at Ballyalbaney Bridge
- There is **low** potential for the survival of archaeological remains at Horseshoe Bridge

RECOMMENDATIONS

It is recommended that;

- Continuous Archaeological Monitoring of all ground works take place at Ballyalbaney Bridge.
- Continuous Archaeological Monitoring of all ground works take place at Horseshoe bridge.

All work is to be undertaken under licence to Department of Housing, local Government and Heritage (DHLGH).

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

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1. INTRODUCTION

This archaeological impact assessment was undertaken on the Ballyalbany Bridge and Horseshoe Bridge, Co. Monaghan. The locations of the bridges are as follows:

- **Ballyalbany Bridge:** Mullaghmore East Td, Tedavnet Parish, Barony of Monaghan, ITM 667441,835229; Figure 1.
- **Horseshoe Bridge:** Mullaghcroghery Td, Monaghan Parish, Barony of Monaghan, ITM 666401, 833149; Figure 1.

The assessment has been prepared by Archer Heritage Planning Ltd for the Monaghan County Council. The desk based study and field survey for this assessment was undertaken in January 2023 by Maeve McCormick and Bart Korfanty of Archer Heritage Planning Ltd. The GPR survey was carried out by Scantech Geoscience Ltd. on the 3rd of February 2023. The Architectural Survey was carried out by Molloy Associated in March 2023. The assessment aims to identify and describe known and potential archaeological and cultural heritage constraints in surrounding areas of the bridges and their approaches and offer recommendations for the mitigation of such impacts.

1.1 Proposed Development

Both of the bridges are part of proposed active travel infrastructure in Monaghan Town. The core objective of the Project is to provide linkage and permeability to existing and proposed active travel provisions in the town which will integrate with the overall active travel policy for Monaghan Town. This will improve safety and contribute towards an increased number of trips in the area by pedestrians and cyclists.

Ballyalbany Bridge

The pedestrian bridge is proposed on the east side of the existing bridge. This allows for linkage to the existing footpaths (via new embankments) on the northeast and southeast sides. This arrangement removes the need for pedestrians to cross the road twice to traverse the Blackwater River at this location. The proposed embankment on the northeast side would be constructed in the corner of Ballyalbaney Graveyard. The proposed new bridge would abut to the existing bridge. Option selection and Preliminary Design have been completed. Planning permission will now be sought for the proposed development.

Horseshoe Bridge

The pedestrian bridge is proposed on the west side of the existing bridge. This allows for linkage to the existing footpaths which are on the northwest and southwest sides. This arrangement removes the need for pedestrians to cross the road twice to traverse the Ulster Canal at this location. The proposed new bridge would abut to the existing bridge. Option selection and Preliminary Design have been completed. Planning permission will now be sought for the proposed development.

2. SITE DESCRIPTION

Ballyalbany Bridge

Ballyalbany Bridge which dates to 1730-1790, is located on northeast side of Monaghan town and carries Coolshannagh Road over the Blackwater River (Figure 2). The bridge is a two-span masonry arch structure. Ballyalbany Bridge is listed in National Inventory of Architectural Heritage (NIAH Reg. No. 41302007) and appraised as *“One of the oldest masonry arch bridge structures in the local area...”*

Horseshoe Bridge

Horseshoe Bridge which dates to 1835-1845, is located in the townland of Mullaghcroghery (Figure 3). It carries Park Road over the disused Ulster Canal. The bridge is a single span masonry arch structure with substantial wing walls on all sides. Horseshoe Bridge is listed in National Inventory of Architectural Heritage (NIAH Reg. No. 41302007) and appraised as *“...a fine example of early to mid-nineteenth-century bridge building on the canal built to plans by Directors General of Inland Navigation engineer, John Killaly...”*

3. METHOD STATEMENT

The following sources were consulted in the preparation of this report:

- Record of Monuments and Places (RMP)/ Sites and Monuments Record (SMR)¹
- Historical maps
- Aerial photography
- Topographical files of the National Museum of Ireland
- Documentary research
- Relevant on-line databases (e.g. Excavation Bulletin; NRA Archaeological Database).

¹ Archive Unit National Monuments Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Floor 2, Block 6, Irish Life Centre

4. ARCHAEOLOGICAL BACKGROUND

4.1 Brief archaeological & historical background

Monaghan takes its name from *Muineachán*, meaning 'the Hilly Place', a reference to its surrounding landscape (Livingstone 1980), though it has also been translated as 'the town of the monks' as it was possibly the site of an early monastery. The dominant Gaelic clan in the Monaghan area was MacMahon and following the Anglo-Norman invasion of 1169, a MacMahon chieftain joined de Courcy on his expedition into Ulster. MacMahon was placed in charge of two forts in the Monaghan area which he soon destroyed, forcing de Lacy to re-invade the territory at a later date (Lewis 1837). Though the area of Monaghan was penetrated by the Anglo-Normans, the area generally remained under the control of the MacMahons who were subject to the northern O'Neill's (Thomas, 1992, 232). In 1335, the MacMahons established their headquarters on a crannog situated on Convent Lake (c. 500m ENE from Horseshoe Bridge; RMP MO009-037). They also founded a Franciscan Friary at Monaghan in 1462 (RMP MO009-039; Brindley 1986), most likely on the site of the earlier ecclesiastical foundation. The Franciscan friary was dissolved in 1588–89 and granted to Edward Withe. Lewis (1837) states that Monaghan, at this time, comprised the monastery and the MacMahon crannog alone and had not reached the status of a village.

In 1585, when the local kingdoms were united to form the modern county of Monaghan, the location of Monaghan town (then known as Rackwallace) was chosen as its capital. The county was divided into baronies and an English garrison was stationed at the site of the town. The new leader of the MacMahon clan allied himself with the English and was made sheriff of the county in 1592. He later turned on the English, joining with the O'Neill to drive them out of Monaghan (Livingstone 1980). His hold over the territory was short-lived, however, and in 1589 an English garrison occupied the town (McMahon 1982). By the end of the Nine Years War in 1603, Monaghan was firmly in English hands and they began to establish administrative institutions for the county there. Sir Edward Blayney was placed in charge of the garrison at Monaghan and stationed a company of foot in a specially designed fort at the north side of the town (Livingstone 1980; Virtue 1868). It was incorporated in 1613 after receiving a market and fair charter in 1611 (Thomas 1992, 323). A corporation controlled the day-to-day running of the town and its surrounding area, i.e. the townlands of Roosky, Mullaghmonaghan, Tirkeenan, Annahagh, Killygoan, Latlurcan, Mullaghcroghery, Collshannagh and Mullagh dun, which together comprised the Liberties of Monaghan.

Gradually, the town centre began to take shape. A market place was formed which immediately became known as The Diamond. To the south of this was the castle which was surrounded by a stone wall enclosing an area (the bawn) twice the size of The Diamond. The town as a whole was defended by a water-filled ditch with four gates opening onto rudimentary streets. By 1640, the town had grown to comprise almost one hundred houses and had become the administrative and commercial centre of the county. At the time, it was inhabited almost exclusively by settlers, though by the reign of James II in

1685, Monaghan was under the control of Catholics who re-opened the monastery in 1688 (Livingstone 1980). By the beginning of the eighteenth century, Monaghan was a Protestant town, mainly occupied by Presbyterian settlers from Scotland. This was a period of stability for Monaghan and it witnessed much development and growth (Livingstone 1980).

The Ulster Canal was constructed by the Ulster Canal Company between 1831 and 1841 to link Lough Neagh with Upper Lough Erne. Starting at Charlemont, on the River Blackwater in Co Armagh, it passes Caledon, Middletown, Monaghan and Clones en route to Wattle Bridge on a navigable section of the River Finn, some 6km from the Erne. Its overall length is 74km (46 miles) and it cost over a quarter of a million pounds to construct. Digging of the canal began in 1831 at the Charlemont end, and the canal reached Monaghan in 1838. The summit level between Monaghan and Smithborough was completed in 1840. All the locks on the canal were built to a nominal width of 12ft (3.66m), in contrast to the minimum lock width of 15ft (4.57m) on the Lagan and Newry canals. This led to continual expenses in transshipping goods and materials to the narrower lighters which negotiated the Ulster Canal, and had a negative impact on the commercial viability of the canal. Also, it proved necessary to keep the canal topped with water to offset natural leakage, leading to summer water shortages. The canal opened to commercial traffic in 1842. However, these shortcomings coupled with competition from the new railway network and the imposition of customs duties following partition in 1921, ensured that the canal was not a commercial success. It was dewatered and abandoned in 1931.

4.2 Record of Monuments & Places

The Record of Monuments and Places (RMP) is a statutory inventory of archaeological sites protected under the National Monuments Acts 1930-2004 (Section 12, 1994 Act), compiled and maintained by the Archaeological Survey of Ireland (ASI). The inventory concentrates on pre-1700 AD sites and is based on a previous inventory known as the Sites and Monuments Record (SMR) which does not have legal protection or status.

Ballyalbany Bridge

There are no RMP sites within 1km radius of Ballyalbany Bridge (Figure 4).

Horseshoe Bridge

There are number of RMP sites within 1km radius of Horseshoe Bridge. The closest one (MO009-067---, Mound) is located c. 500m SE of the Horseshoe Bridge. It is described in the RMP as “*Situated on high ground with excellent views in all directions. A flat topped mound of earth (top: 15m N-S; 16m E-W; base: 28m N-S; 27m E-W; max H c. 1.5m). Defined by a gradual slope on the S-SW side and by a steeper slope on the N-NE side. Possible faint traces of an external bank on the NE side. Known locally*

as 'Tully Fort'." Additionally there are two monuments located within convent lake c.500m to the NE; Crannog MO009-037 and Redundant record MO009-037001. This crannog (MO009-037) is likely to have been the 'caisleán' or castle of Mac Mahon mentioned in 1492. It is now a subcircular overgrown mound (dims 16m N-S; 14m E-W; H 0.7m), and erosion on the N and W shores reveals a matrix of boulders (dims c. 0.2-0.3m). The tops of four oak piles can be seen on the N side. The mound shelves off into deep water within 3-4m and a boulder kerb can be seen beneath the water (archaeology.ie).

The details of the RMPs are presented in Appendix 1 and Figure 5.

Both of the bridges are outside of the Monaghan Town Area of Archaeological Potential.

4.3 Cartographic Sources

Analysis of historic mapping can show human impact on landscape over a prolonged period. Large collections of historical maps (pre- and early Ordnance Survey maps as well as estate or private maps) are held at the Glucksman Map Library, Trinity College and other sources (UCD Library, Ordnance Survey Ireland, local libraries and published material).

4.3.1 Down Survey (1656)

The town of Monaghan is depicted within this map as a collection of structures containing a windmill and castle. It almost looks unfinished. There is a road leading SW from the town which may be indicative of Park Road. (Figure 6)

4.3.2 McCrea Map (1790)

It is possible **Ballyalbany bridge** which dates to 1730-1790, is depicted within this map. The Coolshannagh Road can be seen following roughly the same route as today and crossing over the Blackwater River in the same location as today. **Horseshoe Bridge** which dates to 1835-1845, is not depicted in this map. However the road which crosses over the bridge, now called Park Road is clearly depicted on this map. (Figure 7)

4.3.3 1st Edition (1835) and 25inch (1909-10) OSi Map

Ballyalbaney Bridge (built 1730-1790) is depicted within the 1st edition OS map (1835) much as it stands today. The Coolshannagh Road is clearly marked following the same route as modern times. To the north, in the area now used as a church and graveyard, two structures area marked within a greenspace. These are labelled as 'School House' and 'Seceders Meet House'. Although it is not clear, it does not appear the area was being used as a graveyard at this time. There is little change by the 25inch OS Map (1909-10). The bridge is labelled with the mark which indicates it was utilised as an

Ordinance Survey trig point. To the north, the Presbyterian church, Murdoch Memorial hall and graveyard have now been built and are labelled as such. There is little development in the immediate vicinity of the bridge. (Figure 8)

Horseshoe Bridge (built 1835-1845) is not depicted in the First Edition OS map (1835). However the outline of the proposed route of the Ulster Canal is marked in dashed lines on the map. It crosses over Park Road which follows much the same route as today. The surrounding landscape is undeveloped greenfields. The bridge is clearly depicted on the 25inch OS map (1909-10). It was constructed along with the Ulster Canal which is now depicted as cutting through this landscape in a NW/SE direction. A structure, labelled Gate Lodge, has been built immediately to the south of this bridge. The bridge is labelled with the mark which indicates it was utilised as an Ordinance Survey trig point. (Figure 9)

4.3.4 Cassini Map (1910-1940)

There is no change to either the Ballyalbany Bridge or Horseshoe Bridge in this map. The depiction of the surrounding areas is somewhat less detailed.

There was no increased archaeological potential noted during analysis of Historical Mapping.

4.4 Aerial photography

Aerial photography (or other forms of remote sensing) may reveal certain archaeological features or sites (earthworks, crop marks, soil marks) that for many reasons may not be appreciated at ground level. Online orthostatic photographs of the site were examined (Ordnance Survey Ireland 1995, 2000 & 2005; Google Maps 2018).

Ballyalbany Bridge

Aerial photographs from 1995 (B&W) depicts the bridge and the area around it in low resolution. The road surface of the bridge is partially obscured by the trees canopies. Later photographs (1999 – 2022) show little change in the vicinity of the bridge. (Figure 10)

Horseshoe Bridge

Aerial photographs from 1995 (B&W) depicts the bridge and the area around it in low resolution. The road surface of the bridge is clearly visible going over the Ulster Canal. Later photographs (1999 – 2018) show little change in the vicinity of the bridge. (Figure 11)

There was no increased archaeological potential noted from Aerial Photography.

4.5 Topographical Files

The National Museum of Ireland (NMI) Topographical Files is the national archive of all known antiquities recorded by the National Museum listed by county and townland/street. These files relate primarily to artefacts but also include references to monuments and contain a unique archive of records of previous archaeological excavations. The Museum files present an accurate catalogue of objects reported to that institution from 1928 onwards.

The topographical files were searched in January 2023 for the townlands surrounding Ballyalbaney bridge of Mullaghmore East, Telaydan, Billises, Coolkill East, Derrynagrew, Coolshannagh, Kilnacloy and Blackwater Valley. **There were two records from the townlands surrounding Ballyalbaney bridge; a tool or forklike object (1942:1898) was recovered from Billises and Human Remains (2013:376) comprising of a skull which was recovered by a walker in the townland of Kilnacloy.**

The files were also searched for the townlands surrounding Horseshoe Bridge of Mullaghcroghery, Mullaghdund, Mullaghmonaghan, Tully, Mullaghmatt, Killyconigan and Cornakessagh Demesne. **There are no entries in the Topographical Files from the townland surrounding Horseshoe bridge.**

4.6 Previous Archaeological Excavations

The Excavation Bulletin is a database of summary accounts of archaeological excavations in Ireland and Northern Ireland from 1970 onwards. Summaries relating to archaeological excavations undertaken by the National Roads Authority are also available on-line and were consulted for any adjacent sites. Reports on licensed archaeological works are also held by the Archive Unit of the National Monuments Section.

Ballyalbaney Bridge

There were no previous archaeological excavations in the immediate vicinity of this bridge. The closest reported licensed test excavations (18E0553) took place c 400m to NE and resulted in no archaeological features or deposits being found. Other reported excavations from the wider area are too remote to have meaningful impact on the archaeological potential in this assessment.

Horseshoe Bridge

There were no previous archaeological excavations in the immediate vicinity of this bridge. Majority of reported licensed excavations closest to this bridge are clustered around the Monaghan town centre c.700m NE of this bridge producing various results, however all those findings are too remote to the bridge location to have meaningful impact on the archaeological potential in this assessment.

² The NMI Topographical Files search was undertaken by the Irish Antiquities Division of the NMI on behalf of Archer Heritage and is gratefully acknowledged,

4.7 Protected Structures

Local Authorities have a statutory responsibility to safeguard architectural heritage in accordance with Part IV of the Planning and Development Act 2000. Under S.51 (1), a Council must compile a Record of Protected Structures (RPS), which lists all structures which are of special *architectural, historical, archaeological, artistic, cultural, scientific, social or technical* interest. The protection, unless otherwise stated, includes the exterior and interior of the structure, lands lying within its curtilage (boundary), other structures and their interiors within the curtilage, plus all fixtures and fittings which form part of the interior or exterior of any of these structures. Buildings can be added to, or deleted from the RPS at any time, though generally this occurs when the development plan is being reviewed.

The National Inventory of Architectural Heritage (NIAH) was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. Its purpose is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. It is intended to provide a basis for recommendations of the Minister for Housing, Local Government and Heritage to Local Authorities for the inclusion of particular structures in Records of Protected Structures (RPS).

The Architectural Conservation Area (ACA) aims to identify areas of special character and architectural interest and to preserve that special character. The goal is to provide a framework that will permit a degree of flexibility in terms of design consistent with the maintenance and improvement of the essential character of the ACA. To fulfil this objective all new development in the area of the ACA should be implemented and carried out in accordance with the outlined policies/objectives.

Ballyalbany Bridge

Ballyalbany Bridge is recorded on Monaghan County Council Record of Protected structures (MCC Ref 41400943). It is also recorded on the NIAH (Reg. No. 41302007) where it is described as *“a two-arch limestone bridge, built c.1750, carrying road over Blackwater River. Walls of uncoursed rubble with uncapped parapets, segmental arches having punch-finished voussoirs and full-height V-shaped cutwaters on both elevations of central pier. There is concrete skirting around base of cutwaters and abutments, rolled steel joist supporting water main punches through arch soffit which has remnants of roughcast render. Battered buttresses reinforce wing walls on both sides of river. There is an additional segmental flood arch in wing wall to north-west, parapet over which, along with adjacent roadside wall leading around Presbyterian churchyard, this was rebuilt in stone and cement in recent years. Gently hump-backed bridge.*

This is one of the oldest masonry arch bridge structures in the local area, this crossing which carried one of the main roads from Dublin to Derry and Letterkenny retains its historic appearance despite mid-to late twentieth-century additions and alterations and nineteenth-century embellishments such as buttresses and cutwaters.”

Ballyalbany Presbyterian Church (MCC Ref No 41400941, NIAH Reg. No. 41302005) dating to 1785 – 1890 and Murdock Memorial Hall (NIAH Reg. No. 41302004) dating to 1880 – 1885 are located 100m to the north of the Bridge. Another Bridge (Reg. No. 41302006) is located c.250m to the NE. Blackwater Vale House (Reg. No. 41302008) is located c.200m to the SW. For further details see Appendix 2. **This bridge is not located within Architectural Conservation Area (ACA).**

Horseshoe Bridge

Horseshoe Bridge is recorded on Monaghan County Council Record of Protected structures (MCC Ref Local 18). It is also recorded on the NIAH register (Reg. No. 41303015) where it is described as “a single-arch stone road over railway bridge, built c.1839, carrying Park Road which narrows at crossing, over Ulster Canal and towpath short distance west of nineteenth lock. Parapet walls of roughly squared rubble sandstone with heavy flat capping stones having rounded arrises and punch-finished surfaces. Parapets have large curved splays to both ends of bridge where they are terminated by square piers having heavy pyramidal stone caps to north-east end or continue along roadside to south. Both elevations obscured by ivy and trees growing on embankments either side of disused canal.

This is a fine example of early to mid-nineteenth-century bridge building on the canal built to plans by Directors General of Inland Navigation engineer, John Killaly, although it is not clear who actually designed the bridge. The well executed structure stands as a functioning and gracefully tall element of a now disused canal scheme”.

Gate Lodge (NIAH Reg. No. 41303016) dating from 1860 – 1880, is located c. 30m to the south. Tully House (NIAH Reg. No. 41303017) dating 1790 – 1830 is located c. 200m to the SE. For further details see Appendix 3. **This bridge is not located within Architectural Conservation Area (ACA).**

4.8 Site Visit

The site was visited on the 19th of January 2023 in cold, bright conditions (Plate 1-8).

Ballyalbany Bridge

Ballyalbany Bridge is wide enough to accommodate two cars and crosses the River Blackwater. The road across the bridge has a noticeable hump. It is located to the south of Ballyalbany Presbyterian Church (Reg. No. 41302005). The associated graveyard runs up to the riverbank although the graves seem to stop outside some distance from the river. The bridge comprises three arches, the smallest of

which is located within the graveyard, set a few metres north of the other two arches. The two larger arches cross over the flowing river, the additional third arch would be in use during floods. The river is heavily littered with general rubbish, a trolley can be seen near the bridge arch. Drainage gaps in the wall allow flows of rainwater from the road to the graveyard (Plates 1-4).

There was no clear archaeological potential identified in the site visit.

Horseshoe Bridge

Horseshoe Bridge (Mullaghmatt) was a narrow bridge crossing the disused canal over which only one car can pass at a time. Access to the old canal was hampered by dense vegetation and an extremely steep slope. Both the slope and the canal were heavily littered. The single arch of the bridge was extremely high, possibly 7-8 meters. The path along the edge of the canal runs through the bridge (Plates 5-8). **There was no clear archaeological potential identified in the site visit.**

5. GPR SURVEY

Scantech Geoscience Ltd. was requested by Archer Heritage Planning to carry out a test GPR Survey (Ground Penetrating Radar Survey) at the Ballyalbany Presbyterian Church in Ballyalbany, Co. Monaghan. The GPR Survey was carried out on the 3rd of February 2023.

The objectives of the survey were to locate possible unmarked burials in the churchyard ground within the proposed survey area. Eighty seven 2D GPR profiles 87 n° were collected and interpreted for the purpose of this survey. The Mala Easy Locator system with a central frequency of 450 MHz was used. The effective depth of penetration is estimated to 1.3 to 2m below ground level with a velocity of 8 cm/ns. The rough grounds in the wooded zone of the survey area were not suitable for the GPR investigation.

The GPR survey has not identified any strong evidence of unmarked burial within the area surveyed however two main anomalies have been located with a cluster of smaller anomalies that could potentially indicate the presence of grave. (LeComte, 2023). These anomalies are outside of the subject area (Figure 12). The complete GPR Report is attached as Appendix 4.

6. ARCHITECTURAL SURVEY

This preliminary Stage 1 appraisal was prepared by Molloy & Associates Conservation Architects to assess, at a high level, architectural heritage constraints influencing a progressing design for implementation of the Monaghan County Council Active Travel Scheme, where pedestrian/ cycle lane provisions are proposed to supplement two narrow, historic bridges in Monaghan Town; Ballyalbany

and Horseshoe Bridges. The subject assessment should be read in conjunction with design sketches for each proposal by Atkins, the project designer, together with the Archaeological Impact Assessment by Archer Heritage Planning, dated April 2023.

Both bridges, whilst of significant heritage interest and contributing to a wider urban character of heritage interest, have capacity to accommodate proposed secondary bridges as initially proposed. Each bridge has heritage buildings in proximity. The design, as it evolves, is required to be crafted to respect the character of these buildings and their enclosures, as interacting with a shared urban realm. As described below, it is further recommended, following detailed surveying, that conservation of vulnerable masonry of each bridge is included in the brief to supplement their function, together with improved presentation of their respective environs- all in order to visually enhance their heritage significance.

7. IMPACTS

This archaeological impact assessment was undertaken on the Ballyalbany Bridge (Mullaghmore East Td, Tedavnet Parish, Barony of Monaghan, ITM 667441, 835229; Figure 1) and Horseshoe Bridge (Mullaghcroghery Td, Monaghan Parish, Barony of Monaghan, ITM 666401, 833149; Figure 1), Co. Monaghan. The assessment was prepared in April 2023 for Monaghan County Council by Maeve McCormick and Bart Korfanty of Archer Heritage Planning Ltd. The GPR survey was carried out by Scantech Geoscience Ltd. on the 3rd of February 2023. The Architectural Survey was carried out by Molloy Associated in March 2023. It aims to identify and describe known and potential archaeological and cultural heritage constraints in surrounding areas of the bridges and their approaches and offer recommendations for the mitigation of such impacts.

The subject sites of this assessment are restricted to immediate surroundings of both bridges. There are no RMPs near to either of the bridges. There was no increased archaeological potential noted during analysis of cartographic sources or aerial photography. There were two records in the topographical files from the townlands surrounding Ballyalbany bridge; A tool or forklike object (1942:1898), recovered from Billises and Human Remains (2013:376), recovered in the townland of Kilnacloy. There are no entries from the townland surrounding Horseshoe bridge. There were no previous archaeological excavations near either of the bridges. There was no clear archaeological potential identified in the site visit.

Ballyalbany Bridge (MCC Ref 41400943, NIAH Reg. No. 41302007) and Horseshoe Bridge (MCC Ref Local 18, NIAH Reg. No. 41303015) are recorded on both Monaghan County Council RPS and on the NIAH register. Neither of the bridges are located within an ACA.

The GPR Survey was carried out Scantech Geoscience Ltd. on the 3rd of February 2023 at the Ballyalbany Presbyterian Church in Ballyalbany, Co. Monaghan. The GPR survey has not identified any

strong evidence of unmarked burial within the area surveyed however two main anomalies have been located with a cluster of smaller anomalies that could potentially indicate the presence of grave. This anomaly is located outside of the subject area.

The Architectural Survey was carried out by Molloy & Associates Conservation Architects in March 2023. It was determined that both bridges were of significant heritage interest and contributed to a wider urban character of heritage interest. They both have the capacity to accommodate proposed secondary bridges as initially proposed. Each bridge has heritage buildings in proximity. The design is required to respect the character of these buildings and their enclosures. It is further recommended that conservation of vulnerable masonry of each bridge is in the design.

Considering all these factors, it is deemed that;

- There is **low** potential for the survival of archaeological remains at Ballyalbany Bridge
- There is **low** potential for the survival of archaeological remains at Horseshoe Bridge

8. RECOMMENDATIONS

It is recommended that;

- Continuous Archaeological Monitoring of all ground works take place at Ballyalbaney Bridge.
- Continuous Archaeological Monitoring of all ground works take place at Horseshoe bridge.

All work is to be undertaken under licence to Department of Housing, local Government and Heritage (DHLGH).

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

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Maeve McCormick

27th October 2023

Appendices

Appendix 1: Table of RMP/SMR sites in vicinity of Horseshoe Bridge

SMR No.	Class	Townland	ITM reference	Distance to site
MO009-037----	Crannog	MULLAGHMONAGHAN	666860, 833299	c. 500m NE
<p>Situated at the centre of Convent Lake, which was called Spark's Lake (OS 1834). This is a subrectangular lake (dims c. 180m NW-SE; c. 150m NE-SW) in Monaghan town, and it is c. 500m SW of the town centre. A map of 1591 depicts Macmahon's house on an island in the lake (Mooney 1957, Pl. 12), but one of Bartlett's map of 1602-03, which has been thought to depict this crannog (O'Sullivan 1998, Pl. 58) is a representation of Roosky Lake (pers. comm. Grace Moloney 2012) with its two crannogs (MO012-050----; MO012-051----). This crannog is likely to have been the 'caisleán' or castle of Mac Mahon mentioned in 1492 (AU; AFM). It is now a subcircular overgrown mound (dims 16m N-S; 14m E-W; H 0.7m), and erosion on the N and W shores reveals a matrix of boulders (dims c. 0.2-0.3m). The tops of four oak piles can be seen on the N side. The mound shelves off into deep water within 3-4m and a boulder kerb can be seen beneath the water.</p>				
MO009-037001-	Redundant record	MULLAGHMONAGHAN	666866, 833280	c. 500m NE
<p>One of Bartlett's maps of 1602-03 had been thought to depict Convent Lake which was called Sparke's Lake (OS 1834), but the map (O'Sullivan 1998, Pl. 58) with two crannogs is of Roosky Lake (pers. com. Grace Moloney 2012) and its crannogs (MO012-050----; MO012-051----).</p>				
MO009-060----	Historic town	KILNACLOY, MULLAGHMONAGHAN, ROOSKY (Monaghan By., Monaghan Par.), TIRKEENAN	667117, 833735	c. 900m NE
<p>Monaghan town (Muineacháin – hilly place) is situated on a hill or low ridge between Peter's Lake to the N and Convent Lake to the S. There are references to a McMahon 'caisleán' or castle at Monaghan in 1492 (AFM, AU), which is described as a 'house' in 1496 (AU). It is probably the crannog in Convent Lake (MO009-037----), which is described on a map of c. 1590 as 'McMahon's house'. The foundation of a Franciscan friary (MO009-060002-) nearby in 1462 would have added to the developing nucleus of a settlement, and this has been demonstrated through excavation (MO009-06010-).</p> <p>Monaghan was incorporated as a county with five baronies in 1585, and this location where there was already a friary and a strongpoint of the MacMahons as well as a small settlement may have been selected then for future development as the county town. In 1589-91 the lord deputy, Sir William Fitzwilliam, took advantage of a Mac Mahon dispute to establish a garrison here at the friary. This was part of a political and land settlement that effectively abolished the Mac Mahon chieftainship and the use of Brehon law in the territory. The land settlement was generally accepted by the larger Gaelic magnates as it secured their personal estates, and it also ensured that the county escaped plantation with the other Ulster counties after 1603. However, the infiltration of settlers through the foreclosure of debt and land purchase continued apace. (Moore 1955, 34-7; MacDuinnshleibhe 1955, 49-50; Duffy 1981, 2)</p> <p>Although the garrison at Monaghan was successfully re-supplied after the government defeat at the battle of Clontibret in May 1595, it was probably abandoned soon afterwards and it was not re-established until 1602 when its commander John Berkley built the small fort (MO009-060007-) N of the settlement (Hayes-McCoy 1960, 16; Livingstone 1982, 90-4). In 1604 Sir Edward Blayney was appointed seneschal or governor of the county and the garrison, and two years later he received extensive grants of land around the town and around what would become Castleblayney (Duffy 1981, 14, fig. 5). These were confirmed in 1612, although the castle at Monaghan was specifically excluded (Coyle 1980). In 1606 Sir John Davies, the attorney general, described the town as 'consisting of divers scattered cabins or cottages, whereof the most part was possessed by the cast soldiers of that garrison. In the northmost part thereof there is a little fort, which is kept by the foot company of Sir Edward Blayney, who is seneschal or governor of the county by patent. In the midst of this village there is a foundation of a new castle, which being raised ten or twelve feet from the ground, and so left neglected for the space of two years, is now ready to fall into ruin again' (quoted in Shirley 1879, 113; Livingstone 1980, 98). The town was incorporated in 1613, and had up to 100 houses in 1640. In the census of c. 1659 Monaghan town had an adult male population of 32 English and Scots and 101 Irish (Pender 1939, 149).</p> <p>The map by Richard Bartlett of c. 1602 shows a fortified enclosure with fourteen thatched houses and eight bastions. This is a fanciful idealised fortified town, which did not exist at Monaghan then, but the plan does show the ruins of the friary in the foreground and the little fort that was mentioned by Davies in the background. The town is represented on a slightly later map prepared for Sir Edward Blayney, probably c. 1611-13 and now held in Trinity College Dublin (Ms 1209 (32)), which was illustrated by Ó Gallachair (1962, 145). It depicts the town as a fortified rectangular area which was defended by walls or ramparts and outer fosses. It is situated between the two</p>				

SMR No.	Class	Townland	ITM reference	Distance to site
<p>lakes, but both of these would have been larger than at present. There were five bastions in all and a gate on each side. At the centre the castle being built by Blayney is represented as a rectangular structure that has large rectangular corner towers at the angles and a small enclosed court on its N side in the style of fortified houses. This is within a rectangular bawn with corner bastions at the NW and SE angles. Gardens and fishponds lay to its S but in its curtilage, and the market place, now the Diamond, was immediately to the N. Three streets are represented running from the Diamond, that are now called Glaslough, Dublin and Mill Streets, with Market Street / Park Street running S from Mill Street W of the Diamond also represented on the map rather than Dawson Street, which appears to be a late eighteenth century creation (Bradley and Dunne 1989, 19-21).</p> <p>The town would have been a large rectangle (dims c. 500m E-W; c. 400m N-S), but it would not have been as regular as depicted on the Trinity map. The rear of properties on the identified streets provide the best indication of where the perimeter of the town lay, notably the straight lines formed by the backs of properties on the NE side of Dublin St. and the W side of Park St. Excavation (02E1147; 03E0027) on the N side of the Diamond uncovered evidence of a fosse where it might be expected on the N side of the town as well as evidence of floor levels inside it dating to 1550-1590 (O'Connor 2002, 2006). The sites of the friary (MO009-060002-), the original fort (MO009-060007-), the parish church (MO009-060012-), and Blayney's castle (MO009-06003-) can be identified with some certainty but the only surviving monument from the era of the town's foundation is the market cross (MO009-060006-), which is intact but no longer in its original location.</p>				
MO009-060001-	Burial	MULLAGHMONAGHAN	667023, 833893	c. 900m NE
<p>According to a note in the IFC Schools MSS (957, 157), 'the monks from the monastery, murdered by English soldiers in either 1540 or 1589 are thought to be buried near the holy well which was on the site of the present provincial bank'. Its precise location is not known. See this web-page accessed on 12/12/2017: https://www.duchas.ie/en/cbes/4742056/4731389</p>				
MO009-060002-	Religious house - Franciscan friars	ROOSKY (Monaghan By., Monaghan Par.)	667029, 833568	c.800m NE
<p>A Franciscan friary was founded in 1462 by Phelim McMahon, but suggestions by Archdall (Gwynn and Hadcock 1970, 255) that it may have been on an older church site can be discounted (McKenna 1920, 1,3). Phelim McGuire was buried there in 1519 and Ruarai Mac Redmond Mac Mahon was dragged from sanctuary there and murdered in 1539 (AU). The friary became Observant in 1567, and in 1589 it was sacked by English forces under the Lord Deputy, Sir William FitzWilliam, when the guardian and five others were killed. However, this is recorded under 1540 (AFM) when it might equally well have been perpetrated by a force under the Lord Deputy, Lord Leonard Grey. FitzWilliam left a garrison at the friary, but it was probably withdrawn after the battle of Clontibret in 1595 (Ó Mearáin 1956). Its lands were granted initially to Edward White, but these lands were granted to Edward Blayney in 1606 and confirmed to him in 1612 (Coyle 1980). He is said to have built a castle (MO009-060003-) from the materials of the friary, of which no trace remains.</p> <p>An image of the friary survives on a map of c. 1590 (Mooney 1957, Pl. 12) which shows a simple rectangular structure with a tower attached on the N side of what may have been the junction of the nave and chancel. The tower has battlements and a pointed roof, but a cloister and other buildings are not depicted (Mooney 1955, 140-1) and probably did not exist. The ruins of the friary are also illustrated on Bartlett's map of c. 1602 as a more complex building at a distance from the town, but this is probably fanciful about the relative locations of these features. In 1835 the OS recorded that in the rear of a large house on the Diamond opposite Glaslough St., which was thought to be Blayney's castle (MO009-060003-), were 'some old walls, said to be the remains of an old Abbey, whose burying ground in common with that of the church (MO009-060012-) would seem to have extended beyond its present bounds, as in levelling that open space before the old Gaol a quantity of human bones were dug up..' (Herity 2012, 175). This account was followed by Lewis (1837, vol. 2, 384). These descriptions would place it between the Diamond and Convent Lake, probably in the vicinity of the Court house and the parish church. Archaeological testing (96E0025; 96E0293) over an extensive area here failed to produce any evidence of such a structure (Swan 1997a; 1997b).</p>				
MO009-060005-	Burial	ROOSKY (Monaghan By., Monaghan Par.)	667127, 833728	c.900m NE
<p>The following description is derived from the published 'Archaeological Inventory of County Monaghan' (Dublin: Stationery Office, 1986). In certain instances the entries have been revised and updated in the light of recent research.</p> <p>Burials uncovered during construction of public facilities in Church Square, Monaghan town, in 1940s.</p>				
MO009-060007-	Bastioned fort	MULLAGHMONAGHAN	666853, 833908	c.950m NE

SMR No.	Class	Townland	ITM reference	Distance to site
MO009-060009-	Graveyard	ROOSKY (Monaghan By., Monaghan Par.)	667162, 833746	c.950m NE
MO009-060011-	Graveslab	ROOSKY (Monaghan By., Monaghan Par.)	667150, 833732	c.950m NE
MO009-060012-	Church	ROOSKY (Monaghan By., Monaghan Par.)	667162, 833752	c.950, NE

SMR No.	Class	Townland	ITM reference	Distance to site
perimeter is curved W-N where it is defined now by railings. Archaeological testing (03E1672) undertaken in 2003 prior to the erection of a memorial to the victims of the Monaghan bombings in 1974 located c. 8m W of the perimeter of the graveyard exposed both disarticulated human remains and one in situ skeleton oriented in an east-west direction. The remains are part of the graveyard and were preserved in situ (McCarthy 2006).				
MO009-060013-	Bawn	ROOSKY (Monaghan By., Monaghan Par.)	667211, 833708	C.250m NE
A castle (MO009-060003-) was being built at Monaghan after 1604 by Sir Edward Blayney using material derived from the Franciscan friary (MO009-060002-). It is not represented on the Bartlett map of the town of 1602-03, but it is shown on a map of the town, probably c. 1611-13 and now held in Trinity College Dublin (Ms 1209 (32)), which was illustrated by Ó Gallachair (1962, 145). It shows the castle within a rectangular bawn (B) with a gate at the N and bastions at the NW and SE angles. South of the castle and within its curtilage the map shows gardens and fish ponds. In 1835 the site of the castle was pointed out as being on the Diamond opposite Glasslough St. (Herity 2012, 175) followed by Lewis (1837, 2, 384), but this structure was probably at the N side of the bawn, which would agree with the map of 1611-13. Archaeological excavations (96E0025; 96E0293) in the area to the SW failed to provide any evidence of the castle (Swan 1997a, 1997b).				
MO009-063----	Megalithic tomb - unclassified	GORTAKEEGHAN	665752, 832442	c.950m SW
Located on the crest of a hill in a forested area with commanding views of the Twin Lakes to the S. The remains consist of four deeply set orthostats, aligned E-W, and a large boulder-like capstone 0.2m to the N. The capstone rises to a height of c. 0.5m above the surrounding ground level and there is a small cavity c. 0.25m deep underneath it. No evidence of a cairn survives. (CRDS 1998, 33)				
MO009-067----	Mound	TULLY (Monaghan By., Monaghan Par.)	666763, 832856	c. 500m SE
Situated on high ground with excellent views in all directions. A flat topped mound of earth (top: 15m N-S; 16m E-W; base: 28m N-S; 27m E-W; max H c. 1.5m). Defined by a gradual slope on the S-SW side and by a steeper slope on the N-NE side. Possible faint traces of an external bank on the NE side. Known locally as 'Tully Fort'.				
MO009-084----	Enclosure	MULLAGHADUN	665939, 833818	c.800m NW
Located at the tip of a low N-S spur. An oval or D-shaped enclosure (ext. dims c. 42m N-S; c. 30m E-W) that is probably a slightly raised platform is visible on Google Earth (16/11/2008). It is slightly truncated by a N-S field bank on the E side, and it is clearly visible on a LiDAR image from the Open Topographical Viewer. It is also faintly visible on an OSI image (2005) and Aerial Premium (2013-18). The monument was first reported by Susan Curran from the LiDAR image, and it was also noted by Jean Charles Caillère.				

Appendix 2: Record of NIAH entries in 500m radius of Ballyalbaney Bridge

NAIH No.	Structure	Brief Description	Location
41302007	Bridge	Two-arch limestone bridge, built c.1750, carrying road over Blackwater River. Walls of uncoursed rubble with uncapped parapets, segmental arches having punch-finished voussoirs and full-height V-shaped cutwaters on both elevations of central pier. Concrete skirting around base of cutwaters and abutments, rolled steel joist supporting water main punches through arch soffit which has remnants of roughcast render. Battered buttresses reinforcing wing walls on both sides of river. Additional segmental flood arch in wing wall to north-west, parapet over which, along with adjacent roadside wall leading around Presbyterian churchyard, has been rebuilt in stone and cement in recent years. Gently hump-backed bridge.	Ballyalbaney Bridge, Ballyalbaney, Monaghan
41302009	Church/chapel	Freestanding four-bay mortuary chapel, built 1913. Pitched slate roof with terracotta ridge tiles and concrete skewed gables with moulded brick cornice to eaves holding half-round cast-iron rainwater goods.	New Cemetery, Monaghan
41302015	Grave monument	Cast-iron memorial, dated 1874, comprising upright panel with trefoil-headed top, supported at each end by decorative cast-iron brackets.	New Cemetery, Monaghan
41302008	House	Detached two-storey U-plan multi-phase farmhouse, comprising four or five-bay north block of c.1790 aligned east-west; five-bay west block of c.1860, having full-height canted bay at south end of west elevation; south block comprising gabled south end of west block, slightly lower gabled projecting entrance bay and flat-roof slightly lower bay of c.1860, and slightly projecting square-plan single-bay block of c.1880 having canted bay window to south.	Blackwater Vale House, Ballyalbaney, Monaghan
41302005	Church/chapel	Freestanding four-bay Presbyterian church, built 1788, and remodelled 1846 and 1886, having recessed single-bay gabled blocks to each end, that to north having gabled porch to west elevation.	Ballyalbaney Presbyterian Church, Ballyalbaney, Monaghan
41302004	Hall	Detached five-bay single-storey gable-fronted church hall, dated 1881, with lower late twentieth-century extension partly wrapped around rear, south-west, elevation.	Murdock Memorial Hall, Ballyalbaney, Monaghan
41302001	House	Detached three-bay two-storey house, built c.1880, with canted bay windows to end bays under same continuous hipped roof incorporating entrance to centre. Full-height two-storey addition to rear, single-storey outbuilding to north-east corner and detached outbuilding to north.	The Manse
41302006	Bridge	Three-arch skew limestone bridge, built c.1860, carrying N2 road over River Blackwater, widened to southeast by concrete structure of c.1980.	Monaghan

Appendix 3: Record of NIAH entries in 500m radius of Horseshoe Bridge

NAIH No.	Structure	Brief Description	Location
41303015	Bridge	Single-arch stone road over railway bridge, built c.1839, carrying Park Road which narrows at crossing, over Ulster Canal and towpath short distance west of nineteenth lock. Parapet walls of roughly squared rubble sandstone with heavy flat capping stones having rounded arrises and punch-finished surfaces. Parapets have large curved splays to both ends of bridge where they are terminated by square piers having heavy pyramidal stone caps to north-east end or continue along roadside to south. Both elevations obscured by ivy and trees growing on embankments either side of disused canal.	Horseshoe Bridge, Park Road, Mullaghcroghery, Monaghan
41303017	Bridge	Detached three-bay two-storey house with attic, built c.1810, having two-bay two-storey second pile, latter with two-bay two-storey addition, and remaining bay having single-bay lean-to addition. Lean-to timber-framed glass house to south-east gable of house.	Tully House, Tully Monaghan
41303016	Gate lodge	Detached three-bay single-storey house, constructed c.1870, formerly gate lodge, having T-plan, with gable-fronted porch projection to front façade, and late twentieth-century garage to south-east gable.	Park Road, Monaghan
41303014	House	Three-bay two-storey H-plan house built c.1800, facing north-west, with gable-fronted porch to front elevation flanked by canted bay and single-storey box-bay window.	Cortolvin House, Clones Road, Monaghan
41303013	Bridge	Single-arch road-over-canal bridge, built c.1835. Rubble stone walls and parapet, with cut-stone voussoirs to arch, and cut-stone parapet copings and stone string courses to base of carriageway level. Tarmacadam surface to carriageway, leading from Clones Road to Cortolvin House.	Cortolvin House, Clones road, Monaghan
41303011	House	Detached three-bay two-storey house, dated 1875, with multi-phase, two-storey lean-to extensions to rear effectively adding further pile to rear south elevation of building, and with single-pitch two-storey outbuilding to west side of rear elevation having late twentieth-century conservatory to east side of south elevation.	Tranquilla, Clones road, Mullaghcroghery, Monaghan

Appendix 4: Complete GPR Survey Report

SURVEY REPORT

FOR

A

GPR-SURVEY

AT

BALLYALBANY PRESBYTERIAN CHURCH

BALLYALBANY, CO. MONAGHAN

FOR

ARCHER HERITAGE PLANNING

PRIVATE AND CONFIDENTIAL

THIS REPORT IS THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE ELECTROMAGNETIC/ GROUND PENETRATING RADAR SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSE OF THE SUBSURFACE AND THE EXPERIENCE OF THE AUTHOR. SCANTECH GEOSCIENCE LIMITED HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUE USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE INFORMATION CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT. WHILE THIS REPORT IS PRESENTED IN GOOD FAITH AND WITH PROFESSIONAL INTEGRITY, SCANTECH GEOSCIENCE LIMITED GIVES NO WARRANTY AS TO THE ACCURACY OF THE INTERPRETATIONS AND ASSUMES NO LIABILITY FOR HOW THIS REPORT IS UTILISED.

Author	Checked	Report Version	Date
Brice Le Comte, MSc. Applied Geophysics		Final	April 25 th , 2023

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1 Executive Summary

- Scantech Geoscience Ltd. (Scantech) was requested by Archer Heritage Planning to carry out a GPR-Survey at the Ballyalbany Presbyterian Church in Ballyalbany, Co. Monaghan.
- The GPR Survey was carried out on the 3rd of February 2023.
- The objectives of the GPR survey were to locate possible unmarked burials in the churchyard grounds within the proposed survey area.
- Eighty-seven 2D GPR profiles (87 n^o) were collected and interpreted for the purpose of this survey.
- The Mala Easy Locator system with a central frequency of 450 MHz was used for the purpose of this GPR survey.
- The effective depth of penetration is estimated to 1.3 to 2 m below ground level with a velocity of 8 cm/ns.
- The rough grounds in the wooded zone of the survey area were not suitable for the GPR investigations.
- The GPR survey has not identified any strong evidence of unmarked burial however several main anomalies have been located in order to infirm or confirm the possibility that these could be associated with unmarked burials.
- 7 anomalies have located for ground investigations in three distinct locations (cluster A, cluster B and cluster C).
- 5 areas have been defined in the GPR interpretation.
- The GPR survey interpretation results have been plotted on the digital AutoCAD drawing **SCANTECH_23052_GPR-SURVEY_INTERPRETATION_BALLYALBANY_CHURCH_200223.dwg** file provided with this report in Annex A.
- Animated depth slices are provided in Annex B.

2 Survey Acquisition

The GPR data was collected on the 3rd of February 2023.

2.1 Survey Objectives

The objectives of the survey were to identify and locate possible unmarked burials on the grounds of the Ballyalbany Presbyterian Church within the survey area (see Figure 1 below).



Figure 1: Picture of the survey area with the Ballyalbany Bridge in the background (looking south)

Note: The two graves visible in the picture are outside the survey area.

2.2 Site location and Survey Areas

The site is located at the southern end of the church grounds cornered by the Blackwater River (light blue line) and the Coolshannagh Road (black line) going over the Ballyalbany bridge (c. 1750)

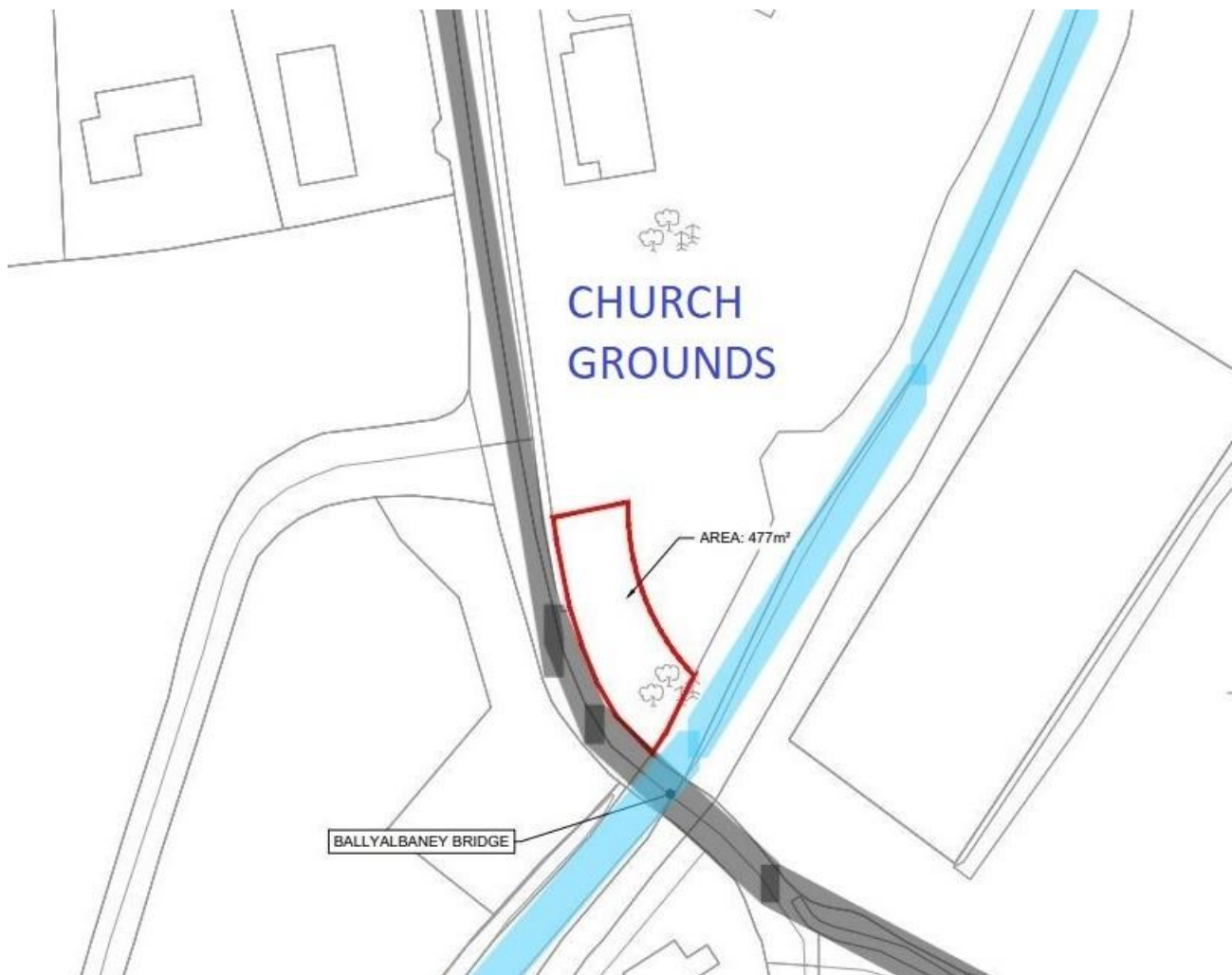


Figure 2: Geophysical survey area (red outlines)

The geophysical survey area is 477m² however a good portion of the survey area is comprised of a rough wooded area and overgrown river banks which were not suitable for the GPR survey.

2.3 Survey Crew

The survey was carried out by Scantech staff as presented in the Table 1 below:

Name	Role
Brice Le Comte	GPR surveying
Ellen Lavelle	GPS surveying

Table 1: Scantech Geoscience Ltd survey crew specific role

2.4 Base Map and Survey Location Mapping

A PDF 2D map was made provided for the purpose of the survey and was used as a base map to locate the GPR profiles and the GPR interpretation in Irish Transverse Mercator coordinates on an AutoCAD drawing provided along with the report in a digital format.

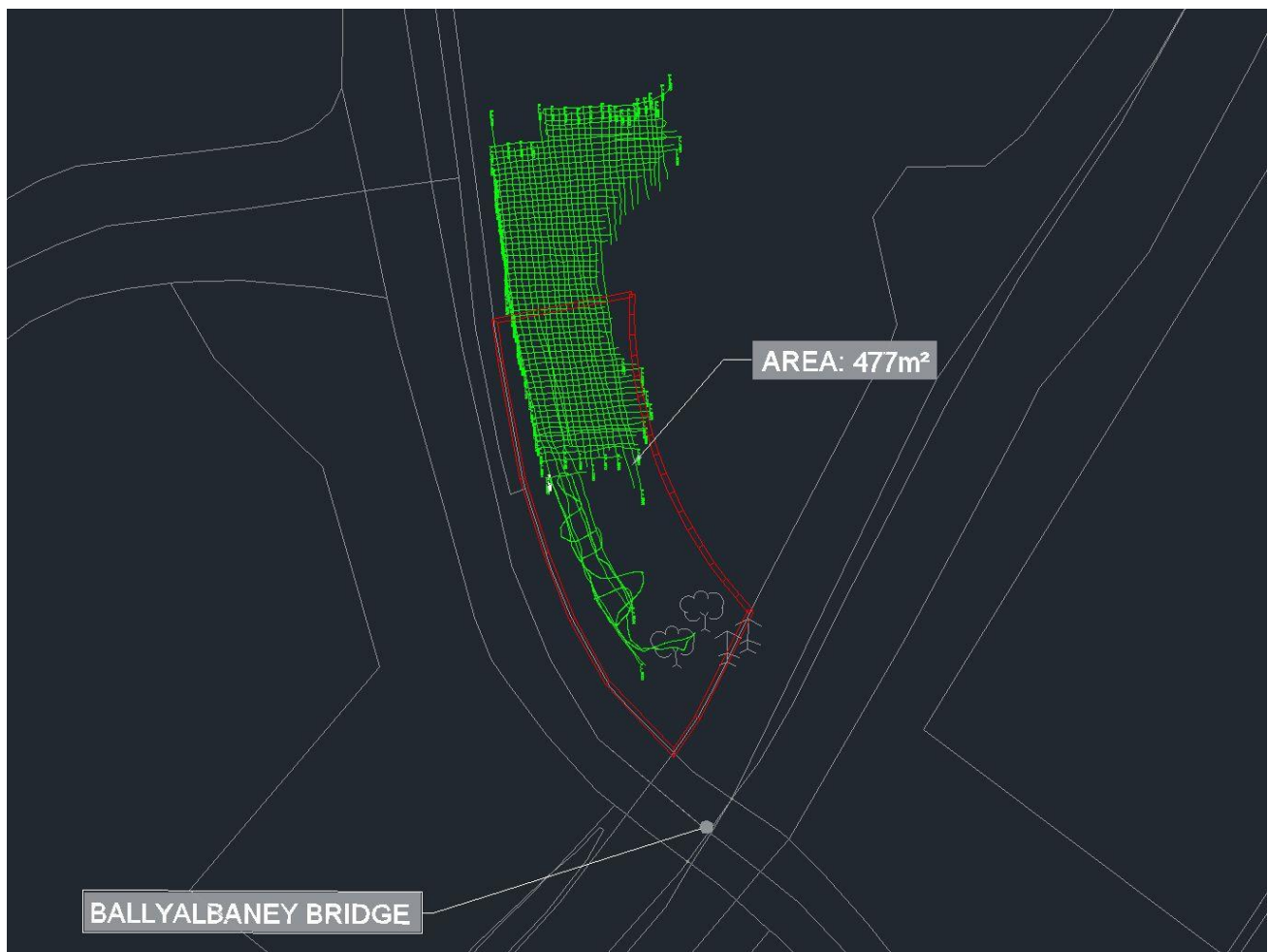


Figure 3: GPR grid (red hatched areas) set up over the primary survey area

The GPR grid was surveyed using an RTK GPS synchronised with the GPR data providing centimetre accuracy positioning for each GPR profiles.

The corners of the church buildings were also surveyed with an RTK GPS in order to overlay the geophysical survey with the base map provided.

The base of the bridge wall and corners of the existing graves can be used as accurate control points however the use of an RTK GPS is highly recommended to locate the anomalies in ITM coordinates.

2.5 Survey Type, Limitations and Methodology

2.5.1 Geophysical Survey - GPR

Ground Penetrating Radar is the highest resolution geophysical technique used by geophysicists to image the subsurface and is particularly useful when trying to determine shallow features like unmarked graves.

Using a GPR antenna, a high frequency electromagnetic pulse is transmitted into the ground for a very short period of time. The pulse is reflected at the boundaries between materials of different dielectric permittivity and the receiver records the returned electromagnetic energy within the short time window.

Combining the impulse response traces along a profile allows the geophysicist to build up a cross-section of the subsurface (radargram or 2D profile).

An area surveyed with densely spaced profiles allows interpolating the radargrams in order to generate 3D GPR data for better visualization and a more effective interpretation through the use of depth slices.

2.5.2 Survey methodology

The survey was carried out using both the Mala EM Locator impulse system with ultra wide bandwidth (450 MHz central frequency). All GPR profiles traces were located with an EMLID RTK GPS providing centimeter accuracy.

Tightly spaced profiles (every 50 cm approximately) were then collected in the two orthogonal directions in order to generate a 3D volume of the surveyed area.

A total of 87 GPR profiles were processed and interpreted for the purpose of this survey representing a total distance of 1460.4m of GPR data.

The effective time window used for the GPR survey was 84.1 ns with a trace interval of 2 cm and a digitization of 535 samples per trace.

2.5.3 Survey limitations

The first limitation of the survey is due the presence of rough ground and tree covers reducing the accessible survey area and GPS coverage.

The penetration of the GPR signal is quite strongly attenuated after depths of 2 mBGL and also noisy due to the presence of air waves coming from the trees.



Figure 4: GPR acquisition with the 450 MHz mounted on a cart with RTK GPS



Figure 5: GPS surveying with the GPR cart in the foreground.

3 Data processing

3.1 Off-Site GPR Analysis

All GPR data was processed and interpreted back in the office.

Off-site GPR analysis, also referred to as post-processing, involves applying a range of mathematical filters to the data to improve the signal to noise ratio which facilitates effective interpretation. It also involves velocity analysis for depth conversions and migration, see 3.3 below.

3.2 GPR Data Processing

Data processing included the following steps for the all the 2D profiles analysis:

- a.) DC adjustment
- b.) Time-zero adjustment
- c.) Time Gain
- d.) Background removal
- e.) Band pass filtering
- f.) Kirchoff migration
- g.) Hilbert transform

Note: the last two steps are only applied for the generation of the 3D data

3.3 GPR Depth Calibration

The speed of a radar wave changes depending on the type of material it travels through. Velocities of GPR waves can be highly variable and depend strongly on the clay and water content of the subsurface as well as the electromagnetic properties of the material (relative permittivity and electrical conductivity).

In order to determine the depth to a GPR anomaly, the recorded two-way travel times must be converted to depth using an accurate estimate of the average subsurface velocity.

The average velocity used for the survey was determined using hyperbolic curve fitting algorithms. All GPR profiles acquired during the survey was converted from travel time to depth using velocities of 8.0 cm/ns.

Variations across the site are expected and the depths information should always be considered with a margin of error around +/- 10 % as ground truthing information was not available.

To convert the measured two-way time to depth, the following formula is used:

$$\text{Depth [m]} = \text{Velocity [cm/ns]} * \text{Two-Way-Time [ns]} * 0.005$$

The depth values presented should be checked and revised once additional ground truthing information becomes available in order to revise and refine the velocity model if required.

The Figures 6 below show an example of a depth calibrated radargram with the 2D processing workflow used for each GPR profiles collected.

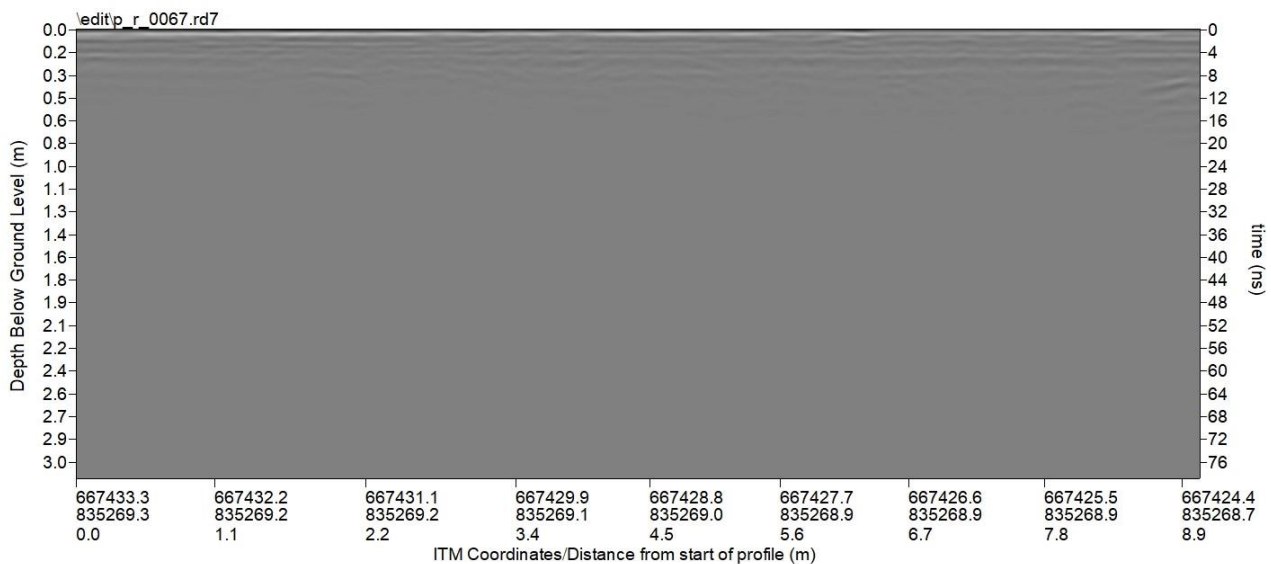


Figure 6: Example Profile 67 with DC removal and time zero

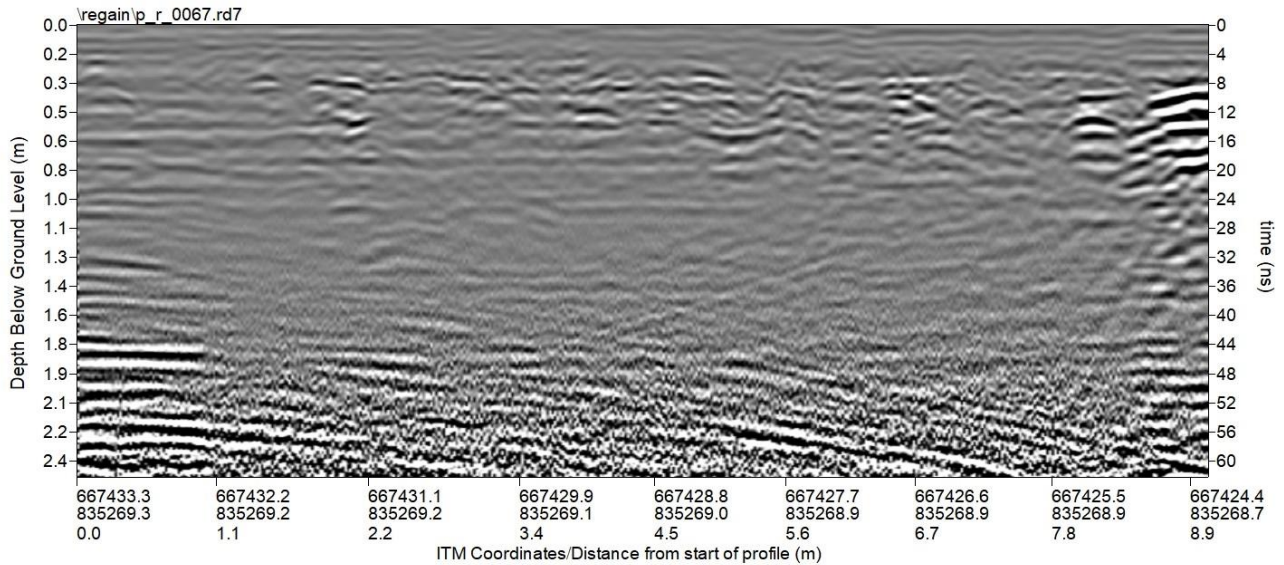


Figure 7: Example Profile 67 after background removal and bandpass and time-gain filters

Notes: Two distinct anomalies are visible at the end of the profile 67 at 0.3 mBGL approximately. The first is a hyperbolic reflection associated from the surface water PVC drain pipe (8m from start) and the second is associated with a French drain type running along the wall (8.5m from start).

3.4 3D Data and 3D Visualisation

The collection of dense 3D grids allows for the creation of a 3D volume after interpolation between processed profiles. The 3D data can be then sliced at specific time range (“thickness”) to visualise the GPR data in a plan view of relative amplitude anomalies (“time slices”) giving a more powerful way to visualise and interpret the GPR data.

The time slices are converted into depth slices using the depth calibration velocity used for the 2D radargrams which is the same as the migration velocity.

These depths slices are then interpolated four times in between each other with a 50% overlap between depth slices to create a smoother visual of the 3D volume.

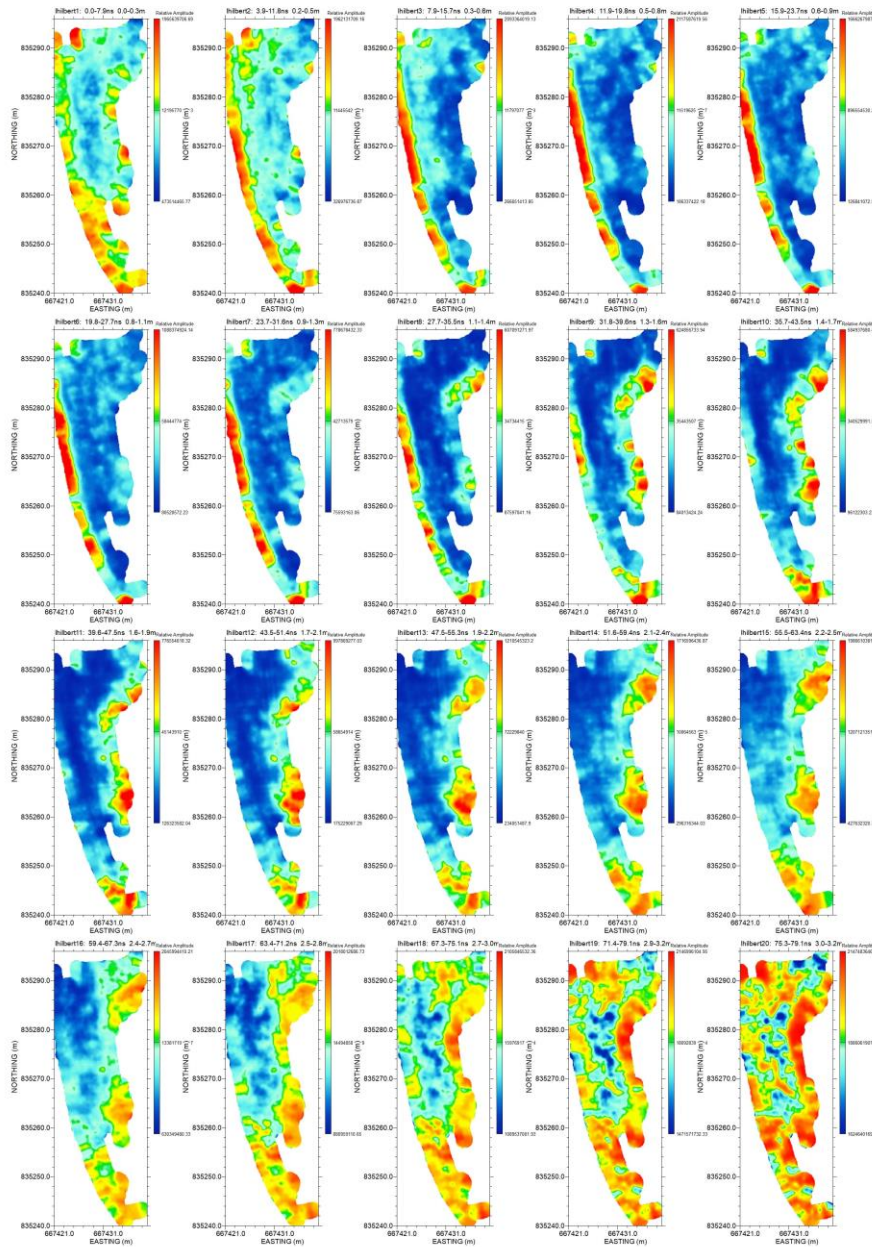


Figure 8: Depth slices with high relative amplitude anomalies in red ($v= 8 \text{ cm/ns}$)

Twenty depth slices were generated with thicknesses of 30 cm each overlapping 15 cm from the previous one in order to create the 3D volume as seen in the example above on Figure 11.

The full 3D volume is presented below in Figure 9.

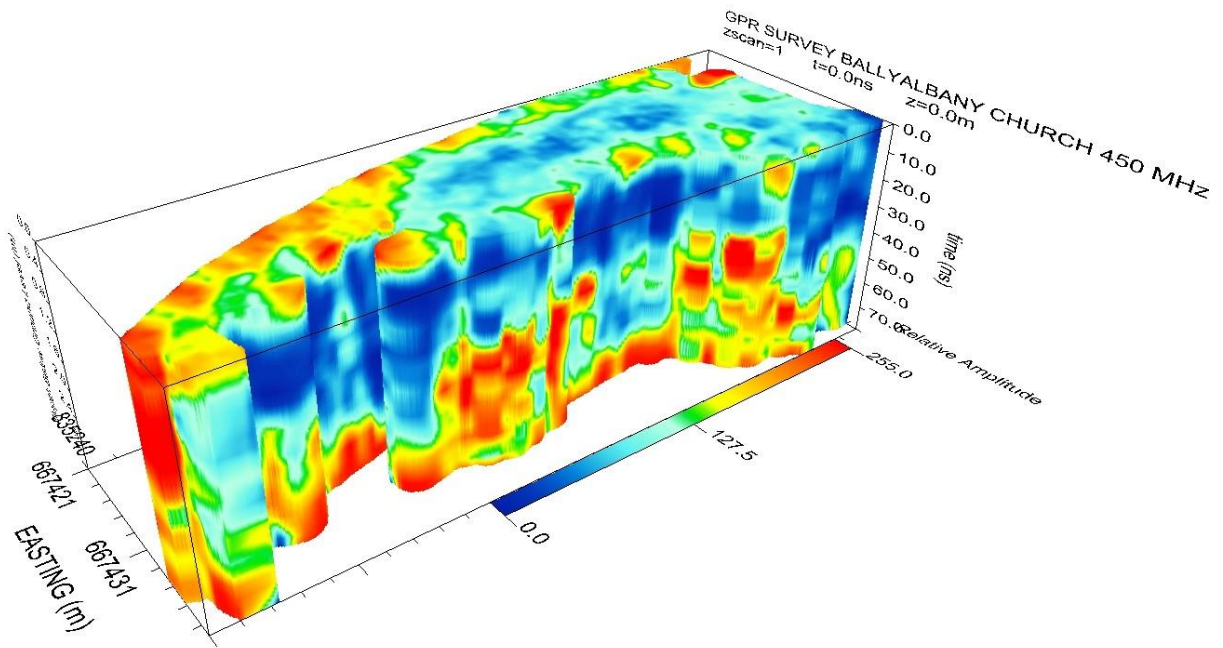


Figure 9: Full 3D GPR volume visualisation

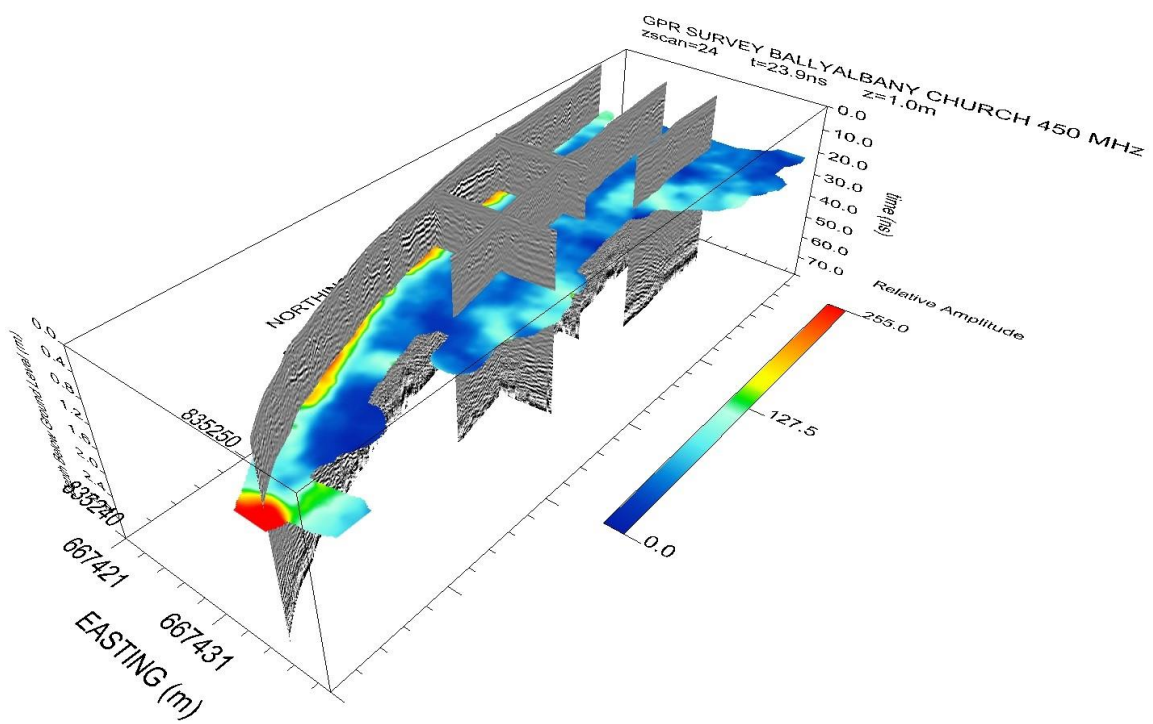


Figure 10: 2D profiles example displayed in the 3D volume

3.5 GPR Data Interpretation

3.5.1 Profiles

Interpretation of GPR data involves the identification and characterisation of anomalies with respect to amplitude, frequency, phase, position, depth, geometry and coherency.

The 2D profiles were analysed in order to identify possible hyperbolic anomalies associated with a burials signature within the survey area.

The Figure 11 below shows the two main anomalies (circled in red) on profile 13 that have the most potential to be associated with two unmarked burials within the survey area. Two other strong anomalies outside the survey area have been highlighted in blue.

The ITM coordinates of the red circled anomalies are (E 667430.9, N 835267.9) and (E 667431.2, N 835266.3) respectively at a depth of 1.0 mBGL approximately. These anomalies are defined as cluster A.

The ITM coordinates of the blue circled anomalies are (E 667428.4, N 835287.9) and (E 667428.5, N 835286.9) respectively at a depth of 0.95 mBGL and 0.86 mBGL approximately respectively. These anomalies are defined as cluster B.

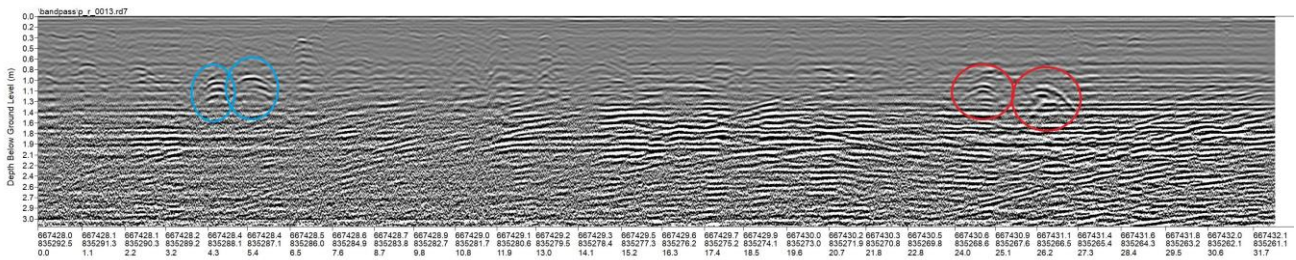


Figure 11: Profile 13 with the two main hyperbolic anomalies within the survey area (red circles) and outside the survey area (blue circles)

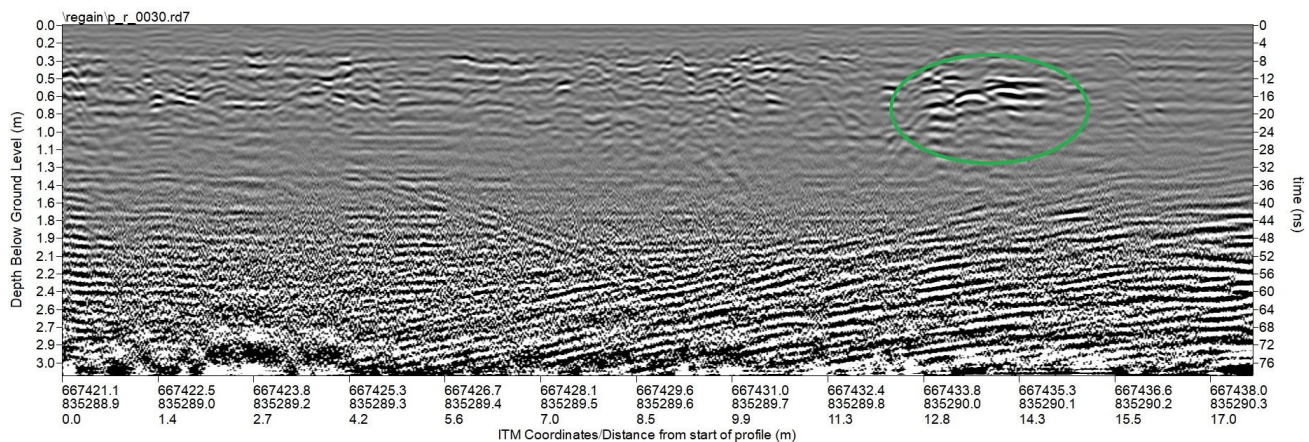


Figure 12: Profile 30 with three shallow anomalies outside the survey area (green circle)

Another interesting cluster of anomalies (green circle) that could be associated possibly with unmarked graves has been identified on Figure 12 above.

The ITM coordinates of the green circled anomalies are (E 667434.1, N 835290.0), (E 667434.6, N 835290.0) and (E 667435.2, N 835290.1) respectively at a depth of 0.7 mBGL, 0.61 mBGL and 0.56 mBGL respectively. These anomalies are defined as cluster C.

3.5.2 Depth Slices

The depth slice analysis and overlay analysis has allowed to interpret several areas of different nature within the survey area.

- Area 1 (dark blue) is associated with a strong shallow high amplitude anomalies indicative of the drainage system running along the wall at depth of 0.3mBGL approximately.
- Area 2 (green) is associated with a strong shallow to deep high amplitude anomalies indicative of the wooded area and the tree root network.
- Area 3 (light blue) is associates with a low amplitude anomalies indicative of a landscaped ground relatively homogeneous showing no convincing evidence of burials signature. Nevertheless two main anomalies on profile 13, at depth below ground of approximately 1m, in a cluster of smaller anomalies could be worth investigating, if necessary, as they are unlikely to be associated with tree roots unlike many other minor anomalies in the vicinity of the wooded area.
- Area 4 (magenta) is an area with shallow to deep high amplitude anomalies associated with the filled ground around the second arch of the bridge from likely from river deposits and/or man-made fill material.
- Area 5 (orange) is the area that couldn't be accessed with the GPR.

The Figure 13 below shows the depth slice overlay from 0.3 to 2.2 used to help the interpretation.

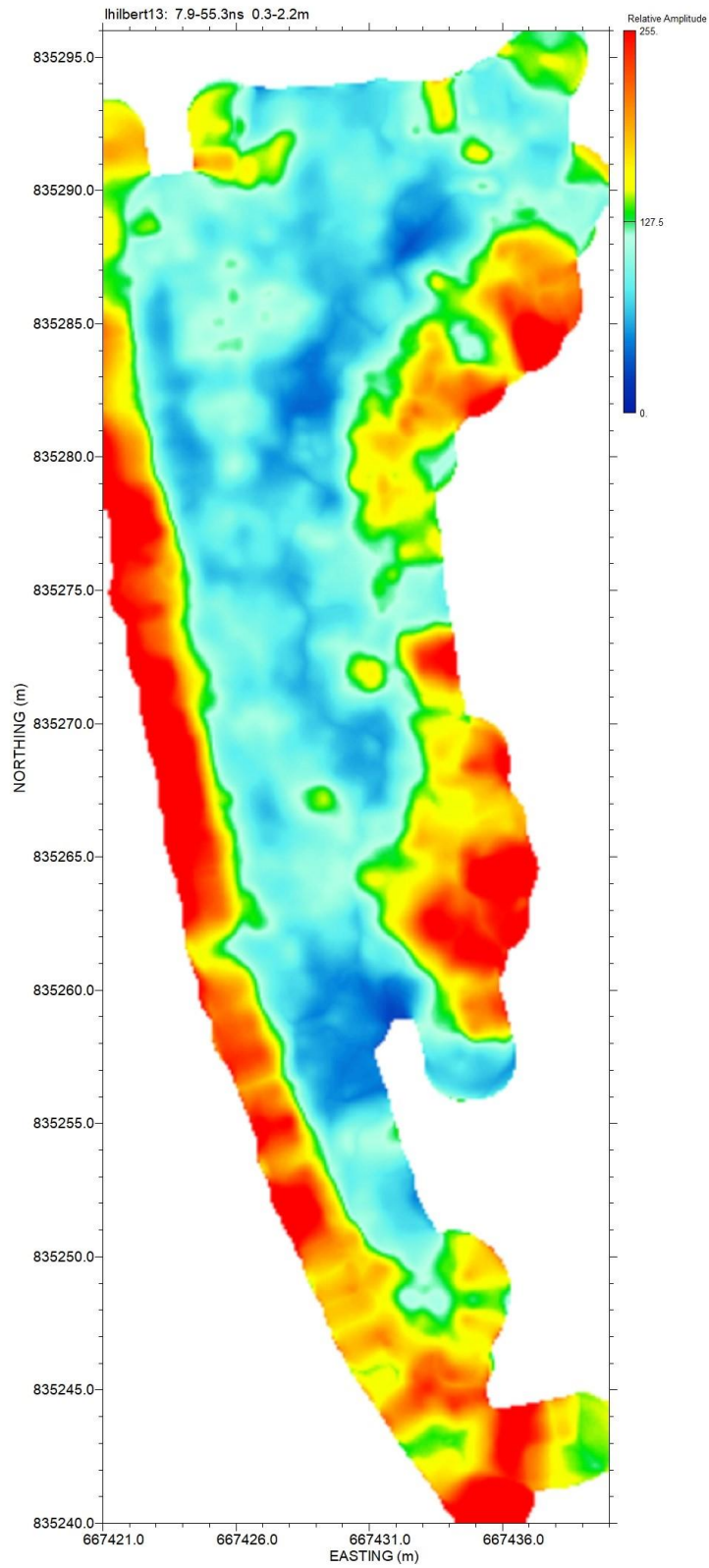


Figure 13: Overlay analysis from depth slices from 0.3 to 2.2Mbgl

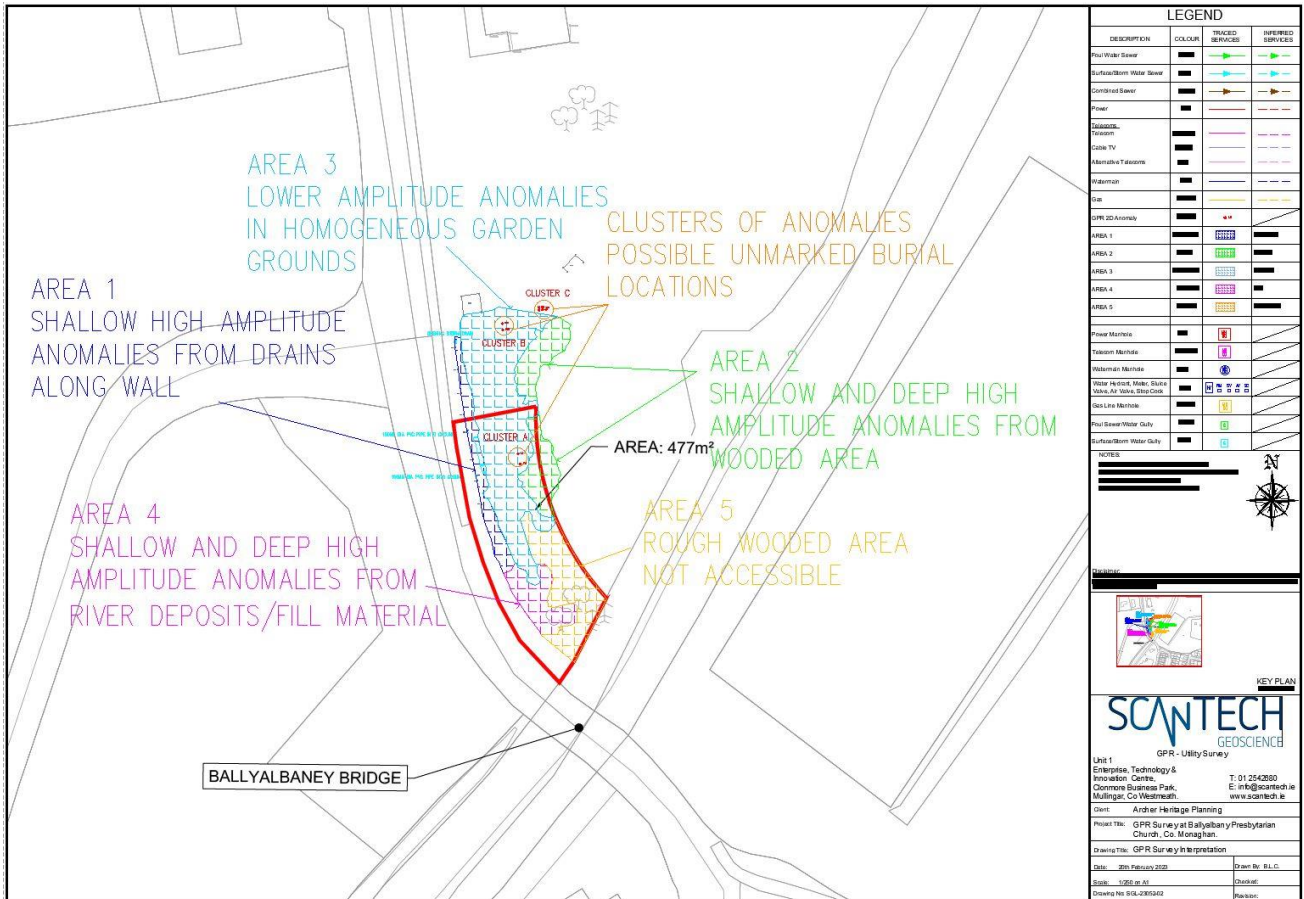


Figure 14: GPR survey interpretation at Ballyalbany Presbyterian Church

The GPR survey interpretation is provided along with the report as a digital AutoCAD drawing **SCANTECH_23052_GPR-SURVEY_INTERPRETATION_BALLYALBANY_CHURCH_200223.dwg** (Annex B).

4 Conclusions & Recommendations

Scantech Geoscience Ltd. was requested by Archer Heritage Planning to carry out a Ground Penetrating Radar survey on the grounds of the Ballyalbany Presbyterian Church in the vicinity of the Ballyalbany Bridge in order to help identify and locate possible unmarked burials within the survey area.

Seven main anomalies have been detected and located within three clusters of anomalies (A, B and C) on the landscaped area however no strong evidence of trenches or backfill is visible nor are they associated with depth slice higher amplitude anomalies. It is possible that these anomalies are associated with old unmarked burials however the probability is not very strong from our experience of burials signature on GPR data.

Scantech recommends to carry out ground investigation on the three clusters and the seven anomalies in order to confirm or infirm the nature of these anomalies.

Scantech reserves the right to revise and refine the interpretation if additional relevant information is provided from ground investigations.

Respectfully submitted,

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Unit 1 Tenure
Business Park,
Monasterboice,
Co. Louth

Ballyalbany & Horseshoe Bridges

Impact Assessment

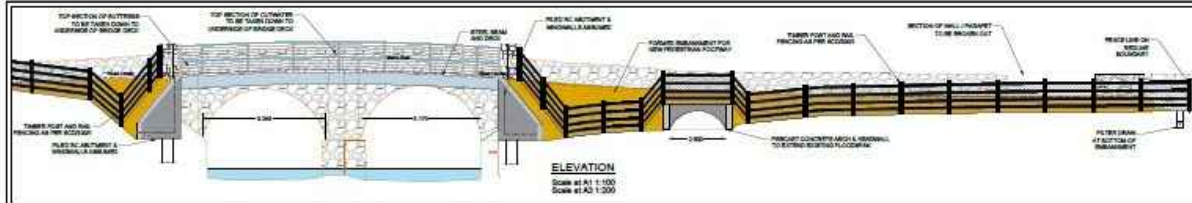
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Date: January 2023

Origin: NMS

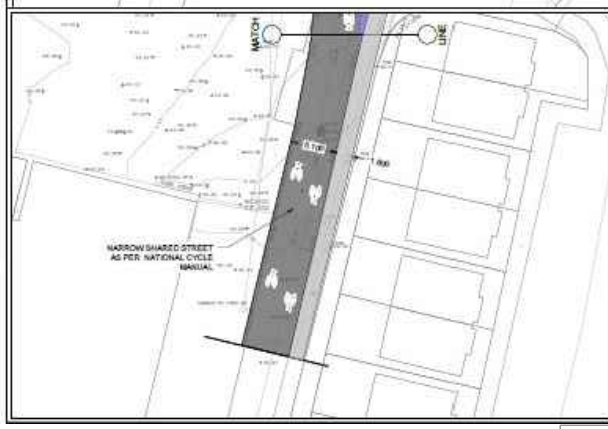
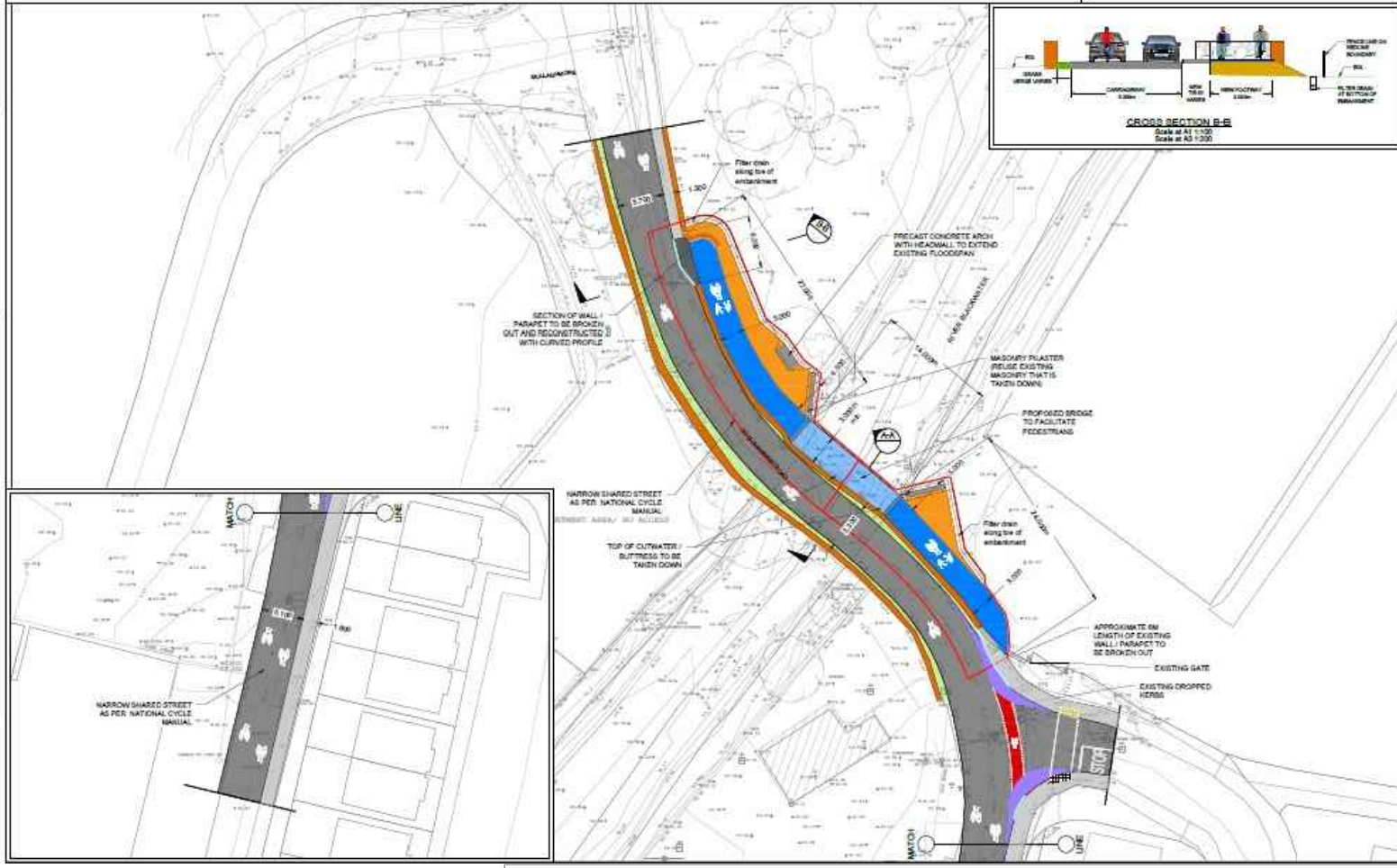
Ref: 2023_04_AIA_01

Figure 1: Site Location Plan



- GENERAL NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE
 2. ONLY WRITTEN DIMENSIONS SHALL BE USED. NO DIMENSIONS SHALL BE SCALED FROM THE DRAWINGS.
 3. ALL LEVELS ARE IN METRES AND ARE TO MAIN REDUCED.
 4. ALL COORDINATES ARE IN METRES AND ARE TO IRISH TRANSVERSE MERCATOR.
 5. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION.

- LEGEND**
- EXISTING CARPARKWAY
 - EXISTING FOOTPATH
 - NEW FOOTPATH
 - PROPOSED TACTILE PAVING (UNCONTROLLED)
 - EXISTING GRASS VERGE
 - PROPOSED GRASS VERGE
 - EXISTING WALL / PARAPET
 - PROPOSED BRIDGE
 - PROPOSED FOOTWAY
 - PROPOSED EMBANKMENT
 - NEW OVER FIDE AREA
 - NEW DROPPED HERB
 - AREA OF LANDTAKE
 - PROPOSED PARAPET / FENCE




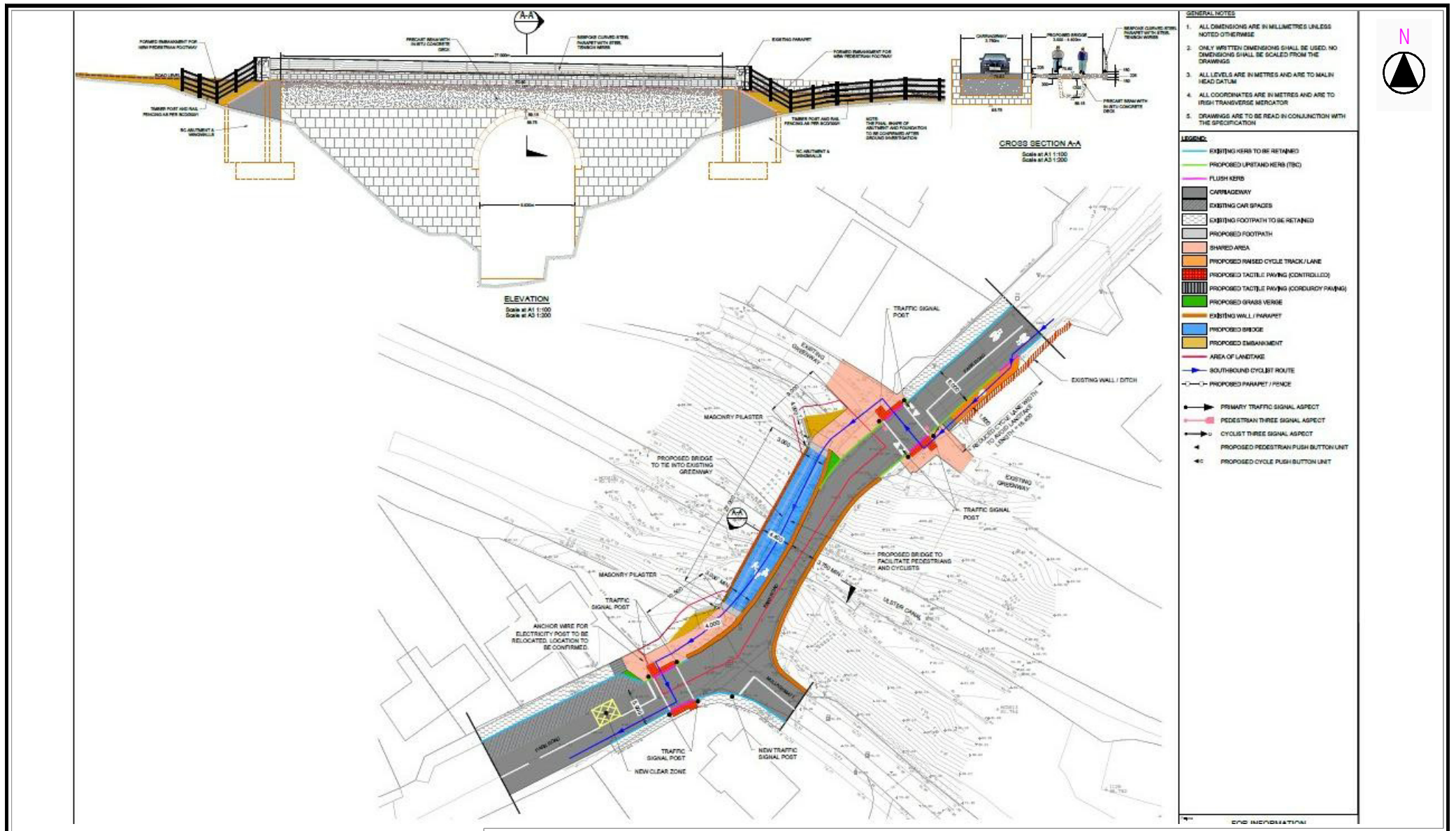
	Unit 1 Tenure Business Park, Monasterboice, Co. Louth	Ballyalbaney & Horseshoe Bridges		Scale: not to scale
		Impact Assessment		Date: April 2023
				Origin: Client
				Ref: 2023_04_AIA_02

Figure 2: Proposed site layout; Ballyalbaney Bridge




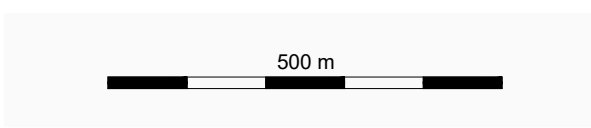
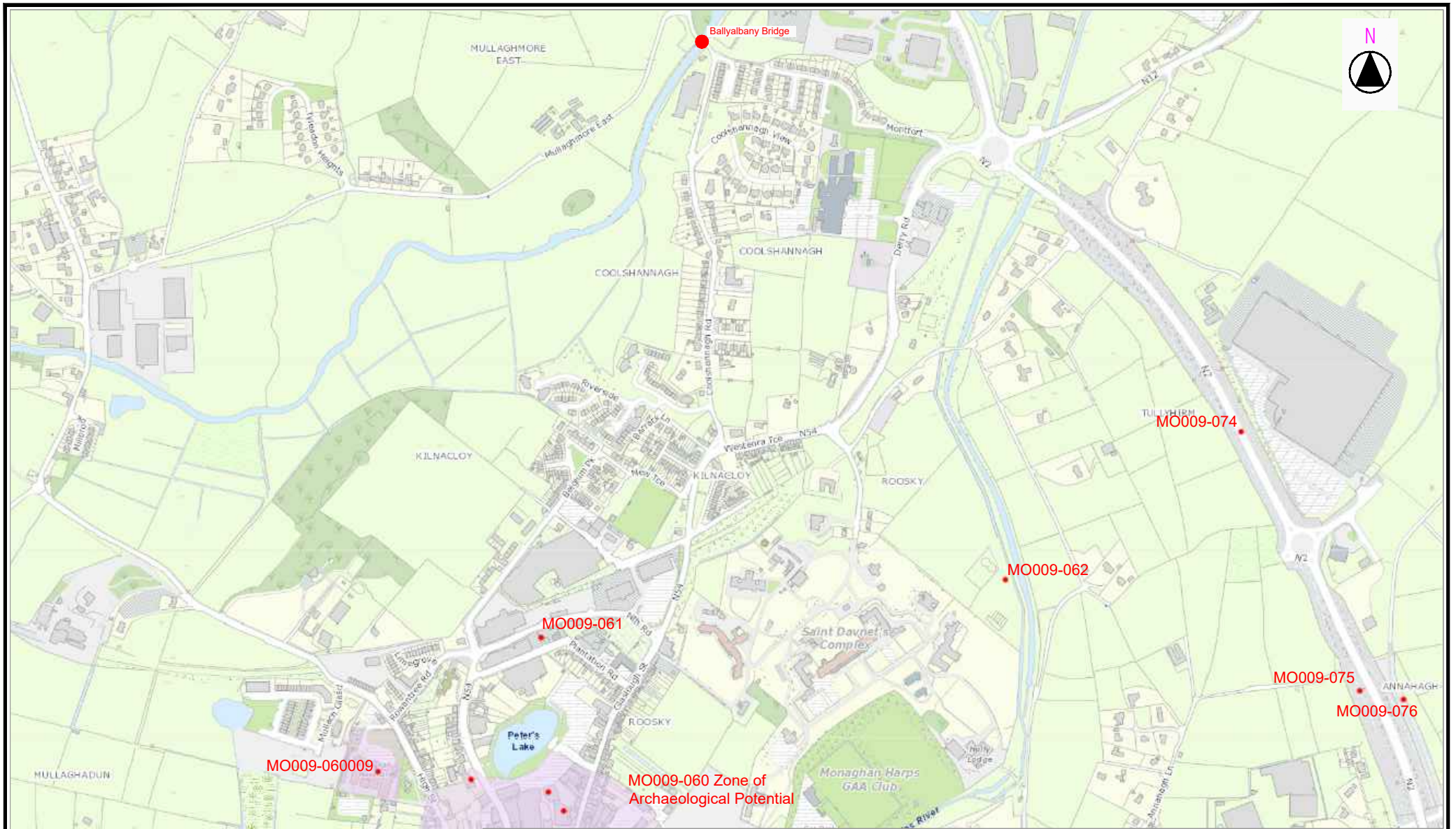
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		Impact Assessment	Date: April 2023	
			Origin: Client	
			Ref: 2023_04_AIA_03	

Figure 3: Proposed site layout; Horseshoe Bridge




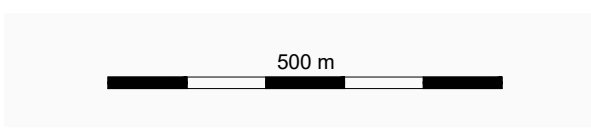
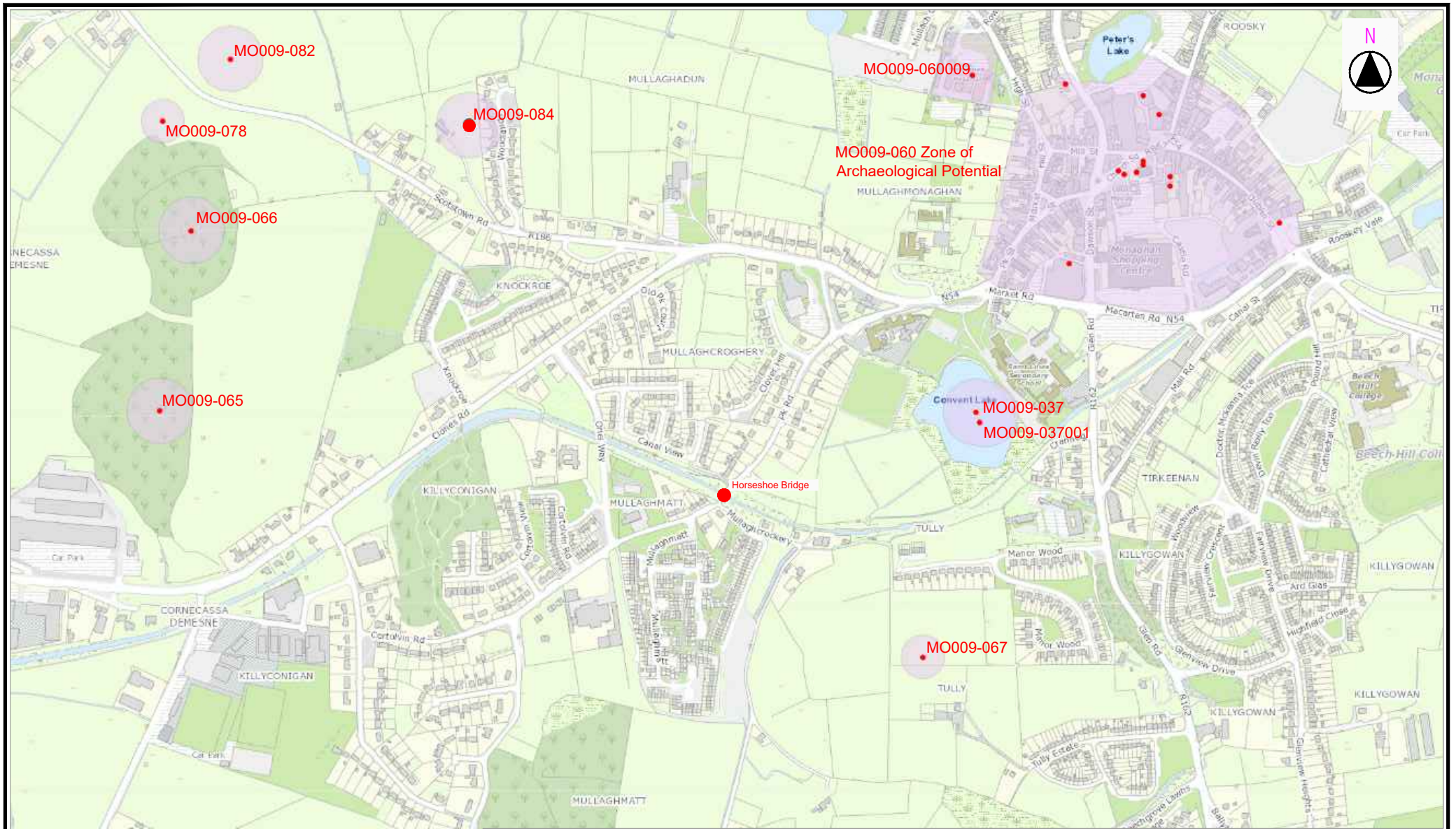
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		Impact Assessment	Origin: NMS Ref: 2023_04_AIA_04

Figure 4: Record of Monuments and Places; Ballyalbaney Bridge




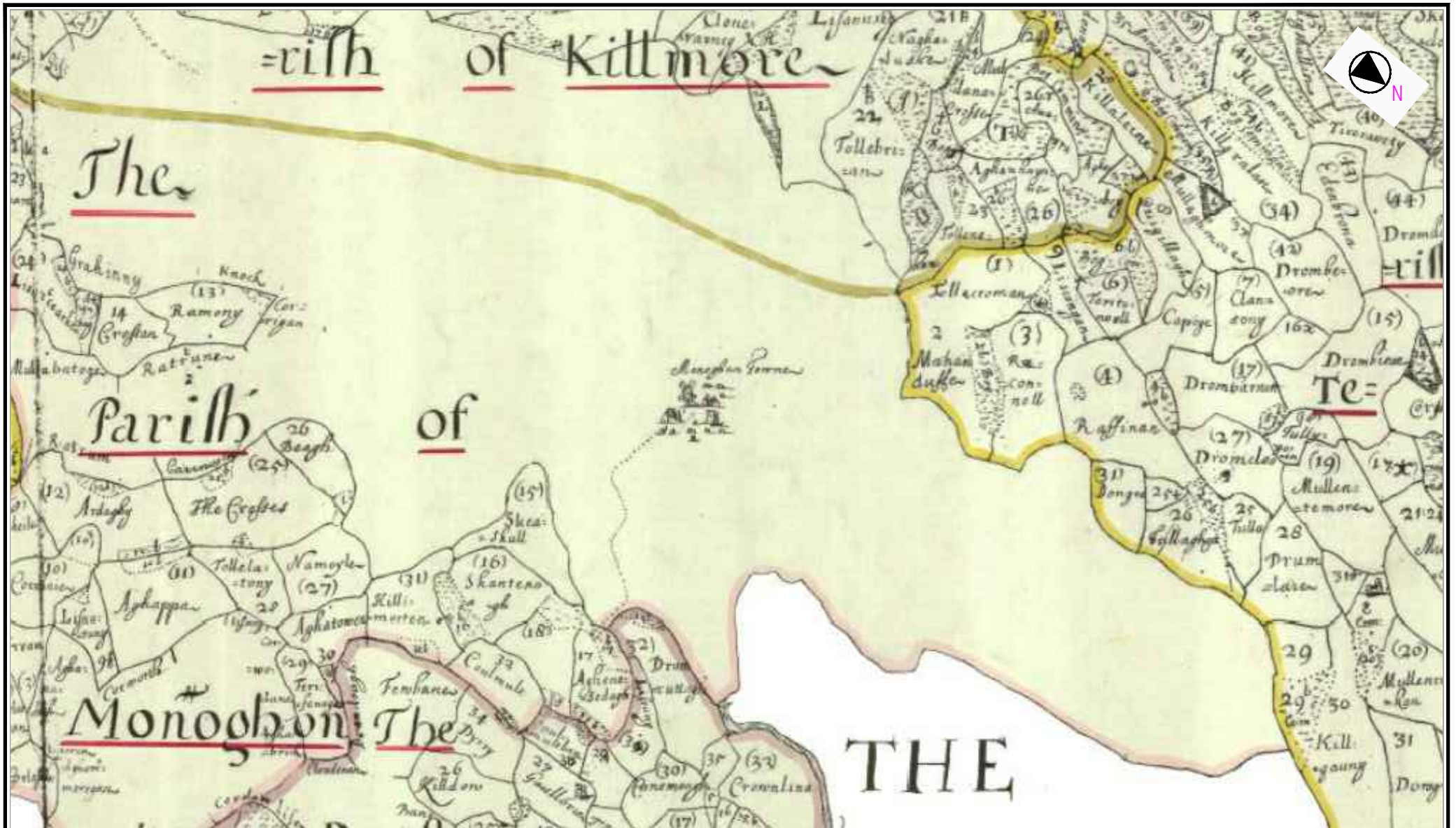
	Unit 1 Tenure Business Park, Monasterboice, Co. Louth	Ballyalbany & Horseshoe Bridges		Scale: 1:10,000 A4
		Impact Assessment		Date: January 2023
			Origin: NMS	Ref: 2023_04_AIA_05

Figure 5: Record of Monuments and Places; Horseshoe Bridge




	Unit 1 Tenure Business Park, Monasterboice, Co. Louth	Ballyalban and Horseshoe Bridges	Scale: not to scale Date: Feb 2023
	Impact Assessment	Origin: Digital collections Ref: 2023_04_AIA_06	

Figure 6: Down Survey Map (William Petty 1656)




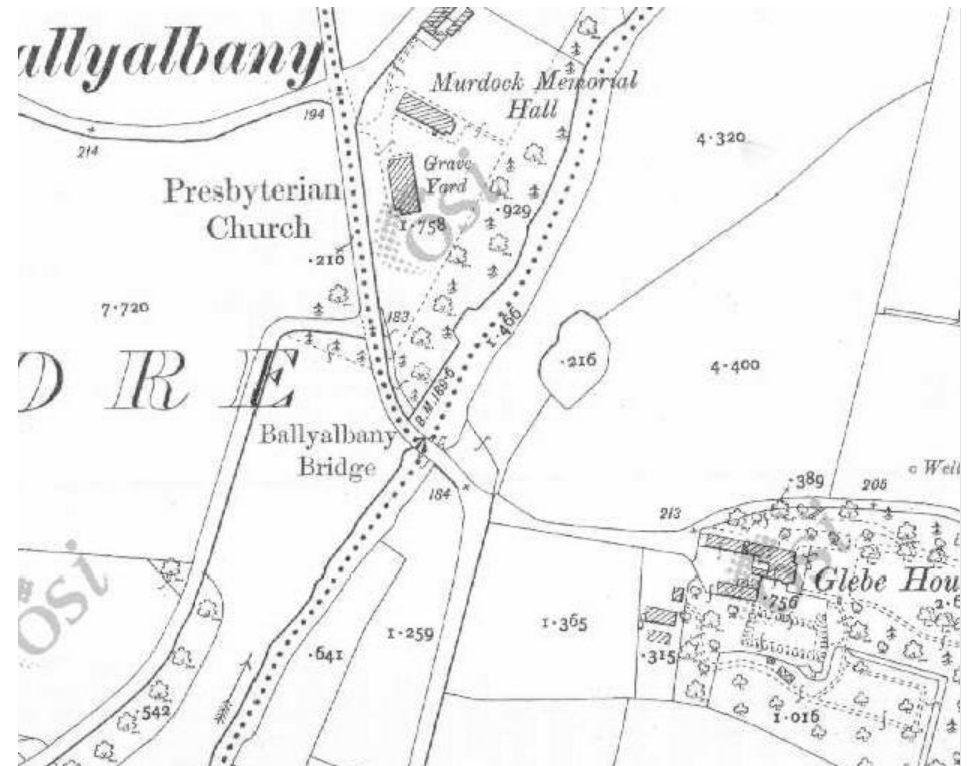
	Unit 1 Tenure Business Park, Monasterboice, Co. Louth	Ballyalbany and Horseshoe Bridges	Scale: not to scale
		Impact Assessment	Date: Feb 2023
			Origin: Digital collections
			Ref: 2023_04_AIA_07

Figure 7: McCrea Map of Monaghan (c.1790)



(l) First Edition OS map 1835

(r) OSI 25" map 1909-10



Unit 1 Tenure
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Ballyalbaney and Horseshoe Bridges

Impact Assessment

Scale: not to scale

Date: Feb 2023

Origin: Digital collections

Ref: 2023_04_AIA_08

Figure 8: Ballyalbaney Bridge, 1st edition and 25 inch OSI Map



(l) First Edition OS map 1835

(r) OSI 25" map 1909-10



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Co. Louth

Ballyalbany and Horseshoe Bridges

Impact Assessment

Scale: not to scale

Date: Feb 2023

Origin: Digital collections

Ref: 2023_04_AIA_09

Figure 9: Horseshoe Bridge, 1st edition and 25 inch OSi Map



(l) OSi Aerial Photography (1995)

(r) Google Earth (2022)


	Unit 1 Tenure Business Park, Monasterboice, Co. Louth	Ballyalbaney and Horseshoe Bridges	Scale: not to scale
		Impact Assessment	Date: Feb 2023
			Origin: OSi/ Google
			Ref: 2023_04_AIA_10

Figure 10: Ballyalbaney Bridge, Extracts from Aerial Photography



(l) OSi Aerial Photography (1995)

(r) Google Earth (2022)


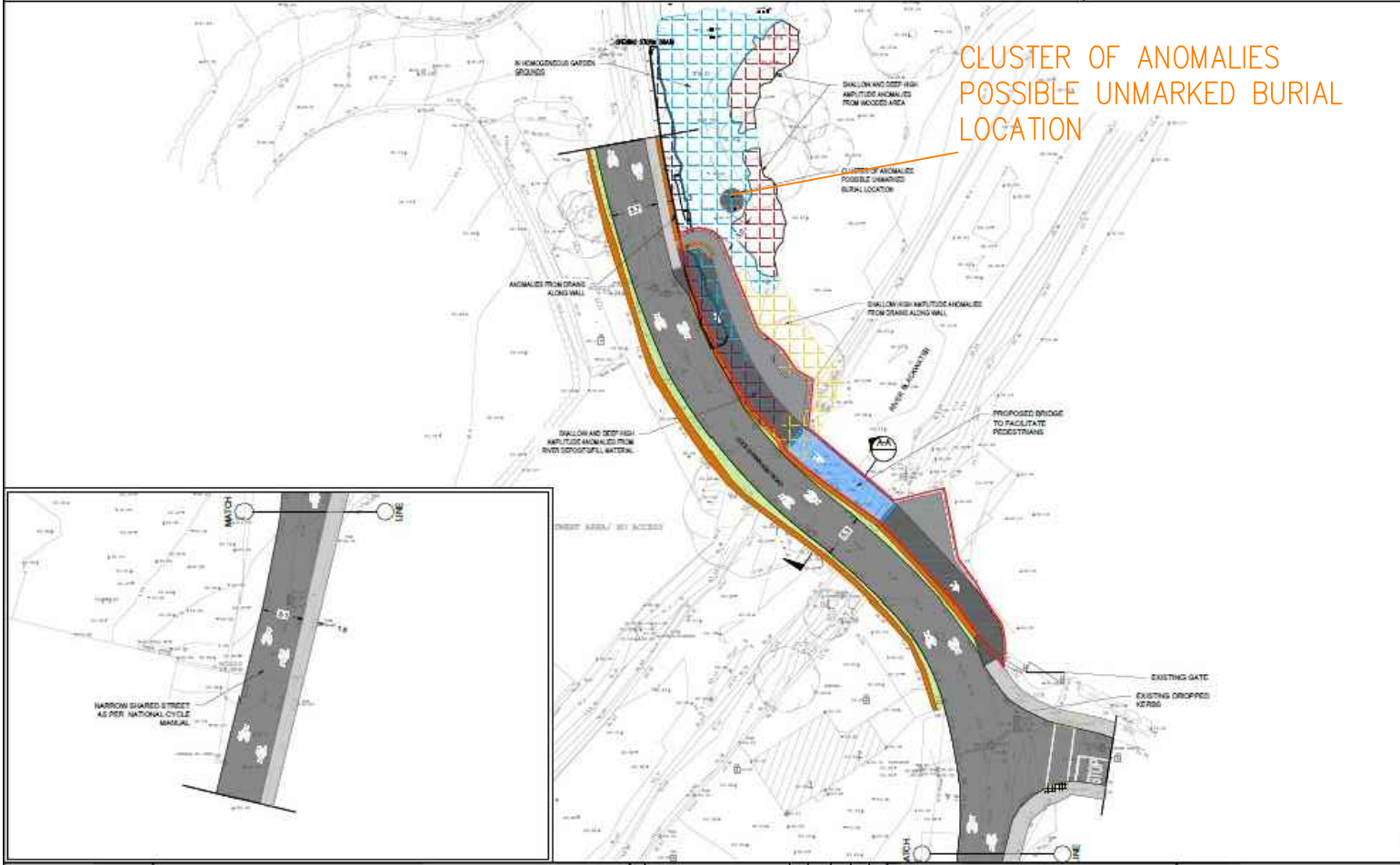
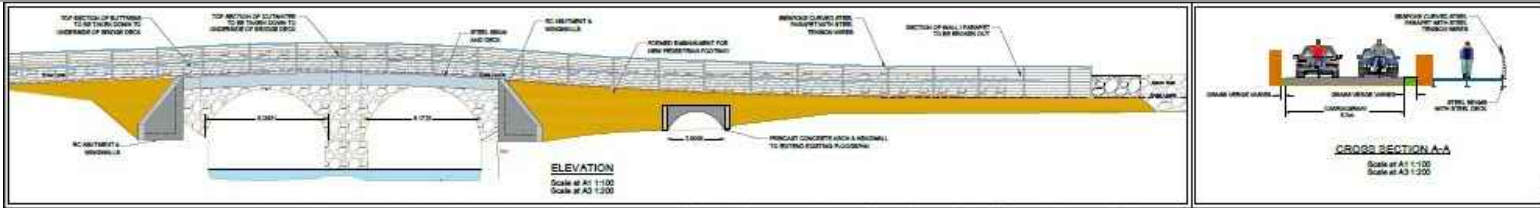
	Unit 1 Tenure Business Park, Monasterboice, Co. Louth	Ballyalbany and Horseshoe Bridges	Scale: not to scale
		Impact Assessment	Date: Feb 2023
			Origin: OSi/ Google
			Ref: 2023_04_AIA_11

Figure 11: Horseshoe Bridge, Extracts from Historical Mapping




	Unit 1 Tenure Business Park, Monasterboice, Co. Louth	Ballyalbany and Horseshoe Bridges	Scale: not to scale
		Impact Assessment	Date: April 2023
			Origin: Client
			Ref: 2023_04_AIA_12

Figure 12: GPR Results



Plate 1: Ballyalbaney Bridge, facing SE, wide enough to allow 2 cars, note the hump



Plate 2: Northern face of Ballyalbaney Bridge,



Plate 3: Ballyalbaney Bridge, smaller third arch within southern graveyard grounds near riverbank



Plate 4: Ballyalbaney Bridge, drainage holes opening onto road



Plate 5: Horseshoe Bridge, narrow roadway, facing N



Plate 6: Western face of Horseshoe Bridge, Note height of arch



Plate 7: Horseshoe Bridge, Note tug path passing under bridge on south side



Plate 8: Horseshoe Bridge, Note steep slope, litter and dense vegetation