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McTigue Quarries Ltd
CLOONASCRAUGH SAND AND GRAVEL PIT
Tuam, Co. Galway

Environmental Impact Assessment Report for Mineral Extraction;
Recovery of inert waste arising from construction & demolition activity (Class 7);
& Restoration of Quarry via recovery of excavation or dredge spoil,
comprising natural materials (Class 5)

Hydrogeological and Hydrological Impact Assessment

February 2022

Report Prepared For:

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Cloonascragh Sand and Gravel Pit
Tuam,
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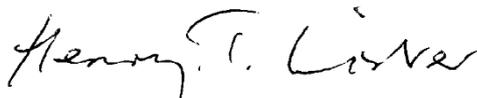
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BCL CONSULTANT HYDROGEOLOGISTS LIMITED

EXPERIENCE & QUALIFICATIONS

BCL is an independent consultancy specialising in all aspects of hydrology and hydrogeology as they relate to minerals extraction, water supply and environmental issues.

Henry Lister (the author of this report) holds a Bachelor of Science (Honours) degree [Applied Geology] conferred by Plymouth University, 1992 and a Master of Science Degree [Groundwater Engineering], Newcastle University, 1994.

BCL has provided specialist services and advice to the extractive industry since 2000. During this time, experience has been gained from involvement in the study of hydrogeological and hydrological systems in connection with planning matters at over 100 quarries throughout Ireland and the United Kingdom.

This report has been prepared by BCL Consultant Hydrogeologists Limited with all reasonable skill, care and diligence, within the terms of the Contract made with the Client. The report is confidential to the Client and BCL Consultant Hydrogeologists Limited accepts no responsibility to third parties to whom this report may be made known. No part of this report may be reproduced without prior written approval of BCL Consultant Hydrogeologists Limited. Where data supplied by third parties has been reproduced herein, the originator's conditions regarding further reproduction or distribution of that data should be sought and observed.

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1 INTRODUCTION

1.1 Background

1.1.1 McTigue Quarries Limited (the Applicant) has commissioned the preparation of an Environmental Impact Assessment Report (EIAR), seeking consent for further quarrying and waste recovery operations at Cloonascragh Sand and Gravel Pit (the Site), Tuam, County Galway.

1.1.2 The EIAR will accompany a planning application (the Application), which will seek to secure planning permission to “*extract and process the remainder of the existing sand and gravel resource within the established sand and gravel pit under the Applicant’s ownership, and which resides above the water table at the existing pit. The application also seeks to allow for the importation of inert materials arising from Construction and Demolition Waste (C&DW) to be brought back to site via return loads within the delivery fleet, for storage in a dedicated, prepared area prior to processing, utilising the same processing plant, which has been specified to accept both C&DW and indigenous sand and gravel, in preparation for resale as recycled aggregate (Class 7 recovery of inert waste). The applicant also proposes to progressively restore the pit (Class 5 recovery of excavation or dredge spoil) with material resultant from the mineral washing and proposed recycling process in order to deliver an improved restoration scheme with a beneficial after-use to Agriculture*”.

1.1.3 The Applicant has appointed a specialist mineral planning consultancy, Quarryplan Limited (QPL), to coordinate the production of the EIAR.

1.1.4 Quarryplan has instructed BCL Consultant Hydrogeologists Limited (BCL) to assess the potential hydrological and hydrogeological impacts associated with the Development Proposals.

1.2 Data Sources

1.2.1 Site specific data include the following:

- i. Topographic surveying supplied by the Applicant.
- ii. Groundwater level data collected at the Applicant's piezometer network.
- iii. "Remedial Environmental Impact Statement (rEIS) to Accompany an Application to An Bord Pleanála (ABP) for Substitute Consent for existing sand and gravel development at Cloonascragh, Tuam, Co. Galway", lodged by Dan Morrissey (Irl) Limited. Section 5 (Soils and Geology) & Section 6 (Surface Water and Groundwater) of the rEIS, prepared by SLR Consulting Ireland (SLR). Dated July 2013. Hereafter referred to as *Reference 1*.
- iv. ABP Ref: 07 SU.0056 Inspector's Report (reasons, considerations and conditions) for recommending grant of Substitute Consent (25th February 2014). Hereafter *Reference 2*.
- v. ABP Ref: 07 SU.0056 Board Direction (reasons, considerations and conditions) for granting Substitute Consent (14th December 2015). Hereafter *Reference 3*.
- vi. "Water Environment Protection Scheme" (BCL, January 2020, ref: QPL/Tuam/002/WEPS), addressing Condition 4 of ABP Ref: 07 SU.0056. Hereafter *Reference 4*.
- vii. Article 11 Declaration: Correspondence from Environmental Licensing Programme (Office of Environmental Sustainability) at the Environmental Protection Agency (EPA) to Quarryplan Limited (cc. Director of Services, Environment Section, Galway County Council). Dated 18th January 2022. Hereafter *Reference 5 (Appendix 1)*.

1.2.2 Both published and unpublished documents and other sources of information that have been examined include:

- i. Mapping published by the Ordnance Survey of Ireland (OSI), Geological Survey of Ireland (GSI) and Environmental Protection Agency (EPA).
- ii. GSI Well Records.
- iii. EPA water quality data.
- iv. Flood Mapping published by the Office of Public Works (OPW).
- v. National Parks and Wildlife Service (NPWS): Spatial mapping & citation information for Designated Sites of ecological interest.
- vi. Met Éireann: Rainfall data.
- vii. Geological information and quarry layout plans provided by the Applicant.

- viii. Institute of Geologists of Ireland (IGI 2013) 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'.
- ix. IGI (2007) 'Recommended Collection, Presentation and Interpretation of Geology and Hydrogeological Information for Quarry Developments and Geology in Environmental Impact Statements – A Guide'.
- x. National Roads Authority (2008) 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Roads Schemes'.
- xi. Working Group on Groundwater (2004) Guidance document GW8: 'Methodology for risk characterisation of Ireland's groundwater'.
- xii. EU Floods Directive (2007/ 60/ EC) of the European Parliament and of the Council of 23rd October 2007 on the assessment and management of flood risk: Official Journal L288/ 27-34.
- xiii. EPA (2003) 'Advice Notes on Current Practice in the Preparation of Environmental Impact Assessments'.
- xiv. EPA (2002) 'Guidelines on the Information to be contained in Environmental Impact Assessments'.
- xv. "Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste", Guidance Note IPPC S5.06.v5, Environment Agency, May 2013.

1.23 At the time of report preparation, in addition to topographic site survey data, information relating to the existing layout and proposed development of the quarry, as supplied by Quarryplan, or their agents, comprises:

- i. *Drawing 001*: "Site Location Plan".
- ii. *Drawing LSS01*: "Planning Application Area and Site Notice Location".
- iii. *Drawing 210924-Dwg-01*: "2019 Survey".
- iv. *Drawing 210924-Dwg-02*: "Removal of Sand".
- v. *Drawing 210819*: "Recycling Area Site Layout".
- vi. *Drawing 210819*: "Recycling Area: Sections and Elevations".
- vii. *Drawing 210924-Dwg-03*: "Final Restoration".
- viii. *Drawing 210819-Dwg-04*: "A-A' Cross Section".
- ix. *Drawing 210819-Dwg-05*: "B-B' Cross Section".
- x. *Drawing 210819-Dwg-06*: "C-C' Cross Section".

1.3 Report Structure

- 1.3.1 The topography, geology, hydrology and hydrogeology of the study area are described in *section 2*.
- 1.3.2 An account of the Proposed Development, including description of intended working methods and water management measures, is given in *section 3*.
- 1.3.3 Assessment of the potential impacts of the Proposed Development and description of mitigation measures proposed to ameliorate significant such impacts are made in *section 4*.
- 1.3.4 Report conclusions and recommendations are given in *section 5*.

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2 BASELINE STUDY

2.1 Site Location & Boundaries

- 2.1.1 The Application Site is located at Cloonascragh Sand and Gravel Pit, in the townland of Cloonascragh, Tuam, County Galway. The existing pit has a total area of 12 hectares (ha). The planning application area occupies *circa* 6.5 ha and is comprised of the northern end of the existing pit, which is in the ownership of the Applicant.
- 2.1.2 The quarry pit is located approximately 2.6 km south of Tuam town. The Site is accessed off the R347 regional route. The surrounding area is generally rural in character, with a number of scattered dwellings (along the R347 and local roads) in the local vicinity. The Site is located adjacent to a Pre-Cast Concrete operation (Moylough) that originally relied upon the resources won from the Site.
- 2.1.3 The lands are bounded to the northwest by the R347, while lane-way access to the railway line bounds the Site to the south. The land to the north is occupied by Moylough Pre-Cast Concrete facility. To the northeast, adjacent to the pit, is a disused yard. To the south/east is the remainder of the pit, which lies outside the control of the Applicant.
- 2.1.4 The Irish Grid Reference (IGR) for the centre of the Application Area is easting ⁵44340, northing ⁷48180.
- 2.1.5 The boundary of the Application Area is illustrated upon *Figure 1 (Appendix 2)*.
- 2.1.6 The Site is currently dormant, with quarrying ceasing in 2014. Ancillary buildings in the form of an office and workshop are evident in the northern part of the Site, as is the area previously used for processing, crushing, washing and screening of material. A settlement lagoon system is also evident in this part of the Site.
- 2.1.7 The topographic survey indicates that the floor of the existing sand and gravel pit is at *circa* 36-40 metres above Ordnance Datum (maOD); as illustrated upon the Existing Site Layout Plan LSS01.

2.1.8 The quarry is stated to have operated above watertable (paragraph 6.60 of rEIS). The top-up pond is fed by groundwater seepage; and currently has a water level of circa 31.5 maOD (January 2022). The rEIS also states that surface water falling on the Site percolates to groundwater through the sand and gravel on the floor of the pit. There is no discharge of water off Site.

2.1.9 In granting Substitute Consent, the ABP Inspector's Report (Reference 2) states that:

- *The remedial Natura Impact Statement (rNIS) screens out Levally Lough Special Area of Conservation (SAC), a small SAC, c.9km to the northeast of the quarry, and Lough Corrib Special Protection Area (SPA), c.15km to the southwest of the site, on the basis that the two Natura 2000 sites are substantially removed from the quarry, outside its potential zone of influence and with no obvious environmental pathways and linkages.*
- *The quarry lies within the Lough Corrib catchment. There are no discharges from the site to any surface water body. Any pollution of groundwater arising from the quarry could impact on water quality in related groundwater and surface water bodies and dependent species.*
- *Groundwater flows appear to be from the site towards two rivers (Grange River and Clare River) falling within the Lough Corrib SAC and SPA. The risk of contamination of groundwater from hydrocarbons and other potential contaminants on site is quite low.*
- *With regard to sedimentation, whilst there is a risk that the quarry has resulted in an increased loading of sediments in groundwater in periods of substantial rainfall, it would appear that the frequency of substantial surface water ponding/flooding on site is limited, with the quarry in practice being worked above watertable.*

- *As sediment loading reduces with distance from source, and in the absence of the site being identified in the River Basin Management Plan for the Western Basin District as a point source, or raised in observations by Inland Fisheries Ireland, I am satisfied that the quarry has not given risen to a serious increase in sedimentation loading in groundwater to adversely impact on water quality in either the Grange or Clare River.*
- *The two Natura 2000 sites are significantly removed from the quarry site and any impacts by way of increased sedimentation in groundwater are highly unlikely at these distances.*
- *No other quarries are operating in the immediate vicinity of the site, so cumulative impacts are unlikely.*

2.2 Designated Sites

- 2.2.1 NPWS mapping has been consulted to check for sites with the following status: Special Area of Conservation (SAC), Special Protection Area (SPA), Natural Heritage Area (NHA) and proposed Natural Heritage Area (pNHA).
- 2.2.2 The Quarry Pit is not covered under any statutory nature conservation designations.
- 2.2.3 There are no NHA or pNHA within 5 km radius of the Application Site.
- 2.2.4 The remedial NIS identifies three Natura 2000 sites within 15 km of the quarry:
- Lough Corrib SAC (site code 00297), c.620 m to the south of the Site.
 - Lough Corrib SPA (site code 004042), c.14.8 km to the southwest of the Site.
 - Levally Lough SAC (site code 00295), c.9.0 km to the northeast of the Site.
- 2.2.5 Lough Corrib is situated to the north of Galway city and is the second largest lake in Ireland, with an area of approximately 18,240 ha (the entire SAC is 20,556 ha).

- 2.2.6 The lake can be divided into two parts: a relatively shallow basin, underlain by Carboniferous limestone, in the south, and a larger, deeper basin, underlain by more acidic granite, schists, shales and sandstones to the north.
- 2.2.7 The surrounding lands to the south and east are mostly pastoral farmland, while bog and heath predominate to the west and north. A number of rivers are included within the cSAC as they are important for Atlantic Salmon. These rivers include the Clare, Grange, Abbert, Sinking, Dalgan and Black to the east, as well as the Cong, Bealanabrack, Failmore, Cornamona, Drimneen and Owenriff to the west.
- 2.2.8 In addition to the rivers and lake basin, adjoining areas of conservation interest, including raised bog, woodland, grassland and limestone pavement, have been incorporated into the SAC.
- 2.2.9 The SAC synopsis for Levally Lough states that it is a fluctuating lake, or turlough, situated 9 km east of Tuam and to the north of the Grange River in Co. Galway. It is overlooked by a low rise on the north side, with some esker or drift mound to the south. The land is flat at the eastern and western ends. A stream enters the turlough from the north-east corner.

2.3 Waste Facilities and Sustainable Economy (EPA Mapping)

- 2.3.1 The EPA mapping shows the location of Waste Emission Site Boundaries; Landfills; Transfer Stations; Licenced and surrendered IPPC, IPC and IEL facilities; and other significant waste activities that are licensed by the EPA.
- 2.3.2 There are no such waste facilities within 5 km radius of the Site.
- 2.3.3 Local authorities license smaller discharges of trade effluent and wastewater to ground or surface waters (Section 4 Discharges). This dataset was compiled in April 2016 and is included on the EPA mapping.
- 2.3.4 The closest Section 4 Discharge is W222/90, which is held by Tuam Golf Club. The discharge point is some 1.2 km to the north of the Application Site.

2.4 Topography

- 2.4.1 The Site comprises an elongated ridge of sand and gravel bounded to the north and south by areas of peat bog, which have been partially cut away in the past. Ground level at the Site entrance is 38.85 maOD; the floor of the existing sand and gravel pit is at *circa* 36-40 maOD; and the top-up pond, which is fed by groundwater seepage, has a water level of *circa* 31.5 maOD (January 2022).
- 2.4.2 On the wider landholding, natural ground elevation upon the ridge of sand and gravel equates to *circa* 35-45 maOD, while the surrounding lands, comprising areas of peat bog, are at some 30 maOD.
- 2.4.3 The ground falls away gently towards the south to the Grange River; and to the west towards the Clare River. In both cases, the closest section of valley floor is shown to have spot levels of 29 maOD (*Figure 2*).

2.5 Geology

- 2.5.1 The geology within and surrounding the Site has been characterised by reference to the mapping and literature cited in *sections 1.2.1 and 1.2.2*.
- 2.5.2 For ease of reference, relevant extracts from the rEIS (*Reference 1*) are reproduced herein.

2.5.2 Drift Geology

- 2.5.2.1 Soils have been stripped from the mineral extraction area by previous operations.
- 2.5.2.2 The drift geology (*Figure 3*) at the Application Area is mapped as sand and gravel (Quaternary Sediments), forming a narrow ridge which stands above the surrounding landscape of cut-over raised peat. An expanse (0.5 km²) of glacial till, derived from limestones, is mapped in the area to the northwest of the public highway (R347 regional route).
- 2.5.2.3 The exposed pit faces indicate water-sorted layers of coarse and fine material deposited at the Site.

2.5.2.4 The clast shape and well-sorted nature of small boulders, cobbles, gravels and sand material in the deposit, indicates that the material was transported and deposited at the Site by melt water during the last glaciation (generally termed glaciofluvial outwash sands and gravels).

2.5.2.5 The deposited sand and gravel material at the Site appears, from the remaining pit exposures, to be coarser towards the edges of the ridge, with finer material (predominantly sand material) in the centre of the ridge.

2.5.3 Bedrock Geology

2.5.3.1 Geological Survey of Ireland (GSI) 1:100,000 geology sheet 11 (South Mayo) shows the Cloonascragh area to be underlain by Visean Carboniferous limestone (undifferentiated).

2.5.3.2 The Visean Limestone is described as a marine shelf facies comprising limestone and calcareous shale (*Figure 4*).

2.5.3.3 No bedrock is exposed at the Site; and it is not proposed to extract any bedrock.

2.6 Meteorology

2.6.1 The following information has been obtained from Met Éireann:

2.6.2 The average annual rainfall at Tuam (for the period 1981 to 2010) is *circa* 1,116 millimetres per year (mm/yr). Corrected for evapotranspiration, the effective rainfall rate is calculated to be 688.5 mm/yr (*Reference 1*).

2.6.3 Total rainfall occurring on Site during the design storm (6-hour duration and 100-year return period) is 59.6 mm. This data is taken from Met Éireann's Depth Duration Frequency (DDF) Model.

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2.7 Hydrology

2.7.1 Surface Watercourses

2.7.1.1 The Site straddles the boundary between two sub-catchments of the Clare River (Figure 2).

2.7.1.2 The main channel of the Clare River is located some 2 km to the west of the Site, with an un-named tributary (EPA Flow Network Segment Code 30_2639) passing within 1 km radius of the Site.

2.7.1.3 The Grange River is located approximately 0.9 km to the south of the Site, with the Barnacurragh tributary (EPA Flow Network Segment Code 30_1121) arising 0.6 km to the northeast of the Site and flowing south to join the Grange River.

2.7.1.4 The confluence of the Grange River with the Clare River is 3.4 km to the southwest of the Site. The Clare River is a sub-catchment of the Corrib.

2.7.1.5 As outlined earlier, there is a small groundwater pond at the southern end of the Applicant's landholding, which is used to top up the washing plant process water recycling system.

2.7.2 Hydrometric Gauges

2.7.2.1 Flow duration percentiles for the Clare River at Corrofin Bridge are taken from flow gauging station number 30004.

2.7.2.2 The catchment area at the gauging station is 695 km² with an average annual rainfall of 1,137 mm/year. The duration percentiles for the river are reproduced below:

DURATION PERCENTILES								
Flows equalled or exceeded for the given percentage of time (m ³ /s) (Data derived for the period 1964 to 2013)								
1%	5%	10%	25%	50%	75%	90%	95%	99%
34.51	28.133	24.311	17.696	11.114	6.034	3.933	2.935	1.976
Levels equalled or exceeded for the given percentage of time (mAOD Poolbeg) (Data derived for the period 1964 to 2013)								
1%	5%	10%	25%	50%	75%	90%	95%	99%
27.918	27.214	26.871	26.37	25.926	25.574	25.357	25.274	25.181

2.7.2.3 The Q50 (the 50 percentile flow) is 11.114 m³/s and the Q95 (the 5 percentile flow) is given as 2.935 m³/s. The Q 95 flow is a significant low flow parameter particularly relevant in the assessment of river water quality consent conditions. Q95 is the flow (m³/s) that was equalled or exceeded for 95% of the flow record.

2.7.2.4 The flow duration percentiles reflect the fact that although the catchment is underlain by a predominantly karstified bedrock, the presence of poorly-drained soils and peat in the catchment means that runoff and flow in the river can be relatively flashy, despite the catchment being relatively low-lying.

2.7.3 Surface Water Quality

2.7.3.1 Under the Water Framework Directive (Directive 2000/60/EC) all surface water catchments have been characterised and assigned an overall status based principally on chemical and ecological status. The status of river water bodies (RWBs) can range from Bad-Poor-Moderate-Good-High.

2.7.3.2 The River Waterbody WFD Status (2013-2018) for the Clare River is “Q3-4, Moderate (At risk)” (this watercourse being part of RWB European Code IE_WE_30C010800: CLARE (GALWAY)_060).

SW 2013-2018

▼ Ecological Status or Potential	Moderate	
▶ Biological Status or Potential	Moderate	
▼ Supporting Chemistry Conditions	Pass	
▼ General Conditions	Pass	
▼ Oxygenation Conditions	Pass	
Dissolved Oxygen (% Sat)	Pass	
Other determinand for oxygenation conditions	High	
▶ Acidification Conditions	Pass	
▼ Nutrient Conditions	Pass	
▼ Nitrogen Conditions	High	
Nitrate	High	
Ammonium	High	
▶ Phosphorous Conditions	High	
Specific Pollutant Conditions	Pass	
Chemical Surface Water Status	Good	

2.7.3.3 The River Waterbody WFD Status (2013-2018) for the local stretch of the Grange River is “Q4, Good (Not at risk)” (this watercourse being part of RWB European Code IE_WE_30G020700: GRANGE (GALWAY)_040).

SW 2013-2018

▼ Ecological Status or Potential	Good	
▶ Biological Status or Potential	Good	
▼ Supporting Chemistry Conditions	Pass	
▼ General Conditions	Pass	
▼ Oxygenation Conditions	Pass	
Dissolved Oxygen (% Sat)	Pass	
Other determinand for oxygenation conditions	High	
▶ Acidification Conditions	Pass	
▼ Nutrient Conditions	Pass	
▼ Nitrogen Conditions	High	
Nitrate	High	
Ammonium	High	
▶ Phosphorous Conditions	High	

2.7.4 Flooding

2.7.4.1 Reference has been made to the National Flood Data Archive held by the OPW, as published on the website www.floodinfo.ie (reproduced at *Appendix 3*).

2.7.4.2 There is no risk of fluvial flooding at the Site. The closest mapped flood points (or areas of flooding) are associated with the main watercourses and their tributaries. The closest area at risk of flooding is some 425 m standoff to the southwest of the Site boundary, where ground level is below the 30 maOD contour line.

2.7.5 Site Drainage

2.7.5.1 There is currently no discharge of surface water to any watercourse from the existing sand and gravel pit; and there are no plans to discharge any water from the Site in the future. Rainfall infiltrates to ground across the Site.

2.7.5.2 Sand and gravel material will be extracted dry; there is no proposal to work below the watertable.

2.7.5.3 As was done previously, water will be used for the washing of aggregate; and there is a water management system in place to manage this process water. The wash water will be recycled through a series of settlement lagoons and then be reused in the washing process. The closed system is topped up with water from the groundwater pond situated at the southern end of the Application Area.

2.8 Hydrogeology

2.8.1 Regional Hydrogeology

2.8.1.1 *Reference 1* provides a comprehensive assessment of the baseline status of the hydrogeological regime at the Site (as reported in July 2013). The relevant details are reproduced herein.

2.8.1.2 Regional mapping, published on the GSI website, indicates that the sand and gravel drift deposits (economic mineral) are not classed as having aquifer status, because they do not extend any significant distance beyond the Site boundary.

2.8.1.3 Bedrock aquifer maps, published on the same website, provide a detailed classification of bedrock aquifer types; and indicate that the Viséan Limestone is classed as a regionally important aquifer – karstified (conduit); the aquifer category is Rkc.

2.8.1.4 The GSI karst database does not list any karst features in the immediate vicinity of the Site. The closest mapped karst feature (GSI website) is a “Swallow Hole” on the main channel of the Clare River (some 2.45 km standoff to the southwest of the Application Area) and a cluster of “Enclosed Depressions, Swallow Holes and Springs” on the southeast edge of Tuam (2.85 km to the northeast). The other karst features are more than 3 km standoff from the Site and are on the opposite side of the Grange-Clare Rivers.

2.8.1.5 Groundwater vulnerability maps (GSI website) indicate that the natural groundwater vulnerability beneath the Site would be classified as being ‘High’.

2.8.1.6 Under the Water Framework Directive (Directive 2000/60/EC), the GWB (Clare-Corrib GWB IE_WE_G_0020) has been assessed by the EPA as having ‘Good’ quantitative status; and ‘Good’ chemical status.

GW 2013-2018

▼ Overall Groundwater Status	Good	
▼ Quantitative Groundwater Status	Good	
Saline (or Other) Intrusions Test	Good	
Impact of Groundwater on Surface Water Ecological/Quantitative Status Test	Good	
Groundwater Dependent Ecosystems (GWDTE) - Quantitative Assessment Test	Good	
Water Balance Test	Good	
▼ Chemical Groundwater Status	Good	
Saline (or Other) Intrusions Test	Good	
Impact of Groundwater on Surface Water Ecological/Chemical Status Test	Good	
Groundwater Dependent Ecosystems (GWDTE) - Chemical Assessment Test	Good	
Drinking Water Protected Area Test	Good	
General Chemical Assessment Test	Good	

2.8.1.7 The Clare-Corrib GWB is conceptualised by the GSI as follows:

- “The area is principally drained by the River Clare and its tributaries; however the present day drainage network has been changed significantly by arterial drainage that took place early in the nineteenth century. Much of the current stream network is a storm runoff system and is inactive during summer months. Prior to artificial drainage, streams sank underground via a few turlough sinks in the GWB.”
- “Within the GWB, surface water catchments are often bypassed by groundwater flowing beneath surface water channels and across surface water catchment divides. A large number of karst features occur within the body. These include turloughs, caves, dolines, swallow holes and springs.”
- “The groundwater in this body is generally unconfined but may become locally confined beneath thick, low permeability subsoil. Most of the groundwater flow occurs in the upper epikarstic layer and in a zone of interconnected solutionally enlarge bedding planes and fissures, generally extending to a depth of 30 m.”

- “The main discharges are to the rivers, large springs and Lough Corrib. In winter, groundwater discharges to the many turloughs and is transmitted via the artificial channels that were installed to alleviate flooding. Flow paths have been measured up to 10 km in length. The GWB covers an area of 1,422 km².”
- “Transmissivity and well yields are variable. Using 60 wells located in the GWB, 59% are either “excellent” (>400 m³/d) or “good” (100-400 m³/d), and 23% are either “poor” (<40 m³/d) or “failed”, with the remainder “moderate” (40-100 m³/d). The median yield is 131 m³/d.”
- “Water table levels in the limestone have high annual variations, which indicates that the storage is low (approximately 0.01-0.02).”
- “The hydrochemical data collected in the limestone display a Calcium-Bicarbonate signature. There is a shallow groundwater component that is characterised by high suspended solids and relatively low electrical conductivities (300-400 µS/cm). There is a deeper groundwater component that is characterised by relatively non-turbid groundwater with higher electrical conductivities (>450 µS /cm).”

2.8.2 Groundwater Levels in the Sand and Gravel Deposits

2.8.2.1 Three piezometers (groundwater level monitoring boreholes) were installed on Site in June 2020. The location of these monitoring piezometers is presented in *Figure 5*. The borehole logs are reproduced in *Appendix 4*.

2.8.2.2 The boreholes have been dipped on a monthly to quarterly basis from September 2020 through to January 2022. The full dataset and summary hydrographs are presented in *Appendix 5*.

2.8.2.3 In January 2021, the groundwater level data was closely bunched at around 32.3 to 32.8 maOD across the monitoring network, with subdued mounding observed at the central piezometer (PZ2-19) and gentle lowering of water level towards the north (PZ1-19) and towards the south (PZ3-19).

- 2.8.2.4 Since May 2021, the groundwater flow direction has stabilised (declining from NNW to SSE); and the hydraulic gradient is steady across the Site (0.002), which is made evident by the trend of the hydrographs.
- 2.8.2.5 The most recent data (January 2022) has been used to produce the groundwater level contours shown on *Figure 5*. This shows that groundwater level is at 32.25 maOD at the northern end of the Site (PZ1-19); and declines to 31.40 maOD at the southern end (PZ3-19), which is close to the groundwater pond.
- 2.8.2.6 The seasonal range during the monitoring period has been from 1.1-1.6 m.

2.8.3 Groundwater Abstractions

- 2.8.3.1 The GSI national database (www.gsi.ie) does not show any private wells or springs in the vicinity of the quarry. The closest mapped supply is some 3 km to the west of the Application Site, lying on the opposite side of the Clare River.
- 2.8.3.2 The Site is not located within any EPA/GSI-delineated Source Protection Areas for Public Water Supplies or for Group Schemes. The closest mapped Source Protection Areas are more than 4 km standoff from the Site; and are on the opposite side of the Grange-Clare Rivers.
- 2.8.3.3 *Reference 1* states that “Residences and farms in the vicinity of the site are served by the Cloonascragh / Cloondarone Group Water Scheme (Ref. No. GY793)”.
- 2.8.3.4 Galway County Council Water Services has confirmed by email (31st January 2022) that the Group Water Scheme remains in place and has provided a map showing the extent of the Scheme (*Appendix 6*); as well as showing a separate mains supply serving Moylough Pre-Cast Concrete. The Executive Technician at Water Services has indicated that the properties at Ballykeaghra, which are some 450 m to the southwest of the Site, are assumed to rely upon domestic wells.

3 SITE ACTIVITIES

3.1 Extraction of Sand and Gravel

- 3.1.1 The development will be undertaken in phases, which will see the remaining sand and gravel being extracted from the disturbed footprint (*circa* 6.5 ha) and the Site being progressively restored.
- 3.1.2 The extraction phase of the development (*Drawing 210924-Dwg-02*) will see sand and gravel extracted to a maximum depth of 34 maOD. This phase of extraction will release some 165,000 m³ (*circa* 264,000 tonnes) of economic mineral.
- 3.1.3 Extraction will progress in a northerly direction from the southern extents of the application area. Given that the application area is comprised of the existing pit footprint, which has already been disturbed, all overburden has already been removed from the working area and no further soil stripping or overburden removal is required.
- 3.1.4 The sand and gravel will be extracted with the use of a 12 m-reach 360° excavator and loaded into dump truck / HGV. Given the mineral type, no blasting is required. Access to the pit floor will be via a small ramp adjacent to the plant site.
- 3.1.5 The mineral will then be hauled to the screening and washing plant site in the north-western part of the existing pit. The won material will then be washed, sized and screened into single-sized products.
- 3.1.6 Suspended quarry fines (silts *etc.*) resultant from the washing process will be deposited in the existing silt ponds shown on the accompanying development plans, where the fines are left to settle before being utilised in the progressive restoration of the Site.
- 3.1.7 The proposed development will take place wholly above the watertable. The peak groundwater level recorded in the piezometer network equates to 32.82 maOD. Mineral extraction will not progress below 34 maOD. Therefore, more than 1 m buffer depth of unsaturated sand and gravel will be retained to deliver a dry operation.

3.1.8 There will be no requirement for dewatering at the Site, thus allowing for a beneficial restoration use back to agriculture.

3.2 Inert Waste Recycling

3.2.1 The application also seeks to allow for Class 7 recovery of inert waste arising from construction and demolition activity, including concrete, bricks, tiles, or other such similar material (excluding land improvement or development).

3.2.2 The Site will only accept Construction and Demolition Waste (C&DW) from its own hauliers and no third parties will be allowed to deliver waste to the Site. The Site will operate at a maximum capacity of 50,000 tonnes per annum with all C&DW arriving via the Applicant's 20-tonne capacity lorries. The actual tonnages of the individual wastes will depend on the sources of the wastes.

3.2.3 The maximum quantity of residual waste consigned from the facility for collection, onward transport and submission to disposal at an authorised facility shall not exceed 15% of the annual intake.

3.2.4 The C&DW, once sorted and held in sufficient quantities, will be processed through the crushing and screening plant in campaigns; in readiness for resale as recycled aggregate. The finer materials will then pass through the on-site processing plant (washing and screening) *i.e.* the same plant as utilised for the indigenous sand and gravel.

3.3 Progressive Restoration

3.3.1 A detailed restoration scheme has been produced by Mullin Design Associates in consultation with the Applicant's Ecologist (Woodrow) and Geo-technical Engineers (QuarryDesign).

3.3.2 As a result of the previous workings at the pit, there is insufficient readily available indigenous material to deliver a beneficial after-use at the Site in order to make it suitable for agricultural use.

- 3.3.3 As such, the delivery of the restoration landform will be supplemented by material recovered from the recycling operation proposed for the Site.
- 3.3.4 In the planning application, this is described as Class 5 recovery of excavation or dredge spoil, comprising natural materials of clay, silt, sand, gravel or stone and which comes within the meaning of inert waste, through deposition for the purposes of the improvement or development of land. A total of 150,000 tonnes of waste will be placed in the restored pit during the facility's lifetime.
- 3.3.5 Pit faces will be progressively restored to 1v:5h slopes with available indigenous stripped topsoils and stored overburden and supplemented with imported inert material, in order to allow machinery to safely manoeuvre on the slopes.
- 3.3.6 As well as delivering biodiversity improvements and achieving a beneficial after-use, the proposed restoration proposals will provide an important facility for the deposition of inert soil-making material obtained from the proposed recycling proposals, resultant from local construction projects.
- 3.3.7 Given that the Site will be restored progressively as mineral extraction extends across it, much of the restoration will be undertaken over the course of the proposed development, with restoration commencing in the southern part of the Site and progressing northwards.
- 3.3.8 The final restoration concept will see the Site restored to agricultural use together with woodland and species-rich grassland to allow for habitat creation and local biodiversity.

3.4 **Article 11 No: 2643**

- 3.4.1 The Article 11 Declaration Request was made by QPL on behalf of the Applicant. The request has been reviewed by the Environmental Licensing Programme (Office of Environmental Sustainability) at the Environmental Protection Agency (cc. Director of Services, Environment Section, Galway County Council), as detailed in correspondence dated 18th January 2022 (*Reference 5 - Appendix 1*).

- 3.4.2 The Agency has determined that the operations as proposed within this planning application fall under Classes 5 and 7 of Part I of the Third Schedule of the Waste Management (Facility Permit & Registration) Regulations 2007, as amended and therefore a Waste Facility Permit is required.
- 3.4.3 The restoration element of the proposals has been deemed by the EPA to constitute a Class 5 recovery operation, where the total quantity of waste recovered at the facility must be less than 200,000 tonnes.
- 3.4.4 The inert recycling element of the proposals has been deemed by the EPA to constitute a Class 7 operation for the recovery of inert waste arising from construction and demolition activity, where the annual intake shall not exceed 50,000 tonnes, and the maximum quantity of residual waste consigned from the facility for collection, onward transport and submission to disposal at an authorised facility shall not exceed 15% of the annual intake.
- 3.4.5 Where the waste related activities being undertaken within the facility encompass a number of classes as set out within Part I of the third schedule, the quantity of waste concerned shall be taken as meaning the total quantity of waste accepted at the facility taking account of inputs relating to all classes of activity and compared to the threshold of the principal class.

4 IMPACT ASSESSMENT & RECOMMENDATIONS FOR MITIGATION

4.1 Background

4.1.1 Baseline assessment has facilitated a conceptual understanding of the extant groundwater and surface water regimes operating within and around the Site. This understanding has been applied to assess the potential impacts posed by the Proposed Development upon the water environment.

4.1.2 Operation of the Proposed Development in the planned manner has the potential to impact upon the water environment in the following ways:

- Interception of groundwater causing a modification of groundwater levels and flow rates within the sand and gravel pit, both during and following workings.
- Derogation of existing groundwater quality.
- Derogation of surface water quantity and quality.
- Risk to local water supplies and floral/faunal habitats.
- Modification of existing flooding characteristics.

4.2 Potential Modification of Groundwater Regime

4.2.1 As discussed previously, the proposed development will take place wholly above the watertable. The peak groundwater level recorded in the piezometer network (September 2020 through to January 2022) equates to 32.82 maOD. Mineral extraction will not progress below 34 maOD. Therefore, more than 1 m buffer depth of unsaturated sand and gravel will be retained to deliver a dry operation.

4.2.2 This demonstrates that there will be negligible risk of intercepting the watertable during the proposed mineral extraction activities *i.e.* there will be no requirement for sub-watertable mineral extraction or dewatering, so that there will be no lowering of the watertable as a result of the quarrying activities and no drawdown-related impact upon groundwater levels and flow.

- 4.2.3 The quarry floor will be free draining under average conditions, relying upon the infiltration capacity of the underlying sand and gravel.
- 4.2.4 The pre-existing Water Management System (established to serve the mineral washing plant) will be made operational again. Fine material will be screened out through washing techniques and allowed to settle in the designated Silt Ponds. The base of these ponds will be blinded by the silt and therefore they will remain perched above the watertable (*i.e.* not in hydraulic continuity), thus the water level in the silt ponds will not coincide with the watertable.
- 4.2.5 The only exception is the pond at the southern end of the Application Site, where the watertable is broadly coincident with surface water level in the pond. The recirculatory system (Silt Ponds) will be topped up with clean water from this groundwater pond.
- 4.2.6 Water usage is minimised by re-circulation through the Water Management System. Losses from the system are typically around 5% (attributed to moisture content in the sold product).
- 4.2.7 When the Site becomes operational, the collection of further monitoring data will be undertaken on a monthly basis. This will include measurement of groundwater levels in the piezometer network. In addition, a gauge board will be installed at the groundwater pond at the southern end of the landholding.
- 4.2.8 This data will be used to demonstrate that the abstraction of clean water from the groundwater pond has negligible impact upon groundwater levels *i.e.* by checking that there is no evidence of a cone of depression in the watertable.

4.3 Potential for Impact upon Groundwater Quality

4.3.1 Oil Care Code

- 4.3.1.1 As in the pre-existing workings, the operation of mobile and fixed plant presents a risk of pollutants entering groundwater as a result of hydrocarbon spillage or leakage on Site. Experience has demonstrated that the risk of such a pollution incident can be minimised by adhering to the following measures:

- A code of practice for the refuelling of machinery;
- Operators will check their vehicles on a daily basis before starting work to confirm that leakages are not present. Operators will report any defect to ensure that repairs are undertaken to that vehicle before it enters the working area;
- Sufficient oil sorbent material (*3M Oil-Sorb* or similar) will be available on Site to cope with a loss equal to the total fluid content of the largest item of plant;
- In the event of the use of such oil sorbent material, any contaminated materials will be disposed from Site in accordance with prevailing tipping legislation; and
- Adequate containment will be provided for all oils stored on the Site, equipped with bunds to the relevant standard.

4.3.1.2 It is considered that the correct adoption of these measures will continue to provide appropriate mitigation against the potential for derogation of groundwater quality as a result of proposed operations.

4.3.2 Recycling Operations

4.3.2.1 The following information is intended as a summary protocol for Handling, Recycling and Storage of Waste.

4.3.2.2 There will be strict management controls and a waste acceptance procedure implemented to ensure that the waste is suitable for use.

4.3.2.3 Checks prior to importation will include:

- Pre-determined specifications and agreements (quotations) with the customer;
- Producer visits, waste verification checks and audits;
- Completion of Waste Characterisation/ Pre-acceptance Forms;
- Independent analysis and reports;

- Pre-determined process routes and storage areas for the wastes;
- Scheduled dates for receipt;
- Visual checks made by the driver prior to and during loading of materials on to the vehicle;
- Records of pre-acceptance checks will be kept at the site office; and,
- Assessment and classification of waste types for suitability of processing and end use criteria.

- 4.3.2.4 Either the supplier or importer will arrange for a suitably competent third party to undertake necessary sampling of intended materials prior to their importation to the development.
- 4.3.2.5 The Site will only accept wastes from its own hauliers and no third parties will be allowed to deliver waste to the Site.
- 4.3.2.6 The C&DW will be imported on to Site and individually weighed in across the existing weighbridge.
- 4.3.2.7 Having assessed the contents of the load, the weighbridge will instruct the driver to proceed to the stocking area. The load will be tipped on a dedicated hardstanding area, which will have a capacity of approximately 500 tonnes, where a site operative will inspect it, with a loading shovel, to ensure that there are no erroneous materials below the surface of the load.
- 4.3.2.8 If the material is unacceptable, it will be reloaded immediately, and the vehicle requested to leave the Site and again will be advised to return the material to the point of loading. This is an extremely unlikely event as there will be a detailed waste acceptance protocol put in place and only internal contractors will be utilised and all contractors will be given training on the acceptability or otherwise of materials.

- 4.3.2.9 At the point of tipping and acceptance of the load, a primary picking operation will be undertaken to remove any potential contaminants (e.g. plastics, wood and papers). These materials will be collected and placed into the designated quarantine area (hardstanding), prior to disposal to licensed landfill sites.
- 4.3.2.10 Once these potential contaminants are removed from the tipped load, a loading shovel will transfer the inert wastes to designated storage bays, constructed on a concrete base. These storage bays will have a combined capacity of approximately 10,000 tonnes.
- 4.3.2.11 The processing/recycling activities taking place as part of this proposal will take place at the plant site, within the existing pit. The process will utilise the same plant and machinery as for the crushing, screening and washing of the mineral won at the Site.
- 4.3.2.12 There may be a requirement for pre-screening of materials if the arisings contain a high percentage of fines. The main product will then be passed through the crushing and screening plant. The materials will be graded and screened prior to and after crushing.
- 4.3.2.13 The screened products from the plant will either be loaded directly into the customer's vehicles for sale; blended with on-site materials in readiness for sale; or placed to stock.
- 4.3.2.14 The EPA has determined that a Waste Facility Permit is required under Classes 5 and 7 of Part I of the Third Schedule of the Waste Management (Facility Permit & Registration) Regulations 2007, as amended.

4.3.3 Water Quality Monitoring

- 4.3.3.1 It is recommended that groundwater samples should be retrieved from the Site piezometers on a quarterly basis.

- 4.3.3.2 The “Water Environment Protection Scheme” (*Reference 4*), addressing Condition 4 of ABP Ref: 07 SU.0056, sets out the following list of parameters for laboratory analysis: *Major Ions; Electrical Conductivity (EC); Enterococci; Escherichia coli (E. coli); Hydrogen Ion concentration (pH); Turbidity; Petroleum Hydrocarbons (Diesel Range Organics); and Poly-Aromatic Hydrocarbons (PAH)*.
- 4.3.3.3 In view of the proposed recycling operations, the analysis schedule for the water samples should be expanded to include *Suspended Solids; Temperature; Biochemical Oxygen Demand (BOD); Chemical Oxygen Demand (COD); Total Organic Carbon (TOC); and Dissolved Oxygen (DO)*.
- 4.3.3.4 This expanded list is taken from the Environmental Guidance cited at *section 1.2.2.xv*.

4.3.4 Refuelling Process

- 4.3.4.1 The crushing and screening plant intended to be used for the processing of the material will be fully mobile and driven by diesel engines.
- 4.3.4.2 Although the crushing and screening plant would be periodically moved about the quarry floor, it is not practicable or time/cost effective to move the plant to a fixed location for refuelling.
- 4.3.4.3 All plant will be refuelled by mobile bowser (similar to the type of bowser delivering home heating oil and adhering to the same environmental standards). The storage vessel (mounted on the back of the delivery vehicle) is double-skinned and housed upon a drip tray.
- 4.3.4.4 The refuelling operation will be completed in accordance with the procedure described within the Oil Care Code (*section 4.3.1*).

4.4 Storm Balancing

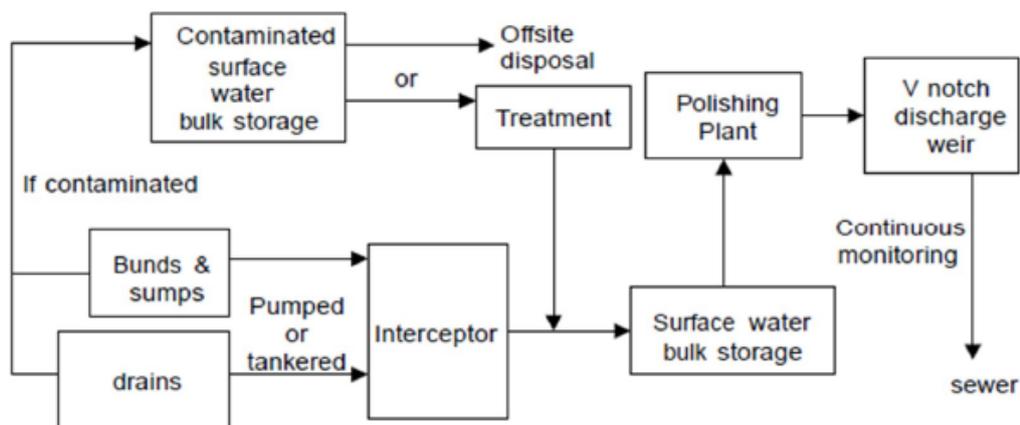
4.4.1 Extraction Area

- 4.4.1.1 Total rainfall occurring on Site during the design storm (6-hour duration and 100-year return period) is 59.6 mm. Given the catchment area of the final extraction area (*circa* 6.5 hectares), this equates to some 3,875 m³ input of rainfall.
- 4.4.1.2 The operational solution is to allow temporary and shallow ponding across the lowest section of quarry floor (34 maOD), which has a surface area of approximately 3.4 hectares. Given that the quarry floor is relatively flat, the water would spread across a large part of the floor without exceeding 15 cm depth.
- 4.4.1.3 Following abatement of the storm, the ponded water will infiltrate to ground across the Site, because the quarry floor is free draining under average conditions, relying upon the infiltration capacity of the underlying sand and gravel. As outlined previously, more than 1 m buffer depth of unsaturated sand and gravel will be retained to deliver a dry operation.
- 4.4.1.4 There is no risk of runoff from the quarry void to neighbouring land. The lowest point on the Site boundary is at *circa* 37 maOD, which is 3 m higher than the quarry floor.

4.4.2 Waste Recycling Facility

- 4.4.2.1 The application seeks to allow for Class 7 recovery of inert waste arising from construction and demolition activity, including concrete, bricks, tiles, or other such similar material.
- 4.4.2.2 The Applicant is proposing to construct a concrete pad with individual bays for the receipt and sorting of the construction and demolition waste. The footprint of the concrete pad is indicated upon *Drawing 210924-Dwg-02*, including 4 No. Recycling Bays, the Designated Tipping Area and the Quarantine Area, which will drain to the Attenuation / Interceptor Tank.
- 4.4.2.3 Indicative dimensions for a HT 18,000-litre tank are included within the planning application package.

- 4.4.2.4 The tank should be maintained empty in readiness for storm events. This will be achieved by pumping to the Silt Ponds. The base of these ponds will be blinded by the silt and therefore they will remain perched above the watertable (*i.e.* not in hydraulic continuity with the groundwater system).
- 4.4.2.5 The key principle at the recycling plant is that water use should be minimised, and wastewater reused or recycled. However, if the Applicant has had to store rogue material/loads in the Quarantine Area, the effluent in the Attenuation / Interceptor Tank may be a complex mixture of substances. The use of whole effluent bioassays for the assessment of the complex effluent or the control of process inputs should be considered in conjunction with the Regulator under the conditions/schedules specified in the Waste Facility Permit.
- 4.4.2.6 When the effluent is derived from rogue material/loads in the Quarantine Area, Environmental Guidance (*section 1.2.2.xv*) indicates that such effluent should be directed to foul sewer or tankered for offsite disposal. Emissions to watercourses and groundwater (under consent) are rare, as they would not meet the relevant Environmental Quality Standards. The Application Site has no connection to foul sewer and consequently will need to rely on tankering away effluent to another disposal point.
- 4.4.2.7 The guidance document provides the following flowchart to summarise “Effluent Management Techniques”:



4.4.2.8 Harmful and persistent substances, constituting a proportion of the COD load, such as solvents, pesticides, organohalogens and other organic substances, may be adsorbed onto particulate and colloidal matter and be removed as a solid residue. Secondary treatment will be required for the sludges that are taken from the bottom of Attenuation / Interceptor Tank; they will need to be collected and tankered to a licensed landfill site for disposal.

4.5 Potential for Impact upon Surface Water Regime

4.5.1 The main channel of the Clare River is located some 2 km to the west of the Site, with an un-named tributary (EPA Flow Network Segment Code 30_2639) passing within 1 km radius of the Site.

4.5.2 The Grange River is located approximately 0.9 km to the south of the Site, with the Barnacurragh tributary (EPA Flow Network Segment Code 30_1121) arising 0.6 km to the northeast of the Site and flowing south to join the Grange River.

4.5.3 The development proposal does not involve working below the watertable; therefore, there will be no lowering of groundwater level and no cone of depression in the watertable (*i.e.* no radius of influence of dewatering drawdown). This means that there will be no risk of derogation or interception of baseflow in the local watercourses.

4.5.4 As described previously, there is no dewatering discharge requirement and there will be no surface water run-off exiting the working area. Any silt-laden runoff will collect at the lowest point in the working area. The suspended solids will settle out on the quarry floor or will be filtered out in the underlying sand and gravel.

4.5.5 There is no risk of runoff from the quarry void to neighbouring land. The lowest point on the Site boundary is at *circa* 37 maOD, which is 3 m higher than the quarry floor. There will be no risk of overflow/transfer of suspended solids from the working area into the surface drainage network.

4.5.6 Since May 2021, the groundwater flow direction has stabilised (declining from NNW to SSE). On this basis, the Grange River is the closest “drain” for the groundwater within the sand and gravel deposit beneath the Site. The Grange River is a tributary of the Clare River, thus falling within the Lough Corrib SAC and SPA. This means that there is the potential for groundwater, if contaminated by Site operations, to also derogate surface water quality in this watercourse.

4.5.7 It is considered that proper implementation of the measures advanced in *section 4.3* (for the protection of groundwater quality) will also serve to prevent the derogation of surface water quality by ensuring the maintenance of good quality discharge of groundwater baseflow and downstream linkage to surface water.

4.6 Risk of Derogation at Local Water Supplies

4.6.1 *Section 2.8.3* examines whether there are any licensed or private registered abstractions lying within 4 km radius of the Site.

4.6.2 Residences and farms in the vicinity of the site are served by the Cloonascragh / Cloondarone Group Water Scheme (Ref. No. GY793).

4.6.3 Galway County Council Water Services has confirmed that the Group Water Scheme remains in place and has provided a map showing the extent of the Scheme (*Appendix 6*); as well as showing a separate mains supply serving the Moylough Pre-Cast Concrete facility.

4.6.4 The Executive Technician at Water Services has indicated that the properties at Ballykeaghra, which are some 450 m to the southwest of the Site, are assumed to rely upon domestic wells.

4.6.5 It is considered that the proposed development will cause no derogation in the quantity and quality of local water supplies.

4.6.6 This is because the proposed development will not involve sub-watertable working or dewatering, therefore there will be no drawdown-related impact upon water levels and flow (*section 4.2*); and water quality will be safeguarded by the same measures specified in *section 4.3*.

- 4.6.7 The piezometer network provides sufficient coverage for groundwater level and quality monitoring to check that there is no risk of impact at local water supplies.
- 4.6.8 The rEIS details how the development on-site had not impacted upon the Group Water Scheme Supply as there has been no abstraction or discharge of waters at the site. The ABP Inspectors Report confirms that “the quarry is not likely to impact directly on surface water quality or quantity in the vicinity of the site as there is no abstraction or discharge to any surface water body”.
- 4.6.9 The owners of the properties at Ballykeaghra have been approached by the quarry operator; and they have confirmed that they are supplied by private wells. Subject to agreeing access arrangements, these would be dipped and tested on an annual basis.

4.7 Residual Impact

- 4.7.1 In this instance, following restoration and re-seeding, the Extraction Area will be returned to an agricultural after-use. The lowest point on the Restoration Landform should be retained as a passive soakaway.
- 4.7.2 The management of residual risk will, for the most part, be the responsibility of the landowner, who will need to be aware that, during storm events, there will be water level variations within the freeboard zone at the margins of the soakaway. Land use should be tailored to allow for these variations.

4.8 Summary Impact & Mitigation Schedule

Summary Impacts & Mitigation Schedule			
	Impacts	Mitigation / Surveillance Monitoring	
Groundwater	Levels & Flows	<p>The proposed development will take place wholly above the watertable. The peak groundwater level recorded in the piezometer network equates to 32.82 maOD. Mineral extraction will not progress below 34 maOD. Therefore, more than 1 m buffer depth of unsaturated sand and gravel will be retained to deliver a dry operation.</p> <p>The recirculatory system (Silt Ponds) will be topped up with clean water from the groundwater pond.</p>	<p>Monthly monitoring of groundwater level at Site piezometers will be continued for the duration of the Proposed Development to provide data for future review.</p> <p>Water usage is minimised by re-circulation through the Water Management System. Losses from the system are typically around 5% (attributed to moisture content in the sold product).</p>
	Quality	<p>Inert materials arising from Construction and Demolition Waste (C&DW) will be imported and processed in preparation for resale as recycled aggregate (Class 7 recovery of inert waste). The pit will be restored with material resultant from the mineral washing and proposed recycling process (Class 5 recovery of excavation or dredge spoil).</p> <p>Negligible likelihood exists of groundwater quality derogation resulting from accidental spillages and / or undetected long-term leakage and / or fugitive suspended solids entrained within runoff onto peripheral lands.</p>	<p>The EPA has determined that a Waste Facility Permit is required under Classes 5 and 7 of Part I of the Third Schedule of the Waste Management (Facility Permit & Registration) Regulations 2007, as amended.</p> <p>There will be strict management controls and a waste acceptance procedure implemented to ensure that the waste is suitable for use, including summary protocol for Handling, Recycling and Storage of Waste. The Applicant is proposing to construct a concrete pad with individual bays for the receipt and sorting of the construction and demolition waste, including: 4 No. Recycling Bays, Designated Tipping Area and Quarantine Area, which will drain to an Attenuation / Interceptor Tank.</p> <p>Precautionary procedures have been advanced for the protection of groundwater quality; by minimising the likelihood of occurrence in the first instance, and specification of reactive measures for the management of accidental spillage and / or long-term leakage of fuel, lubricating or hydraulic oils should this occur.</p> <p>Groundwater samples will be retrieved from the Site piezometers on a quarterly basis and sent for laboratory analysis to confirm that there has been no development-related impact on water quality.</p>
Surface Watercourses	Levels & Flows	<p>During the design storm, there will be temporary and shallow ponding across the lowest section of quarry floor.</p> <p>There will be no lowering of groundwater level and no cone of depression in the watertable.</p> <p>There is no dewatering discharge requirement and there will be no surface water run-off exiting the working area.</p>	<p>The ponded water will infiltrate to ground across the Site, because the quarry floor is free-draining under average conditions. There is no risk of runoff from the quarry void to neighbouring land.</p> <p>The development proposal does not involve working below the watertable; therefore, will be no risk of derogation or interception of baseflow in the local watercourses.</p> <p>Any silt-laden runoff will collect at the lowest point in the working area. The suspended solids will settle out on the quarry floor or will be filtered out in the underlying sand and gravel.</p>

	Quality	The Grange River is the closest “drain” for the groundwater within the sand and gravel deposit beneath the Site.	Proper implementation of the measures advanced for the protection of groundwater quality (see above) will also serve to prevent the derogation of surface water quality by ensuring the maintenance of good quality discharge of groundwater baseflow and downstream linkage to surface water.
Water Supplies	Yield & Quality	Residences and farms in the immediate vicinity of the site are served by the Cloonascragh / Cloondarone Group Water Scheme (Ref. No. GY793). The properties at Ballykeaghra, which are some 450 m to the southwest of the Site, rely upon domestic wells.	The proposed development will not involve sub-watertable working or dewatering, therefore there will be no drawdown-related impact upon water levels and flow at the domestic wells; and water quality will be safeguarded by the same measures specified above. The piezometer network provides sufficient coverage for groundwater level and quality monitoring to check that there is no risk of impact at local water supplies. Notwithstanding this, the domestic wells at Ballykeaghra should be dipped and tested on an annual basis (subject to agreeing access arrangements).

5 CONCLUSIONS

- 5.1 Published guidance¹, which details the criteria for ranking the importance of hydrological and hydrogeological features (low / medium / high / very high / extreme) and assessing the magnitude of impact (negligible / small / moderate / large adverse), has allowed for judging the significance of impact (imperceptible / slight / moderate / significant / profound).
- 5.2 The proposed development will take place wholly above the watertable. The peak groundwater level recorded in the piezometer network equates to 32.82 maOD. Mineral extraction will not progress below 34 maOD. Therefore, more than 1 m buffer depth of unsaturated sand and gravel will be retained to deliver a dry operation.
- 5.3 This demonstrates that there will be negligible risk of intercepting the watertable during the proposed mineral extraction activities *i.e.* there will be no requirement for sub-watertable mineral extraction or dewatering, so that there will be no lowering of the watertable as a result of the quarrying activities and no drawdown-related impact upon groundwater levels and flow.
- 5.4 The Visean Limestone (part of the Clare-Corrib GWB) is a regionally important aquifer of ‘**high**’ importance. The magnitude of impact of the proposed operation at the Applicant’s quarry on the regional water balance is ‘**negligible**’, therefore the significance of impact on the regional water balance is rated as ‘**imperceptible**’.
- 5.5 The groundwater flow direction at the Site is from NNW to SSE, which is towards the closest stretch of the Grange River (tributary of the Clare River), thus falling within the Lough Corrib SAC and SPA.
- 5.6 There is no dewatering discharge requirement and there will be no surface water run-off exiting the working area.

¹ Institute of Geologists of Ireland (IGI 2013) ‘Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements’.

- 5.7 Any silt-laden runoff will collect at the lowest point in the working area. The suspended solids will settle out on the quarry floor or will be filtered out in the underlying sand and gravel.
- 5.8 There is no risk of runoff from the quarry void to neighbouring land. The lowest point on the Site boundary is at *circa* 37 maOD, which is 3 m higher than the quarry floor. There will be no risk of overflow/transfer of suspended solids from the working area into the surface drainage network.
- 5.9 In granting Substitute Consent, the ABP Inspector was satisfied that:
- The quarry had not given risen to a serious increase in sedimentation loading in groundwater to adversely impact on water quality in either the Grange or Clare River;
 - The risk of contamination of groundwater from hydrocarbons and other potential contaminants on site was quite low;
 - The two Natura 2000 sites were significantly removed from the quarry site and any impacts by way of increased sedimentation in groundwater were highly unlikely at these distances; and,
 - No other quarries were operating in the immediate vicinity of the site, so cumulative impacts were unlikely.
- 5.10 The Grange River (tributary of the Clare River) is linked with the Lough Corrib SAC and SPA; and is of **'high'** importance. The magnitude of impact on the hydrology of the river is **'negligible'**, therefore the significance of impact of activities within the Application Area on the hydrology of the Lough Corrib SAC and SPA is rated as **'imperceptible'**.

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McTigue Quarries Ltd
CLOONASCRAUGH SAND AND GRAVEL PIT
Tuam, Co. Galway

Environmental Impact Assessment Report for Mineral Extraction;
Recovery of inert waste arising from construction & demolition activity (Class 7);
& Restoration of Quarry via recovery of excavation or dredge spoil,
comprising natural materials (Class 5)

Hydrogeological and Hydrological Impact Assessment

February 2022

APPENDIX I
Article 11 Declaration: Correspondence from EPA





Mr Chris Tinsley
Quarryplan Limited
10 Saintfield Road
Crossgar
Co Down

By Email

18 January 2022

Article 11 No: 2643

Re: Article 11 Declaration

Headquarters, PO Box 3000
Johnstown Castle Estate
Co Wexford,
Y35 W821, Ireland

Ceannchethrú, Bosca Poist 3000
Eastát Chaisleán Bhaile Sheáin
Contae Loch Garman,
Y35 W821, Éire

T: +353 53 916 0600

F: +353 53 916 0699

E: info@epa.ie

Dear Mr Tinsley

The Agency has reviewed your Article 11 Request, which was received on 10 January 2022, and, based on the information provided, advises as follows:

You have stated that a total of 150,000 tonnes of waste will be filled during the facility's lifetime. Accordingly the Agency has determined that a Waste Facility Permit is required under Classes 5 and 7 of Part I of the Third Schedule of the Waste Management (Facility Permit & Registration) Regulations 2007, as amended. This determination is contingent on the conditions of the classes being met:

Class 5 recovery of excavation or dredge spoil, comprising natural materials of clay, silt, sand, gravel or stone and which comes within the meaning of inert waste, through deposition for the purposes of the improvement or development of land, where the total quantity of waste recovered at the facility is less than 200,000 tonnes.

Class 7 recovery of inert waste arising from construction and demolition activity, including concrete, bricks, tiles, or other such similar material at a facility (excluding land improvement or development) where -

- (a) the annual intake shall not exceed 50,000 tonnes, and
- (b) the maximum quantity of residual waste consigned from the facility for collection, onward transport and submission to disposal at an authorised facility shall not exceed 15% of the annual intake.

Please note, where the waste related activities being undertaken within a facility encompass a number of classes as set out within Part I of the third schedule, the quantity of waste concerned shall be taken as meaning the total quantity of waste accepted at the facility taking account of inputs relating to all classes of activity and compared to the threshold of the principal class.

If the conditions of the classes cannot be met then a waste licence will be required from the Agency.

Please also note, the waste authorisation required depends on the lifetime recovery objective of the facility. The lifetime recovery objective includes the amount of waste deposited to-date and

the amount of waste that will be filled during the facility's lifetime. You have stated 150,000 tonnes as the total amount of waste that will be filled during the facility's lifetime. Should this amount change, resulting in 200,000 tonnes or more being required during the facility's lifetime, then a waste licence will be required.

I trust this advice assists.

Yours sincerely
Environmental Licensing Programme
Office of Environmental Sustainability

cc Director of Services, Environment Section, Galway County Council

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McTigue Quarries Ltd
CLOONASCRAUGH SAND AND GRAVEL PIT
Tuam, Co. Galway

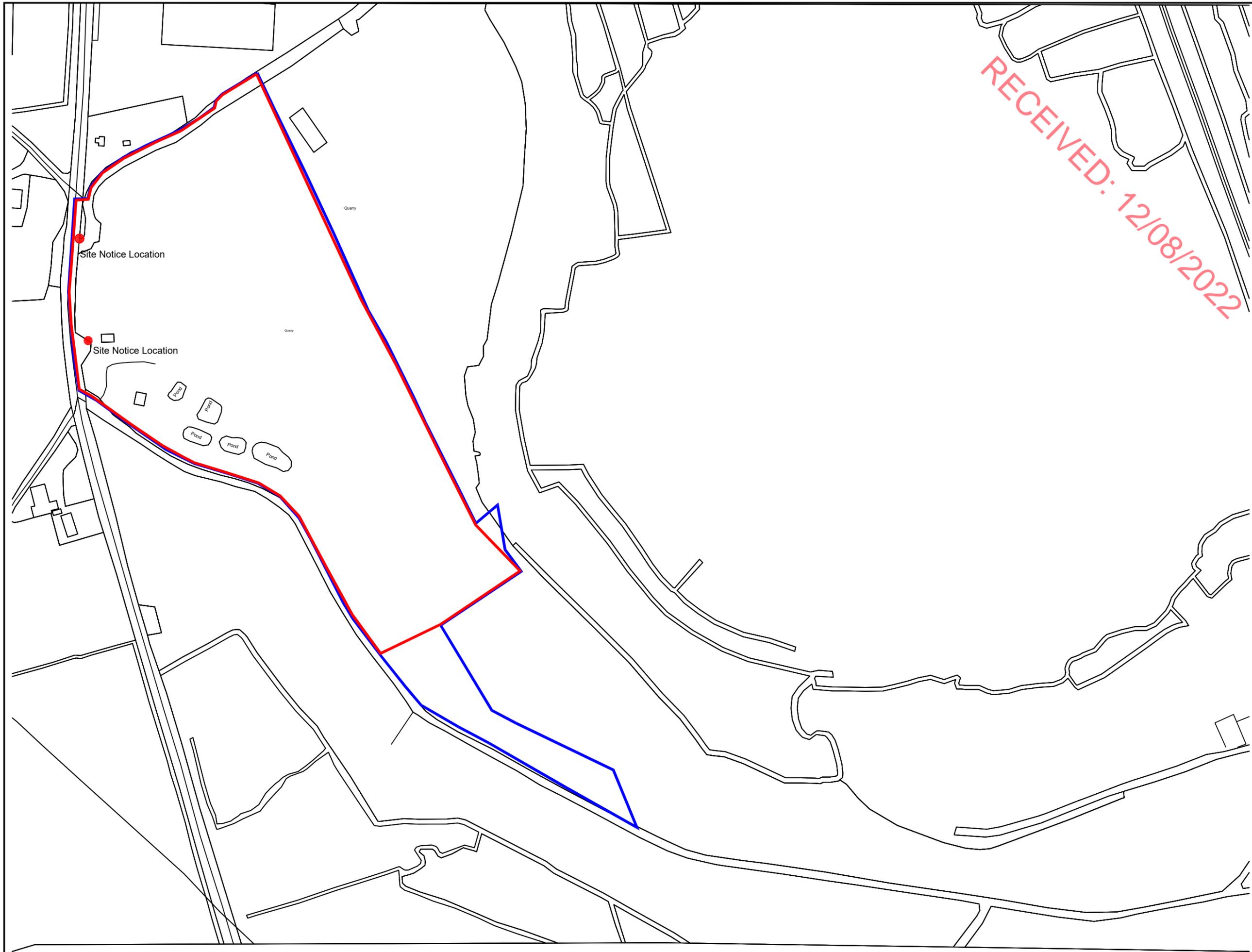
Environmental Impact Assessment Report for Mineral Extraction;
Recovery of inert waste arising from construction & demolition activity (Class 7);
& Restoration of Quarry via recovery of excavation or dredge spoil,
comprising natural materials (Class 5)

Hydrogeological and Hydrological Impact Assessment

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APPENDIX II
Figures





— Planning Application Boundary

— Lands Under Control of Applicant

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Map Series | Map Sheets
 1:2,500 | 2882-C
 1:5,000 | 2882
 Ordnance Survey Ireland
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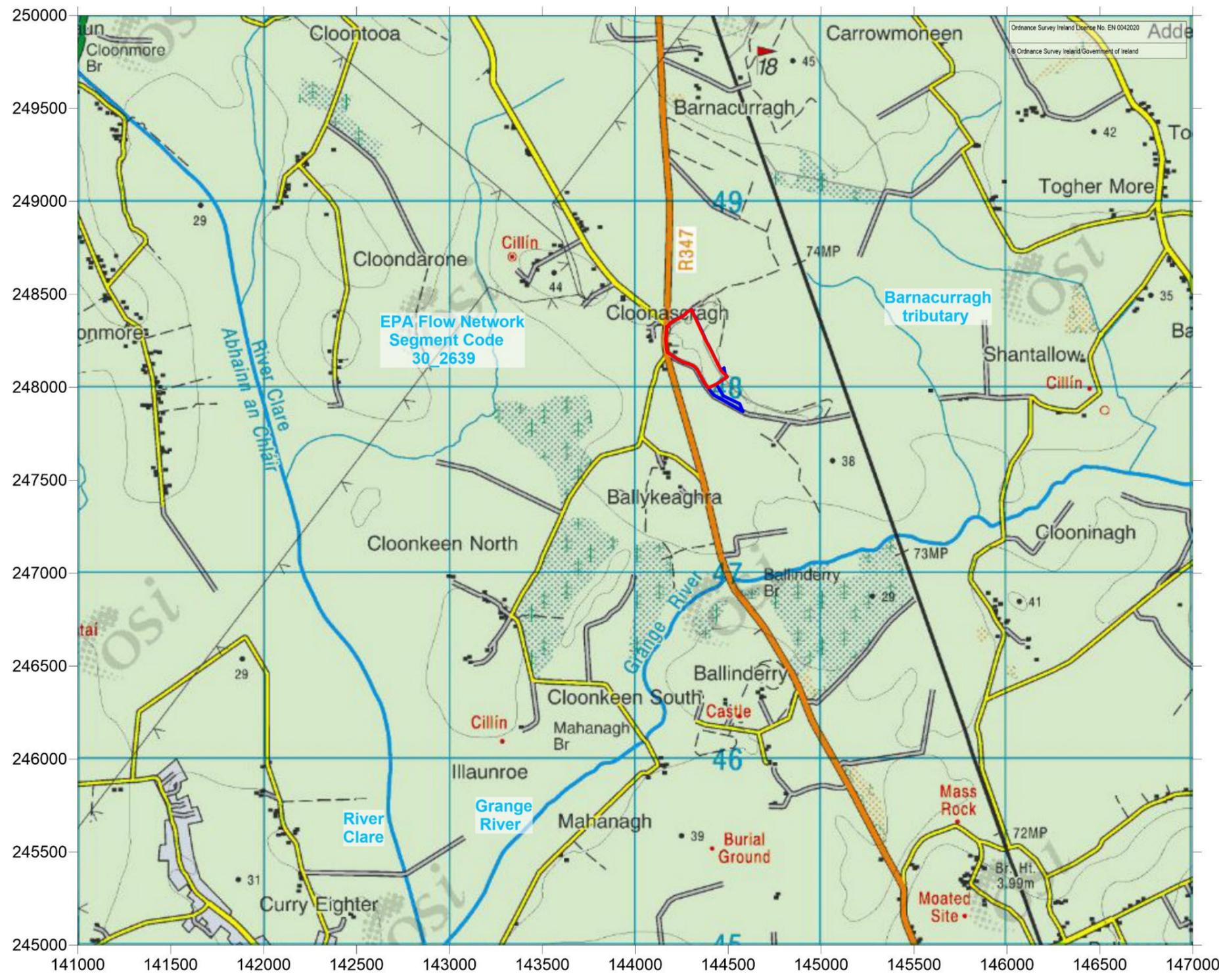
Quarryplan Limited
 10 Saintfield Road
 Crossgar
 Downpatrick
 BT30 9HY
 T: +44 (0)28 44 832904
 e: info@quarryplan.co.uk

Cloonascragh Sand and Gravel Pit-
 Site Location Plan

McTigue Quarries Ltd
 Cloonascragh, Tuam

FILE NAME & LOCATION QP\Surveys\McTigue\Tuam\SiteLocation	
DRAWN BY CST	DATE Oct 2021
DRAWING No. 001	SCALE 1:2500@A3

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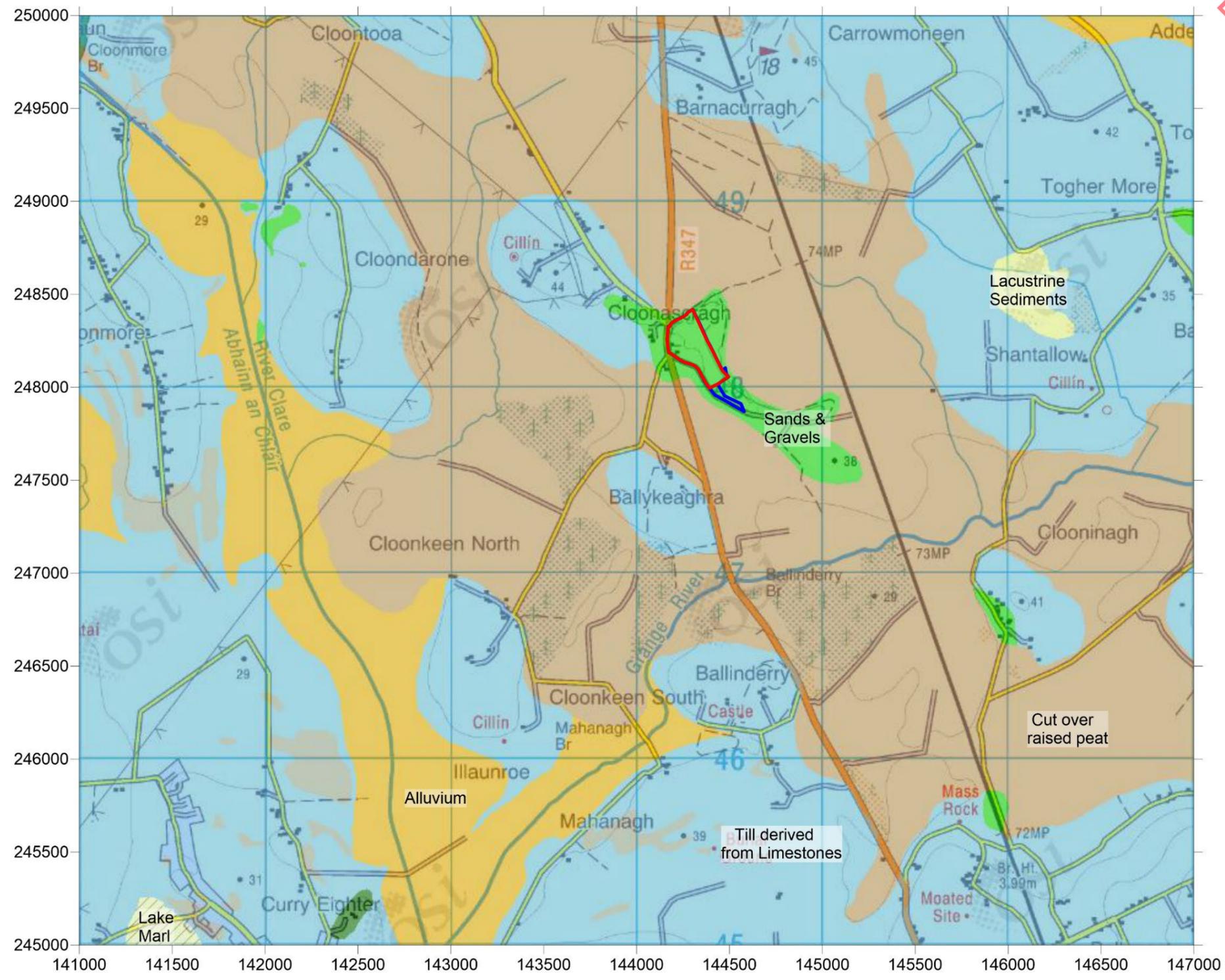
 Application Area
 Landholding

 Technology Centre, Wolverhampton
 Science Park Wolverhampton, WV10 9RU
 tel: 01902 824111 fax: 01902 824112
 email: info@bclhydro.co.uk
 www: http://www.bclhydro.co.uk

Cloonacraigh Sand and Gravel Pit, Tuam, Galway
Hydrological Setting (Extract from OSI Mapping)

Drawn By: HL	Scale: 1:25,000
Date: Jan 2022	Figure No: 2

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Application Area
Landholding

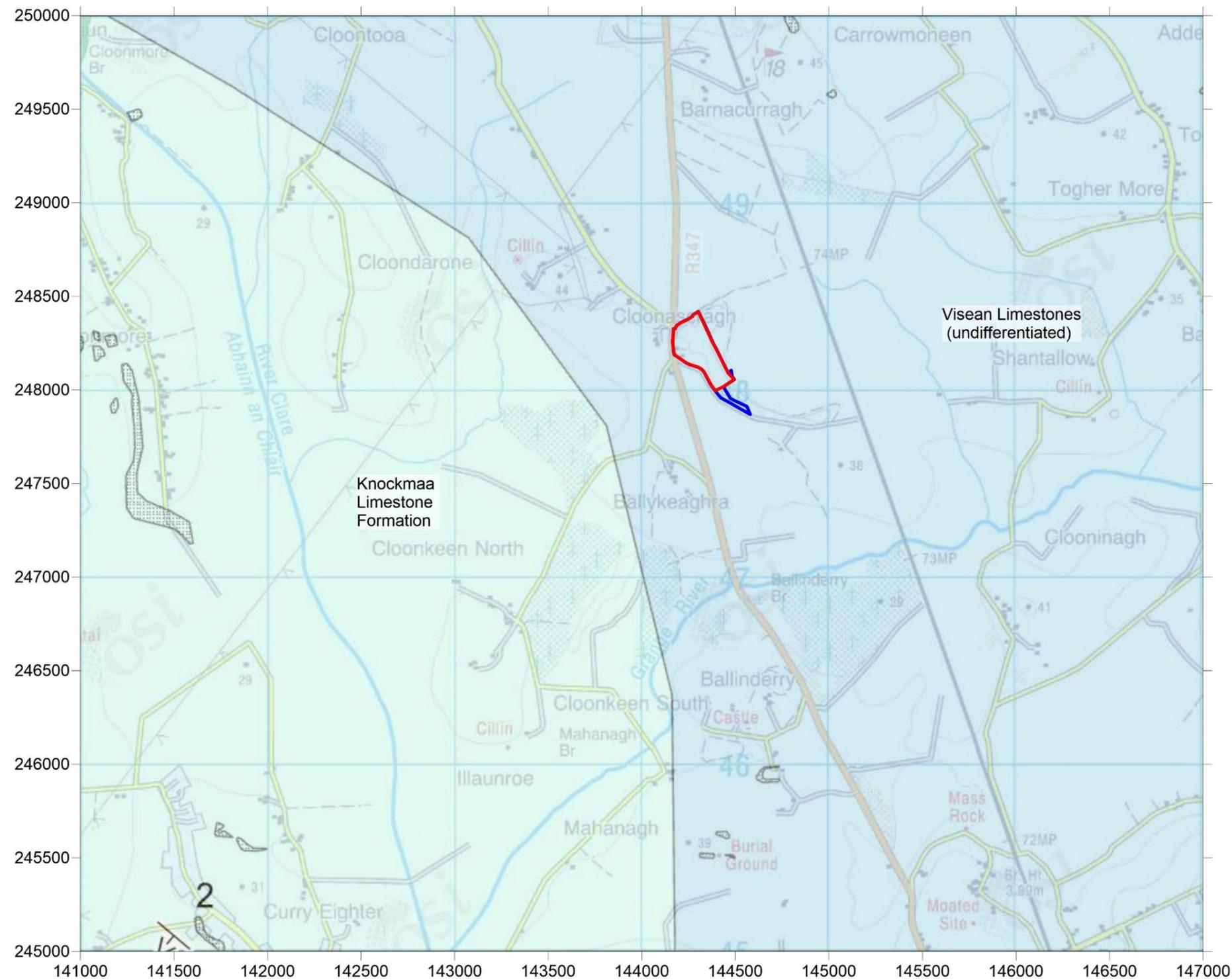
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 Technology Centre, Wolverhampton
Science Park Wolverhampton, WV10 9RU
tel: 01902 824111 fax: 01902 824112
email: info@bclhydro.co.uk
www: http://www.bclhydro.co.uk

Cloonacragh Sand and Gravel Pit, Tuam, Galway
Quaternary Geology (Extract from GSI Mapping)

Drawn By: HL	Scale: 1:25,000
Date: Jan 2022	Figure No: 3

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Application Area
Landholding

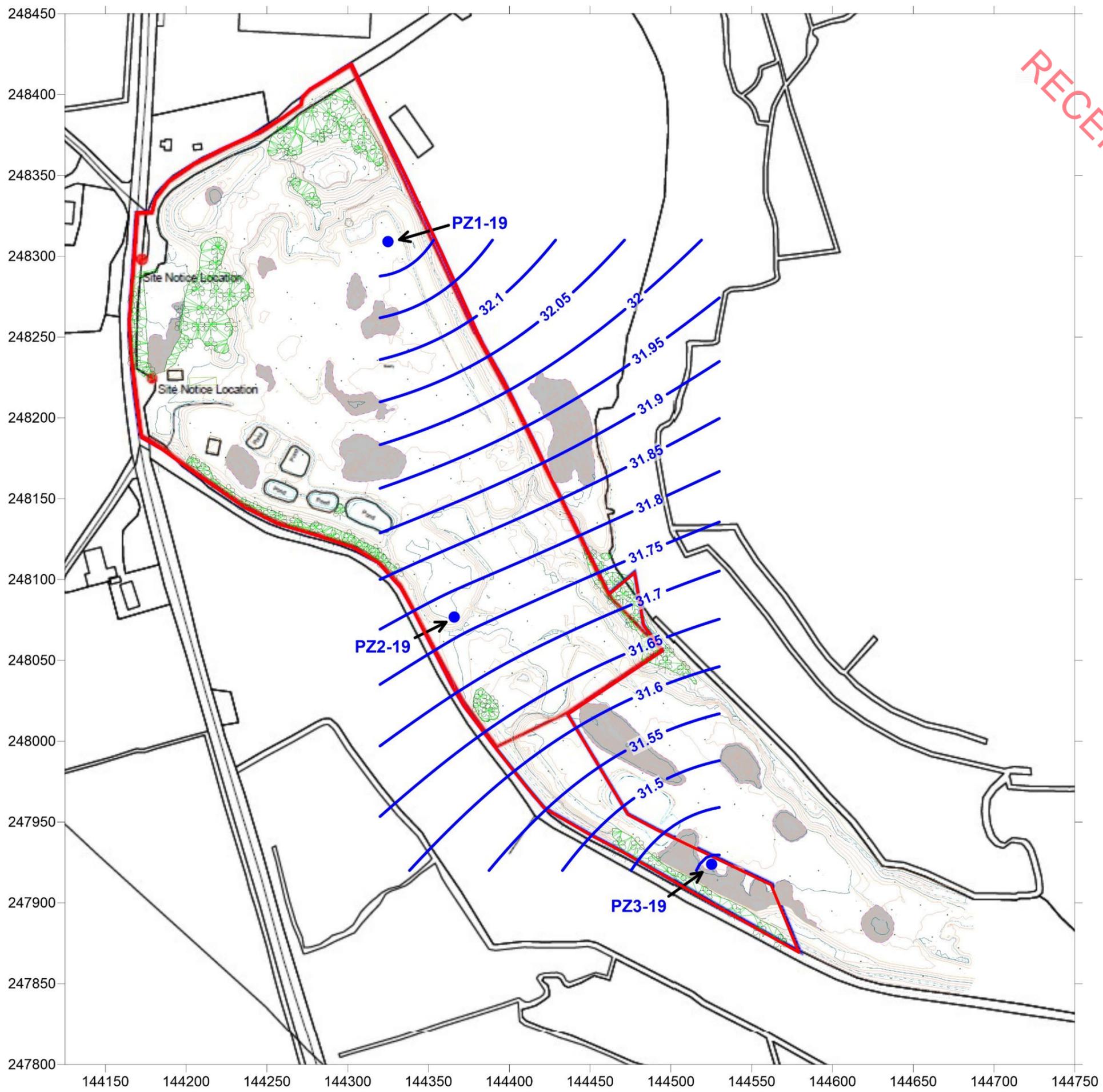
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Cloonacragh Sand and Gravel Pit, Tuam, Galway
Bedrock Geology (Extract from GSI Mapping)

Drawn By: HL	Scale: 1:25,000
Date: Jun 2020	Figure No: 4

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-  Landholding Boundary
-  Groundwater Level Contours (maOD)
-  Groundwater Level Piezometer

 Technology Centre, Wolverhampton
Science Park Wolverhampton, WV10 9RU
tel: 01902 824111 fax: 01902 824112
email: info@bclhydro.co.uk
www: http://www.bclhydro.co.uk

Cloonascragh Sand and Gravel Pit, Tuam, Galway
Groundwater Level Contours (maOD) in Jan-22

Drawn By: HL	Scale: 1:2,500
Date: Jan 2022	Figure No: 5

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Tuam, Co. Galway

Environmental Impact Assessment Report for Mineral Extraction;
Recovery of inert waste arising from construction & demolition activity (Class 7);
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Hydrogeological and Hydrological Impact Assessment

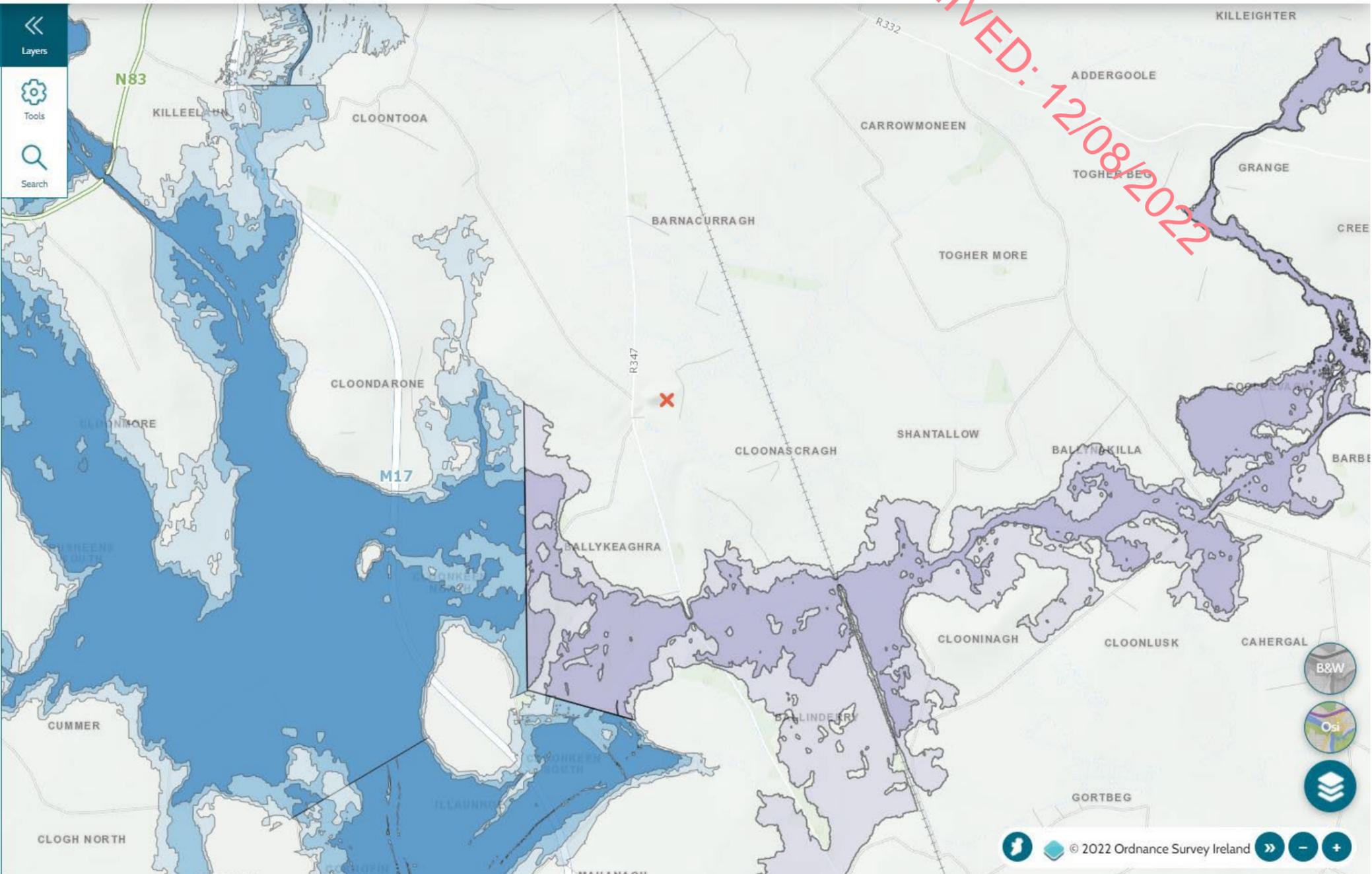
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APPENDIX III
OPW Flood Mapping



Active Layers + Add Layer

- CFRAM River Flood Extents – Present Day On
- River - Low Probability Legend: Layer Queryable: No
- River - Medium Probability Legend: Layer Queryable: No
- River - High Probability Legend: Layer Queryable: No
- CFRAM Coastal Flood Extents – Present Day Off
- National Indicative Fluvial Mapping - Present Day On
- CFRAM PDF Maps (Printable)
- Geological Survey Ireland (GSI) Groundwater Flooding Probability Maps
- Past Flood Events



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February 2022

APPENDIX IV
Borehole Logs



Address: TUAM CO Galway
 Date of drilling: 30-6-20 Ref. No: 0201
 Well Owner: GARRY McHugh
 Address: Bellare
 Well location: Same

County: _____ Townland: _____

Well Details

Drilling method: Rotary
 Depth of well: 110 feet
 Diameter: 6" inches
 Depth of lining: 40 feet
 Diameter of lining: 168" 6" inches
 Depth to Bedrock: 35 feet
 Type of Subsoil: Sand
 Type of Bedrock: Lime

Water entry levels: 40 feet
 Depth to any cavities met in drilling: 40 feet
 Static water level below ground: 20 feet
 Measured pumping rate: - gph
 Duration of pumping: - hours
 Drawdown during pumping: - feet
 N.B. (= Pumped Water Level - Static Water Level)
 Estimated maximum safe yield: 100 gph

Indicate if there are detailed records

Pumping test:
 Chemical analysis of water sample:
 Bacterial analysis of water sample:

Remarks (e.g. any unusual features): _____

use only

Well No. _____

Alt. _____ m

E _____
N _____

Accuracy

6" sheet

metres
mm
metres
mm
metres
metres
metres
metres
metres
metres
m3/d
metres
metres
metres
m3/d

RECEIVED: 12/08/2022

Address: TEAM
 Date of drilling: 30-6-20 Ref. No: 0203
 Well Owner: Carry Mihig
 Address: Belclane
 Well location: Same

County: _____ Townland: _____

Well Details
 Drilling method: Rotary
 Depth of well: 110 feet
 Diameter: 6" inches
 Depth of lining: 40 feet
 Diameter of lining: 168mm 6" inches
 Depth to Bedrock: 40 feet
 Type of Subsoil: Sand + Gravel
 Type of Bedrock: Lime

Water entry levels: 60 feet
 Depth to any cavities met in drilling: 60 feet
 Static water level below ground: 20 feet
 Measured pumping rate: - gph
 Duration of pumping: - hours
 Drawdown during pumping: - feet
 N.B. (= Pumped Water Level - Static Water Level)
 Estimated maximum safe yield: 660 gph

Indicate if
 there are
 detailed records

Pumping test:
 Chemical analysis of water sample:
 Bacterial analysis of water sample:

Remarks (e.g. any unusual features):

use only	
Well No.	
Alt.	m
E	
N	
Accuracy	
6" sheet	
	metres
	mm
	metres
	mm
	metres
	metres
	metres
	metres
	m ³ /d
	metres
	m ³ /d

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Hydrogeological and Hydrological Impact Assessment

February 2022

APPENDIX V
Groundwater Levels and Hydrographs



Cloonascragh Piezometers				
Dip Readings (mbDatum)				
Piezometer ID:-		PZ1-19	PZ2-19	PZ3-19
Installation Date:-				
Operator:-		McTigue	McTigue	McTigue
Monitored By:-	McTigue			
Datum Level (maOD):-		36.200	35.300	35.000
Eastings:-		144324.93	144366.00	144525.41
Northings:-		248308.86	248076.68	247923.69
Pipe Size:-				
Pipe Depth:-				
Comments:-		driller ref 0201	driller ref 0202	driller ref 0203
Date	Weather			
23-Sep-2020	Dry	4.290	3.250	3.240
05-Nov-2020	Dry	3.940	2.810	2.830
26-Nov-2020	Dry	3.750	2.630	2.570
14-Jan-2021	Wet	3.920	2.650	2.550
25-Jan-2021	Snow/Frost	3.880	2.480	2.410
27-Apr-2021	Showery	4.250	3.110	3.180
19-May-2021	Dry	4.840	3.930	3.980
22-Jun-2021	Showery	4.120	3.700	3.720
11-Nov-2021	Showery	4.560	3.900	4.040
07-Dec-2021	Showery	4.320	3.810	3.860
20-Jan-2022	Dry	3.960	3.530	3.610

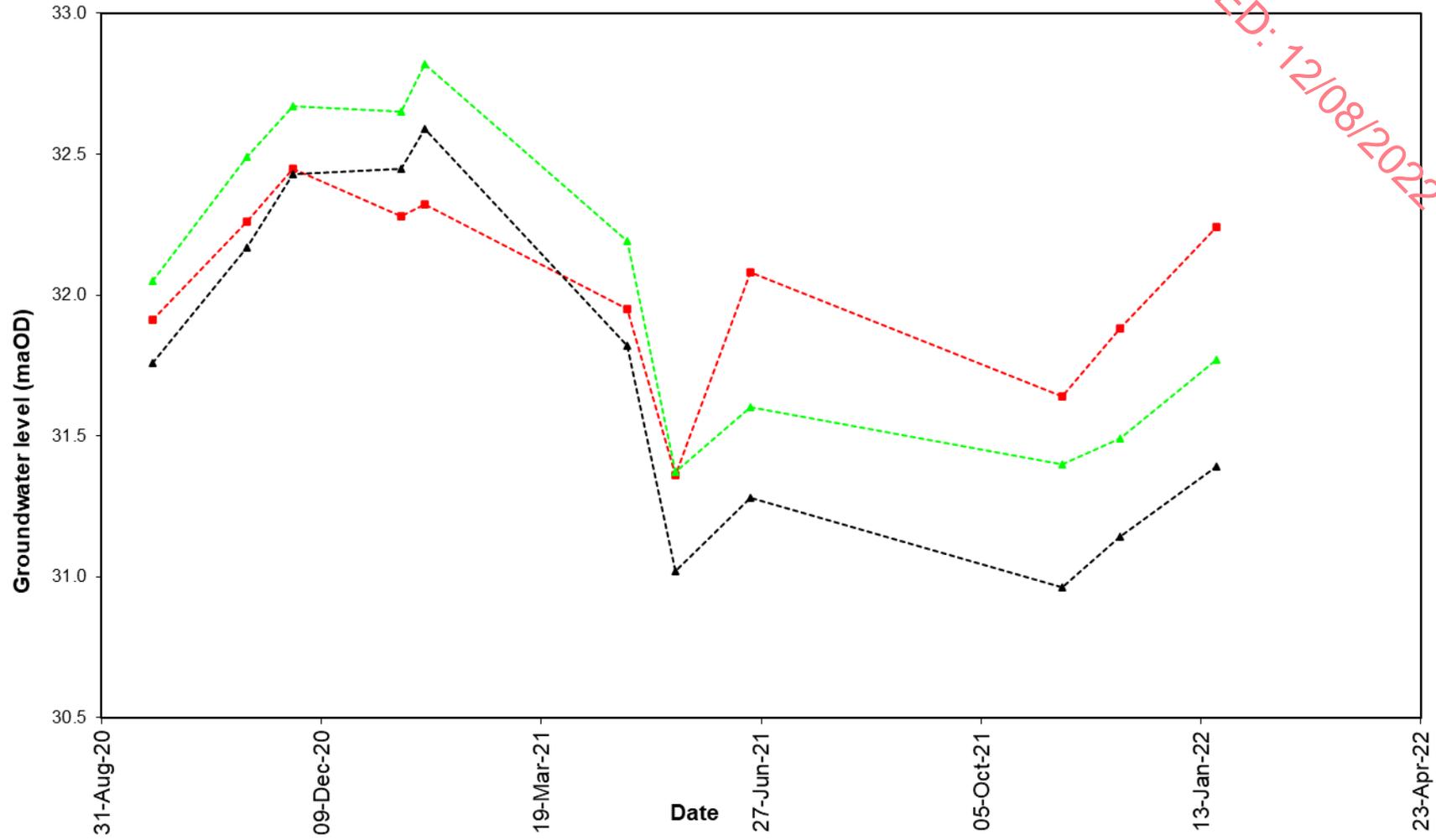
RECEIVED 12/08/2022

Cloonascragh Piezometers				
Groundwater Levels (maOD)				
Piezometer ID:-		PZ1-19	PZ2-19	PZ3-19
Installation Date:-				
Operator:-		McTigue	McTigue	McTigue
Monitored By:-	McTigue			
Datum Level (maOD):-		36.200	35.300	35.000
Eastings:-		144324.93	144366.00	144525.41
Northings:-		248308.86	248076.68	247923.69
Pipe Size:-				
Pipe Depth:-				
Comments:-		driller ref 0201	driller ref 0202	driller ref 0203
Date	Weather			
23-Sep-2020	Dry	31.910	32.050	31.760
05-Nov-2020	Dry	32.260	32.490	32.170
26-Nov-2020	Dry	32.450	32.670	32.430
14-Jan-2021	Wet	32.280	32.650	32.450
25-Jan-2021	Snow/Frost	32.320	32.820	32.590
27-Apr-2021	Showery	31.950	32.190	31.820
19-May-2021	Dry	31.360	31.370	31.020
22-Jun-2021	Showery	32.080	31.600	31.280
11-Nov-2021	Showery	31.640	31.400	30.960
07-Dec-2021	Showery	31.880	31.490	31.140
20-Jan-2022	Dry	32.240	31.770	31.390

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Cloonascragh Piezometers

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APPENDIX VI
Group Water Scheme



