

Contents

Summary

1.0 Introduction

2.0 Objectives

3.0 Investigation Programme

3.1 Investigation and Sampling Strategy

- 3.1.1 General
- 3.1.2 Constraints on Investigations
- 3.1.3 Soil Investigation and Sampling Techniques and Protocols
- 3.1.4 Groundwater Investigation and Sampling Techniques and Protocols
- 3.1.5 Soil-Gas and Vapour Investigation and Sampling Techniques and Protocols
- 3.1.6 Surface Water Investigation and Sampling Techniques and Protocols
- 3.1.7 Infrastructure Investigation and Sampling Techniques and Protocols

3.2 Sample Locations

4.0 Monitoring Programme

4.1 Objectives of Monitoring Programme

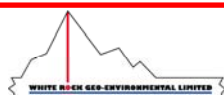
- 4.1.1 Objectives of Environmental Monitoring Programme
- 4.1.2 Objectives of Infrastructure Monitoring Programme

4.2 Environmental Monitoring Infrastructure

- 4.2.1 Location
- 4.2.2 Groundwater monitoring
- 4.2.3 Soil Vapour Monitoring
- 4.2.4 Procedure for the Inspection and Maintenance of Environmental Monitoring Infrastructure

4.3 Environmental Monitoring Programme

- 4.3.1 Monitoring Frequency
- 4.3.2 Analytical Suites



4.4 Infrastructure Monitoring Programme

4.5 Assessment and Reporting Procedures

4.5.1 Assessment Procedure

4.5.2 Reporting Procedure

4.5.3 Recording and Data Management

5.0 Other Issues

6.0 Glossary

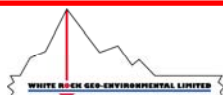
Appendices

Appendix A - Figures and Plans contained in ESSD

Appendix B - Investigation and Sampling Protocols

Appendix C - Quality Assurance and Quality Control

Appendix D - Inspection and Monitoring Protocols

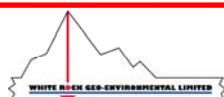


Summary

This document represents the design Site Protection and Monitoring Programme (SPMP) for Parrys Quarry Landfill site permit application submitted to the Environment Agency as part of the Environmental Permit as an inert landfill.

An Environmental Monitoring Programme for the site is presented in Section 3 and Appendices B to E. The results of routine monitoring will be collated into a Monitoring Report and sent to the Agency on the 31st of January each year. The Monitoring Report will also contain recommendations for changes to the Site Protection and Monitoring Programme (if any) to be formally agreed, in writing, by the Agency. The format of the Monitoring Report is given in Appendix E3.

The testing, inspection and maintenance programme for pollution prevention infrastructure at the site (the Infrastructure Monitoring Programme) has been designed as detailed in Section 4.4.



1.0 Introduction

The application for the Parrys Quarry landfill will be submitted to the Environment Agency to allow for the deposition of inert waste to enable restoration of the mineral workings at the site. All of the risk assessments including environmental management monitoring plans and detailed hydrogeological and landfill gas risk assessments are submitted with the application including the monitoring schedules.

The application was prepared by White Rock Geo-Environmental Ltd.

1.1 Site Location

The site is situated within the existing Parry's Quarry in Alltami, Flintshire and bounded by the A494 to the south, A55 to the north and Pinfold Road to the west. The National Grid Reference (NGR) for the entrance to the site is SJ 27478 66278, presented at Figure 1 below and is detailed at Drawing ESSD 1.

Access to the site is directly off Pinfold Lane through lockable steel security gates.

The site is currently operated as a brick clay quarry which covers an area of approximately 17 hectares. An area of the wider site holds an EP (Ref: EPR/TB3590HJ) for the transfer and reprocessing of inert waste. This EP application seeks to apply for an inert landfill permit.

The overall design is to now provide an engineering development platform using on site clays and crushed sandstone and the shortfall to be made up of imported inert waste which will then have a suitable engineering clean cover break over it which will comply with NHBC development protocols and requirements.

The site will be operated in one phase based on hydraulic containment.

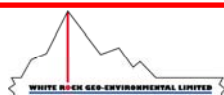
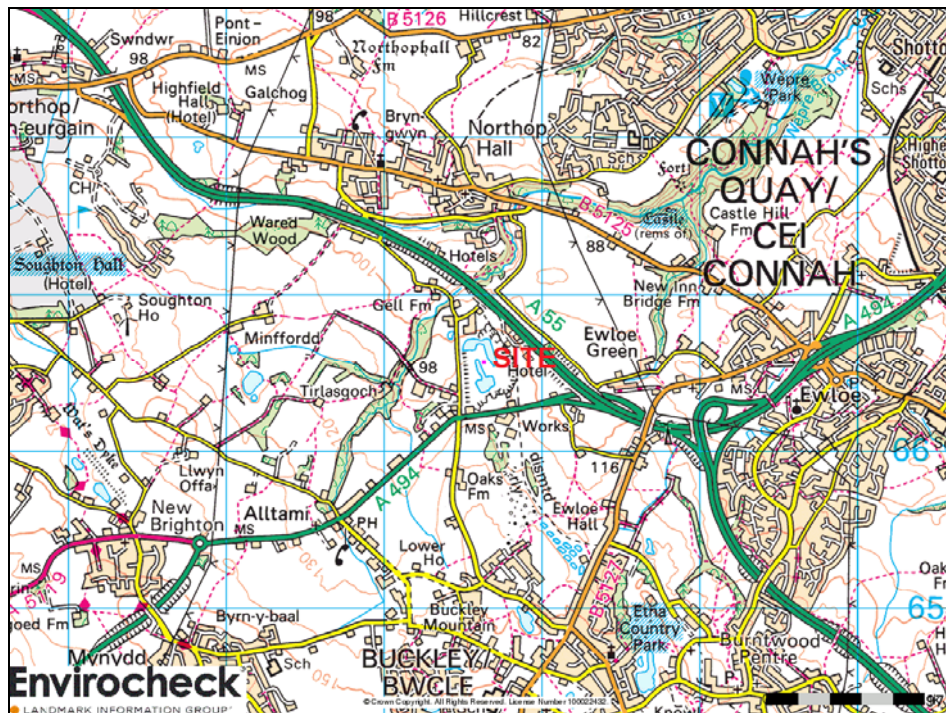


Figure 1: Site Location

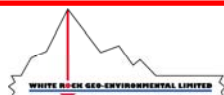


1.2 Installation Details

The site is currently operated as a brick clay quarry which covers an area of approximately 17 hectares. An area of the wider site holds an EP (Ref: EPR/TB3590HJ) for the transfer and reprocessing of inert waste.

The proposed landfill operations will comprise the restoration of the quarry void space inert waste with a fully engineered contained cell. The landfill will be below ground with the base of the cell and engineered containment being below the water table in Phase 1 and operated on the principle of hydraulic containment.

The local topography is undulating and formed from a series of ridges and valleys. The site is situated at an elevation of circa 105mAOD on the site of the valley with the land to the south west rising up towards New Brighton at circa 145mAOD and falling away towards the north east towards the Wepre Brook, which is at an elevation of approximately 55mAOD. The wider topography is generally falling towards the River Dee Estuary which is at an elevation of circa 5mAOD approximately 4.5km to the north of site.



The permit application boundary is covered under the planning permission 04268 and the appeal APP/A6836/A/08/2068136.

Figure 2: Aerial view of site



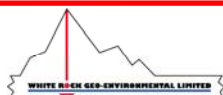
The entire quarry perimeter is fenced with three strand barbed post and wire fence. The outer limit of the quarry has a hedgerow and tree planting. The site security fencing is considered adequate under the provisions of the Mines and Quarries Regulations 1999 in the location. The site has a substantial access to the site fitted with lockable gates. The site is within the entire ownership of Mold Investments Limited.

The gates at the site entrance are locked outside operating hours, and the site has offices and a wheelwash, inert treatment facility comprising a washing plant, mobile crusher and mobile screen.

All of the receptors have been identified on Drawing ESSD 2 and surrounding land uses are set out in Table ESSD1.

The site has an operational void capacity of 732,362m³.

The site is situated within an outcrop of Carboniferous aged Coal Measures strata (predominately comprising mudstones with subordinate sandstones, siltstones and coal beds). The geological succession is complicated by local structural controls; which has created a series of fault bounded blocks in the area and caused the various types of bedrock to locally become juxtaposed against each other.



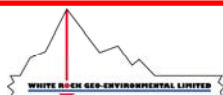
The geological sequence at the site has previously been described as very complex (TerraConsult⁷, 2015); which is considered to reflect the rapid lateral and vertical changes in lithology due to the depositional nature of the sequence and post-depositional structural controls (i.e. dipping bedding and faulting). Attempts were made by TerraConsult to laterally correlate units observed at the site; evidently this was difficult due to the limitations of the available data (including that boreholes only provide a one-dimensional (vertical) record of the geological succession) and the complicated nature of the geology as outlined above. Nevertheless, based on published geological mapping, the following simplified geological sequence for local area has been identified:

- Etruria Formation⁸ – comprising red, purple, brown, ochreous, green, grey and commonly mottled mudstone, with lenticular sandstones and conglomerates. The Etruria Formation includes the ‘Buckley Blue’ unit (a local and now obsolete name), which comprises a purple, black and grey mudstone, and was principally the clay that was excavated from the quarry void;
- Pennine Middle Coal Measures Formation – comprising inter-bedded grey mudstone, siltstone, pale grey sandstone and coal seams. The upper part of the Coal Measures includes a sandstone unit referred to as the ‘Hollin Rock’ which immediately underlies the Etruria Formation; and
- Pennie Lower Coal Measures Formation – comprising inter-bedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.

Available geological mapping (British Geological Survey (BGS) (2018), as shown on Drawing ESSD8, and at Figure 7 below indicates that sandstones of the Etruria Formation are present across the eastern two thirds of the Site (and extend to the area immediately to the east); mudstones, sandstones and conglomerates of the Etruria Formation are present across the western third of the Site. The Middle Coal Measures are then present further to the west. This includes the Hollin Rock Member which is identified beyond a north-south faulted boundary (with an apparent 50m downthrow) present along the western boundary of the Site.

The Lower Coal Measures Formation are present c. 50m to the east of the Site beyond another approximately north-south faulted boundary.

Mapping of the superficial geology, as shown on Drawing ESID10, also shows that glacial till is present above bedrock across much of the area surrounding the site. The TerraConsult report shows that it is c. 2m in thickness and comprises a sandy clay with sandstone

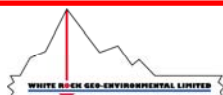
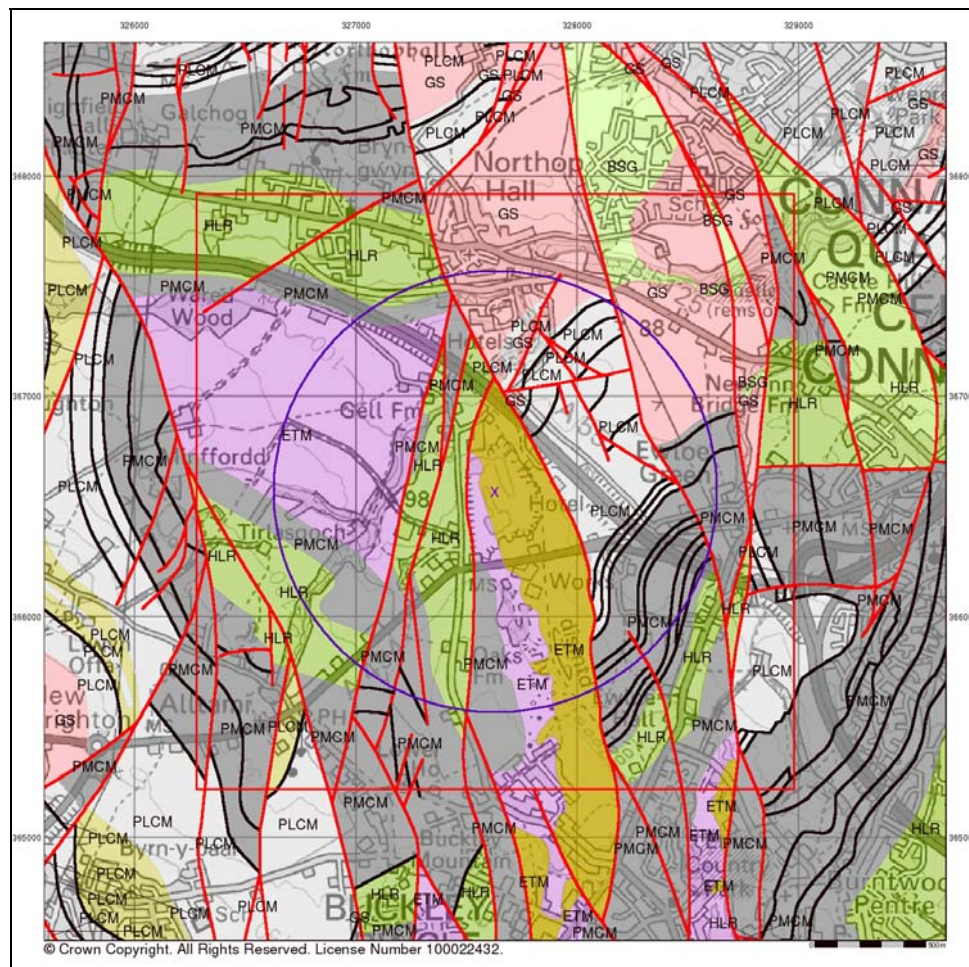


fragments. Superficial deposits are absent along the route of Alltarni Brook where it is closest to the site (i.e. 250m to the northeast). Elsewhere however, alluvium is present along the course of the brook to the south (i.e. up-stream); and alluvium and glacio-fluvial (sand and gravel) deposits are present on both Alltarni and Wepre brooks to the north (i.e. down-stream).

The mapping shows that superficial deposits are absent from across much of the site; this is due to the development that has taken place (i.e. initially a brickworks, followed by quarry extraction). Furthermore, the southern quarter of the site; the areas immediately to the north and to the south of the site; and several other areas in the vicinity are identified as artificial ground. Again, this relates to the former uses of these areas.

The local bedrock geology is also presented at Figure 2 for reference below. The solid geological map is presented at Drawing ESSD 8

Figure 2: Bedrock Geology



2.0 Objectives

The objectives of this report are:

To design a monitoring programme for the installation to:

- ◆ Monitor the effectiveness of pollution prevention infrastructure and provide early warning of any release of polluting substances to ground or groundwater.
- ◆ To collect data on the condition of the ground at the installation to assist in the permit surrender process.
- ◆ To provide defensive monitoring at site boundaries for pollutant migration onto the site of the installation.
- ◆ To monitor the movement of pollutants in the ground and / or groundwater beneath the site of the installation.

To review and if necessary amend the inspection, testing and maintenance programme for pollution prevention infrastructure at the installation to ensure their continued integrity.

3.0 Site Investigation Programme

3.1 Investigation and Sampling Strategy

3.1.1 General

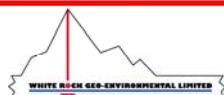
The initial site investigation was carried out as part of the Hydrogeological Risk Assessment for the quarry extension and are on-going with additional data which will be forwarded to the Environment Agency prior to commencement of the operations.

The project team comprised of:

Mold Investments Ltd	- Client Operator
White Rock Geo-Environmental Ltd	- Consultant/Agent, CQA Engineer and Monitoring
Apex Environmental Drilling Services	- Specialist Drilling Contractor

The works involved the drilling of fourteen gas monitoring boreholes and nineteen boreholes for groundwater monitoring.

The boreholes were installed under full time Construction Quality Assurance Supervision and ten sets of groundwater have been taken from each borehole



to establish baseline conditions. The samples taken were submitted to a suitable UKAS accredited laboratory for the groundwater testing and to report on the findings.

3.1.2 Constraints on Investigations

No underground tanks or sub surface infra structure has been identified in professional environmental risk assessments and detailed knowledge of the site history and the comprehensive Site Report. Accordingly, the eight perimeter boreholes used for the Hydrogeological Risk Assessment are therefore deemed satisfactory for the remainder of the landfill operations.

No preferential pathways have been constructed as the boreholes were installed with adequate bentonite grout sealing to prevent potential surface pollution entering into the sub surface soils and groundwater, and no borehole was drilled into the former workings or sub surface structures.

3.1.3 Soil Investigation and Sampling Techniques and Protocols

All drilling works were carried out in accordance with BS5930:2015.

All the boreholes were logged and a full installation report is presented at Appendix ESSD 7 and ESSD 10.

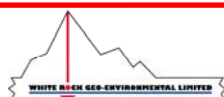
3.1.4 Groundwater Investigation and Sampling Techniques and Protocols

Rotary drilling was undertaken using a purpose-built drilling rig utilising a suitable end bit so that satisfactory cuttings were recovered.

Groundwater Observations

Groundwater when encountered was measured and recorded in the following manner:

- a. When water is first encountered the depth from ground level to the point of entry shall be recorded, together with the casing depth, and boring observations suspended for not more than 20 minutes, to allow the free static water level to develop. This shall be recorded, together with the time taken for this rise in water level to occur. If at the end of the period of 20 minutes the water is still rising, this shall be recorded together with the depth to water below ground level. Boring shall then be continued.
- b. An exception to the above is where groundwater occurs as a slow seepage in the boring. In this case, the point of entry of the seepage shall be recorded and boring continued.



- c. The same procedure shall be forwarded when further water entries are observed.
- d. Water levels shall be recorded at the beginning and end of each shift.
- e. On each occasion, when groundwater is recorded, the depth of the boring, the length of casing inserted in the boring and the time o'clock shall also be recorded.
- f. The Engineer may require boring to be left open for 24 hours after completion and the water level recorded at the end of this time.

Site Records

The Contractor has a record of all site operations recorded on a daily basis as indicated in the General Specification. The Daily Journal for the operations included in this particular portion of the specification shall include the following items.

Groundwater monitoring

It is essential to monitor groundwater from the boreholes for quality to assess the integrity of the performance of the site and to ensure that there is no impact on groundwater.

Boreholes are located both up and down hydraulic gradient. Borehole locations are presented on Drawing ESSD 11. Eight permanent monitoring boreholes are installed at the locations shown on ESSD 11.

It is recommended that the trigger levels are reviewed on an annual basis or as appropriate. If, for example, the trigger levels are exceeded on three consecutive times, then this should be highlighted and discussed within any annual review of monitoring data. Such an occurrence may be the result of contaminant breakthrough or a change in the up gradient groundwater quality. Procedures have been set out in the Groundwater and Leachate Monitoring Plans.

The groundwater sampling regime is set out in Table 1

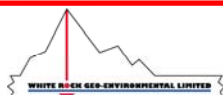


Table 1: Groundwater Monitoring

Parameter	Landfilling Phase		Closure/ Aftercare
	Quarterly	Annually	Annually
Water Level	•	•	•
pH	•	•	•
Electrical conductivity 20°C	•	•	•
Ammoniacal nitrogen	•	•	•
Chloride	•	•	•
Sulphate	•	•	•
Alkalinity	•	•	•
Sodium	•	•	•
Potassium	•	•	•
Calcium	•	•	•
Magnesium	•	•	•
Iron	•	•	•
Arsenic	•	•	•
Cadmium	•	•	•
Copper	•	•	•
Chromium	•	•	•
Lead	•	•	•
Nickel	•	•	•
Zinc	•	•	•
Phenol	•	•	
Napthalene	•	•	
Benzene	•	•	
Hazardous Substance Scan		Annual for first six years only from BHG,H,I	Six Yearly

3.1.5 Soil-Gas and Vapour Investigation and Sampling Techniques and Protocols

Soil gas will be monitored at each location using an infra-red gas analyser at the frequencies set out in Table 2 at Boreholes G1 to G14 outside the site and from the internal monitoring points and gmp1.1 to 1.9 within the inert waste mass as set out in Table 3.

Table 2: Soil Gas Monitoring

Determinands	Monitoring Frequencies	Units and Accuracies
Methane (CH ₄)	Quarterly	%v/v ±0.5%
Carbon Dioxide (CO ₂)	Quarterly	%v/v ±0.5%
Carbon Monoxide (CH ₄)	Quarterly	-
Oxygen (O ₂)	Quarterly	%v/v ±0.5%
Atmospheric Pressure	Quarterly	±1 mb
Differential pressure	Quarterly	±0.1 mb
Meteorological Data	Quarterly	-

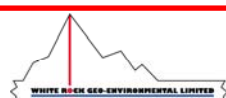


Table 3: Gas monitoring point locations

Phase 1	GMP1.1-1.9	Monitoring Point in waste	Design detail on ESSD 7
Perimeter	BH G1-G14	Monitoring Borehole outside waste. Combined gas and groundwater	Design detail on ESSD 7

3.1.6 Surface Water Investigation and Sampling Techniques and Protocols

Surface water monitoring is to be carried out from upstream SW1 and downstream SW2 locations one for the Alltami Brook as indicated on Drawing ESSD10. Surface water monitoring is set out in Table 4.

Table 4: Surface water monitoring

Monitoring points			Parameter	Frequency
Alltami Brook (up-stream) SW1	Alltami Brook (down-stream) SW2	Discharge point	pH, electrical conductivity, suspended solids, ammoniacal nitrogen, chloride, sulphate, nitrate, nickel (dissolved), manganese (dissolved), visible oil / grease	Monthly (during operational phase); quarterly thereafter

3.1.7 Infrastructure Investigation and Sampling Techniques and Protocols

The ground around the current fuel tank has been tested for TPH species and the SGV/CLEA pathfinder suite to determine potential background contamination levels currently on site, pre-landfill operations.

3.2 Sample Locations

Discussion of the selection, justification and design for each sample location with respect to individual zones for the site are given in the HRA and ESSD and are summarised below in Table 5.

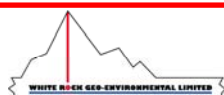


Table 5: External Groundwater and Gas Monitoring Boreholes locations
Sample location BH1

Perimeter	BH C	Perimeter Up Hydraulic Gradient	Level and Quality
Perimeter	BH C1	Perimeter Up Hydraulic Gradient	Level and Quality
Perimeter	BH G	Perimeter Down Hydraulic Gradient	Level and Quality
Perimeter	BH H	Perimeter Down Hydraulic Gradient	Level and Quality
Perimeter	BH I	Perimeter Down Hydraulic Gradient	Level and Quality

Sample location BHG

Down gradient of the landfill. The sample location forms part of a targeted sampling strategy for identifying elevated levels of pollutants associated with a particular source identified in Table 1 being released from the land fill into the environment, specifically the groundwater, and Table 2 for ground gas and landfill gas.

Sample location BHH

Down gradient of the landfill. The sample location forms part of a targeted sampling strategy for identifying elevated levels of pollutants associated with a particular source identified in Table 1 being released from the land fill into the environment, specifically the groundwater, and Table 2 for ground gas and landfill gas.

Sample location BHI

Down gradient of the landfill. The sample location forms part of a targeted sampling strategy for identifying elevated levels of pollutants associated with a particular source identified in Table 1 being released from the land fill into the environment, specifically the groundwater, and Table 2 for ground gas and landfill gas.

Sample location BHC and C1

Upgradient of the landfill. The sample location forms part of groundwater level monitoring and gas monitoring.

Surface Water Monitoring

Discharge consent limits are set out in the consent and presented as Table 6 below for reference

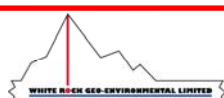
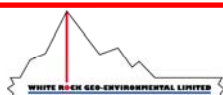


Table 6 Point Source Emission Limits for Surface Water Discharge at point of discharge from consent

Parameter	Trigger Value	Sampling Frequency
pH	>6<9	Monthly*
Oil and Grease	No visible oil or grease	Monthly*
Suspended solids	50mg/l	Monthly*
Chloride	90mg/l	Monthly*
Sulphate	296mg/l	Monthly*
Nitrate	1mg/l	Monthly*
Manganese	0.06mg/l	Monthly*

*If no discharge this is to be reported as to why no sample has been taken in quarterly report

Surface water monitoring point locations are shown on Drawing ESSD 10.



4.0 Monitoring Programme

4.1 Objectives of the Monitoring Programme

The objectives of the monitoring program are to ensure that the site has no impact on the surrounding environment.

4.1.1 Objectives of Environmental Monitoring Programme

It is essential to monitor groundwater adjacent to the site for quality to assess the integrity of the performance of the site and to ensure that there is no impact on groundwater and to ensure that pollution sources have no impact.

Boreholes are located both up and down hydraulic gradient. Borehole locations are presented on ESSD 10 and background groundwater quality collected from these boreholes was used to set the Compliance Limits. This has been based on an initial three sets of data and a further six sets to be collected during the permit decision process.

Gas monitoring is carried out at the perimeter to ensure that gas migration off site is not occurring. Trigger levels have been set and are contained within the Landfill Gas Risk Assessment and further monitoring will help to develop the compliance limits over the time for issue of a permit.

Visual assessment and physical monitoring takes place around the fuel tank to ensure no leakages are observed.

4.2 Environmental Monitoring Infrastructure

4.2.1 Location

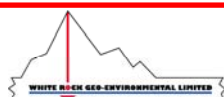
ESSD 10 shows the location of groundwater points and surface water monitoring points are shown at shown on Drawing ESSD 10 at the site and ESSD 7 shows the internal and external monitoring points for landfill gas.

4.2.2 Groundwater monitoring

The completion details of each groundwater monitoring installation are contained in Appendix D1. Each monitoring point is finished with a lockable cover and is designed to prevent the ingress of surface water.

4.2.3 Soil Vapour Monitoring

Completion details of each soil vapour monitoring installation are contained in Appendix E1. Each installation is finished with a lockable cover and designed to prevent the ingress of surface water.



4.2.4 Procedure for the Inspection and Maintenance of Environmental Monitoring Infrastructure

All gas/groundwater monitoring boreholes will be routinely inspected to ensure that they are fit for purpose. Any defects will be reported during the monitoring exercise and repairs will be implemented within one month of notification.

4.3 Environmental Monitoring Programme

4.3.1 Monitoring Frequency

The proposed environmental monitoring programme, including QA/QC checks is contained within the Permit and repeated in Appendix D1 and is summarised in Tables 1, 2 and 3 above.

4.3.2 Sampling and Analysis Protocols

The protocols for analysis is detailed in Section 3.3 above

4.3.3 Personnel Issues

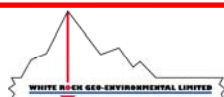
Personnel responsible for sampling, maintenance and inspection will be trained in environmental monitoring to an appropriate level to ensure compliance with the quality assurance and quality control plan. Roles and responsibilities for monitoring and ensuring adequate competence of staff are shown in Management Plan that accompanied the application.

4.4 Infrastructure Monitoring Programme

The existing inspection, testing and maintenance of pollution prevention infrastructure programme meets the objectives identified within Section 3 above and thus there are no changes to the EMS programme for the installation summarised within the Permit Application.

4.4.1 Personnel Issues

Personnel responsible for the inspection, testing and maintenance of pollution prevention infrastructure have been trained to an appropriate level to ensure compliance with the Infrastructure Monitoring Programme. Roles and responsibilities for undertaking the Programme (including reporting) and ensuring adequate competence of staff and have been audited by the Environment Agency on several occasions.



4.5 Assessment and Reporting Procedures

4.5.1 Assessment Procedure

A review will be undertaken of the monitoring data by a suitably experienced person and will compare the data to the agreed trigger levels to ensure that then operations are having no impact on the environment. It is certain that the concentration at each environmental monitoring location will change for each monitoring round even if there are no anthropological influences (e.g. due to seasonal variations, sample and analytical uncertainty etc). Monitoring data should be assessed in a time series to determine the range of natural variation in pollutant concentrations. Values should be set that trigger more intensive monitoring and investigation if they are exceeded. The monitoring programme for the site should be assessed in the light of the data it produces. It is hoped that the frequency of monitoring would reduce as trends in pollutant concentrations are characterised and improvements to pollution prevention infrastructure (if necessary) are shown to have worked.

4.5.2 Reporting Procedure

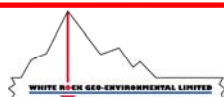
Summaries of the monitoring data will be sent to the Agency on the 31st of January each year along with the results of the data assessment, and any recommendations for amendments to the Monitoring Programme.

The formats for standard and emergency reporting procedures have been agreed with the Environment Agency and are shown in Appendix E3 and emergency and breach information is set out as Schedule 6 Notification in the Permit.

4.5.3 Recording and Data Management

All hard copies of monitoring data are to be kept. All results are to be entered onto an electronic spreadsheet, such as Microsoft Excel or similar to allow for graphical and statistical analysis over time.

One of the purposes of the SPMP is to provide the operator with data to aid in the process of surrendering of a Permit. In order to surrender a Permit the operator must demonstrate to the Agency that the site is in a satisfactory state. A suitably designed monitoring programme should provide sufficient data to demonstrate satisfactory state without recourse to additional intrusive investigations. However this is encumbant upon suitable procedures to record such data, or summaries thereof.



5.0 Other Issues

Staff training and awareness of protection of groundwater, spillage procedures and emergency plans are part of the EMS procedures for the site and form part of the staff inductions and training.

6.0 Glossary

EMS Environmental Management System for Mold Investments Ltd

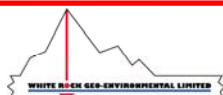
MCERTS Certified Monitoring Scheme

QA Quality Assurance

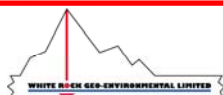
QC Quality Control

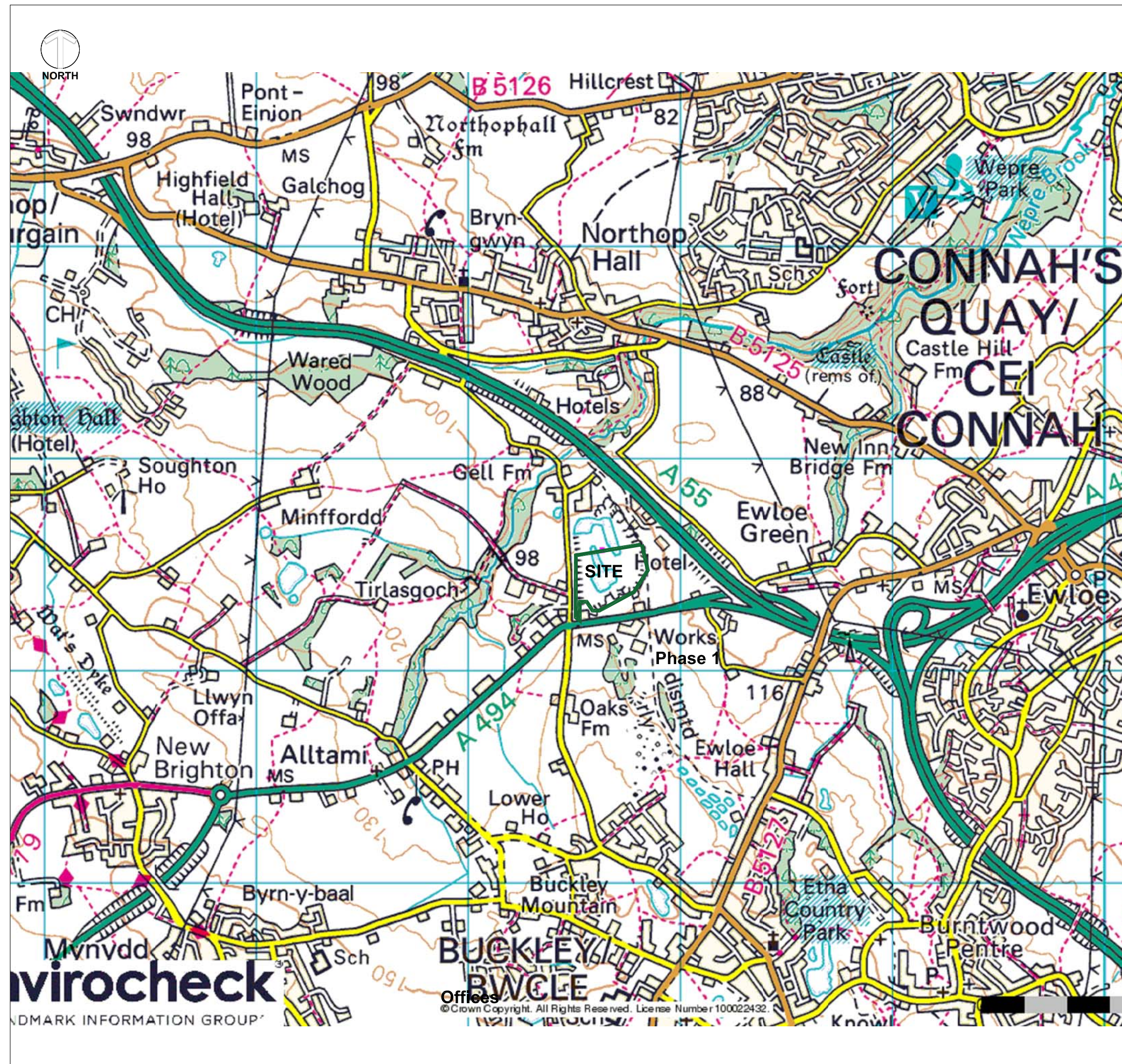
CQA Construction Quality Assurance

UKAS United Kingdom Accreditation Services

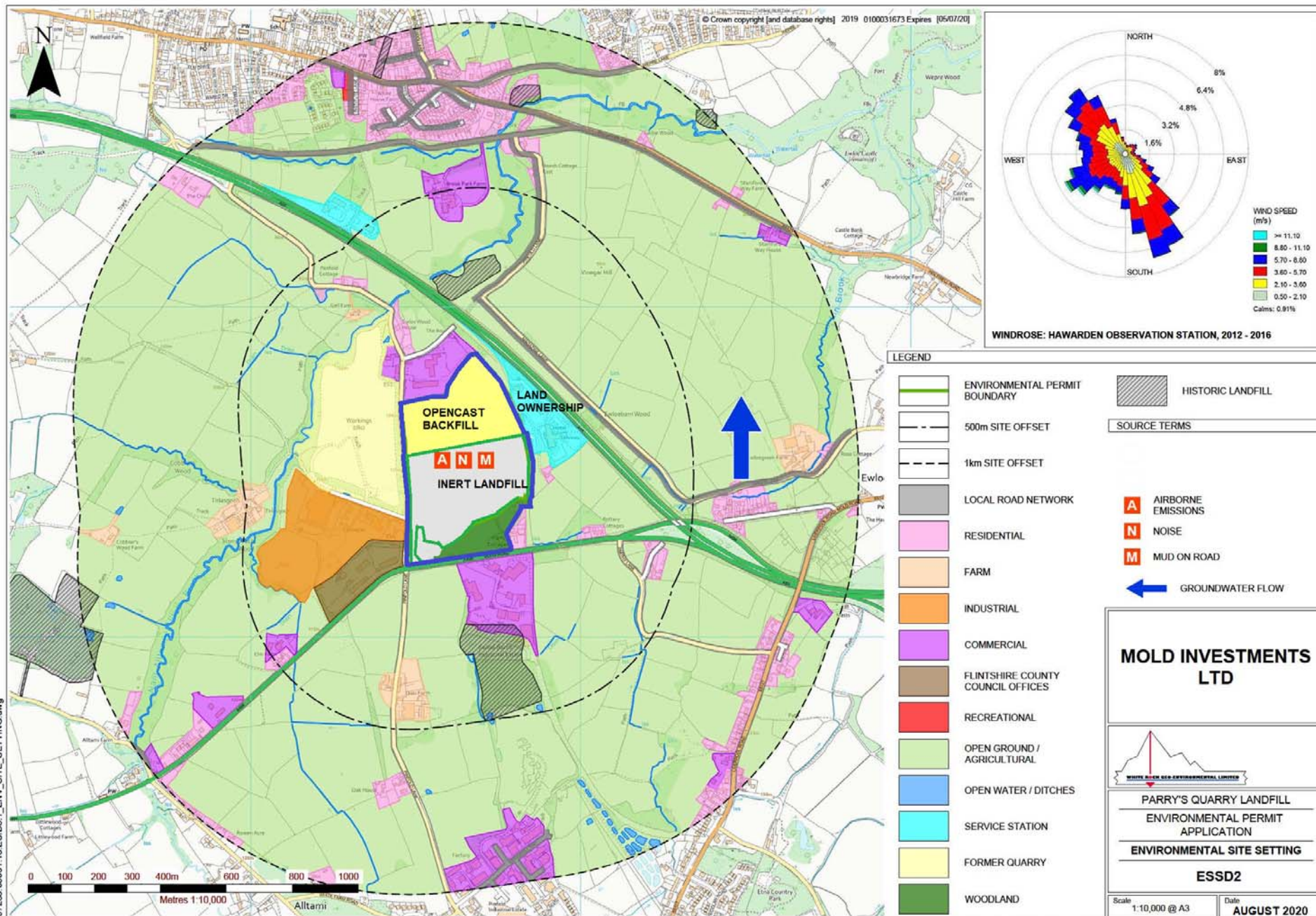


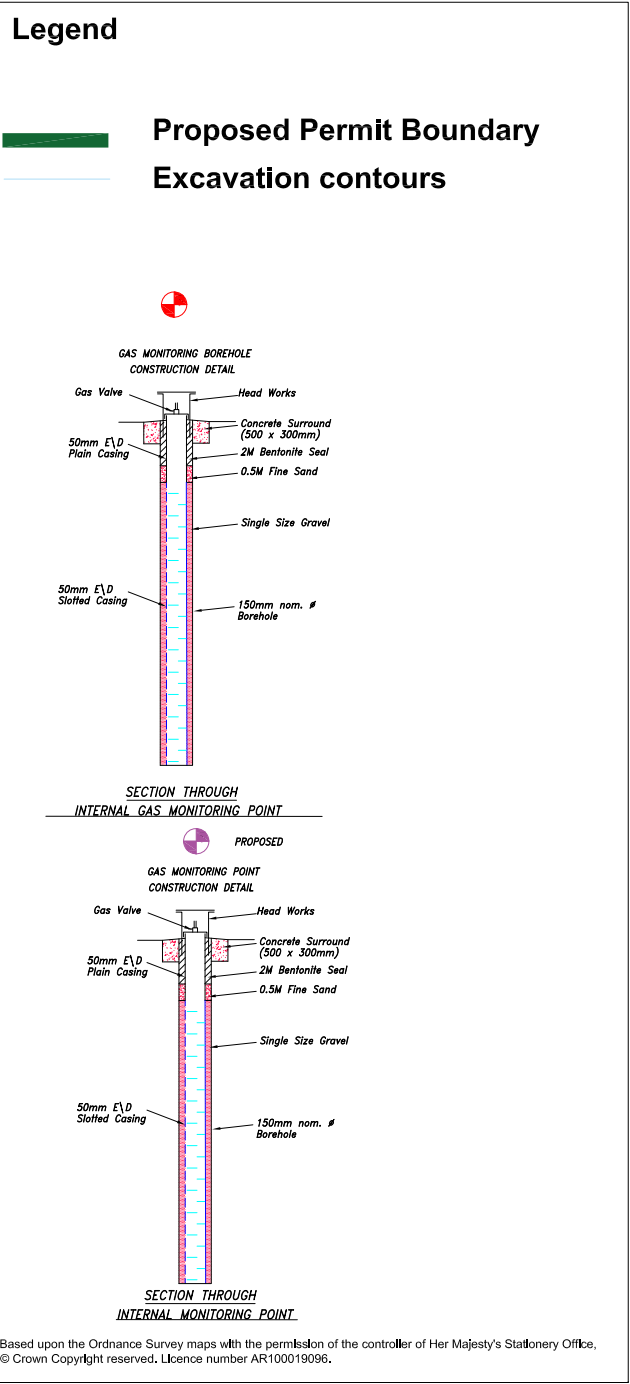
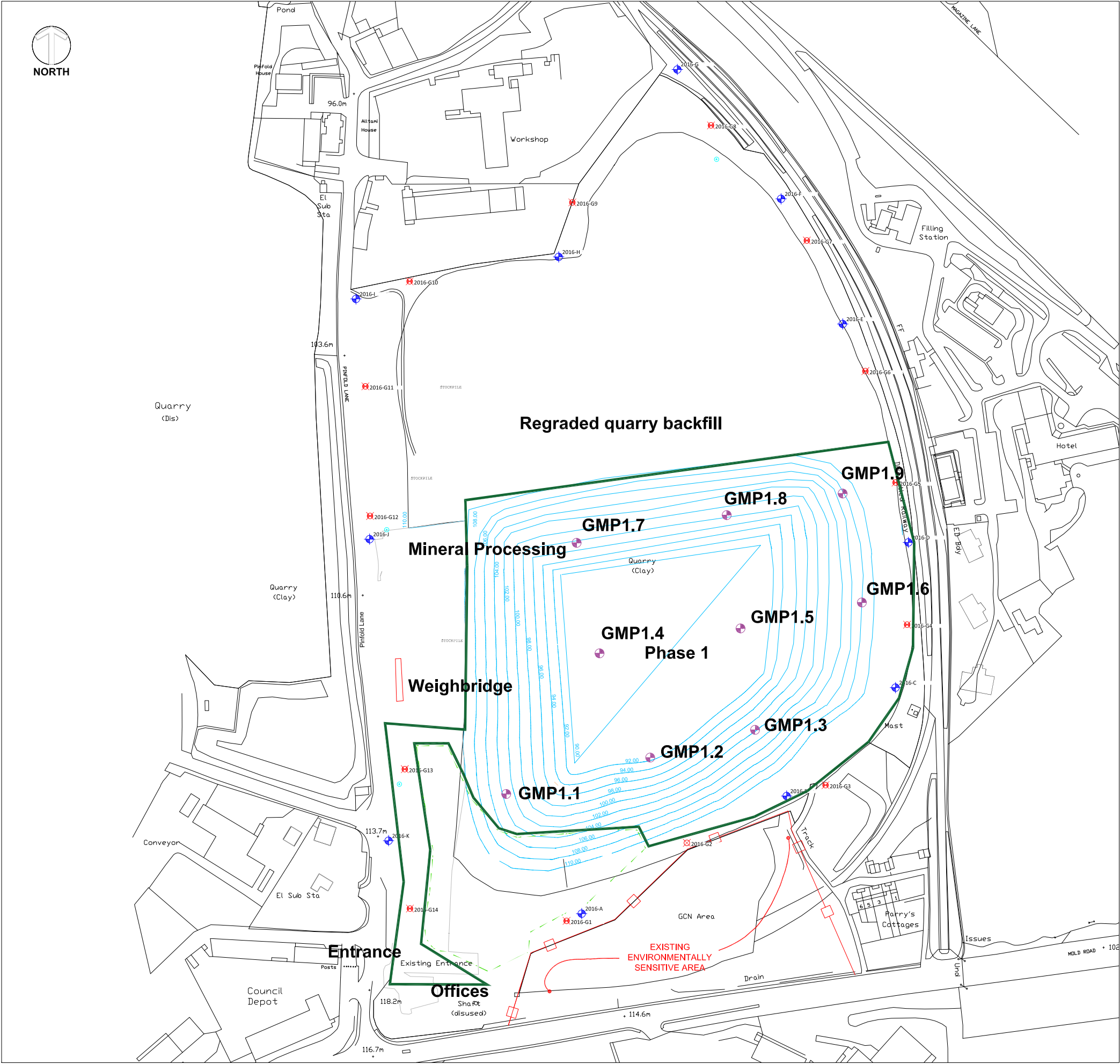
APPENDIX A





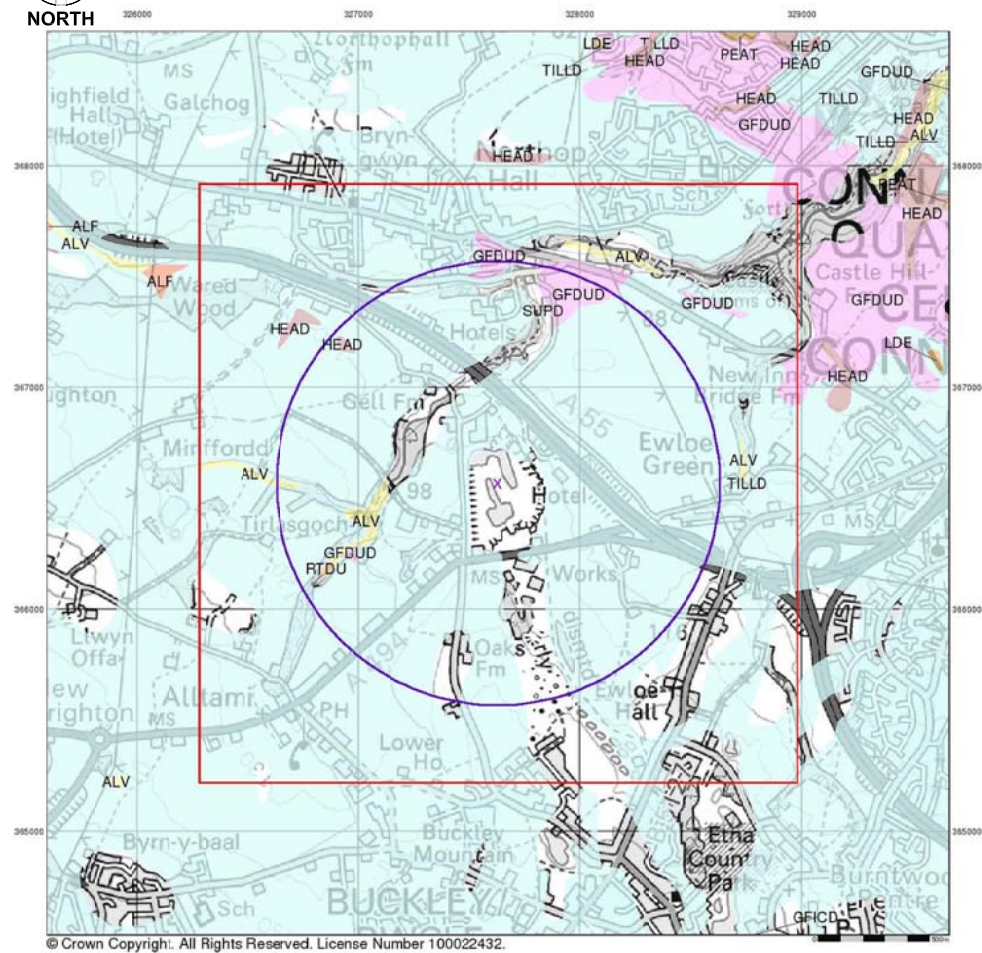
07238 00001.13 ESID3.1_ENV_SITE_SETTING.dwg







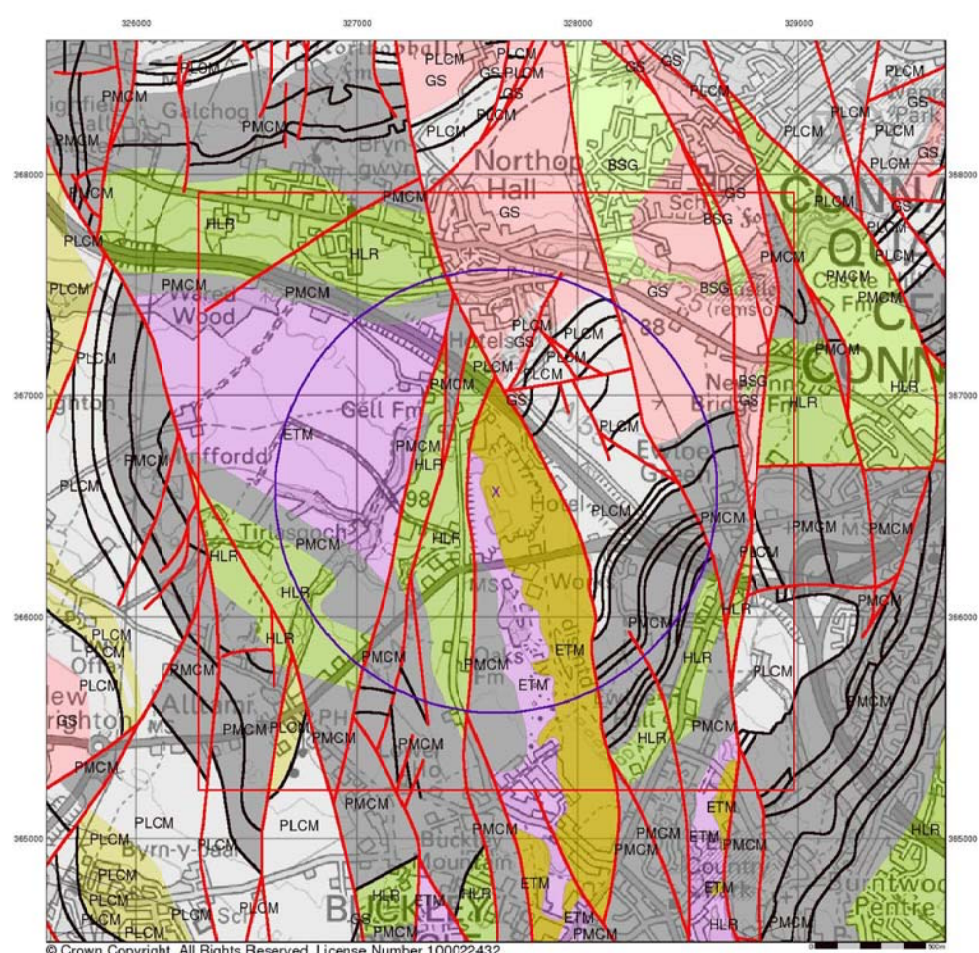
Superficial Geology



© Crown Copyright. All Rights Reserved. License Number 100022432.

Rock Type	LEX	Rock Name	Age	Rock Type	LEX	Rock Name	Age
Sand and Gravel	GFDUD	Glaciofluvial Deposits, Undifferentiated, Devensian	Devensian - Devansian	Clay, Silt, Sand and Gravel	GFDUD	Head (Undifferentiated)	Quaternary - Quaternary
Diamicton	TILLD	Till, Devensian	Devansian - Devansian	Sand and Gravel	TILLD	River Terrace Deposits (Undifferentiated)	Quaternary - Quaternary
Clay, Silt, Sand and Gravel	ALV	Alluvium	Quaternary - Quaternary	Unknown Lithology	ALV	Superficial Deposits (Undifferentiated)	Quaternary - Quaternary

Bedrock Geology



© Crown Copyright. All Rights Reserved. License Number 100022432.

Rock Type	LEX	Rock Name	Age	Rock Type	LEX	Rock Name	Age
Mudstone, Siltstone and Sandstone	PLCM	Pennine Lower Coal Measures Formation	Langsettian - Langsettian	Mudstone, Siltstone and Sandstone	PMCM	Head (Undifferentiated)	Bolsovian - Durkumantian
Mudstone, Sandstone and Conglomerate	ETM	Etruria Formation	Westphalian - Westphalian	Sandstone	ETM	River Terrace Deposits (Undifferentiated)	Westphalian - Westphalian
Sandstone and (Siltstone/siltstone) Argillaceous Rocks, interbedded	GS	Gwespyr Sandstone	Langsettian - Yeadonian	Sandstone	HLR	Superficial Deposits (Undifferentiated)	Bolsovian - Bolsovian

Legend

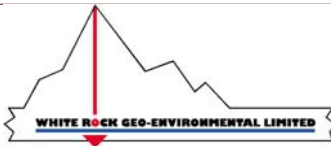
Based upon the Ordnance Survey maps with the permission of the controller of Her Majesty's Stationery Office, © Crown Copyright reserved. Licence number AR100019096.

Client: **Mold Investments Ltd**

Project: **Parrys Quarry**

Title: **Regional Geology**

CAD Ref: EL/MQBH/1	Version: 1	Drawn by: ARM	Scale:	Date: June 2020
-----------------------	---------------	------------------	--------	--------------------



Drawing:
ESSD8

APPENDIX B

SAMPLING PROTOCOLS

Contents

B1 Groundwater

Samples will be collected using a baler or dedicated groundwater inertial pumps in individual boreholes, to avoid cross contamination with groundwater samples, and which will be cleaned or rinsed with the first sampling between successive wells. Three times the well volume will be purged prior to collecting samples wherever possible

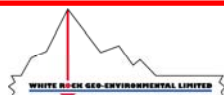
B2 Surface Water

Samples will be collected using a suitable collection bottle

B3 Soil-gas and Vapours

Soil gas will be monitored at each location using an infra red gas analyser

Results shall be recorded as peak and steady state.



APPENDIX C

QUALITY ASSURANCE AND QUALITY CONTROL

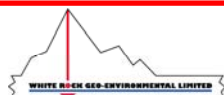
Contents

C1 Sampling and Analytical Quality Assurance and Quality Control Plan

Samples will be collected using a dedicated groundwater inertial pumps or balers in individual boreholes, to avoid cross contamination with groundwater samples, and which will be cleaned or rinsed with the first sampling between successive wells.

Appropriate protective equipment will be worn when handling groundwater. Samples will, where possible, be despatched to the laboratory on the same day, and in any event no later than the following day. Samples which are stored overnight will either be stored in a refrigerator or cool box. All samples will be analysed at the laboratory under UKAS accreditation. The laboratory operates externally verified quality control procedures and checks on analytical work. These include spiked samples, blanks etc. On account of the large batches of samples that are processed by scientific laboratories under UKAS/NAMAS, the QA/QC checks implemented are efficient in identifying any quality control failures. Accordingly, it is not proposed to submit additional QC samples (sampling duplicates, field standards or field blanks) from the site, as this will only duplicate the controls already being implemented by the laboratory.

Gas analyses will have an annual calibration certificate and a copy forwarded each year to the Environment Agency.



APPENDIX D

INSPECTION AND MONITORING PROTOCOLS

D1 Data Recording and Reporting Procedures

All hard copies of monitoring data are to be kept. All results are to be entered onto an electronic spreadsheet, such as Microsoft Excel or similar to allow for graphical and statistical analysis over time.

One of the purposes of the SPMP is to provide the operator with data to aid in the process of surrendering of a Permit. In order to surrender a Permit the operator must demonstrate to the Agency that the site is in a satisfactory state. A suitably designed monitoring programme should provide sufficient data to demonstrate satisfactory state without recourse to additional intrusive investigations. However this is encumbant upon suitable procedures to record such data, or summaries thereof.

