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ENVIRONMENTAL SETTING AND SITE DESIGN REPORT FOR PROPOSED EXTENSION TO UPPER LYDE QUARRY

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Report prepared for:

Hereford Quarries Ltd
Lugg Bridge Quarry
HEREFORD
HR1 3LZ

Barkers Chambers • Barker Street • Shrewsbury • United Kingdom • SY1 1SB
T: 01743 355770 • *E*: info@hafrenwater.com

GENERAL NOTES

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Author: Heather Macleod BSc MSc FGS

Reviewers: Chris Leake BSc MSc FGS

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1 INTRODUCTION

1.1 Report context

Upper Lyde Quarry (the site) is operated by Hereford Quarries Ltd for the extraction of sand and gravel with restoration to pre-existing ground levels using inert waste. Planning Permission was granted in August 2023 for an extension of the mineral extraction and restoration and it is now proposed to apply to vary the existing Environmental Permit (reference KB3105LH) to include the extension.

The proposed extension includes three areas: to the southwest of the site, immediately northeast of the site and to the east of Upper Lyde Lane. The permitted restoration back to agriculture using both overburden and imported inert materials, includes areas of high quality habitat for nature conservation.

Hafren Water has been appointed by Hereford Quarries Ltd to prepare the Environmental Setting and Site Design (ESSD) report, which sets out the background and baseline conditions, in support of the Permit Variation Application. The format of this ESSD report is based upon the Environment Agency (EA) on-line guidance "What to include in your environmental setting and site design report" published in January 2020 and last updated 14th May 2025. It is understood that the EA has not requested a Hydrogeological Risk Assessment.

1.2 Environmental Permit history

An Environmental Permit, reference KB3105LH, was issued to the Operator on 19th May 2021. This permit contained the standard rule set SR2015 N° 39: *Use of waste in a deposit for recovery operations.*

A Waste Recovery Plan (WRP) was approved by the Environment Agency for waste deposit for recovery on this site. Based on the approved WRP the Permit was issued with the standard rule set SR2015 N° 39. This allows the deposit of 60,000 m³ for the recovery operation.

1.3 Site history

Historically the site was agricultural. Planning Permission was first granted for mineral extraction with restoration via landfill in 1965 for an area of 2.4 hectares (ha). Initially mineral extraction was limited to the southern corner of the site. Planning Permission was amended in 2001, and the operation of the site was transferred to Hussar Minerals Ltd who recommenced mineral extraction. An application was made for an Environmental Permit by Hereford Quarries Ltd (the Operator) in 2015 to restore the site with inert waste.

It is understood[1] that approximately 195,2000 m³ sand and gravel remains to be extracted. Restoration of the site will be achieved using 63,000 m³ overburden supplemented with 262,500 m³ of inert waste.

There are no records of waste activities having previously been undertaken on the site and there are no other land uses relevant to the assessment of environmental risk undertaken on the site.

It has been reported by the Operator that there have been no previous pollution incidents on the site.

1 Westbury Environmental Ltd. Addendum to the waste recovery plan for Upper Lyde Quarry. 28 July 2025. Report Ref 25/004a V3

2 SITE DETAILS

2.1 Location

The site is located approximately 5 kilometres (km) north of the centre of Hereford, 1 km southeast of Moreton on Lugg and approximately 0.6 km northeast of the hamlet of Upper Lyde as shown on *Drawing 3944/ESSD/01*. The site is centred on National Grid Reference (NGR) SO ^{3}49339 ^{2}44849, postcode HR4 8NF.

Access to the site is via an unclassified road, which leads off Morten Road and links the A49 and A4110 north of the site.

The site is located within a rural agricultural area and is bounded on all sides by arable land. Access to the site is off Upper Lyde Lane via Moreton Road, which connects the site to the A49 Hereford trunk road to the east.

2.2 Site classification

The site currently operates under a Standard Rules Permit; SR2015 N^{o} 39: *Use of waste in a deposit for recovery operations,* allowing the deposit of 60,000 m³ of waste for recovery which has largely been completed. This application is for a bespoke Deposit for Recovery (DfR) Permit.

2.3 Site setting

The site covers approximately 6.15 ha. It is located within an area of undulating topography and towards the top of a northeast trending ridge, which attains a maximum elevation of 128 metres Above Ordnance Datum (mAOD), 160 m to the west of the western extension area. The northern and southern flanks of the ridge are relatively steep, falling to 75 mAOD and 95 mAOD, 320 m to the north and south respectively. Ground elevations across the site decrease from approximately 125 mAOD in the west to 100 mAOD in the east, as shown on *Drawing 3944/ESSD/01*.

Numerous residential properties are located in the vicinity of the site. The closest of these, as shown on *Drawing 3994/ESSD/02*, is Springfield, which is 36 m to the east It is noted that this property has been demolished and is being rebuilt further east within its landholding. Appletree Cottage is also east of the site and 97 m from the site boundary. Windrush is located approximately 40 m north of the northern boundary with Fayre View and Braeman lying to the west of Windrush at approximately 60 m and 65 m north of the site respectively. Properties located on the A4110, Bewdley Bank, comprise Bewdley House and Hill View, which are 50 m and 65 m from the western boundary respectively. Properties south of the site are over 250 m

from the southern site boundary. A minimum 50 m standoff is designed into the mineral extraction area from the site boundary closest to each of the nearest residential properties.

The site overlies a Secondary A aquifer (Bedrock) and Secondary (undifferentiated) aquifer (Superficial Drift).

It is located in a Flood Zone 1, which means the site has a low probability of flooding.

It is not located in a Drinking Water Protected Area for surface water or groundwater and it is not within a Drinking Water Safeguarding Zone for surface water or groundwater. It is not located within a Source Protection Zone.

3 CONCEPTUAL SITE MODEL

3.1 Source: Historical development

A small area of agricultural waste was deposited in the southern corner of the originally permitted area prior to 2001. This was completely removed prior to commencement of infilling with inert waste under the current Permit.

There are no known non-permitted waste activities at the site.

Contamination of the land could exist from agricultural applications of fertilisers and pesticides, although this is not expected.

There are no historic contamination incidents reported for the site.

3.2 Source: Proposed development

a) Waste types

The proposed waste to be imported to the Upper Lyde landfill will be inert. The majority of fill will comprise inert waste and soils from site clearance and earthworks from the local area which has End of Waste, 2A Certification, and is no longer considered a waste product.

The inert waste imported to the site will be classified under the waste codes provided within the Addendum to the Waste Recovery Plan, and are reproduced in *Appendix 3944/ESSD/A1*.

Waste types listed under codes 02 04 01and 10 13 14 are the only ones not listed in Environment Agency Guidance, to be acceptable without testing.

Waste type 02 04 01 includes soils generated from washing beet. The Waste Recovery Plan for the site states that this waste will be used solely in the upper centimetres of the waste profile to replace/supplement topsoil during restoration.

Waste code 10 13 14 comprises concrete from the "manufacture of cement, lime and plaster and products made from them" and is likely to comprise very small volumes at the site.

Waste code 19 12 12 will not be accepted at the site.

All incoming waste will be subject to rigorous Waste Acceptance Criteria (WAC) and Procedures. Details of the WAC are provided in the Waste Recovery Plan.

All waste entering the site will be in Company vehicles only, ie an open gate policy will not be operated at the site and waste will not be accepted from other registered waste carriers. Any waste consignments arriving at the gates other than in Company vehicles will be refused entry.

The WAC will ensure that the history of the site from which the waste is derived is known and not contaminated, and the chemical composition of the waste (where appropriate) will be obtained before it is accepted. All waste will be visually inspected on arrival at the site. A decision making tree will be used to aid the assessment of suitable wastes. Any waste identified as not suitable will be turned away or, if already tipped, will be moved to a secure 'quarantine' area until appropriate disposal options are found.

To ensure that no gas or leachate generation occurs on-site existing vegetation within the current quarry void will be removed entirely prior to commencement of landfilling.

b) Phasing

The site has been divided into Phases.

Phases 1a and 2 are located immediately to the west of Upper Lyde Lane and east of the existing quarry. It is approximately 2 ha in size and up to 10 m deep.

Phase 1b is located immediately west of the existing quarry, with agricultural fields on all other sides. This area is approximately 2.9 ha in size and up to 10 m deep.

Phase 3 is located immediately south of Moreton Road, and east of the unclassified Upper Lyde Lane. Agricultural fields are located to the east and south. This area is approximately 1.3 ha and up to 8 m deep.

Mineral extraction is largely complete in Phases 1a and 2 and is progressing in Phase 1b. Deposit of waste will be undertaken in areas of completed mineral extraction, allowing progressive restoration. The site phasing is provided on *Drawing 3944/ESSD/02*.

c) Waste volumes

In order to achieve the approved restoration profile approximately 420,000 tonnes of inert waste will be imported to the site (based on a typical density of 1.6 tonnes per cubic metre).

3.3 Pathway and receptor: Geology

3.3.1 Regional

The regional bedrock is dominated by strata from the Silurian Lower Old Red Sandstone Formation. In the area of the site these strata comprise extensive thicknesses of the Moor Cliffs (MOCL) Formation (formerly the Raglan Mudstone). The MOCL is described on the BGS on-line lexicon as mainly red and green mudstones and siltstones, with beds of fine-grained calcareous sandstone. It varies in thickness between 120 and over 800 m. In the region it dips gently to the east towards the centre of a syncline, which trends roughly north-northeastwards between the site and the River Lugg.

Glacial Till covers much of the area west of the site. This is fringed by Hummocky Glacial deposits described by the BGS as sand and gravel, diamicton or moraine deposits. From Burghill eastwards the bedrock is exposed beneath top- and subsoils, except on higher ground where Glaciofluvial sand and gravel deposits exist with isolated narrow tracts of Glacial Head. The Glaciofluvial deposits occur within a wide, shallow channel eroded into the bedrock. Further east, the wide shallow valley of the River Lugg is underlain by alluvial deposits.

The regional geology is shown on *Drawing 3944/ESSD/03.*

3.3.2 Local geology

Local geology is based on site investigation undertaken by Key GS in September 2019, the results of borehole drilling at the site in 2001 (Edge & Pritchard) and a trial pit investigation in 1990 by Bennie Land and Minerals. The locations of mineral evaluation and permanent monitoring boreholes are shown on *Drawing 3944/ESSD/04*. Borehole logs are provided in *Appendix 3944/ESSD/A2*. The Key GS and Bennie Land and Minerals investigations covered the proposed extension area, whereas the 2001 investigation focused on the currently permitted quarry area.

The geology encountered is summarised below:

3.3.3 Soil

The superficial Glaciofluvial deposits are covered at the site by topsoils and subsoils.

3.3.4 Silts and sands – representative of "*Silt and Sand*" horizon of the Glaciofluvial deposits

These deposits comprise red brown silty to very fine sand or sandy clayey silt with some discontinuous sand and gravel lenses. Silt and sand was proven in the western and southern parts of Phase 1b, in the west of the extension area.

3.3.5 Sand and Gravel - representative of "*Lower Gravel*" horizon of the Glaciofluvial deposits

The Lower Gravel generally comprised a red brown, slightly silty to silty, fine to coarse-grained sand and fine to medium gravel. Hard lime-cemented bands and some very silty/clayey bands were present. This forms the economic mineral at the site.

This deposit thins to the northeast of Phase 3, where it becomes absent. It appears to deepen to the southwest where it is overlain by the silts and sands horizon, although this could not be confirmed due to difficult drilling conditions. The mineral thickness varies from approximately 9.9 m in the north of the currently permitted area (Phase 0), to 0.7 m in the northeast of Phase 3 and 1.7 m in the south of Phase 1b in the west of the site.

3.3.6 Mudstone and sandstone – representative of the Moor Cliffs Formation

The base of the Lower Gravel, or silt and sand deposit, rests on extremely weak to weak, sandy mudstone and sandstone. The mudstone was encountered in the 2019 boreholes in the northeast at elevations of between 112 and 101 mAOD. The highest elevation was recorded in the southwest and this is considered likely to mark the southern extent of the channel eroded into the bedrock.

A mappable scale sandstone horizon is shown on the BGS map as outcropping approximately 144 m east of Phase 3.

3.4 Pathway and receptor: Aquifer characteristics

3.4.1 Aquifer designations and regional context

The Glaciofluvial deposits and the Moor Cliffs Formation are classified by the Environment Agency as Secondary A aquifers. These aquifers are defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming important sources of baseflow to rivers.

The boundary of the superficial aquifer is delineated locally by the lateral extent of the deposit. A perched watertable exists in the sand and gravel, above the Moor Cliffs mudstone. However, due to its limited lateral extent, recharge and, hence, the volume of groundwater stored with the Glaciofluvial deposits is limited.

The Moor Cliffs Formation is designated a Secondary aquifer due to the presence of water-bearing sandstone horizons. The closest such sandstone is shown on the BGS geological maps to be approximately 450 m northeast of the site.

3.4.2 Springs

Three springs are shown on Ordnance Survey maps within 2 km of the site. Two are located to the north of the site and occur towards the outer edge of the Glaciofluvial deposits. The third is to the southeast and located at the edge of the Till deposits.

A further spring is known to exist 60 m east of the site at Springfield Cottage. This was formerly used as the potable supply to the cottage via a brick and stone collection chamber. The cottage is now connected to the mains water supply.

3.4.3 Licensed groundwater abstractions

Details of groundwater abstractions were requested from the Environment Agency in January 2026. Five such abstractions were identified by the Environment Agency within a 2 km radius of the Site. These allow abstraction at seven locations as detailed in *Table 3944/ESSD/T1* below. Their locations are shown on *Drawing 3944/ESSD/05.*

3944/ESSD/T1: Licensed groundwater abstractions

Licence	NGR	Source (as provided by EA)	Licence holder	Use	Distance/ direction from site
WA/055/0012/006	SO 49908 45469	Borehole	Upper House Farm	GA	0.4 km NE
	SO 49726 45810	Borehole		GA	0.71 km NE
19/55/12/0782	SO 5037 4404	Borehole	Mr M Edwards Kentchester Water Gardens	H&N	0.71 km SE
19/55/12/0805	SO 5038 4560	Borehole?	Mr C Perkins & Sons		0.81 km NE
19/55/12/0804	SO 4972 4394	Borehole	Mr Watkins	GA	0.84 km SE
WA/055/0012/019	SO 47383 45066	Borehole	Tillington Top Fruit Farm Ltd	GA	1.65 km W
	SO 47718 43721	Borehole		GA	1.56 Km SW

Key:
GA – General Agriculture
H& N – Horticulture& Nurseries

All of the above abstractions are described as being made from boreholes as opposed to wells. It can be seen from *Drawing 3944/ESSD/05* that all of these abstractions are located outside of the sand and gravel deposit in which the site is located. Due to the location of the borehole abstractions in different geological strata to that at the site it is considered highly unlikely that any hydraulic link exists between the site and the licensed abstractions.

3.4.4 Private unlicensed abstractions

Herefordshire Council identified twelve unlicensed private abstractions within a 1 km radius of the site. Of these, two are identified as located within the sand and gravel aquifer in which the site is located. The closest of these abstractions, the spring supply at Springfield Cottage (Map Reference 1 below) east of the site, is no longer used and the property is now served with mains water. The other abstraction from the sand and gravel aquifer is located is at High Croft (Map reference 2), 100 m west of and upgradient of the site. Details of the abstractions are provided below, and their locations are shown on *Drawing 3944/ESSD/05*.

3944/ESSD/T2: Private groundwater abstractions					
Map Ref	**NGR**	**Location**	**Source**	**Depth (m)**	**Distance/ direction from site**
1	SO 4945 4482	Spring Cottage	Catchpit/Spring, Springfield		0.06 km E
2	SO 48910 44661	High Croft	Well		0.1 km W
3	SO 49051 45151		Borehole		0.3 km N
4	SO 50108 45284		Spring		0.34 km ENE
5	SO 50148 45289		Well		0.37 km ENE
6	SO 49042 45206		Well		0.38 km NW
7	SO 48702 45191		Well		0.55 km NW
8	SO 49902 45755	Upper House Farm	Borehole		0.67 km NE
9	SO 56613 45675		Borehole		0.78 km NE
10	SO 50444 45630		Borehole		0.8 km NE
11	SO 48812 43873	Burlton Court Farm			0.68 km SW
12	SO 50566 45671		Well		0.94 NE

Sixteen deregulated abstractions have been identified by the Environment Agency within a 2km radius of the site. The locations of these are shown on *Drawing 3944/ESSD/05.* Of the eighteen one is identified as used for a private water supply including drinking water. All remaining abstractions are for agricultural purposes. The only abstraction located within, and potentially sourced from the sand and gravel aquifer in which the site is located is at High Croft, 100 m west of and upgradient of the site.

3.5 Pathway and receptor: Groundwater flow

Groundwater monitoring is undertaken at five permanent boreholes installed in 2001 close to the currently permitted boundary. Their locations are shown on *Drawing 3944/ESSD/04*. Boreholes PZ1, 2, 3 and 5 were designed to monitor groundwater in the sand and gravel aquifer. PZ1 and PZ2 are on the western boundary of Phase 0 (the currently permitted site)

and PZ3 and PZ5 are to the east, adjacent to the Upper Lyde Lane. Borehole PZ4 is also located adjacent to Upper Lyde Lane and monitors groundwater in the deeper Moor Cliffs Formation.

Groundwater was regularly monitored between 2001 and 2005, but largely ceased between 2005 and 2018, after which time approximate monthly monitoring recommenced. In 2019 Borehole PZ1 was lost as quarrying progressed and this was replaced with PZ6 (borehole 07/2019), located in the south of Phase 1b.

Borehole PZ1 was recorded as being dry for much of the monitoring period and its replacement, PZ6, similarly suffers from the absence of groundwater, despite its response zone extending to the base of the sand and gravel.

A summary of the monitoring boreholes within the site and data recorded to date is provided in *Table 3944/ESSD/T3* below.

3944/ESSD/T3: Summary of groundwater levels

Borehole ref	Datum elevation (mAOD)	Response zone (mAOD)	Groundwater elevation (mAOD)				Count
			Max	Mean	Min	Date of max*	
PZ1	117.598	112.5-106.0	-	-	Dry	-	19
PZ2	115.352	108.2-104.7	106.60	105.39	104.47	25/03/2024	223
PZ3	111.596	106.7-103.3	106.16	104.72	102.84	26/01/2021	223
PZ4	110.091	105.4-91.9	100.83	99.34	96.05	07/01/2003	222
PZ5	109.892	106.9-103.7	106.17	104.97	104.38	20/03/2014	224
PZ6	120.40	115.2-112.2	112.35	112.27	Dry	05/01/2021	15

* Installation samples mudstone and sand and gravel but water level representative of deeper mudstone aquifer

3.5.1 Sand and gravel aquifer

Groundwater levels in the sand and gravel aquifer (PZ1 to PZ3, PZ5 and PZ6) show clear seasonal variation of approximately 0.6 m to 0.9 m between winter highs and summer lows. The response to winter rainfall and the relatively small annual change in water level is typical of an aquifer with good permeability and high storage. At its maximum elevation, groundwater is between 3.9 and 8.9 m below datum (mbd). A plot of temporal groundwater elevations is provided on *Drawing 3944/ESSD/06*.

Groundwater is lowest at PZ4 in the east and highest at PZ3 in the north.

Inferred groundwater contours for 20th January 2026, representative of winter high groundwater levels, is provided on *Drawing 3944/ESSD/07a*. This indicates groundwater flows towards the

northeast, following the topographic ridge. Flow is likely to be to the north-northeast at the northern edge of the sand and gravel outcrop and to the southeast on the southern edge. Inferred groundwater contours for 13th January 2025, a relative groundwater low, follow the same pattern as those in January 2026 but at approximately 0.5 m lower *(Drawing 3944/ESSD/07b)*.

Groundwater **discharge** via seepages and springs is likely to occur at the edges of the sand and gravel outcrop, for example at Spring 1 on *Drawing 3944/ESSD/07*. There is no evidence of any surface water groundwater interaction in the vicinity of the site associated with the shallow sand and gravel aquifer.

Groundwater **recharge** to the sand and gravel will comprise rainfall direct to the outcrop, which is assumed to be able to enter the aquifer readily due to the nature of the topsoil and subsoil. However, as the outcrop is of limited extent (around 80 ha) this recharge will be limited.

The indicative **hydraulic gradient** in the sand and gravel deposit is 0.014.

Water levels recorded in borehole PZ6, were approximately 6 m higher than those recorded elsewhere on-site. These were interpreted as representative of small volumes of groundwater captured in the borehole 'sump', ie between the base of the borehole at 7.7 metres below ground level (mbgl) (8.2 mbd) and the base of the sand and gravel at 7.5 mbgl (8 mbd). This is not in continuity with groundwater in the sand and gravel deposit and the borehole has been confirmed as dry since January 2021.

Unsaturated zone thicknesses vary across the site and are equal to the measured depth to the watertable at the boreholes. These vary from the complete thickness of the sand and gravel aquifer, 11.6 m, at boreholes PZ1 (now destroyed) and 8.15 m at PZ6, both in the west/ southwest of the site, to 3.9 m at borehole PZ5 on the southeastern boundary. These variations arise due to the geometry of the deposit which is located on a hillside, with the sand and gravel being thickest in the central/western part of the site and thinning to the northeast.

As the mineral is only extracted to the watertable, and dewatering is not undertaken, the proposed waste will all be situated above groundwater and the site will be dry.

3.5.2 Moor Cliff Formation

Groundwater within borehole PZ4, in the deeper Moor Cliff Formation, is approximately 5 to 6 m lower than the groundwater elevations in the overlying sand and gravel. This indicates that the Moor Cliff Formation acts as an aquitard and restricts vertical groundwater movement from the sand and gravel to underlying bedrock strata.

The sand and gravel is extracted to the watertable within the sand and gravels above the Moor Cliff Formation. An indicative unsaturated zone of 4 to 5 m exists within the Moor Cliff Formation below the base of the sand and gravels. This conclusion is based on groundwater levels in a single borehole (PZ4) and hence may not be representative of a wider watertable and unsaturated zone within the Moor Cliff Formation mudstones.

3.6 Pathway and receptor: Groundwater quality

Regional groundwater quality data is not available for the sand and gravel aquifer.

Groundwater quality analyses has been undertaken regularly on samples collected from the site since 2018. Data from 2021 has been checked and verified and is used in this assessment.

Based on the borehole construction and the groundwater flow direction, PZ2 is considered to be up-gradient and PZ3 and PZ5 down-gradient within the sand and gravel aquifer. PZ4 samples the lower Moor Cliff strata. The data are presented in *3944/ESSD/A3- 3944/ESSD/A3* together with temporal graphs of concentration for key determinands. A summary of the data is provided below. In this summary the Environment Agency convention applies whereby values lower than the detection limit are halved before being analysed.

3944/ESSD/T4: Summary of groundwater quality analyses									
Borehole	Determinant	Unit	Max	Min	Mean	Median	SD	Count	Count >LOD
PZ2	pH	Units	8.0	6.8	7.3	7.3	0.3	23	23
	Conductivity	(µs/cm)	892	565	724	724	94	23	23
	Calcium	(mg/l)	220.0	56.4	148.0	153.0	38.5	23	23
	Magnesium	(mg/l)	5.9	2.0	4.0	4.0	0.9	23	23
	Potassium	(mg/l)	30.9	0.5	3.5	1.4	6.7	23	23
	Sodium	(mg/l)	63.3	6.3	22.4	20.4	13.5	23	23
	Sulphate	(mg/l)	99	9	44	34	28	23	23
	Chloride	(mg/l)	79	7	39	38	17	23	23
	TON	(mg/l)	40.0	0.03	6.4	4.7	7.7	23	22
	Ammoniacal Nitrogen	(mg/l)	9.5	0.001	0.71	0.07	1.95	23	10
	TOC	(mg/l)	2.50	0.001	0.22	0.00	0.70	22	2
	Iron	(µg/l)	100.0	0.50	5.83	0.50	20.35	23	3
	Manganese	(µg/l)	120.0	0.001	20.58	0.90	34.82	23	11
PZ3	pH	Units	7.7	6.8	7.2	7.2	0.2	27	27
	Conductivity	(µs/cm)	877	554	756	758	70	27	27
	Calcium	(mg/l)	200.0	8.8	152.8	166.0	39.8	27	27
	Magnesium	(mg/l)	4.9	2.2	4.2	4.2	0.5	27	27

3944/ESSD/T4: Summary of groundwater quality analyses									
Borehole	**Determinant**	**Unit**	**Max**	**Min**	**Mean**	**Median**	**SD**	**Count**	**Count >LOD**
PZ3 (cont.)	Potassium	(mg/l)	1030.0	1.0	40.0	1.9	194.2	27	27
	Sodium	(mg/l)	135.0	0.0	24.5	18.0	27.3	27	27
	Sulphate	(mg/l)	220	31	75	67	36	27	27
	Chloride	(mg/l)	87	3	40	40	18	27	27
	TON	(mg/l)	17.0	3.00	11.1	12.0	4.0	27	27
	Ammoniacal Nitrogen	(mg/l)	0.6	0.001	0.11	0.00	0.18	27	3
	TOC	(mg/l)	2.30	0.001	0.33	0.00	0.78	26	4
	Iron	(µg/l)	0.5	0.50	0.50	0.50	0.00	27	0
	Manganese	(µg/l)	60.0	0.001	7.75	2.50	15.04	27	8
PZ4	pH	Units	7.9	6.8	7.4	7.5	0.3	27	27
	Conductivity	(µs/cm)	840	369	539	497	119	27	27
	Calcium	(mg/l)	174.0	2.5	100.3	100.0	34.0	27	27
	Magnesium	(mg/l)	4.7	2.0	3.6	3.5	0.6	27	27
	Potassium	(mg/l)	4.9	1.7	3.0	3.2	0.8	27	27
	Sodium	(mg/l)	22.6	0.0	13.5	13.0	5.5	27	27
	Sulphate	(mg/l)	66	1	18	16	13	27	24
	Chloride	(mg/l)	110	6	25	23	22	27	27
	TON	(mg/l)	19.0	0.03	2.5	0.3	5.1	27	25
	Ammoniacal Nitrogen	(mg/l)	0.5	0.001	0.10	0.00	0.17	27	2
	TOC	(mg/l)	2.00	0.001	0.08	0.00	0.38	26	1
	Iron	(µg/l)	0.5	0.50	0.50	0.50	0.00	27	0
	Manganese	(µg/l)	12.0	0.001	1.68	0.50	2.27	27	3
PZ5	pH	Units	7.7	6.7	7.2	7.2	0.3	27	27
	Conductivity	(µs/cm)	781	355	630	653	107	27	27
	Calcium	(mg/l)	173.0	2.5	120.2	140.0	48.0	27	27
	Magnesium	(mg/l)	4.8	1.3	3.5	3.5	0.7	27	27
	Potassium	(mg/l)	3.3	0.8	2.2	2.2	0.6	27	27
	Sodium	(mg/l)	220.0	0.0	19.7	11.0	39.8	27	27
	Sulphate	(mg/l)	160	1	43	34	37	27	26
	Chloride	(mg/l)	56	7	30	35	14	27	27
	TON	(mg/l)	21.0	0.03	8.1	7.6	6.1	27	26
	Ammoniacal Nitrogen	(mg/l)	0.8	0.001	0.12	0.00	0.21	27	4
	TOC	(mg/l)	1.50	0.001	0.06	0.00	0.29	26	0
	Iron	(µg/l)	0.5	0.50	0.50	0.50	0.00	27	0
	Manganese	(µg/l)	35.0	0.001	6.60	2.50	10.51	27	10

Based on the analysis results, it can be seen that the groundwater at PZ2, up-gradient of the site, is characteristic of natural, recently recharged neutral groundwater with low calcium, magnesium, sodium and potassium major ion concentrations. Sulphate fluctuates but without obvious seasonal variation. All determinands appear to show greater fluctuation after a hiatus in monitoring in 2023.

Down-gradient water quality at PZ3 and PZ5 shows moderate but generally greater fluctuations than observed at PZ2. Water quality generally shows a progression from borehole PZ2, due to its longer residence time within the sand and gravel aquifer allowing ion exchange. A possible slight upward trend is observed with chloride and sulphate concentrations, but overall concentrations remain relatively low.

PZ4 appears to show a slightly different character to the other boreholes commensurate with its deeper response zone and sampling the lower Moor Cliff Formation of mudstones rather than the sand and gravel.

Ammoniacal nitrogen is mostly recorded below the lower limit of detection (LOD). Iron and manganese tend to be low and at, or close to, the lower detection limit for all boreholes with occasional spikes.

No clear evidence exists of groundwater contamination due to the existing inert waste operation within Phase 0.

3.7 Pathway and receptor: Surface water

3.7.1 Rainfall

The long-term average (LTA) monthly rainfall for the region for the period 1940 to 1970 is available from the Ministry of Agriculture, Farming and Fisheries (MAFF) Technical Bulletin 34 (Climate and Drainage, Area 25 North). This, together with the potential evapotranspiration (for grassland), is provided below.

3944/ESSD/T5: LTA monthly rainfall and potential transpiration (mm)

(mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
P	66	50	49	50	64	54	63	76	65	63	76	70
PE	3	10	32	56	80	93	91	70	44	20	5	0

P = Precipitation/Rainfall PE = Potential evapotranspiration

The LTA annual rainfall based on the MAFF data is 746 mm/annum. The effective rainfall, or that which may infiltrate and recharge the aquifer, is calculated as P – PE and equates to 331 mm/annum for the region.

More recent rainfall data has been obtained from the Environment Agency's online Hydrological Explorer for the Broomy Hill raingauge located in the west of Hereford, approximately 5 km south of the site. For the period 1993 to 2025, a LTA average rainfall of 654 mm/annum is estimated, with the highest annual rainfall of 989 mm being recorded in 2014 and the lowest of 367 mm being recorded in 2011. Using the evapotranspiration figures above, the annual effective rainfall is 310 mm/annum.

3944/ESSD/T6: LTA monthly rainfall (mm); Broomy Hill												
(mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
P	60.9	53.5	48.9	45.9	53.3	43.1	38.6	47.3	45.1	74.4	68.4	73.4
P = Precipitation/Rainfall												

3.7.2 Watercourses

The site is located within the catchment of the River Lugg, which flows southwards approximately 1.7 km east of the site and on the water divide between two of its small tributaries. These occur north and south of the site and flow northeastwards towards Moreton Brook, which itself flows southeastwards before discharging to the River Lugg at Selwick Green (4 km southeast of the site).

The closest of these tributaries lies approximately 330 m to the north of the site and rises from a series of springs situated at elevations between 90 and 100 mAOD. The watercourse to the south of the site appears to emanate from a small pond just above the 85 mAOD contour, approximately 820 m south-southeast of the site (see *Drawing 3944/ESSD/08*).

a) Water quality

The site is within the EA designated "Moreton Brook- source to confluence with River Lugg" waterbody, which has a Water Framework Directive Ecological classification of "Bad" with physio-chemical quality assessment of "Moderate". Reasons for it not achieving "Good" status are given as predominantly from agriculture and rural land management.

b) Flooding

Based on the Environment Agency on-line "Flood Map For Planning", the site is located within Flood Zone 1 (FZ1), with a less than 0.1% annual probability of flooding by rivers (fluvial flooding).

The closest FZ2 (at 0.1% to 1% probability of fluvial flooding) is 1.4 km east of the site and is related to the River Lugg and Wellington Brook.

c) Ecological importance

The River Lugg is a Site of Special Scientific Interest (SSSI) and part of the River Wye Special Area of Conservation (SAC), which lies approximately 1.7 km east of the site. The River Lugg is considered to be one of the best British mainland examples of both a clay river and a river displaying a transition from nutrient-poor to naturally nutrient-rich water chemistry. Despite being canalised in some small sections of its 101 km length, and running through an intensively farmed catchment in its middle and lower reaches, it is a largely unpolluted natural river and supports river plant communities of special interest and otter populations.

The River Wye SAC covers a catchment of over 2,200 ha. It is important for its river flora and fauna, designated primarily due to the presence of Annex I habitats and Annex II species, in particular, Atlantic Stream (White-clawed) Crayfish, Common Otter, Atlantic Salmon, Bullhead and Twaite Shad, amongst others.

d) Sources of contamination

Five consented discharges occur within the Moreton Brook waterbody, including primarily Water Company and non-water company treated sewage effluent discharges. No such discharge occurs up-gradient of the site (*Drawing 3994/ESSD/09*).

3.7.3 Waterbodies

Two waterbodies, referred to as WB1 and WB2 on *Drawing 3944/ESSD/08*, are shown on the Ordnance Survey map, located in the vicinity of Upper Lyde Farm, 330 m and 460 m to the southeast of the site. The smaller of the two, WB2, was dry during the site visit in September 2022. Two larger waterbodies (WB3 and WB4) are located close to the source of the southern watercourse (*Drawing 3944/ESSD/08*) and a further waterbody (WB5) is located to the southwest of the site at Burlton Court Farm.

In addition to the waterbodies, two covered reservoirs are marked on the OS map. The closest and largest (R2) is located towards the high point on the ridge, 120 m west of the site, and the second, much smaller one (R1), is located 160 m to the north-northeast.

The closest reservoir has recently been replaced by Welsh Water with a larger surface, covered reservoir just to its south.

3.7.4 Licensed surface water abstractions

The Environment Agency has identified one surface water abstraction within a 2 km radius of the site. This is Licence N° 19/55/12/0803 located in Lyde Brook, 840 m to the south of the site at NGR SO 4968 4392, as shown on *Drawing 3944/ESSD/05*. The licence permits 17,045 m³ to be abstracted annually between November and March for spray irrigation storage.

3.8 Pathway: Man-made subsurface pathways

A water main crosses the southwest of the site and its standoff marks the edge of proposed mineral extraction and inert fill. It is located within a barren area with respect to sand and gravel deposits, comprising the silty fine sand to clayey silt overburden.

3.9 Existing sources of contamination

3.9.1 Historical landfill sites

Details of historic landfills within a 2 km radius of the site have been obtained from the EA. Their locations are shown on *Drawing 3944/ESSD/09* and site details are summarised in *Table 3944/HIA/T3*.

3944/ESSD/T7: Historical landfill sites

Licence Number	Site name	Distance/ direction	Licence holder	Active years	Accepted waste
EAHLD35334	Grove Farm	150 m NNW	Mr P M Brown	1987-1994	Inert
EAHLD35333	Burlton Court	676 m WSW	Mr Arundel	1987-	Inert, Industrial, Commercial, Household
EAHLD35603	St Donats Farm	920 m NNW	R Davies Glenwell	1998-2008	Inert
EAHL30529	Old Quarry	1 km WNW	Mr J E Williams	1987-1989	Inert

Whilst Burlton Court Landfill is reported to have been licensed to receive inert, industrial, commercial and household waste, it is only 3,240 m² in area and is not located within the same geological strata as Upper Lyde Quarry. Consequently it poses little risk of adverse impact to the proposed development.

3.9.2 Permitted landfill sites

One authorised landfill was identified by the EA within a 2 km radius of the site. Williams Landfill is located 840 m northwest of Upper Lyde Quarry, it is licensed to receive non-biodegradable

waste and started taking waste in 1988. A review of recent aerial images on Google Maps indicates that this site is no longer an operational landfill.

3.10 Receptor: Amenity (nuisance)

Sensitive receptors are summarised below and shown on *Drawing 3944/ESSD/10*.

3944/ESSD/T8: Sensitive receptors			
Receptor	**Type**	**Distance from site**	**Direction**
Windrush	Residential property	40 m	N
Fayre View	Residential property	60 m	N
Braemar	Residential property	65 m	N
Springfield	Residential property	36 m	E
Appletree Cottage	Residential property	97	E
Upper Lyde Road	Road	10 m	Between Phase 2 & 3
Moreton Road	Road	10 m	N
Ponds (WB1)	Surface water feature	330 m	SE
Ponds (WB2)	Surface water feature	460 m	SE
Spring	Surface water feature	50 m	E
Spring	Surface water feature	395 m	N
Spring	Surface water feature	325 m	N
Traditional Orchard	Priority Habitat	340 m	NW
Traditional Orchard	Priority Habitat	545 m	E
Traditional Orchard	Priority Habitat	763 m	SE
Covered Reservoir		225 m	SW
Conservation – River Lugg SSSI		2.5 km E	

3.11 Receptor: Habitats and natural heritage

The River Lugg is a SSSI as described in Section 3.7.2 (c) above, and part of the River Wye SAC.

The closest Listed buildings are over 500 m to the northwest of the site and no Scheduled Monuments occur within 2 km of it.

No groundwater-dependent terrestrial ecosystems have been identified in the vicinity of the site.

3.12 Source, pathway, receptor summary

Whilst a number of abstractions have been identified in the vicinity of the site only one is located down gradient and within the same aquifer as the site. This abstraction, the

unlicensed abstraction at Springfield, is no longer used, the house now being served by mains water. Groundwater abstractions are therefore discounted as receptors for the proposed development.

One licensed surface water abstraction exists in the vicinity of the site, however, this is over 800 m from the site and is located off the sand and gravel aquifer. Hydraulic connection between the site and this abstraction is therefore highly unlikely and this receptor is discounted.

The closest site of ecological importance, the River Lugg SSSI and Wye SAC is sufficient distance to also not form a receptor for activities at the site.

3944/ESSD/T9: Summary of identified receptors and pathways	
Source	Imported inert materials used to restore the site, conservatively assessed at the maximum theoretical concentration to simulate a worst case potential risk
Potential primary pathway	Vertical infiltration of rainfall into the imported inert waste, downwards and into the unsaturated sand and gravel to the watertable Horizontal migration with groundwater in the sand and gravel down-gradient to the discharge zone The presence of Moor Cliff Formation beneath sand and gravel deposits limits any potential pathway to deeper aquifers
Potential primary receptor	Groundwater within the sand and gravel Secondary 'B' Aquifer
Potential secondary receptor	The spring at Springwell Cottage is in hydraulic continuity with the groundwater within the superficial deposit (no longer used as a water supply)
Compliance point	For hazardous substances – groundwater within the sand and gravel aquifer immediately adjacent to the site (ie at the down-gradient site boundary) For non-hazardous substances (pollutants) – the spring east of the site and the tributary of Moreton Brook north of the site

4 POLLUTION CONTROL MEASURES

4.1 Site engineering

4.1.1 Capping

An engineered capping system is not required at the site. Restoration topsoil will be applied.

4.2 Construction works and aftercare

The proposed progressive restoration scheme will return the site back to original ground levels and an agricultural after use.

Settlement is only likely to be significant for sites filled with putrescible waste. Waste types to be imported at the site will be non-putrescible and therefore significant settlement is not anticipated. Waste materials will be placed in the restoration works following good practice techniques. A stability risk assessment has not been provided for this site due to the scale and nature of the proposed restoration works.

The site will continue to be accessed through lockable gates, which are secured outside of operating hours. Incoming waste is received in the reception area.

The site comprises five Phases, Phase 0 being largely complete and Phases 1a, 1b, 2 and 3 representing the extension to the existing permitted area. The site will be progressively restored in Phase number order, commencing to the east of the currently Permitted Phase 0.

The site will operate in accordance with strict waste acceptance procedures to ensure that only acceptable inert wastes are allowed.

All waste will be placed above the existing groundwater table.

4.3 Surface water management

There are no surface water management features on the site. It is not expected that surface water will encounter any contaminated material due to strictly implemented waste acceptance procedures.

4.4 Leachate drainage system

A leachate drainage system is not required since the waste to be deposited, as approved in the Waste Recovery Plan by the Environment Agency, will be inert; there will be little, if any, leachate generation.

4.5 Post-closure controls

The proposed development will not require any post-closure controls. Only waste materials allowed under deposit for recovery activities are to be accepted on to the site.

The likelihood of differential settlement and structural failure of the site is considered to be extremely low, due to the types of wastes to be used in the development. The waste types are not biodegradable; therefore, it is anticipated that there will be no gas generation or significant settlement.

The Environmental Permit will be surrendered when the restoration works are completed at the site, ie when the site has been restored in accordance with the current planning consent.

4.5.1 Mining subsidence

The likelihood of mining-related subsidence is considered highly unlikely at the site.

5 MONITORING

5.1 Gas

5.1.1 Monitoring infrastructure

There is no existing gas monitoring infrastructure at the site. Due to the nature of the restoration works, there is no proposed gas monitoring infrastructure within the site or around the perimeter.

Due to the low organic content of the material, there is low likelihood of gas generation.

5.1.2 Monitoring

Gas monitoring has not been undertaken at the site.

A gas monitoring plan is not deemed necessary due to the nature of the waste types being used in the development.

It will be confirmed that no biodegradable waste will be present in the site through the implementation of strict waste acceptance procedures. Waste acceptance procedures will be in place on the site to ensure that only waste types allowed under the Environmental Permit are accepted for placement in the restoration works. No putrescible wastes will be accepted on the site.

5.1.3 Gas management

Due to the low organic content of the restoration materials, there is low likelihood of gas generation, such that there would be not enough gas for gas engines or flaring. Therefore, active or passive gas management via gas extraction or venting is not considered necessary.

Any contravening waste types will be identified at the following points:

- Pre-acceptance checks on incoming soils by way of a Hazardous Waste Assessment in accordance with WM3 Technical Guidance
- By checking the accompanying Waste Transfer Note. For example, wastes that have been incorrectly coded on the Waste Transfer Note will not be accepted onto the site
- By carrying out a visual assessment of the load prior to offloading
- By visual checks during offloading
- By visual checks during the placement of material
- By compliance sampling and testing of the waste being received

If contravening waste types are discovered during these checks, they will be removed in accordance with the waste rejection procedure.

5.2 Groundwater and surface water

5.2.1 Groundwater monitoring infrastructure

Groundwater monitoring boreholes exist at the site, with PZ2 providing up-gradient water levels and quality and PZ3, PZ4 and PZ5 providing down-gradient water levels and quality. It is recommended that additional monitoring boreholes are installed in the northwestern corner of the proposed Phase 1b and on the eastern boundary of the proposed Phase 3. These will ensure continued up and down-gradient conditions of the entire site can be determined.

The boreholes should be drilled such that they prove the base of the superficial deposits (sand and gravel). Based on the Key GS 2019 investigation boreholes depths of up to 5 m are likely. The boreholes should be completed with 50 mm diameter piezometer installations.

5.2.2 Groundwater monitoring schedule

It is proposed that the monitoring schedule below is undertaken going forward. Analysis of major ions has largely been reduced to six monthly.

3944/ESSD/T10: Proposed analytical suite		
Monitoring point	**Frequency**	**Determinands**
All boreholes	Quarterly	Chloride, ammoniacal nitrogen, electrical conductivity, dissolved oxygen, sulphate, pH, total organic carbon, iron, manganese
	Six monthly	As quarterly and total oxidised nitrogen, potassium, sodium, alkalinity, calcium, cadmium, chromium, copper, magnesium, nickel, phosphorous, lead, zinc

It is proposed that an additional monitoring borehole be installed on the eastern boundary of Phase 3 to act as a down-gradient monitoring point for the phase.

5.2.3 Surface water monitoring

a) Operational phase

Surface water run-off will be directed away from the quarry void and inert waste using shallow ditches and berms, as required, around the perimeter of the operational area. This will prevent ingress of surface water, other than incident rainfall, to the quarry void.

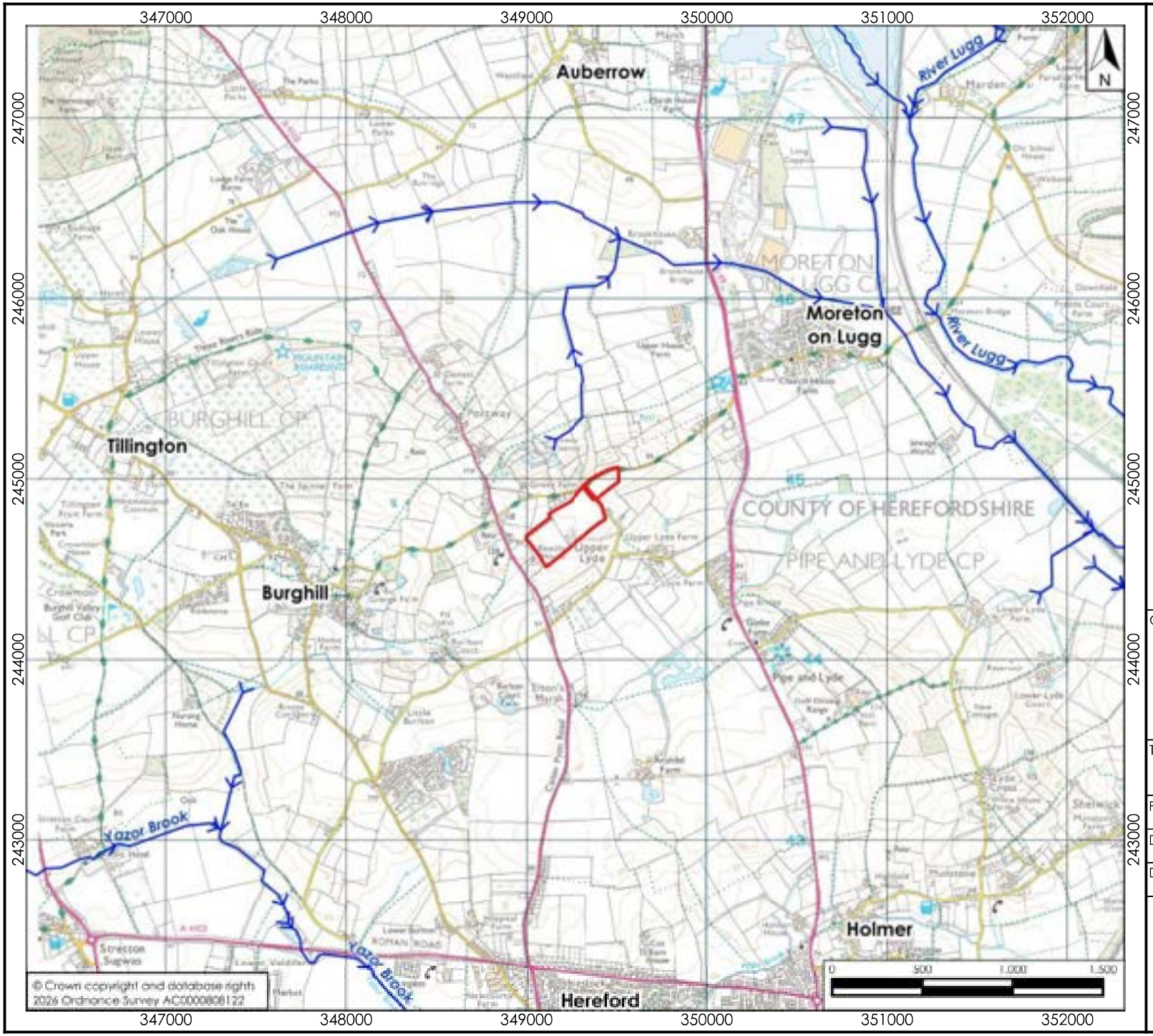
Water directly entering the site will be collected in the lowest point of the void and will be allowed to naturally infiltrate to the residual underlying sand and gravel deposit.

b) Post-restoration

On completion of restoration, continued recharge of surface water run-off to the sand and gravel aquifer will be ensured via the use of swales and infiltration trenches constructed adjacent to the down-gradient, eastern site boundary of Phase 2 adjacent to Upper Lyde Road.

Due to the absence of surface water at the site, surface water monitoring is not required.

DRAWINGS



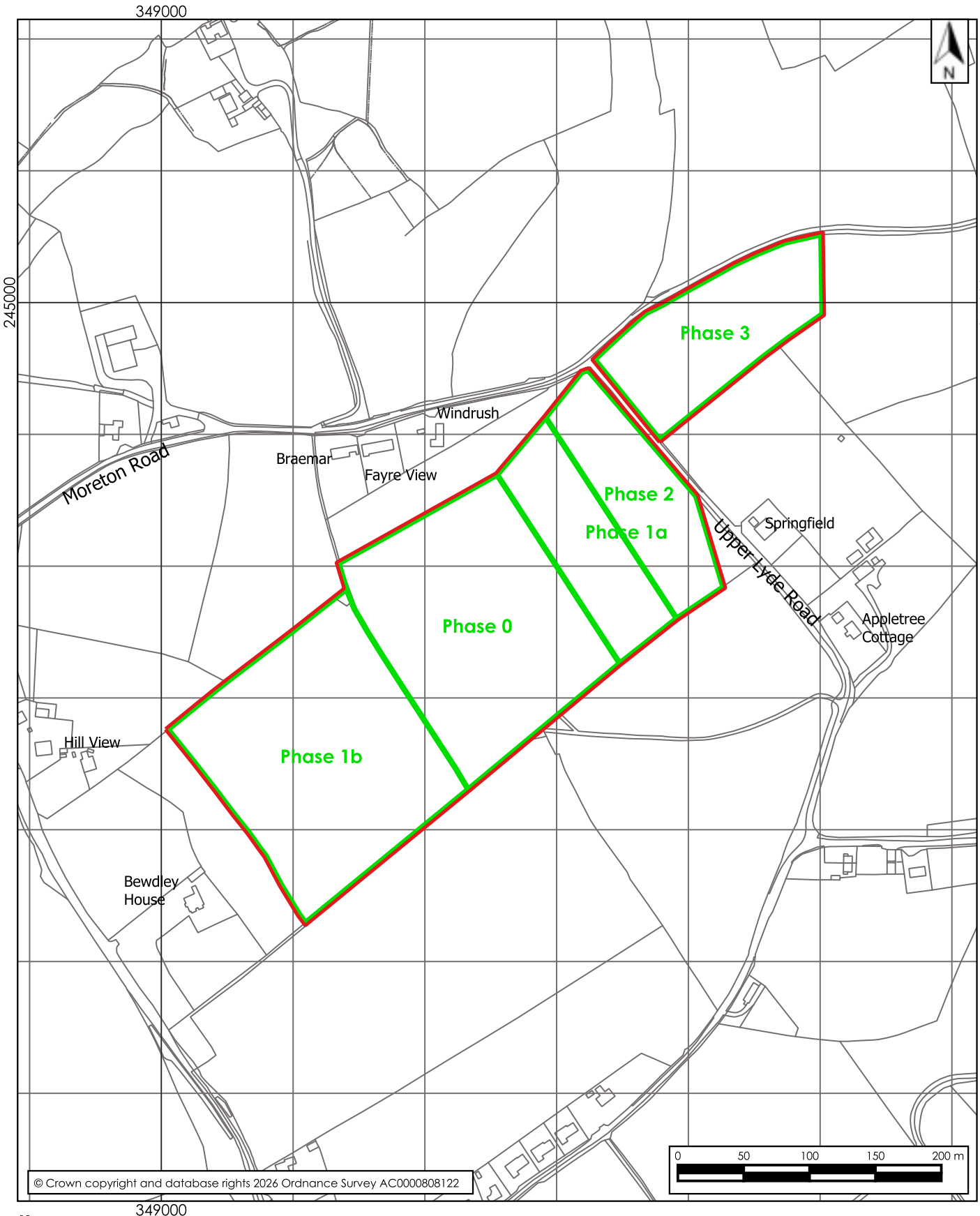
Key

- Site Boundary
- Watercourses

Scale correct at A4

Client	Hereford Quarries Limited
Title	Site Location
Project	Upper Lyde
Drawing	3994/ESSD/01
Version	1, KK
Date	Feb 2026
Scale	1:30,000

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Key

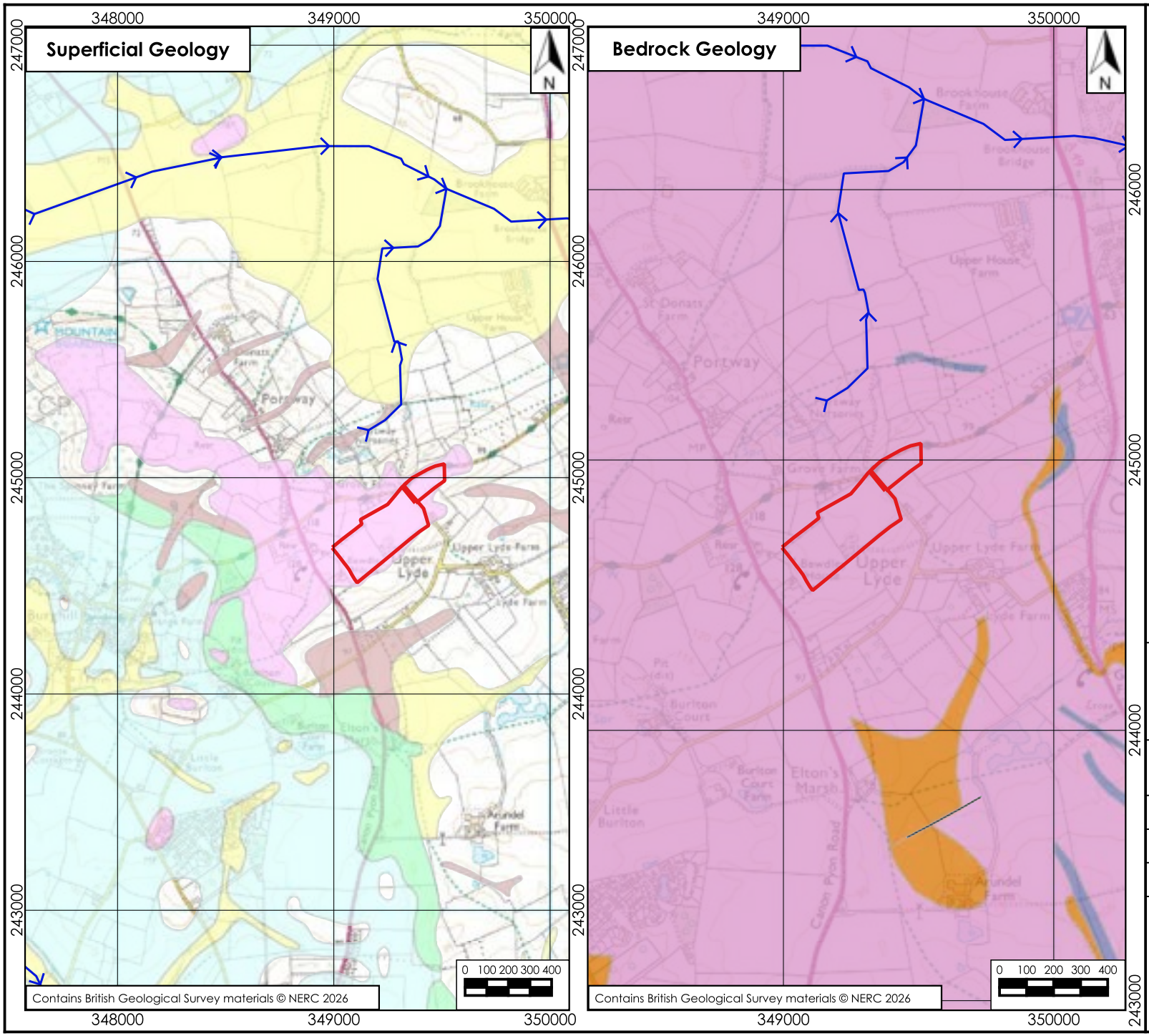
Site Boundary

Phase boundary

Scale correct at A4

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Client	Hereford Quarries Limited
Title	Site Layout
Project	Upper Lyde
Drawing	3994/ESSD/02
Version	1, KK
Date	Feb 2026
Scale	1:4,000



Key

- Site Boundary
- Watercourses

Superficial Geology

- Alluvium - Clay, Silt, Sand and Gravel
- River Terrace Deposits, 2 (Lugg) - Sand And Gravel
- Head - Clay, Silt, Sand and Gravel
- Glaciofluvial Deposits - Sand And Gravel
- Hummocky Glacial Deposits Diamicton, Sand And Gravel
- Till - Diamicton

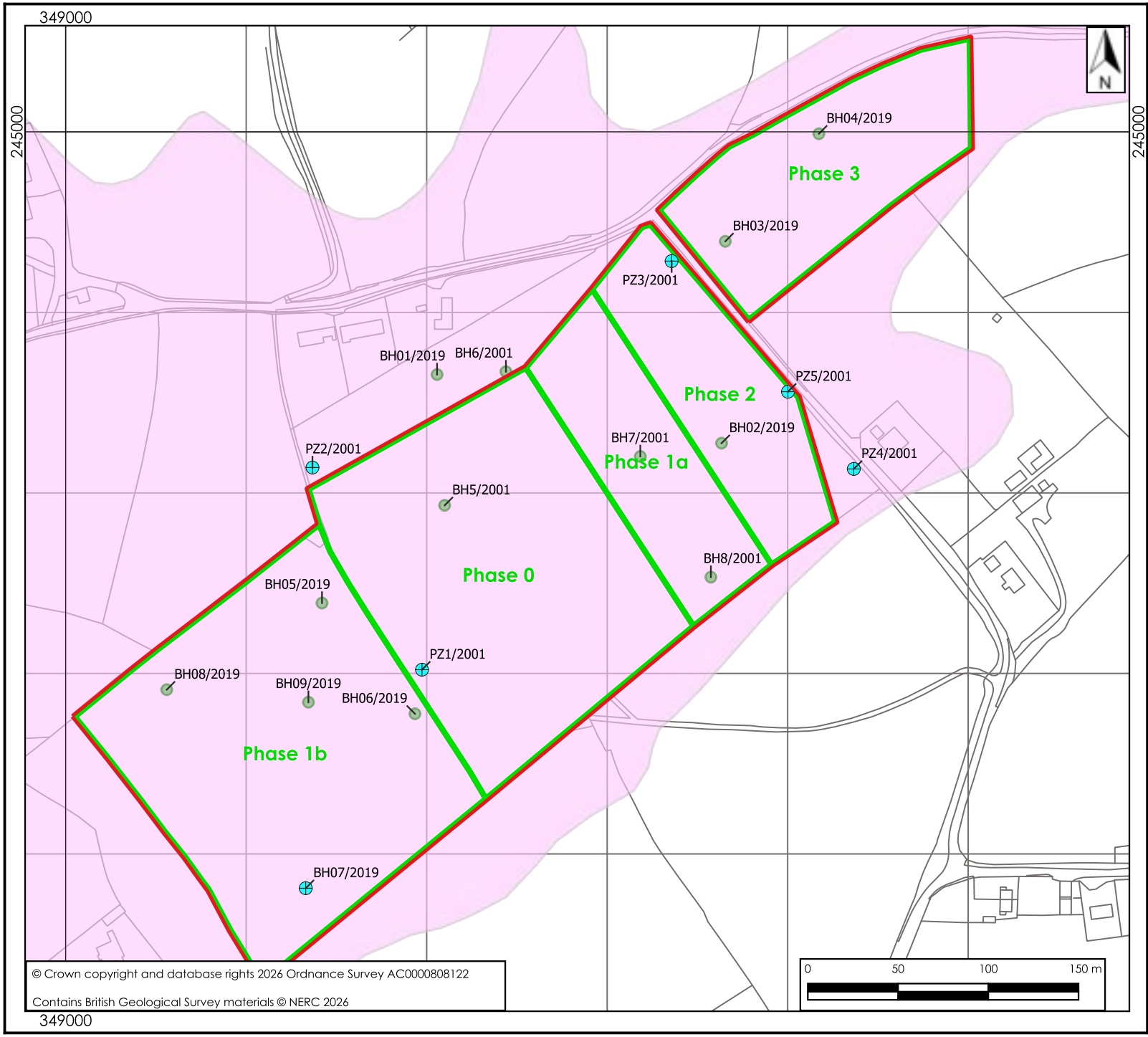
Bedrock Geology

- Moor Cliffs Formation - Siltstone And Mudstone Interbedded
- Moor Cliffs Formation - Sandstone
- Moor Cliffs Formation - Calcareous Mudstone

Scale correct at A4

Client	Hereford Quarries Limited
Title	Regional Geology
Project	Upper Lyde
Drawing	3994/ESSD/03
Version	1, KK
Date	Feb 2026
Scale	1:25,000

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Key

Site Boundary

Superficial Geology

Glaciofluvial Deposits - Sand And Gravel

Borehole locations

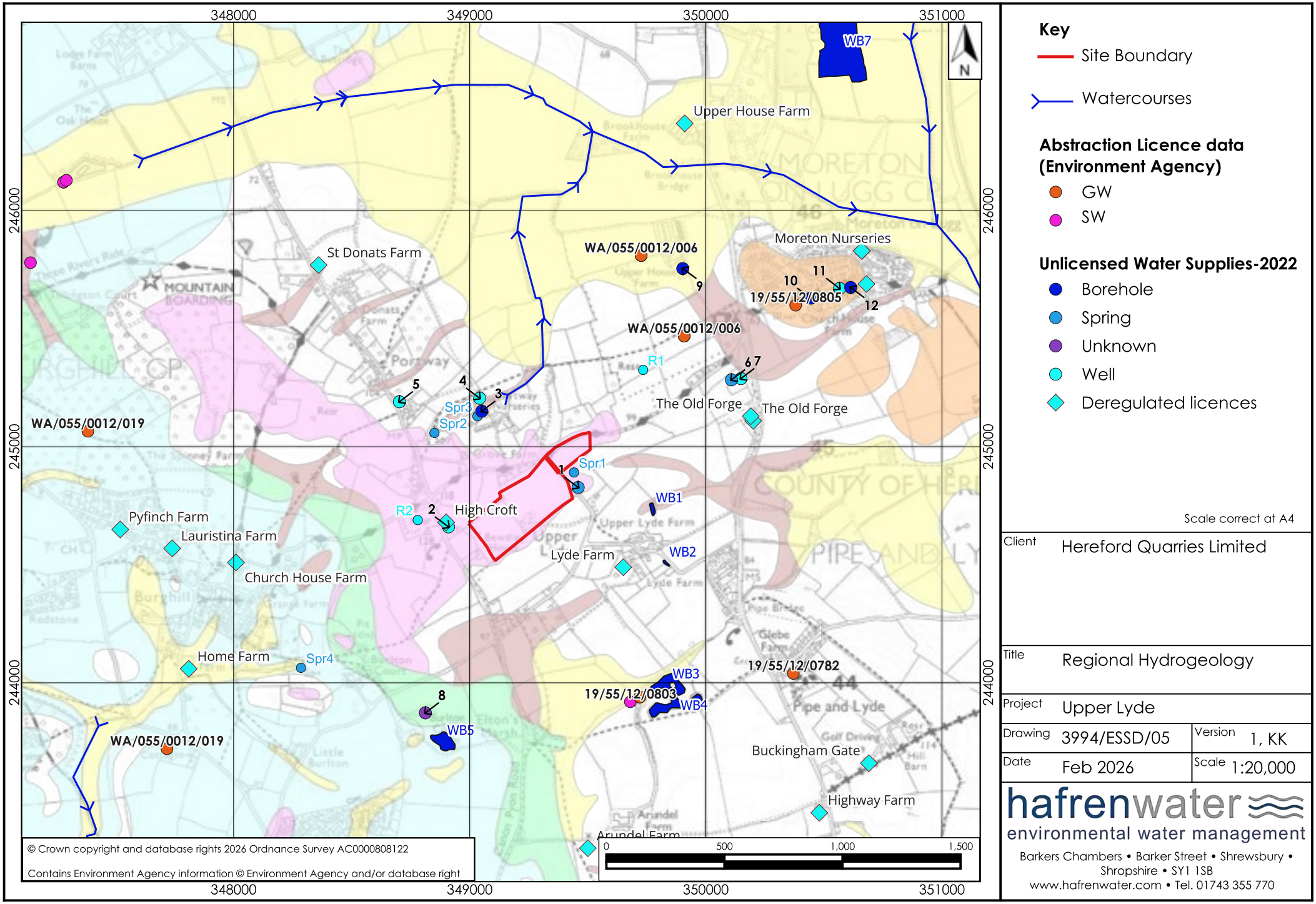
Peizometer

Site Investigation Borehole

Scale correct at A4

Client	Hereford Quarries Limited
Title	Local Geology
Project	Upper Lyde
Drawing	3994/ESSD/04
Version	1, KK
Date	Feb 2026
Scale	1:3,000

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Key

- Site Boundary
- Watercourses

Abstraction Licence data (Environment Agency)

- GW
- SW

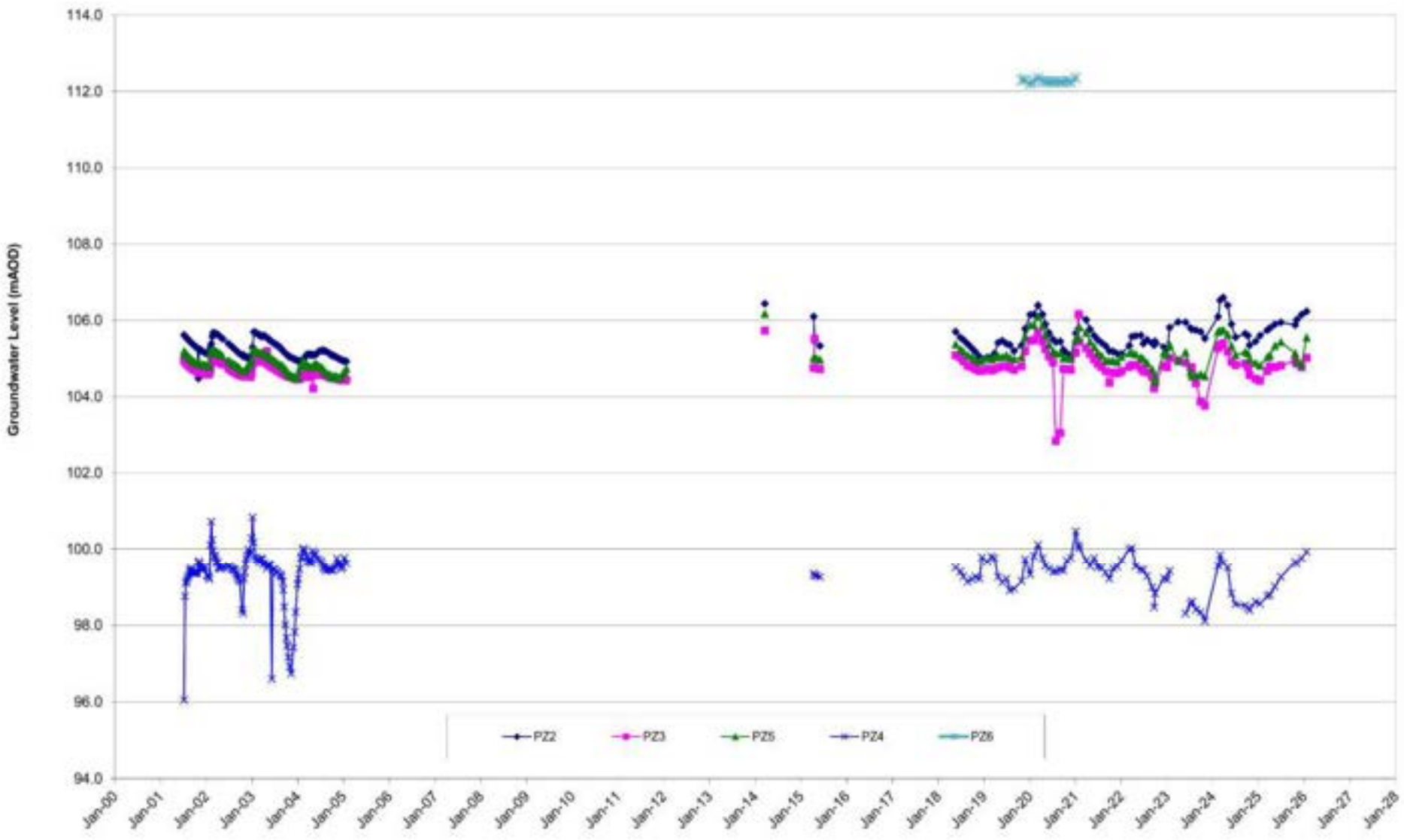
Unlicensed Water Supplies-2022

- Borehole
- Spring
- Unknown
- Well
- Deregulated licences

Scale correct at A4

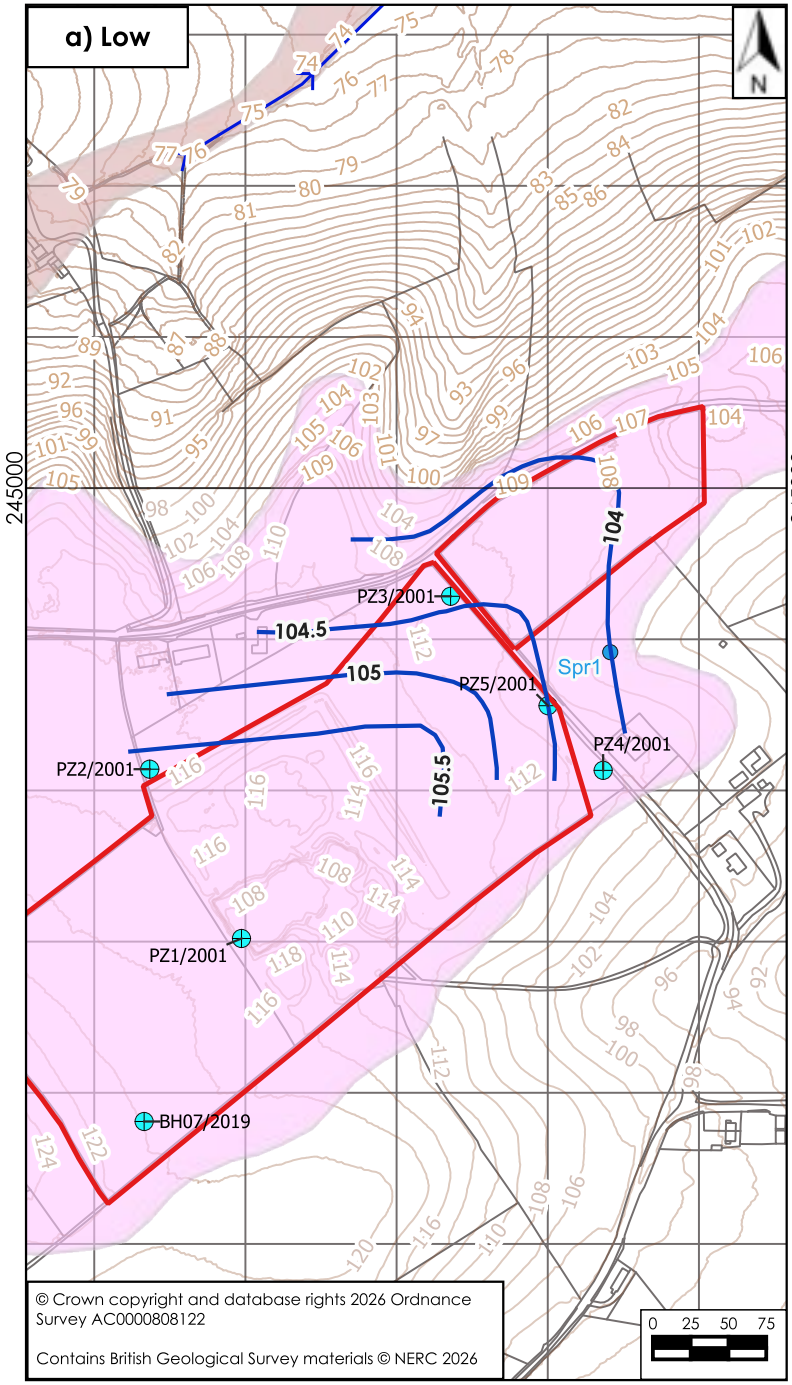
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Title	Regional Hydrogeology
Project	Upper Lyde
Drawing	3994/ESSD/05
Version	1, KK
Date	Feb 2026
Scale	1:20,000

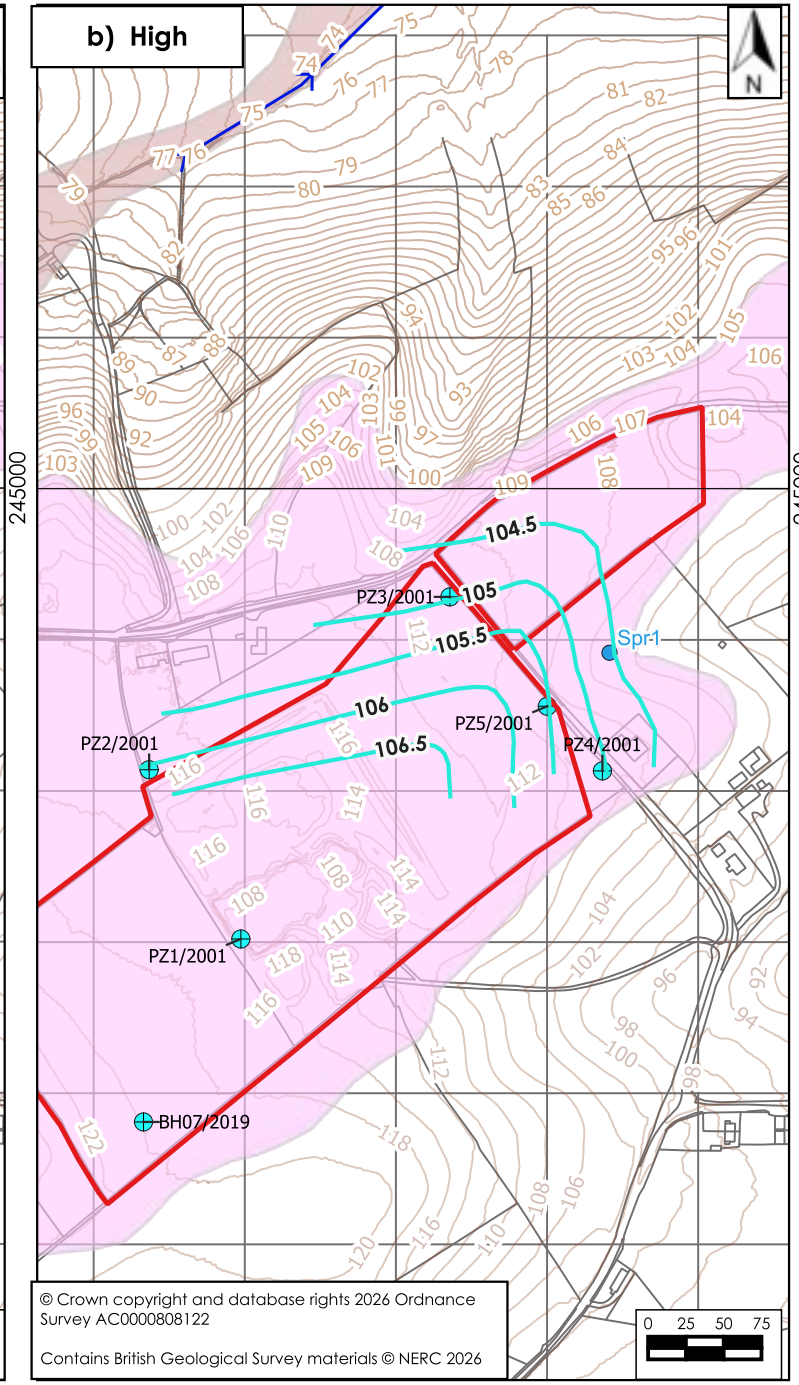
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Client	Hereford Quarries Limited
Title	Groundwater Hydrograph
Project	Upper Lyde
Drawing	3994/ESSD/06
Version	1, KK
Date	Feb 2026
Scale	N/A





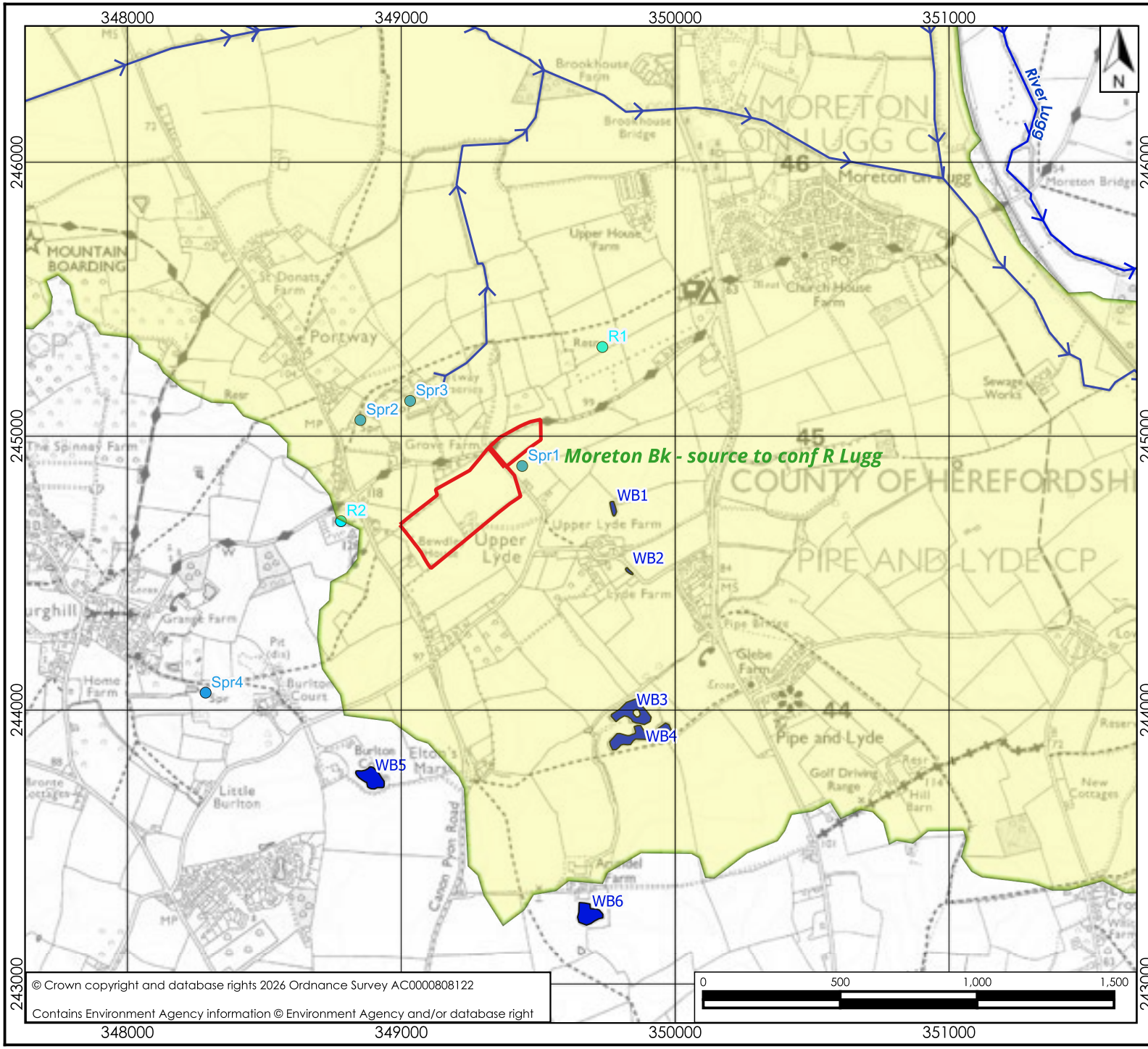
Key

- Site Boundary
- Springs
- Peizometer
- Inferred Goundwater Contours - HIGH January 2026
- Inferred Goundwater Contours - LOW January 2025

Scale correct at A4

Client	Hereford Quarries Limited
Title	Inferred Groundwater Contours
Project	Upper Lyde
Drawing	3994/ESSD/07a+b
Version	1, KK
Date	Feb 2026
Scale	1:5,000

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Key

- Site Boundary
- Watercourses
- Waterbodies
- Springs
- Covered/Uncovered Reservoir
- Moreton Brook WFD waterbody catchment

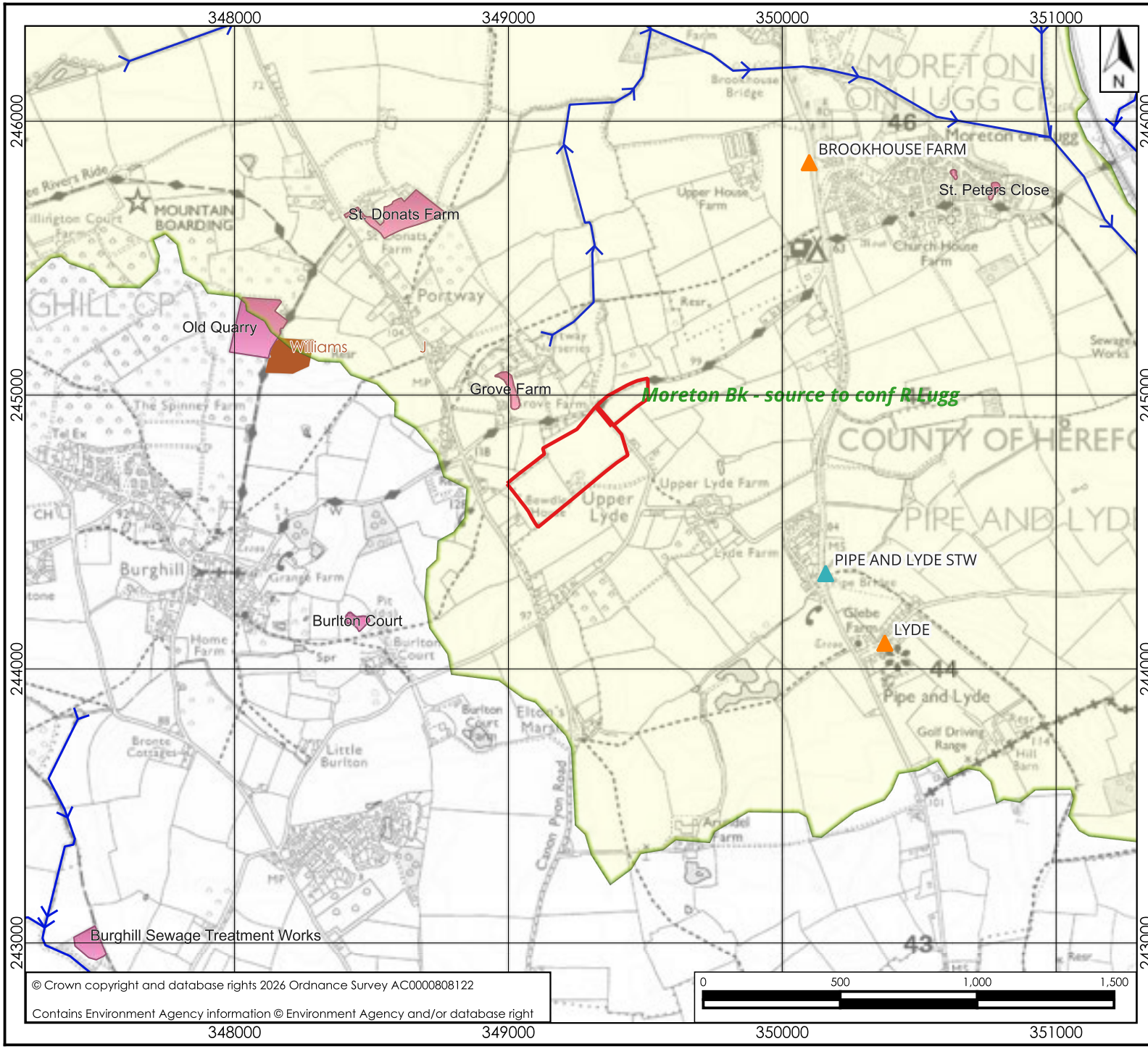
Ecologicical Importance of hydrology

- SSSI
- SAC

Scale correct at A4

Client	Hereford Quarries Limited
Title	Hydrology
Project	Upper Lyde
Drawing	3994/ESSD/08
Version	1, KK
Date	Feb 2026
Scale	1:20,000

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Key

- Site Boundary
- Watercourses
- Permitted Waste Sites
- Historical Landfill Sites

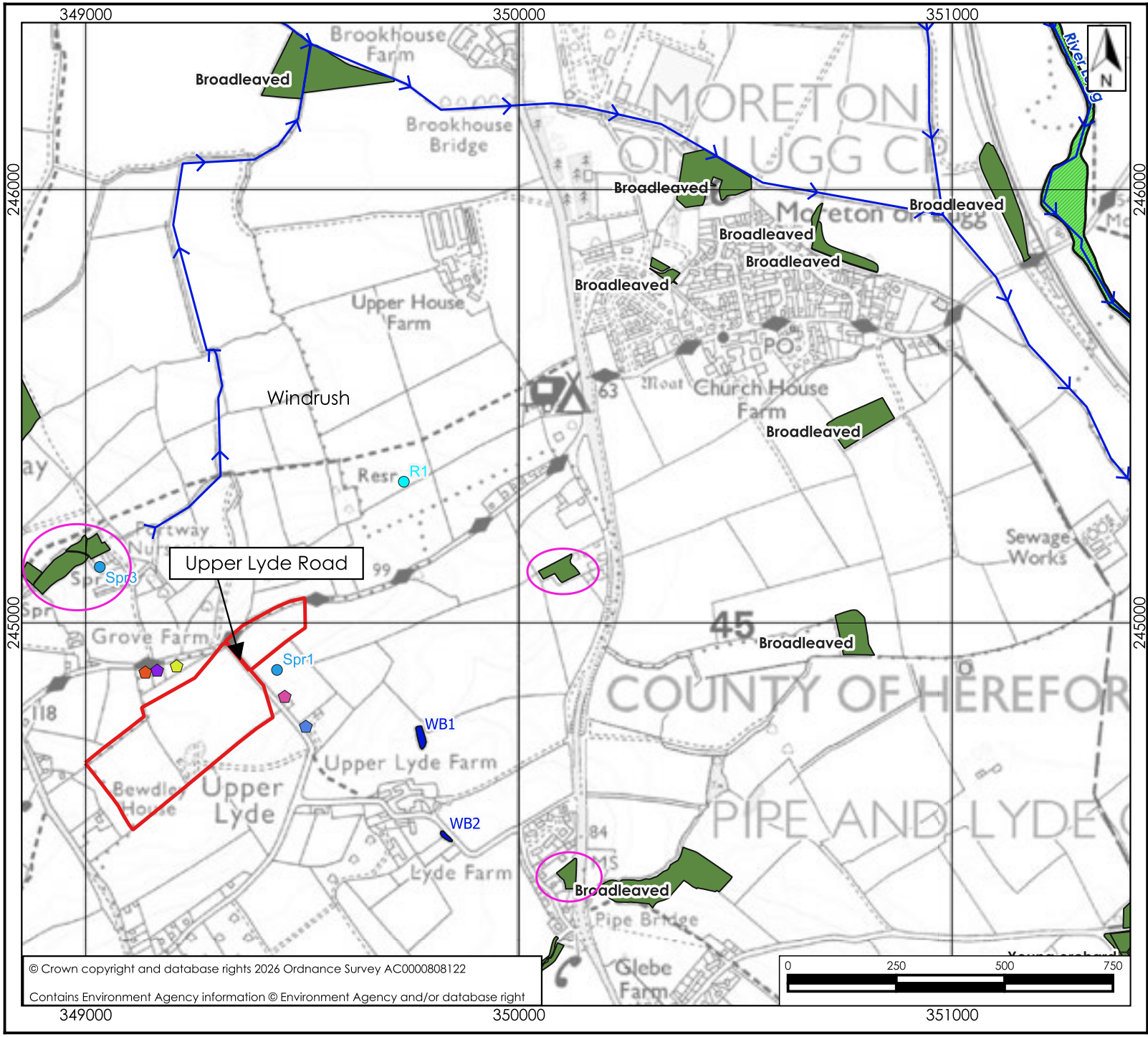
Consented_Discharges_2026

- Sewage - not water company
- Sewage - water company
- Trade

Scale correct at A4

Client	Hereford Quarries Limited
Title	Other Sources of Contamination
Project	Upper Lyde
Drawing	3994/ESSD/09
Version	1, KK
Date	Feb 2026
Scale	1:20,000

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Key

- Site Boundary
- Watercourses
- Waterbodies
- Springs
- Covered Reservoir
- Special Area of Conservation
- Site of Special Scientific Interest
- Traditional Orchards

Residential Property

- Windrush
- Fayre View
- Braemar
- Springfield
- Appletree Cottage

Scale correct at A4

Client	Hereford Quarries Limited
Title	Sensitive Receptors
Project	Upper Lyde
Drawing	3994/ESSD/10
Version	1, KK
Date	Feb 2026
Scale	1:12,500

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APPENDIX 3944/ESSD/A1

Accepted waste codes

Exclusions

Wastes having any of the following characteristics shall not be accepted:

- Consisting solely or mainly of dusts, powders or loose fibres
- Wastes that are in a form that is either sludge or liquid

Sub-source	Waste code	Description	Additional restrictions
Source: 01 Waste resulting from exploration, mining, quarrying and physical and chemical treatment of minerals			
01 01 wastes from mineral excavation	01 01 02*	Wastes from mineral non-metalliferous excavation	Restricted to waste overburden and interburden only
01 04 wastes from physical and chemical processing of non-metalliferous minerals	01 04 08*	Waste gravel and crushed rocks other than those mentioned in 01 04 06	
	01 04 09*	Waste sand and clays	
02 Waste from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing			
02 04 wastes from sugar processing	02 04 01	Soil from cleaning and washing beet	Will be deposited in place of non-waste topsoil and will meet the British Standard for topsoil (BS 3882:2015 as specified in EA guidance)
10 Wastes from thermal processes			
10 12 wastes from manufacture of ceramic goods, bricks, tiles and construction products	10 12 08*	Waste ceramics, bricks, tiles and construction products (after thermal processing)	
10 13 wastes from manufacture of cement, lime and plaster and articles and products made from them	10 13 14	Waste concrete	
17 Construction and demolition wastes			
17 01 concrete, bricks, tiles and ceramics	17 01 01 *	Concrete	
	17 01 02 *	Bricks	
	17 01 03 *	Tiles and ceramics	
	17 01 07 *	Mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06	Metal from reinforced concrete must have been removed

Sub-source	Waste code	Description	Additional restrictions
17 05 soil, stones and dredging spoil	17 05 04 *	Soil and stones other than those mentioned in 17 05 03	Restricted to topsoil, peat, subsoil and stones only, deposited in place of non-waste topsoil and will meet the British Standard for topsoil BS 3882:2015 as specified in the EA guidance
19 Wastes from waste management facilities			
19 12 wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified	19 12 09 *	Minerals (eg sand, stones) only	Restricted to wastes from treatment of waste aggregates that are otherwise naturally occurring minerals Does not include fines from treatment of any non-hazardous waste or gypsum from recovered plasterboard
	19 12 12	Other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11	Restricted to crushed bricks, tiles, concrete and ceramics and soils from the mechanical treatment of construction/demolition waste Metal from reinforced concrete must be removed Does not include gypsum from recovered plasterboard
20 Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions			
20 02 garden and park wastes	20 02 02 *	Soils and stones	Restricted to topsoil, peat, subsoil and stones only

* Denotes waste types (code 0) that can be accepted at the site without testing, in accordance with the Environment Agency "Waste Acceptance procedures for deposit for recovery" 29 June 2023. https://www.gov.uk/government/publications/deposit-for-recovery-operators-environmental-permits/waste-acceptance-procedures-for-deposit-for-recovery

APPENDIX 3944/ESSD/A2

Borehole logs

Contract Name UPPER LYDE, HEREFORD

Contract No 6198

Date 25-6-01

Sheet 1 of 3

APEX DRILLING SERVICES

Tel: 01656 749149

DAILY DRILL LOG

Working Day No 1

Client EDGE + PRITCHARD

Order No N. Pritchard

Driller A. JONES

Crewman C. RICKETS

Bore Hole	Top Depth	Base Depth	Thickness	Core Recovery	Strata Description	Remarks
	MOVE EQUIPMENT TO SITE					
	MOVE TO B/H & PZ1					
& PZ1	GROUND	2-60	2-60		SANDY CLAY GRAVEL	
	2-60	9-20	6-60		GRAVEL + SAND	
	9-20	11-50	2-30		RED/GRAY MUDSTONE	
	INSTALLATION :- 1/2 hr					
	+0-50	4-80	5-30		50mm PLAIN PIPE	
	4-80	10-80	6-00		50mm SLOTTED PIPE	
	4-30	10-80	6-50		PEA GRAVEL	
	3-30	4-30	1-00		BENTONITE	
	0-50	3-30	2-80		ARISING'S	
PZ2		MOVE TO B/H & PZ2				
&	GROUND	2-30	2-30		SANDY CLAY GRAVEL	
	2-30	9-80	7-50		GRAVEL + SAND	
	9-80	10-50	0-70		RED/GRAY MUDSTONE	
	INSTALLATION :- 1/2 hr					
	+0-50	7-00	7-50		50mm PLAIN PIPE	
	7-00	10-00	3-00		50mm SLOTTED PIPE	
	6-50	10-00	3-50		PEA GRAVEL	
	5-50	6-50	1-00		BENTONITE	
	0-50	5-50	5-00		ARISING'S	

QUANTITIES

Site Move:	
Bore Moves:	No
Casing: Size	Mts
Open Hole: Mts	Standing: Hrs
Install AW:	Metres Geolog:
Core Recovery:	Mts
Tests: SPT No	Samples: U100 No
Cabin / Core Store:	Wks
Miscellaneous:	

Hours:	Total
Move =	hrs
Stand =	hrs
Drill =	hrs
Day Works =	hrs
Breakdown =	hrs

TOTAL HOURS

Signed by Apex D.A. [signature]

Signed by Client ..... Date .....

Contract Name UPPER LYDE, HEREFORD

Contract No 6198

Date 25-6-01

Sheet 2 of 3

APEX DRILLING SERVICES

Tel: 01656 749149

DAILY DRILL LOG

Working Day No 1

Client EDGE + PRITCHARD

Order No N. Pritchard

Driller A. JONES

Crewman C. RICKETS

Bore Hole	Top Depth	Base Depth	Thickness	Core Recovery	Strata Description	Remarks
	MOVE TO	B/H		B/H PZ3		
BPZ3	GROUND	1-00	1-00		SANDY CLAY GRAVEL	
	1-00	2-40	1-40		GRAVEL MUDSTONE BANDS	
	2-40	7-40	5-00		GRAVEL + SAND CLAY BANDS	
	7-40	8-50	1-10		RED MUDSTONE	DAMP AT BASE
	INSTALLATION :- 1½ hr					
	+0-50	4-65	5-15		50mm PLAIN PIPE	
	4-65	7-65	3-00		50mm SLOTTED PIPE	
	4-20	7-65	3-45		PEA GRAVEL	
	3-20	4-20	1-00		BENTONITE	
	0-50	3-20	2-70		ARISINGS	
		MOVE	TO B/H 5			
5	GROUND	1-70	1-70		SANDY CLAY GRAVEL	
	1-70	9-10	7-40		GRAVEL	
	9-10	10-00	0-90		RED MUDSTONE	
	B/H BACKFILLED + CAPPED					
	MOVE TO	B/H 6				
6	GROUND	0-70	0-70		SANDY CLAY	
	0-70	7-90	7-20		GRAVEL	
	7-90	8-50	0-60		RED MUDSTONE	
	B/H BACKFILLED + CAPPED					

QUANTITIES

Site Move:

Bore Moves:

Casing: Size

Open Hole: Mts Standing:

Install AW: Metres Geolog:

Core Recovery:

Tests: SPT No Samples: U100

Cabin / Core Store:

Miscellaneous:

Hours: Total

Move = h

Stand = h

Drill = h

Day Works = h

Breakdown = h

TOTAL HOURS

Signed by Apex D.A Jones

Signed by Client Date

Blue – Client's Copy Yellow – Office Copy

Contract Name UPPER LYDE HEREFORD

Contract No 6198

Date 25-6-01

Sheet 3 of 3

APEX DRILLING SERVICES

Tel: 01656 749149

DAILY DRILL LOG

Working Day No 1

Client EDGE & PRITCHARD

Order No M. Pritchard

Driller A. JONES

Crewman C. RICKETS

Bore Hole	Top Depth	Base Depth	Thickness	Core Recovery	Strata Description	Remarks
	MOVE TO		B/H			
7	GROUND	0-70	0-70	7		
	0-70	7-80	7-10		SANDY CLAY	
	7-80	8-50	0-70		GRAVEL	
					RED MUDSTONE	DAMP 7-50m
	B/H BACKFILLED +				CAPPED	

QUANTITIES

Site Move:	1
Bore Moves:	6 No
Casing: Size	Mts
Open Hole: 57-50 Mts	Standing: 1½ Hrs
Install 50mm 29-95m	Metres Geolog:
Core Recovery:	Mts
Tests: SPT No	Samples: U100 No
Cabin / Core Store:	Wks
Miscellaneous:	

Hours: *Total*

Move = ... hrs

Stand = ... hrs

Drill = ... hrs

Day Works = ... hrs

Breakdown = ... hrs

TOTAL HOURS

Signed by Apex D A Jones

Signed by Client ..... Date .....

Blue – Client's Copy Yellow – OS Copy

Contract Name UPPER LYDE HEREFORD

Contract No 6198

Date 26-6-01

Sheet 1 of 2

APEX DRILLING SERVICES

Tel: 01656 749149

DAILY DRILL LOG

Working Day No 2

Client EDGE + PRITCHARD M. Pritchard

Order No

Driller A. JONES

Crewman C. RICKETS

Bore Hole	Top Depth	Base Depth	Thickness	Core Recovery	Strata Description	Remarks
	MOVE TO B/H 8					
8	GROUND	0-50	0-50		SANDY CLAY	
	0-50	1-80	1-30		GRAVEL CLAY BANDS	
	1-80	7-40	5-60		GRAVEL	
	7-40	8-50	1-10		RED MUDSTONE	
	B/H BACKFILLED + CAPPED					
	MOVE TO B/H BY PZ4					
BY PZ4	GROUND	0-50	0-50		SANDY CLAY	
	0-50	3-20	2-70		GRAVEL CLAY BANDS	
	3-20	17-50	14-30		RED MUDSTONE GRAY SANDSTONE BANDS	
	INSTALLATION 1½ hr					
	40-50	14-50	15-00		50mm PLAIN PIPE	
	14-50	17-50	3-00		50mm SLOTTED PIPE	
	14-00	17-50	13-50		6. PEA GRAVEL	
	2-50	4-00	1-50		BENTONITE	
	0-50	2-00	1-50		ARISINGS	
	MOVE TO B/H BY PZ5					
BY	GROUND	1-50	1-50		SANDY CLAY	
PZ5	1-50	4-40	2-90		GRAVEL CLAY BANDS	
	4-40	5-50	1-10		RED MUDSTONE	DAMP 3-90m

QUANTITIES

Site Move:			
Bore Moves:	No		
Casing:	Size		Mts
Open Hole:	Mts	Standing:	Hrs
Install AW:		Metres Geolog:	
Core Recovery:	Mts		
Tests: SPT	No	Samples: U100	No
Cabin / Core Store:	Wks		
Miscellaneous:			

Hours: *Total*

Move = ... hrs

Stand = ... hrs

Drill = ... hrs

Day Works = ... hrs

Breakdown = ... hrs

TOTAL HOURS

Signed by Apex D.A. Jones

Signed by Client ..... Date .....

Blue – Client's Copy Yellow – OS Copy White – Office Copy

Contract Name UPPER LYDE, HEREFORD

Contract No 6198

Date 26-6-01

Sheet 2 of 2

APEX DRILLING SERVICES

Tel: 01656 749149

DAILY DRILL LOG

Working Day No 2

Client EDGE + PRITCHARD M. Pritchard

Order No

Driller A. JONES

Crewman C. RICKETTS

Bore Hole	Top Depth	Base Depth	Thickness	Core Recovery	Strata Description	Remarks
PZ5	INSTALLATION :- ½ hr					
	+0-50	2-50	3-00		50 mm PLAIN PIPE	
	2-50	5-50	3-00		50 mm SLOTTED PIPE	DAMP 3-90m
	2-30	5-50	3-20		PEA GRAVEL	
	1-30	2-30	1-00		BENTONITE	
	0-50	1-30	0-80		ARISINGS	
		MOVE TO B/H 10				
10	GROUND	0-50	0-50		SANDY CLAY	
	0-50	4-80	4-30		GRAVEL	
	4-80	5-50	0-70		RED MUDSTONE	DAMP 4-20m
	B/H BACKFILLED + CAPPED					
	MOVE TO B/H 11					
11	GROUND	0-50	0-50		SANDY CLAY	
	0-50	4-70	4-20		GRAVEL	
	4-70	5-50	0-80		RED MUDSTONE	DAMP 4-50m
	B/H BACKFILLED + CAPPED					
	CEMENT SECURITY COVERS ON B/H'S 1, 2, 3, + 9 (1½ hrs)					
	SUPPLY 5 PAD LOCKS					
			SITE COMPLETE			

QUANTITIES

Site Move:

Bore Moves: 5 No

Casing: Size Mts

Open Hole: 32-00 Mts

Standing: 2½ Hrs

Install ~~ADL~~: 50mm 24m

Metres Geolog:

Core Recovery: Mts

Tests: SPT No

Samples: U100 No

Cabin / Core Store: Wks

Miscellaneous:

Hours:	Total
Move =	hrs
Stand =	hrs
Drill =	hrs
Day Works =	hrs
Breakdown =	hrs

TOTAL HOURS

Signed by Apex D.A. Jones

Signed by Client Date

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

BOREHOLE NUMBER BH01

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 3/9/19 **COMPLETED** 4/9/19 **CO-ORDINATES** 349205.76 mE, 244865.59 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 113.4 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Will Roberts **CHECKED BY** BD

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	
	B 1			Brown SILT with rootlets and rare sub-angular fine to medium gravel	
				0.50	112.90
	B 2			Brown clayey to very clayey fine to medium occasionally coarse SAND and fine to medium rarely coarse rounded to sub-angular GRAVEL	
	B 3				
2					
	B 4				
				3.20	110.20
	B 5			Brown silty sandy fine occasionally medium rarely coarse GRAVEL with some cobbles 3.20 to 3.40m; hard cemented band	
4	B 6	PSD			
	B 7	PSD			
				5.50	107.90
6	B 8	PSD		Brown silty to very silty very sandy fine to medium occasionally coarse rounded to sub-angular GRAVEL	
	B 9	PSD		7.00 to 7.50m; hard cemented band	
8	B 10	PSD			
				8.50	104.90
	B 11	PSD		Brown slightly clayey to clayey silty very sandy fine to coarse rounded to sub-angular GRAVEL	
10	B 12	PSD			
				10.40	103.00
	B 13			10.50 Extemely to very weak very clayey fine grained SANDSTONE recovered as fine to medium gravel	102.90
				Bottom of borehole at 10.50 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

Key GeoSolutions
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Telephone: 01952 822960

BOREHOLE NUMBER BH02

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 4/9/19 **COMPLETED** 5/9/19 **CO-ORDINATES** 349363.38 mE, 244827.57 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 111.2 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Will Roberts **CHECKED BY** BD

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	
	B 1			Brown slightly sandy gravelly clayey SILT. Gravel is fine to medium sub-rounded to sub-angular	
				0.50	110.70
	B 2			Brown clayey to very clayey very gravelly fine to coarse SAND. Gravel is fine to coarse sub-rounded to angular	
	B 3				
2				2.00	109.20
	B 4	PSD		Brown clayey very sandy fine to medium occasionally coarse rounded to sub-angular GRAVEL	
	B 5	PSD			
4					
	B 6	PSD		4.10 to 4.40m; hard cemented band 4.00m; becoming slightly clayey to clayey	
	B 7	PSD		5.00 to 6.00m; gravel becoming rarely course	
6					
	B 8	PSD		6.30 to 6.60m; hard cemented band 6.00m; becoming very clayey	
	B 9	PSD		7.20	104.00
8				Soft red brown occasionally grey mottled CLAY	
	B 10				
	B 11			8.80	102.40
				8.60m; becoming stiff	
				9.10 Red very weak MUDSTONE. Recovered as fine angular mudstone gravel	102.10
				Bottom of borehole at 9.10 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

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BOREHOLE NUMBER BH03

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 5/9/19 **COMPLETED** 6/9/19 **CO-ORDINATES** 349365.44 mE, 244939.4 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 110.1 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Will Roberts **CHECKED BY** BD

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	
	B 1			Brown slightly gravelly SILT	
				0.50	109.60
	B 2			Brown clayey occasionally very clayey very sandy fine to medium rarely coarse rounded to sub-angular GRAVEL	
	B 3	PSD		1.00 to 3.00m; with "hard bands"	
2					
	B 4	PSD			
				3.00	107.10
	B 5	PSD		Brown clayey fine to coarse SAND & fine to medium occasionally coarse sub-rounded to sub-angular GRAVEL 3.00 to 6.00m; with "hard bands"	
4					
	B 6			4.00 to 5.00m; becoming slightly clayey gravelly to very gravelly fine to coarse SAND	
	B 7	PSD			
6					
				6.00	104.10
	B 8			Very soft red brown CLAY with occasional fine angular MUDSTONE gravel	
				7.00	103.10
	B 9			7.20 Red very weak MUDSTONE. Recovered as fine angular mudstone gravel	102.90
				Bottom of borehole at 7.20 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

BOREHOLE NUMBER BH04

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 6/9/19 **COMPLETED** 9/9/19 **CO-ORDINATES** 349417.3 mE, 244999.01 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 108.4 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Brian Duthie **CHECKED BY** WR

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	
	B 1			Red brown gravelly silty CLAY	
				1.00	107.40
	B 2	PSD		Red brown very silty very sandy fine to medium GRAVEL	
2				1.00 to 2.00m; with "hard bands"	
	B 3	PSD			
	B 4	PSD			
4					
	B 5	PSD			
	B 6	PSD			
				5.50	102.90
				5.50 to 7.00m; Driller description "Red gravelly marl"	
6				Red brown slightly sandy gravelly silty CLAY	
	B 7	PSD			
				7.00	101.40
	B 8			7.20 Driller Description "Possible Rock"	101.20
				Bottom of borehole at 7.20 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

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BOREHOLE NUMBER BH05

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 9/9/19 **COMPLETED** 10/9/19 **CO-ORDINATES** 349142 mE, 244739 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 116.7 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Brian Duthie **CHECKED BY** WR

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	
	B 1			Red brown gravelly CLAY. With "hard bands"	
	B 2				
				1.00	115.70
	B 3			Red brown slightly sandy slightly gravelly CLAY	
2					
	B 4				
				2.60	114.10
	B 5	PSD		Grey brown silty SAND & GRAVEL 2.60 to 3.00m; hard cemented band 3.00 to 3.40m; hard cemented band	
				3.40 to 3.60m; hard cemented band	113.10
				Refusal at 3.60 metres. Bottom of borehole at 3.60 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

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Telephone: 01952 822960

BOREHOLE NUMBER BH06

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 10/9/19 **COMPLETED** 10/9/19 **CO-ORDINATES** 349193.52 mE, 244677.64 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 117.3 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Will Roberts **CHECKED BY** BD

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS
	B 1			Brown silty slightly gravelly CLAY
				0.50 116.80
	B 2			Red brown sandy gravelly silty CLAY with "hard bands"
	B 3			
2				
	B 4			
	B 5			
				3.60 3.50 to 3.60m; hard cemented band 113.70

Refusal at 3.60 metres.
Bottom of borehole at 3.60 metres.

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

WELL NUMBER BH07

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 10/9/19 **COMPLETED** 11/9/19 **CO-ORDINATES** 349133 mE, 244581 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 119.9 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Will Roberts **CHECKED BY** BD

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS		WELL DIAGRAM
	B 1			Brown very silty fine SAND		
				0.50	119.40	
	B 2			Brown slightly gravelly slightly sandy silty CLAY		
				1.00	118.90	
	B 3			Red brown slightly gravelly silty CLAY with occasional bands of very silty fine SAND and slightly sandy SILT		
2	B 4					Arisings
	B 5					
4	B 6					
	B 7			4.50 to 5.00m; becoming very sandy and slightly gravelly with fine gravel		
	B 8					
				5.80	114.10	
6	B 9	PSD		Red brown slightly silty sandy fine to coarse rounded to sub-angular GRAVEL		
	B 10	PSD		6.80m; becoming grey brown		
	B 11	PSD		7.10m; becoming very sandy with gravel fine to rarely to occasionally medium GRAVEL		
				7.50	112.40	
	B 12			7.70	112.20	
				Driller description "MUDSTONE" 7.50 to 7.70m; 2hrs chiselling		
				Refusal at 7.70 metres. Bottom of borehole at 7.70 metres.		

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

BOREHOLE NUMBER BH08

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 12/9/19 **COMPLETED** 12/9/19 **CO-ORDINATES** 349056 mE, 244691 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 119.5 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Will Roberts **CHECKED BY** BD

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	
	B 1			Red brown slightly sandy slightly gravelly SILT	
				0.50	119.00
				Red brown slighly sandy silty CLAY	
	B 2				
2	B 3				
	B 4			3.20 to 3.50m; hard band of gravel	
4	B 5				
				5.00	114.50
				5.20 5.00 to 5.20m; hard cemented band	114.30
				Red brown fine to coarse GRAVEL with hard band	
				Refusal at 5.20 metres.	
				Bottom of borehole at 5.20 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

GENERAL BH / TP / WELL 19-302 GEOLOGICAL LOGS.GPJ GINT STD A4 ASTM LAB.GDT 13/12/19

BOREHOLE NUMBER BH09

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

CLIENT Wye Valley **PROJECT NAME** Upper Lyde

PROJECT NUMBER 19-302 **PROJECT LOCATION** Hereford

DATE STARTED 12/9/19 **COMPLETED** 12/9/19 **CO-ORDINATES** 349134.48 mE, 244684.04 mN

DRILLING CONTRACTOR APEX **GROUND ELEVATION** 118 m **HOLE SIZE** 150

DRILLING METHOD Cable Percussive Rig **LOGGED BY** Brian Duthie **CHECKED BY** WR

DEPTH (m)	SAMPLE TYPE NUMBER	TESTS	GRAPHIC LOG	MATERIAL DESCRIPTION & REMARKS	
	B 1			Red brown slightly sandy slightly gravelly SILT	
				0.50	117.50
	B 2			Stiff red brown gravelly CLAY	
2					
	B 3				
				3.00	115.00
	B 4			Stiff red brown silty CLAY	
4				4.00	114.00
	B 5			Red brown fine to coarse GRAVEL with hard band	
				4.50	113.50
				4.50m; hard cemented band	
				Refusal at 4.50 metres. Bottom of borehole at 4.50 metres.	

NOTES

SAMPLE TYPE KEY U = Undisturbed D = Disturbed B = Bulk J = Jar VA = Shear Vane SPT = Standard Penetration Test

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TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP01
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	18-09-19 18-09-19	120.50	E 349053 N 244670	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.90	Red brown firable SILT with rootlets 0.00 - 0.30 with rootlets			
0.90-3.10	Red brown slightly sandy to sandy clayey SILT			
3.10-4.60	Red brown silty very sandy fine to medium rarely coarse sub-rounded to rounded GRAVEL	4.30-4.60	PSD	

PHOTOGRAPHS / DIAGRAMS

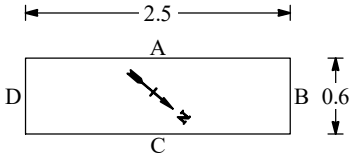


Photo 1 - View of pit.



Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

UK TRIAL PIT LOG WITH PHOTOS 19-302 GEOLOGICAL TRIAL PIT LOGS.GPJ GINT STD AGS 3_1.GDT 13/12/19

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Telephone: 01952 822960

TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP02
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	18-09-19 18-09-19	124.90	E 349029 N 244606	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-5.10	Red brown silty to very silty fine SAND 0.00 - 0.30 with rootlets			

PHOTOGRAPHS / DIAGRAMS

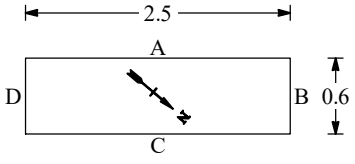


Photo 1 - View of pit.



Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

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TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP03
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	18-09-19 18-09-19	121.90	E 349093 N 244585	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-1.00	Red brown fine SAND 0.00 - 0.30 with rootlets			
1.00-4.60	Red brown silty fine SAND with occasional thin to thick laminations of SILT			
4.60-5.10	4.50 at 4.50m becoming damp Red brown silty fine to medium occasionally coarse SAND & fine occasionally medium sub-rounded to rounded GRAVEL			

PHOTOGRAPHS / DIAGRAMS

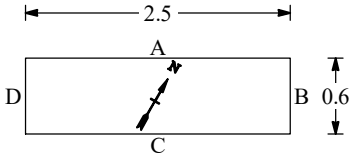


Photo 1 - View of pit.



Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

UK TRIAL PIT LOG WITH PHOTOS 19-302 GEOLOGICAL TRIAL PIT LOGS.GPJ GINT STD AGS 3_1.GDT 13/12/19

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TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP04
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	18-09-19 18-09-19	117.90	E 349120 N 244691	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.70	Brown friable SILT 0.00 - 0.30 with rootlets			
0.70-2.50	Red brown clayey sandy gravelly SILT with bands of silty very sandy fine occasionally medium rarely coarse sub-angular to rounded GRAVEL 1.40 - 1.50 Red brown clayey SILT	2.00-2.50	PSD	
2.50-4.30	2.40 - 2.50 Red brown silty CLAY Brown slightly clayey very sandy fine occasionally medium rarely coarse sub-angular to rounded GRAVEL 2.50 - 4.30 with rare cobbles/boulders of hard cemented bands	4.00-4.20	PSD	

PHOTOGRAPHS / DIAGRAMS

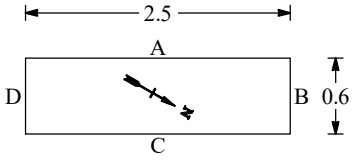


Photo 1 - View of pit.



Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

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info@keygs.com
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TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP05
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	19-09-19 19-09-19	117.50	E 349096 N 244728	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.30	Brown silty fine SAND with occasional gravel			
0.30-1.80	0.00 - 0.30 with rootlets Red brown sandy to very sandy silty CLAY			
1.80-2.50	Red brown slightly silty fine to coarse SAND & fine occasionally medium rarely coarse sub-rounded to rounded GRAVEL			
2.50-3.20	Red brown sandy to very sandy silty CLAY			
3.20-8.10	Red brown silty very sandy fine to medium occasionally coarse sub-rounded to rounded GRAVEL 3.20 - 3.50 hard cemented band	7.00-8.00	PSD	

PHOTOGRAPHS / DIAGRAMS

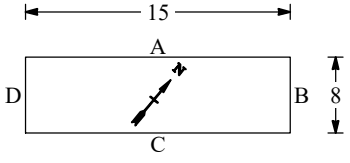


Photo 1 - View of pit.



Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

UK TRIAL PIT LOG WITH PHOTOS 19-302 GEOLOGICAL TRIAL PIT LOGS.GPJ GINT STD AGS 3_1.GDT 13/12/19

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TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP06
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	18-09-19 18-09-19	111.20	E 349315 N 244924	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.40	Red brown silty gravelly fine to coarse SAND			
0.40-4.50	0.00 - 0.30 with rootlets Red brown silty very sandy fine occasionally medium to coarse sub-rounded to rounded GRAVEL with occasional cobbles			
	2.50 Gravel becoming fine to medium occasionally coarse			
		3.00-3.20	PSD	
		4.00-4.20	PSD	

PHOTOGRAPHS / DIAGRAMS

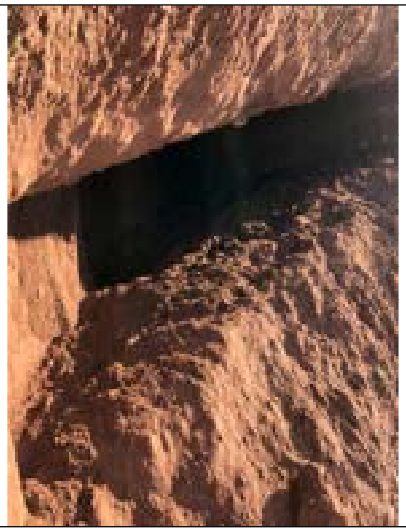
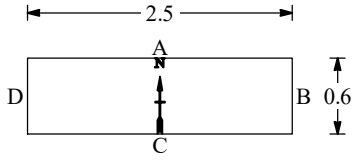


Photo 1 - View of pit.



Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

UK TRIAL PIT LOG WITH PHOTOS 19-302 GEOLOGICAL TRIAL PIT LOGS.GPJ GINT STD AGS 3_1.GDT 13/12/19

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TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP07
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	18-09-19 18-09-19	114.80	E 349135 N 244822	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.40	Red brown clayey fine SAND with occasional fine to medium gravel			
0.40-4.50	0.00 - 0.30 with rootlets			
	Red brown silty very sandy fine to medium occasionally coarse sub-rounded to rounded GRAVEL with rare cobbles			
	1.00 becoming slightly silty			
		2.00-2.10	PSD	
	3.50 with occasional cobbles			
		3.90-4.10	PSD	

PHOTOGRAPHS / DIAGRAMS



Photo 1 - View of pit.

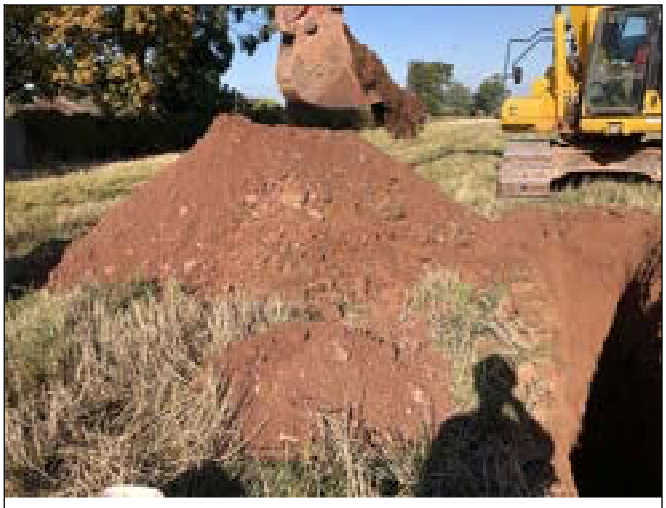
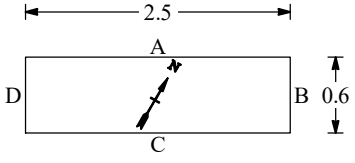


Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

UK TRIAL PIT LOG WITH PHOTOS 19-302 GEOLOGICAL TRIAL PIT LOGS.GPJ GINT STD AGS 3_1.GDT 13/12/19

Key GeoSolutions
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Telephone: 01952 822960

TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP08
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	19-09-19 19-09-19	105.00	E 349522 N 244992	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.40	Brown slightly silty to silty slightly gravelly fine SAND			
0.40-2.40	0.00 - 0.30 with rootlets Red brown silty very sandy fine to medium occasionally coarse sub-rounded to rounded GRAVEL			
	2.00 becoming gravelly to very gravelly SAND	2.20-2.40 2.40-2.60	PSD	
2.40-4.80	Red brown sandy to very sandy fine to coarse sub-angular to angular MUDSTONE and SANDSTONE (recovered as gravels)			

PHOTOGRAPHS / DIAGRAMS

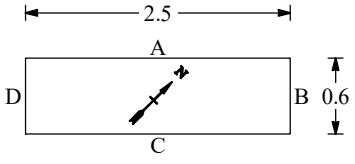


Photo 1 - View of pit.



Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

UK TRIAL PIT LOG WITH PHOTOS 19-302 GEOLOGICAL TRIAL PIT LOGS.GPJ GINT STD AGS 3_1.GDT 13/12/19

Key GeoSolutions
info@keygs.com
Telephone: 01952 822960

TRIAL PIT LOG

Project				TRIAL PIT No
Hereford - Upper Lyde				TP09
Job No	Date	Ground Level (m)	Co-Ordinates (m)	
19-302	19-09-19 19-09-19	104.70	E 349485 N 245036	
Contractor				Sheet
Wye Valley				1 of 1

STRATA		SAMPLES & TESTS		
Depth	DESCRIPTION	Depth	Remarks/Tests	Legend
0.00-0.40	Brown silty slightly gravelly fine to medium SAND			
0.40-1.10	0.00 - 0.30 with rootlets			
1.10-1.80	Red brown silty fine to medium occasionally coarse SAND & fine to medium occasionally coarse sub-rounded to rounded GRAVEL			
	Red brown rarely grey very sandy fine to coarse sub-angular to angular extremely weak to very weak sandy MUDSTONE and SANDSTONE (recovered as gravels)			

PHOTOGRAPHS / DIAGRAMS



Photo 1 - View of pit.

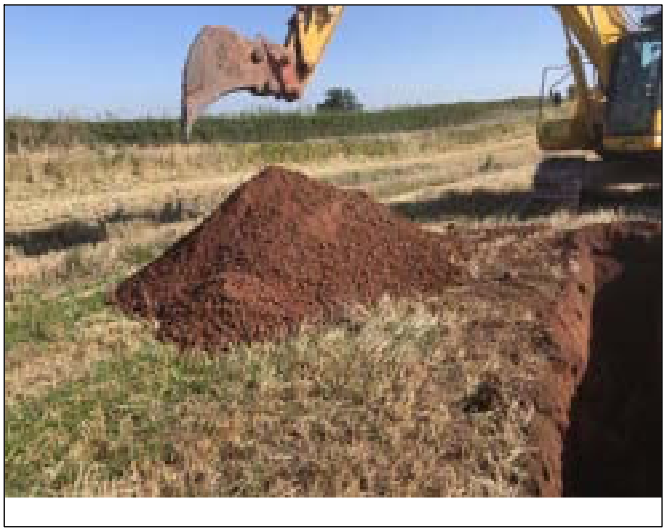
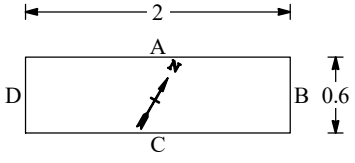


Photo 2 - Arisings.

Shoring/Support:
Stability:





GENERAL REMARKS

All dimensions in metres Scale 1:112.5	Client Wye Valley	Method/ Plant Used Excavator	Logged By WR

UK TRIAL PIT LOG WITH PHOTOS 19-302 GEOLOGICAL TRIAL PIT LOGS.GPJ GINT STD AGS 3_1.GDT 13/12/19

APPENDIX 3944/ESSD/A3

Groundwater quality data

PZ2

Date:		26/01/2021	01/03/2021	29/03/2021	27/04/2021	01/06/2021	29/06/2021	29/07/2021	31/08/2021	27/09/2021	29/10/2021	01/12/2021	05/01/2022	31/01/2022	07/03/2022	29/03/2022	27/04/2022
Determinant	**Unit**										ND	ND	ND	ND			
Arsenic	(µg/l)																
Cadmium	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3					<2.5	<2.5	<2.5
Chromium (Total)	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3					<2.5	<2.5	<2.5
Chromium (Dissolved)	(µg/l)																
Copper	(µg/l)	5	<1	3	<1	<1	5	7	4	5					<1	<1	<1
Iron	(µg/l)	14	<10	<10	<10	<10	<10	<10	<10	<10					<10	<10	<10
Lead	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	<5					<5	<5	<5
Manganese	(µg/l)	<5	38	<5	56	<5	110	120	47	58					31	<10	<10
Nickel	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3					<2.5	<2.5	<2.5
Zinc	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	6					<5	<5	<5
Calcium	(mg/l)	141	89.7	153	128	144	150	168	172	161					180	159	105
Magnesium	(mg/l)	3.43	3.77	3.67	3.66	3.55	3.86	4.05	3.95	3.91					4.3	4.15	4.02
Potassium	(mg/l)	1.76	1.36	1.33	1.22	1.21	1.28	1.57	1.46	2.7					1.38	30.9	3.65
Sodium	(mg/l)	22.4	23.9	21.6	24.6	20.3	24.5	27	32	18.9					23.3	63.3	10
Phosphorus	(mg/l)	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.05					0.01	0.01	0.01
pH	pH Units	7.6	7.4	7.4	7.4	7.2	7.1	7.6	7	6.8					7.2	7.2	7.3
Sulphate	(mg/l)	15	9	15	15	13	25	30	49	44					71	44	23
Chloride	(mg/l)	33	52	51	43	45	56	79	42	33					57	37	26
TON	(mg/l)	0.94	4	2.1	6	3.7	5	4.7	3.2	5.6					5.4	3.1	<0.05
Amonical Nitrogen	(mg/l)	0.014	<0.002	<0.002	<0.002	0.009	<0.002	0.19	<0.002	<0.002					<0.002	0.12	0.29
Conductivity	(µs/cm)	606	695	700	582	724	804	794	682	776					729	652	587
TOC	(mg/l)	<2	<2	<2	<2	2.4	<2	2.5	<2	<2					<2	<2	<2
Alkalinity	(mg/l)	350	300	390	390	340	340	390	340	400					300	330	260
Dissolved Oxygen	(ppm)	7	7	7	6	7	7	6	4	6					5	6	6
Dissolved Organic Carbon	(mg/l)																

PZ3

Date:		26/01/2021	01/03/2021	29/03/2021	27/04/2021	01/06/2021	29/06/2021	29/07/2021	31/08/2021	27/09/2021	29/10/2021	01/12/2021	05/01/2022	31/01/2022	07/03/2022	29/03/2022	27/04/2022
Determinant	**Unit**																
Arsenic	(µg/l)																
Cadmium	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Chromium (Total)	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Chromium (Dissolved)	(µg/l)																
Copper	(µg/l)	6	1	5	<1	2	4	4	4	4	4	<1	<1	<1	<1	<1	<1
Iron	(µg/l)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Manganese	(µg/l)	<5	<5	<5	<5	<5	21	22	50	<5	25	<5	<5	<10	60	<10	<10
Nickel	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Zinc	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Calcium	(mg/l)	176	108	170	147	170	167	178	8.8	157	166	171	119	200	185	166	173
Magnesium	(mg/l)	4.23	4.25	4	4.15	4.08	4.08	4.54	4.28	4	4.37	4.39	4.39	4.37	4.5	4.4	4.04
Potassium	(mg/l)	1.87	1.63	1.7	1.7	1.67	1.79	2.07	2.12	1.46	1.99	2.15	1.91	2.12	2.09	5.4	1.99
Sodium	(mg/l)	19.9	22.4	19.5	17.7	17.9	24.2	15.9	0.01	17.2	23.6	18	19.9	20.8	22.3	30.9	11.9
Phosphorus	(mg/l)	0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
pH	pH Units	7.5	7.5	7.3	7.3	7.1	7	7.5	7	6.9	7.1	7	7.1	7.2	7.2	7.1	7.1
Sulphate	(mg/l)	41	33	43	48	48	67	63	63	31	75	67	72	89	93	78	76
Chloride	(mg/l)	49	45	44	70	49	59	87	61	33	53	41	51	29	46	40	34
TON	(mg/l)	17	16	16	14	17	15	15	13	3.3	12	13	12	14	13	12	11
Amonical Nitrogen	(mg/l)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.1	0.11
Conductivity	(µs/cm)	751	771	758	669	823	877	814	765	741	741	791	870	774	747	725	800
TOC	(mg/l)	<2	<2	<2	<2	<2	<2	2.3	<2	<2	<2	<2	<2	<2	<2	<2	2.2
Alkalinity	(mg/l)	310	280	300	330	300	300	350	310	340	320	330	300	170	280	290	280
Dissolved Oxygen	(ppm)	7	7	7	6	6	8	8	6	8	7	6	7	6	7	7	6
Dissolved Organic Carbon	(mg/l)																

PZ2

Envirochem

Date:		07/06/2022	28/06/2022	04/07/2024	18/09/2024	09/10/2024	22/10/2024	10/12/2024	13/01/2025	21/10/2025	04/11/2025	30/06/2025
Determinant	**Unit**											
Arsenic	(µg/l)											
Cadmium	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<3	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium (Total)	(µg/l)	<2.5	<2.5									
Chromium (Dissolved)	(µg/l)			<2.5	<2.5	<2.5	<20	0.21	<0.2	<0.2	<0.2	<0.2
Copper	(µg/l)	<1	<1	<1	1.00	13.00	<20	<0.3	0.49	0.52	0.38	0.80
Iron	(µg/l)	<10	<10	<10	<10	<10	100.00	<10	<10	<10	10.00	<10
Lead	(µg/l)	<5	<5	9.00	17.00	<5	<20	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	(µg/l)	<10	<10	<10	<10	<10	<20	0.90	0.23	0.35	0.94	<0.2
Nickel	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<20	<0.5	<0.5	1.00	<0.5	<0.5
Zinc	(µg/l)	<5	<5	<5	9.00	<5	<10	<2	<2	<2	<2	2.90
Calcium	(mg/l)	140	140	220.00	180.00	190.00	190.00	56.40	65.90	168.00	169.00	135.00
Magnesium	(mg/l)	3.4	3.5	4.70	5.90	4.70	4.76	1.97	2.00	5.27	4.81	4.32
Potassium	(mg/l)	1.4	1.2	2.60	1.60	17.00	1.10	0.50	0.60	1.11	1.71	1.28
Sodium	(mg/l)	22	11	14.00	17.00	59.00	15.50	6.29	7.08	20.40	19.10	12.90
Phosphorus	(mg/l)	<0.010	<0.010	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.33	0.02
pH	pH Units	6.9	7.2	7.10	7.30	7.20	6.90	7.30	7.80	7.30	7.40	8.00
Sulphate	(mg/l)	27	11	99.00	84.00	84.00	78.20	34.00	31.00	68.00	68.00	74.00
Chloride	(mg/l)	29	7	26.00	44.00	73.00	27.40	28.00	18.00	38.00	42.00	20.00
TON	(mg/l)	1.3	2.1	8.70	9.80	40.00	8.70	2.40	4.70	8.90	9.40	7.70
Amonical Nitrogen	(mg/l)	<0.002	0.073	<0.02	0.83	9.50	<0.4	<0.8	1.90	<0.8	<0.8	1.90
Conductivity	(µs/cm)	725	565	892.00	865.00	878.00	880.00	691.00	653.00	706.00	747.00	729.00
TOC	(mg/l)	<2	<2	<2	<2	<2		<2	<2	<2	<2	<2
Alkalinity	(mg/l)	360	360	220.00	190.00	200.00	307.00	210.00	200.00	ND	335.00	190.00
Dissolved Oxygen	(ppm)	6	4	6.00	6.00	7.00	9.60	7.00	8.00	7.00	9.00	5.00
Dissolved Organic Carbon	(mg/l)						80.70					

PZ3

Date:		07/06/2022	28/06/2022	04/07/2024	18/09/2024	09/10/2024	22/10/2024	10/12/2024	13/01/2025	21/10/2025	04/11/2025	30/06/2025
Determinant	**Unit**											
Arsenic	(µg/l)											
Cadmium	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<3	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium (Total)	(µg/l)	<2.5										
Chromium (Dissolved)	(µg/l)		<2.5	<2.5	<2.5	<2.5	<20	0.20	0.32	<0.2	<0.2	<0.2
Copper	(µg/l)	<1	<1	<1	2.00	<1	<20	0.60	0.97	0.53	1.16	0.35
Iron	(µg/l)	<10	<10	<10	<10	<10	<100	<10	<10	<10	<10	<10
Lead	(µg/l)	<5	<5	11.00	20.00	<5	<20	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	(µg/l)	<10	<10	<10	<10	<10	<20	<0.2	<0.2	5.54	0.97	0.79
Nickel	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<20	<0.5	<0.5	<0.5	<0.5	<0.5
Zinc	(µg/l)	<5	<5	<5	<5	<5	<100	<2	<2	<2	2.20	<2
Calcium	(mg/l)	200	170	190.00	160.00	150.00	168.00	66.80	137.00	137.00	130.00	155.00
Magnesium	(mg/l)	3.2	4.2	4.50	4.60	4.20	4.15	2.22	4.46	4.01	3.77	4.93
Potassium	(mg/l)	1.9	1.8	2.80	1.90	1.90	1.42	1.03	1.33	1.30	1.50	1030.00
Sodium	(mg/l)	23	12	13.00	135.00	99.00	14.30	6.89	13.80	12.70	12.50	18.40
Phosphorus	(mg/l)	<0.01	<0.01	0.01	0.02	0.02	0.02	<0.010	0.02	<0.01	0.11	<0.01
pH	pH Units	6.8	7.2	7.00	7.10	7.20	6.92	7.30	7.60	7.40	7.40	7.70
Sulphate	(mg/l)	120	95	87.00	64.00	62.00	78.60	220.00	120.00	51.00	49.00	85.00
Chloride	(mg/l)	64	30	26.00	24.00	22.00	22.30	3.10	29.00	16.00	17.00	38.00
TON	(mg/l)	12	13	9.50	7.50	7.20	6.50	3.00	7.90	5.90	6.00	7.20
Amonical Nitrogen	(mg/l)	<0.002	<0.002	<0.02	0.56	<0.02	<0.4	<0.8	<0.8	<0.8	<0.8	<0.8
Conductivity	(µs/cm)	798	713	846.00	715.00	739.00	782.00	791.00	711.00	554.00	602.00	755.00
TOC	(mg/l)	2	<2	<2	<2	<2		2.10	<2	<2	<2	<2
Alkalinity	(mg/l)	260	320	200.00	190.00	180.00	306.00	120.00	160.00	ND	274.00	260.00
Dissolved Oxygen	(ppm)	4	4	6.00	8.00	7.00	8.20	6.00	7.00	6.00	9.00	5.00
Dissolved Organic Carbon	(mg/l)						74.00					

PZ4

Date:		26/01/2021	01/03/2021	29/03/2021	27/04/2021	01/06/2021	29/06/2021	29/07/2021	31/08/2021	27/09/2021	29/10/2021	01/12/2021	05/01/2022	31/01/2022	07/03/2022	29/03/2022	27/04/2022
Determinant	**Unit**																
Arsenic	(µg/l)																
Cadmium	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Chromium (Total)	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Chromium (Dissolved)	(µg/l)																
Copper	(µg/l)	4	<1	2	<1	<1	<1	4	3	6	2	<1	<1	<1	<1	1	<1
Iron	(µg/l)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Manganese	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	12	<5	<5	<5	<10	<10	<10	<10
Nickel	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Zinc	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Calcium	(mg/l)	110	90.2	112	98.9	161	106	112	2.5	174	108	105	79.2	113	100	88.9	145
Magnesium	(mg/l)	3.13	3.39	3.24	3.15	3.54	3.21	3.39	3.46	4.56	3.86	3.4	3.6	3.98	4.21	4.15	3.25
Potassium	(mg/l)	3.85	3.64	3.52	3.29	1.78	3.03	3.52	3.17	2.23	3.17	3.21	3.41	3.11	2.97	4.94	2.19
Sodium	(mg/l)	17.6	9.07	22.2	19.5	21.3	16.3	10.3	0.01	19.6	14.5	12.1	22.6	15.1	17.4	20	9.43
Phosphorus	(mg/l)	0.02	<0.01	<0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.05
pH	pH Units	7.7	7.7	7.5	7.6	7.3	7.2	7.7	7.3	6.8	7.2	7.3	7.2	7.5	7.6	7.5	7
Sulphate	(mg/l)	17	10	21	21	33	33	18	29	66	17	13	16	12	14	17	24
Chloride	(mg/l)	36	13	58	31	53	24	10	13	42	110	23	29	32	30	30	30
TON	(mg/l)	0.3	0.48	0.42	0.05	19	<0.05	0.15	0.08	13	0.17	0.25	0.16	0.09	0.29	0.07	15
Amonical Nitrogen	(mg/l)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Conductivity	(µs/cm)	505	489	555	470	819	548	510	477	840	758	454	556	483	472	479	718
TOC	(mg/l)	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Alkalinity	(mg/l)	240	250	300	260	280	240	290	300	370	240	250	210	250	230	260	260
Dissolved Oxygen	(ppm)	7	7	7	6	6	6	8	6	8	6	6	6	6	6	5	5
Dissolved Organic Carbon	(mg/l)																

PZ5

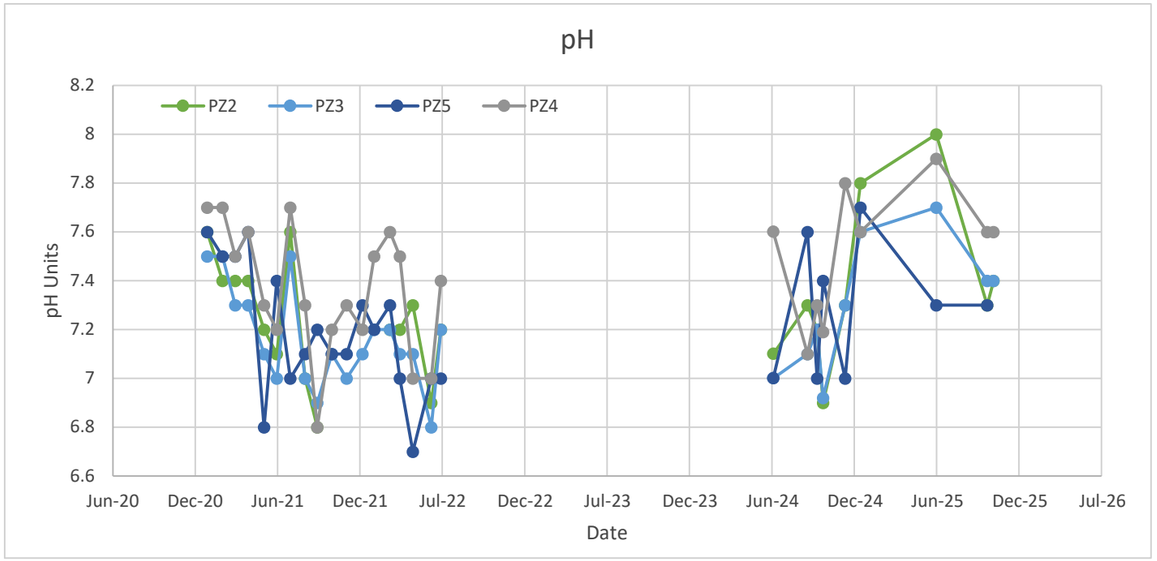
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Determinant	**Unit**																
Arsenic	(µg/l)																
Cadmium	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Chromium (Total)	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Chromium (Dissolved)	(µg/l)																
Copper	(µg/l)	6	1	5	<1	<1	4	5	4	3	4	<1	<1	<1	<1	<1	<1
Iron	(µg/l)	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Lead	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Manganese	(µg/l)	7	<5	<5	<5	<5	7	35	33	<5	27	27	<5	<10	12	<10	<10
Nickel	(µg/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<2.5	<2.5	<2.5
Zinc	(µg/l)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Calcium	(mg/l)	164	105	165	147	108	151	169	2.5	113	164	162	101	159	141	134	138
Magnesium	(mg/l)	3.63	3.33	3.55	3.87	2.87	3.54	3.87	4.01	3.55	3.9	3.76	3.78	3.48	3.38	3.41	3.15
Potassium	(mg/l)	2.36	1.66	1.64	1.68	3.06	2.08	2.44	2.52	3.19	2.81	2.6	2.47	2.35	1.99	3.32	1.99
Sodium	(mg/l)	18.5	23.6	16.2	10.5	17.6	14	17.8	0.01	7.88	19.7	14.1	19.7	18.1	14.6	23	11
Phosphorus	(mg/l)	0.06	<0.01	0.03	0.06	0.01	0.06	0.04	0.05	0.01	0.07	0.07	0.01	0.06	0.05	0.07	0.04
pH	pH Units	7.6	7.6	7.5	7.5	7.6	6.8	7.4	7	7.1	7.2	7.1	7.1	7.3	7.2	7.3	7
Sulphate	(mg/l)	37	19	31	29	14	40	48	49	10	38	37	32	28	32	26	22
Chloride	(mg/l)	43	43	35	36	35	27	36	38	9	37	56	37	39	55	42	27
TON	(mg/l)	8.7	13	15	21	0.16	16	13	8.3	0.46	4.5	5.2	6.9	7.6	7.6	8.2	18
Amonical Nitrogen	(mg/l)	<0.002	<0.002	<0.002	0.013	<0.002	<0.002	<0.002	<0.002	0.028	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.22
Conductivity	(µs/cm)	689	681	726	639	542	769	781	699	507	696	653	777	649	692	610	698
TOC	(mg/l)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Alkalinity	(mg/l)	320	300	280	310	250	300	350	370	310	400	330	280	320	260	300	250
Dissolved Oxygen	(ppm)	7	7	7	7	6	7	6	6	9	6	6	7	7	5	4	6
Dissolved Organic Carbon	(mg/l)																

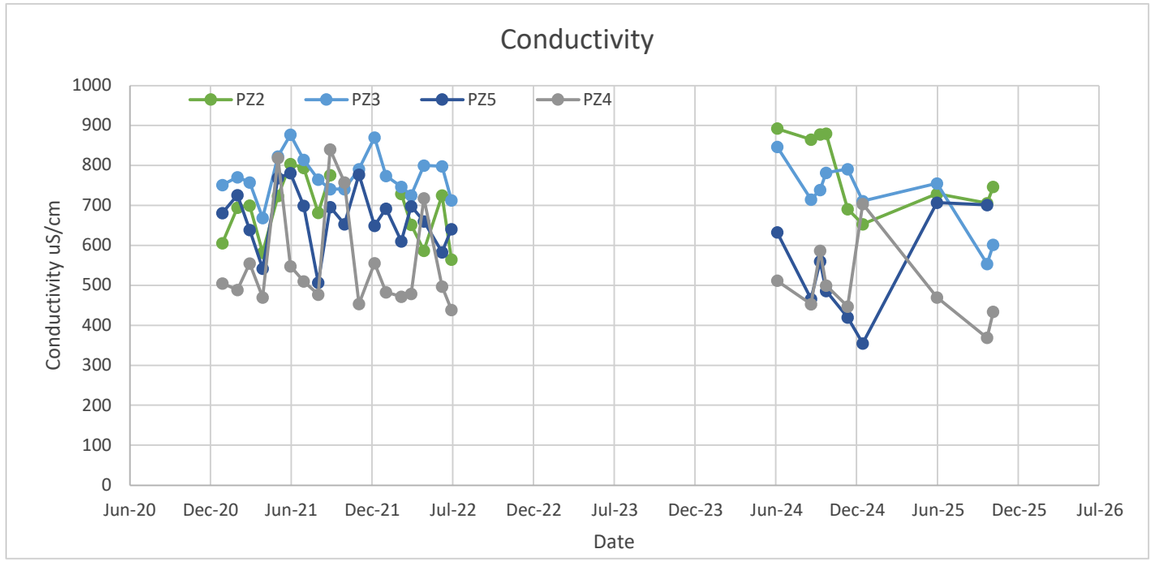
PZ4

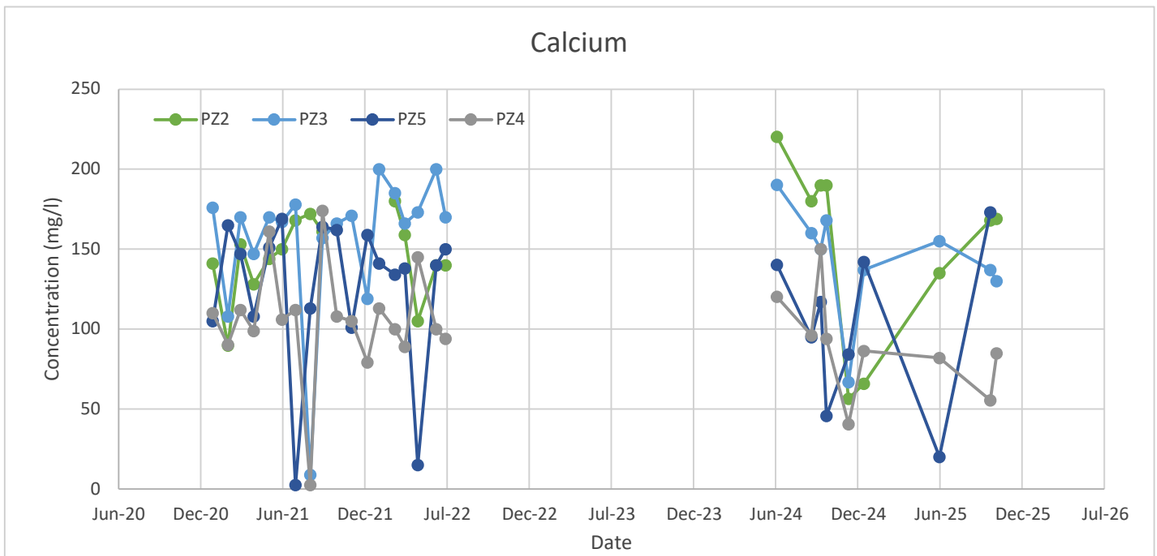
Date:		07/06/2022	28/06/2022	04/07/2024	18/09/2024	09/10/2024	22/10/2024	10/12/2024	13/01/2025	21/10/2025	04/11/2025	30/06/2025
Determinant	**Unit**											
Arsenic	(µg/l)											
Cadmium	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<3	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium (Total)	(µg/l)	<2.5	<2.5									
Chromium (Dissolved)	(µg/l)			<2.5	<2.5	<2.5	<20	<0.2	0.25	<0.2	<0.2	<0.2
Copper	(µg/l)	<1	<1	<1	2.00	<1	<20	1.24	2.40	1.04	0.67	0.73
Iron	(µg/l)	<10	<10	<10	<10	<10	<100	<10	<10	<10	<10	<10
Lead	(µg/l)	<5	<5	12.00	23.00	<5	<20	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	(µg/l)	<10	<10	<10	<10	<10	<20	<0.2	<0.2	<0.2	0.93	0.48
Nickel	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<20	<0.5	0.55	<0.5	<0.5	<0.5
Zinc	(µg/l)	<5	<5	<5	<5	<5	<100	4.90	12.8	2.8	<2	4.1
Calcium	(mg/l)	100	94	120.00	96.00	150.00	94.00	40.60	86.40	55.40	84.90	82.00
Magnesium	(mg/l)	3.2	3.2	3.80	3.70	3.20	4.02	2.04	4.62	3.95	4.65	3.02
Potassium	(mg/l)	3.3	3.1	4.00	3.30	1.90	2.98	1.95	3.41	1.92	1.71	2.45
Sodium	(mg/l)	17	7.6	14.00	10.00	5.30	11.30	6.15	13.00	11.10	11.20	11.60
Phosphorus	(mg/l)	<0.01	<0.01	0.026	0.011	0.062	0.024	0.018	0.035	<0.01	0.089	0.028
pH	pH Units	7	7.4	7.60	7.10	7.30	7.19	7.80	7.60	7.60	7.60	7.90
Sulphate	(mg/l)	22	<10	<10	14.00	29.00	10.50	11.00	11.00	<10	11.00	10.00
Chloride	(mg/l)	27	9	8.50	9.50	13.00	6.61	6.80	9.10	6.00	6.60	8.40
TON	(mg/l)	<0.05	0.44	0.16	1.00	2.90	10.50	0.38	0.27	0.22	0.42	0.70
Amonical Nitrogen	(mg/l)	<0.002	<0.002	0.06	0.47	<0.02	<0.4	<0.8	<0.8	<0.8	<0.8	<0.8
Conductivity	(µs/cm)	497	439	511.00	453.00	587.00	500.00	447.00	704.00	369.00	434.00	470.00
TOC	(mg/l)	<2	<2	<2	<2	<2		<2	<2	<2	<2	<2
Alkalinity	(mg/l)	250	270	150.00	160.00	170.00	219.00	150.00	160.00	ND	233.00	160.00
Dissolved Oxygen	(ppm)	7	4	7.00	6.00	6.00	7.50	5.00	7.00	6.00	9.00	5.00
Dissolved Organic Carbon	(mg/l)						3.40					

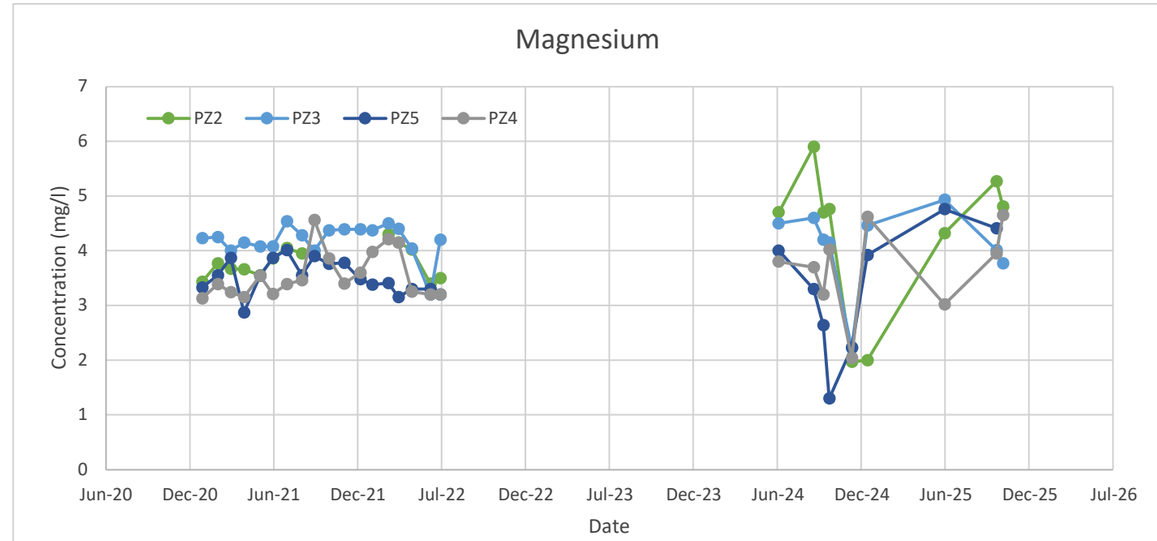
PZ5

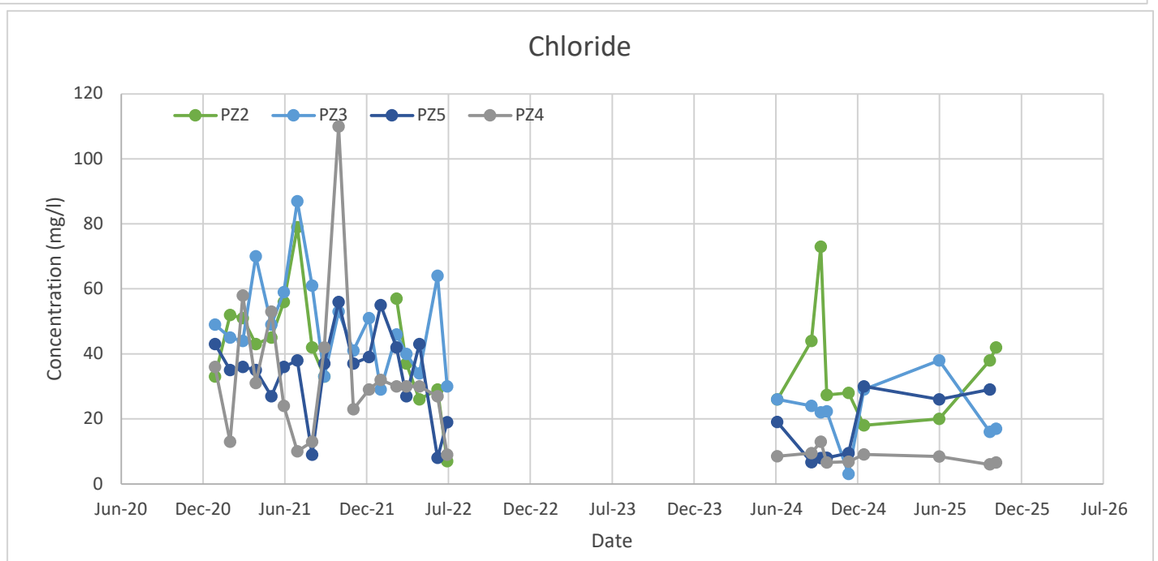
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Determinant	**Unit**											
Arsenic	(µg/l)											
Cadmium	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<3	<0.2	<0.2	<0.2	<2	<0.2
Chromium (Total)	(µg/l)	<2.5	<2.5									
Chromium (Dissolved)	(µg/l)			<2.5	<2.5	<2.5	<20	0.35	1.05	<0.2	<0.2	0.24
Copper	(µg/l)	<1	<1	<1	3.00	<1	<20	0.87	0.76	1.09	0.56	0.87
Iron	(µg/l)	<10	<10	<10	<10	<10	<100	<10	<10	<10	<10	<10
Lead	(µg/l)	<5	<5	<5	16.00	<5	<20	<0.5	<0.5	<0.5	<0.5	<0.5
Manganese	(µg/l)	<10	<10	<10	<10	<10	<20	<0.2	<0.2	10.40	0.27	0.60
Nickel	(µg/l)	<2.5	<2.5	<2.5	<2.5	<2.5	<20	<0.5	<0.5	1.54	0.82	<0.5
Zinc	(µg/l)	<5	<5	<5	<5	6.00	<100	<2	<2	3.10	<2	2.10
Calcium	(mg/l)	15	140	150.00	140.00	95.00	117.00	45.70	84.20	20.10	173.00	142.00
Magnesium	(mg/l)	3.3	3.3	3.20	4.00	3.30	2.64	1.30	2.23	4.76	4.41	3.92
Potassium	(mg/l)	2.2	1.9	2.80	2.40	2.90	1.25	0.76	0.99	1.66	1.66	1.50
Sodium	(mg/l)	220	6.8	5.40	7.20	4.90	5.16	4.81	7.32	8.42	8.54	7.83
Phosphorus	(mg/l)	0.055	0.046	0.05	0.05	0.02	0.04	0.02	0.04	<0.01	0.06	0.05
pH	pH Units	6.7	7	7.00	7.00	7.60	7.00	7.40	7.00	7.30	7.30	7.70
Sulphate	(mg/l)	34	20	45.00	44.00	<10	35.20	34.00	29.00	140.00	130.00	160.00
Chloride	(mg/l)	43	8	19.00	19.00	6.70	7.98	8.00	9.50	26.00	29.00	30.00
TON	(mg/l)	15	14	13.00	13.00	0.28	4.30	1.40	1.60	<0.05	0.34	2.30
Amonical Nitrogen	(mg/l)	<0.002	<0.002	<0.02	0.82	<0.2	<0.4	<0.8	<0.8	<0.8	<0.8	<0.8
Conductivity	(µs/cm)	660	583	641.00	632.00	466.00	560.00	486.00	420.00	707.00	701.00	355.00
TOC	(mg/l)	<2	<2	<2	<2	<3		<2	<2	<2	<2	<2
Alkalinity	(mg/l)	280	300	150.00	180.00	150.00	197.00	150.00	130.00	ND	304.00	120.00
Dissolved Oxygen	(ppm)	6	4	6.00	2.00	8.00	8.50	6.00	8.00	7.00	8.00	5.00
Dissolved Organic Carbon	(mg/l)						5.60					

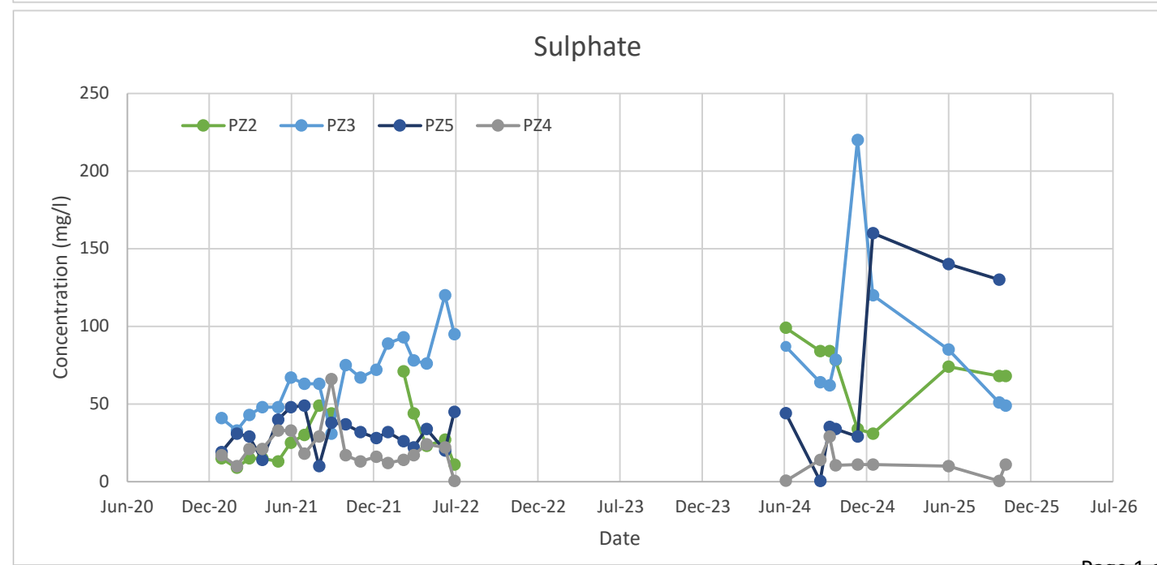

pH
PZ2
PZ3
PZ5
PZ4
pH Units
8.2
8
7.8
7.6
7.4
7.2
7
6.8
6.6
Jun-20
Dec-20
Jun-21
Dec-21
Jul-22
Dec-22
Jul-23
Dec-23
Jun-24
Dec-24
Jun-25
Dec-25
Jul-26
Date

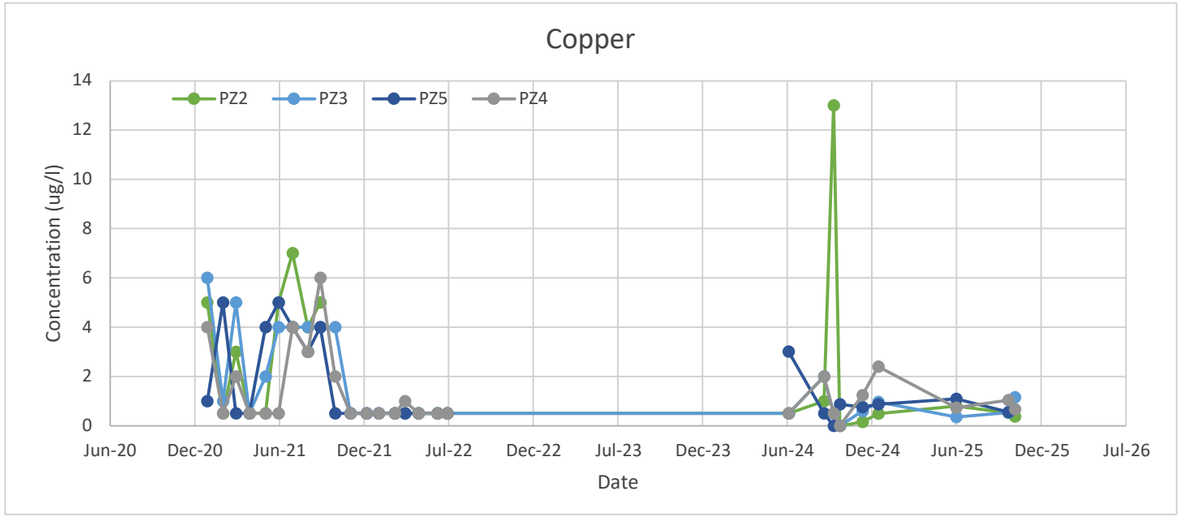

Conductivity
PZ2
PZ3
PZ5
PZ4
Conductivity uS/cm
1000
900
800
700
600
500
400
300
200
100
0
Jun-20
Dec-20
Jun-21
Dec-21
Jul-22
Dec-22
Jul-23
Dec-23
Jun-24
Dec-24
Jun-25
Dec-25
Jul-26
Date

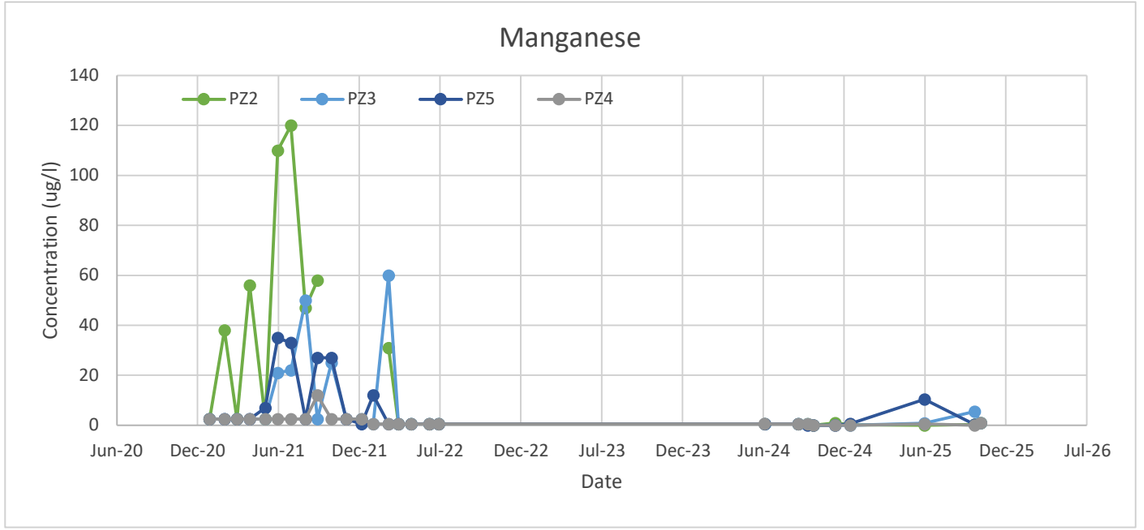

Calcium
PZ2
PZ3
PZ5
PZ4
Concentration (mg/l)
250
200
150
100
50
0
Jun-20
Dec-20
Jun-21
Dec-21
Jul-22
Dec-22
Jul-23
Dec-23
Jun-24
Dec-24
Jun-25
Dec-25
Jul-26
Date

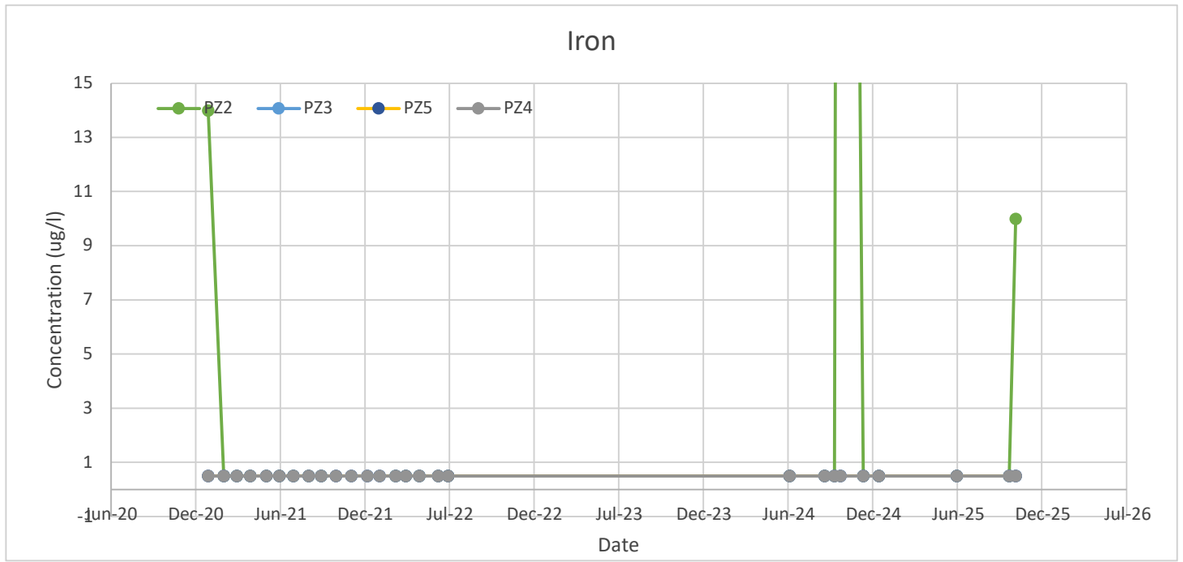

Magnesium
PZ2
PZ3
PZ5
PZ4
Concentration (mg/l)
7
6
5
4
3
2
1
0
Jun-20
Dec-20
Jun-21
Dec-21
Jul-22
Dec-22
Jul-23
Dec-23
Jun-24
Dec-24
Jun-25
Dec-25
Jul-26
Date

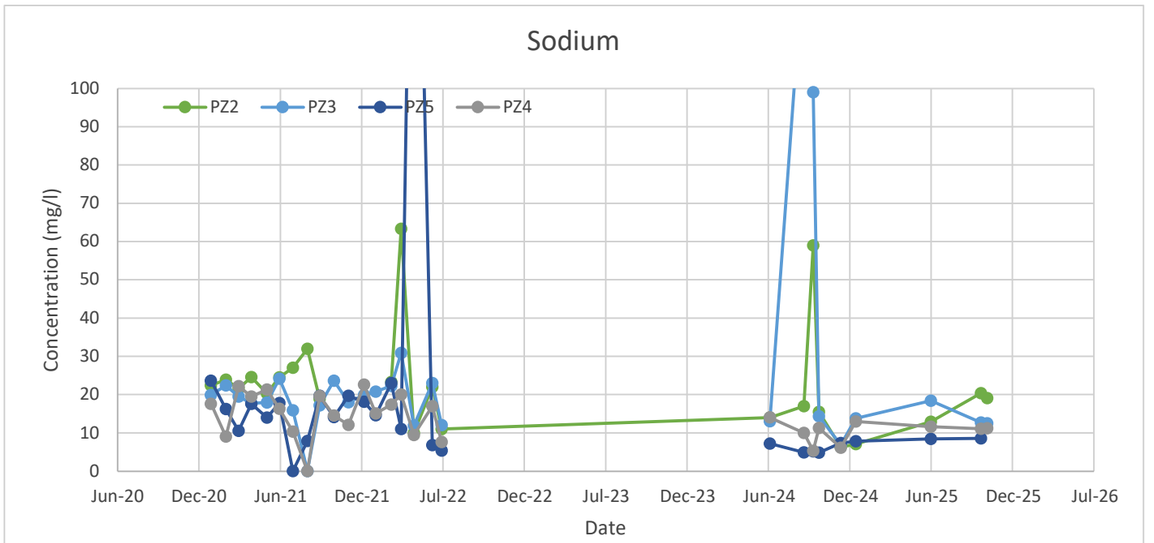

Chloride
PZ2
PZ3
PZ5
PZ4
Concentration (mg/l)
120
100
80
60
40
20
0
Jun-20
Dec-20
Jun-21
Dec-21
Jul-22
Dec-22
Jul-23
Dec-23
Jun-24
Dec-24
Jun-25
Dec-25
Jul-26
Date

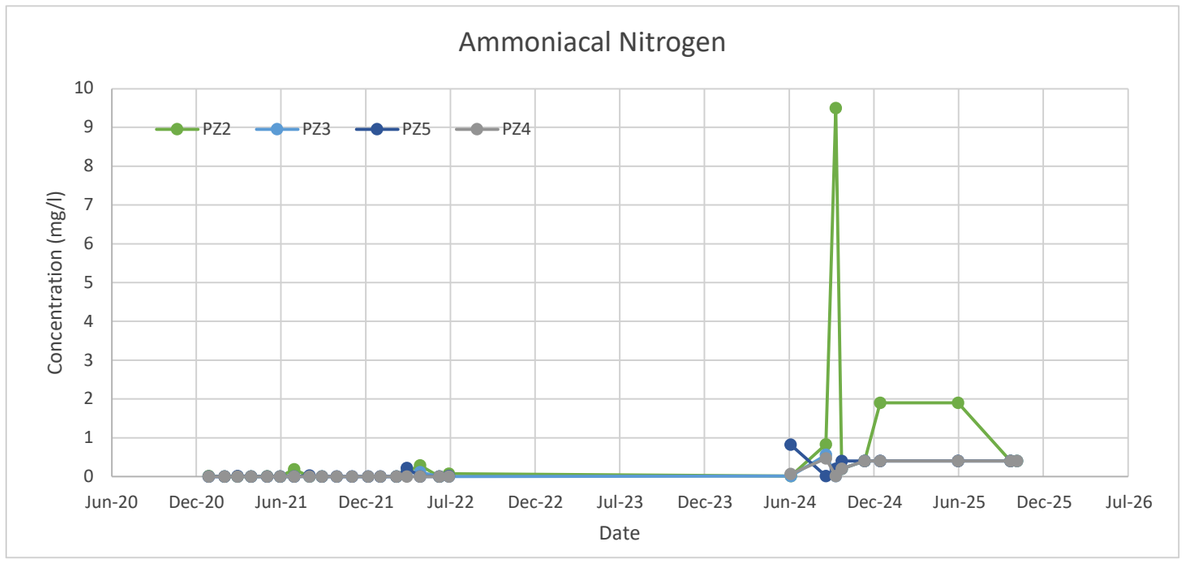

Sulphate
PZ2
PZ3
PZ5
PZ4
Concentration (mg/l)
250
200
150
100
50
0
Jun-20
Dec-20
Jun-21
Dec-21
Jul-22
Dec-22
Jul-23
Dec-23
Jun-24
Dec-24
Jun-25
Dec-25
Jul-26
Date


Copper
PZ2
PZ3
PZ5
PZ4
Concentration (ug/l)
Date
Jun-20
Dec-20
Jun-21
Dec-21
Jul-22
Dec-22
Jul-23
Dec-23
Jun-24
Dec-24
Jun-25
Dec-25
Jul-26


Manganese
PZ2
PZ3
PZ5
PZ4
Concentration (ug/l)
Date


Iron
PZ2
PZ3
PZ5
PZ4
Concentration (ug/l)
Date


Sodium
PZ2
PZ3
PZ5
PZ4
Concentration (mg/l)
Date


Ammoniacal Nitrogen
PZ2
PZ3
PZ5
PZ4
Concentration (mg/l)
Date