

**APPENDIX C**

**ENVIRONMENTAL SETTING AND SITE DESIGN (ESSD) REPORT (REPORT  
REFERENCE BRE/EA/AW/5624/01/ESSD)**



**AN APPLICATION FOR AN ENVIRONMENTAL PERMIT  
FOR THE PERMANENT DEPOSIT OF INERT WASTE AS  
A DISPOSAL OPERATION FOR THE RESTORATION OF  
EARLS BARTON SPINNEY QUARRY, GRENDON  
ROAD, EARLS BARTON, NORTHAMPTON TO  
AGRICULTURE AND NATURE CONSERVATION  
INTEREST**

**ENVIRONMENTAL SETTING AND SITE DESIGN  
REPORT (ESSD)**

Report reference: BRE/EA/AW/5624/01/ESSD  
February 2022



Technical advisers on environmental issues

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Although now withdrawn, the Environment Agency Template: Conceptual Site Model, Environmental Setting and Site Design Report. Version 1 dated 14 October 2016 (the ESSD Template) provided a suggested list of drawings to illustrate the conceptual site model and environmental setting and stated that “*You can use other formats as long as you present all of the required information*”. The drawings listed above have been prepared with reference to the relevant features included in the former ESSD Template. The features in the former ESSD Template relevant to Figure ESSD 3, 4, 5, 6, 7 and 12 are shown on other drawings included with this application. It is acknowledged that the ESSD template has been updated but the information provided in the drawings remains valid under the updated guidance.

## APPENDICES

- Appendix A Planning permission reference 15/00091/MINVOC & WP/15/00791/CRA
- Appendix B Non-material amendment reference 19/00022/MINMA & WP/19/00220/CRA
- Appendix C Drawing reference EB 1 entitled ‘Working Phasing Scheme’
- Appendix D The results of the topographical survey carried out on 16 November 2020 (drawing reference BRE/EA/09-21/22757)
- Appendix E Envirocheck Report for Phases 1 & 3 (Reference 224788374\_1\_1)
- Appendix F Envirocheck report for Phase 1 (Reference 224788374\_1\_1)
- Appendix G Borehole logs and borehole location plan
- Appendix H Data provided by the Environment Agency and South Northamptonshire Council
- Appendix I The monitoring database for the site and the groundwater level data collected at the site in 2007
- Appendix J Graphs of the groundwater quality and groundwater levels at the Site
- Appendix K Drawing reference E18 / 04 entitled ‘Restoration Proposals Phases 1 and 2’
- Appendix L Drawing reference E18 / 05 entitled ‘Restoration Proposals: Phase 3’

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This report has been prepared by MJCA with all reasonable skill, care and diligence, and taking account of the Services and the Terms agreed between MJCA and the Client. This report is confidential to the client and MJCA accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by MJCA beforehand. Any such party relies upon the report at their own risk.

## 1. Introduction

### Report Context

- 1.1 MJCA is commissioned by Breedon Trading Limited (Breedon) to prepare an application for a bespoke Environmental Permit for the deposition of waste on land as a disposal activity, specifically as an inert waste landfill operation, in Phases 1 and 3 at Earls Barton Spinney Quarry (Earls Barton Quarry), Grendon Road, Earls Barton Northampton. Throughout this report the areas in Phases 1 and 3 in which waste will be deposited and which it is anticipated will be the subject of an Environmental Permit are referred to as the site and, unless specified otherwise, references to Phase 1 and Phase 3 are to those areas of Phases 1 and 3 in which waste will be deposited. This report comprises the Environmental Setting and Site Design (ESSD) report including the Conceptual Site Model to support the application. The ESSD has been prepared with reference to the Environmental Agency (EA) guidance on what to include in your Environmental Setting and Site Design report published by the EA on GOV.UK on 30 January 2020<sup>1</sup> (the ESSD Guidance).
- 1.2 It is understood that planning permission was first granted for mineral extraction and restoration operations at the site in September 2007 (planning permission reference 07/00050/MIN). The original planning permission for the site has been varied on several occasions since it was first issued including in October 2010 when planning permission reference 10/00066/EXT was granted for the *'...replacement of extant planning permission 07/00050/MIN to extend the time limit...'* The extant planning permission for the site reference 15/00091/MINVOC & WP/15/00791/CRA was granted on 24 February 2016 (the 2016 planning permission) for the *'Variation of conditions 2 (Approved Documents), 16 (Waste Deposition Phases), 17 (Working Scheme) and 43 (Floodplain Compensatory Storage) of permission ref. no. 10/00066/MINEXT – Earls Barton Spinney Quarry, Off Grendon Road, Earls Barton'*. Condition 2 of the 2016 planning permission states that *'Upon commencement the development hereby permitted shall supersede, consolidate and replace planning permission ref. nos. 10/00066/MINEXT...'*. A copy of the 2016 planning permission is presented at Appendix ESSD A.

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<sup>1</sup> <https://www.gov.uk/guidance/landfill-operators-environmental-permits/what-to-include-in-your-environmental-setting-and-site-design-report>

- 1.3 The 2016 planning permission has been the subject of several Non-Material Amendments (NMAs) in 2017, 2018 and 2019 the most relevant of which is NMA reference 19/00022/MINNMA & WP/19/00220/CRA dated 14 June 2019 '*...to work the remaining permitted mineral in the following sequence – 1G then 1F with 1D being extracted contemporaneously during the summer months when weather conditions allow of planning consent: 15/00091/MINVOC at Earls Barton Spinney Quarry, Off Grendon Road, Earls Barton*' (the 2019 NMA). The 2019 NMA amended Condition 3 of the 2016 planning permission which relates to the approved documents and plans. There were no other changes to the 2016 planning permission. A copy of the 2019 NMA is presented at Appendix ESSD B.

### Site Details

- 1.4 With the exception of the A45, Earls Barton Quarry is located in a generally rural setting. The area of Earls Barton Quarry which is the subject of the Environmental Permit application (the site) is located approximately 350m south-south east of Earls Barton, approximately 550m south of Ecton and approximately 1km east of Great Billing which comprises the eastern outskirts of Northampton as shown on Figure ESSD 1. There are three main phases of mineral extraction at Earls Barton Quarry as shown on drawing reference EB 1 presented at Appendix ESSD C and the phases are sub divided. As explained above, the site which is the area the subject of the Environmental Permit application is limited to those areas in Phases 1 and 3 in which waste will be deposited (Figure ESSD 2). No waste will be deposited in the southern half of Phases 1B and 1F, in Phases 1C to 1E, in the Plant Area or in Phase 2 where the extent of quarrying operations extends beyond the Environmental Permit application boundary. It is understood that these areas will be backfilled with site derived overburden material as part of the quarrying operation. The area in which waste will be deposited in Phase 1 (referred to as Phase 1) is centred approximately on National Grid Reference (NGR) SP 850 623 (Phases 1A and 1B) and NGR SP 844 623 (Phases 1F and 1G) between the River Nene to the south and the A45 to the north. The areas in which waste will be deposited in Phase 3 (referred to as Phase 3) is centred approximately on NGR SP 831 624 adjacent to and south of the A45. The River Nene is approximately 250m south of Phase 1 and approximately 0.8km south of Phase 3. The area the subject of the Environmental Permit application is approximately 21 hectares. The site is accessed from Grendon Road through a

private access point which connects to the A45 to the north of Phase 1 (Figure ESSD 2).

- 1.5** The whole of Phase 1 at Earls Barton Quarry is being worked in 8 sub phases referenced A to G and the Plant Area in a generally clockwise direction (Figure EB 1 at Appendix ESSD C). Mineral extraction operations have yet to commence in Phase 3. The whole of Phase 3 at Earls Barton Quarry will to be worked in 2 sub phases referenced A and B (Figure EB 1 at Appendix ESSD C). Prior to the extraction of sand and gravel ground levels in Phase 1 fell gently from approximately 51mAOD in the north to approximately 48mAOD in the south. The grounds levels in Phase 3 fall gently from approximately 53mAOD in the north to approximately 51mAOD in the south. The results of the topographical survey carried out at the site on 16 November 2020 are presented on the drawing presented at Appendix ESSD D. Earls Barton Quarry is being dewatered and the mineral is worked dry with the extracted being discharged to other areas of the Earls Barton Quarry site or to the River Nene. It is understood that Breedon hold an Environmental Permit reference EPR/GB3499EJ for the discharge of trade effluent comprising site drainage to the River Nene in the vicinity of the site.
- 1.6** With the exception of the A45, the site is located in a predominantly rural setting. The closest residential receptors to Phase 1 comprises a caravan park approximately 180m to the east. The caravan park is set amongst and generally to the north of a transport services depot. White Mills Marina is located approximately 400m east-south east of Phase 1. There is a residential property approximately 390m north of Phase 1 beyond the A45. The residential property is located adjacent to and north of Whites Nursery which is located approximately 240m north of Phase 1. There are no residential receptors within 500m of Phase 3. The closest properties to Phase 3 comprise the service stations on the A45 with the northern service station location approximately 350m to the west – north west.
- 1.7** There are several public rights of way in the vicinity of the site as shown on Figure ESSD 2. Footpath TC17 runs in a generally south westerly direction along the River Nene approximately 250m south of Phase 1 to a location approximately 390m south of Phase 1 where it joins Bridleway KF19 from the north, Bridleway KF20 from the south and Footpath KF4 from the south west. Bridleway KF19 joins Bridleway TC13 approximately 170m to the north. Prior to mineral extraction Bridleway TC13 ran in

a generally north east direction through the southern part of Phase 1 of Earls Barton Quarry to the south of the site. It is understood that Bridleway TC13 has been diverted round the southern boundary of Phase 1D before running northerly between Phase 1C and Phases 1D and 1E. There is a byway which runs in a generally westerly direction from the north western corner of Phase 1 to the south western corner of Phase 3. The eastern end of the byway is number TC12 and the mid and western sections of the byway is number TE11. It is understood that the eastern end of Byway TC12 and the northern end of the diverted route of Bridleway TC13 are joined by a generally north south running track adjacent to and to the east of Phase 1A and between Phase 1A and the Plant Area. Adjacent to the south western corner of Phase 3 Byway TE11 joins Byway TE10 which runs in a generally north south direction to the east of Phase 3 and south of Phase 3.

- 1.8** Based on information provided by Breedon it is understood that there is a gas pipeline which runs in a generally north south direction adjacent to and to the east of Phase 1A and between Phase 1A and the Plant Area.
- 1.9** Based on information reviewed on the Defra MAGIC website the Upper Nene Valley Gravel Pits SSSI is located approximately 600m to the east – south east of the site and the Upper Nene Valley Gravel Pits Ramsar Site is located approximately 1.0km to the east – south east of the site. The Upper Nene Valley Gravel Pits Ramsar Site has additionally been scheduled as a Special Protection Area (SPA). There are no Special Areas of Conservation (SACs), Local Nature Reserves (LNRs) or National Nature Reserves (NNRs) located within 2km of the site.



## 2. Source

### Historical Development

- 2.1** Historical maps for the period 1884 to 2019 are provided with the Envirocheck reports presented at Appendix ESSD E and Appendix ESSD F for the site. With the exception of changes to the field boundaries and tracks no historical developments are shown on the historical maps within Phase 3. Several small gravel pits are shown on the 1:10,560 scale historical map dated 1952 to the south of the eastern part of Phase 1.
- 2.2** Sewage tanks and filter beds are shown on the 1900 1:2,500 scale historical map in an area adjacent to and to the north of Phase 3. From 1925 the area is labelled on historical maps as a sewage works or works. On the 1967 map the works no longer are shown and the former location of the works is occupied by an area of woodland labelled "Commander's Spinney".
- 2.3** Based on the Envirocheck report the southern part of an historical landfill is located in the central part of Phase 1 which is currently occupied by the plant site. Based on the information available the boundary of the historical landfill extended to the north west towards and beyond the A45 dual carriageway external to the site boundary. The landfill site was operational between 1980 and 1991 and accepted inert waste. There is reference in the Hydrological and Hydrogeological Assessment Report prepared in support of the application for planning permission reference 07/00050/MINFUL<sup>2</sup> to a backfilled borrow pit located in the central part of Phase 1 which was formed during the construction of the A45 trunk road by Sir Alfred McAlpine & Co. Ltd.
- 2.4** Historical landfill data provided by the EA shows that within the boundary of a lake located approximately 220m south west of Phase 1 13 discrete areas of historical landfill are recorded all of which are associated with a former landfill site recorded as accepting inert waste between 1989 and 1993. Details of historical landfill sites within approximately 5km of a point located approximately at the centre of the site are provided at Appendices ESSD E and ESSD F. A historical landfill site is located east of Phase 1G in Plant Area. A historical landfill has not been identified by Breedon during the operation of the Plant Area but mineral extraction operations have not been

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<sup>2</sup> Scott Doherty Associates. 2008. Proposed sand & gravel workings on land at Earls Barton. Hydrological and hydrogeological assessment. Revised report. Report reference SDA/07022/Final dated February 2008.

carried out in the Plant Area by Breedon. Based on discussions with Breedon it is understood that historical landfill in the Plant Area may comprise material that was deposited during the construction of the A45.

- 2.5 Information provided by the EA in respect of pollution incidents in the area of the site are presented in Section 3.

### **Proposed Development**

- 2.6 As explained in Section 1 there are three main phases of mineral extraction at Earls Barton Quarry as shown on drawing reference EB 1 presented at Appendix ESSD C and the phases are sub divided. The site, which is the area the subject of the Environmental Permit application, is limited to those areas in Phases 1 and 3 in which waste will be deposited (Figure ESSD 2). No waste will be deposited in the southern half of Phase 1 or in Phase 2. It is anticipated that approximately 250,000m<sup>3</sup> of inert waste materials will be needed to complete the restoration of Phase 1 and Phase 3. On site overburden and quarry waste materials are being used to restore the remainder of Phases 1 and 3 together with Phase 2. The consented restoration scheme is to agriculture and nature conservation interest which is shown on drawings references E18/04 (Phases 1 and 2) and E18/05 (Phase 3) presented at Appendices ESSD K and ESSD L respectively. As explained in Section 1 the site is accessed from Grendon Road through a private access point which connects to the A45 to the north of Phase 1 (Figure ESSD 2). Internal haul roads are constructed as necessary to provide access across the site.

- 2.7 Condition 3 of the 2016 planning permission as amended by the 2019 NMA states that:-

*'Except where modified by this schedule of conditions, the development hereby approved shall only be carried out in accordance with the following documents and plans, unless otherwise agreed in writing with the Mineral Planning Authority:*

[inter alia]

*b) Drawing No. E18/04*

*c) Drawing No. E18/05'*

- 2.8** The total quantity of waste that will need to be deposited to complete the restoration scheme is limited by the final levels shown on the approved restoration plans which are presented at Appendices ESSD K and L.
- 2.9** The waste types that will be accepted at the site the subject of the Environmental Permit are presented in Section 2 of the application report. Detailed waste acceptance procedures will be in place to minimise the risk that unacceptable waste materials will be accepted at the site and procedures will be in place for the rejection of non-conforming loads. The waste acceptance procedures are presented at Appendix K of the application report. The receipt, handling and storage of materials are the subject of procedures in the company management system which is the subject of the ISO 14001 Environmental Management System (EMS). A summary of the EMS is presented at Appendix I of the application report.

### 3. Pathway and receptor

#### Geology

- 3.1** The geology at and in the vicinity of site is taken from the British Geological Survey (BGS) 1:50,000 scale Solid and Drift edition Sheet 186 Wellingborough, logs of mineral exploration boreholes and groundwater monitoring boreholes drilled at and in the vicinity of the site and information made available online by the BGS including geological mapping. A plan showing the geology at and in the vicinity of the site is presented on Figure ESSD 8 and indicative hydrogeological cross sections are presented on Figure ESSD 11 and a plan showing the location of the cross sections on Figure ESSD 11A.
- 3.2** The available logs for mineral proving boreholes and groundwater monitoring boreholes drilled at and in the vicinity of the site are presented at Appendix ESSD G together with a drawing (reference BRE/EA/11-19/21489) showing the location of the boreholes. Logs are available for twenty-three mineral proving boreholes and six groundwater monitoring boreholes drilled in October 2019. The approximate locations of the groundwater monitoring boreholes are shown on Figure ESSD 10. The approximate locations of the mineral proving boreholes are shown on drawing reference BRE/EA/11-19/21489 presented with the logs at Appendix ESSD G.
- 3.3** Based on the BGS geological mapping Phase 3 is underlain by Quaternary River Terrace Deposits (undifferentiated). The majority of Phase 1 is underlain by Quaternary River Terrace Deposits. In the vicinity of Phase 3 the River Terrace Deposits are designated the Ecton Member which is part of the Quaternary Nene Valley Formation. The River Terrace Deposits comprise sands and gravels. Based on the BGS geological mapping Alluvium comprising silt and clay with peat lenses is recorded overlying the River Terrace Deposits in the west of Phase 1. The Alluvium is associated with the Earls Barton Brook which is also referred to as Sywell Brook in some sources including the EA Catchment Data Explorer website. Earls Barton Brook flows from north to south in proximity to the western boundary of Phase 1.
- 3.4** Based on the logs for boreholes GW4, GW5 and GW6 presented at Appendix ESSD G the superficial deposits in Phase 1 comprise typically between 0.85m and 1.4m of clay overlying a unit of predominantly sand and gravel between approximately 1.0m and approximately 6.5m in thickness. The sand and gravel unit is made up of

individual layers of sand, gravel, sand and gravel and clay of variable thickness. The proportion of clay within the main sand and gravel unit is variable. At groundwater monitoring borehole GW4 in the north west of Phase 1 the recorded thickness of the main sand and gravel unit is 6.3m. There is a clay layer 2.2m in thickness recorded within the sand and gravel unit and the total thickness of sand and gravel proved above and below the clay layer is approximately 4.1m. At boreholes GW5 and GW6 located to the south of Phase 1 no discrete clay layer is recorded within the main sand and gravel unit. In Phase 3 a clay layer typically between 0.9m and 4.0m in thickness overlies a unit of predominantly sand and gravel between approximately 0.5m and approximately 5.05m in thickness. Clay layers up to 0.5m in thickness are recorded in the sand and gravel unit in several of the mineral proving boreholes.

- 3.5** Based on the BGS geological mapping the superficial deposits at the site are underlain by the Whitby Mudstone Formation of the Lias Group. The Whitby Mudstone Formation comprises predominantly mudstone and siltstone. Based on logs of boreholes made available on the BGS website the log of borehole SP86SW1/A-R located approximately 1.3km south west of Phase 3 records approximately 4.57m of Whitby Mudstone Formation. Borehole SP86SW154 located approximately 1.2km west of Phase 3 records approximately 10.14m of Whitby Mudstone Formation. The base of the Whitby Mudstone Formation was not proved in either of the boreholes. The thickness of the Whitby Mudstone Formation recorded on BGS 1:50,000 scale Solid and Drift edition Sheet 186 Wellingborough is between 20m and 65m.

### Hydrology

- 3.6** The hydrology at and in the vicinity of the site is based on a review of published Ordnance Survey maps and information provided by the EA. The watercourses and water bodies in the vicinity of the site are shown on Figures ESSD 1 and ESSD 2.
- 3.7** The River Nene is located at its closest approximately 250m to the south of Phase 1. The River Nene is located at its closest approximately 0.8km south of Phase 3. The Earls Barton Brook is located adjacent to and west of the western boundary of Phase 1 and flows to the south to a confluence with a channel linking the lake located approximately 150m south west of Phase 1 with the River Nene. Ecton Brook flows in a southerly direction approximately 80m west of Phase 3.

- 3.8** White Mills Marina is located approximately 400m east-south east of Phase 1. A series of lakes adjacent to the River Nene are located east of Phase 1 with the closest lake located approximately 1.13km east of the site. Several water bodies located in areas of former mineral extraction are located near the site with a lake located approximately 150m south west of Phase 1 and two smaller lakes located approximately 640m south and 675m south-south east of Phase 3.
- 3.9** Based on information presented on the National River Flow Archive (NRFA) website the EA maintains a river flow gauging station on the River Nene located near Upton approximately 11km west and upstream of the site. It is reported that the 95% exceedance flow (Q95) at Upton gauge is 0.278m<sup>3</sup>/s. Downstream of the site there is a gauging station on the River Nene at Orton located approximately 46km north east of the site at which the reported 95% exceedance flow (Q95) is 1.104m<sup>3</sup>/s.
- 3.10** Based on the EA Flood map for Planning dataset the majority of the site is located in Flood Zone 1 which is defined as land having less than 1 in 1000 annual probability of river flooding. A small area located in the south east of Phase 1 is located within Flood Zone 2 associated with the River Nene to the south of the site. Flood Zone 2 is defined as land having between a 1 in 100 and 1 in 1000 annual probability of river flooding.
- 3.11** Based on information provided by the EA no major or significant pollution incidents have been recorded within the site boundary. There is one 'Significant' pollution incident to water located within a 2km radius of the site boundary. The pollution incident is recorded approximately 1.8km south west of Phase 3 with the pollutant recorded as natural organic material and the cause of the incident recorded as algal activity. Details of past pollution incidents within approximately 5km of a point located approximately at the centre of the site are provided at Appendix ESSD H.
- 3.12** The quality of the surface water in the vicinity of the site is classified by the EA under the Water Framework Directive (WFD). The EA WFD classifications are presented on the EA Catchment Data Explorer website. Earls Barton Brook was classified by the EA in 2016 as having a 'Good' chemical quality and a 'Poor' ecological quality. The reach of the River Nene in the vicinity of the site was classified by the EA in 2016 as having a 'Good' chemical quality and a 'Moderate' ecological quality.

- 3.13** Based on information provided by the EA there are no licensed surface water abstractions located within the site boundary. There is one licensed surface water abstraction located approximately 260m south of Phase 1 as shown on Figure ESSD 9. The purpose of the abstraction is mineral washing and the water is abstracted from the River Nene. There are no other licensed surface water abstractions within 2km of the site. Details of surface water abstractions located approximately 5km of a point located approximately at the centre of the site are provided at Appendix ESSD H.

### **Hydrogeology**

- 3.14** The hydrogeology at and in the vicinity of the site is based on the available geological information described above together with groundwater level and groundwater quality monitoring data provided by Breedon and information on groundwater abstractions provided by the EA and information presented on the MAGIC website.

### **Aquifer Characteristics**

- 3.15** The superficial deposits at the site are designated as a Secondary A Aquifer by the EA which is defined as 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers'. The Whitby Mudstone Formation is designated as unproductive strata by the EA. Unproductive strata is defined by the EA as 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'.
- 3.16** Based on information provided by the EA there is one licensed groundwater abstraction within 2km of the site as shown on Figure ESSD 9. Groundwater is abstracted from a mineral extraction located 1.10km east of the site. The water is used for washing and dust suppression in the production of mineral products. Details of additional licensed groundwater abstractions located within approximately 5km of a point located approximately at the centre of the site are provided at Appendix ESSD H.
- 3.17** Based on information made available online by the EA the site is not located within 5km of a groundwater Source Protection Zone (SPZ) for public drinking water supply.

A private groundwater abstraction is located approximately 4.40km south of the site at Denton Nurseries with an annual abstraction rate of 73m<sup>3</sup>.

### Groundwater Flow

- 3.18** Groundwater levels in the superficial sand and gravel superficial deposits are monitored currently in a network of groundwater monitoring boreholes located in the vicinity of the site. The locations of the current groundwater monitoring borehole network is shown on Figure ESSD 10. Groundwater level monitoring data from the current network of monitoring boreholes from October 2019 is provided at Appendix ESSD I with a groundwater level hydrograph presented at Appendix ESSD J. The logs for the groundwater monitoring boreholes drilled in 2019 are presented at Appendix ESSD G. In addition to the groundwater monitoring boreholes drilled in 2019 groundwater levels are also monitored currently in borehole BHF which is an existing borehole identified in 2019 to the south of Phase 3.
- 3.19** Based on the hydrograph presented at Appendix ESSD J the groundwater levels in the vicinity of the western part of the site range generally between approximately 50m above Ordnance Datum (mAOD) in borehole GW1 located to the north of Phase 3 to approximately 48mAOD to the south of Phase 3 at boreholes GW2, GW3 and BHF. In the vicinity of Phase 1 groundwater levels range generally between approximately 49.5mAOD at borehole GW4 located in the north of Phase 1 to approximately 46mAOD to the south of Phase 1 at boreholes GW5 and GW6. The variation during the monitoring period in groundwater levels at individual boreholes is approximately 1m.
- 3.20** Indicative contours of groundwater levels recorded on 11 July 2007, 30 October 2019, 15 January 2020 and 31 March 2020 are shown on Figure ESSD 13. Consistent with Figure ESSD 13 the general direction of groundwater flow at and in the vicinity of the site is to the south or south east towards and in the direction of flow of the River Nene. The locations of the indicative hydrogeological cross sections at the site are shown on Figure ESSD 11A. The indicative hydrogeological cross sections through the site are shown on Figure ESSD 11. An indicative groundwater level interpolated based on groundwater levels recorded on 10 November 2020 is shown on the sections.
- 3.21** A network of groundwater monitoring boreholes previously was established in the vicinity of Phase 1 and was monitored during the period of 13 February 2007 to 11



July 2007. It is understood that boreholes monitored in 2007 generally are no longer accessible or can no longer be located. The groundwater level monitoring data from 2007 is presented at Appendix ESSD I and the locations of the boreholes monitored in 2007 are shown on Figure ESSD 13. Indicative contours of groundwater levels recorded on 11 July 2007 are presented on Figure ESSD 13. It is considered that the groundwater level data recorded in the vicinity of the site in 2007 is consistent generally with the recent groundwater monitoring data and provides additional confidence that the general direction of groundwater flow in the vicinity of the site is to the south or south east.

### ***Groundwater Quality***

- 3.22** Since January 2020 Breedon has been undertaking groundwater quality monitoring at seven groundwater monitoring boreholes in the vicinity of the site generally on a weekly basis between January 2020 and April 2020. The monitoring frequency was reduced to monthly from May 2020 to October 2021. Graphs showing the variation in groundwater quality at the boreholes in the vicinity of the site are presented at Appendix ESSD J. On the graphs presented at Appendix ESSD J concentrations recorded as below the analytical limit are plotted at the concentration of the detection limit.
- 3.23** Ammoniacal nitrogen concentrations at the site range typically from below the detection limit of 0.01mg/l to 0.9mg/l. Higher ammoniacal nitrogen concentrations up to 0.9mg/l have been recorded at borehole GW2 located south of Phase 3. With the exception of boreholes GW1 and GW4 chloride concentrations range typically between 28mg/l and 167mg/l. The chloride concentrations recorded at borehole GW1 to the north of Phase 3 typically are lower, the highest concentration recorded was 16mg/l. The highest chloride concentrations are recorded in borehole GW4 located in the north of Phase 1 with the maximum concentration recorded at 216mg/l on 7 January 2020. Although sulphate concentrations vary between 48mg/l and 200mg/l, significantly lower maximum concentrations were recorded at 67mg/l and 71mg/l at boreholes GW1 and GW4 respectively. The highest electrical conductivity (EC) values recorded was 1340µS/cm at borehole GW4. The lowest EC values were recorded at borehole GW1 in the range 413µS/cm to 610µS/cm.

#### 4. Pollution control measures and monitoring

##### Basal and side slope engineering

4.1 The works comprise the deposition of waste on land as a disposal activity, specifically as an inert waste landfill operation, to restore Earls Barton Quarry to agriculture and nature conservation interest. The restoration works will be carried out progressively and prior to the placement of the inert waste into each phase dewatering will continue from the mineral extraction operations such that wastes will not be deposited directly into water.

4.2 The waste materials imported to the site will comprise a limited range of inert wastes only. Inert waste is defined in the EU Landfill Directive (Council Directive 1999/31/EC) as:

*'...waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the eco toxicity of the leachate must be insignificant, and in particular not endanger the quality of surface water and/or groundwater'.*

4.3 It is considered that the waste does not comprise a contaminant source with the potential to have a significant detrimental effect on groundwater quality. In accordance with guidance from the EA it is understood that for sites which do not have a natural geological barrier equivalent to a 1m thick mineral layer with a hydraulic conductivity no greater than  $1 \times 10^{-7}$  it is necessary to establish artificially a geological barrier. The excavation of the site will comprise the removal of the superficial deposits only. As it is likely that the hydraulic conductivity of the natural geological barrier in the base of the site which is underlain by the Whitby Mudstone Formation is less than  $1 \times 10^{-7}$ m/s and the thickness of the natural geological barrier is in excess of 1m, an artificially established geological barrier will not be needed in the base of the site.

- 4.4** The side slopes of the excavation will comprise in situ permeable Quaternary River Terrace Deposits. In the southern areas of Phase 1B and Phase 1F, where the extent of quarrying operations extends beyond the Environmental Permit application boundary, the side slopes will be formed from backfilled site derived overburden material. As a result it will be necessary to construct a side slope artificial geological barrier against both the in situ permeable Quaternary River Terrace Deposits excavation side slopes and the backfilled side slopes constructed from placed site derived overburden material. The side slope artificial geological barrier will be constructed by placing carefully selected materials against the side slopes of the site to a minimum thickness of 1m perpendicular to the face of the slope. Basal and side slope engineering is described further in the SRA report. The construction of the artificial geological barrier will be the subject of Construction Quality Assurance (CQA) consistent with the conditions of the permit.

#### **Capping**

- 4.5** As the materials imported to the site will comprise inert waste materials only it is not necessary to construct a cap or to provide cap protection soils.

#### **Restoration**

- 4.6** Pursuant to the conditions of 2016 planning permission and the subsequent NMAs the site will be restored to agriculture and nature conservation interest. The approved restoration schemes for the site are presented at Appendix ESSD K and Appendix ESSD L.

#### **Water management**

- 4.7** Groundwater in the vicinity of the site is recorded in the mineral deposits. As explained above, pumping to facilitate dewatering is being carried out during the operational life of the mineral workings and will be carried out until the level of the filled material is above the natural groundwater level.

- 4.8 As the site will not be capped rainfall incident to the site will continue to either be lost through evapotranspiration, infiltrate to the ground or will run off to the wider surface water management system. It is not necessary to install a drainage layer at the site as inert waste only will be deposited at the site hence the site will present a negligible risk to controlled waters.

#### **Post closure controls (aftercare)**

- 4.9 Following the completion of infilling in the site, the land will be restored generally to original ground levels with subsoil and topsoil sufficient to support the restoration of the site to agriculture and nature conservation interest.
- 4.10 As no leachate, groundwater or landfill gas management systems will be installed the potential degradation of such systems over time is not relevant. The post closure monitoring that will be necessary at the site will be agreed with the EA prior to closure of the landfill.
- 4.11 Under the Environmental Permitting (England and Wales) Regulations 2016 a permit may be surrendered only when it is concluded that the facility no longer presents a risk to the environment in the absence of active controls as the waste has degraded such that emissions from the facility are acceptable. The site will be operated as an inert waste landfill site and there will be no active controls at the site. It is likely that permit completion will be attained when the site has been filled to achieve the restoration landform, a suitable soil cover has been placed to meet the specified requirements and the results of the environmental monitoring confirm the inert nature of the wastes deposited.

#### **Gas monitoring**

- 4.12 As the site comprises an inert waste landfill site it is considered that the guidance presented in LFTGN03<sup>3</sup> in respect of the scope of a gas risk assessment for the deposit of inert waste on land is the relevant guidance. In paragraph 2.3.1 of LFTGN03 it is stated that: -

*'New inert landfills ought not to pose a landfill gas hazard. The emphasis in the risk assessment should, therefore, be placed on*

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<sup>3</sup> Environment Agency Guidance on the management of landfill gas. LFTGN03. September 2004.

*the Waste Acceptance Procedures and particularly the waste characterisation and compliance monitoring measures introduced to ensure that only inert waste is deposited at the site. If these measures can be shown to be robust, then the landfill gas source should be demonstrably negligible. Provisions for the monitoring of gas within the waste body will normally be required at inert waste landfills.'*

- 4.13** The site will be the subject of an Environmental Permit restricting the waste types accepted at the site to inert wastes only hence in accordance with paragraph 2.3.1 of LFTGN03 should not pose a gas hazard. Robust waste acceptance procedures (WAP) will be implemented to minimise the risk that non-inert wastes will be accepted at the site. The robust WAP will form part of the externally accredited Environmental Management System (EMS) for the site. Based on the robust waste acceptance procedures it is concluded that the site will comprise a negligible source of gas.
- 4.14** Recommendations for in waste gas monitoring are presented in EA guidance entitled Landfill operators: environmental permits<sup>4</sup> (the monitoring and reporting guidance). The monitoring and reporting guidance states in the section entitled '*Monitor landfill gas*' that '*You can rely on searcher bar (also called spike test) monitoring where the total depth of waste is less than 4 meters or before each cell or area is complete.*' It is proposed, in line with monitoring and reporting guidance, that searcher bar monitoring is used to monitor gas from the inert waste materials during the operational period.
- 4.15** Although the maximum waste thickness may be up to 6m, it is anticipated that over a significant majority of the site the waste depth will not exceed 4m hence in accordance with the monitoring and reporting guidance it may not be necessary to install post closure in waste gas monitoring boreholes at the site. It is proposed that the need for post closure in waste gas monitoring boreholes will be determined based on the actual extracted profile and the restored profile and the need to install post closure in waste gas monitoring boreholes will be agreed with the EA with reference to the latest guidance.

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<sup>4</sup> Environment Agency. Landfill operators: environmental permits. Monitor and report your performance. Dated 30 January 2020. Updated 21 April 2021. Available at <https://www.gov.uk/guidance/landfill-operators-environmental-permits/monitor-and-report-your-performance>

**4.16** As it is anticipated that over a significant majority of the site the waste depth will not exceed 4m it is proposed, in line with EA guidance, that searcher bar monitoring is used to monitor gas from the inert waste materials during the post closure period. The number and locations of post closure searcher bar locations will be agreed with the EA with reference to the latest guidance. The programme of gas monitoring is presented in Table ESSD 1 and a Gas Action Plan is presented in the Landfill Gas Risk Assessment (LFGRA) at Appendix G of report reference BRE/EA/AW/5624/01/LFGRA (Table LFGRA 1). The post closure monitoring will be agreed with the EA.

#### **Groundwater monitoring and surface water monitoring**

- 4.17** No biodegradable waste materials will be deposited at the site which could result in the generation of leachate. Only inert wastes will be deposited at the site which have a limited potential for leaching of contaminants.
- 4.18** Nonetheless a programme of confirmatory groundwater monitoring is presented in Table ESSD 1. The monitoring will be carried out during the operation of the site and for a limited period following the restoration of the site. The monitoring locations are shown on Figure ESSD 10. As the proposed groundwater monitoring will be sufficient to confirm the environmental performance of the site it is considered unnecessary to monitor surface water quality. The post closure monitoring will be agreed with the EA.

## 5. Site Condition Report

- 5.1 The application is necessary to authorise the permanent deposit of waste on land as a disposal (landfill) activity to restore the site in accordance with the obligations in planning permission reference 15/00091/MINVOC as amended by the NMAs. Although now withdrawn the section of the ESSD guidance<sup>5</sup> which was relevant to preparation of a Site Condition Report stated:

*“A site condition report (SCR) is not necessary for parts of a permitted activity where you permanently deposit waste. A SCR is necessary for areas of the permitted site where you have not deposited any waste (e.g. site access areas, site offices, weigh bridge, wheel wash etc.)”*

- 5.2 As the Environmental Permit boundary comprises only the extent of the area in which waste will be deposited permanently there are no areas of the site in which waste will not be deposited. Notwithstanding the ESSD guidance has been withdrawn it is still considered unnecessary to provide an SCR with the application.

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<sup>5</sup> Conceptual Site Model, Environmental Setting and Site Design Report” Version 1 dated 14 October 2016

**TABLES**



Table ESSD 1

## Programme of environmental monitoring during the operational phase of the site

	Location	Frequency	Determinants
Groundwater	Groundwater monitoring locations: <sup>1</sup>  GW1 GW2 GW3 GW4 GW5 GW6 BHF	Quarterly	Groundwater level and depth to base.  pH, electrical conductivity, ammoniacal nitrogen, chloride, lead, nickel, zinc, sulphate and total organic carbon (TOC)
Gas (searcher bar locations internal to the waste)	Gas monitoring locations:  Two points per hectare <sup>2</sup>	Six-monthly	Methane, carbon dioxide and oxygen concentrations and the differential pressure <sup>3</sup> .

**Notes**

1. The site layout and the environmental monitoring locations (drawing reference BRE/EA/03-20/21657) is shown on Figure ESSD 10.
2. The post closure monitoring will be agreed with the EA with reference to the latest guidance prior to the completion of the site restoration.
3. Meteorological and ground conditions will be recorded during each monitoring visit.

**FIGURES**



### Key / Notes



Approximate boundary of the site  
the subject of the Environmental  
Permit application

Rev	Final	HM	LBA	GT	22/02/22
	Status	Drn	App	Chk	Date

Site  
**EARLS BARTON QUARRY**



Title  
The site location

Figure ESSD 1      Scale  
1:50,000@A4

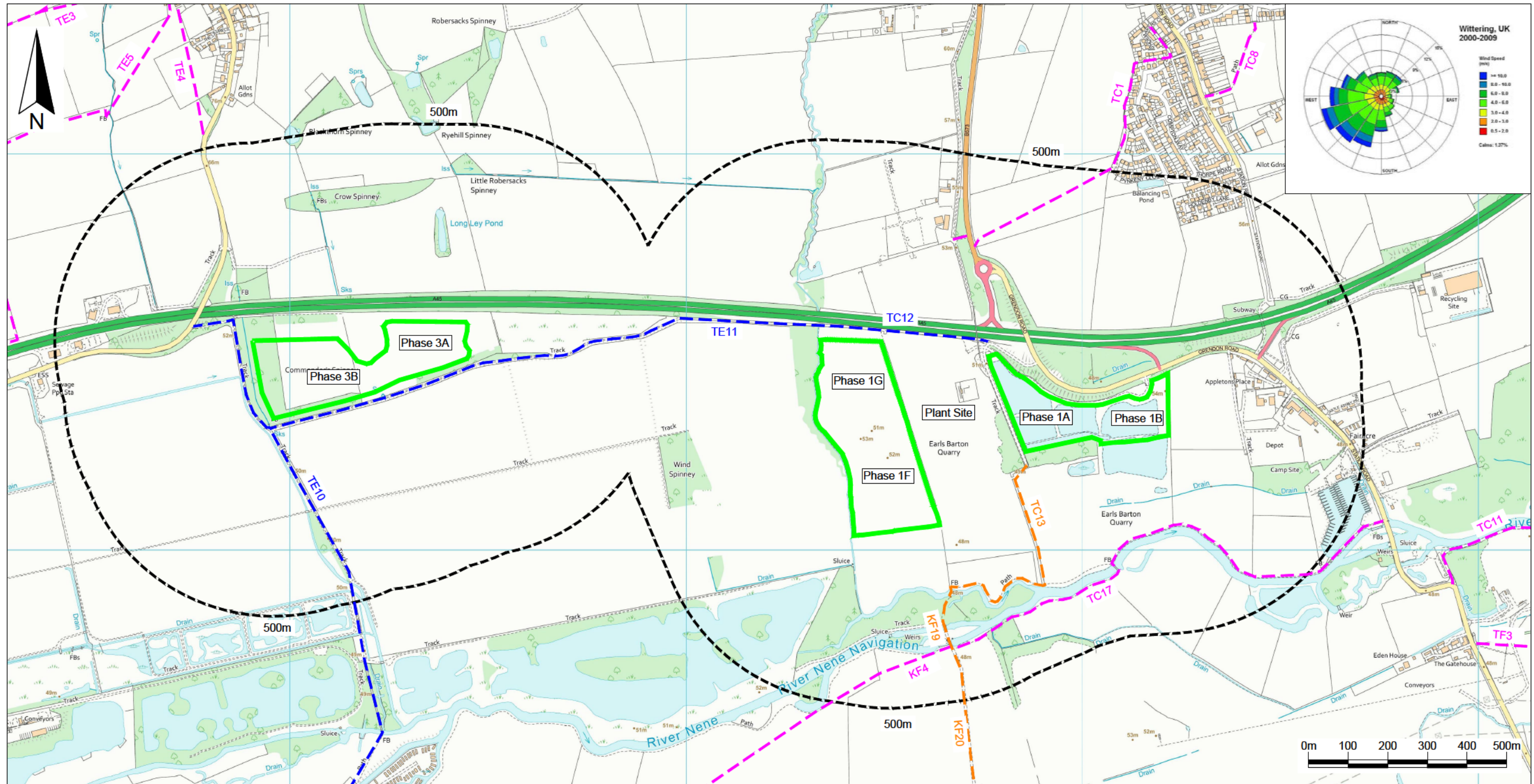
Drawing Ref  
BRE/EA/03-20/21678

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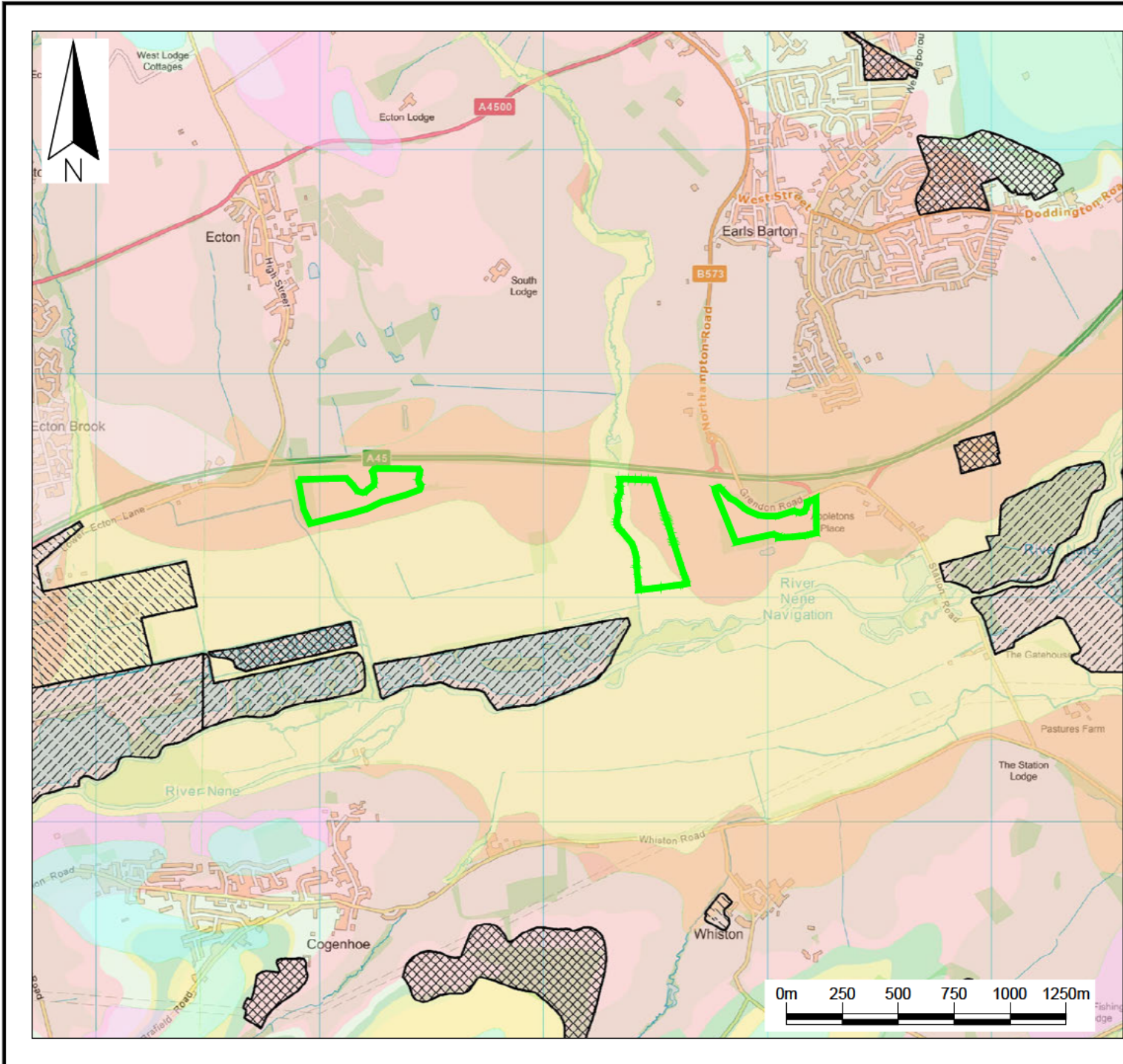


**Key / Notes**

- Approximate boundary of the site the subject of the Environmental Permit application
- Bridleway
- Byway
- 500m distance from the site
- Footpath

**Note:**  
 The approximate site boundary is based on SLR drawing reference EB1 entitled "Working Phasing Scheme" dated August 2015 and discussions with Breedon

Rev	Final	KR	LBA	GT	22/02/22
	Status	Dm	App	Chk	Date
Site EARLS BARTON QUARRY					
Client 					
Title Plan showing receptors within the vicinity of the site					
Figure ESSD 2				Scale 1:10,000@A3	
Drawing Ref BRE/EA/09-21/22756					



**Key / Notes**

Approximate boundary of the site the subject of the Environmental Permit application

**Artificially Modified Ground**  
 Infilled ground  
 Disturbed ground (undivided)  
 Landscaped ground (undivided)

**Superficial Deposit**  
 Alluvium  
 River Terrace Deposits  
 Oadby Member  
 Glaciofluvial deposits  
 Alluvial fan deposits

**Bedrock**  
 Blisworth Limestone Formation  
 Wellingborough Limestone Member  
 Stamford Member  
 Northampton Sand Formation (Inferior Oolite Group)  
 Whitby Mudstone Formation (Lias Group)

Great Oolite Group  
 Rutland Formation

	Final	HM RLW	GT	22/02/22
Rev	Status	Drn App	Chk	Date

Site  
 EARLS BARTON QUARRY

Client

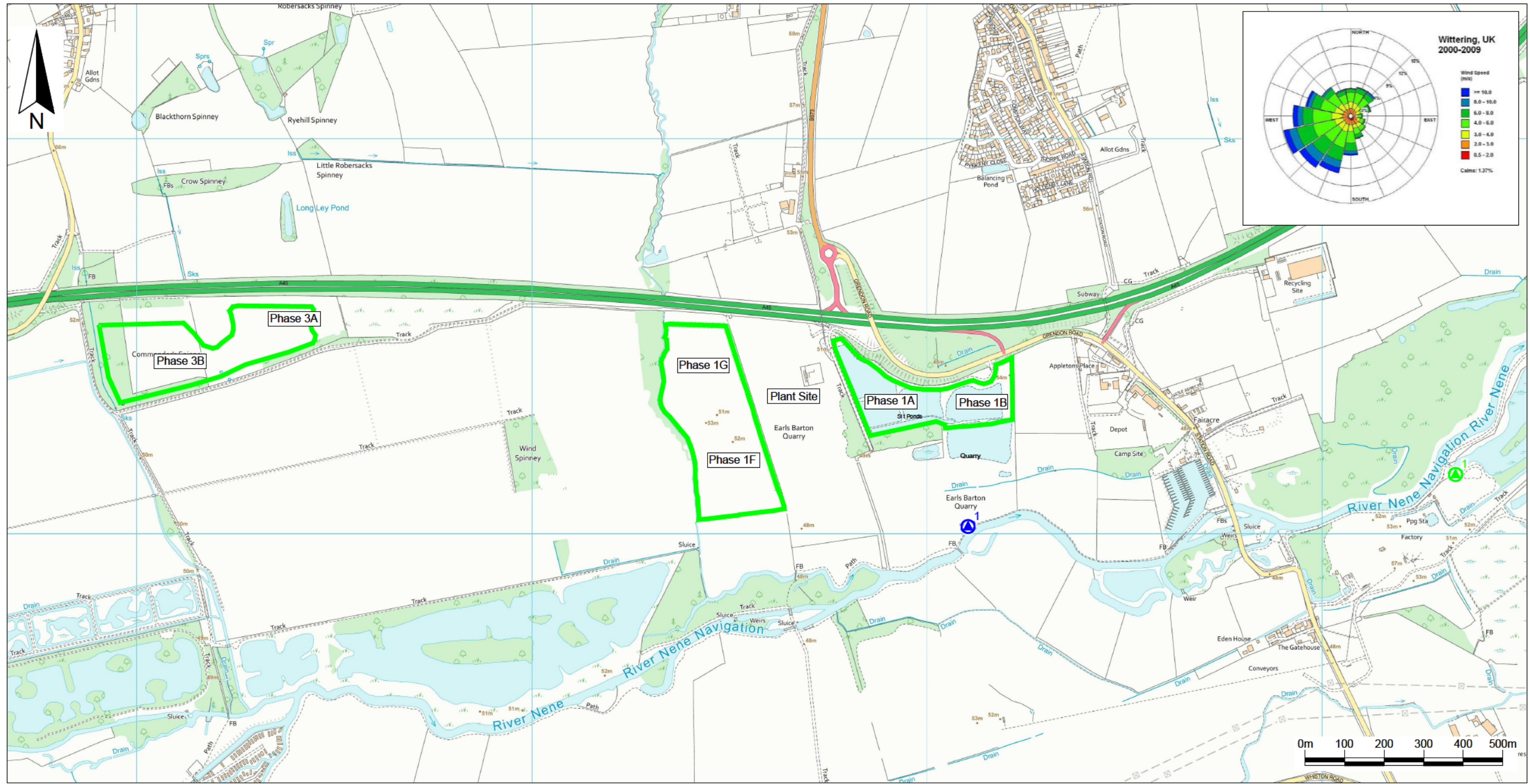
Title  
 The regional geology of the site and the surrounding area

Figure ESSD 8      Scale 1:25,000@A4




Drawing Ref  
 BRE/EA/03-20/21658

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**Key / Notes**

-  Approximate boundary of the site the subject of the Environmental Permit application
-  Location of a groundwater abstraction
-  Location of a surface water abstraction

Rev	Final	HM	RLW	GT	22/02/22
	Status	Dm	App	Chk	Date

Site  
EARLS BARTON QUARRY

Client  

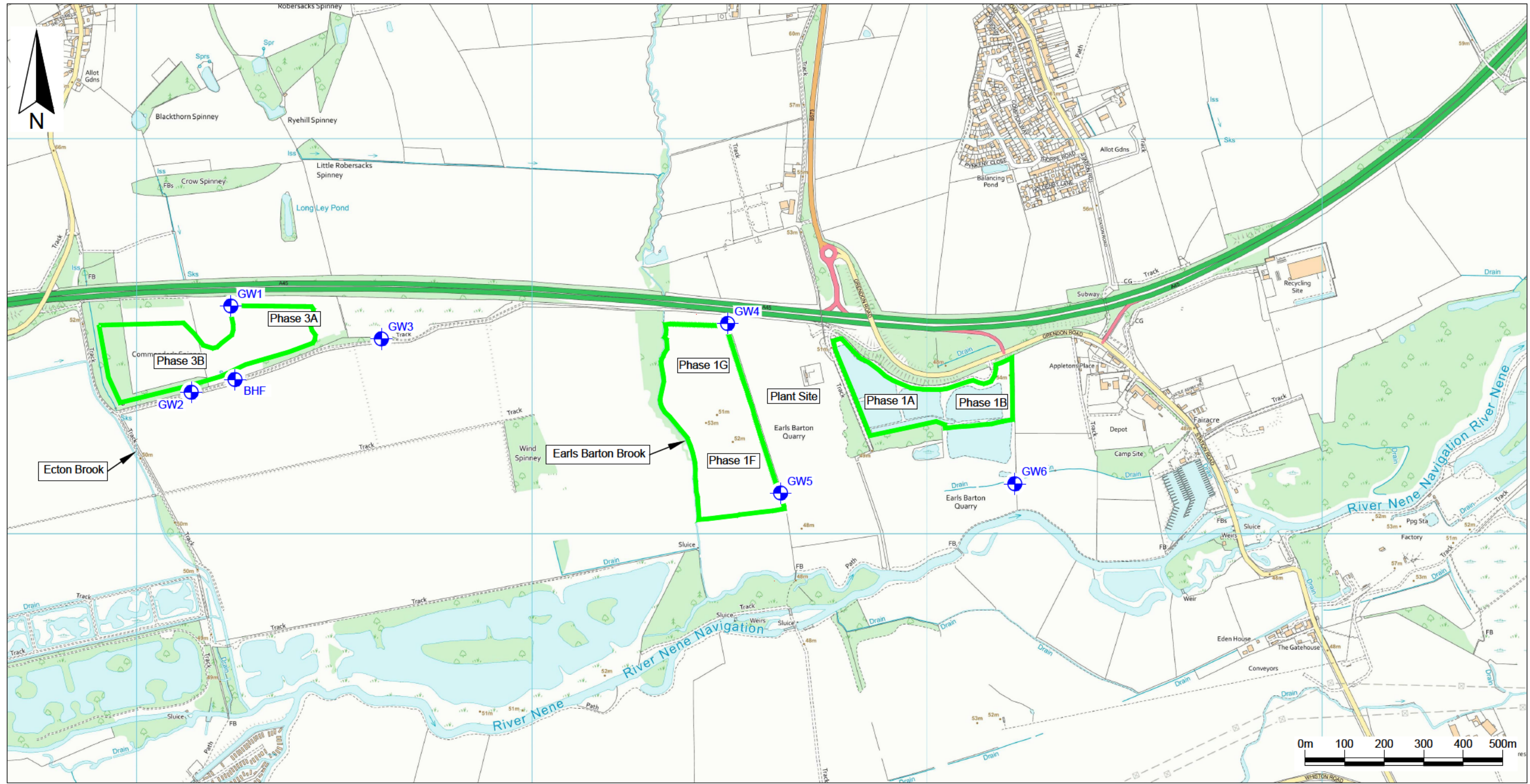

Title  
The approximate locations of groundwater and surface water abstractions within 2km of the site

Figure ESSD 9      Scale  
1:10,000@A3


Drawing Ref  
BRE/EA/03-20/21667


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**Key / Notes**

 Approximate boundary of the site the subject of the Environmental Permit application

 <sup>GW1</sup> Location of a groundwater monitoring borehole drilled in 2019

	Final	HM	RLW	GT	22/02/22
Rev	Status	Dm	App	Chk	Date

Site  
EARLS BARTON QUARRY

Client  

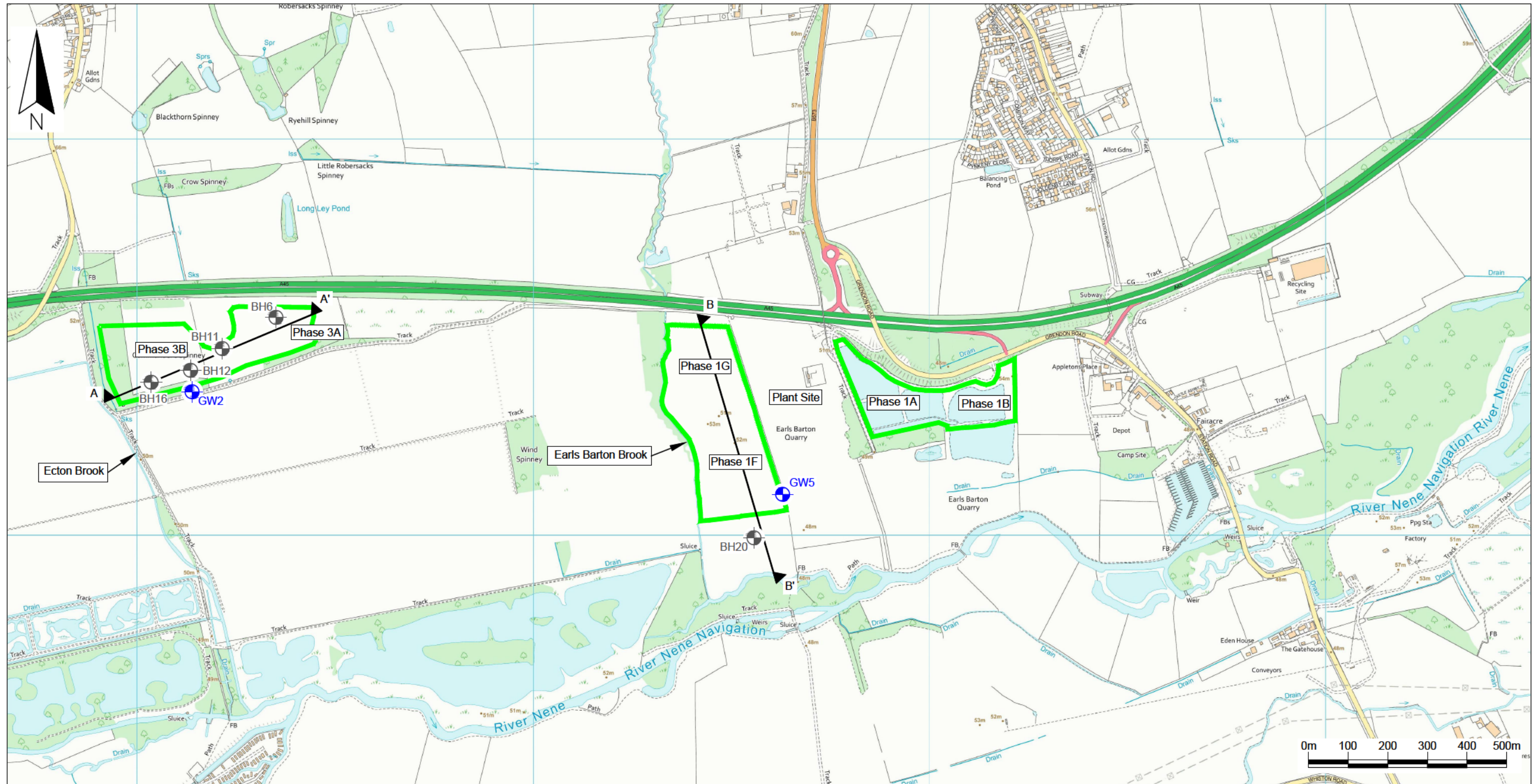

Title  
Plan showing the site layout and the environmental monitoring locations.

Figure ESSD 10      Scale  
1:10,000@A3





Drawing Ref  
BRE/EA/03-20/21657







**Key / Notes**

- 
Approximate boundary of the site the subject of the Environmental Permit application
  
- 
Location of cross section (the cross sections are shown on drawing reference BRE/EA/05-20/21774)
  
- 
GW5 Location of a groundwater monitoring borehole drilled in October 2019
  
- 
BH6 Mineral proving boreholes drilled in 2019

Rev	Final	HM	RLW	GT	22/02/22
	Status	Dm	App	Chk	Date

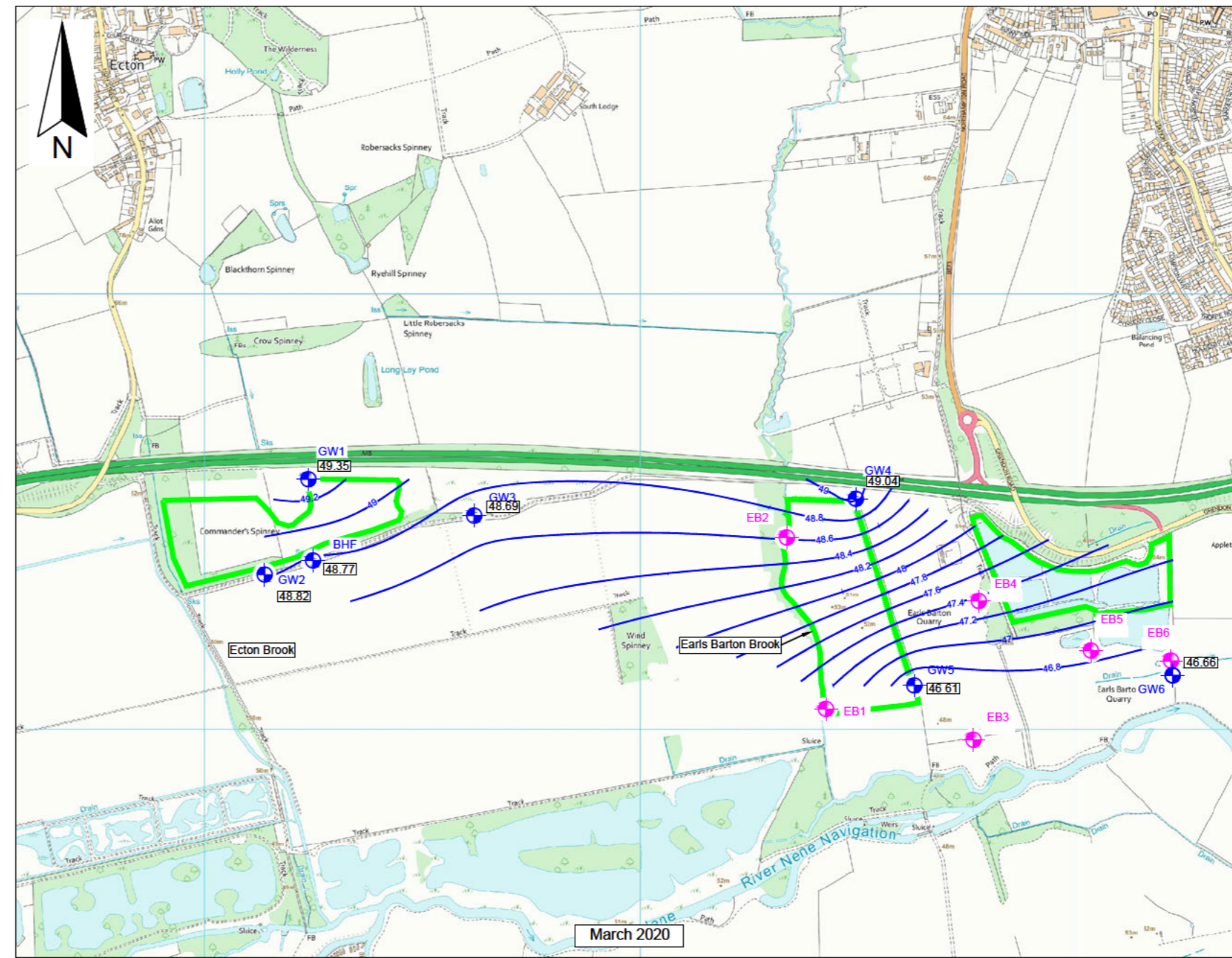
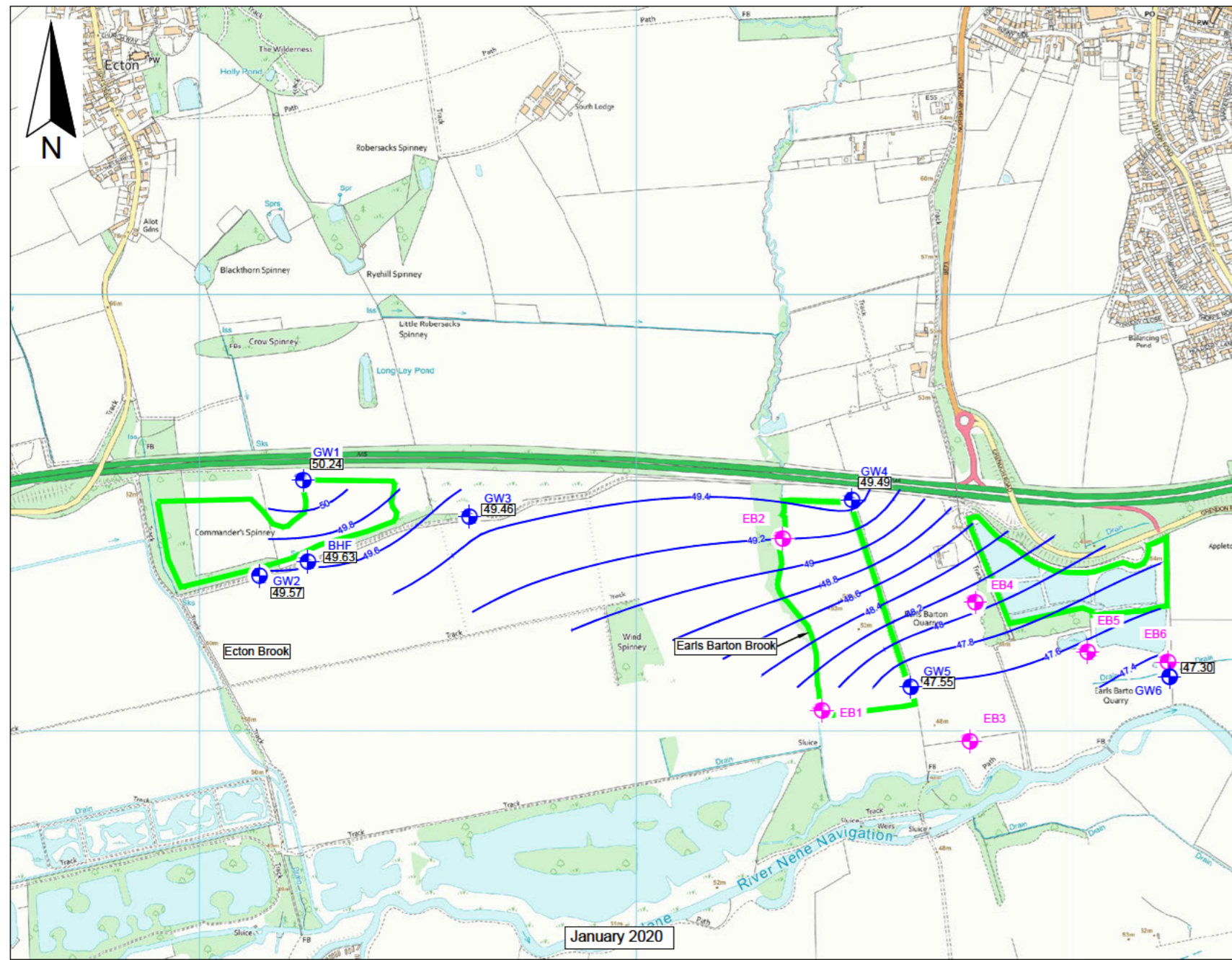
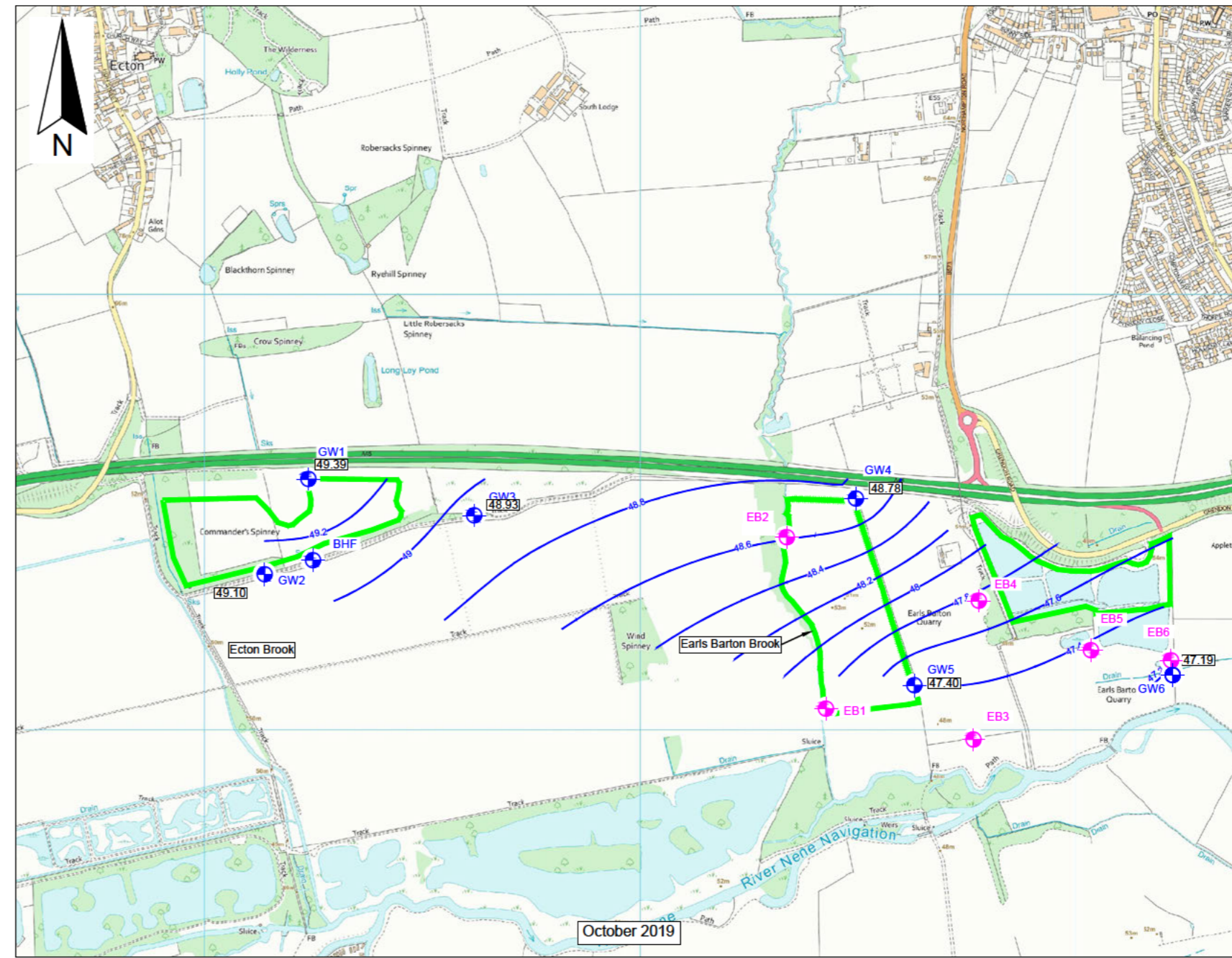
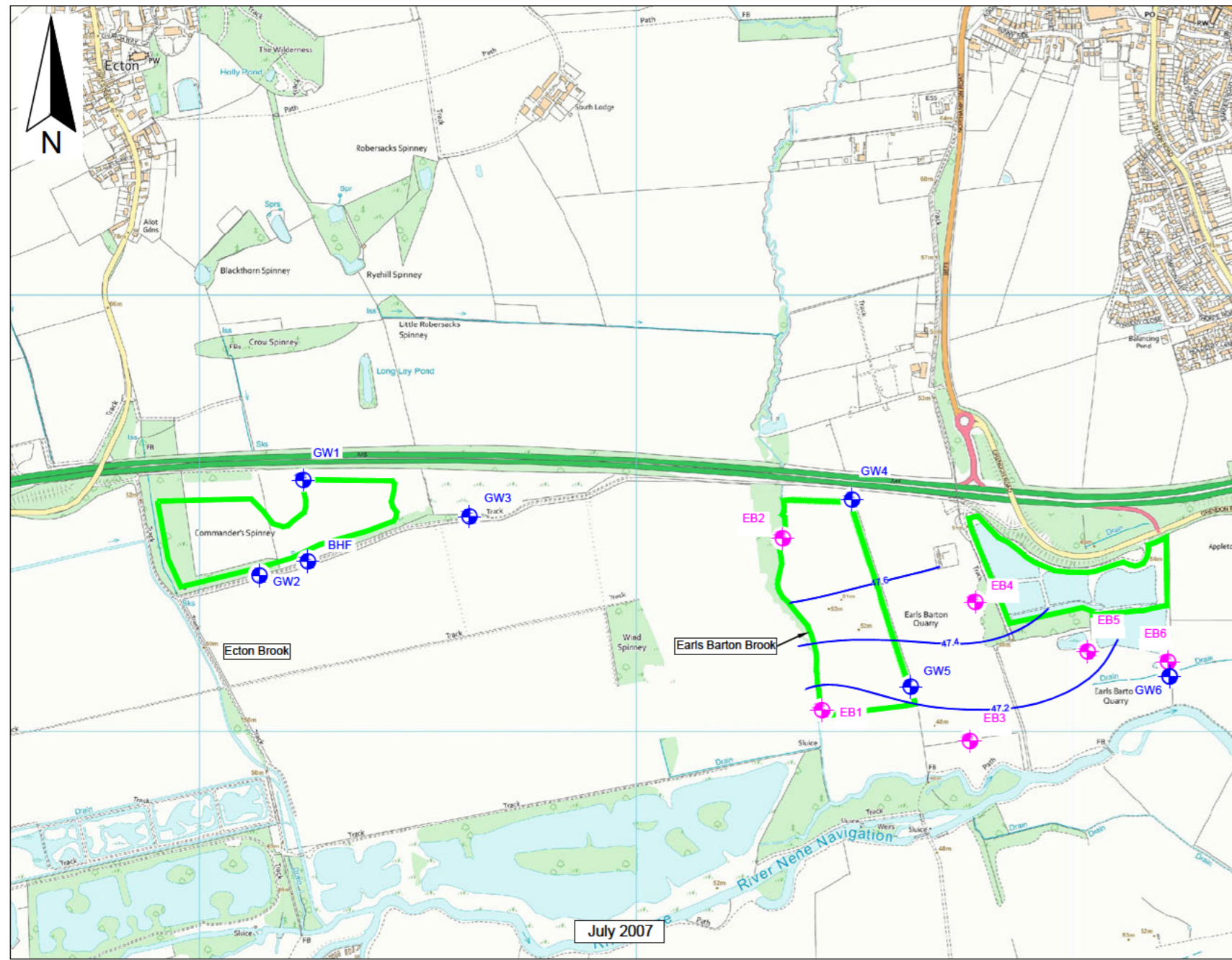
Site  
EARLS BARTON QUARRY



Title  
Plan showing the locations of the hydrogeological cross sections across the site

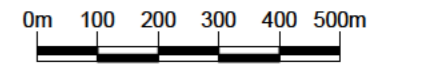
Figure ESSD 11A      Scale  
1:10,000@A3

Drawing Ref  
BRE/EA/05-20/21777



### Key / Notes

- Approximate boundary of the site the subject of the Environmental Permit application
- Indicative groundwater level contours in m above Ordnance Datum
- Groundwater level in m above Ordnance Datum
- GW1 Approximate location of a groundwater monitoring borehole drilled in 2019
- EB1 Approximate location of a groundwater monitoring borehole monitored in 2007



Rev	Final	SRWRLW	GT	22/02/22
	Status	Dm	App Chk	Date

Site: EARLS BARTON QUARRY



Title: Indicative contours of the variation in groundwater levels across the application area

Figure ESSD 13 Scale: 1:12,500@A2

Drawing Ref: BRE/EA/04-20/21726  
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**APPENDICES**