Buckton Vale Quarry Access Road

Environmental Setting and Site Design (ESSD) Report

Churchill Enviro Ltd

Report No. K4859-ENV-R004-01
25 October 2022
Revision 01

BYRNELOOBY

IRELAND | UK | UAE | BAHRAIN | KSA

Document Control

Document: Environmental Setting and Site Design (ESSD) Report

Project: Buckton Vale Quarry Access Road

Client: Churchill Enviro Ltd

Report Number: K4859-ENV-R004-01

Document Checking:

Revision	Revision/ Review Date	Details of Issue	Authorised		
			Prepared By	Checked By	Approved By
00	02 August 2022	Issued to Client	E Greenhalgh	P Roberts	P Roberts
01	25 October 2022	Issued to Agency	E Greenhalgh	C Finney	J Baxter
Disclaimer: Please note that this report is based on specific information, instructions and information from our Client and should not be relied upon by third parties.					

www.ByrneLooby.com

Contents

1 Introduction

1.1 Report Objectives

This Environmental Setting and Site Design (ESSD) report has been produced to support a Bespoke Permit application for a recovery activity by Churchill Enviro Ltd to construct an access road at Buckton Vale Quarry (the Site).

Environment Agency (Agency) guidance[1] on ESSDs has been used to prepare this report.

1.2 Site Details

The Site is situated in Carrbrook, approximately 4km North East of Stalybridge, Tameside. The Site is located at Grid Reference SD992327 01457 and is a well-established gritstone and sandstone quarry operating under permission reference 04/01800/FUL. It is characterised by two large voids described as the eastern and western voids. The Site office and weighbridge are located in the western void close to the Site entrance. The Site entrance is a private road linking the Site to Castle Lane. The Site location is shown on drawing referenced 4859/1/004.

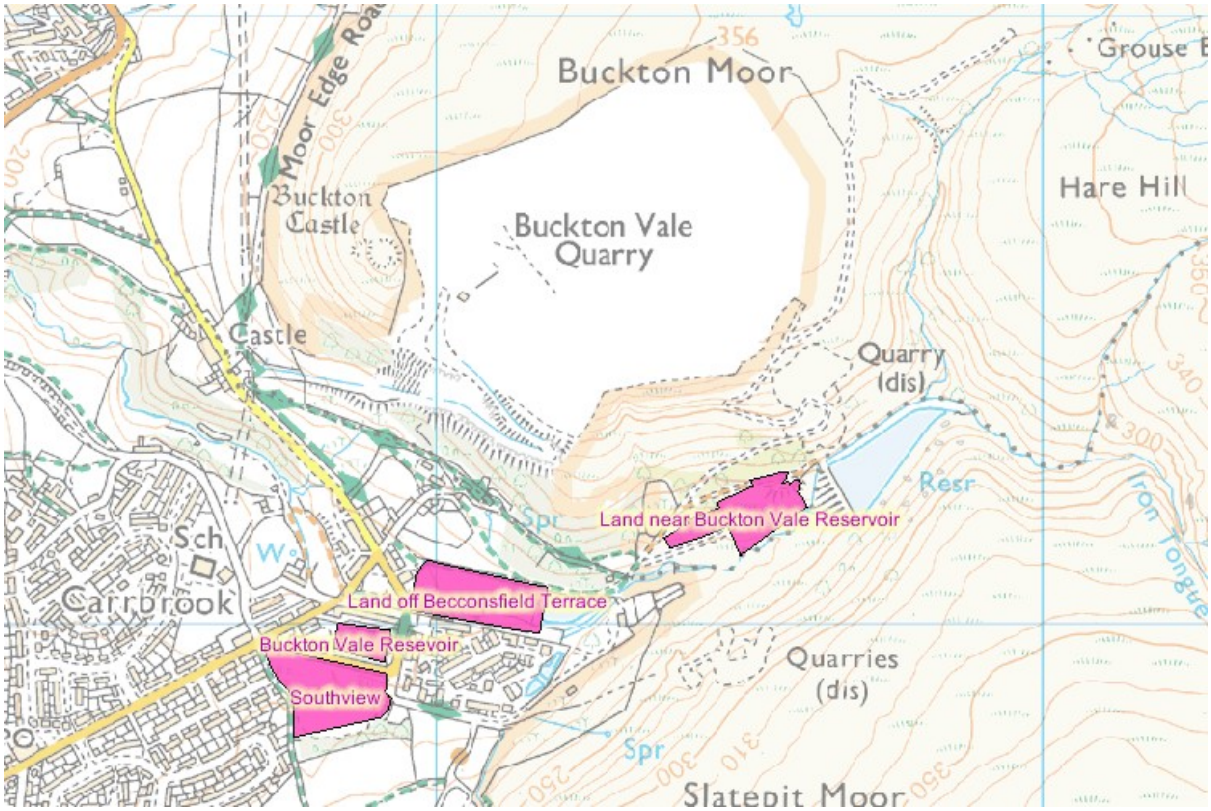
Drawing reference 4859/1/002 shows the current ground levels around the proposed Site. The elevation of the lowest point of the proposed site is approximately 299 m AOD. This inclines in a north-east direction to around 342 m AOD.

The Site has three existing Standard Rules (SR) 2015 No.39 permits (referenced EPR/WE0949AB/A001, EPR/CB3301TX and EPR/GB3004XN) which allow the construction of a surface water retaining bund, stabilisation works and a rock trap. The Operator proposes to surrender permits EPR/CB3301TX prior to construction of the access road to avoid uncertainty about the extent of each deposit. Permit EPR/WE0949AB was issued in March 2022 and will be an independent feature to the access road.

The Operator is not aware of any other former waste management activities within the Site. Information gained previously from the Agency's website indicates there are records of historic landfilling (unspecified) to the South of the Site immediately to the West of Buckton Vale Reservoir. Additionally, a further three areas have been highlighted to the south, on the eastern edge of Carrbrook. The areas of historic landfilling are highlighted on Figure 1.1 below.

[1] Landfill operators: environmental permits - What to include in your environmental setting and site design report - Guidance - GOV.UK (www.gov.uk)

Figure 1.1 – Area's of historic landfilling



There are a number of properties and other potential receptors close to the proposed permit boundary; these are listed in Table 1 below and their location shown on drawing referenced 4859/1/006.

Table 1 – Sensitive Receptors

Receptor Number	Receptor	Receptor Type	Approx Distance from Site Boundary (m)	Direction from Site	Freq (%) of Prevailing Wind Direction
1	Alphine Pike & Buckton Moor (South)	Local Wildlife Site / Protected Habitat (Upland Heath)	40	N, E & W	1.68-23.4
2	Buckton Castle Ruins	Scheduled Monuments	70	W	5.2
3	Footpaths	Public Right of Way	65 - 365	E – W	6.7 – 5.2
4	Moor Edge Road	Road	290	W	5.2
5	Properties off Car Lane	Residential	325	S	1
6	Castle Lane	Road	420	SW	3.5
7	Properties off Castle Lane	Agriculture / Residential	430	SW	3.5
8	Castle Clough & Cowbury Dale	Local Nature Reserve	420 - 470	SW - S	3.5 - 1
9	Stayley Brook	Water Course	475	SW	3.5
10	Intake Cottage	Residential	490	NNW	6
11	Tamyon Brook	Water Course	360	NW	2.9

Receptor Number	Receptor	Receptor Type	Approx Distance from Site Boundary (m)	Direction from Site	Freq (%) of Prevailing Wind Direction
12	New Harehill Clough	Water Course	450	E	6.7

Extraction of stone at the quarry is anticipated to continue until approximately 2042 as detailed by the latest planning permission 18/00826/FUL.

2 Conceptual Site Model

2.1 Historical Activity

Carboniferous millstone grit has been extracted from the Site for well over 150 years. It is understood that the quarry was dormant in the 1970s but reopened in 1982. The first planning permission relating to the Site referenced 19/2/302 was granted in 1957. This provided for an extension to the quarry area. A second permission referenced 19/2/1018, was granted in 1965 for a further extension to the boundary of the quarry. This permission was surrendered upon the subsequent granting of planning permission referenced K/17366, which was granted in November 1985. The permission covered an area of 33 hectares. The Site is currently operated under permission referenced 04/01800/FUL with the latest variation referenced 18/00826/FUL which was issued in December 2020 and extended the timescale for extraction of the remaining mineral reserve at the Site until 2042.

Approximately 960,000 m^3 of mineral reserve exist adjacent to the northern boundary of the Site. 140,772.03tonnes of rock were extracted in 2021 however extraction rates can vary greatly depending on market value and contracts. Whilst there is no limit on extraction rates, the operational capacity is controlled by limits on vehicle movements (90 return trips), and restrictions on operational hours. The effect of the condition restricting vehicle movements is to limit the annual sales (removal of mineral from the site) to approximately 500,000 tonnes, however sales have been significantly below that level over recent years.

2.2 Proposed Activity

Planning permission 18/00826/FUL extended the timescale for extraction of the remaining mineral reserve at Buckton Vale Quarry until 2042. The majority of the remaining reserve is located adjacent to the northern boundary of the site. The full depth of this material (approximately 32 m) has yet to be quarried and this represents a significant volume of valuable undisturbed material (approximately 960,000 m^3).

It is understood however that a substantial quantity of overburden from elsewhere in the quarry was placed above this location historically. Previous access roads have since been removed with progression of the quarrying activities elsewhere in the site and it is no longer possible to access the overburden which must be removed prior to quarrying the mineral in that area. The overburden will ultimately be used in the low-level restoration scheme for the site.

In order to access the overburden and the mineral underneath it a new road needs to be constructed within the north-western area of the site to enable suitable plant to safely access the overburden and then the mineral. This road will ascend along the northwest and north quarry wall following existing quarry features where possible, as shown on drawing reference 4859/1/002.

The Operator demonstrated through approval of a Waste Recovery Plan (WRP) (referenced: K4859-ENV-R001-00) that it would be financially viable to use non-waste to construct the road and thereby met the substitution test to construct it using suitable inert waste materials.

2.2.1 Waste Types and Quantities

Details of the waste types and waste acceptance procedures are provided in the approved WRP (referenced: K4859-ENV-R001-00) and summarised below.

It is proposed to use waste classified under the EWC codes permitted by Standard Rules permit referenced (SR) 2015No.39 as the restoration fill proposed for Buckton Vale as detailed in Table 2. This would be very similar to the non-waste material sourced from aggregate or topsoil suppliers if non-wastes were used for the new road.

Approximately 140,158 m^3 of material will be required to complete the access road scheme which equates to a tonnage of 266,700 tonnes using a conversion factor of 1.8 tonnes / m^3.

Table 2 – Proposed Waste Types

01 Waste resulting from exploration, mining, quarrying and physical and chemical treatment of minerals	
01 01 02	Wastes from mineral non metalliferous excavation
01 04 08	Waste gravel and crushed rocks other than those mentioned in 01 04 06
01 04 09	Waste sand and clays
10 wastes from thermal processes	
10 12 08	Waste ceramics, bricks, tiles and construction products (after thermal processing)
10 13 14	Waste concrete
17 Construction and demolition wastes	
17 01 01	Concrete
17 01 02	Bricks
17 01 03	Tiles and ceramics
17 01 07	Mixture of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06
17 05 04	Soil and stones other than those mentioned in 17 05 03
19 Wastes from waste management facilities	
19 12 09	Minerals (for example sand, stones) only
20 Municipal wastes (household waste and similar commercial, industrial and institutional wastes) including separately collected fractions	
20 02 02	Soil and stones

2.2.2 Waste Acceptance

All incoming materials will be subject to strict waste acceptance procedures as outlined in the approved WRP and the Site's Environmental Management System (EMS). Waste acceptance is a

structured hierarchy with appropriate points of control for the identification and validation of waste for recovery at the Site and is summarised as follows:

Level 1 Basic characterisation through pre-acceptance assessment of appropriate information (i.e. EWC codes, site investigations etc);

Level 2 Compliance testing

Level 3 On-site verification through retrospective analysis of samples taken from deposited materials

Each stage in the proposed waste acceptance scheme is detailed further below.

2.2.2.1 Level 1: Waste Characterisation

Table 1 above details the list of wastes to be accepted at the Site.

The EWC code of wastes will be checked against any relevant available data provided (e.g. waste description, waste source or chemical testing) to confirm that the waste is non-hazardous, the coding is correct, it can be accepted under the permit and it is suitable for the proposed activity. The waste enquiry procedure requires the following information to be gathered from any potential waste load prior to acceptance:

- Full address where the waste was produced;
- The identity of the producer;
- Information on the waste production process;
- Source and origin of waste (e.g. site investigation reports, borehole logs);
- Description of the waste treatment applied, or a statement of reasons why treatment is not considered necessary;
- Code according to the European Waste Catalogue;
- Evidence the waste is free from contamination and not hazardous;
- Chemical analysis data on the composition of the waste (i.e. totals mg/kg) and the leaching behaviour (i.e. WAC) where necessary; and
- The nature of the waste i.e. smell, colour, physical form.

This data will be reviewed by a suitably qualified person to ensure that all sampling is representative of the source of the waste and an appraisal of the composition, including the likelihood of hazardous properties, will be undertaken.

Landfill Directive Inert wastes can be accepted without supporting analytical test data, if the waste meets the additional restriction imposed by Council Decision 2003/33/EC e.g. the waste is

uncontaminated, a single-stream waste from a single source, and excludes where appropriate top soil and peat.

2.2.2.2 Level 2: Compliance testing

Additional onsite testing may be undertaken to validate compliance testing. This will be targeted at specific wastes should any suspicion of contamination be identified either as a result of Level 1 or subsequent Level 3 checks. This material will only be accepted if the appropriate testing confirms that the material is free from contamination and inert WAC testing confirms compliance with the inert WAC leachable limits.

In addition, non targeted sampling of emplaced wastes will be taken on a periodic basis (quarterly) to confirm that the Level 1 and 2 waste acceptance procedures have effectively precluded unsuitable materials.

2.2.2.3 Level 3: On-site verification

Assuming the initial checks have been completed to the satisfaction of the competent person the weighbridge clerk will be the second point of control prior to the deposit of wastes.

All incoming vehicles enter via the main site entrance and check in at the site office. The documentation accompanying the load shall be checked by the weighbridge clerk and shall include, but not be limited to, the Carriers Certificate of Registration and Duty of Care Waste Transfer Note.

The information to be recorded in respect of each load will be where appropriate:

- Pre-treatment details;
- Waste type;
- Date;
- Time;
- Customer name;
- Vehicle registration number and type;
- Ticket number; and
- Carriers registration number.

It is recognised that there are difficulties achieving a visual inspection of waste loads arriving at the weighbridge in compacted or bulky type vehicles. For these types of loads emphasis is placed on checking the documentation at the weighbridge and visual inspection at disposal.

Every load of waste delivered to site will be visually inspected, where possible, by the weighbridge clerk or other site staff prior to deposit and after deposit by the plant operatives in the working area.

The weighbridge clerk will confirm that the accompanying documentation (i.e. waste description or likely levels of contamination) demonstrates that the waste load is the same waste type described by the customer at the pre-acceptance stage. If the documentation is incorrect and the correct paperwork cannot be provided, the weighbridge clerk will inform the Technically Competent Person (TCP) and the load will be rejected.

Where practicable, the weighbridge operator or other site staff will then visually inspect the load for compliance with the documentation. If the inspection shows that the load differs from the description, the load will be rejected as above.

If everything is in order the weighbridge operator will instruct the driver to proceed to the working area following all site rules and procedures.

The operatives at the working area will undertake a visual inspection of all loads arriving at site. Should any load look or smell suspicious or appear unsuitable for disposal the operatives at the working area will contact the weighbridge operator to assess the waste load in question.

If the waste is not acceptable, the weighbridge operator will inform the TCP and the waste will be treated in accordance with the rejection procedure.

2.2.2.4 Rejection Procedure

The rejection procedure covers the system for controlling all actions needed for rejection of a load or part load of waste determined by inspection to be unsuitable for disposal at the site. The procedure outlines what is to be done in order to deal with wastes which have been rejected either at the weighbridge reception area or at the working area.

2.2.2.5 Site Records

All records will be maintained and kept on file in accordance with the EMS. Records can be made available to the Agency for inspection if required.

2.2.3 Construction

It is proposed to construct the site using imported reclaimed inert waste soils and stones. The materials brought to site will have an inherently low pollution potential and will not contain substances at concentrations that are hazardous or may present a risk to surface water or groundwater. After its deposit and subsequent profiling, the already low permeability of this material is further reduced. This further restricting the leachability of any potential soluble components and mobilisation of solids from its compacted surface.

The fill specification for the access road is outlined in the accompanying Geotechnical Design Report (document reference 4859-R06 Issue 01, dated May 2021) attached in Appendix B of the WRP. The Geotechnical Design report recommends that the Operator follows an end-product specification for the fill material which should require compaction of the fill at a water content range between optimum and optimum + 4.0%. The dry density should be 95% of maximum as measured in the Proctor test and have a maximum 5% air void value. The undrained shear strength of the material should be 55 kPa or greater. Source and compliance testing should be carried out at a rate of two tests per source or per 1,000 m^3 of material, whichever is greater. This testing should include determination of changes in undrained shear strength with increasing water content, in addition to Proctor testing.

The nature of the material to be used means it is unlikely to be subject to consolidation or settlement which may lead to instability. The likely cohesive nature of this material also makes it suitable for use in the steeper slope faces.

2.3 Geology

A Hydrogeological Risk Assessment (HRA) (referenced: 4859/R/007/01) is attached as Appendix B.

The regional geology of the area can be interpreted from British Geological Survey (BGS) website[2] and 1:50,000 and 1:10,000 scale maps. The solid geology within the vicinity of the quarry comprises bedrock strata of the Namurian Stage of the Upper Carboniferous. Operations at the quarry involve the extraction and processing of the Lower Kinderscout Grit which is part of the Millstone Grit Group.

There are no superficial deposits recorded at the site according to the BGS data. Superficial deposits form a discontinuous cover are noted to the west and south of the Site. They are typically dominated by Head / glacial till, (Quaternary in age) and glacially derived sediments.

2.4 Aquifer Characterisation

There are no surface watercourses that cross the local area in the vicinity of the quarry. Surface water drainage from the moorland to the east (Broken Ground, Grouse Butts) drain preferentially into the valley to the east of the quarry between Buckton Vale and Hare Hill. This drainage supplies and contributes water to the reservoir along with Far Harehill Clough and Iron Tongue at the bottom of the valley (circa 250mAOD). Overflow from the reservoir contributes water to Carr Brook which flows south-westerly.

The site is not located within or near to a groundwater Source Protection Zone, (SPZ). Groundwater vulnerability is classified as “minor aquifer Low”. The Carboniferous Millstone Grit Group strata are considered by the Environment Agency as Secondary A aquifers. Groundwater vulnerability is classified as “minor aquifer Low”. The site is not located in Drinking Water

[2] Geology of Britain viewer | British Geological Survey (BGS)

Safeguard Zone (Groundwater) (SgZs), which can be established around public water supplies where additional pollution control measures are needed.

Regionally, to the west and locally the superficial deposits are classified typically as Secondary aquifers (undifferentiated). Groundwater in superficial strata are not considered to be a receptor at the site as none are present.

2.5 Groundwater Flow

Recharge to the groundwater system locally is on the higher topography to the north, (White Gate) northeast (Alphin Pike) and east of the site (Hare Hill and Broken Ground). Groundwater flow within the bedrock succession will be essentially controlled by the presence of discontinuities within the rock mass, the primary permeability of the constituent rock types are considered to be relatively low. The quarry is worked "dry" hence the groundwater table is below the base of the site.

Borehole logs are present for review on the BGS website. Where information is available, groundwater elevations are at ~225 mAOD or lower.

The BGS note that the Millstone Grit strata are a "multi-layered" aquifer system where abundant springs are located at the base of sandstone layers and at junctions between shale and sandstone horizons.

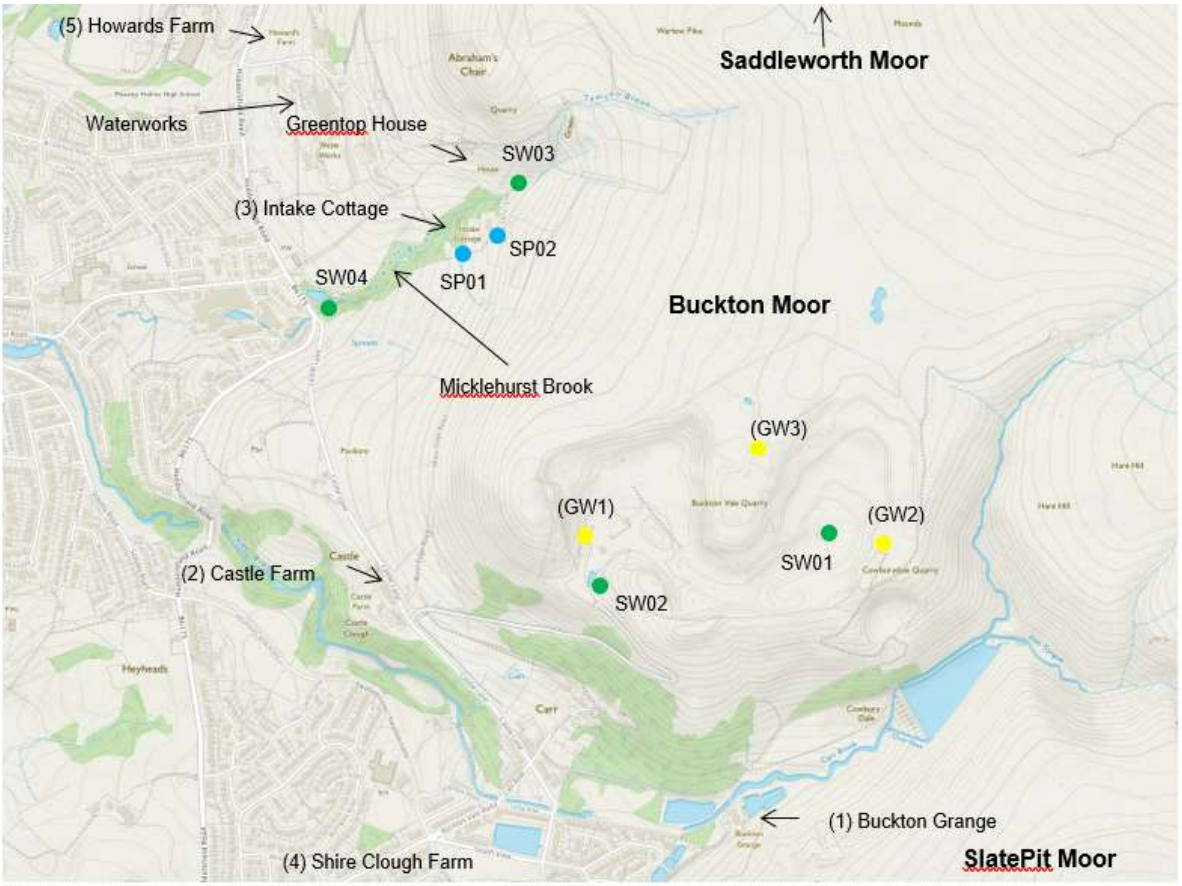
It is also noted by BGS that groundwater movement is primarily by fracture flow, (secondary permeability) hence groundwater flow directions are difficult to establish and cannot be inferred by water level data. This is reflected in the data contained within the nearby drilling logs.

A review of OS mapping indicates that spring lines appear to exit the topography to the northwest (near Greentop House) and south of the quarry (Carr Lane) which appear coincident with the change in geology from Lower Millstone Grit (Sandstone) to Hebden Formation (Mudstone / Siltstone) at elevations of circa 250 mAOD. These spring lines are above the height of the groundwater observed on the 1981 drilling logs but importantly are some 50 m below the base elevation of the quarry floor.

Tameside Metropolitan Council (TMC) has records of historic wells and springs identified on historical mapping (within 1 km of site). However according to TMC information, spring or well-fed resources are not used as a private water supply.

Groundwater monitoring points have been installed at the Site. Surface water / spring monitoring points have also been established. These are shown on Figure 2.1. These points are monitored to establish baseline chemistry for the Site and will continue to be monitored during the road construction activity.

Figure 2.1 – Existing Environmental Monitoring Points



GW monitoring points yellow; surface water points green and spring line monitoring points are blue

As the site sits within an elevated area on the periphery of the South Pennine Moors, where the lithological units dip to the southwest, it is conceptualised that the groundwater approaches from the north / northeast consistent with topography. Any standing water / surface water run-off also infiltrates to join the groundwater below the base of the quarry (in the local vicinity to the quarry) and exits to the northwest and south west as discrete spring lines. GW3 is upgradient, GW1 and GW2 are downgradient.

2.6 Groundwater Quality

Groundwater quality is similar to spring line quality. There were no exceedances of the Drinking Water Standards (DWS) of the parameters tested, with the exception of a single exceedance of ammoniacal nitrogen at GW1, and manganese was exceeded at GW3 which is an upgradient monitoring point.

2.7 Surface Water

There are no surface watercourses that cross the area of the quarry. On site, surface water collects and ponds within the central part of the eastern quarry and an area towards the access to the

quarry (from rainfall). From here, infiltration may continue to form part of the contributing supply to the groundwater system.

2.8 Man-made subsurface pathways

There are no known man-made subsurface pathways within the site boundary.

2.9 Amenity (nuisance)

An Environmental Risk Assessment (ERA) (referenced: K4859-R-005-01) has been submitted with this application and addresses the risk from amenity (nuisance), and the control measures in place.

2.10 Habitats and Natural Heritage

A 'Conservation & Heritage Screen' was provided by the Agency (reference: EPR/JB3104KX/A001). No European Sites, Sites of Special Scientific Interest (SSSI), National Nature Reserve (NNR), Local Nature Reserves (LNR), Ancient Woodland, Scheduled Ancient Monument or Great Crested Newts were identified. It did establish a Local Wildlife Site (LWS) Alphine Pike & Buckton Moor (South) and protected habitats (Upland Heath) surrounding the Site. Both are included in Table 1 above which identifies the other sensitive receptors in the area.

2.11 Compliance Points

There will be no point source discharges of trade effluent or sewage to groundwater or surface water associated with the recovery activity at the Site. The materials brought to site will have an inherently low pollution potential and will not contain substances at concentrations that are hazardous or may present a risk to surface water or groundwater. After its deposit and subsequent profiling, the already low permeability of this material is further reduced. This further restricting the leachability of any potential soluble components and mobilisation of solids from its compacted surface.

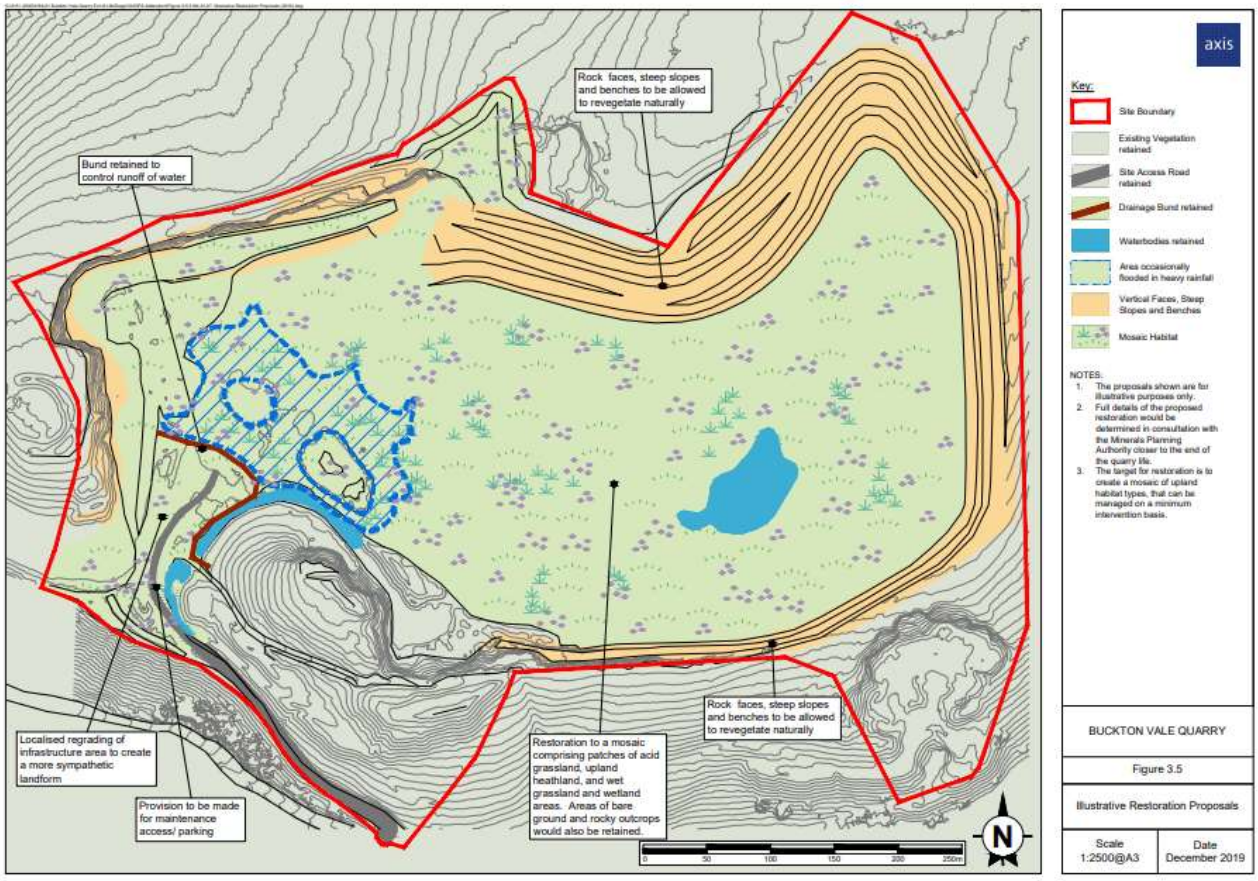
As such no compliance points or limits are proposed.

3 Pollution Control Measures

3.1 General

The proposed access road will be used to extract the quarry overburden which will be placed in stockpiles elsewhere in the quarry. The Operator will then either blast or mechanically extract the remaining reserve downwards. This will require the access road to also be gradually reduced in level assuming it will continue to be used to access the mineral. The material in the road will also be stockpiled on site with the overburden for eventual use in the low-level restoration scheme. The types of material needed to construct the road will require similar geotechnical and chemical properties i.e. inert as the overburden which will also make it suitable for use onsite.

Figure 3.1 – Proposed Restoration Scheme



The low-level restoration scheme is likely to constitute an 'Open mosaic habitat on previously developed land', which is a UKBAP priority habitat. Such habitats tend to develop on brownfield sites, such as quarries, where these sites have previously been disturbed or severely modified by previous use, with spatial variation developing across the site. The resultant variation allows for a mosaic of different vegetation types and often patches of bare ground, to be supported in close proximity. This, combined with a low nutrient content of the soil which prevents fast growing plant

species becoming dominant, provides a continuity of resources for invertebrates and other wildlife throughout the year.

It is proposed that site-won restoration material be used to provide a growing medium for some of the proposed vegetation types, including those currently confined atop the mineral reserve. This is likely to comprise aggregates and mineral waste, which would be low in nutrients and hence likely to be suitable for the target vegetation types, preventing fast growing competitor species from developing. The landform of the existing infrastructure area would be regraded to create a restored landform that would be more sympathetic to the adjacent hillsides.

3.2 Surface Water Management

A surface water management scheme is in place at the quarry. Permit EPR/WE0949AB allows the construction of a surface water retaining bund. The proposed scheme for the quarry is summarised below:

- Provide bund across the western void pond to provide surface storage in extreme events. Provide access ramps at locations as required by the quarry operator.
- Enlarge the upper central pond by 775m^3 to 2,075m^3 storage below 298.5m level.
- Provide an orifice flow control in a headwall at the lower end of the upper western attenuation pond to control discharge from the upper area. Set orifice plate at or just below the base level of the pond to allow pond to fully drain out
- Provide final site discharge orifice plate control at lower end of the lower southwestern attenuation pond.
- Provide flow control on the discharge from the eastern storage pond at 299.0m level to allow use of volume up to the 300m level as attenuation above the stored level.

3.3 Post Closure Controls

The proposed after-use of the site is detailed earlier in this report. On completion of the recovery activity the Site will be used as an access road which will be gradually reduced in level assuming it will continue to be used to access the mineral reserve. The material in the road will also be stockpiled on site with the overburden for eventual use in the low-level restoration scheme. The types of material needed to construct the road will require similar geotechnical and chemical properties i.e. inert as the overburden which will also make it suitable for use onsite. It is expected that the material used will have a low risk associated with biogenic gas production or leaching of potentially harmful substances. It is the operator's intention to demonstrate the recovery permit can be surrendered shortly after completion of the works by provision of appropriate monitoring data, topographical survey and records of waste used in the scheme. It is considered that it is unlikely that any additional monitoring infrastructure will be required to demonstrate the site does not present a risk to human health or the environment.

4 Monitoring

There will be no point source emissions that require monitoring within the constraints of the environmental Permit. Details of the monitoring of potential amenity emissions are detailed in the accompanying ERA.

Environmental monitoring will continue as part of the wider site and in accordance with condition 41 of the planning permission. The sampling locations are shown on figure 2.1 .

A HRA is attached as Appendix B and details the proposed monitoring which is summarised in Table 3

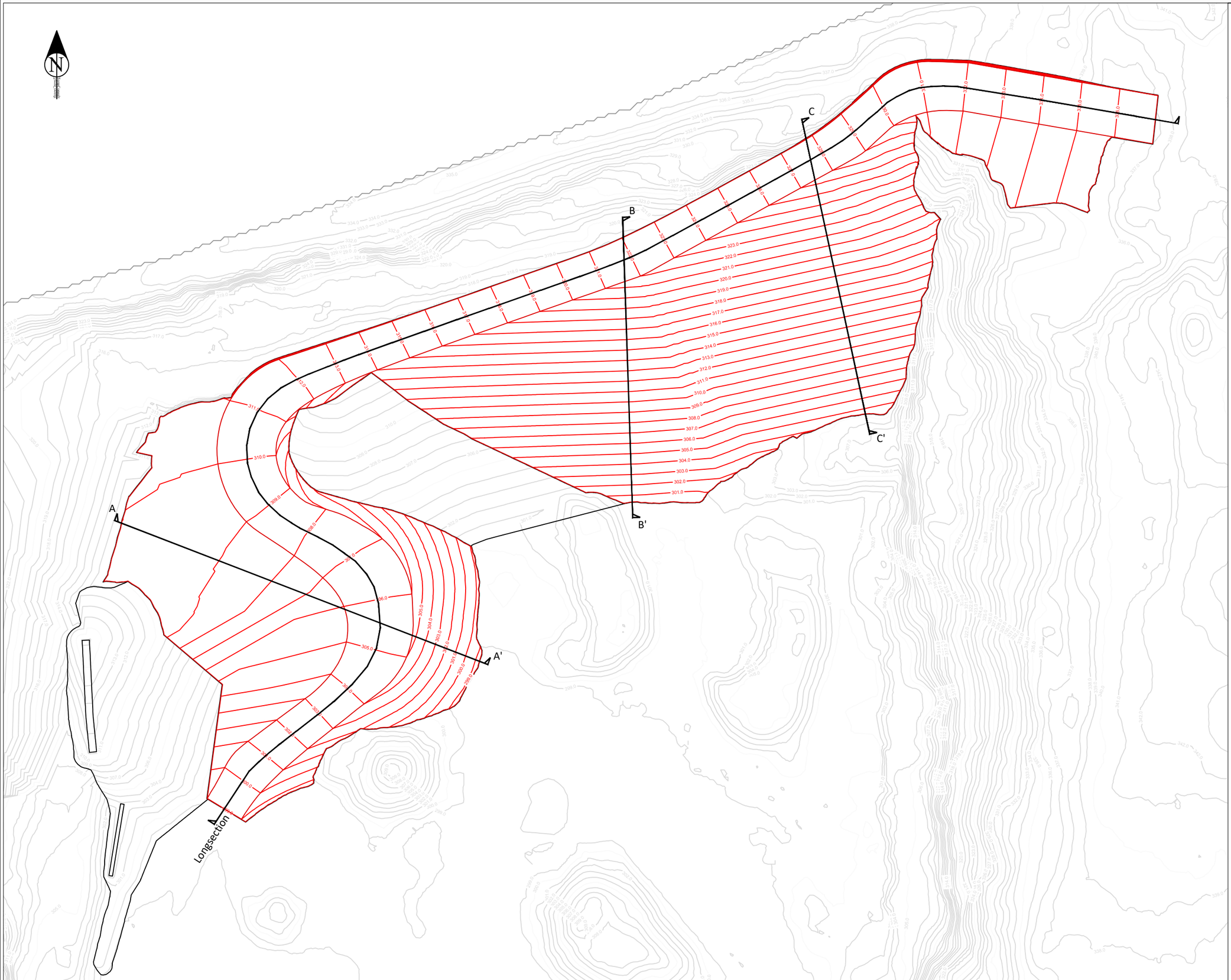
Table 3 – Proposed Monitoring

Location	Parameter	Monitoring Frequency
GW1, GW2 and GW3	Electrical Conductivity, Chloride, Ammoniacal Nitrogen, pH, Total Alkalinity, Arsenic, Barium, Cadmium, Magnesium, Calcium, Iron, Manganese, Chromium, Copper, Lead, Mercury, Nickel, Potassium, Sulphate, Sodium, Zinc, BOD, COD, TOC, TON	Quarterly
	Water Level	Quarterly
SW1, SW2, SW3, SW4, SP1 and SP2	Electrical Conductivity, Chloride, Ammoniacal Nitrogen, pH, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, Lead, Mercury, Nickel, Potassium, Sulphate, Sodium, Zinc, BOD, COD, TOC, TON	Quarterly

No compliance limits are proposed.

This data may be used to support a future surrender application for this waste recovery activity to provide evidence that the necessary measures have been taken to avoid a pollution risk resulting from the operation of the Site and to return the site of the regulated facility to a satisfactory state, having regard to the state of the site before the facility was put into operation.

Appendix A – Drawings



Key

Existing Contours

Proposed Upper Bench Access Road Contours

TerraConsult

Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX

Client

Churchill Enviro Limited

Site

Buckton Vale Quarry

Title

Proposed Upper Bench Access Road Cross Section Locations

Scale	1:1,000	@ A3	
Drawing No.	4859/1/002		
Rev	Date	Description	
File	4859.1.002 Cross Section Locations		
Date	06/20	Engineer	PP
Drawn	PP GH	Checked	DRAFT

TerraConsult

Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX

Client

CHURCHILL ENVIRO LIMITED

Site

BUCKTON VALE QUARRY

Title

SITE LOCATION PLAN

Scale	1:15,000	@ A4
Drawing No.	4859/1/004	
Rev	Date	Description
File	4859.1.004 Site Location	
Date 06/20		Engineer PP
Drawn PP		Checked JB

Key

1 Sensitive Receptors within 500m of permit boundary

Buffer Zone

Proposed Permit Boundary

TerraConsult

Bold Business Centre, Bold Lane, Sutton, St Helens WA9 4TX

Client

Churchill Enviro Limited

Site

Buckton Vale Quarry

Title

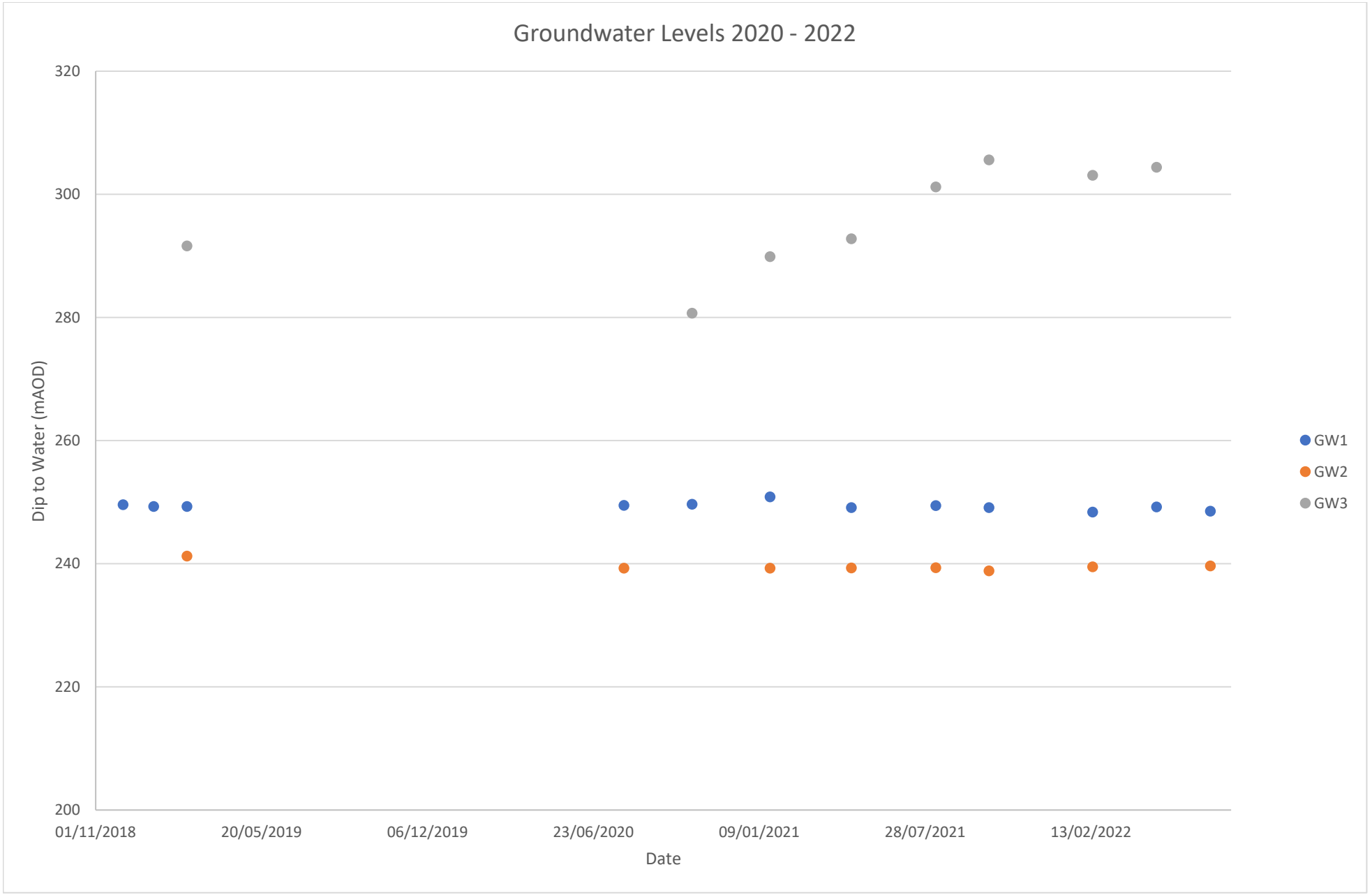
Sensitive Receptor Plan

Scale	N/A	@ A3
Drawing No.	4859.1.001	
Rev	Date	Description
File	4859.1.006 Sensitive Receptor Plan	
Date	02/08/22	Engineer KMB
Drawn	JM	Checked Final

C:\Users\JakeMorton\AppData\Local\Microsoft\Windows\INetCache\Content.Outlook\SCJNQHB0

Appendix B – Hydrogeological Risk Assessment

Appendix C – Groundwater Levels and Quality


Groundwater Levels 2020 - 2022
320
300
280
260
240
220
200
Dip to Water (mAOD)
01/11/2018
20/05/2019
06/12/2019
23/06/2020
09/01/2021
28/07/2021
13/02/2022
Date
GW1
GW2
GW3

Parameter	Units	GW1	GW1	GW1	GW1	GW1	GW1	GW1	GW1	GW1	GW2
		24/01/2020	15/04/2020	30/07/2020	20/10/2020	22/01/2021	30/04/2021	10/08/2021	13/10/2021	15/02/2022	24/01/2020
Ammoniacal Nitrogen	mg/l	<0.01	0.05	<0.01	<0.01	0.05	0.4	<0.01	<0.01	<0.01	<0.01
Arsenic (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium (Dissolved)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Biochemical Oxygen Demand	mg/l	1	<2.0	<1.4	1.4	1.4	>11.2	<1.3	<1.0	<1.0	1
Cadmium (Dissolved)	mg/l	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Calcium (Dissolved)	mg/l	8	10	7	8	6	8	9	8	7	9
Chemical Oxygen Demand	mg/l	<5	<5	<5	6	<5	13	6	<5	<5	<5
Chloride	mg/l	28	26	24	12	20	23	21	21	17	27
Chromium (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Conductivity	uS/cm	208	222	196	226	174	203	206	198	122	209
Copper (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Oxygen	mg/l	10.4	8.6	9	9.6	11.1	8.9	9.1	9.6	11.8	11
Iron(Dissolved)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium (Dissolved)	mg/l	7	7	6	7	6	7	8	7	5	8
Manganese (Dissolved)	mg/l	0.018	0.036	<0.002	0.005	0.002	0.003	0.009	0.004	0.007	0.014
Mercury (Dissolved)	mg/l	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Nickel (Dissolved)	mg/l	0.001	0.012	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
pH	pH units	6.4	6.9	6.4	6.6	6.4	6.4	6.6	6.5	6	6.4
Potassium (Dissolved)	mg/l	<1	2	<1	<1	<1	4	1	1	<1	1
Sodium (Dissolved)	mg/l	15	14	15	17	14	15	16	14	13	15
Total Alkalinity as CaCO3	mg/l	13	22	13.2	24.8	10.2	14.2	17.6	68.7	12.8	15
Total Organic Carbon	mg/l	0.66	0.52	0.38	0.44	0.37	2.2	0.61	0.53	0.21	0.61
Total Oxidised Nitrogen	mg/l	3.8	4.7	3.6	1.7	2.4	2	1.3	1.8	2.4	3.6
Total Sulphur (Dissolved)	mg/l	26	29	26	27	30	33	43	37	35	27
Zinc (Dissolved)	mg/l	0.04	0.011	0.003	0.009	0.005	0.005	0.009	0.01	0.013	0.043

Parameter	Units	GW2	GW2	GW2	GW2	GW2	GW2	GW2	GW2	GW3	GW3
		01/06/2020	30/07/2020	20/10/2020	22/01/2021	30/04/2021	10/08/2021	13/10/2021	15/02/2022	24/01/2020	01/06/2020
Ammoniacal Nitrogen	mg/l	0.02	<0.01	<0.01	0.04	0.1	<0.22	0.01	<0.01	<0.01	0.12
Arsenic (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium (Dissolved)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01
Biochemical Oxygen Demand	mg/l	5.2	<1.9	7	1.6	1.5	3.1	<1.0	<1.0	<1.0	<1.0
Cadmium (Dissolved)	mg/l	0.00002	<0.00002	<0.00002	<0.00002	0.00006	<0.00002	0.00016	0.0001	0.00017	0.00013
Calcium (Dissolved)	mg/l	6	5	6	6	6	5	3	6	4	4
Chemical Oxygen Demand	mg/l	<5	<5	<5	<5	<5	<5	<5	<5	32	<5
Chloride	mg/l	8	7	2	7	10	8	7	6	6	10
Chromium (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Conductivity	uS/cm	117	106	119	109	119	105	<100	<100	<100	107
Copper (Dissolved)	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Dissolved Oxygen	mg/l	7.4	7.9	6	9.1	9.2	6.8	8.1	11.8	8.9	6.2
Iron(Dissolved)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium (Dissolved)	mg/l	4	3	3	4	4	3	2	3	3	3
Manganese (Dissolved)	mg/l	0.05	0.007	0.031	0.017	0.041	<0.002	0.141	0.147	0.181	0.108
Mercury (Dissolved)	mg/l	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Nickel (Dissolved)	mg/l	0.003	0.001	0.004	<0.001	0.003	<0.001	0.009	0.006	0.009	0.009
pH	pH units	6.1	6.4	6.4	6.5	6.4	6.5	5.6	6	5.2	5.3
Potassium (Dissolved)	mg/l	1	<1	<1	<1	1	1	<1	1	1	3
Sodium (Dissolved)	mg/l	7	7	8	8	9	8	4	8	4	5
Total Alkalinity as CaCO3	mg/l	17	15.3	15.6	18.2	12.1	14.8	4.7	25.6	12	6
Total Organic Carbon	mg/l	0.93	0.3	0.75	1.2	0.34	<0.20	1.6	0.48	1.7	0.79
Total Oxidised Nitrogen	mg/l	1.8	2.3	0.7	2.1	1.6	1.4	0.7	10.4	1.1	0.7
Total Sulphur (Dissolved)	mg/l	18	14	16	16	19	17	17	14	15	20
Zinc (Dissolved)	mg/l	0.01	<0.002	0.01	0.007	0.009	0.002	0.021	0.016	0.061	0.013

Parameter	Units	GW3	GW3	GW3	GW3	GW3	GW3	GW3
		30/07/2020	20/10/2020	22/01/2021	30/04/2021	10/08/2021	13/10/2021	15/02/2022
Ammoniacal Nitrogen	mg/l	<0.01	0.03	0.06	0.15	<0.01	<0.01	<0.01
Arsenic (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium (Dissolved)	mg/l	0.01	0.01	0.01	<0.01	<0.01	0.01	0.01
Biochemical Oxygen Demand	mg/l	<2.8	<1	1.6	2.1	<1.0	<1.0	<1.0
Cadmium (Dissolved)	mg/l	0.00013	<0.00002	0.00012	0.00015	0.00008	0.00017	0.00016
Calcium (Dissolved)	mg/l	3	3	4	4	4	3	4
Chemical Oxygen Demand	mg/l	<5	<5	5	5	5	<5	<5
Chloride	mg/l	6	3	5	8	6	7	9
Chromium (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Conductivity	uS/cm	<100	<100	<100	103	<100	124	<100
Copper (Dissolved)	mg/l	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Oxygen	mg/l	8.1	8.9	9.2	8.3	8.5	8.3	11.3
Iron(Dissolved)	mg/l	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01
Lead (Dissolved)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Magnesium (Dissolved)	mg/l	2	2	2	4	3	2	2
Manganese (Dissolved)	mg/l	0.152	0.182	0.18	0.118	0.087	0.129	0.144
Mercury (Dissolved)	mg/l	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003	<0.00003
Nickel (Dissolved)	mg/l	0.009	0.011	0.009	0.008	0.005	0.008	0.008
pH	pH units	5.5	5.5	5.8	5.8	5.9	5.6	5
Potassium (Dissolved)	mg/l	1	<1	<1	1	<1	<1	4
Sodium (Dissolved)	mg/l	5	5	5	7	6	4	4
Total Alkalinity as CaCO3	mg/l	7.8	4.6	7.5	6.5	7.7	5.1	6.6
Total Organic Carbon	mg/l	0.88	0.87	1.3	0.65	0.66	0.66	0.94
Total Oxidised Nitrogen	mg/l	1.2	0.6	1.1	0.9	<0.2	0.7	9.3
Total Sulphur (Dissolved)	mg/l	16	15	16	21	19	17	17
Zinc (Dissolved)	mg/l	0.018	0.018	0.039	0.017	0.009	0.028	0.029

IRELAND | UK | UAE | BAHRAIN | KSA

BYRNELOOBY

www.byrnelooby.com

Email: info@byrnelooby.com