Intelligent Ground Solutions

Remediation and Verification Strategy

Land at 1 Salop Road
1 Salop Road,
Wrexham,
LL13 7AF

For DT Filling Stations

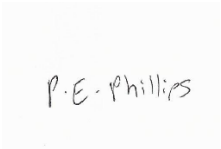
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1.0 Introduction & Objectives

Geo^2 Limited were commissioned by DT Filling Stations to compile a Remediation and Verification Strategy for land at:

1 Salop Road,
Wrexham,
LL13 7AF

This report provides guidance on appropriate steps which should be taken to mitigate risks, and upon the collection of appropriate evidence, to demonstrate that these works have been undertaken successfully. Collated evidence should be retained to allow a Verification Completion Report to be written by Geo^2.

This report does not provide any engineering or geotechnical guidance, this does not aim to address the health and safety implications of any system of work, nor does it inform the CDM Construction Phase Health, Safety and Environmental Plans.

This report is based on proposed development plans provided to Geo^2. If development plans are to change, Geo^2 should be contacted in order to apply relevant revisions to this report.

2.0 Planning Information

The Phase I report provides detailed information of planning applications for the site. In summary, a planning application was made in May 2000 for the continuation of hazardous substances consent for part of the site, with no further details provided. This was followed by an application for the demolition of the theatre building in April 2016, with Japanese Knotweed being noted on the riverbank as part of these works. A planning application was submitted in August 2020 for the proposed development of a car wash and tyre fitting unit. This application was rejected on the grounds of the site being located within a Zone 2 floodplain, being at an unacceptable risk of flooding which could give rise to flooding offsite. The application was also rejected due to proposed access passing onto Salop Road. In September 2020 Wrexham Council issued a recommendation of a contaminated land phased investigation.

Geo^2 have also been provided with correspondence between the local Contaminated Land Officer and the planning team from June 2024, detailing the need for an intrusive investigation to be undertaken to assess the potential for contamination at the site. Details of this are summarised below.

Geo^2 have also engaged in correspondence with the Contaminated Land Officer regarding previous works and reports undertaken by Geo^2 at the site, with the regulator indicating their agreement with the conclusions and recommendations of the reports.

2.1 Proposed Redevelopment

The site is proposed to be redeveloped as a car wash and vehicle maintenance unit. The latest proposed site layout plans that have been made available to Geo^2 indicate the presence of a vehicle maintenance building in the south-west corner of the site, with car wash units along the western site boundary. A bin store is to be located immediately to the south of the vehicle maintenance building and a pole sign is proposed in the north-west corner. An automated laundromat unit is proposed in the south-east corner with two vacuum and two air units proposed close to the eastern site boundary. The remainder of the site is to be covered in tarmac hardstanding and used for traffic routes, parking bays and waiting areas. A gully outfall is proposed on the eastern boundary discharging to the River Gwenfro. The ingress and egress point is proposed to be located in the north-east of the site along the northern boundary, passing onto Rivulet Road.

There are no areas of landscaping in the proposed redevelopment plans with the site to be covered with hardstanding.

A figure detailing the proposed redevelopment is presented in Appendix A.

3.0 Purpose of Remediation

The purpose of this document is to:

- Summarise the pertinent previous work at the site;
- Summarise the likely scope of remediation requirements to facilitate the proposed development at the site;
- Present the likely verification requirements; and
- Support the discharge of planning conditions relating to land contamination remediation.

4.0 Previous Work

The following previous reports have been reviewed in preparation of this strategy:

- Earth Environmental and Geotechnical – Phase I Geo Environmental Desk Study (Report ref: A4428/21) – November 2021
- Geo^2 – Groundwater and Stream Sampling Letter Report (Report ref: 24/4495.1.1) – November 2024
- Geo^2 – Phase II Contaminated Land Site Assessment (Report ref: 24/4495.2.1) – December 2024
- Geo^2 – Supplementary Investigation Report (Report ref: 25/4495.3.1) April 2025

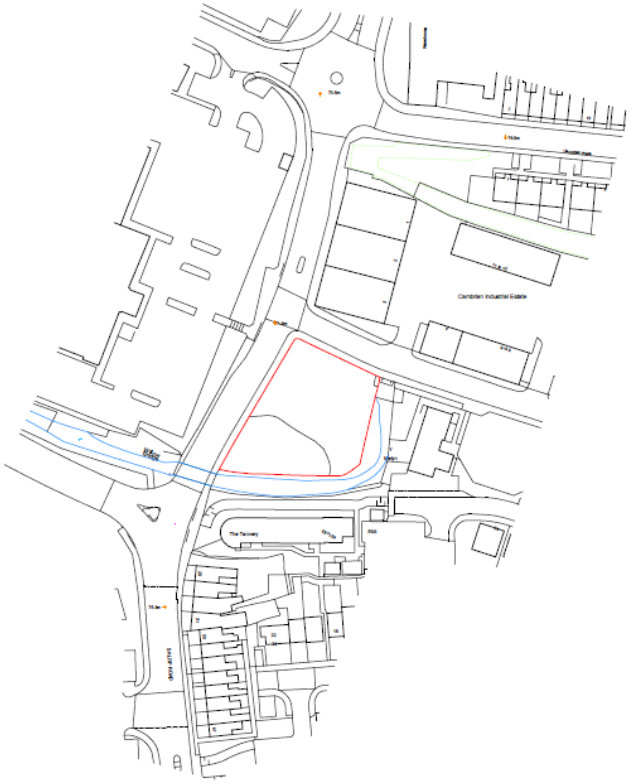
For full details of the site and intrusive investigations undertaken at the site, this strategy should be read in conjunction with the aforementioned reports. The reports are summarised in Section 5.3.

5.0 Site Information

5.1 Site Description

The site is situated in the town of Wrexham, approximately 400m south of the town centre, with access provided by one ingress/egress point on the northern boundary, from Rivulet Road. It is currently a disused site which predominantly comprises an area of tarmac with a vegetated area in the south of the site. The River Gwenfro flows along the south and east boundaries of the site, flowing south-west to north-east.

The site location is presented as Figure A below.



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Figure A: Site Location Plan. Red is the approximate site boundary.

5.2 Site History Summary

Residential properties were located on site from 1874, with a Well marked in the north-west corner of the site from 1899. The residential buildings were demolished with a works being constructed on site by 1958. This is noted as being part of the Cambrian Leather Works from circa 1966 to 1990. By 1994 the buildings on the site had been demolished and replaced with one building in the south-west corner labelled as the Wrexham Musical Theatre from circa 2007. The rest of the site is a tarmac car park. The theatre building was demolished by 2016 with the site comprising tarmac hard standing with a vegetated area in the south in the present day.

Key offsite sources comprise a gas works to the east of the site and a tannery (Cambrian Leather Works) to the north in the earliest mapping from 1873. By 1899 the river was culverted from the north-east corner of the site. By circa 1966 site to the east was identified as a gas holder station. The Cambrian Leather Works have been redeveloped into the Cambrian Industrial Estate by 1990. The Gas Holder Station was demolished by 2007 with residential properties constructed on the site (Willow Bridge Crescent and Cefn-y-Nant) by 2016.

Information pertaining to remedial works undertaken on the neighbouring gas works site were provided to Geo^2 by the Environmental Health Officer, sourced through the Planning Portal. This included the following documents:

- WSP, Former Gasworks, Rivulet Road, Wrexham. Post Remediation Validation Report, 2004
- R.E. Fry & Associates (REFA), Summary of Remediation Policy, Proposed Residential Development – Rivulet Road, Wrexham, 2012

Former Gas Holder 1 and 'Area B' (the former Rivulet Road Gasworks) were located immediately adjacent to the River Gwenfro to the south-west of the main Rivulet Road Gasworks site, on the opposite bank to the Carbana site. Area B was described as a former gas processing area and a tar tank was discovered immediately adjacent to the River Gwenfro wall with the eastern side of the tank being attached to the wall. Immediately to the north of this, black viscous tar was observed on the river wall. Works identified extensive gasworks contamination associated with this infrastructure in soils and groundwater.

Information made available through the planning portal which detailed the excavation of contaminated soils from these areas. The contamination in Area B was noted to be present in the top of the sandy gravel strata at approximately 2.0-2.3m depth. Contaminated soils were noted in the gasholder from 1.5m bgl. Excavations of the base of the holder identified underlying contaminated natural silty sand, indicating that the contaminative source was not contained in the gasholder. Whilst this site has been developed into a residential end use no information regarding the remediation or information demonstrating the absence of contamination within the groundwater or at depth in proximity to the subject site has been encountered.

The available information indicates that widespread gasworks contamination was identified on the opposing bank of the River Gwenfro to the site, immediately adjacent to the river. Although remedial works have been undertaken, any contamination that had migrated offsite was not addressed. This is considered a potential offsite source of contamination.

Figure B overleaf shows historical mapping of the gasworks with the site outlined in red, and Area B and Gasholder 1 and wider gasworks outlined in blue.

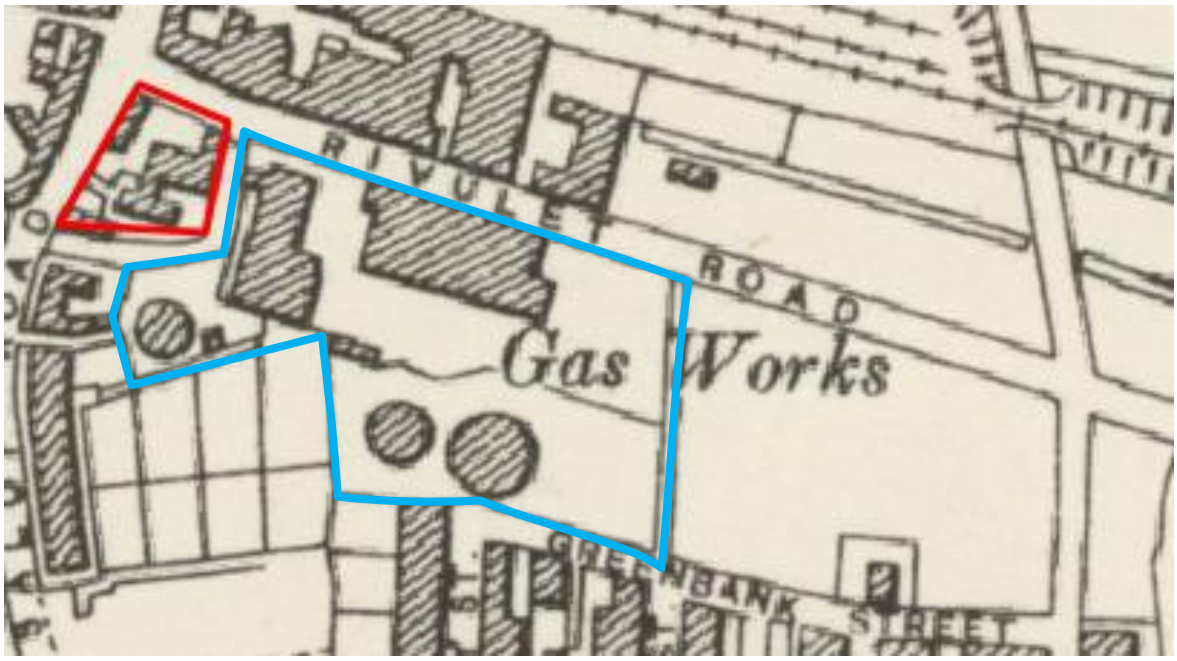


Figure B: Historical map detailing proximity of gasworks to the site. The site is outlined in red and Area B and Gasholder 1 are outlined in blue.

5.3 Summary of Historical Reports

The following sections summarise the pertinent parts of the reports, in relation to this remediation strategy, as referenced in Section 4.0.

5.3.1 Site Investigations

Geo^2 undertook a round of groundwater sampling from existing wells onsite and obtained samples from the stream in December 2024 prior to the Phase II Investigation

Geo^2 undertook the Phase II intrusive investigation in December 2024 Works comprised of the following:

- Drilling of 7 No. soil bores (WS1-5, WS7 & WS9)
- Installation of 3 No. groundwater monitoring wells
- Sampling of soils and groundwater

Following recommendations made in the Phase II report to, a supplementary phase of intrusive ground investigation was undertaken by Geo^2 in March 2025. Works comprised of the following:

- Drilling of 6 No. soil bores (WS1-5, WS7 & WS9)
- Installation of 6 No. groundwater monitoring wells
- Sampling of soils, groundwater and surface water
- Groundwater flow direction modelling

Ground conditions identified during the investigations comprise made ground described as a silty sand and gravel, including mixed fill and brick, proven to a maximum depth of 2.0m bgl. The base of the made ground was recorded between 1.0m and 2.0m bgl across the site.

Natural soils generally comprised soft to stiff gravelly silts and clays proven to between 1.5m and 4.0m bgl. This was underlain by wet sand, gravel and cobbles proven to a maximum depth of 5.0m bgl. Water strikes were encountered between 2.5 and 2.9m in the soil bores. It is considered likely that natural superficial material is associated with river deposits given the proximity of the River Gwenfro.

It should be noted that the water strikes were observed in the gravel layer underlying the silts/clays. Sub-artesian effects were observed within the wells, with water level rising higher than the strike observed during drilling. It is considered that the silts/clays are acting as a confining layer with the water body being confined in the underlying gravels.

No bedrock was encountered in any location.

5.3.2 Identified Contamination Summary

Contamination was identified during the supplementary investigation in WS102 (2.8-4.0m), WS104 (2.8-3.5m) and WS105 (3.6-4.0m). This contamination was observed in wet gravels underlying the silts and clays. In the case of WS105, contamination was observed in the sand layer underlying the silt/clay. Contamination was observed to comprise black staining with a hydrocarbon sheen on the water and a very strong coal tar odour.

Each of the monitoring wells were dipped during the investigation. Coal tar smearing was noted on the interface probe in WS2, WS102, WS104 and WS105. These locations are in the south and east of the site, in close proximity to the river and the adjacent historical gas works site.

5.3.3 Groundwater Summary

Groundwater was struck between 2.5m and 3.0m bgl in natural strata during the investigations. This was observed in the gravel strata, with groundwater displaying sub artesian effects and rising within the well. Evidence of coal tar contamination was identified in the groundwater of WS102, WS104, WS105 and WS2. This was observed as black viscous smearing with a strong gasworks odour. Significant hydrocarbon, VOC and SVOC contamination was identified in the laboratory analysis exceeding controlled waters GAC, confirming the presence of contamination observed onsite.

No concentrations of volatile hydrocarbon compounds presenting a potential vapour risk to Commercial site users were recorded in the groundwater samples.

5.3.4 Soil Contamination Summary

Due to the site's proposed use as a car wash and vehicle maintenance unit, the soil analysis testing results were compared against 'Commercial' end use Generic Assessment Criteria (GACs) thresholds with a conservative 1% Soil Organic Matter (SOM).

Evidence of coal tar contamination was identified in the wet gravel layer in WS102, WS104 and WS105 during the advancement of exploratory holes.

Environmental laboratory assessment of shallow soil samples has recorded concentrations of naphthalene in WS102 (3.6m) and WS104 (3.2m) that exceed Generic Assessment Criteria for Human Health in a commercial setting.

These exceedances were identified in the wet deep gravel strata and corresponded with observed coal tar contamination.

5.3.5 Ground Gas Risk Summary

It is not considered that a risk is present from gas generation from made ground soils and natural ground, as this has been classified as low risk in the Geo^2 Supplementary Report. It should be noted that the site is located in a radon affected area.

5.3.6 Contaminant Distribution

Evidence of coal tar contamination was observed within the soil bores in the south and east of the site, close to the boundary with the river. Laboratory analysis recorded exceedances of 2-methylnaphthalene GAC in the natural gravels of WS102 and WS104. No concentrations of other contaminants were identified above soil commercial threshold levels.

Due to the characterisation of the identified contamination as coal tar, and the lack of evidence pointing to an on-site source, it is reasonable to interpret the likely source as being offsite and associated with the historical gasworks to the south and east. Information provided to Geo^2 informed of remedial works undertaken at the gas works and the historical presence of significant coal tar contamination immediately adjacent to the river on the opposing bank to the site. This is further supported by the location of contamination onsite being predominantly located in monitoring wells adjacent to the river in the south and east of the site.

Ground modelling indicates that the contamination is in the gravel stratum at depths deeper than the base of the river. This gravel stratum is confined by an overlying clay/silt layer evidenced by observations of sub-artesian effects during supplementary investigation works. This confining layer is likely to sever the pathway between the impacted groundwater the river. Surface water samples were obtained from upstream and downstream of the River Gwenfro with no concentrations of hydrocarbon, BTEX, VOC or SVOC compounds recorded above laboratory detection limits indicating that the identified contamination is not impacting the watercourse.

6.0 Conceptual Site Model

Geo^2 have identified and summarised the linkages to determine where any unacceptable risks lie. Source-pathway-receptor linkage review is visualised within the Updated Conceptual Site Model (CSM), Section 6.2 of the Supplementary Investigation report and summarised herein.

Evidence presented in the Supplementary Investigation Report indicates that no pathway is present linking the deeper gravel aquifer with the River Gwenfro. This is supported by the absence of

contamination in the surface water samples, the absence of a shallower perched waterbody, the lack of shallower impact and allows for revision to the qualitative risk assessment.

As the source is considered to be offsite, a historical plume associated with the gas works is assessed to be the most likely source. Contamination on site is currently located in the south and east and is unlikely to rapidly migrate across site given the age and location of the source to the south and east. Also, given the likely age of the impact and likely absence of any ongoing source it is also feasible that the plume may be stable or reducing.

Whilst groundwater flow direction is towards the river, coal tar presents as a DNAPL and will not necessarily follow the groundwater flow direction but will travel along the gradient of the boundary between the gravel and an underlying impermeable stratum. This mechanism allows the apparent migration of gas works contamination onsite which is considered to have passed through the confined gravel strata beneath the river and migrated against the hydraulic gradient.

Table 1 overleaf shows details the identified contamination linkages.

Source	Pathway	Receptor	Risk Assessment (Probability x Severity)	Justification
Shallow soil contamination on site E.g., Heavy Metals, PAH, TPH, BTEX, ACM and ground gases.	Dermal contact, ingestion, and inhalation of soils dust	Future land users	**Low** (Unlikely x Medium)	No evidence of shallow contamination was identified during the investigations. No evidence of ACMs was detected in shallow soils. The proposed hard cover use of the site will act to sever pathways.
		Construction Workers	**Low** (Unlikely x Medium)	
	Vertical or lateral migration of ground gas	Adjacent land users	**Low** (Unlikely x Medium)	No evidence of shallow soil contamination or extensive thicknesses of made ground that could act as a source of hazardous ground gases were identified during the investigation.
		Future land users	**Low** (Unlikely x Medium)	
		Construction Workers	**Low** (Unlikely x Medium)	

Source	Pathway	Receptor	Risk Assessment (Probability x Severity)	Justification
Offsite source with onsite component in deeper soil and groundwater TPH, VOC, SVOC, BTEX	Lateral migration in surface waters	Surface water	**Moderate/Low** (Low Likelihood x Medium)	Soil contamination was identified in deeper gravels and groundwater onsite that have been impacted by an offsite source. The presence of an overlying confining layer currently severs the pathway between the River Gwenfro and the contaminated groundwater/soils. A risk would become present where a pathway is made between deep and shallow soils.
	Vertical migration of contaminants in groundwater	Superficial and Bedrock Secondary A aquifers	**Moderate/low** (Low likelihood x Medium)	Contamination was identified within the deeper gravels on site. Due to the proximity of the River Gwenfro, surface waters are assessed to be the primary receptor. The source of contamination is assessed to be offsite.
	Dermal contact, ingestion, and inhalation of soils dust	Future land users	**Low** (Unlikely x Medium)	Contamination was identified as being from an offsite source migrating towards the site. The presence of an overlying confining layer currently severs the pathway between the site users and the contaminant plume. The depth to the contaminated strata reduces the risk to site users further.
		Construction Workers	**Low** (Unlikely x Medium)	
	Vertical or lateral migration of ground gas	Future land users	**Low** (Unlikely x Medium)	
		Construction Workers	**Low** (Unlikely x Medium)	

Table 1. Identified Contamination Linkages

7.0 Remedial Objectives

The Remediation Strategy had been devised based on the intrusive investigations undertaken by Geo^2 in order to:

- Mitigate the risks posed by the identified contaminants of concern and break potential contaminant linkages allowing the redevelopment of the site for a commercial end use; and
- To ensure the redevelopment works themselves are undertaken in such a fashion as to prevent the introduction of contaminated materials or may pose a risk to future site users, neighbours or the environment.

The following remediation measures are therefore proposed and detailed further in the following sections:

- Remedial works – Section 8

Other items which may arise as the development progresses which are also discussed (but may be subject to revision following any remedial works) in this report include:

- Imported materials – Section 9
- Services upgrade and corridors – Section 10
- Waste and Material Management – Section 11
- Unexpected contamination – Section 12
- Health and safety considerations – Section 13

Upon completion of the development works, a Verification Completion Report will be required to be produced in line with anticipated contaminated land planning conditions. This Verification Report will confirm that the development works have been undertaken in line with the agreed Remediation and Verification Strategy and confirm, with evidence, that the site as completed does not present a contamination risk to human health for the site end users or controlled waters.

8.0 Remedial Works

8.1 Site Clearance

All natural or man-made hard materials including concrete slabs, hardstanding, brickwork, foundations, utilities, required vegetation etc. at or below the surface shall be broken out from beneath the development platform as required.

Any asbestos containing materials (ACMs) within the excavated materials should be appropriately managed and removed from site by a licensed contractor.

All materials recovered during the works which are intended for re-use shall be processed and stockpiled for chemical testing to demonstrate they are suitable for re-use within the proposed redevelopment.

It is recommended that a watching brief is implemented. A method statement for a watching brief is included as Appendix B.

8.2 Excess or Unsuitable Material

Where excess or unsuitable materials are produced, such as site won material that cannot be processed, if material is found to be contaminated or if it is unsuitable for geotechnical reasons then this material will need to be removed from site following the appropriate procedures and all relevant transfer notes and consignment notes should be retained.

8.3 Reuse of Uncontaminated Site Won Materials using an MMP

Made Ground soils may be suitable for reuse onsite as part of the site's development. Should the developer choose to retain site won materials, it should be ensured that this material cannot be considered a waste product. This can be achieved by complying with the CL:AIRE Definition of Waste: Code or Practice (DoWCoP), or through use of an appropriate exemption. Advice should be sought with respect to either circumstance to ensure compliance.

To enable material to be reused under the CL:AIRE DoWCoP, it is recommended that a Materials Management Plan (MMP) is put in place before redevelopment works commence (it is not possible to produce an MMP once works have commenced). Guidance and relevant forms are available from the industry body CL:AIRE at www.claire.co.uk.

8.4 Excavations

Excavations undertaken for the installation of new infrastructure and services should not penetrate the cohesive layer overlying the gravels. This cohesive layer extends to between 1.5 and 4.0m below ground level. The cohesive soils currently act to sever the pathway to the coal tar contamination identified in the underlying gravels. Investigation works identified sub artesian groundwater characteristics when the cohesive layer was penetrated. This resulted in confined contaminated groundwater rising within boreholes and a similar pattern is to be expected in excavations that penetrate into the gravels.

In the event that excavations must penetrate into the gravels in order to install the required infrastructure, it is essential that engineered controls are put in place to ensure that:

1. During the installation works that any groundwater can be controlled. It should be assumed that this is likely to be contaminated, and offsite disposal will be necessary. It should be noted that the most significant impact is located close to the river and placement of any structure further from the stream is likely to reduce the potential for encountering contamination.

2. During installation works, measures should be taken to prevent water entering the excavation, this might include measures such as sheet piling or formation of a Cofferdam structure.

3. Prior to backfilling of the excavation, it must be ensured that a seal can be retained, preventing formation of a pathway between the deeper contaminated groundwater and the shallower soils. This might include backfilling with impermeable materials, an appropriate concrete or similar.

The specification of the engineered elements of this solution should be produced by an appropriate specialist.

8.5 Decommissioning of boreholes

Numerous boreholes are present across the site which may provide a potential pathway for confined contaminated groundwater and vapours.

All wells on site should be decommissioned using wetted bentonite pellets from base to 0.5mbgl and sealed from 0.5mbgl to surface within the headworks using concrete.

This will act to sever any potential future pathways between the surface and made ground and the underlying contaminated groundwater. Decommissioning of boreholes will also act to prevent them acting as potential high-permeability routes for any potential future release of contamination to enter the subsurface at the site.

All wells should be decommissioned in line with the Environment Agency guidance document *'Good Practises for Decommissioning Redundant Boreholes and Wells, 2012'*

A historical wide diameter well associated with the previous use of the site as a leather works is present and should also be decommissioned. This well likely require the use of gravel and bentonite due to its diameter and depth. Gravel should be used to fill the well until the level of the base of the cohesive material (3.5mbgl). Wetted bentonite should then be used to fill the well to 0.5mbgl with a concrete seal completing the remainder.

9.0 Imported Materials

Sampling and chemical laboratory analysis of imported materials will be required to confirm that such materials are suitable for use and will not present a risk to site users or the local environment. Sampling and testing requirements are set out below.

Testing requirements in line with Yorkshire and Lincolnshire Pollution Advisory Groups (YALPAGs) Verification Requirements are set out below and should be met. The YALPAG guidance is accepted by a number of councils across England, but it should be noted that Wrexham County Borough Council may have its own requirements.

Imported materials must be able to demonstrate suitability for use; this should include information demonstrating the source of the materials origin and suitable chemical analysis.

9.1 Sampling Frequency

Sampling of imported material should be undertaken at the following frequencies:

- **For virgin quarried material** a frequency a minimum of three samples or one per 1,000 m^3 (whichever is greater);
- **For crushed hardcore/secondary aggregate** a minimum of three samples or one sample per 500 m^3 materials (whichever is greater);
- **For greenfield/manufactured** soils[1] a minimum of three samples, or one per 250 m^3 (whichever is greater);
- **For brownfield/screened/recovered soils** a minimum of six samples, or one sample per 100m^3 (whichever is greater).

Sampling should be undertaken for each separate source of material.

9.2 Laboratory Analysis

Sampling and laboratory analysis of imported materials should be undertaken on the following:

- **Virgin Quarried Material** - Heavy metals suite[2];
- **Crushed hardcore/secondary aggregate** – Heavy metals suite, speciated Polyaromatic Hydrocarbons (PAH[3]) and asbestos identification. Additional testing (e.g. TPH) may be needed dependent on the source;
- **Greenfield/manufactured soils** – Heavy metals suite, speciated PAH, speciated Total Petroleum Hydrocarbons (TPH-CWG) asbestos identification, pH and soil organic matter;
- **Brownfield/screened/recovered soils** Heavy metals suite, speciated PAH, speciated Total Petroleum Hydrocarbons (TPH-CWG) asbestos identification, pH and soil organic matter.

[1] i.e. Manufactured at a licenced facility to BS 3882:2015 or BS8601:2013 as relevant.
[2] As, Cd, Cr_{III}, Cr_{VI}, Cu, Hg, Ni, Pb, Se, Zn.
[3] 16 USEPA speciation

Plus any additional relevant analysis if deemed appropriate when materials are imported from a brownfield source, such as BTEX, phenols, cyanides etc.

Sampling should be undertaken for each separate source of material.

It is strongly recommended that all soils/materials are tested prior to importation as failures identified on site post placement will require excavation and removal of those materials. It should be noted that regional guidance may expect verification of materials after import to site.

All samples will be submitted to an appropriative UKAS accredited laboratory for analysis. All samples will be collected and submitted in line with best practice guidelines. All analysis should consider the required target concentrations and ensure a suitable level of detection is specified.

All environmental chemical analysis should be compared to appropriate generic screening criteria (GACs) for a commercial/industrial end use, drawn from the following sources:

- Environment Agency SGV Values.
- LQM / CIEH's Suitable for Use Levels (S4ULs)
- DEFRA Category 4 Screening Levels (C4SLs).
- EIC Soil Generic Assessment Criteria for Human Health.

Results of the analysis, if not undertaken by the Environmental Consultant, shall be provided to the Environmental Consultant for screening against the commercial/industrial site setting GACs and confirmation sought as to acceptability prior to import to site. All sampling should be undertaken by suitably qualified personnel, with all relevant quality control procedures in place.

Once a contractor for the proposed remediation is appointed, details should be provided to regulators, along with details of their suitability to undertake the works.

10.0 Services Upgrade and Corridors

10.1 Upgraded Water Pipe Material

Organic contaminants in soils may represent a risk to standard plastic water supply pipes. It is recommended that the Client consults with the local water undertaker to confirm any requirement to upgrade the water supply material.

10.2 Service Corridors

Installation of clean site won materials within service corridors should be undertaken. If service corridors are backfilled with imported materials, then all material imported should be tested on a ratio of 1 sample per 250 m^3 (minimum three samples) for a range of contaminants appropriate to the source of the material but to include testing for the presence of asbestos and hydrocarbons as a minimum.

11.0 Waste and Material Management

Wastes should be managed according to the waste hierarchy shown in Figure C, below and following appropriate duty of care protocols. The amount of waste created through a project should be minimised as much as possible. Materials on-site should be clearly separated into different waste streams to allow for re-use and recycling.



Figure C. Waste Hierarchy Diagram.

11.1 Laboratory Analysis and Materials Classification

A number of soil samples were collected from across the site during the site investigations and subject to laboratory chemical analysis. It should be noted, however, that the results presented in Section 5.0 of the Supplementary Investigation Report may not be fully representative of waste excavation arisings generated during the construction phase, and therefore further sampling and laboratory analysis, including Waste Acceptance Criteria (WAC), may be required for excavation arisings to be managed off-site for disposal.

Before excavation arisings (and other materials) leave site as waste, they should be classified appropriately. Each type of waste which a site produces will have an individual European Waste Code (EWC). This is a six-digit code which is unique to the waste stream. For example:

17-05-04 = Mixed Soil and Stones

Some codes can also be hazardous and marked by an asterisk (*)

13-05-07* = Oily water from oil/water separators

Geo^2 are able to advise on material codes, material testing and classification. Often additional sampling may be needed to give a detailed classification for disposal. If you need additional information on this, we recommend referring to UK Government technical guidance document "WM3" which details how materials should be classified::

11.2 Key Documents

If material leaves a site, it will require either a waste transfer note or a hazardous waste consignment note. It is illegal for waste to be removed from a site without these documents.

Document	Link to download
Waste Transfer Note	https://www.gov.uk/government/publications/duty-of-care-waste-transfer-note-template
Hazardous Waste Consignment Note	https://www.gov.uk/government/publications/hazardous-waste-consignment-note

Table 2. Waste Transfer and Consignment Note Links.

All relevant waste transfer notes and consignment notes should be retained by the contractors and provided in a timely and well-organised manner to Geo^2 for inclusion within the Verification Report. Geo^2 will require a fully quantified list of waste materials removed from site. It is vital that any paperwork is stored securely and not lost from site. **It is a legal requirement to keep transfer notes and consignment notes**. Hard copies of waste tickets and digital scans of tickets should be retained (for up to 6 years).

11.3 Haulier and Receiving Facility Licence Checks

The main contractor on site is responsible for the wastes that they produce, and also responsible for checking that the organisations removing waste from site, and receiving such waste, are appropriately registered with the Environment Agency.

To check if a business managing waste is registered with the Environment Agency, follow this link: https://environment.data.gov.uk/public-register/view/search-waste-carriers-brokers.

https://environment.data.gov.uk/public-register/view/search-waste-operations

11.4 Regulatory Waste Exemptions

Regulatory waste exemptions may be suitable for the small-scale groundworks activities anticipated to be required for the site's redevelopment.

A U1 exemption for example (Use of Waste in Construction) currently permits the reuse of small volumes of certain materials (e.g. crushed brick / concrete) to form bunds, access roadways on site, or limited volumes of clean 'virgin' topsoil being imported from offsite. A U1 can be filed very quickly and has no application fee. There are, however, limits on volume and constraints on material types for the use of a U1 which should be fully understood before use.

https://www.gov.uk/guidance/u1-waste-exemption-use-of-waste-in-construction

A T5 exemption allows a contractor to temporarily screen and blend waste on a small scale to produce aggregate or soil at a particular location, such as a construction or demolition site. For example, grading waste concrete after is has been crushed to produce a certain type of aggregate.

You can store or treat up to 5,000 tonnes of waste (other than bituminous mixtures) under this exemption. However, you cannot store waste for more than 12 months.

https://www.gov.uk/guidance/waste-exemption-t5-screening-and-blending-waste

11.5 Ancillary Wastes

The Phase I report undertaken by Earth Environmental & Geotechnical in November 2021 indicates that Knotweed was identified on the riverbank in 2016. Geo^2 were unable to verify this during investigations due to the density of vegetation however, if any invasive species are identified during future development works then treatment / removal of the infected area should be undertaken by a specialist contractor.

Should any liquid wastes be identified during future development works it may be necessary to dispose of the wastes through the use of a vacuum tanker.

Any general waste generated during future works should be disposed of by the contractors.

All relevant waste transfer notes and consignment notes should be retained by the contractors.

11.6 Excess or Unsuitable Material

Where excess or unsuitable excavation arisings are produced and found to be contaminated or unsuitable for geotechnical reasons, then this material will need to be removed from site as a waste, following the appropriate duty of care procedures, and all relevant transfer notes and consignment notes should be retained.

WAC testing will likely be required for soils to be removed from site to suitably licenced facilities.

All relevant waste transfer notes and consignment notes should be retained by the contractors for inclusion within the Verification Report.

12.0 Unexpected Contamination

It is recommended that contractors should remain vigilant for encountering contaminated soils or waters during the preconstruction and construction works. Contractors should be trained in identifying potential areas of contamination and a site-specific briefing provided on areas of potential contamination in advance of construction-phase works commencing on site.

Unexpected contamination may comprise impacted Made Ground or underlying natural soils, or unexpected structures such as storage tanks, subsurface features, pipes, sumps or chambers with associated contamination.

As a guide, potential contamination in soils or waters may comprise visually impacted materials (stained, coloured) and/or distinctly odorous material. Encountered odours could be gas works, petrol, diesel, solvents or oil-like.

In the event that materials of this or similar description are encountered, and the material is considered to be previously unidentified, then Geo^2 should be contacted. In such circumstances,

the affected area should be isolated and work in the area stopped, pending the Geo^2 consultant visit to sample or assess the soil/water. The area should remain isolated whilst the samples are analysed at an appropriate laboratory and the mitigation measures are confirmed, if considered necessary.

Based on a comparison of analysis results against adopted screening criteria, Geo^2 will assess whether the identified materials present an environmental risk that needs treatment or removal from site. Validation samples will be collected from the edge and base of the excavation by a Geo^2 engineer. The number of validation samples required should be decided by the Geo^2 engineer, based upon the excavation size and depth, material types and contamination distribution, but will be a minimum of six with at least one sample per 5m length of excavation face and 10m^2 of excavation base.

All waste soils/materials should be appropriately segregated and stored to prevent spreading contamination across the site (such as placing on and being covered by plastic sheeting). Waste should then be appropriately classified and disposed of in accordance with the applicable waste management regulations under full duty of care documentation. The potential exists for materials which could be classified as hazardous waste to be present, and this should also be dealt with in accordance with the relevant legislation.

Should unidentified underground features be encountered, such as fuel tanks or chambers etc, that require removal in line with the proposed development, they should be appropriately decommissioned. Decommissioning may comprise pumping and removal of wastewater and any sediment in accordance with the applicable waste management regulations under full duty of care documentation. Water and sediment waste may need to be sampled and analysed to determine whether it needs to be disposed of as hazardous. Should suspected contaminated material be identified beneath or adjacent to the structure, Geo^2 should be contacted to undertake further sampling and analysis with the appropriate validation sampling undertaken. All results will be included in the Validation Completion Report.

Should any structure encountered remain in situ, Geo^2 should be contacted to ensure that any potential impact that may be associated with this feature can be appropriately addressed, if necessary. This process may entail additional sampling works, which would require the identified area to be isolated until a Geo^2 engineer is able to attend site.

All samples obtained by Geo^2 will be

- Collected using methodologies in line with standard industry guidance
- Stored in appropriate containers and controlled conditions for the required analysis;
- Transferred under chain of custody to an appropriately accredited laboratory for analysis.

The relevant planning authorities should be notified should any unexpected contamination be identified. Remedial actions that are identified as necessary as a result of encountered materials should be agreed prior to the work being carried out.

A method statement for a watching brief is included as Appendix B.

13.0 Health and Safety Considerations

The Principal Contractor is required to have appropriate risk assessments and method statements in place under the Construction (Design and Management) Regulations, 2015. These should recognise and address the construction-phase hazards presented by ground conditions on site.

Groundworkers should be made aware of the possibility of encountering contaminated soils through toolbox talks and in particular the potential presence of asbestos and an appropriate protocol to mitigate exposure of the workforce and general public should be in place.

Other health and safety factors that should be considered, taking into consideration the unexpected identification of asbestos fibres in Made Ground soils include, but are not limited to:

- **Dusts**: To minimise risks from dusts (including potentially containing asbestos fibres) damping down or covering of stockpiles may be considered necessary. Movement of potential contamination off site on vehicle wheels shall be minimised by cleaning of vehicle wheels and/or use of a road sweeper, as required.
- **Welfare**: Washing facilities and a clean canteen room from which work boots and overalls are excluded. Provision must be allowed to permit adequate hygiene to be maintained and to ensure provision of appropriate personal protective equipment (PPE).

14.0 Verification Completion Report

Upon completion of the development works, a Verification Completion Report will be required. This should be undertaken by an appropriately qualified and competent person. Once an appointed person is in place, details should be provided to regulators prior to commencement of works.

The aim of the Verification Completion Report will be to demonstrate that the measures proposed in this Remediation and Verification Strategy have been undertaken.

To ensure that the Verification Completion Report can be completed, the following information detailed in Table 3 should be requested from suppliers or retained for inclusion in the report by the Principal Contractor.

Remediation Report Section	Item	Examples of Information Required (not an exhaustive list)
Section 8	Remedial Works	Watching brief report, including photolog. Documentation of all relevant transfer notes and consignment notes provided. Details of excavation environmental protection measure, if applicable. Details of borehole decommissioning. Details and analysis certificates of all validation samples taken, if applicable. Documentation from the licenced contractor of any asbestos containing material removal, if applicable. Details of any imported materials.
Section 9	Imported Materials	Name and address of the source sites for imported hard core, subsoil and topsoil materials. Volumes of each material imported and delivery notes provided. Minimum three soil samples collected by Geo^2 on site for each material / source site, or testing as per Section 10. Chemical testing results for all imported hard core / soils.
Section 10	Services Upgrade and Corridors	Details of any upgraded pipework included within the final development, if applicable. Documentation associated with the testing of the imported service trench fill, if applicable.
Section 11	Waste and Material Management	Records of waste transfer notes. Details of receiving facility and associated permits. Details of waste haulier and associated licences.
Section 12	Unexpected Contamination	If any unexpected contamination is encountered then the relevant information, testing certificates, validation exercise and tickets indicating volumes of off-site removal of soils should be obtained. If unexpected contamination encountered, evidence should be provided to demonstrate its classification, volume, how it was treated/disposed, and the appropriate verification testing undertaken. If no unexpected contamination is encountered, the Principal Contractor is to provide a statement on a headed letter confirming this.

Table 3. Requirements for Verification Report

15.0 Limitations

This Report was prepared by Geo^2 for the sole and exclusive use of the Client and for the specific purpose for which Geo^2 was instructed. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Geo^2's Standard Terms and Conditions.

Geo^2 does not intend, without its written consent through a formal letter of reliance or warranty, for this Report to be disseminated to any party other than the named Client or to be used or relied upon by any party other than the named Client. Use of the Report by any other party is unauthorised and such use is at the sole risk of the user. Any party using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Geo^2 from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by Geo^2.

The recommendations contained within this Report represent Geo^2's professional opinions, based upon the information detailed within the Report, exercising the reasonable skill and care to be expected of a professional consultant holding itself out as having the competence, experience, and resources necessary for the purpose of carrying out similar work in scope and character to the services performed. The Report needs to be considered in the light of the proposal and associated limitations of scope. The Report needs to be read and considered in full and isolated sections cannot be used without full reference to other elements of the Report and any previous works referenced within the Report.

16.0 References

Yorkshire and Lincolnshire Pollution Advisory Group, Verification Requirements for Cover Systems, Version 4.1, June 2021

BSI, 2019: Code of Practise for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings, ref. BS8485:2015 +A1:2019

CIRIA, Good practice on the testing and verification of protection systems for buildings against hazardous ground gases (C735), August 2014

CIRIA, 2001, Contaminated Land Risk Assessment, a guide to good practise, C552

CL:AIRE Definition of Waste : Code or Practice (DoWCoP)

Good Practises for Decommissioning Redundant Boreholes and Wells, 2012

Historical reports

Earth Environmental and Geotechnical – Phase I GeoEnvironmental Desk Study (Report ref: A4428/21) – November 2021

Geo^2 – Groundwater and Stream Sampling Letter Report (Report ref: 24/4495.1.1) – November 2024

Geo^2 – Phase II Contaminated Land Site Assessment (Report ref: 24/4495.2.1) – December 2024

Geo^2 – Supplementary Investigation Report (Report ref: 25/4495.3.1) – April 2025

Appendix A – Figures

RIVULET ROAD

A525

SALOP ROAD

CADWCH YN GLIR

KEEP CLEAR

Signage totem

Spray Screen

BT Supplies to be brought into LV cabinet and office of second building

Steel palisade fence

5pmh speed limit sign

Gully outfall

WB4

WB3

WB2

WB1 (Open)

LV Pillar

1.8 x 1.8 hut

Gully

Wash Bay 4

Wash Bay 3

Wash Bay 2

Wash Bay 1

Carbana

Speedyfit

EXIT

NO ENTRY

GIVE WAY

Exit

Roller Shutter

Roller Shutter

Bin

Bin

Bin

Bin

Cycle Parking

Laundromat

P

P

P

P

P

0 5 10

metres

N

Y

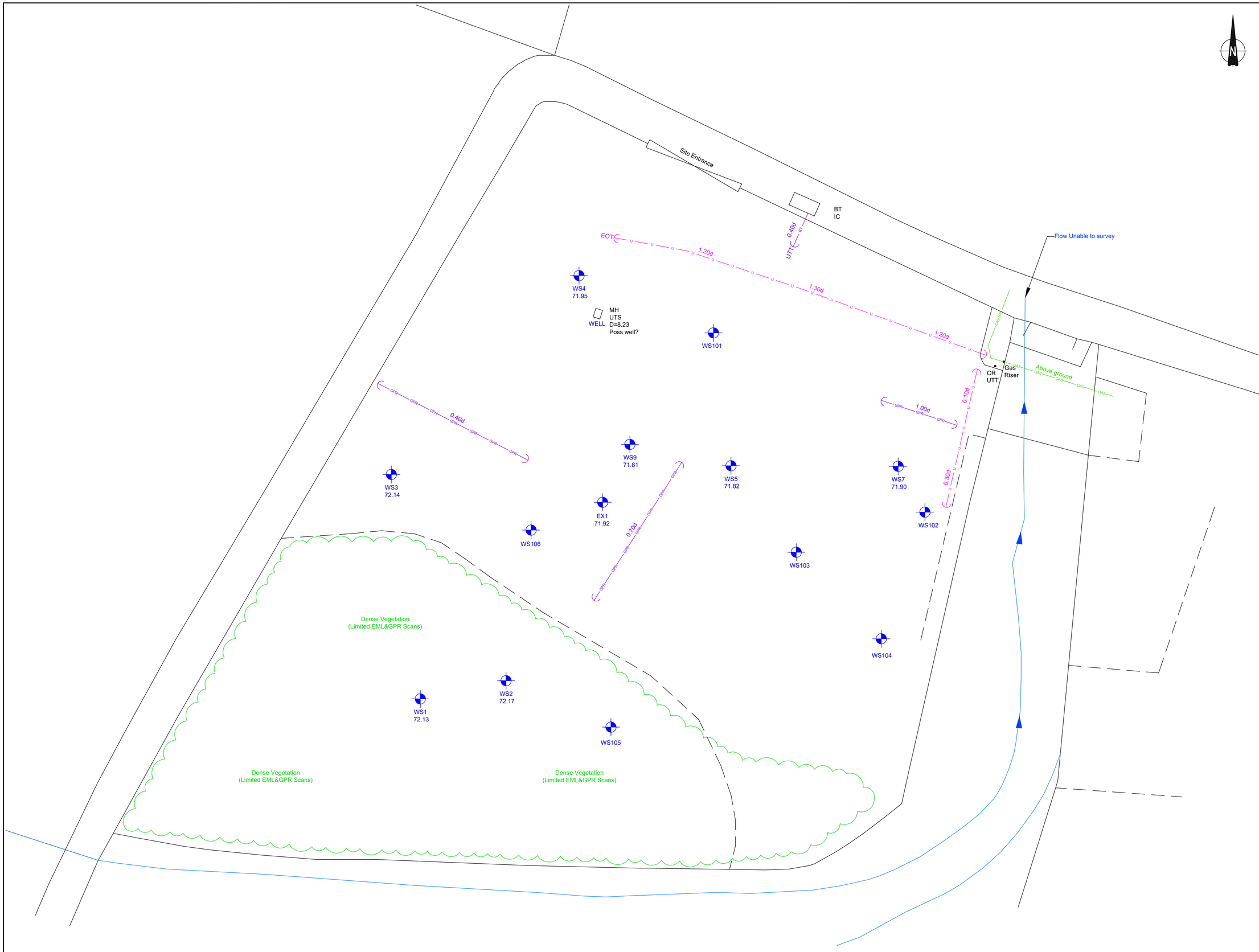
Melyn

(Residential)

NOTES:

Finished floor level as existing +-200mm.

Client: Carbana		CARBANA CLEAN CAR, CLEAN CONSCIENCE	Scale: 1 in 200 A3	Drawing Title: Block Plan
Job Title: Wrexham, Salop Road			Date: 29/10/2024	Drg No.: P2 / Rev: 5



LEGEND

- Foul Drainage
- Surface Drainage
- Combined Drainage
- Electricity
- Electricity High Voltage
- Electricity Low Voltage
- Gas
- Ground Probing Radar
- Water
- Cable Television
- Close Circuit Television
- Communication
- British Telecom
- Compressed Air
- Offset Fill-Line
- Oil Pipe
- Pipe
- Ventilation
- Fuel Line
- Vapour Recovery
- Gauge Line
- Telemetry
- Fibre Optics
- Unknown
- Fence
- Edge of Canopy
- Gully Run
- Electricity (TFR) Taken From Records
- BT (TFR) Taken From Records
- Gas (TFR) Taken From Records
- Water (TFR) Taken From Records
- End Of Trace
- Do Not Drill / Banded Pipes
- T TANK* - W= Water U=Unknown F=Foam P=Product C=Concrete
- Borehole
- Trial Pit Location
- Excavated Area
- Window Sample
- Soil Vapour Sample

ABBREVIATIONS

AR	Assumed Route	MW	Monitoring Well
BO	Bollard	NPV	No Pipes Visible
BO/ILL	Illuminated Bollard	OH	Overhead Service
BH	Borehole	OSA	Off Survey Area
BTB	British Telecom Box	OSBM	Ordnance Survey Bench Mark
BTIC	British Telecom Cover	PR	Pipe Riser
C/BOX	Control Box	P	Post
C/B FENCE	Closeboard Fence	P&R FENCE	Post & Rail Fence
CR	Cable Riser	RET WALL	Retaining Wall
CATV	Cable TV	RWP	Rain Water Pipe
CP	Catch Pit	RS	Road Sign
Co	Concrete	RE	Rodding Eye
CON	Conifer	S/A	Soakaway
CL	Cover Level	S/BIRCH	Silver Birch
d	Depth (in metres)	SAP	Sapling
D/CHAN	Drainage Channel	SEC FENCE	Security Fence
DP	Down Pipe	SL	Spot Light
ER	Earth Rod	SP	Soil Pipe
EIC	Electricity IC	ST	Stop Tap
EP	Electricity Pole	SV	Sluice Valve
EOC	Edge of Canopy	SVP	Soil Vent Pipe
EOT	End of Trace	SVS	Soil Vapour Sample
F/BED	Flower Bed	TBM	Temporary Bench Mark
FH	Fire Hydrant	TFR	Taken From Records
FS	Fire Switch	TL	Traffic Light
GV	Gas Valve	TP	Telegraph Pole
G	Gully	TS	Traffic Sensor
GPR	Ground Probing Radar	UTL	Unable to Locate
G/RUN	Gully Run	UTR	Unable to Raise
HT	Height	UTS	Unable to Survey
H/CHESTNUT	Horse Chestnut	UTT	Unable to Trace
H/THORN	Hawthorn	VR	Vapour Recovery
IC	Inspection Cover	VP	Vent Pipe
IL	Invert Level	WM	Water Meter
INT	Interceptor	WFC	Water Filled Chamber
KO	Kerb Outlet	WP	Waste Pipe
LP	Lamp Post	WR	Water Riser
LC	Lighting Column	WS	Window Sample
LH	Lamp Hole	U/S	Underside
MH	Manhole Cover	Ø	Pipe Diameter

General Notes:

Only Gas/Electric service plans provided at time of survey.

UTT Gas - TFR.

Large part of site overgrown UTS.

Some services may go undetected where active connections cannot be applied.

Hand Pits advised at WS locations.

AVOIN MAA SURVEYS LTD

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Client

GEO2

Site Location

1 Salop Road
Wrexham
LL13 7AF

Surveyed by AD	Drawn by AC	Approved by -
Drawing No. 1124/GEO2/11333		Revision -
Scale 1:100 @ A1	Date 11/11/2024	Sheet No. 1 of 1

DISCLAIMER: The location of under ground services shown on this drawing has been determined using electro-magnetic (and/or ground probing radar, where requested) techniques and visual observations. the limitations of this drawing should be realised and no guarantee can be given that all services have been identified. This drawing may not include the location of all public services that may cross the site and therefore the relevant service drawings should be obtained from the appropriate utility company and used in conjunction with this drawing. Additional services, structures or other below ground obstructions not indicated on this drawing may be present on site. reference should be made to historical plans and as built drawings. Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document "avoiding dangers from underground services". Location accuracy is determined by refering to manufacturers guidelines for the systems deployed. Reference should be made to the latest version of AMS Ltd site procedures document for utility location surveys Please note ground penetrating radar depths are approximate only.

Appendix B – Watching Brief Method Statement

Watching Brief Method Statement: Salop Road, Wrexham

This method statement aims to establish a structure by which site works / development contractors will be able to effectively meet the requirements of a watching brief. A watching brief is frequently proposed as part of planning conditions imposed onto any brownfield site, or a site potentially affected by contaminants. This methodology proposed a strategy which allows the site workers to effectively undertake these works themselves without the need for a full time environmental specialist.

Requirements of a Nominated Competent Person (CP)

The party undertaking the site works will nominate a Competent Person (CP) who will be responsible for providing a watching brief over all excavation, soil handling works associated with construction and for ensuring site workers conform to appropriate PPE requirements at all times. The CP will be on-site during all enabling, and construction works.

The CP will be briefed by Geo^2 on environmental management during or in advance of the groundworks at an on-site meeting to be held prior to the commencement of works. This would typically address the following issues;

- A review of any existing site information with regard to areas of potential contamination both identified and unidentified,
- Types of contamination which may be encountered and also potential for unexpected contamination, and means of identification,
- Potential risks associated with contaminants, with regard to health and safety concerns of construction workers,
- Potential for waste disposal issues,
- Ensuring that the CP is confident and capable of undertaking the practical responsibilities identified,
- Any additional site-specific concerns or factors which may prove relevant to works, such as any visual monitoring / inspection requirements (e.g. daily observations of adjacent streams etc).

The CP would be required to maintain records of any issues, as detailed above, which would be encountered during the programme of works. Records should detail the time and date, nature of any incident, or detail of potentially contaminated soils encountered, location of this material, where possible extent and the actions undertaken to ensure this was appropriately classified. These would be required to be submitted to the Client and Geo^2 to ensure that an appropriate validation report could be complied to enable the planning conditions to be lifted. Records should be available on-site at all times for inspection as required.

The CP is also responsible for contacting Geo^2 in the event of encountering situations requiring environmental management.

Unexpected Contamination

Unexpected contamination may comprise impacted sub-soil, or structures such as underground storage tanks (UST), subsurface features, pipes, sumps or chambers with associated contamination observed beneath the site during the redevelopment works.

Where apparently contaminated sub-soils (or waters) are encountered, the permanent nominated CP should be contacted for assessment.

As a guide, apparently contaminated sub-soils or waters may comprise visually impacted and strongly odorous material. Encountered odours could be gas works, petrol, diesel, solvents or oil-like. Should materials of this description, or other description following a site-specific briefing, be encountered and this material be considered to be unidentified, Geo^2 should be contacted. In such circumstances, the affected area should be isolated and work in the area stopped, pending the Geo^2 consultant visit to sample or assess the soil. The area should remain isolated whilst the samples are analysed at an appropriate laboratory, if considered necessary.

Additionally, the Local Planning Authority (LPA) may need to be informed in writing upon the contractor encountering unexpected contamination. If necessary, following consultation with Geo^2, works are to stop in the area, with the exception of investigative works, until an updated Remediation Strategy can be updated, reissued and agreed by the LPA.

Based on the results, and in comparison with adopted screening criteria, Geo^2 will determine whether the identified materials present a significant environmental risk. Should the soil need to be removed in line with the proposed development programme, or as a result of a risk-based analysis, validation samples will be collected from the edge and base, if appropriate, of the excavation by a Geo^2 site engineer.

All waste should be appropriately isolated and stored to prevent spreading contamination across the site. Waste should then be classified and disposed of in accordance with the applicable waste management regulations under full duty of care documentation. Potential exists for hazardous waste to be present, and this should also be dealt with in accordance with the relevant legislation.

Should unidentified underground features be encountered, such as tanks or fuel delivery lines, that require removal in line with the proposed development, they should be appropriately decommissioned. Decommissioning should comprise pumping and removal of wastewater and any sediment in accordance with the applicable waste management regulations under full duty of care documentation. Water and sediment waste may need to be sampled and analysed to determine whether it needs to be disposed of as hazardous.

Should any structure encountered remain in situ, Geo^2 should be contacted to ensure that any potential impact that may be associated with this feature can be appropriately addressed, if necessary. This process may entail additional sampling works, which would require the identified area to be isolated until Geo^2 site staff are able to attend site.

Following removal of any such structure, the CP should inspect the excavations for apparently impacted materials. Should apparently contaminated material be identified beneath or adjacent to the structure, Geo^2 should be contacted to undertake further sampling and analysis. All results will be included in the Validation Report.

The relevant planning authorities will be notified should any unexpected contamination be identified and any remedial actions that are required as a result of encountered materials will be agreed prior to the work being carried out.

Sampling Procedure

All samples obtained by Geo^2 will be stored in appropriate vessels for the required analysis and stored in controlled conditions prior to submission to an appropriately accredited laboratory. All samples will be obtained in line with standard industry guidance.

Geo^2 Contact

A Geo^2 contact will be prescribed to the site upon implementation of the watching brief.