13.0 MATERIAL ASSETS

13.1 Introduction

This section of the EIAR addresses the impacts of the development on the material assets located in the vicinity of the application site. Material assets are defined in the EPA 'Advice notes on current practice (in the preparation of Environmental Impact Statements)' (2003) as 'resources that are valued and that are intrinsic to specific places, they may be either human or natural origin and the value may arise for either economic or cultural reasons'.

The developments utilisation of the area's material assets, or proximity to these material assets, can lead directly and indirectly to potential environmental impacts. The objective of the assessment is to ensure that these assets are used in a sustainable manner with respect to the development and propose measures where necessary.

13.2 Methodology

The information for the assessment of the impacts of the application site was obtained from:

- *Guidelines on the information to be contained in Environmental Impact Statements Environmental Protection Agency* (2002).
- *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements Environmental Protection Agency* (2003).
- *Draft Revised Guidelines on the Information to be contained In Environmental Impact Statements* (EPA, September 2015).
- *Draft Advice Notes for Preparing Environmental Impact Statements* (EPA, September 2015).
- *Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)* (EPA, May 2022).
- *Laois County Development Plan 2021-2027*.
- *Laois County Council Landscape Character Assessment, 2021-2027*.
- Site visits.
- Aerial photography.
- Historical Mapping.

The material assets, which have been identified as being within and adjacent to the application site and which may be directly affected by the activities undertaken are addressed below. The EPA Guidelines on the information to be contained in Environmental Impact Statements (March 2002) states that the material assets should be assessed under the headings of:

- Archaeological Heritage
- Folklore/Tradition/History
- Architecture/Settlements
- Monuments/Features
- Designed Landscape
- Natural Resources of Economic Value
- Buildings & Structures
- Infrastructure.

The *Guidelines on the Information to be contained in Environmental Impact Statements* (2022) and *Draft Advice Notes for Preparing Environmental Impact Statements* (2015) state that the following material assets should be assessed in relation to quarries:

- Build Services
- Roads & Traffic
- Effects of vibration on surface structure
- Road damage due to transport and machinery use
- Loss of, or damage to water supplies
- Effects potential for groundwater development in the area, in the future, especially downgradient of the site
- Impacts on geological heritage

The EPA guidelines on the *Information to be contained in an Environmental Impact Assessment Report* (2022) state the Built Services, Roads & Traffic and Waste Management should be assessed as part of this section of the EIAR.

There is an element of crossover between this section and certain other sections. Some of the items listed above have been dealt with under the relevant sections of the EIAR for instance impacts on Geological Heritage have been dealt with under Section 6.0 Land, Soils and Geology. Designed landscape is dealt with under Section 12.0 Landscape. Archaeological Heritage, Architecture and Monuments which have all been dealt under Section 14.0 Cultural Heritage.

13.3 Existing Environment

The application site is 8.5 hectares in area and comprises of several grazing fields with some woodland and scrub in the central area which are separated by hedgerows. The site has an elevation range of between approximately 92mOD and 130mOD (Ordnance Datum) and is located on a hillside that steadily slopes in a westerly direction towards the lower lying and flatter peatlands (Abbeyleix Bog) to the east of the site.

There is a number of existing sand and gravel pits in the area, the closest one is a small disused pit located approximately 500m to the southeast of the site. This is currently used as a Defence Forces and An Garda Síochána Firing Range.

The proposed development consists of the extraction of sand and gravel material and transporting the material to the applicants manufacturing facility located approximately 1.3km to the south of the application site. Here the material will be processed into various grades of aggregate. The material will occasionally be processed on-site using mobile plant.

The material assets that have been identified within proximity of the application site and in the surrounding landscape are listed below:

- Residential Buildings
- Geological Resource

- Land Resource
- Roads & Traffic
- Public Utilities
- Groundwater and Water Supplies
- Scenic Routes & Views
- Tourism
- Archaeology
- Waste

13.3.1 Residential Buildings

The local residences within the immediate vicinity of development are shown on Figure 4.1 located in Section 4.0. The potential impacts on residences associated with quarries and pits are in relation to landscape, noise, dust and traffic as a result of the day-to-day activities.

13.3.2 Geological Resource

Overburden present on the site will be removed and used to construct a berm and for landscaping and restoration of the application site. Based on the GSI subsoils map (www.gsi.ie), glaciofluvial sands and gravels are mapped within the site boundary and these deposits are mapped to extend to the north, south and east of the site. Cutover bog, as described above, is mapped to the west of the site.

Based on the GSI bedrock geology map (www.gsi.ie), Dinantian Pure Bedded Limestones are mapped to underlie the proposed development and these comprise two bedrock formations in the area of the site, namely; the Ballyadams Formation and the Clogrenan Formation with the former underlying the majority of the site. The Ballyadams Formation, which is mapped to underlie the central, western and northern sections of the site comprise crinoidal wackestone / packstone Limestone. The Clogrenan Formation, which is mapped to underlie the eastern section of the site comprise chery, muddy, calcarenitic Limestone.

The proposed development is not located within any geological heritage site. The closest geological heritage site is Abbeyleix Bog (site code LS001) which is located 100m to the west of the site.

13.3.3 Land Resource

Landuse in the surrounding area is largely agricultural with scattered rural pattern of residential dwellings along the local roads to the west. Further north (~200m) along the public road to the west, there are a number of housing estates on the out skirts of Abbeyleix.

There are a number of existing sand and gravel pits in the area, the closest one is a small disused pit located approximately 500m to the southeast of the site. This is currently used

as a Defence Forces and An Garda Síochána Firing Range. The existing Booth Precast Products Ltd manufacturing facility is located 1.3km to the south of the site.

There are four Natura 2000 sites located within a 15km radius of the application site with the closest consisting of the River Barrow and River Nore SAC which is 2.2km west of the application site.

13.3.4 Roads and Traffic

Material extracted from the application site will be transported using articulated and rigid trucks to the existing manufacturing facility located 1.3km to the south of the application site via the L-5731-25. There will be no direct transport of material to market. The maximum anticipated number of truckloads per day will be in the region of 29 No.

13.3.5 Public Utilities & Access

The pit does not have any connection to the relevant utilities. Should a connection be required the relevant utility providers will be contacted. An overhead line traverses the site with another located along the north western boundary of the site. Should the proposed development be granted planning permission the relevant utilities will be contacted with regards to relocation overhead lines where required. An existing access of the L-5731-25 local road will be upgraded in order for traffic to enter and exit the site safely.

13.3.6 Groundwater and Water Supplies

All surface water falling on the site as precipitation will percolate to ground. A concrete manhole ring and an adjoining tank are located in an area close to the entrance to the site. This infrastructure was previously used for the purposes of supplying water to the site and will be used along existing groundwater wells to supply water to top up the wheelwash and for dust suppression as required.

13.3.7 Scenic Routes & Views

The current County Development Plan lists a number of views and prospects for the County. The application site is not located in the vicinity of a designated view and prospect.

13.3.8 Tourism

There are a number of tourist attractions located in the Abbeyleix area which include the following:

Bog Loop Walks

The Collins Bog and Killamuck Bog Loops are two waymarked looped walks. The loops take walkers through woodland and forestry paths. At 4.5 km, the Collin's Bog is the shorter of the 2 looped walk options.

Abbeyleix Golf Club

The 18 hole course at Abbeyleix designed by the well known Golf Architect Mel Flanigan is fast developing a reputation as one of the best courses in the midlands. The 18 hole layout consists of rolling terrain which contains mature trees with many scenic views.

Heritage House Abbeyleix

The heritage House opened in 1997 with a museum dedicated to the local history and culture from Abbeyleix and County Laois. The Heritage House displays information in relation on Abbeyleix and the surrounding area including history of the town. There is also a carpet exhibition room where you can find out how handmade carpets manufactured in Abbeyleix formed part of the furnishings of the Titanic.

Heywood Gardens

The attraction consists of an eighteenth-century gardens, lakes, woodland and architectural features. It was transferred to State ownership in November 1993 from the Salesian Fathers who had taken care of it since 1941. The formal Gardens form the centre-piece of the property and were designed by the famous architect, Sir Edwin Lutyens (1869-1944) and probably landscaped by Gertrude Jekyll (1843-1932). It is one of four Gardens in this country designed by him, the others being in the War Memorial Park, Lambay Island and Howth Castle. The Gardens are composed of four elements linked by a terrace that ran along the front of the house which now no longer exists.

Abbeyleix Bog

The Abbeyleix Bog Project (ABP) conserves and protects the bog which was once threatened with harvesting for peat moss. Abbeyleix Bog is located to the south of Abbeyleix and includes an area of approximately 150 hectares of diverse habitats including degraded (but recovering) raised bog, lagg, cutaway, wet carr woodland, and meadows.

A lease was signed in 2010 with Bord Na Móna to hand over the bog to the local community to manage for a period of 50 years with a primary focus on conservation. The bog is managed by a local voluntary organisation known as the Abbeyleix Bog Project Ltd.

A Boardwalk was constructed to facilitate access to the 'High Bog' and was officially opened in August 2014. The boardwalk allows a safe route through part of the bog and view the area from a stable platform, protecting the bog and the visitors in one action.

13.3.9 Archaeology

There are no items of cultural heritage, monuments or buildings of heritage interest known from the application area.

13.3.10 Waste

All material extracted from the application site will have a use. Overburden and material screened from extracted material will be for landscaping and restoring areas around the quarry. All material designated as waste such as, scrap metal etc. will be recovered, recycled or disposed of at an appropriately licensed or permitted facility.

13.4 Development Description

The application site consists of a greenfield area of 8.5 hectares comprising of several grazing fields with some woodland and scrub in the central area. The applicant proposes to remove the existing woodland, vegetation and overburden and extract the underlying sand and gravel material in line with an eight-phase extraction plan.

It is proposed to construct a berm along the western boundary using overburden and sand and gravel material removed from Phase 1. As extraction proceeds into various phases, overburden removed from the working phase will be used to restore the previous phase where material has been extracted. This will be undertaken on a rolling basis to minimise the uncovered area of the site.

All extracted sand and gravel material from the application site will be transported to the applicants manufacturing facility located approximately 1.3km to the south of the application site.

The proposed development will require the erection of minor infrastructure to include a wheel wash and refuelling area. These facilities will be located close to the entrance to the site. Plant and machinery which will operate at the application site will consist of excavators, road trucks and a water bowser.

The pit will operate between the hours of 0700 hours and 2000 hours Monday to Friday and 0800 to 1800 hours on Saturday and will not operate on Sundays or Public Holidays. The maximum rate of extraction will be in the region of 200,000 tonnes/annum; however, this will depend on the demand for material. Therefore, the applicant is seeking a 10 year permission in order to extract the available material taking into account years when the maximum extraction rate will not be achieved. The application site will be landscaped and restored in line with the proposed landscape and restoration plan.

13.5 Impact Assessment

13.5.1 Do-Nothing Effect

If the proposed development is not granted planning permission, the site will continue to be used for agricultural use and material will continue to be sourced from pits and quarries located at a greater distance from the application site. The application site will continue to be used for agricultural purposes and there would be no change to material assets located in the vicinity of the site.

13.5.2 Residential Buildings

Proposed mitigation measures in relation to the days to day activities that will be undertaken are listed in various sections of the EIAR. These measures will aid in reducing the impact of quarrying activity. Environmental monitoring including water, noise and dust monitoring will be undertaken in order to ensure that the operation of the pit is compliant in relation to threshold levels conditioned on the proposed development by the Planning Authority. The impact on air quality as a result of the proposed development is considered as medium term, negative and slight and thus no residual impact is anticipated. The noise levels associated with operational phase of the proposed development is considered as medium-term negative, not significant effect.

13.5.3 Geological Resource

The loss of a geological resource will result in an impact which will be permanent in duration as the natural topography will be changed as a result of extraction of material. The proposed landscape and restoration plan will serve to reduce the impact associated with quarrying activity. The extraction of the sand and gravel material will result in a negative, irreversible, slight, direct, likely, permanent effect.

13.5.4 Land Resource

The current land use is agricultural with livestock grazing being the sector practised. The proposed development will result in the loss of agricultural land during the operation phase of the development. However, the landscape and restoration plan proposes to return the land to agricultural land on completion of extraction.

Security fencing and stock proof post and wire fencing will be erected around the perimeter of the application site to prevent unauthorised access. Warning signs will also be erected around the boundaries of the site. The proposed extraction area has been designed to include a 12m wide buffer zone between the edge of the extraction works and the hedgerows along the northern, eastern and southern boundaries of the site.

The assessment of the Natura 2000 sites in the area and the related conservation objectives found that the proposed development will not impact on the conservation objective of the designated sites.

The extraction of material from the application site will result in a negative, irreversible, moderate, direct, likely, permanent effect on land and landuse.

13.5.5 Roads and Traffic

The proposed development will generate a number of traffic movements associated with the transport of material off-site. However, it will not result in an increase in the traffic on the L-5731-25 as material for the manufacturing facility is currently sourced from quarries

and pits a considerable distance away. Therefore, the proposed development will result in a reduction in the traffic going though Abbeyleix and Ballinakill towns which will result in a positive effect. Vehicles will pass through the wheelwash facility and will be checked to ensure that the contents of the load are safely secured and contained prior to leaving the pit.

13.5.6 Public Utilities & Access

There is currently no connection to public utilities. Should a connection be required, the relevant utility company will be contacted. There the potential effect is assessed as neutral.

13.5.7 Groundwater and Water Supplies

Existing infrastructure on site will be used to supply water to top up the wheelwash and for dust suppression as required. A tractor and bowser already located at the manufacturing facility will also be used for dust suppression. The proposed development will not be a significant user of water.

All surface water falling on the site as precipitation will percolate to ground. An adequate buffer of 3m has been left between the winter high water table and the finished floor level. The potential for impact on surface water and groundwater associated with accidental spillages and leakages exists, however, mitigation measures proposed in various section of the EIAR will serve to reduce the potential of these occurring. It is unlikely that the proposed development will impact on water supplies to users in the vicinity.

Groundwater protection measures included in Chapter 7.0 Water which include adopting best practice controls to ensure any potential sources of contamination on the site will be managed appropriately and the volumes present will be small in the context of the scale of the project. The potential residual impacts associated with groundwater contamination and subsequent health effects are not likely.

13.5.8 Scenic Routes & Views

The visual impact assessment undertaken shows that the proposed development is visible from a number of locations to the west of the application site. The proposed landscaping works will aid in screening the development from outside views. The proposed hedgerow to be planted along the western boundary and the planting of side slopes will aid in screening the site once matured. The visual impact significance associated with the proposed development has been assessed as being Slight/Moderate to Moderate at locations where the development site is visible.

13.5.9 Tourism

With regards potential impacts to the tourism, various measures have been proposed to ensure that noise and dust levels from the development will be below recommended

guideline values. The potential for the proposed development to impact on the water environment have been mitigated through various design measures. The proposed development will result in less HGVs travelling through Abbeyleix town which will have a positive effect. Therefore, no significant impact on tourist attractions or amenities located in close proximity of the development is envisaged. The closest tourist amenity is Abbeyleix Bog which is located to the west of the site and assessments in relation to biodiversity, water, air and noise have proposed mitigation measures which will safeguard Abbeyleix Bog. Please refer to Chapter 5.0 Biodiversity and Chapter 7.0 Water for details on the impact assessment undertaken.

13.5.10 Archaeology

The proposed development will impact seven anomalies identified by geophysical survey that have the potential to be of archaeological significance (anomalies 2, 3, 4, 5, 10, 11, and 12). There are no other items of cultural heritage, monuments or buildings of heritage interest known from the application area or vicinity. There are no known direct or indirect impacts on any other known items of cultural heritage, archaeology or buildings of heritage interest in the application area or the vicinity. It is recommended that anomalies 2, 3, 4, 5, 10, 11, and 12 identified through geophysical survey be further investigated by licensed archaeological test excavation.

13.5.11 Waste

All material extracted from the quarry will have a use. Overburden and material screened from extracted material will be used for landscaping and restoring areas around the pit. All material designated as waste such as scrap metal etc. will be collected by an appropriately licenced contractor and recycled or disposed of at an appropriate facility. There the potential effect is assessed as neutral.

13.5.12 Unplanned Events

The various sections of the EIAR have assessed the potential impacts associated with unplanned events occurring and have included mitigation measures where required.

13.6 Mitigation Measures

Mitigation measures are discussed in the relevant sections where required to ameliorate any impacts identified.

13.7 Residual Impacts

The proposed development will result in the loss of a geological resource which will be permanent in duration. The proposed restoration plan will mitigate the impact in so far as possible.

13.8 Technical Difficulties

No technical difficulties were encountered.

13.9 References

Guidelines on the information to be contained in Environmental Impact Statements, Environmental Protection Agency (EPA, 2002)

Advice notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003)

Environmental Management Guidelines – Environmental Management in the Extractive Industry (Non – Scheduled Minerals) (EPA, 2006)

Guidance for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DECLG, 2013)

Directive 2014/52/EU European Parliament and of the Council EIA Directive (April, 2014)

Draft Revised Guidelines on the Information to be contained In Environmental Impact Statements (EPA, September 2015)

Draft Advice Notes for Preparing Environmental Impact Statements (EPA, September 2015)

Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) (EPA, May 2022)

Laois County Development Plan 2021-2027

Laois County Council Landscape Character Assessment 2021-2027

14.0 ARCHAEOLOGY & CULTURAL HERITAGE

14.1 Introduction

This Chapter of the EIAR has been undertaken to assess the significant effects, if any, of a proposal to carry out sand and gravel quarrying on lands in the townlands of Knocknamoe and Ballymullen, Co. Laois. A wide variety of paper, cartographic, photographic and archival sources was consulted. All the lands of the proposed development were visually inspected.

An impact assessment and mitigation strategy has been prepared. An impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural resource, while a mitigation strategy is designed to avoid, reduce or offset such adverse impacts.

The assessment was prepared by Dr. Charles Mount who has more than twenty-five years of cultural heritage assessment experience. He holds B.A., M.A. and Ph.D. degrees in archaeology as well as a professional diploma in EIA and SEA Management and is a member of the Institute of Archaeologists of Ireland and the Discovery Programme.

14.2 Methodology

This study which complies with the requirements of Directive EIA 2014/52/EU is an assessment of the known or potential cultural heritage resource within a specified area and includes the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the project on the environment, taking into account current knowledge and methods of assessment. It consists of a collation of existing written and graphic information in order to identify the likely context, character, significance and sensitivity of the known or potential cultural heritage, archaeological and structural resource using an appropriate methodology (EPA 2002 and 2003).

The study involved detailed investigation of the cultural heritage including the archaeological, architectural and historical background of the application area and the surrounding area up to 1km and the study area is indicated on Fig 14.1. This area was examined using information from the:

- Record of Monuments and Places (RMP) of County Laois;
- The Sites and Monuments Record
- The *Laois County Development Plan 2021-2027* including the Record of Protected Structures;
- Aerial photographs;
- Excavation reports;
- Cartographic and
- Documentary sources.

A field assessment was carried out on the 18 of June 2019 to identify and assess any known archaeological sites and structures and previously unrecorded features, possible finds and

structures within the application area and vicinity. A geophysical survey was carried out in the application site by J. M. Leigh Surveys Ltd. in July 2022.

14.3 Existing Environment

14.3.1 The Landscape

The application area is situated in south Co. Laois, to the south of the town of Abbeyleix and immediately to the east of the Knocknamoe to Ballinakill road. The soils of the area are coarse and loamy overlying calcareous gravels (http://gis.teagasc.ie/soils/map.php).

14.3.2 Archaeological and historical development of the study area

The following is a summary of the archaeological and historical development of the study area and the main types of sites and monuments that are known from the surrounding landscape. The information is drawn from the assessment. It is intended to indicate the types of sites and monuments known to be present in the study area as well as the pattern of landholding and to place this material in its cultural heritage context. The application area is situated in the townlands of Knocknamoe, the civil parish of Abbeyleix and Barony of Cullenagh. Note the spellings of place names varied throughout history, the historical spellings are used here.

14.3.2.1 Prehistoric Period

There are no prehistoric sites or artefacts known from the study area and the nature of prehistoric activity is unknown.

14.3.2.2 Early medieval period

In the early medieval period, the study area formed part of the kingdom of Loigis which was ruled by the Loigis Reta kings. Cinneidigh, son of Graeithin, is recorded in the Annals of the Four Masters as lord of Laeighis as early as 875. About 1017 Cearnach Ua Mordha (O'More) was recorded in the Annals of the Four Masters as the lord of Laeighis. The O'More's remained the lords of Laeighis until the arrival of the Anglo-Normans in the twelfth century (MacCotter 2008, 173). Settlement at this period is usually indicated by the presence of enclosed farmsteads known as ringforts and cashels. There are no ringforts known from the study area, however, levelled enclosures in Tullyroe townland (LA023-037----), and Ballymullen townland (LA024-039---- and LA030-001----) may be the remains of ringforts (see Fig. 14-1 and Appendix 14.1).

14.3.2.3 Medieval period

Following the loss of the Kingdom of Leinster in 1166 King Diarmait Mac Murchada regained the Kingdom in 1169-70 with the aid of Anglo-Norman mercenaries. He paid them with land grants and promised the succession of Leinster and his daughter to their leader Richard fitz Gilbert de

Clare. On the death of Diarmait Mac Murchade in 1171 Mac Murchada's kingdom passed to de Clare, who became the first Anglo-Norman Lord of Leinster. By the time of de Clare's death in 1176, when the Lordship of Leinster passed to King Henry II, the process of sub-infeudation (the granting of lands by lords to their dependents, to be held by feudal tenure) was well under way. In 1181 Meiler fitz Henry was granted the manor of Laois. He established the capital of Laois at Dunamase but later gave up Laois to Robert Marshall when he entered a monastery.

Manorialism describes the organisation of the feudal rural economy and society characterised by the vesting of legal and economic power in a Lord supported economically from his own direct landholding and from the obligatory contributions of a legally subject part of the peasant population under his jurisdiction. In Ireland, the Lord's Manor House was also sometimes enclosed by a rectangular moat and these sites are referred to as moated sites. They are a useful indicator of Anglo-Norman settlement, however there are no moated sites in the study area.

During the fourteenth century the study area went out of the control of the Anglo-Normans into the hands of the O'More who established the lordship of Dysert Gallen.

14.3.2.4 Post- medieval period

In the early sixteenth century Patrick O'More was the lord of Dysert Gallen but in 1551 he was attainted and Dysert Gallen was initially leased to Robert Sentleger (Fiant Edward VI No. 684) and in 1552 to Richard Mannering (Ibid. No. 1145). In 1556 the area of modern Laois was shired as Queen's County and the O'Mores lost much of their lands during the subsequent plantation of the county by new settlers. In 1570 Alexander Cosby and his wife Dorcas Sydney were granted the manor of Gallen by Queen Elizabeth (Fiant No. 1623) and the manor was confirmed to them in 1593 (Fiant No. 5825). The Tudor Fiants (No. 5878) record that in 1594 Ballemollen alias Miltowne was a 'parcel of the lands evicted out of the hands of the O Moores, traitors'.

The Down Survey records that in 1641 Ballymullen was held by the crown and by 1671 had come to Sir John Temple while Knocknamoe was held by Florence Fitzpatrick in 1641 and in 1671 was held by Fflor Fitzpatrick (http://downsurvey.tcd.ie). In the second half of the eighteenth century the town of Abbeyleix was developed by the de Vesci viscounts who held the Abbeyleix House Estate. By the early nineteenth century Knocknamoe and Ballymullen had come into the hands of Thomas Vesey Viscount de Vesci (NLI MS Map 218 (a-k) L).

14.3.3 Buildings

14.3.3.1 Designated structures

The *Laois County Development Plan 2021-2027* was examined as part of the baseline study for this section of the EIAR. The review established that there are no structures listed in the Co. Laois Record of Protected Structures situated within the application area. There are seventeen structures listed within the application area.

RPS No.	Address	Town/ townland	NIAH No.	NIAH rating
RPS 085	Abbeyleix Courthouse (Old), Stucker Hill, Abbeyleix	Abbeyleix	12900707	Regional
RPS 086	Abbeyleix Market House, Market Square, Abbeyleix	Abbeyleix	12900736	Regional
RPS 087	Abbeyleix South National School, Ballycolla Road, Abbeyleix	Abbeyleix	12900721	Regional
RPS 088_A	Church of Ireland Church & Ballycolla Road, Abbeyleix	Abbeyleix	12900720	Regional
RPS 088_B	Abbeyleix Sexton's House/Heritage Centre, Ballycolla Road, Abbeyleix	Abbeyleix	12900722	Local
RPS 089	Catholic Church of the Holy Rosary, Church Avenue, Abbeyleix	Abbeyleix	12900702	National
RPS 752	Second Viscount de Vesci Memorial, Market Square, Abbeyleix	Abbeyleix	12900703	Regional
RPS 754	Laois Cleaners, Main Street, Abbeyleix	Abbeyleix	12900713	Regional
RPS 755	House, Main Street, Abbeyleix	Abbeyleix	12900715	Regional
RPS 756	Third Viscount de Vesci Memorial, Main Street, Abbeyleix	Abbeyleix	12900716	Regional
RPS 757	Abbeyleix Courthouse (New), Ballycolla Road, Abbeyleix	Abbeyleix	12900717	Regional
RPS 758	Wingfield Memorial, Ballycolla Road, Abbeyleix	Abbeyleix	12900718	Regional
RPS 759	Abbeyleix Railway Station, Ballycolla Road, Abbeyleix	Abbeyleix	12900719	Regional
RPS 760	Old Manse, Main Street, Abbeyleix	Abbeyleix	12900725	Regional
RPS 761	House, Main Street, Abbeyleix	Abbeyleix	12900730	Regional
RPS 762	House, Main Street, Abbeyleix	Abbeyleix	12900734	Regional
RPS 816	Oatlands House, Abbeyleix	Abbeyleix	RPS 817	Allwort House, Carlow Road, Abbeyleix

Table 14.1 list of Protected Structures in the study area.

The closest RPS structure to the application area, the Abbeyleix Court House RPS No. 757, is situated 0.65km to the north-west of the application area. This and the rest of the RPS structures in the study area are considered to be too far distant to be directly or indirectly impacted by the proposed development.

14.3.3.2 Non-designated structures

The National Inventory of Architectural Heritage (NIAH) which is maintained by the Dept. of Culture, Heritage and the Gaeltacht was examined as part of the baseline study for this chapter of the EIAR on 11th June 2019. The NIAH was reviewed on the 25th of August 2022 and there are

no additions to Inventory in the study area. The review established that there are no structures listed in the NIAH situated within the application area or the study area.

14.3.3.3 Field inspection

On the 18th June 2019 fieldwork was carried out to identify any additional non-designated structures of heritage interest in the vicinity of the application area. This involved assessing all upstanding structures that are marked on the 1909 edition of the six-inch Ordnance Survey mapping within 100m of the application area (see Figure 14.1). There are two upstanding structures situated within this area outside the application area (see Table 14.2 below).

No.	1
Structure type	House
Townland	Knocknamoe
Designation	None
Data source	1909 OS map.
Perceived Significance:	None
Type of impact:	None
Significance & quality of impact	None
Description	Two bay two storey house with slate roof and single chimney. No heritage interest. See Plate 14.1.
Mitigation proposal	No mitigation required
No.	2
Structure type	Farm building
Townland	Knocknamoe
Designation	None
Data source	1909 OS map.
Perceived Significance:	None
Type of impact:	None
Significance & quality of impact	None
Description	Ruined single story farm building with slate roof. No heritage interest. See Plate 14.2.
Mitigation proposal	No mitigation required

Table 14.2 Non-designated structures in the vicinity of the application area.

The fieldwork established that there are no undesignated structures of heritage interest within or in the vicinity of the application area.

14.3.4 Archaeological Assessment Recorded

14.3.4.1 Monuments

The Record of Monuments and Places was examined for designated monuments in the application area. This review established that there is a redundant record of a delisted non- monument situated within the application area (see Appendix 14.1 and Fig. 14.1). This refilled sandpit is noted in the Record of Monuments as:

LA023-038---- Knocknamoe Redundant record
Non-archaeological, this is the site of a sand pit which is now closed and has been filled in. The sand was used for building the Cork-Dublin Road. Not marked as an antiquity on the first two editions of the OS 6-inch map.

The closest Recorded Monument outside the application area is the site of a levelled enclosure in Ballymullen townland situated 0.66km south-east of the application area. This levelled enclosure is noted in the Record of Monuments as:

LA024-039---- Ballymullen Enclosure
Marked on the 1841 and 1909 editions of the OS 6-inch map; a semicircular enclosure (max. diam. c. 30m NW-SE). Described as a small D-shaped enclosure with gap on E side (OPW file). No visible surface remains.

This and the remaining Recorded Monuments in the study area are considered to be too far distant from the application area to be directly or indirectly impacted by the proposal.

14.3.4.2 Non-designated monuments

The Sites and Monuments Record (SMR) which is maintained by the Dept. of Culture, Heritage and the Gaeltacht was examined at http://webgis.archaeology.ie/historicenvironment/ on 11 June 2019 for additional non- designated monuments in the study area. The SMR was reviewed on the 25th of August 2022 and there are no additions to Record in the study area. This indicated that there are no additional monuments situated within the study area listed in the SMR.

14.3.4.3 Cartographic Sources

The Ordnance Survey 1st and 3rd edition six-inch maps and 1st edition twenty-five-inch maps of the area were examined. This analysis did not indicate any previously unrecorded archaeological sites or monuments in the application area or vicinity.

14.3.4.4 Place Name Evidence

The place names were extracted from the cartography to facilitate the search for structures and monuments and small finds, to help identify any unrecorded monuments or structures, to search for any published papers and documents related to the study area and to assist in the study of the

historical development of the area (see Table 3 below). The English translations of the townland names of the study presented below are based on the Placenames Database of Ireland. The placenames mainly refer to natural topographic or landcover features. Abbeyleix Demesne was the land belonging to the Abbey of Laois. It's not clear where the mill of Ballymullen was located as its not marked on the Down Survey or any later maps. Ralish refers to a ringfort RMP LA030-002---- which is outside the study area. Rathmoyle probably refers to the multi-vallated ringfort LA024-029---- which is also outside the study area.

Abbeyleix Demesne	Abbey of Laois Demesne
Ballymaddock	town of Madóg
Ballymullen	town of the mill
Knocknamoe	hill of the cows
Ralish	ringfort of (the) enclosure
Rathmoyle	the bare ringfort
Tullyroe	red hillock

Table 14.3 Placenames in the study area.

14.3.4.5 Aerial Photographs

Examination of the Ordnance Survey 1995, 2000 and 2005 aerial imagery as well as Google Earth imagery from 2005, 2008, 2010, 2011, 2018, 2019, 2020, 2021 and 2022, and Bing maps imagery from 2011 did not indicate any additional cultural heritage or archaeological sites in the application area or vicinity.

14.3.4.6 Other sources

Examination of archaeological corpus works on prehistoric artefacts (Harbison 1969, Eogan 1965, 1983, 2000, Kavanagh 1991, Simpson 1990), and pottery (O'Ríordáin and Waddell 1993) and Iron Age material (Raftery 1984) did not reveal any additional material.

14.3.4.7 Previous Assessment

There have been no previous cultural heritage assessments of the application area.

14.3.4.8 Excavations

Examinations of the Excavations Bulletin www.excavations.ie indicated that there have been no archaeological excavations carried out in the application area. There have been several investigations carried out in the study area that recovered nothing of archaeological significance (see below).

Abbeyleix , Co. Laois
Author: Denis Shine, Cultural Resource Development Services Ltd, Unit 4, Dundrum Business Park, Dundrum, Dublin 14.
Site type: Urban
License number: 08E0088, 08E0113

CRDS Ltd have been retained by Laois County Council to act as the archaeological consultants on the Wastewater Improvement Scheme for County Laois, to be carried out in six towns or villages: Abbeyleix, Clonaslee, Durrow, Mountrath, Rathdowney and Stradbally. The development will consist in total of c. 15,000m of pipe trench and differs slightly for each location, with some of the sewer networks being upgraded or repaired. New treatment facilities have been proposed for each location. The scheme will also make river crossings in Abbeyleix, Clonaslee, Durrow, Mountrath and Stradbally. An assessment of the river crossing in Abbeyleix was completed by Aisling Collins of AUS, a subsidiary of CRDS (07D068 and 07R261).

In total c. 5000 linear metres will be laid in Abbeyleix. The scheme is largely within the confines of Abbeyleix town. The development passes in close proximity to a burial-ground and workhouse shown on the 1890 revision of the 6-inch OS map. These are within or adjacent to the grounds of district hospital in the townland of Knocknamoe to the east of the town. Here the pipeline will be 1–1.2m in width but will have an associated wayleave of 5– 10m. This was identified as an area of high archaeological potential in the original impact assessment, which recommended full-time monitoring in this area. However, with the approval of the National Monuments Service (NMS) and Laois County Council it was decided to test this area in advance of the development to better inform its design. Two licence numbers were issued by NMS for this excavation, 08E088 and 08E0113.

Two test-trenches, one 42m and the other 5m in length, were excavated on 27 February 2008. These were 2m in width and varied in depth from 0.5m to 1.9m. Both trenches contained large amounts of rubble presumably from the demolition of the workhouse which was constructed in 1842. However, ten intact walls belonging to the workhouse were also exposed. These were constructed of large limestone blocks, bonded with mortar. No features were exposed within these walls, with all the internal features appearing to have been removed during its demolition. No remains of the burial-ground to the workhouses to the immediate south (outside the grounds of the district hospital) were encountered.

Abbeyleix, Co. Laois Author: Tim Coughlan Site type: Pit
License number: 13E0276

Monitoring was carried out at Abbeyleix, Durrow, Mountrath, Rathdowney and Stradbally, Co. Laois during groundworks for the Laois Towns and Villages Wastewater Improvement Scheme. Monitoring followed on from recommendations made within a desktop assessment for the scheme, which was carried out in 2007 (Doherty) and testing, which was carried out at several locations in 2008 (Johnston 2008a-b, Shine 2008a-c).

Monitoring of ground disturbance associated with the construction of wastewater treatment works, and some sections of pipeline, was undertaken intermittently between July and October 2013, according to the contractors' programme. The work was undertaken by Mark Moraghan and Brenda O'Mara of IAC Ltd and supervised by Tim Coughlan.

No features of archaeological potential were uncovered at any of the areas of development, with the exception of a pit, which was identified close to an existing road in Tullyroe, Abbeyleix (643409, 685272 ITM). The pit, of unknown date or function, was found in an area that had been, according to the landowner, subject to relatively modern disturbances.

Tullyroe, Co. Laois
Author: Aaron Johnston, for Cultural Resource Development Services Ltd, Archaeological and Historical Consultants, Unit 4A, Dundrum Business Park, Dundrum, Du
Site type: No archaeological significance License number: 07E1171

Pre-development testing was carried out on 16 January 2008 within a section of the development corridor for the proposed Laois Towns and Villages Wastewater Improvement Scheme in Tullyroe townland, Abbeyleix, Co. Laois. This section of the development corridor was within c. 30–50m of the site of a possible enclosure LA023–037. One test-trench was excavated for 150m along the approximate line of the proposed pipeline route across a flat section of field under pasture. No archaeological features were exposed and no finds were recovered.

14.3.4.9 Field Inspection

A field inspection was carried out on the 18 June 2019. This involved an inspection of all the lands in the application area (see Plate 14.3).

Field 1
Long and narrow steeply south-west sloping field of pasture enclosed by low banks with hedges and trees (Plate 14.4). There is no visible indication of any cultural heritage material.

Field 2
Long and narrow south-west sloping field that has been planted with conifers and apart from a cleared area is overgrown (Plate 14.5). There is no visible indication of any cultural heritage material.

Field 3
Northern part of an irregularly shaped field of undulating pasture with slopes to east and west and enclosed by low banks with hedges and trees (Plate 14.6). There is no visible indication of any cultural heritage material.

Field 4
An irregularly shaped field of steeply north-sloping pasture enclosed by low banks with hedges and trees and overgrown at north-east (Plate 14.7). There is no visible indication of any cultural heritage material.

Field 5
A rectangular-shaped field of steeply west-sloping pasture enclosed by low banks with hedges and trees (Plate 14.8). There is no visible indication of any cultural heritage material.

14.3.4.10 Geophysical Survey

A detailed gradiometer survey was conducted under licence No. 22R0258 issued by the Department of Housing, Local Government and Heritage by J. M. Leigh Surveys Ltd. in July 2022 (Leigh 2022). Survey ground conditions were exceptionally difficult with much of the site comprising of a steep west facing slope. The survey was restricted by the wooded and overgrown areas within the application site and the particularly steep west facing slope.

The survey identified 12 anomalies in total (see Table 14.4 and Appendix 14.2). Four of the anomalies are probably relict agricultural divisions (several of which appear on Ordnance Survey historical mapping). One anomaly is a series of farm-tracks visible on aerial imagery. The remaining seven anomalies are curvilinear trends and either clustered or isolated responses that have the potential to be of archaeological significance (anomalies 2, 3, 4, 5, 10, 11, and 12). It is recommended that anomalies 2, 3, 4, 5, 10, 11, and 12 be further investigated by archaeological test excavation.

Anomaly.	Description	Archaeological Significance	Impact	Recommendation
1	Series of faint trends.	Low probably relict agricultural division	High	None
2	Curvilinear trends at limit of detection.	Not clear	High	Archaeological testing
3	Cluster of responses	Possible archaeology	High	Archaeological testing
4	Isolated responses	Possible archaeology	High	Archaeological testing
5	Isolated responses	Possible archaeology	High	Archaeological testing
6	Linear trend, southern part is associated with relict boundary (anom 7) & probably also a relict boundary.	Low probably relict agricultural division	High	None
7	Linear trend visible on the 1st ed OS 6-inch map,1st ed 25-inch map &1909 ed OS 6-inch map as field boundary.	Low probably relict agricultural division	High	None
8	Curvilinear trends at limits of instrument detection. In an area of gravel quarrying. These are the lines of farm-tracks visible on OSI orthophoto 1995, 2000 & 2005; Google Earth images from 2005, 2008, 2010, 2018,	Low farm-track	High	None

9	Linear trends on northeast-southwest & north-south alignment. Probably remains of relict field divisions.	Low probably relict agricultural division	High	None
10	Cluster of responses	Possible archaeology	High	Archaeological testing
11	Cluster of responses	Possible archaeology	High	Archaeological testing
12	Responses	Possible archaeology	High	Archaeological testing

Table 14.4 Summary of geophysical survey results.

14.4 Impacts of the Development Construction Phase

14.4.1 Direct Impacts

The proposal will a significant, irreversible and permanently negative/adverse impact on seven anomalies identified by geophysical survey that have the potential to be of archaeological significance (anomalies 2, 3, 4, 5, 10, 11, and 12). No other direct impacts on any known items of archaeology, cultural heritage or buildings of heritage interest in the application area or the vicinity during the construction stage have been identified by the assessment.

14.4.2 Indirect Impacts

No indirect impacts on any known items of archaeology, cultural heritage or buildings of heritage interest in the application area or the vicinity during the construction stage have been identified by the assessment.

14.4.3 Worst Case Impacts

In the worst case, the development might disturb previously unknown deposits or artefacts in field 2, the southern part of field 3, and fields 4 and 5 without preservation by record taking place.

14.4.4 Operational Phase Direct Impacts

No direct impacts on any known items of archaeology, cultural heritage or buildings of heritage interest in the application area or the vicinity during the operational stage have been identified by the assessment.

14.4.5 Indirect Impacts

No indirect impacts on any known items of archaeology, cultural heritage or buildings of heritage

interest in the application area or the vicinity during the operational stage have been identified by the assessment.

14.5 'Do Nothing' Scenario

If the proposed development were not to proceed no negative impact on the cultural heritage has been identified by the assessment.

14.6 Cumulative Impacts

Apart from seven geophysical anomalies identified in the application site, with yet to be confirmed archaeological significance, no known items of archaeology, cultural heritage or buildings of heritage interest in the application site or the vicinity have been identified by the assessment. Due to the absence of significant archaeological or cultural heritage material in the application site and vicinity at the time of the assessment no cumulative impacts have been identified.

14.7 Mitigation Measures

14.7.1 Construction Phase

1. It is recommended that anomalies 2, 3, 4, 5, 10, 11, and 12 identified through geophysical survey be further investigated by licensed archaeological test excavation.

2. Due to the possibility of the survival of previously unknown subsurface archaeological deposits or finds in field 2, the southern part of field 3, and fields 4 and 5, these areas should be investigated by licensed archaeological test excavation in advance of development.

3. Where archaeological testing cannot be carried out due to the presence of tree cover, topsoil stripping should be monitored by a qualified archaeologist who will observe and report on the stripping of topsoil.

4. Any archaeological material identified through archaeological testing or monitoring should be preserved by record through licensed archaeological excavation in advance of development.

14.7.2 Operational Phase

1. Where archaeological testing cannot be carried out due to the presence of tree cover, topsoil stripping should be monitored by a qualified archaeologist who will observe and report on the stripping of topsoil.

2. Any archaeological material identified through archaeological testing or monitoring should be preserved by record through licensed archaeological excavation in advance of development.

14.8 Conclusions and Recommendations

During construction the proposal will impact seven anomalies identified by geophysical survey that have the potential to be of archaeological significance (anomalies 2, 3, 4, 5, 10, 11, and 12). There are no other items of cultural heritage, monuments or buildings of heritage interest known from the application area or vicinity. There are no known direct or indirect impacts on any other known items of cultural heritage, archaeology or buildings of heritage interest in the application area or the vicinity. In the worst case, the development might disturb previously unknown deposits or artefacts in field 2, the southern part of field 3, and fields 4 and 5 without preservation by record taking place. For the operational phase no direct impacts on any known items of archaeology, cultural heritage or buildings of heritage interest in the application area or the vicinity during the operational stage have been identified by the assessment. In the worst case, the development might disturb previously unknown deposits or artefacts in field 2, the southern part of field 3, and fields 4 and 5 without preservation by record taking place.

In advance of the construction phase:

1. It is recommended that anomalies 2, 3, 4, 5, 10, 11, and 12 identified through geophysical survey be further investigated by licensed archaeological test excavation.
2. Due to the possibility of the survival of previously unknown subsurface archaeological deposits or finds in field 2, the southern part of field 3, and fields 4 and 5, these areas should be investigated by licensed archaeological test excavation in advance of development.
3. Where archaeological testing cannot be carried out due to the presence of tree cover, topsoil stripping should be monitored by a qualified archaeologist who will observe and report on the stripping of topsoil.
4. Any archaeological material identified through archaeological testing or monitoring should be preserved by record through licensed archaeological excavation in advance of development.

During the operational phase:

1. Where archaeological testing cannot be carried out due to the presence of tree cover, topsoil stripping should be monitored by a qualified archaeologist who will observe and report on the stripping of topsoil.
2. Any archaeological material identified through archaeological testing or monitoring should be preserved by record through licensed archaeological excavation in advance of development.

14.9 References

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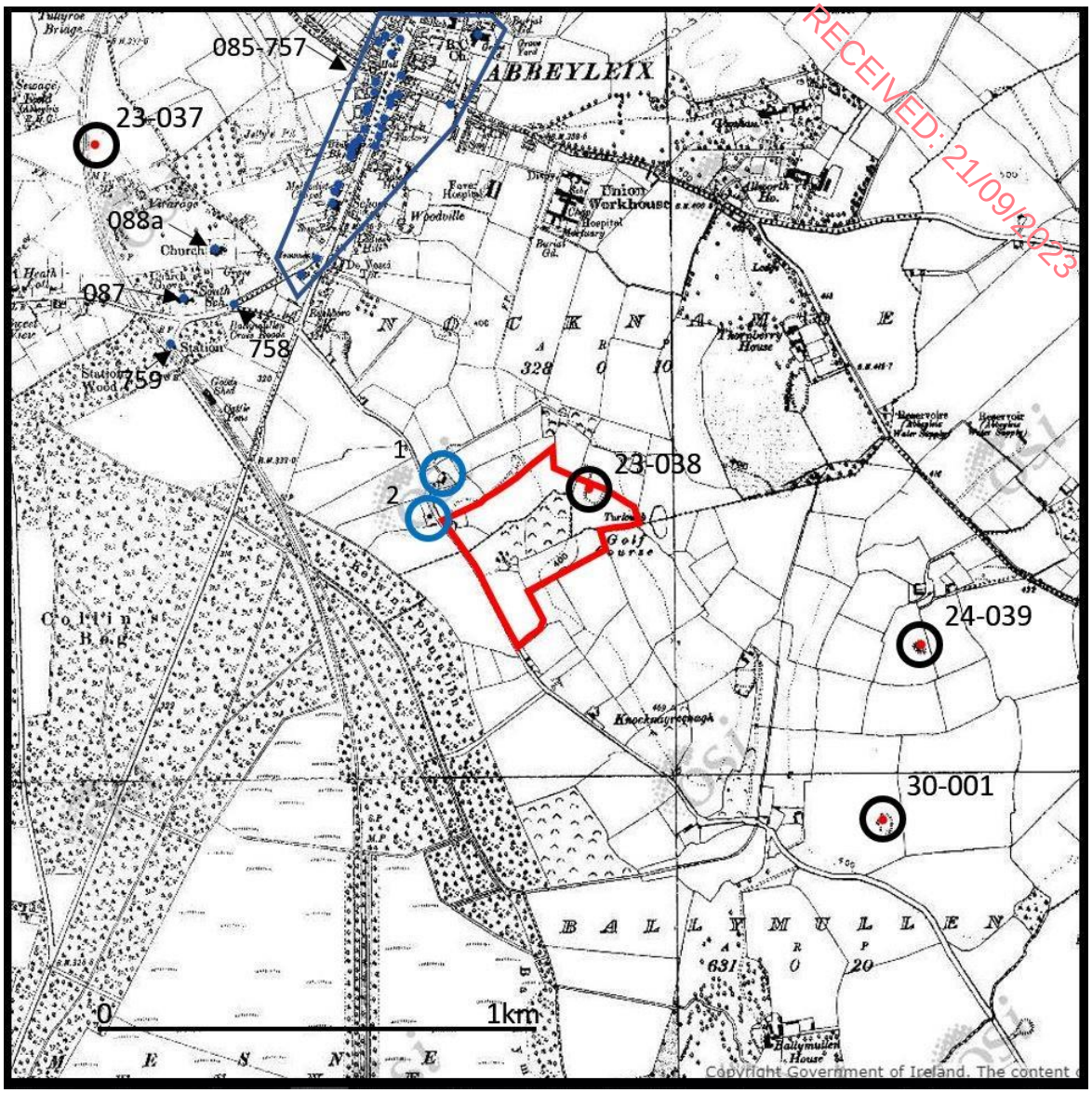

Fig. 14.1. The study area is indicated and superimposed on the Sites and Monuments Record. The Application area is indicated with the red line. RMP sites are indicated with black circles, the structure in the Record of Protected Structures are indicated with blue dots and numbered and the structures within 100m of the application area on the 3rd edition OS mapping are indicated with blue circles

Plate 14.1. View of Structure 1 looking north-west.

Plate 14.2. View of Structure 2 looking north.

Plate 14.3. Aerial view from Bing maps of the application area outlined in red with the fields numbered and boundaries between each area highlighted with the dashed gold line.

Plate 14.4. View of field 1 looking north-east.

Plate 14.5. View of field 2 looking south-west.

Plate 14.6. Panoramic view of field 3 looking south.

Plate 14.7. Panoramic view of field 4 looking north.

Plate 14.8. Panoramic view of field 5 looking south-east.

Appendix 14.1 Recorded Monuments in the study area

LA023-037---- TULLYROE Enclosure
Situated in gently undulating countryside. Cropmark of circular enclosure visible on aerial photograph (CUCAP, AYN 38). No visible surface remains.

LA023-038---- KNOCKNAMOE Redundant record
Non-archaeological, this is the site of a sand pit which is now closed and has been filled in. The sand was used for building the Cork-Dublin Road. Not marked as an antiquity on the first two editions of the OS 6-inch map.

LA024-039---- BALLYMULLEN Enclosure
Marked on the 1841 and 1909 editions of the OS 6-inch map; a semicircular enclosure (max. diam. c. 30m NW-SE). Described as a small D-shaped enclosure with gap on E side (OPW file). No visible surface remains.

LA030-001---- BALLYMULLEN Enclosure
Marked on the 1841 ed OS 6-inch map; a circular enclosure (max. diam. c. 20m). In undulating countryside. No visible surface remains.

Appendix 14.2 Geophysical Survey Report

GEOPHYSICAL SURVEY REPORT

Knocknamoe and Ballymullen, Abbeyleix, County Laois

Date:
05/08/2022

J. M. Leigh Surveys Ltd.
124 Oaklawn West
Leixlip
County Kildare
www.jmlsurveys.com
01 615 4647

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GEOPHYSICAL SURVEY SUMMARY SHEET
KNOCKNAMOE AND BALLYMULLEN, ABBEYLEIX, COUNTY LAOIS

Site Name	Knocknamoe and Ballymullen, Abbeyleix	**Ref No.**	22045
Townland	Knocknamoe and Ballymullen	**Licence No.**	22R0258
County	County Laois	**Licence Holder**	Joanna Leigh
ITM (centre)	E644090, N683950	**Purpose**	RFI
Client	Earth Science Partnership Ltd.	**Reference No.**	21694 Laois County Council.

Ground Conditions Survey was conducted where possible within a landscape comprising of steep slopes and wooded areas.

Survey Type Detailed gradiometer survey totalling c. 4 hectares.

Summary of Results

The data comprises of faint linear and curvilinear trends. Most of these likely represent agricultural activity or a change in slope.

Isolated responses are identified within Areas A and B. Although it is possible that some of these represent more deeply buried ferrous debris, clusters of responses in Areas A and B may be of interest. They may represent the remains of large pit-type features, comprising of burnt material. This is speculative but must be considered. In Area B, a series of linear trends is evident. Although there is no clear pattern, these may represent the remains of short ditch type features. However, this is speculative, and it is likely that they result from more recent ground disturbance and agricultural activity.

Report Date 05/08/2022 **Report Author** Joanna Leigh

Contents

Geophysical Survey Report
Knocknamoe and Ballymullen, Abbeyleix, County Laois

1 Introduction

1.1 A geophysical survey has been conducted by J. M. Leigh Surveys Ltd. at a site in the townland of Ballymullen, Abbeyleix, County Laois. The survey was requested by Earth Science Partnership, on behalf of Boothe Concrete Ltd.

1.2 This survey forms part of a wider study by Earth Science Partnership Ltd. for the proposed extraction of sand and gravel, planning reference 21694 Laois County Council.

1.3 The site is located to the south of Abbeyleix, along the L5731 local road. The application area is contained within several fields, some of which comprise of woodland areas. Two areas (Areas A and B) were deemed suitable for a geophysical investigation. The site and survey locations are presented in Figure 1 at a scale of 1:3,000.

1.4 A redundant record (RMP LA023-038) is recorded within the north of the application area. This is described as non-archaeological, and is the site of a sand pit which is now closed and has been filled in. The sand was used for building the Cork-Dublin Road. In addition, a former golf course is depicted at this location on the historic 25inch Ordnance Survey Mapping.

1.5 The main aim of this survey was to identify and geophysical responses that may represent the remains of unknown archaeological features. A detailed gradiometer survey was conducted under licence 22R0258 issued by the Department of Housing, Local Government and Heritage.

2 Survey ground conditions and further information

2.1 Survey ground conditions were exceptionally difficult with much of the site comprising of a steep west facing slope.

2.2 Survey Area A comprised of a steep slope which levelled off slightly in the centre. Survey Area B was located at the highest part of the site and comprised of undulating topography. Survey was restricted by the adjacent wooded area and overgrown vegetation. The wooded areas sit within the steep west facing slope. Area C was deemed unsuitable for survey as the west facing slope was particularly steep here. No survey could be undertaken in Area C.

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. 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. All data was collected in 'zigzag' traverses. Grid orientation was positioned to facilitate data collection.

3.4 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.

4 Data display

4.1 The survey results and accompanying interpretation diagram for Area A are presented in Figures 2 and 3, both at a scale of 1:1,250. A greyscale image and accompanying interpretation diagram for Area B are presented in Figures 4 and 5, also at a scale of 1:1,250.

4.2 Numbers in parenthesis in the text refer to specific responses highlighted in the resistance survey interpretation diagram (Figures 3 & 5).

4.3 Isolated ferrous responses in the gradiometer data 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.

4.4 The raw gradiometer data is presented in archive format in Appendix A1.01. The raw data is displayed as a greyscale image and xy-trace plot, both at a scale of 1:500. 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.

4.5 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

Area A (Figures 2 & 3)

5.1 A series of faint trends (1) are evident on the north of the data. These most likely represent agricultural activity, and no clear archaeological pattern is evident.

5.2 Further, curvilinear trends (2) are identified in the north of the Area A. These are at the limits of instrument detection and may represent the change in slope here. An archaeological interpretation is unclear.

5.3 A cluster of responses (3) and isolated responses (4) are of potential interest. Although it is possible they represent more deeply buried modern ferrous debris, an

archaeological interpretation must be considered. They are located on a break of slope within the field, and it is possible that they represent the remains of pit-type features of archaeological interest. This interpretation is cautious but must be considered.

5.4 Further isolated responses (5) to the south have an ill-defined form and it is equally likely that these represent modern ferrous debris.

5.5 Linear trends (6) have no clear archaeological pattern and are most likely agricultural in origin.

5.6 The linear trend (7) appears to define an area of heightened response and modern magnetic disturbance to the south. The trend (7) may represent a more recent former field division.

Area B (Figures 4 & 5)

5.7 Curvilinear trends (8) are at the limits of instrument detection. These may result from the undulating topography here, or perhaps represent the former infilled sand pits as described in the RMP LA023-038 file. No clear archaeological interpretation can be provided.

5.8 Further trends (9) have a more regular form. These may be of interest, perhaps representing former field divisions or the remains of short, ditched features. This is speculative and they may equally result from more recent agricultural activity.

5.9 A cluster of responses (10) is similar in magnetic signature to the responses (3) in Area A. It is possible that large pit-type features are represented here. This is speculative and the responses may equally represent more deeply buried modern ferrous debris.

5.10 Further responses (11) are evident. These are less well defined, and interpretation is cautious. They may equally be modern in origin.

5.11 The response (12) appears at the edge of the field and at the end of a linear response. This may represent part of a former field division and no clear archaeological interpretation can be provided.

6 Conclusion

6.1 The data comprises of faint linear and curvilinear trends. Most of these most likely represent agricultural activity or a change in slope.

6.2 Isolated responses are identified within Areas A and B. Although it is possible that some of these represent more deeply buried ferrous debris, clusters of responses in Areas A and B may be of interest. They may represent the remains of large pit-type features, comprising of burnt material. This is speculative but must be considered.

6.3 In Area B, a series of linear trends is evident. Although there is no clear pattern, these may represent the remains of short ditch type features. However, this is speculative, and it is likely that they result from more recent ground disturbance and agricultural activity.

6.4 No survey could be conducted in Area C due to the very steep west facing slope.

6.5 Consultation with a licensed archaeologist and with the Department of Housing, Local Government and Heritage is recommended to establish if any additional archaeological works are required.

7 Technical Information Section

13.10 Instrumentation & Methodology

Detailed Gradiometer Survey

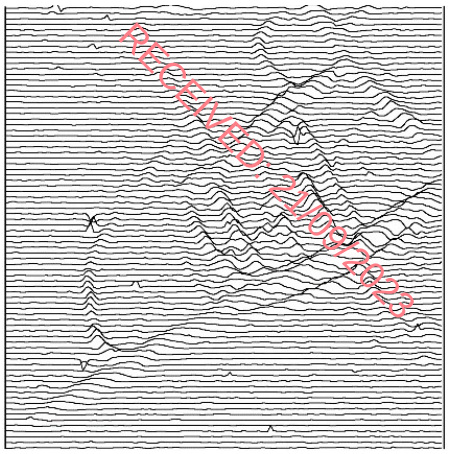
Detailed gradiometer survey can either be targeted across a specific area of interest or conducted as a blanket survey across an entire application area, often as a standalone methodology.
Sampling methodologies can vary but a typical survey is conducted with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is often collected in grids measuring 40m x 40m, with the data displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. This can sometimes produce results with a more detailed resolution. A survey with a grid size of 20m x 20m and a traverse interval of 0.5m will provide a data set with high resolution.

13.10.1 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.

13.11 Gradiometer Data Display & Presentation



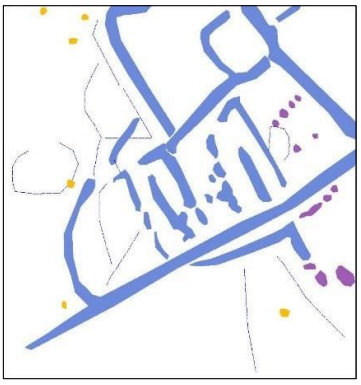
13.11.1 XY Trace

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.

13.11.2 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.

13.11.3 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 allow 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. The archive plots are provided as PDF images upon request.*

13.12 Glossary of Interpretation Terms

Categories of responses may vary for different data sets. The list below are the most used categories for describing geophysical responses, as presented in the summary interpretation diagrams.

13.12.1 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, pits and associated features.

13.12.2 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.

13.12.3 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.

13.12.4 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.

13.12.5 Ploughing/Ridge & Furrow

Visible as a series of linear responses, these anomalies equate with recent or archaeological cultivation activity.

13.12.6 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.

13.12.7 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.

13.12.8 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.

13.13 Bibliography

European Archaeological Council (EAC) (2016) '*Guidelines for the use of Geophysics in Archaeology*' by Armin Schmidt, Paul Linford, Neil Linford, Andrew David, Chris Gaffney, Apostolos Sarris and Jörg Fassbinder.

English Heritage (2008) '*Geophysical guidelines: Geophysical Survey in Archaeological Field Evaluation*.' Second Edition.

Gaffney, C. Gater, J. & Ovenden, S. (2006) '*The use of Geophysical Techniques in Archaeological Evaluations.*' IFA Paper No. 6.

Gaffney, C & Gater, J (2003). '*Revealing the buried past: Geophysics for Archaeologists*.' Tempus Publishing Limited.

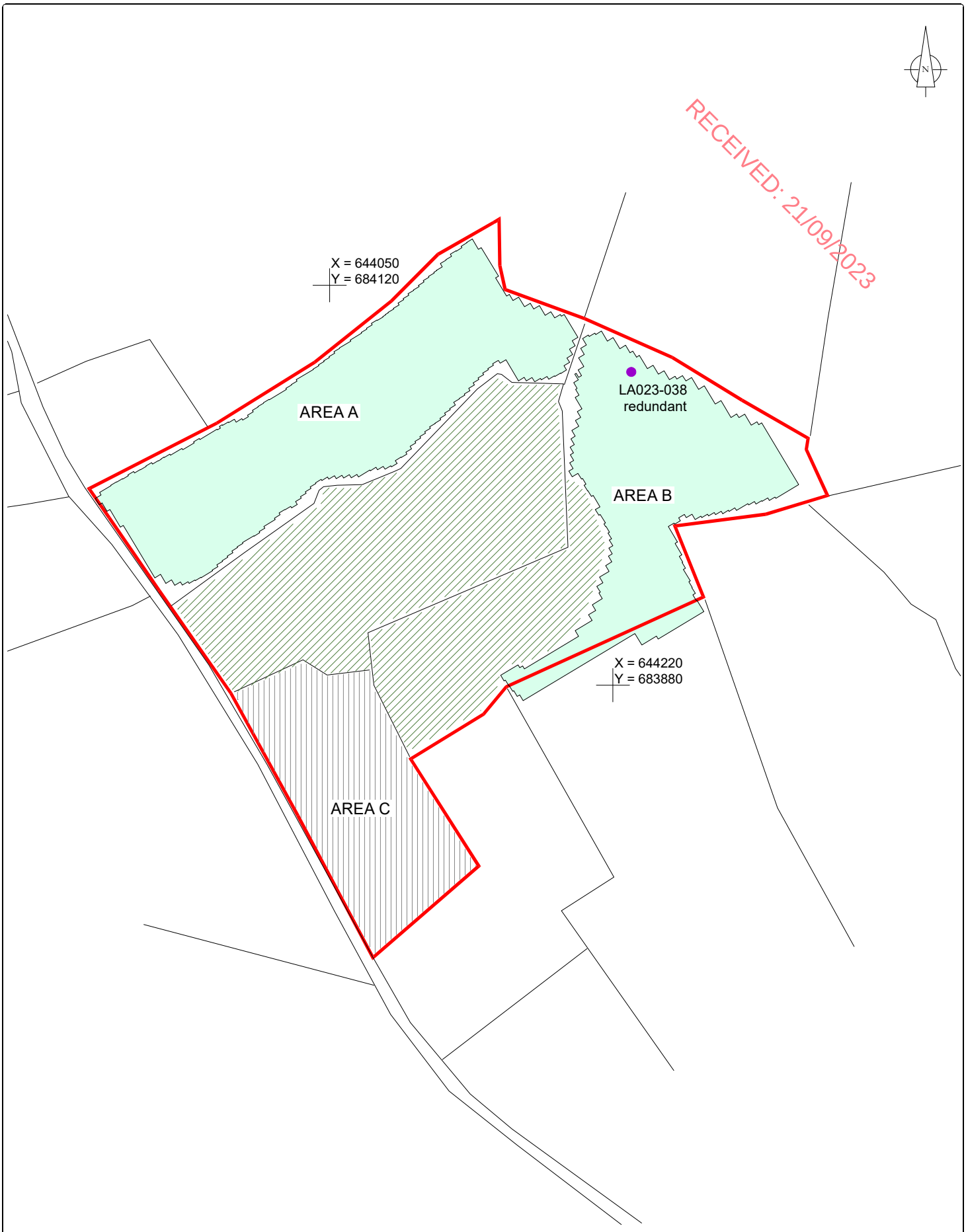
National Soil Survey of Ireland (1980) *General soil map second edition (1:575,000)*. An Foras Taluntais.

13.14 List of Figures

Figure	Description	Scale
Figure 1	Site & survey location diagram	1:3,000
Figure 2	Area A: Summary greyscale image	1:1,250
Figure 3	Area A: Summary interpretation diagram	1:1,250
Figure 4	Area B: Summary greyscale image	1:1,250
Figure 5	Area B: Summary interpretation diagram	1:1,250

Archive Data Supplied as a PDF Upon Request

A1.01	Raw data XY-Trace plot & greyscale image	1:500



Application Area

Detailed Gradiometer Survey

Not suitable for Survey - vegetation

Not suitable for Survey - steep slope

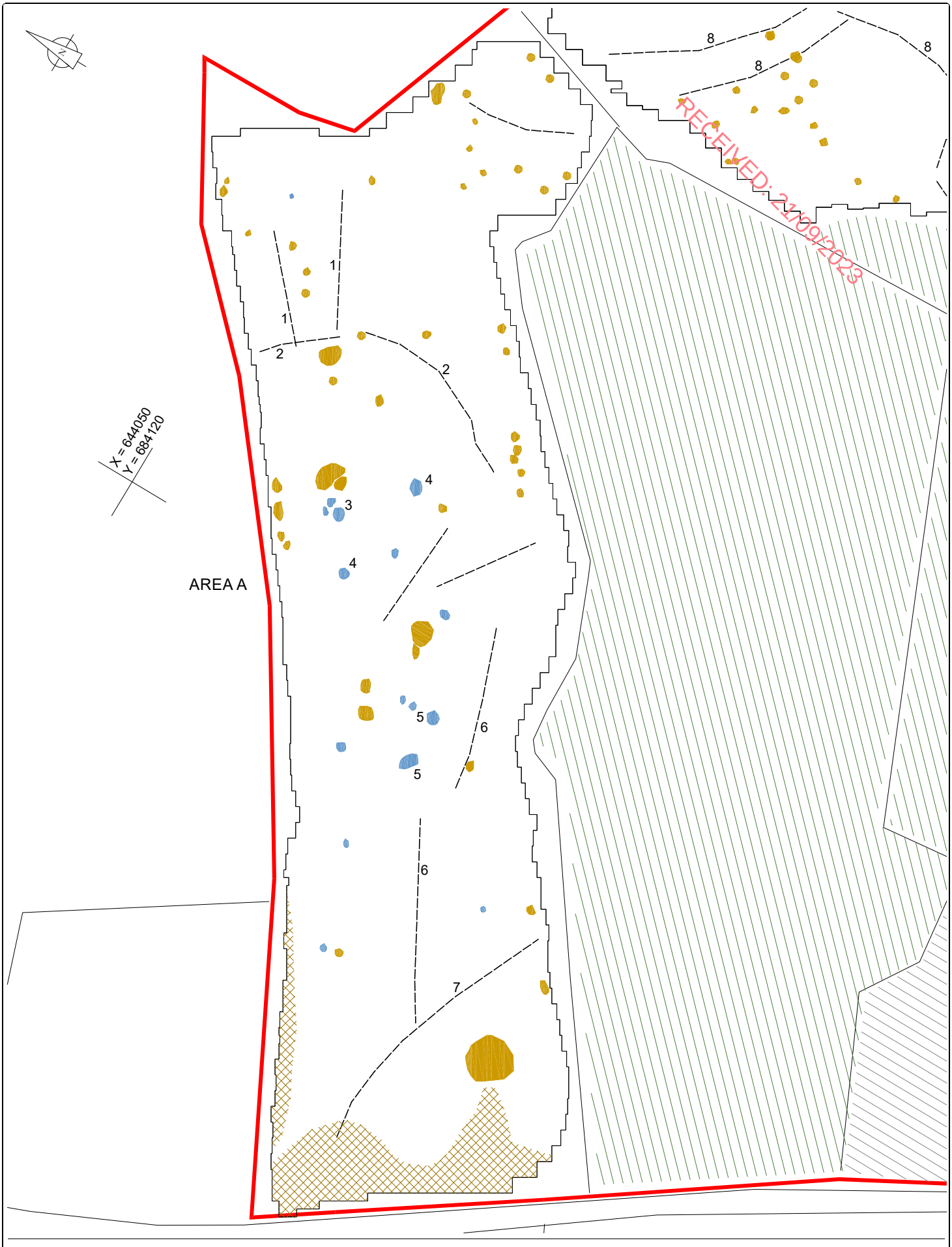
0 metres 120

Client: Earth Science Partnership Ltd.	Project: Geophysical Survey Knocknamoe and Ballymullen, Abbeyleix, Co. Laois	Title: Site & Survey Location	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:3,000 Figure: 1 Licence No.: 22R0258 Issue Date: 05.08.2022

Application Area

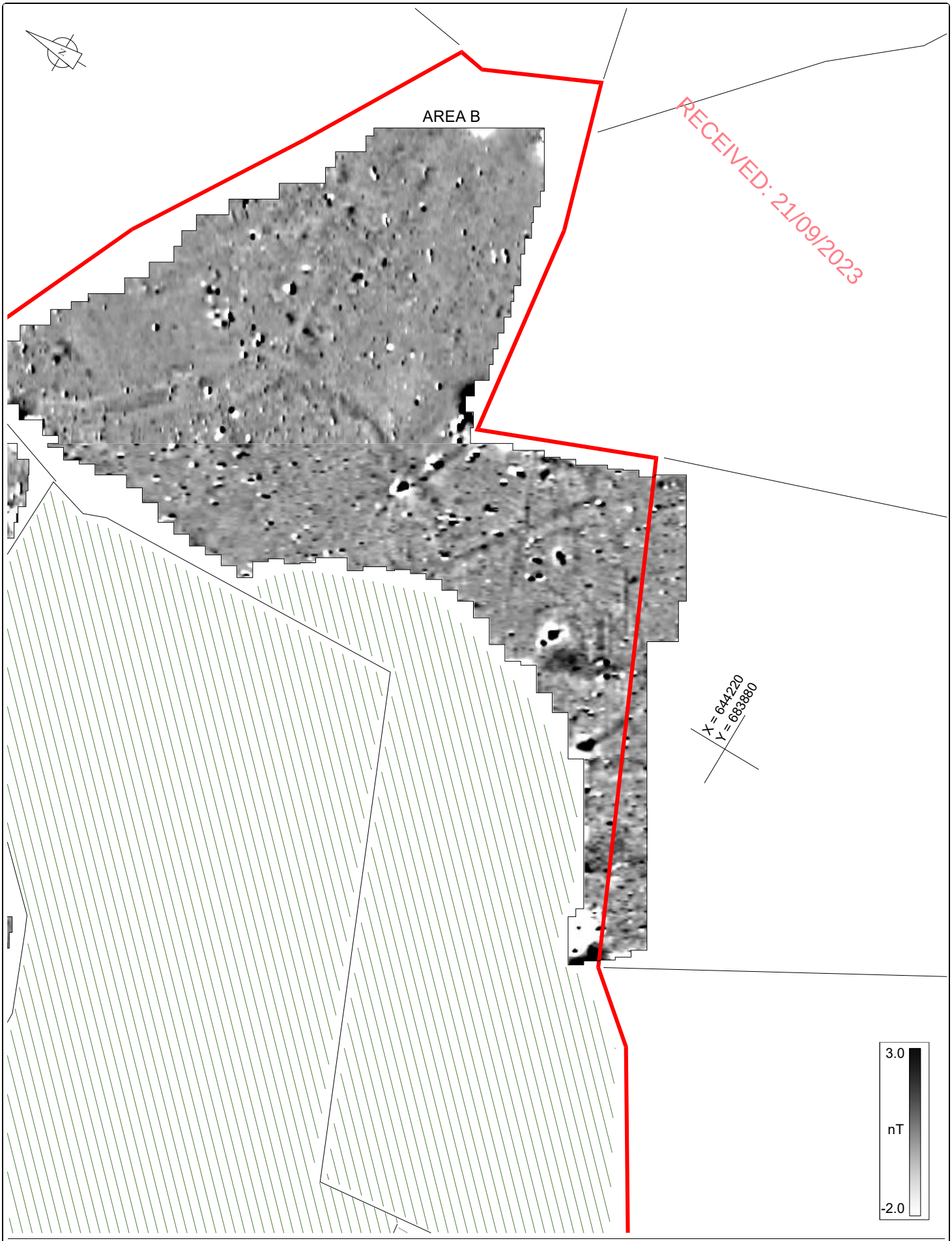
0 metres 50

Client: Earth Science Partnership Ltd.	Project: Geophysical Survey Knocknamoe and Ballymullen, Abbeyleix, Co. Laois	Title: Summary Greyscale Image Area A	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:1250 Figure: 2 Licence No.: 22R0258 Issue Date: 05.08.2022



Client: Earth Science Partnership Ltd.	Project: Geophysical Survey Knocknamoe and Ballymullen, Abbeyleix, Co. Laois	Title: Summary Interpretation Area A	J.M. Leigh Surveys Ltd. www.jmlsurveys.com

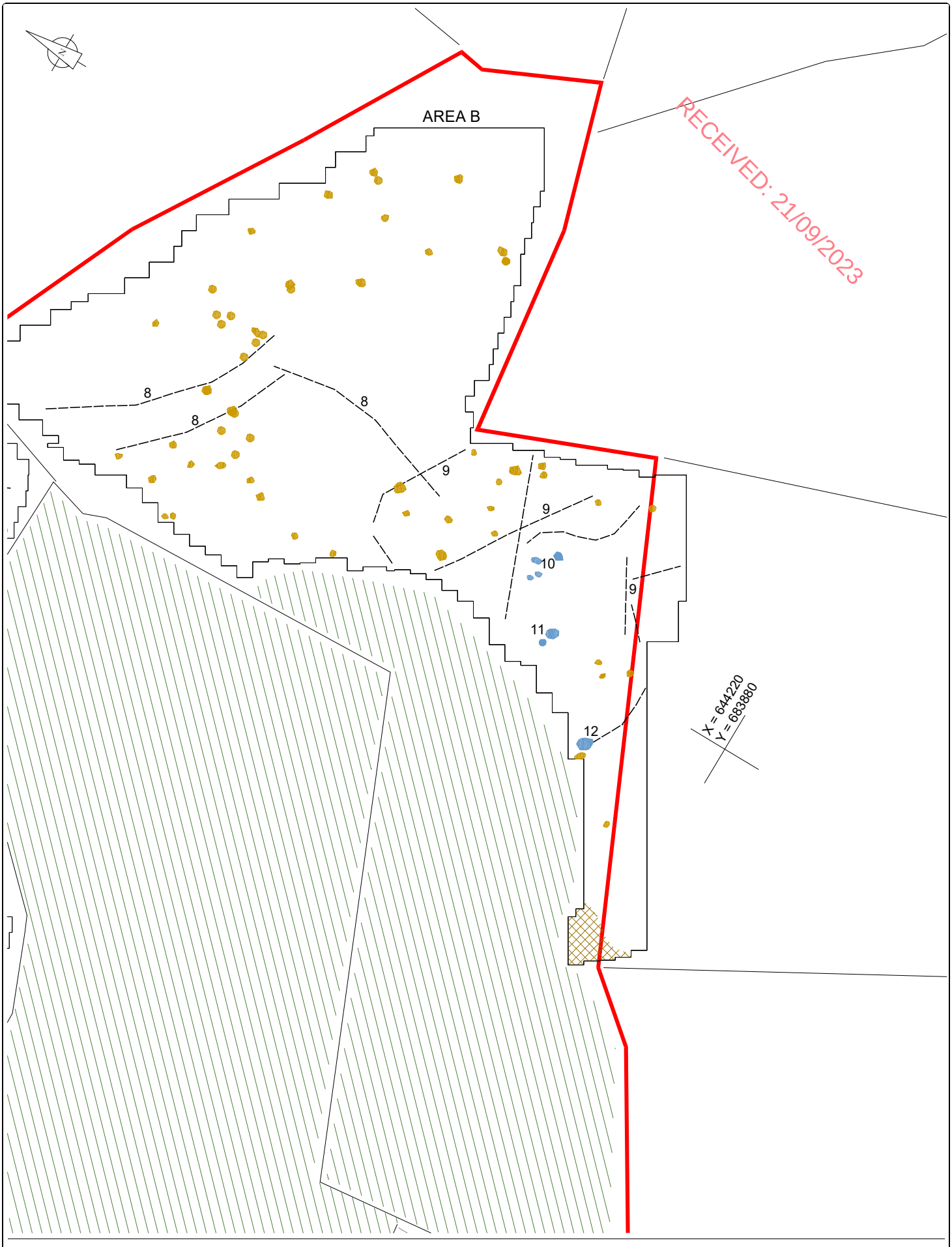
Scale @ A4: 1:1250
Figure: 3
Licence No.: 22R0258
Issue Date: 05.08.2022



Application Area

0 metres 50

Client:	Project:	Title:		
Earth Science Partnership Ltd.	Geophysical Survey Knocknamoe and Ballymullen, Abbeyleix, Co. Laois	Summary Greyscale Image Area B	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:1250 Figure: 4 Licence No.: 22R0258 Issue Date: 05.08.2022



Positive response - ?Archaeology

Trend

Modern ferrous

Modern magnetic disturbance

0 metres 50

Client: Earth Science Partnership Ltd.	Project: Geophysical Survey Knocknamoe and Ballymullen, Abbeyleix, Co. Laois	Title: Summary Interpretation Area B	J.M. Leigh Surveys Ltd. www.jmlsurveys.com

Scale @ A4: 1:1250
Figure: 5
Licence No.: 22R0258
Issue Date: 05.08.2022

15.0 INTERACTIONS

15.1 Introduction

This section addresses the cumulative impacts, indirect impacts and main interactions between different aspects of the environment that may be impacted on as a result of the development. Only topics that could be logically linked to the development have been examined in detail. Accordingly, when a topic is not mentioned, it is concluded that no potential for conflict exists.

15.2 Interactions

Inter-relationships relate to the interactions between impacts within a project and the interactions between impacts identified under one topic with impacts identified under another topic. Each of the various environmental and related topics have been discussed separately in the preceding sections of the EIAR and the major interactions between the recorded environmental impacts are assessed within the individual chapters of the EIAR. In examining the interactions of the potential impacts for this development one must investigate the combined physical, environmental, visual and socio-economic impact of the development on the receiving environment. Table 15.1 illustrates the interaction of impacts assessed for this project.

Table 15.1: Interactions

	Pop. & Human Health		Biodiversity		Land, Soils & Geology		Water		Climate		Air		Noise		Traffic		Landscape		Material Assets		Cultural Heritage	
	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O	C	O
Pop. & Human Health																						
Biodiversity																						
Land, Soils & Geology			✓	✓																		
Water	✓	✓	✓	✓	✓	✓																
Climate	✓	✓																				
Air	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
Noise	✓	✓	✓	✓																		
Traffic	✓	✓									✓	✓	✓	✓								
Landscape	✓	✓	✓	✓	✓	✓																
Material Assets	✓	✓			✓	✓											✓	✓				
Cultural Heritage																						

Weak Interaction = ✓ Some Interaction = ✓ Strong Interaction = ✓

15.2.1 Population & Human Health and Water

Contaminants or leakages from plant and vehicles can potentially migrate through the underlying overburden to groundwater which could impact on water quality. Procedures will be put in place for dispensing fuel, servicing plant and equipment and for dealing with accidental spillages should they arise.

15.2.2 Population & Human Health and Climate

Plant associated with the operation of the development will result in emissions to air associated with the day-to-day operations which are difficult to eliminate. The low level of activity associated with the proposed development will not result in significant emissions to the environment.

The proposed development if granted planning permission will ensure that sand and gravel will be sourced closer to the manufacturing facility thereby reducing the distance that material has to be transported from the source site to the manufacturing facility leading to a reduction in climate emissions. Measures will be put in place to reduce emissions in so far as possible in order to reduce the impact on climate from day-to-day operations.

15.2.3 Population & Human Health and Air

The primary interaction between air and humans would relate to potential dust emissions associated with extraction and transport of material around and off-site. The air modelling survey shows that the proposed development will not lead to significant levels of PM2.5, PM10 and dust emissions. Dust deposition monitoring will be undertaken to ensure that levels are within the recommended guideline values. Provided that emission limits applied to the pit are adhered to no residual impacts to the air quality are envisaged.

15.2.4 Population & Human Health and Noise

Day to day activities undertaken at the pit will generate noise associated with the extraction, loading of vehicles and transportation of material within and off site. Various measures will be put in place to ensure noise levels are not elevated.

A noise assessment undertaken demonstrates that the development will not result in an increase in noise levels above recommended guideline values. Noise monitoring will be undertaken to ensure levels at sensitive locations are below recommended levels.

15.2.5 Population & Human Health and Traffic

Material for the manufacturing facility is currently sourced from quarries and pits a considerable distance away from the manufacturing facility. Therefore, the proposed

development will result in a reduction in the traffic going though Abbeyleix and Ballinakill towns and on the lower Ballymullen Road.

15.2.6 Population & Human Health and Landscape

The removal of existing vegetation, overburden and the extraction of the underlying sand and gravel will result in the creation of a void area. Various landscaping and restoration measures are proposed in order mitigate the impact associated with the development.

15.2.7 Population & Human Health and Material Assets

Extraction of material will result in the loss of a geological resource which cannot be replaced. The development will sustain direct and indirect employment which will have a positive impact. The proposed landscape and restoration plan will aid in mitigating the impact associated with extraction of the resource.

15.2.8 Biodiversity and Land, Soils & Geology

The proposed development will result in the loss of an existing land use which is agricultural and the removal of the existing trees and vegetation in order to extract the underlying resource. The proposed landscape and restoration plan will mitigate the loss of the existing habitats with the land to be returned to agricultural use on completion of extraction which is the current land-use. The proposed landscape and restoration plan aims to increase the biodiversity of the site.

15.2.9 Biodiversity and Water

Contaminants or leakages from plant and vehicles can potentially migrate through the underlying overburden to groundwater and surface water which could impact on water quality and associated habitats and species. Procedures will be put in place for dispensing fuel, servicing plant and equipment and for dealing with accidental spillages should they arise.

15.2.10 Biodiversity and Air

Activities undertaken at the pit have the potential to create windblown dust which can impact on biodiversity of the area. Proposed mitigation and management measures will be in place to prevent dust blow. Monitoring will be undertaken on a regular basis to ensure levels of dust deposition are within the recommended guideline values.

15.2.11 Biodiversity and Noise

The extraction, processing and transport of material can lead to noise emissions. Elevated noise levels can potentially affect some birds and mammals particularly those sensitive to noise. Due to the low level of activity no significant impact was identified by the project Ecologist provided that mitigation measures are adhered to.

15.2.12 Biodiversity and Landscape

An 8-phase extraction/landscape & restoration plan has been compiled for the proposed development which will be implemented which will ensure that continuous landscaping and restoration is being undertaken. The proposed landscape and restoration plan will increase the biodiversity of the site on completion of extraction of the available resource.

15.2.13 Land, Soils & Geology and Water

The removal of overburden can increase the risk of contamination of groundwater in the event of accidental spillages occurring. Procedures will be put in place for dispending fuels and servicing plant etc. in order to reduce the potential of accidental spillages occurring.

15.2.14 Land, Soils & Geology and Air

The extraction and stockpiling of material can give rise to windblown dust. Dust suppression consisting of the use of a water bowser to dampen haul roads and sprinklers fitted to conveyor lines will be deployed.

15.2.15 Land, Soils & Geology and Landscape

The proposed development will result in the loss of the existing land-use which is agricultural and the extraction of the underlying resource. The implementation of the proposed landscape and restoration plan will result in the returning of the land to agricultural use.

15.2.16 Land, Soils & Geology and Material Assets

Extraction of material will result in the loss of a geological resource which cannot be replaced. However, the material will be used to serve the need for construction materials. The implementation of the proposed landscape and restoration plan will result in the returning of the land to agricultural use. The development will sustain direct and indirect employment which will have a positive impact.

15.2.17 Water and Air

Dust associated with day to day activities has the potential to contaminate surface water and groundwater if appropriate measures are not in place. Potential sources of dust emissions will be managed to ensure that they do not give rise to dust emissions. Emissions from the site will be below recommended guideline values for dust deposition. Also, the

proposed phased extraction plan will ensure that only a limited area of the site will be subject to extraction at anyone time.

15.2.18 Climate & Air

Plant and machinery operating at the pit will result in emissions to air and climate associated with the operation which is difficult to mitigate against. Energy conservation measures and good management practices will serve to reduce the emissions in so far as is possible.

15.2.19 Air and Traffic

The transport of material to and from the site has the potential generate emissions to air associated with dust blow and engine emissions. Mitigation measures are proposed in various sections in order to effectively mitigate against windblown dust particles and engine emissions.

15.2.20 Noise and Traffic

Traffic associated with the development generates noise and a minor source of vibration. The development will not result in an increase in traffic on the local road infrastructure and will result in a reduction in traffic passing through Abbeyleix due to material being sourced much closer to the manufacturing facility.

15.2.21 Landscape and Material Assets

The visual impact assessment undertaken shows that the application site is visible from locations to the west with limited views to the east. The application site is not located or visible from any scenic views. The proposed landscape and restoration plan will aid in screening the pit from outside views.

15.3 'Do Nothing' Scenario

If the proposed development does not proceed, the application site will continue to be utilised for livestock grazing.

16.0 MITIGATION AND & MONITORING SUMMARY

This section of the EIAR provides a summary of the mitigation measures proposed in order to avoid, reduce or remedy the potential impacts identified and a summary of monitoring proposed to ensure that mitigation measures are effective.

16.1 Population & Human Health

16.1.1 Mitigation Measures

No mitigation measures other than those detailed elsewhere in this EIA Report, are required.

Section 7.0 – Water
Section 8.0 – Climate
Section 9.0 – Air
Section 10.0 – Noise
Section 11.0 – Traffic
Section 12.0 – Landscape

16.1.2 Monitoring

Environmental monitoring will be carried out in accordance with the requirements of the conditions attached to the grant of planning permission.

16.2 Biodiversity

16.2.1 Mitigation Measures

16.2.1.1 Potential Effects on Designated Sites

During the extraction of each phase an infiltration swale will be dug on the lower side of the excavations to ensure any run-off percolates into the ground. A 30m wide zone (as shown in Figure 3.4, Chapter 3.0) will also be left along the road with its existing vegetation. This will act as a soakaway and natural buffer for the wetland habitats west of the road and for the Ballymullen Stream.

The following mitigation is proposed for hydrocarbon materials:

- All plant and machinery will be serviced before being mobilised to site;
- Refuelling will be completed in a controlled manner, at all times, in the specially designed fuelling facility on site (refer to Drawing PP-140 00)
- Only designated trained operators will be authorised to refuel plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills;

- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill; and,
- Runoff from the site entrance and overflows from the wheel wash will be directed to a silt trap and full retention hydrocarbon interceptor* prior to discharge to ground.

**The full retention hydrocarbon interceptor will be sized to cope with a 10-year storm return period*

16.2.1.2 Habitats and Mammals

The landscape chapter details the planting and preparation measures for restoration to be incorporated into each phase of the extraction. Broadly these are to establish tree cover on the side slopes of the pit and grassland for agricultural use on the base. The front hedge will be replanted to allow for traffic visibility while all marginal hedges will be retained.

The use of native species of woody plants is emphasised in the Notice Nature publication while the maintenance and replacement of hedgerows fulfils the network objectives. Once complete the landscaping will result in a partial replacement of the woodland area with benefits to biodiversity that will increase in time.

Biosecurity measures will be employed during the construction to avoid the introduction of any non-native invasive species on site. Any hired equipment and machinery used on site will be washed before its arrival on site. The NRA guidelines *'The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads'* (2010) will be followed for the project as there are currently no invasive species.

16.2.1.3 Disturbance/displacement of breeding birds

No removal of vegetation will be undertaken on-site between 1st March and 31st August (incl).

16.2.1.3 Disturbance/displacement of mammals

- No interference with ground levels will occur within 30m of the sett identified consistent with the NPWS procedure. NPWS will be notified before work begins.
- Measures will be taken to allow access through the peripheral fencing for badgers and other mammals

16.2.1.3 Potential effects on surrounding habitats (Abbeyleix Bog)

Phase 4 of the extraction plan is significantly reduced and there will be no extraction in the southern end of the site immediately upstream of the petrifying spring. The existing vegetation will be retained so that the situation will remain as it is today.

16.2.1.3 Airborne Dust

Measures to avoid likely effects of dust emissions on Abbeyleix Bog are outlined in Section 9 of the EIAR. They include a wheel-wash at the entrance to the site and the use of a water bowser. Also the phased pattern of extraction will limit the area of exposed sediment at any one time. The absence of grading at the site will reduce the exposure of fines (which could become wind-borne) while the extracted material will be damp over much of the year. The seeding of berms and fully extracted areas will be done as soon as they are exposed (see landscape section).

16.3 Land, Soils & Geology

16.3.1 Mitigation Measures

16.3.1.1 Initial Excavation of Soil and Subsoils including Berm and Entrance Construction

Initial site earthworks and entrance/berm creation will result in a direct impact on the local geological environment, albeit this is an acceptable and unavoidable part of the proposed sand and gravel pit development. These impacts will be localised (i.e. only at the point of extraction/placement) and will be mostly mitigated through the adoption of a suitable landscape and restoration plan which will be undertaken following the completion of the extraction phase.

The soil and subsoil which will be removed are not notable from a geological heritage point of view and are widely abundant in the area. The stripped topsoil will be used to form a berm along the western boundary and for the ultimate restoration of the site.

16.3.1.2 Excavation of Soil and Subsoils (Aggregate)

Site earthworks and aggregate extraction will result in a direct impact on the local geological environment, albeit this is an acceptable and unavoidable part of the proposed sand and gravel pit development. These impacts will be localised (i.e. only at the point of extraction) and will be mostly mitigated through the adoption of a suitable landscape and restoration plan which will be undertaken during the operational phase and on completion of extraction.

The soil and subsoil which will be removed are not notable from a geological heritage point of view and are widely abundant in the area. The stripped topsoil will be used to form a berm along the western boundary and for the ultimate restoration of the site.

16.3.1.2 Contamination of Soil and Subsoils from Oil / Fuel Spills and Leaks

The following mitigation is proposed:

- All plant and machinery will be serviced before being mobilised to the site;
- Refuelling will be carried out on a proposed refuelling pad at all times;
- The refuelling pad will include a drainage collection system and oil interceptor;
- Only designated trained operators will be authorised to refuel plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills; and,
- An emergency spill kit with an oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill.

16.3.2 Effects on Land and Landuse

Post extraction phase a landscape and restoration plan will be implemented. This will involve previously stripped overburden being placed on the pit floor to establish grassland which will provide a level of protection to groundwater. Post restoration, the site will be returned to agriculture which will reduce the risk of illegal activities such as fly-tipping.

The restoration plan involves returning the pit to grassland by spreading/contouring previously stripped overburden over the extraction area. The site contouring will slope to the west as it currently does with the restored elevation ranging between ~94m OD on the west of the site and between 102.5 – 103m OD on the east.

The tree/scrub area currently present at the site will not be replanted and therefore there will be a ~2ha increase in grassland area post-restoration.

16.3.3 Monitoring

An inspection of the geological environment will be undertaken by a competent Geologist and Geotechnical Engineer on a biannual basis (i.e. every two years).

16.4 Water

16.4.1 Mitigation Measures

16.4.1.1 Impacts on Groundwater due to Initial Site Development Works

The main mitigation with respect to groundwater quality protection during the construction phase will be the employment of best practice measures with respect to oil usage and refuelling of plant and machinery which are dealt with in Section 7.7.4.3.

Post construction and extraction phase a landscape and restoration plan will be implemented. This will involve previously stripped overburden being placed on the pit floor to establish grassland which will provide a level of protection to groundwater. Post restoration, the site will be returned to agriculture.

16.4.1.2 Impacts on Groundwater Vulnerability Rating due to Aggregate Extraction

Albeit there will be a slight increase in groundwater vulnerability due to the removal of overburden, there will be no extraction within 3m of the groundwater table and therefore there will be no effect on the current GSI groundwater vulnerability rating which is "High".

The main mitigation with respect to groundwater quality protection during the extraction phase will be the employment of best practice measures with respect to oil usage and refuelling of plant and machinery which are dealt with in Section 7.7.4.3 below.

Post extraction phase a landscape and restoration plan will be implemented. This will involve previously stripped overburden being placed on the pit floor to establish grassland which will provide a level of protection to groundwater. Post restoration, the site will be returned to agriculture.

16.4.1.3 Effects on Groundwater Recharge

Section 7.6.5 discusses the greenfield baseline drainage regime at the site. Due to the lack of surface drainage features within the site and the absence of drainage outfalls from the site, all effective rainfall landing on the site must currently recharge to the ground.

Typically, the removal of vegetation cover has the potential to increase surface water runoff, however, due to the well-drained nature of the underlying sand and gravel deposits at the site a significant increase in runoff will not occur. Sand and gravel pits that operate above the groundwater table, generally have a dry pit floor with maybe some very localised ponding (measures are proposed below to deal with potential ponding). This is HES's experience from visiting many sand and gravel pits across the country.

However, it is proposed that the extraction of aggregate will be done in 8 no. phases and therefore all the vegetation will not be stripped at once. Once each phase is extracted, the ground will be reinstated with topsoil and reseeded before the next phase commences. This

will mitigate against the risk of increased runoff at the site.

Due to the revised extraction plan (i.e. reduced area at Phase 4), there is now no proposed aggregate extraction directly up-gradient of the spring location. Therefore, there will be no alternation of the recharge/runoff regime directly up-gradient of the mapped petrifying spring area.

In addition, as a surface water control measure, it is proposed to excavate an infiltration drain/swale along the perimeter of each phase bench level within the pit to ensure all potential runoff is collected and diverted to the ground. This will ensure there will be no reduction in groundwater recharge at the site. Currently, at the greenfield site, there are no drainage outfalls and this will continue to be the case at the proposed developed site.

The proposed development at each phase will initially require the stripping of vegetation cover which will expose the underlying sand and gravel deposits. Therefore, in the absence of vegetation, during the operational /extraction phase of the development, there is actually the potential for slightly increased groundwater recharge during the spring/summer months due to a reduction in evapotranspiration. However, due to the fact that the site will be extracted in 8 no. phases as described above, the effect would not be significant.

Compaction of the pit floor due to quarry traffic/machinery (leading to increased surface water runoff and reduced recharge) is not expected as the material proposed for extraction was found to be dense with no significant fines (i.e. silts/clays) and regular course layers (i.e. clay/silt) proportions. Therefore, the material by its nature has a very limited ability to compact and seal. Any areas of minor pockets of surface water ponding that might occur will be drained into the proposed infiltration trenches/swales as outlined above. Also, once each phase is completed, the exposed deposits will be ploughed before reinstating the topsoil layer to ensure good drainage/percolation is maintained.

There will be no processing of aggregate at the application site, therefore there will be no requirement to manage or store fines (clay and silts) at the site. The fact that fines will not be separated and will not require management at the application site will prevent the risk of increased runoff as a result of the storage of such material.

Finally, a greenfield corridor (approx. 30m wide) will remain along the low-lying western side of the application site. This is the lowest point on the site, particularly the northwestern section/field of the site, where runoff collects naturally during very wet periods and percolates to the ground over a period of time. This section of the site will remain as grassland as it acts as a natural soakaway for the existing site. This will act as a natural drainage buffer between the proposed extraction area and Abbeyleix Bog.

Therefore, even in the absence of mitigation, the proposed development would have no significant potential to impact on groundwater recharge at the application site. However, the proposed mitigation measures outlined above will maintain the existing drainage regime at the application site and ensure no negative effects on groundwater recharge.

16.4.1.4 Surface Water and Groundwater Contamination from Oil / Fuel Spills and Leaks

The following mitigation is proposed:

- All plant and machinery will be serviced before being mobilised to the site;
- Refuelling will be completed at the dedicated refuelling area, with a controlled drainage system that drains via a hydrocarbon interceptor;
- Only designated trained operators will be authorised to refuel plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills;
- An emergency spill kit with an oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill; and,
- Runoff from the site entrance and overflows from the wheel wash will be directed to a silt trap and full retention hydrocarbon interceptor* prior to discharge to the ground.

**The full retention hydrocarbon interceptor will be sized to cope with a 10-year storm return period.*

16.4.1.5 Groundwater Quality Impacts on Local Wells

Mitigation measures with respect to oils/fuels and groundwater quality are dealt with under Surface Water and Groundwater Contamination from Oil / Fuel Spills and Leaks.

16.4.1.6 Hydrological Impacts on Downstream Designated Sites

Mitigation measures with respect to oils/fuels and groundwater quality are dealt with under Surface Water and Groundwater Contamination from Oil / Fuel Spills and Leaks.

16.4.1.7 Hydrological/Hydrogeological Impacts on Abbeyleix Bog and Related to Designated Habitats

A number of measures are proposed to ensure the drainage regime at the application site is maintained and these include the following:

- No groundwater dewatering is required. Sand and gravel extraction will be by dry working, and will occur above the groundwater table;
- Removal of vegetation/Extraction and restoration of the site in 8 phases therefore only a small section of the site will be worked at any one time;
- Due to the revised extraction plan (i.e. reduced area at Phase 4), there is now no proposed aggregate extraction within the groundwater catchment to the main spring area. The catchment area to the important spring has been avoided;
- Therefore, there will be no alternation of the recharge/runoff regime directly up-gradient of the spring area;
- Installation of temporary perimeter swales/drains to ensure all rainfall is collected and percolated to the ground;
- Ploughing of the pit ground level at the end of each phase prior to reinstating topsoil to

ensure good drainage percolation is maintained; and,

- Maintaining a greenfield/grassland corridor on the lower lying western side of the site which acts as a natural drainage buffer between the proposed extraction area and Abbeyleix Bog.

Best practice measures for managing oils and fuels at the site, which are present in Section 7.7.3.3, will ensure no significant impacts on groundwater quality will occur. Runoff from the site entrance and overflows from the wheel wash will be discharged via a hydrocarbon interceptor. Good practice measures with regard to oils and fuels will be employed around the rest of the site area.

16.4.2 Monitoring

Continuous automated groundwater level monitoring (by means of data loggers) and quarterly groundwater quality monitoring will be undertaken at the 5 no. monitoring well locations within the proposed development. The proposed list of parameters to be analysed for is listed below.

Groundwater Laboratory Analysis Suite

Parameters	Units
Alkalinity Total	mg/l $CaCO_3$
Alkalinity Total	mg/l HCO_3
Sulphate	mg/l SO_4
Chloride	mg/l Cl
Nitrate	mg/l NO_3N
Orthophosphate	mg/l P
Ammonia N	mg/l NH_3-N
Total Calcium	mg/l
Magnesium	mg/l
Sodium	mg/l
Potassium	mg/l
Iron	mg/l
Manganese	mg/l

Regular inspections of the full retention hydrocarbon interceptor from the wheel wash, including the sampling of overflow water from the interceptor, will ensure the system is operating at its highest standard.

Daily visual inspections and monitoring of the effectiveness of the infiltration, and the drainage swale will be included in the overall Environmental Management Plan (EMP) for the site during construction and operation. Discharge into the infiltration, and the drainage swale will be via check dams/silt traps and these elements will also require regular weekly monitoring and cleaning.

With regard to Abbeyleix Bog, a proposed Hydrological Monitoring Plan has been devised and is summarised in the Error! Reference source not found. below. This proposed hydrological monitoring plan is subject to agreement with Abbeyleix Bog Committee.

Location	Automated	Monthly	Quarterly	Annual
Development Site Monitoring Wells (5 no.) & Bog Piezometers Sets (3 no.), and BH2 and BH3 from the existing bog monitoring network.	Data loggers installed in MW1 – MW5	Manual Water level Measurement (mbtoc)(1)	-	-
Bog Piezometer Set 3 no. (at petrifying Spring)	-	Estimation of discharge/flow (L/s) & Manual Water level Measurement	-	-
MW5, and Bog Piezometers Sets (3 no.)	-	-	Field Hydrochemistry (pH, Electrical Conductivity & Temperature)(2)	-
MW5, and Bog Piezometers Sets (3 no.)	-	-	-	Laboratory Hydrochemistry Analysis (refer to Appendix I of the plan (Appendix 7.3) for the suite of parameters) (2)

16.5 Climate

16.5.1 Mitigation Measures

The following mitigation measures will be practiced at the proposed development in order to limit the effects of the development on the local and regional climate:

- Strict adherence to 'good site/engineering practices' such as switching off all vehicles and plant when not in use.
- Plant will be serviced regularly to ensure efficient fuel consumption.
- Energy consumption and emission volumes will be considered when purchasing new

plant and vehicles.

- It is proposed to implement energy audits in order to assess energy requirements and areas where energy usage can be reduced which will lead to a reduction in greenhouse gas emissions

16.5.2 Monitoring

No monitoring is proposed.

16.6 Air

16.6.1 Mitigation Measures

The following mitigation measures are implemented within the pit in order to limit the effects on air quality:

- Vehicles using site roads have their speed restricted to 40 kph on unsurfaced roads. Speed restrictions on hard surfaced roads are dictated by site management and are within the legal speed limit.
- A truck wheelwash is available at the site exit to prevent track out of materials onto the public road.
- Un-paved site roads are regularly watered using bowsers, especially during dry and windy periods when watering should be done twice per day.

16.6.2 Monitoring

To ensure that the existing development is not impacting on air quality, it is recommended that dust deposition monitoring be undertaken at the boundary of the site. Monitoring will ensure that the TA Luft guideline limit value of 350 mg/(m2*day) is complied with at the site boundary. Monitoring can be carried out using the Bergerhoff method as recommended by the Department of Environment, Heritage and Local Government (DOHLEG, 2004). If monitoring indicates a potential issue with dust deposition, additional mitigation measures shall be implemented to remediate.

16.7 Noise

16.7.1 Mitigation Measures

The following mitigation measures are proposed as part of the Noise section:

- Acoustic berms of minimum 6m height will be constructed as specified in Plate 10.3.
- There will be no processing of material on-site
- During extraction with acoustic berm constructed all plant will operate at local road elevation
- All plant on site will have well maintained silencers.

- Machinery will be throttled down or turned off when not in use.
- A noise buying standard will be put in place where any replacement of mobile plant will have noise characteristics considered.
- Construction activity will not be carried out during extraction activity.
- All mobile plant onsite will have white noise bleepers (broadband) for reversing to Health and Safety Standards

16.7.2 Monitoring

It is proposed to carry out noise monitoring at locations on the perimeter of the site on an annual basis close to the nearest two receptors NSL1 and NSL2.

16.8 Traffic

16.8.1 Mitigation Measures

The following are measures that will be implemented to mitigate the impacts associated with the Project:

- No parking shall be permitted along the L5731-25 as this will restrict visibility and reduce road width for passing vehicles; and
- Visibility of 3 x 160 metres to be maintained at the proposed site direct access in accordance with the Laois Development Plan.

16.8.2 Monitoring

No monitoring is proposed.

16.9 Landscape

16.9.1 Mitigation Measures & Monitoring

It is proposed to implement a rolling landscape and restoration plan which will aid in reducing the visual impact associated with the proposed development. This includes the revegetating or areas, provision of berms and planting of trees and shrubs to reduce visibility of the pit.

A restoration plan will be implemented during the operational phase and will be completed on extraction of the available resource. This will involve spreading a layer of soil material on the pit floor, seeding and returning to grassland. This is dealt with in more detail in the landscape and restoration plan.

16.10 Material Assets

16.10.1 Mitigation Measures

Mitigation measures are discussed in the relevant sections where required to ameliorate any impacts identified.

16.10.2 Monitoring

Monitoring is proposed in various sections of the EIAR where relevant.

16.11 Cultural Heritage

16.11.1 Mitigation Measures

During construction the proposal will impact seven anomalies identified by geophysical survey that have the potential to be of archaeological significance (anomalies 2, 3, 4, 5, 10, 11, and 12). There are no other items of cultural heritage, monuments or buildings of heritage interest known from the application area or vicinity. There are no known direct or indirect impacts on any other known items of cultural heritage, archaeology or buildings of heritage interest in the application area or the vicinity. In the worst case, the development might disturb previously unknown deposits or artefacts in field 2, the southern part of field 3, and fields 4 and 5 without preservation by record taking place. The operational phase No direct impacts on any known items of archaeology, cultural heritage or buildings of heritage interest in the application area or the vicinity during the operational stage have been identified by the assessment. In the worst case, the development might disturb previously unknown deposits or artefacts in field 2, the southern part of field 3, and fields 4 and 5 without preservation by record taking place.

In advance of the construction phase:

1. It is recommended that anomalies 2, 3, 4, 5, 10, 11, and 12 identified through geophysical survey be further investigated by licensed archaeological test excavation.
2. Due to the possibility of the survival of previously unknown subsurface archaeological deposits or finds in field 2, the southern part of field 3, and fields 4 and 5, these areas should be investigated by licensed archaeological test excavation in advance of development.
3. Where archaeological testing cannot be carried out due to the presence of tree cover, topsoil stripping should be monitored by a qualified archaeologist who will observe and report on the stripping of topsoil.
4. Any archaeological material identified through archaeological testing or monitoring should be preserved by record through licensed archaeological excavation in advance of development.

During the operational phase:

1. Where archaeological testing cannot be carried out due to the presence of tree cover, topsoil stripping should be monitored by a qualified archaeologist who will observe and report on the stripping of topsoil.

2. Any archaeological material identified through archaeological testing or monitoring should be preserved by record through licensed archaeological excavation in advance of development.

16.11.2 Monitoring

As above.

17.0 DIFFICULTIES ENCOUNTERED IN COMPILING ANY SPECIFIED INFORMATION

In general, no significant difficulties, in terms of technical deficiencies or lack of sources of information, were encountered in compiling the specified information contained in the EIAR.

References to published sources of information are acknowledged in the text. A list of all consultants involved in the compilation of information for this Assessment Report is provided in Chapter 1.

The full impact analysis was carried out by experienced consultants and the best available methods were employed to forecast environmental effects.