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Former Jovil Garage

Phase II Interpretative Report

May 2026

Document Control

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Client:	Mr Josh Morris
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DISCLAIMER

This report was produced by RB Geotechnical for Mr Josh Morris (The client), for the specific purposes of a Phase II Intrusive Investigation and Interpretative Report, for the proposed residential development at the Former Jovil Garage on Manchester Road, Linthwaite, West Yorkshire. report may not be used by anyone else other than the client without their express permission. In any event, RB Geotechnical accepts no liability for any costs, liabilities or losses arising from the use of reliance upon the contents of this report by anyone other than the client.

1.0 INTRODUCTION

1.1 Brief and Scope

RB Geotechnical was commissioned by the client, to carry out a Phase II Intrusive Site Investigation at the former Jovil Garage in Linthwaite, West Yorkshire, in relation to the proposed new residential development on the site.

RB Geotechnical undertook an intrusive ground investigation on 24th March 2026, to gain the necessary information required to assess the underlying ground conditions on site to carry out a soil contamination assessment and ground gas assessment.

This report discusses the findings of this ground investigation and provides an analysis which includes a series of conclusions and recommendations relating to the potential risks and constraints of the proposed development.

1.2 Terms and Conditions

This report has been prepared for Mr Josh Morris, for the purpose of assessing the ground conditions at the proposed residential development at the former Jovil Garage on Manchester Road, Linthwaite, West Yorkshire.

1.3 Scope and Objectives of Report

The purpose of this report is to provide factual and interpretative information required to comply with the requirements of a Phase II Intrusive Site Investigation. The scope of the report is as follows:

- To provide general information on the site such as location and description;
- To summarise the ground investigation and its findings;
- Provide factual information and descriptions of ground conditions;
- To assess the soil for contamination issues; and
- To provide recommendations for further works where necessary.

1.4 Constraints and Limitations

This report is intended for the client for assisting them in assessing the ground conditions for soil contamination and ground gas issues in addition to soakaway infiltration testing.

RB Geotechnical has endeavoured to assess all information provided to them. The report includes summaries of information from external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.

The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

It should be noted that although every effort has been made to ensure the accuracy of the data obtained from the investigation, the possibility exists for variations in ground and groundwater conditions between and around the borehole locations. In addition, groundwater levels will vary seasonally and with changes in weather conditions.

1.5 Sources of information

The sources of information used for this report are:

- RGS, Jovil Garage Report, J4207/18/E/EDS, 21st March 2018;
- Mugen Windowless Sample Borehole Logs, March 2026; and
- Envirolab Report No 26/03604, May 2026.

Although every effort has been made to ensure the accuracy of the information contained herein, no checks have been carried out to ensure the accuracy of information obtained from third parties and no liability can be accepted for any errors or misinterpretation of the third-party information where it has been incorporated into this report.

2.0 SITE DETAILS

2.1 Site Location and Description

The 0.01ha sized site, is situated at Jovil Garage on Manchester Road, Linthwaite, West Yorkshire. It is currently occupied by a single storey vehicle repair garage, situated between terraced houses. The National Grid Reference for the centre of the site is 410257, 415002.

2.2 Proposed Development

The proposed development comprises the demolition of the existing building and the construction of two new double storey residential dwellings in its place. The proposed development plan is shown in Appendix A.

3.0 EXISTING INFORMATION

3.1 Site History

Historically the site was an initially undeveloped parcel of land set between terraced houses on Manchester Road. By the 1930s the garage was present and the site remained unchanged since. An old quarry was mapped 150m to the South East, with the rest of the surrounding area mainly occupied by houses.

3.2 Geology

The site is mapped as being underlain by bedrock of the Millstone Grit Sandstone, interbedded with Siltstone and Mudstone.

3.3 Radon

The EnviroInsight Report indicates that the property is not within a Radon Affected Area, as less than 1% of properties are above the Action Level. No radon protective measures are therefore required.

3.4 Aquifers

The underlying bedrock is classified as being a Secondary A Aquifer.

3.5 Contamination Assessment

Potential on-site sources of contamination have been identified in the form of possible soil contamination associated with the sites previous use as a vehicle repair garage. This could lead to oil and fuel leaks resulting in a range of potential soil contaminants being present. A historical quarry nearby also indicates a potential risk of ground gases that could affect the site.

It was therefore recommended that a Phase II Intrusive Investigation was carried out on the site to allow for a ground gas assessment and soil contamination assessment.

4.0 INTRUSIVE INVESTIGATION

4.1 Design

The Ground Investigation was designed by RB Geotechnical to investigate the ground conditions of the site. Due to access limitations and the size of the site, the intrusive investigation was limited to 2 boreholes, however this was deemed sufficient to establish the ground conditions, soil contamination assessment and ground gas assessment.

4.2 Ground Investigation Activities

The Ground Investigation was undertaken in general accordance with:

- BS 5930 (1999). Code of Practice for Ground Investigation;
- BS1377. Methods of test for Soils for Civil Engineering Purposes; and
- BS 10175:2011 (2011). Investigation of Potentially Contaminated Sites – Code of Practice.

The Ground Investigation comprised the following:

- Two Windowless Sample Boreholes to allow for installation of ground gas monitoring standpipe and collection of shallow soil samples;
- Ground Gas Monitoring Assessment; and
- Soil Contaminated Land Testing.

This Ground Investigation was undertaken on 24th March 2026. The exploratory holes were logged and sampled by a qualified engineer.

An exploratory hole location plan is shown in Appendix A.

4.3 Sampling and In-Situ Testing

Small, disturbed samples were recovered from the boreholes and stored in plastic pots and jars placed into a cool box.

The cool boxes were then sent to the laboratory and the samples stored appropriately in a refrigerator until testing.

4.4 Laboratory Testing – Environmental

All chemical (contamination) laboratory testing was scheduled by RB Geotechnical and was intended to provide contamination data for the specific areas sampled. The scope of the testing was designed to enable comments regarding characterisation of potential contamination on site.

Two soil samples were sent to Envirolab, which is a registered UKAS Testing laboratory. Table 4.1 summaries the Laboratory Testing carried out. Full chemical laboratory testing results are shown in Appendix C.

Table 4.1 Summary of Chemical Laboratory Testing

Analysis	Total number of Samples
Heavy Metals	2
Cyanide	2
Speciated PAH	2
Total TPH	2
Asbestos	2

4.5 Ground Gas Monitoring Standpipe

Ground gas monitoring standpipe was installed in two Windowless Sample Boreholes (WS01 and WS02), with the construction details as follows:

- WS01: 0.10m plain pipe and 0.50m slotted, with bentonite seal to 0.10m and pea gravel from 0.10m to 0.60m – with response zone set within natural ground strata; and

- WS02: 0.10m plain pipe and 0.50m slotted, with bentonite seal to 0.10m and pea gravel from 0.10m to 0.60m – with response zone set within natural ground strata.

5.0 INTRUSIVE GROUND INVESTIGATION FINDINGS

The exploratory hole location plan is shown in Appendix A and full exploratory hole logs are included as Appendix B.

5.1 Ground Conditions Encountered

5.1.1 Concrete Slab

A 0.10m thick CONCRETE SLAB was encountered from ground level in both exploratory holes, extending to a depth of 0.10mbgl (metres below ground level).

5.1.2 Bedrock (Millstone Grit Sandstone)

Intact SANDSTONE was encountered from 0.10mbgl initially as an extremely weak pale yellow and orangish brown thinly bedded SANDSTONE, but becoming strong with depth, until complete borehole refusal at 0.60mbgl. Groundwater

No groundwater was encountered during drilling.

5.2 Ground Gas Monitoring

Ground gas monitoring standpipe was installed into two boreholes (WS01 and WS02)

The risks associated with ground gases have been considered in accordance with British Standard BS 8485:2015+A1:2019 “Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings” and CIRIA Report C665 “Assessing Risks Posed by Hazardous Gases to Buildings”.

Ground Gas Monitoring was carried out on six separate occasions following the intrusive Ground Investigation on the following dates: 3rd April 2026, 10th April 2026, 16th April 2026, 20th April 2026, 2nd May 2026 and 13th May 2026, ensuring that a range of Atmospheric Pressures were encountered in addition to differing pressure patterns. Full gas monitoring results are shown in Appendix D in addition to presentation of the atmospheric pressure curves. Gas monitoring was carried out on what was predicted to be the worst-case gas regime on each monitoring day, by looking at weather predictions prior to attending site. RB Geotechnical believe that a suitable range of atmospheric pressures and pressure

patterns was encountered during this gas monitoring assessment enabling a representative and worst-case gas regime to be established for the site.

The methodology used to carry out a semi-quantitative estimate of the risks from ground gas at the site is that described in BS8485:2015+A1:2019 and CIRIA Report C665 which recommends following the classification system proposed by Wilson and Card in CIRIA Report 149.

Gas Screening Values (GSV) for the site was calculated using the highest gas values (using both Methane and Carbon Dioxide) and flow rate. The highest measured gas value on this site was Carbon Dioxide of 0.00%, with a Flow Rate of 0.10l/hr. The GSV for the site can therefore been calculated as 0.00 x 0.10 = to be 0.000 l/hr.

Using Table 2 from BS8485:2015+A1:2019, the site GSV of 0.043 l/hr classifies it as having a 'Very Low' Hazard Potential, with a CS value of CS1.

Using Table 3 from BS8485:2015+A1:2019, the site can be defined as being building type 'Type A', which is defined as being a private building.

Using Table 4 from BS8485:2015+A1:2019, the gas protection scores by CS (assuming worst case for site CS1) and type of building, for this site is: 0, which means no ground gas protective measures are required.

Groundwater was not encountered during gas monitoring.

6.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

6.1 Foundations

The ground conditions on site show favourable ground for shallow foundations, whereby shallow strip or pad foundation will suffice if placed onto the shallow bedrock at depths from around 0.60mbgl, where an allowable bearing pressure in excess of 200kPa is likely to be achievable.

All foundation excavations must be inspected to ensure that no footings are placed upon any existing weak Made Ground, softer materials, or any other weak materials that would be incapable of safely sustaining the applied foundation loads. This is particularly important wherever any appreciable amounts of Made Ground occur. Additionally, all foundation excavations should be inspected to confirm that the proposed bearing stratum is rid of any largely clayey or peaty spots and is uniformly compacted.

6.2 Excavations

For any deep excavation in excess of 1.20m where vertical sides are necessary, the sides are expected to be relatively stable due to the presence of shallow bedrock.

7.0 GROUND CONTAMINATION – GENERIC QUANTITATIVE RISK ASSESSMENT

The following assessment was performed in the context of the planning regime and in line with current UK guidelines which follows the procedures set out in the Environmental Agency 'Land Contamination Risk Management' (LCRM) web pages which are accessible via the government website. LCRM provides the technical framework for structured decision making about land contamination and builds on previous work carried out under the Contaminated Land Research Programme of the former Department of the Environment. LCRM has adopted and refined the methodology and terminology that has been used in contaminated land risk assessment for a number of years.

This is used to determine if unacceptable risks to humans, vegetation or to specific parts of the wider environment are present on the site. The risk assessment follows the source, pathway, receptor methodology, as described in Contaminated Land Report (CLR) 11, which is used to build a conceptual site model to determine the presence of any pollutant linkages at the site. Should pollutant linkages exist at the site it is deemed necessary to further develop the risk assessment by comparing contamination test results with generic or site-specific assessment criteria in order to determine if an unacceptable level of risk is present at the site. If legislation or guidance changes, or the proposed end use is modified, then it will be necessary to reassess the risks which may require further sampling and testing.

We understand our brief to comprise the following items related to the contamination aspects of this investigation.

- Compare laboratory test results with generic assessment criteria;
- Determine a conceptual site model and identify any pollutant linkages at the site;
- Determine the level of risk posed by environmental hazards on site to human health, vegetation, controlled waters and structures; and
- Make recommendations for further work or remediation strategies.

Soil samples were recovered in accordance with current industry practice and were sent to Envirolab to be analysed for the determinants listed in section 4.1 of this report.

The results of these analyses are included in Appendix C of this report.

7.1 Human Health Assessment

UK guidance recommends that a risk-based approach is taken for the assessment of contaminated land and as such, DEFRA have introduced the CLEA methodology, SGV's and Category 4 Screening Values (C4SL). The CLEA methodology is a deterministic risk assessment model that estimates the long-term exposure to contaminants in the soil for children and adults and predicts the amount of contaminant to which a person might be exposed based on a given soil concentration. By comparison with relevant health criteria on tolerable or acceptable intakes of various contaminants the model was used by DEFRA and the Environment Agency to generate SGV's and C4SL's.

At the time of writing this report the DEFRA and Environment Agency has not published SGV's/C4SL using the CLEA 1.071 software for all anthropogenic toxic substances with C4SL's for further contaminants due to be produced at some point in the future. As such, it was necessary to use other methods to generate target concentrations for contaminants of concern on site.

In order to generate generic assessment criteria which are protective of human health, for use in human health risk assessment, where CLEA SGV's and C4SL's are not available the Environment Agency recommends the use of the CLEA 1.071 software in conjunction with advice found on the GOV.UK CLEA web pages. Accordingly, the Chartered Institute of Environmental Health (CIEH) in partnership with Land Quality Management (LQM) derived a set of Generic Assessment Criteria Values following the approach set out in the DEFRA research project SP1010, C4SL. The GAC for missing contaminants of concern were calculated using the CLEA 1.06 software released in July 2009 and termed Suitable 4 Use Levels (S4UL's). The input parameters used for calculating each S4UL value are listed in the substance specific chapters of the reference document associated with the S4UL's, namely 'The LQM/CIEH S4ULs for Human Health Risk Assessment (Land Quality Press, 2015). Where published UK guidance values are not available (I.e., for TPH), the results have been determined in-house using published toxicological data and UK government endorsed risk models.

The current view of the Environment Agency is that the C4SL's are considered to be a trigger value at which an exceedance may cause concern for human health and generally requiring further investigation and/or assessment.

The DEFRA C4SL and LQM/CIEH S4UL's for a residential use has been selected as this matches the proposed future land use.

8.0 DISCUSSION OF RESULTS

8.1 Human Health Hazards

The results shown in Table 8.1, confirm that no elevated levels of contamination were measured within the shallow soils on site.

Table 8.1 Comparison of Soil Test Results with Residential End Use C4Sl/S4UL

Determinant	Assessment Criteria (mg/kg)		Recorded Concentrations Across The Site (mg/kg)	
	C4SL Screening Levels	S4UL Generic Assessment Criteria/RB Geotechnical Generic Assessment Criteria	Highest Recorded Value	Location of Highest Recorded Value and other Exceedances
Metals, semi- metals and non-metals				
Arsenic	37	37	<1	All
Cadmium	17	11	<1.0	All
Copper	NC	2400	30	WS02
Chromium Total	NC	910	28	WS02
Lead	210	NC	14	WS01
Mercury (elemental)	NC	1.2	<0.17	All
Nickel	NC	130	11	WS02
Selenium	NC	250	2	WS02
Zinc	NC	3700	32	WS02
PAH (total)	NC	NC	12.4	WS02
TPH (total)	NC	NC	27	WS02
Naphthalene	NC	1.5	0.13	WS02
Acenaphthylene	NC	170	0.04	WS02
Acenaphthene	NC	210	0.05	WS02
Fluorene	NC	170	0.15	WS02
Phenanthrene	NC	95	0.48	WS02
Anthracene	NC	2400	0.20	WS02
Fluoranthene	NC	280	2.97	WS02
Pyrene	NC	620	1.81	WS02
Benzo(a)anthracene	NC	7.2	1.62	WS02
Chrysene	NC	15	1.60	WS02
Benzo(b)fluoranthene	NC	2.6	1.40	WS02
Benzo(k)fluoranthene	NC	77	0.44	WS02
Benzo(a)pyrene	3.2	2.2	0.79	WS02
Indeno(1,2,3-c,d)Pyrene	NC	2.3	0.38	WS02

Determinant	Assessment Criteria (mg/kg)		Recorded Concentrations Across The Site (mg/kg)	
	C4SL Screening Levels	S4UL Generic Assessment Criteria/RB Geotechnical Generic Assessment Criteria	Highest Recorded Value	Location of Highest Recorded Value and other Exceedances
Dibenzo(a,h)anthracene	NC	0.24	0.13	WS02
Benzo(g,h,i)perylene	NC	320	0.26	WS02
Others				
Cyanide (total)*	NC	5	<1	All
Asbestos	NC	NC	ND	All

NOTES:
(1) C4SL/LQM S4UL 2015 for Residential with gardens land use scenario at 1% organic matter content
(2) *= Dutch Target value used as screening value for cyanide.
(3) NC = No criterion.

9.0 CONCEPTUAL SITE MODEL

9.1 Introduction

The information obtained from this investigation has been collated and evaluated to develop a refined Conceptual Model for the site.

The following assessment was performed in the context of the planning regime and in line with current UK guidelines which follows the procedures set out in the Environmental Agency 'Land Contamination Risk Management' (LCRM) web pages which are accessible via the government website. LCRM provides the technical framework for structured decision making about land contamination and builds on previous work carried out under the Contaminated Land Research Programme of the former Department of the Environment. LCRM has adopted and refined the methodology and terminology that has been used in contaminated land risk assessment for a number of years.

The site has been assessed in line with current UK guidelines, namely the 'Land Contamination Risk Management' (LCRM) web pages which are accessible via the government website and Part IIA of the Environmental Protection Act 1990 and follows the procedures set out in the Environmental Agency 'Model Procedures for the Management of Land Contamination – Contamination Land Report (CLR).11'.

CLR.11 provides the technical framework for structured decision making about land contamination and builds on previous work carried out under the Contaminated Land Research Programme of the former Department of the Environment. CLR 11 has adopted and refined the methodology and terminology that has been used in contaminated land risk assessment for a number of years.

CLR.11 defines the three essential elements to any risk:

- A contaminant **source** - a substance that is in, on or under land and has the potential to cause harm or to cause pollution of controlled waters;
- A **receptor** – in general terms, something that could be adversely affected by a contaminant, such as people, an ecological system, property or a water body; and
- A **pathway** - a route or means by which a receptor can be exposed to or affected by a contaminant.

Each of these elements can exist independently, but they create a risk only where they are linked together, so that a particular contaminant affects a particular receptor through a particular pathway. This kind of linked combination of source-pathway-receptor is described as a **pollutant linkage**.

This report presents a Phase 2 Conceptual Model and Quantitative Risk Assessments for the site, based on the proposed residential end use.

9.2 Hazard Identification

9.2.1 Potential Contamination Sources

Potential Contamination Sources had been identified as potentially contaminated soils beneath the building due to its historical use as a vehicle repair garage. Potential fuel and oil leaks could have led to a number of various contaminants being present.

Upon carrying out the Phase II intrusive investigation it was found that solid intact Sandstone bedrock was encountered immediately beneath the Concrete slab. No elevated levels of any soil contaminants were recorded in the shallow soils. No elevated levels of ground gases were also encountered during the ground gas monitoring assessment.

A summary of potentially significant sources of contamination encountered are presented in Table 9.1.

Table 9.1 Summary of Contaminant Sources & Contaminants

Structure / Process	Contaminants Present on Site
Potential fuel and oil leaks	• No elevated levels of contamination in the soils • No elevated levels of ground gases.

9.2.2 Potential Receptors

The following are considered as potential receptors in relation to the current and proposed use of the site.

- **Future Residents**

- **Utility / Construction / Demolition / Site Investigation workers** – Workers undertaking routine / non-routine work involving ground disturbance works and maintenance of below ground services (assuming workers are only wearing standard construction / utility worker PPE);
- Underlying **Aquifer** – Underlying bedrock
- **New potable water supply pipes**
- **Ingress of ground gases into structures**

9.2.3 Potential Contamination Pathways

The following were considered plausible contamination pathways given the nature of the site:

- Dermal contact and ingestions of soils;
- Inhalation of dust/fibres and vapours;
- Ingestion of home grown produce; and
- Risk from ground gases, asphyxiation or explosion.

9.2.4 Quantitative Risk Assessment

By considering the sources, pathways and receptors, an assessment of the environmental risks is made with reference to the significance and degree of the risk. This assessment is based on consideration of whether the source contamination can reach a receptor and hence whether it is of major or minor significance.

An initial conceptual model of the source-pathway-receptor linkages has been developed based on the information derived from the Phase I Desk Study and this intrusive investigation. The Conceptual Site Model has been used to identify Relevant Pollutant Linkages for the current and proposed end uses which have been assessed quantitatively and qualitatively using CIRIA 552 guidance, as described in Table 9.2 and Table 9.3.

Table 9.2 Methodology for Assessing Consequence of Harm

Consequence	Criteria
Severe	Short term (acute) risk to Human Health likely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Short term risk of pollution of sensitive water resource. Catastrophic damage to buildings / property
Moderate	Chronic damage to Human Health likely, over a long term, to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Pollution of sensitive water resources
Mild	Health effects to Human Health that are unlikely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services. Damage to sensitive buildings / structures / services or the environment
Negligible	Non-permanent health effects to Human Health that are unlikely to result in "significant harm" as defined by the Environmental Protection Act 1990, Part IIa. Those that are easily prevented by means such as personal protective clothing. Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.

Table 9.3 Methodology for Assessing Likelihood of Consequence Occurring

Probability	Criteria
Almost Certain	Circumstances are such that an event either appears very likely in the short term and almost inevitable over the long term or there is evidence of currently harm occurring
Likely	Circumstances are such that an event, whilst not inevitable, is possible in the short term and is likely to occur over the long term
Unlikely	Circumstances are such that it is possible an event could occur, but it is by no means certain to occur even over a longer period, and it is less likely in the shorter term
Very Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable even in the medium to long term
Extremely Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are highly improbable even in the long term

The risk assessment table and apportioned scores presented in Table 9.4 are in general accordance with CIRIA 552. The main exception is that irreversible risks to human health are considered to have a severe consequence irrespective of whether the effects are chronic or acute in nature.

Table 9.4 Comparison of Consequence and Likelihood

Consequence / Probability	Severe	Moderate	Mild	Negligible
Almost Certain	Very High Risk	High Risk	Moderate Risk	Low Risk
Likely	High Risk	Moderate Risk	Moderate/ Low Risk	Low Risk
Unlikely	Moderate Risk	Moderate/ Low Risk	Low Risk	Very Low Risk
Very Unlikely	Low Risk	Low Risk	Very Low Risk	Very Low Risk
Extremely Unlikely	Very Low Risk	Very Low Risk	Very Low Risk	Very Low Risk

The categories of risk are defined as follows:

Very High Risk: There is a probability that severe harm is almost certain to arise to a designated receptor from an identified source, or there is evidence that severe harm to a designated receptor is currently occurring.

High Risk: There is a probability that severe harm is likely to arise to a designated receptor from an identified source, or there is a probability that moderate harm is almost certain to arise.

Low Risk: There is a possibility that harm could arise to a designated receptor from an identified source, but it is likely that this harm, if realised, would be mild at worst.

Very Low Risk: There is a very low possibility that harm could arise to the receptor, but it is likely that this harm, if realised, would be mild at worst.

In accordance with CLR11, professional judgement has been employed to evaluate the risk on a qualitative basis using available information.

A summary of the pollution linkages is provided in Table 9.5

Table 9.5 Conceptual Site Model

Source	Receptor	Pathway	Risk	Pollutants Encountered/Chemicals of Concern	Remedial Option(s)/Next Steps
On Site: Potential fuel and oil leaks **Off Site:** Potential ground gases	Residents	• Dermal contact or ingestion contaminants in soil-derived dust and entrained surface water run-off from areas where soil is exposed at the surface or where excavation takes place and in shallow groundwater in the natural strata if excavation takes place below the water table. • Inhalation of contaminants in soil derived dust from areas where soil is exposed at the surface of where excavation takes place. • Inhalation of soil and water derived vapours and ground gas outdoors • Inhalation of soil derived, and water derived vapours and ground gas indoors where it may have accumulated in buildings and enclosed spaces.	Low	No elevated levels of soil contamination was recorded across the site. No elevated levels of ground gases measured during ground gas assessment.	
	Construction Workers		Low		
	Groundwater within the underlying superficial soils and bedrock	• Leaching of contaminants and/or migration of free phase contaminants from the unsaturated zone soils to groundwater in the natural strata • Vertical migration of contaminants in shallow groundwater to deeper strata and aquifer.	Low	No Further Assessment Required	
	Surface Water	• Lateral migration of contaminants and/or migration of free phase contaminants present in the Made Ground via groundwater to surface water discharge • Lateral migration of contaminants and/or migration of free phase contaminants present in the Made Ground and entrained in surface water runoff	Low	No Further Assessment Required	
	Building	• Accumulation of soil and water derived vapours/and or ground gas in enclosed spaces	Low	No elevated levels of ground gases identified.	
	Potable Water Supply Routes	• Migration of contaminants into newly placed potable water supply routes	Low	No elevated levels of contamination that could affect potable water supply routes.	

9.3 Discussion of Risks

The risk assessment presented in the above sections and summarised within the CSM presented in Table 9.5 shows that no Contaminant Linkages have been identified at the site. The following sections provide a discussion of the environmental risks based on the ground investigation and laboratory data.

9.3.1 Human Health

Proposed property users

The ground investigation and laboratory testing showed no elevated levels of contamination across the site. No elevated levels of ground gases were encountered too.

Therefore no remedial measures are deemed necessary.

Therefore, the current risks to human health have currently been assessed to be **LOW.**

Utility / Construction / Demolition / Site Investigation (i.e. Ground Disturbance) Workers

The probability of contact with contaminated soils increases for workers involved with ground excavation (e.g. during development, site investigation or maintenance works). However, due to the exposure time to contaminants on site and the assumption that appropriate PPE will be worn the risks to site operatives is considered minimal. The risk is classified as being **LOW**.

9.3.2 Aquifer

The risks to the underlying aquifer has been assessed to be **LOW.**

9.3.3 Surface Water

The risk of contaminants to controlled waters is considered to be **LOW**.

9.3.4 Potable Water Supply Pipes

The current risk to proposed new utility routes is **LOW**.

9.3.5 Buildings

Ground Gas Monitoring did not identify any elevated levels of ground gases. Therefore current risk of ground gases is **LOW.**

10.0 CONCLUSIONS AND RECOMMENDATIONS

Potential on-site sources of contamination were identified as possibly contaminated shallow soils associated with the sites historical use as a vehicle repair garage. Potential off-site sources of ground gases were also identified, due to nearby historical quarrying.

An intrusive investigation was therefore carried out on site comprising two Windowless Sample Boreholes, to allow for installation of ground gas monitoring standpipe and collection of soil samples for soil contamination testing.

Ground conditions were found to concrete slab to 0.10mbgl, underlain by solid intact Sandstone bedrock which resulted in borehole refusal at 0.60mbgl.

No elevated levels of soil contamination were recorded in the samples tested and no elevated levels of any ground gases measured during the ground gas assessment.

No remedial measures are therefore required. It is however recommended that should any soft landscaping be proposed in the small yard areas, then a suitable topsoil material is imported and placed.

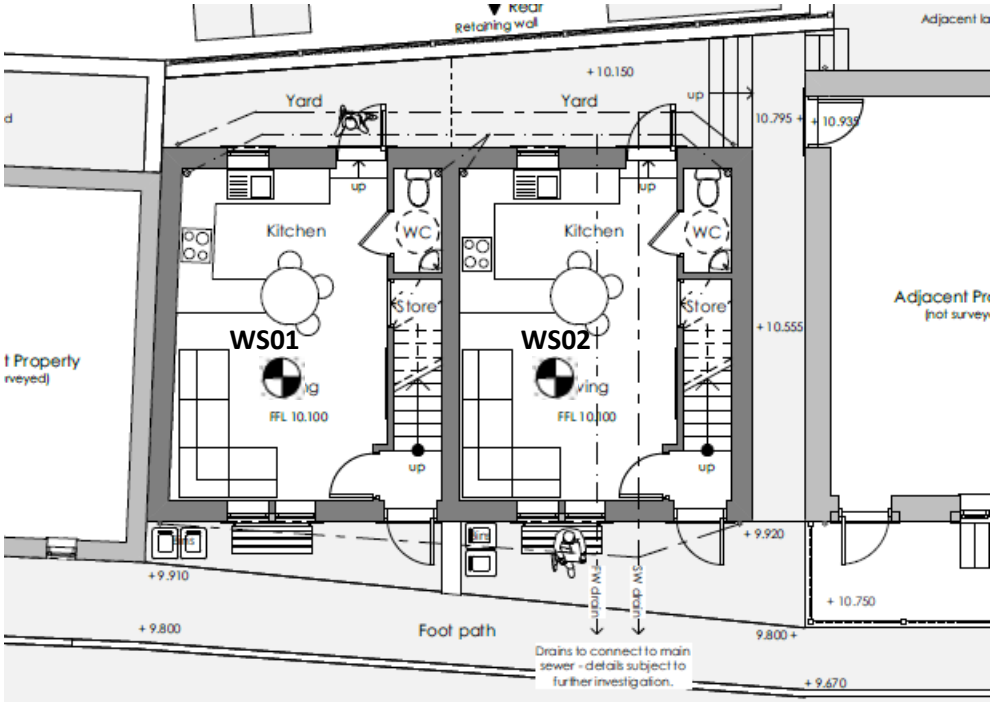
It was established that traditional shallow strip or pad foundations will suffice, placed onto the solid intact bedrock at depths of around 0.60mbgl, where an allowable bearing pressure in excess of 200kPa is likely achievable.

11.0 REFERENCES

- BRE Special Digest 1:2005: Concrete in aggressive ground, BRE Construction Division
- BS 5930: (2015): Code of Practice for Site Investigation. British Standards Institution
- BS 10175: (2011): Code of Practice for the Investigation of Potentially Contaminated Sites. British Standards Institution
- BS 8485: (2015); Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings
- CIRIA Special Publication (2002) Construction over abandoned mine workings.
- CIRIA C665 (2007) Assessing risks posed by hazardous ground gases to buildings
- CL:AIRE (2013) SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination
- DEFRA and Environment Agency (2004) Model Procedures for the Management of Land Contamination, R&D Publication CLR11.
- Environment Agency (2009) CLEA Software (Version 1.06) Handbook, Scientific Report SC050021/SR4
- Environment Agency (2009) Updated technical background to the CLEA Model, Scientific Report SC050021/SR3
- Environment Agency (2000) Secondary Model Procedure for the Development of Appropriate Soil Sampling Strategies for Land Contamination, R&D Technical Report P5-066/TR.
- Interim Advice Note 73/06 (2009) Design Guidance for Road Pavement Foundations, Draft HD25.
- Meyerhof, G (1957) The Ultimate Bearing Capacity of Foundations on Slopes, Proceedings of the 4th International Conference, Vol. 3, pp. 384 – 386.

- Ministry of Agriculture, Fisheries and Food (1998) Code of Good agricultural Practice for the Protection of Soil. MAFF Publications, London
- Nathanail, C.P., McCafferey. C., Gillett, A., Ogden, R.C., and Nathanail, J.F. (2015) The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham.
- NHBC (2007) Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present, Report Edition No. 4.
- NHBC (2008) Guidance for the Safe Development of Housing on Land Affected by Contamination.
- NHBC (2022) Part 4 Building Near Trees

APPENDIX A – PROPOSED DEVELOPMENT AND EXPLORATORY HOLE LOCATION PLAN



Exploratory Hole

Appendix A –Exploratory Hole Location Plan and Proposed Development RB Geotechnical

APPENDIX B – EXPLORATORY HOLE LOGS

Mugen Geo Ltd.

Site Land at Joville Garage Manchester Road Linthwaite HD			**Number** WS1
Machine : Archway Competitor **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** RB GEOTECHNICAL	**Job Number** 2603 HD7 5QX RB
	Location (Handheld GPS) 410277 E 415023 N	**Dates** 01/05/2026	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.10)	CONCRETE SLAB			
					0.10	Extremely weak becoming strong pale yellow stained orangish brown thinly bedded SANDSTONE.			
					(0.50)				
					0.60	Complete at 0.60m			

Remarks
Borehole drillied within existing building and terminated at 0.6m bgl on solid strata. Dry upon completion. Gas monitoring well installed.

Scale (approx)	Logged By
1:10	SJP

Figure No. 2603 HD7 5QX RB.WS1

Mugen Geo Ltd.

Site Land at Joville Garage Manchester Road Linthwaite HD			**Number** WS2
Machine : Archway Competitor **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**	**Client** RB GEOTECHNICAL	**Job Number** 2603 HD7 5QX RB
	Location (Handheld GPS) 410279 E 415020 N	**Dates** 01/05/2026	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					(0.10)	CONCRETE SLAB			
					0.10	Extremely weak becoming strong pale yellow stained orangish brown thinly bedded SANDSTONE.			
					(0.50)				
					0.60	Complete at 0.60m			

Remarks
Borehole drillied within existing building and terminated at 0.6m bgl on solid strata. Dry upon completion. Gas monitoring well installed.

Scale (approx)	Logged By
1:10	SJP

Figure No. 2603 HD7 5QX RB.WS2

APPENDIX C – SOIL CONTAMINATION LABORATORY TEST RESULTS

envirolab
Hattersley Science & Technology Park
Stockport Road, Hattersley, SK14 3QU

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 26/03604
Issue Number: 1 **Date:** 09 April, 2026

Client:
RB Geotechnical
7 Carr Manor View
Leeds
UK
LS17 5AG

Project Manager: Ross Blake
Project Name: Linthwaite
Project Ref: Not specified
Order No: N/A
Date Samples Received: 25/03/26
Date Instructions Received: 25/03/26
Date Analysis Completed: 09/04/26

Approved by:

Amy Riding
Client Manager

Envirolab Job Number: 26/03604

Client Project Name: Linthwaite

Client Project Ref: Not specified

Lab Sample ID	26/03604/1	26/03604/2						Units	Limit of Detection	Method ref
Client Sample No	1	2								
Client Sample ID	WS01	WS02								
Depth to Top	0.20	0.20								
Depth To Bottom										
Date Sampled	20-Mar-26	20-Mar-26								
Sample Type	SOIL - ES	SOIL - ES								
Sample Matrix Code	4A	5A								
% Stones >10mm$_A$	27.4	22.4						% w/w	0.1	A-T-044
Cyanide (free)$_A$ M#	<1	<1						mg/kg	1	A-T-042sFCN
Cyanide (total)$_A$ M#	<1	<1						mg/kg	1	A-T-042sTCN
Arsenic$_D$ M#	<1	<1						mg/kg	1	A-T-024s
Cadmium$_D$	<1.0	<1.0						mg/kg	1	A-T-024s
Copper$_D$ M#	23	30						mg/kg	1	A-T-024s
Chromium$_D$ M#	23	28						mg/kg	1	A-T-024s
Lead$_D$ M#	14	11						mg/kg	1	A-T-024s
Mercury$_D$	<0.17	<0.17						mg/kg	0.17	A-T-024s
Nickel$_D$ M#	10	11						mg/kg	1	A-T-024s
Selenium$_D$ M#	<1	2						mg/kg	1	A-T-024s
Zinc$_D$ M#	28	32						mg/kg	1	A-T-024s
TPH total (>C6-C40)$_A$ M#	13	27						mg/kg	10	A-T-007s

Envirolab Job Number: 26/03604

Client Project Name: Linthwaite

Client Project Ref: Not specified

Lab Sample ID	26/03604/1	26/03604/2						Units	Limit of Detection	Method ref
Client Sample No	1	2								
Client Sample ID	WS01	WS02								
Depth to Top	0.20	0.20								
Depth To Bottom										
Date Sampled	20-Mar-26	20-Mar-26								
Sample Type	SOIL - ES	SOIL - ES								
Sample Matrix Code	4A	5A								
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	NAD	NAD								A-T-045
Asbestos Matrix (visual)$_{D}$	-	-								A-T-045
Asbestos Matrix (microscope)$_{D}$	-	-								A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	N/A	N/A								A-T-045

envirolab

Envirolab Job Number: 26/03604

Client Project Name: Linthwaite

Client Project Ref: Not specified

Lab Sample ID	26/03604/1	26/03604/2						Units	Limit of Detection	Method ref
Client Sample No	1	2								
Client Sample ID	WS01	WS02								
Depth to Top	0.20	0.20								
Depth To Bottom										
Date Sampled	20-Mar-26	20-Mar-26								
Sample Type	SOIL - ES	SOIL - ES								
Sample Matrix Code	4A	5A								
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01	0.05						mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01	0.04						mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02	0.20						mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04	1.62						mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04	0.79						mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05	1.40						mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05	0.26						mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07	0.44						mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06	1.60						mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04	0.13						mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08	2.97						mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01	0.15						mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03	0.38						mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	0.13						mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	0.08	0.48						mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07	1.81						mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	0.08	12.4						mg/kg	0.01	A-T-019s

Report Notes

General

•This report shall not be reproduced, except in full, without written approval from Envirolab.
•The client Sample No, Client Sample ID, Depth to top, Depth to Bottom and Date Sampled are all provided by the client and can affect the validity of results.
•The results reported herein relate only to the material supplied to the laboratory.
•The residue of any samples contained within this report, and any received within the same delivery, will be disposed of **four weeks** after the initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of **six months** after the initial Asbestos testing is completed.
•Analytical results reflect the quality of the sample at the time of analysis only.
•Opinions and Interpretations expressed are outside our scope of accreditation.
•A deviating sample report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
•If a sample is outside of the calibration range or affected by interferences then it may need diluting. This will result in the limit of detection (LOD) being raised.
•Subcontracted Analysis: Please see the appended report for any deviations, current LODs and accreditation status of the test.

Key

Superscript "#"	Accredited to ISO 17025
Superscript "M"	Accredited to MCertS
Superscript "U"	Individual result not accredited
None of the above symbols	Analysis unaccredited
Subscript "A"	Analysis performed on as-received Sample
Subscript "D"	Analysis performed on the dried sample, crushed to pass 2mm sieve.
Subscript "D" on Asbestos	Analysis performed on a dried aliquot of sample provided.
Subscript "^"	Analysis has dependant options against results. Details appear in the comments of your Sample receipt
IS	Insufficient Sample for analysis
US	Unsuitable Sample for analysis
NDP	No Determination Possible
NAD	No Asbestos Detected
Trace	Asbestos found not suitable for Gravimetric Quantification – not enough to accurately weigh.
N/A	Not applicable

Asbestos

Identification: Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis
"Trace Asbestos Identified" will be reported if there is not enough present to verify the type.

Assigned Matrix Codes

1	SAND	6	CLAY/LOAM	A	Contains Stones
2	LOAM	7	OTHER	B	Contains Construction Rubble
3	CLAY	8	Asbestos Bulk (Only Asbestos ID accredited)	C	Contains visible hydrocarbons
4	LOAM/SAND	9	Incinerator Ash (some Metals accredited)	D	Contains glass / metal
5	SAND/CLAY			E	Contains roots / twigs
Note: 7,8,9 matrices are not covered by our ISO 17025 or MCertS accreditation, unless stated above.					

Soil Chemical Analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH by method A-T-007:
For waters, free and visible oils are excluded from the sample used for analysis, so the reported result represents the dissolved phase only.
Results "with Clean up" indicates samples cleaned up with Silica during extraction.

EPH CWG (method A-T-055) from TPH CWG:
EPH CWG results have humics mathematically subtracted through instrument calculation.
Where these humic substances have been identified in any IDs from "TPH CWG with clean up" please note that the concentration is **NOT** included in the quantified results but present in the ID for information.

Electrical Conductivity of water by method A-T-037:
Results greater than 12900µS/cm @ 25^0C / 11550µS/cm @ 20^0C fall outside the calibration range and as such are unaccredited.

Please contact your client manager if you require any further information.

Envirolab Deviating Samples Report

Hattersley Science & Technology Park, Stockport Road, Hattersley, SK14 3QU
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: RB Geotechnical, 7 Carr Manor View, Leeds, UK, LS17 5AG

Project No: 26/03604

Date Received: 25/03/2026 (am)

Project: Linthwaite

Cool Box Temperatures (°C): 6.1

Clients Project No:

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	26/03604/1	26/03604/2
Client Sample No	1	2
Client Sample ID/Depth	WS01 0.20m	WS02 0.20m
Date Sampled	20/03/26	20/03/26
A-T-007s	08/04/2026	08/04/2026
A-T-019s	09/04/2026	09/04/2026
A-T-024s	08/04/2026	08/04/2026
A-T-042sFCN	30/03/2026	30/03/2026
A-T-042sTCN	30/03/2026	30/03/2026
A-T-044	07/04/2026	07/04/2026
A-T-045	01/04/2026	01/04/2026

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

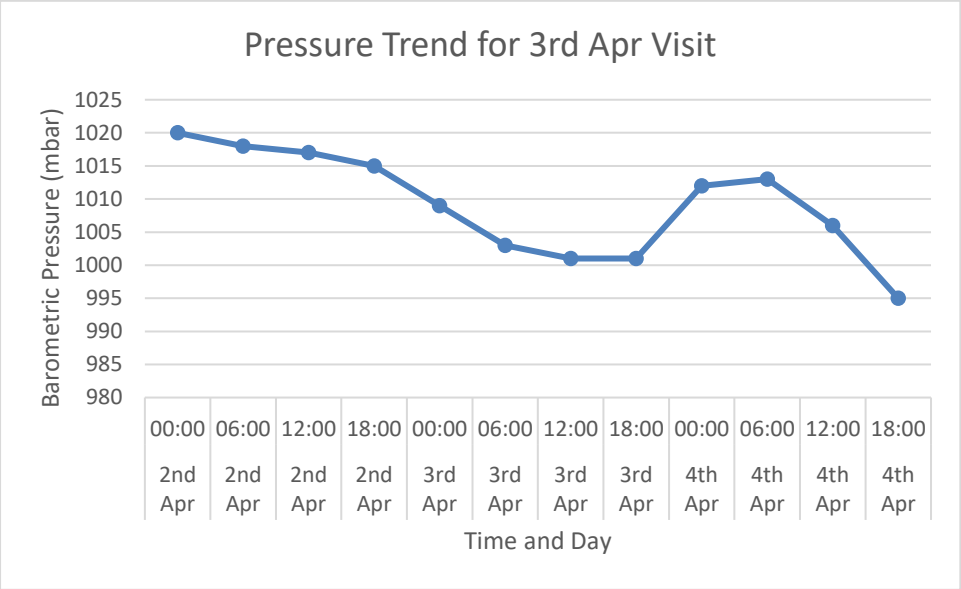
APPENDIX D – GROUND GAS MONITORING RESULTS

Date	Hole	Flow Range (L/hr)	CH4 (%) v/v		CO2 (%) v/v		O2 (%) v/v		Atmospheric Pressure (Mb)	Pressure Pattern	Groundwater Level
			Peak	Steady	Peak	Steady	Peak	Steady			
3rd April 2026	WS01	0.00-0.10	0.00	0.00	0.00	0.00	18.20	18.20	1003	Falling	Dry
	WS02	0.00 - 0.10	0.00	0.00	0.00	0.00	18.30	18.30	1003	Falling	Dry
10th April 2026	WS01	0.00-0.10	0.00	0.00	0.00	0.00	18.20	18.20	1018	Falling	Dry
	WS02	0.00 - 0.10	0.00	0.00	0.00	0.00	18.00	18.00	1018	Falling	Dry
16th April 2026	WS01	0.00-0.10	0.00	0.00	0.00	0.00	18.00	18.00	1013	Rising	Dry
	WS02	0.00 - 0.10	0.00	0.00	0.00	0.00	18.10	18.10	1013	Rising	Dry
20th April 2026	WS01	0.00-0.10	0.00	0.00	0.00	0.00	17.90	17.90	1019	Steady	Dry
	WS02	0.00 - 0.10	0.00	0.00	0.00	0.00	18.30	18.30	1019	Steady	Dry
2nd May 2026	WS01	0.00-0.10	0.00	0.00	0.00	0.00	18.10	18.10	1015	Falling	Dry
	WS02	0.00 - 0.10	0.00	0.00	0.00	0.00	18.10	18.10	1015	Falling	Dry
13th May 2026	WS01	0.00-0.10	0.00	0.00	0.00	0.00	17.90	17.90	999	Falling	Dry
	WS02	0.00 - 0.10	0.00	0.00	0.00	0.00	18.50	18.50	999	Falling	Dry

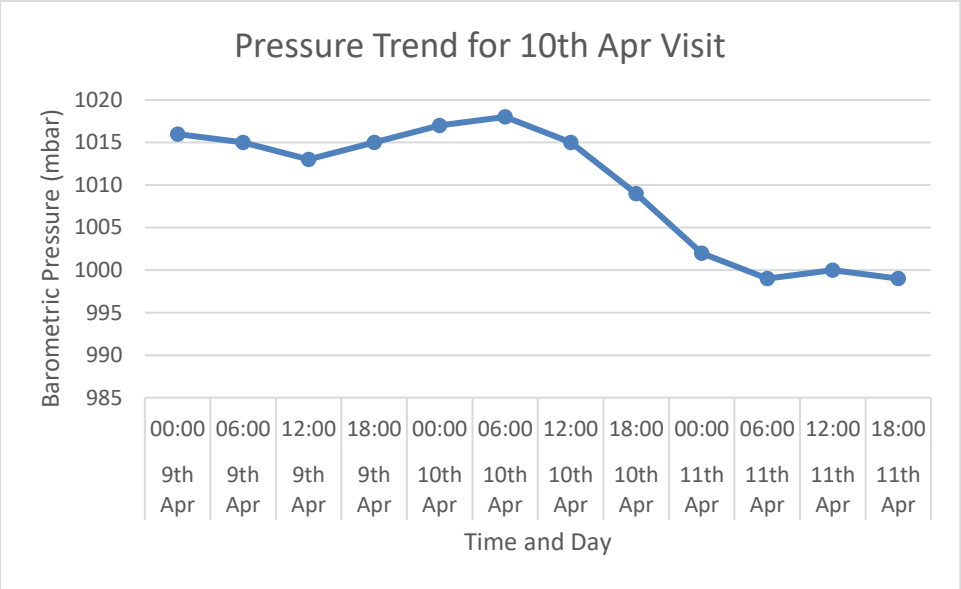
916716634

Pressure Trends

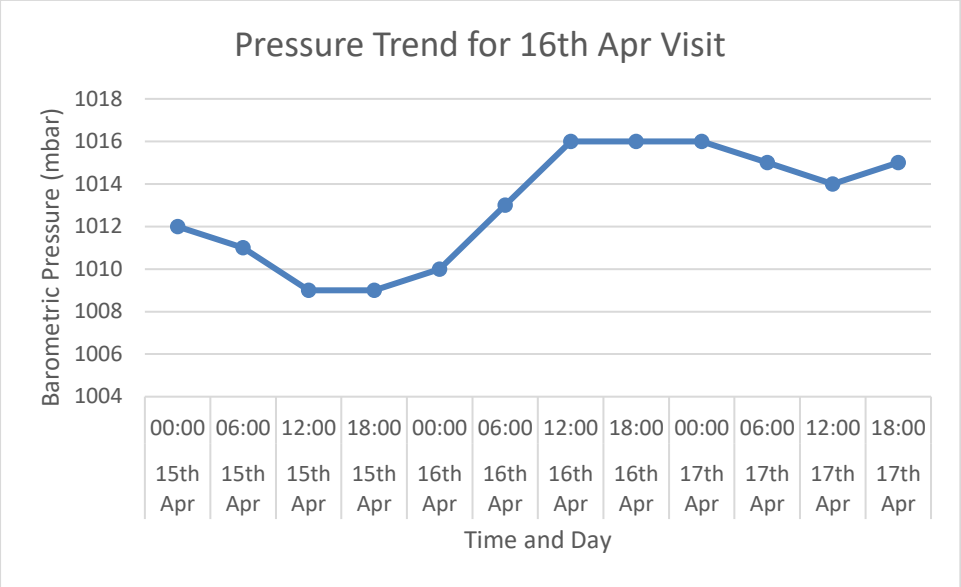
3rd April 2026: Falling gently



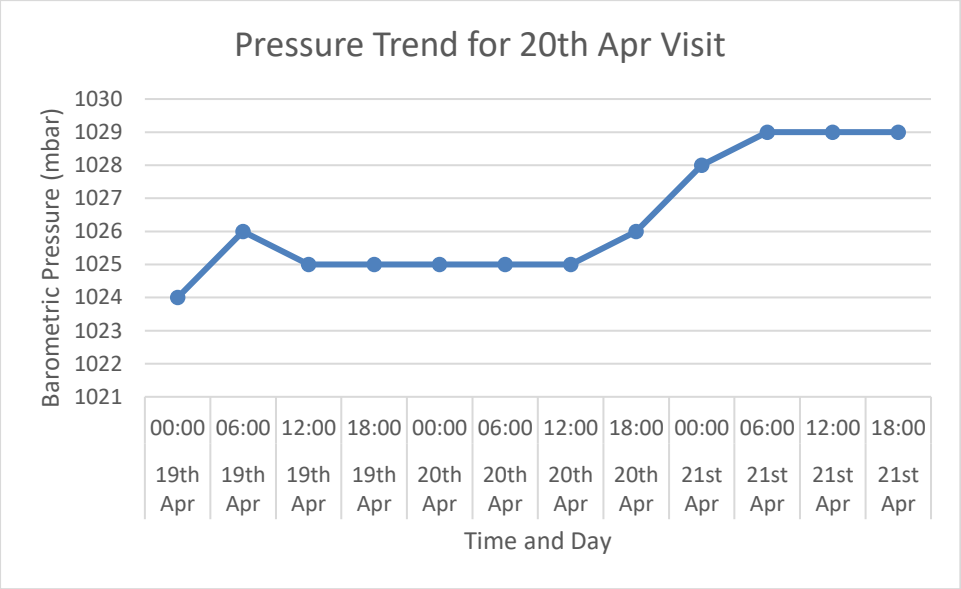
10th April 2026 Visit: Gently Falling then steady



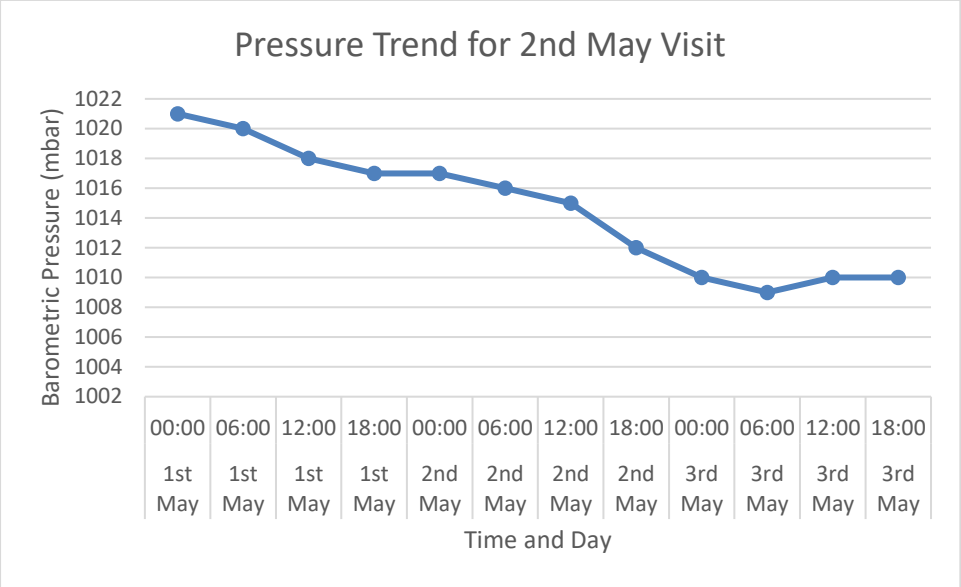
16th April 2026: Rising then steady



20th April 2026 visit: Steady



2nd May 2026: Gently falling



13th May 2026: Falling