




Remediation Strategy

Land at Lanner, Redruth

On behalf of

Practical Developments (South West) Limited

Quality Management

Prepared by:	Tom Paltridge BSc MSc FGS	
Reviewed & Authorised by:	Mike Willis BSc MSc FGS	
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Hydrogeo Ltd
Unit 4- Waddington House
Llanover Business Centre
Llanover
Monmouthshire
NP7 9HA
T: 01873 856813
E: mike@hydrogeo.co.uk
W: hydrogeo.co.uk



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1 Introduction

1.1 Background

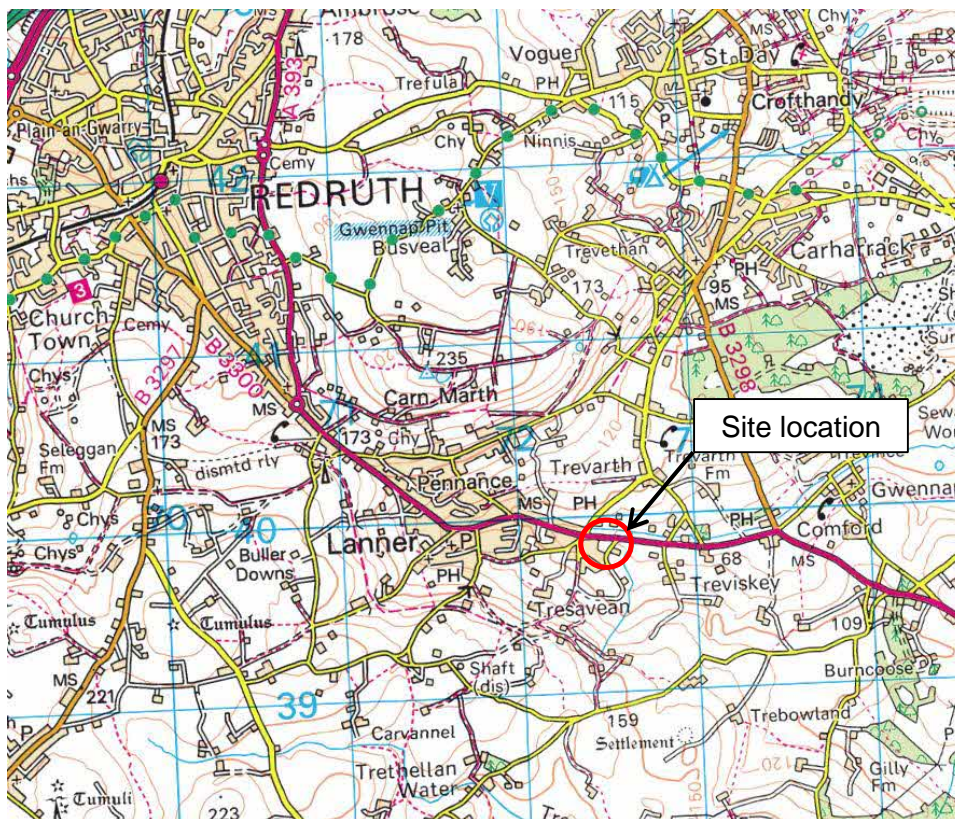
Hydrogeo Limited have been commissioned by Practical Developments (South West) Limited (the Client) to formulate a Remediation Strategy report for a proposed residential development on land at Lanner, Cornwall (the Site).

Site Description

The Site is approximately 0.45 hectares in size, lies within 800m east of Lanner village centre and approximately 3.5km to the south east of Redruth. The Site comprises an approximately rectangular undeveloped parcel of grassy agricultural land. The Site is bounded to the north by the A393 road, to the east by a lane and agricultural land, and to the west and south by residential properties.

The elevation at the Site ranges from between approximately 85m above ordnance datum (mAOD) in the south west to approximately 81mAOD in the north east. The location of the Site has been shown in Figure 1-1 and the site boundary has been shown in Figure 1-2.

Figure 1-1 Site location map



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Figure 1-2 Site boundary



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Proposed Development

The site is to be developed for residential use with private gardens and associated infrastructure. The development comprises a total of 5 no. domestic dwellings with public open space areas, access roads and drainage.

The proposed site layout has been attached at Appendix A and an extract of the plan shown in Figure 1-3.

The finished ground level of the garden and soft landscaped areas of the 5 no. properties are to be formed by a clean cover layer comprising 600mm verified clean subsoil and topsoil. A high-visibility geotextile marker reference layer will be installed on the existing site formation level prior to placement of the clean cover layer.

Where non-continuous hardstanding is proposed within the development plots it will be necessary to cover the exposed soils with a high-visibility geo-membrane (alternatively, a suitable geo-textile can be used with a high visibility barrier mesh above). The areas of non-continuous hardstanding will be advised by the developer team. The construction shall comprise a minimum of 400mm compacted, clean sub-base or sub base with lean-mix concrete added above a reference layer. Full details of the remediation works are

discussed in section 6 of this report. The proposed layout plan details the site construction surfaces.

Figure 1-3 Proposed site layout plan



1.2 Report Objectives

This remediation strategy outlines the design philosophy to be applied at the Site and collates key site investigation and assessment works which have been carried out to date by Wheel Jane Consultancy. The remediation strategy details the works required to remediate and validate the Site to a standard which is considered suitable for the proposed residential development.

The remediation strategy specifically covers made ground containing elevated concentrations of arsenic and metals in order to address the potential risks associated with these contaminants to future site users.

The remediation strategy shall also ensure that risks to any sensitive receptors are suitably mitigated. Potential risks associated with historical contamination during the site enabling works and construction phase of the development shall be appropriately controlled.

The in-situ verification of the placement of verified clean import material within soft landscaping areas (topsoil and sub soil) is to be undertaken during the construction phase.

2 Site Background

2.1 Site Condition

The Site is an undeveloped parcel of grassy land previously used to store waste mining material from nearby metalliferous mines and used as a refuse heap in the 19th century.

The mining material (made ground) has been identified during previous reporting and site investigation and found to contain elevated concentrations of arsenic and other contaminants, along with other anthropogenic waste such as glass, plastic, brick, timber, ceramic, charcoal, metal and concrete.

The made ground has been identified across the Site area and there is not considered to be any specific 'hotspots'. All of the made ground is to be treated as contaminated for the purposes of this report.

Site Visit

Hydrogeo visited the Site on the 29th August 2019 in order to gain an understanding of the layout and record any construction constraints prior to development. The Site was observed to be undeveloped, with no evidence of stockpiled material, waste, excavations or other potential contamination. Photographs of the Site can be seen in Figure 2-1 and Figure 2-2.

Figure 2-1 Development site - looking north east



Figure 2-2 Development site - looking north west



2.2 Summary of Previous Works

It is understood that all previous reports listed in this section are available to the client team.

The following reports have been produced for the Site to date. These reports should be read in conjunction with this remediation strategy:

Wheal Jane Consultancy - Phase 1 Environmental Risk Assessment (October 2017).

Wheal Jane Consultancy - Phase 2 Ground Investigation (October 2018).

Wheal Jane Consultancy - Phase 1 Environmental Risk Assessment

The desk study comprised a review of geological, historical and environmental for the Site and conducted a qualitative risk assessment with source-pathway-receptor Conceptual Site Model.

It was identified that the Site was used as a refuse heap in the late nineteenth century, with no significant changes since.

The risk of ingress of radon gas was identified as 'high'.

The risk assessment identified risks to soils and/or controlled water from contamination within the former refuse heap as 'moderate to high'.

The risk of ingress of ground gas was identified as 'low'.

The risk to soil and/or controlled water from contamination relating to historic mining activity was identified as 'low to moderate'.

It was recommended that a phase of intrusive ground investigation was undertaken to collect soil samples and to better understand the ground conditions.

Wheal Jane Consultancy - Phase 2 Ground Investigation

The intrusive ground investigation was conducted on 9th October 2017 and comprised the following:

7 no. trial pits (TP01 to TP17) to depths of between 3.1m and 3.5m below ground level (mBGL).

5 no. windowless sample boreholes (WS01 to WS05) to depths of between 4.45m and 5.45mBGL.

2 no. dynamic probe holes (DP01 and DP02) to depths of between 1.0m to 5.4mBGL.

Gas and groundwater monitoring standpipes were installed in boreholes WS02 (response zone: 1.0m to 2.7mBGL) and WS04 (response zone: 1.0m to 4.0mBGL).

The granular made ground was identified to a maximum depth of 3.6mBGL, with a typical thickness of 3.0m across the Site. It contains glass, plastic, brick, timber, ceramic, charcoal, metal and concrete. It is noted that the unit becomes more cohesive with depth and was recorded as clay from depths of around 1.50m to 2.00mBGL across areas of the Site.

Alluvium superficial deposits were recorded at depths between 2.3m and 4.1mBGL, and the Mylor Slate Formation was recorded at depths between 4.45m and 5.45mBGL.

Groundwater was identified at depths of between 2.0mBGL (WS05) and 3.3mBGL (TP03) within the made ground, the alluvium or the interface between the two.

A total of 9 no. soil samples were collected between depths of 0.2m to 2.7mBGL and selected samples were tested for a suite of contaminants including total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), toxic metals and asbestos.

When screened against generic assessment criteria (GAC) comprising the LQM/CIEH S4ULs and DEFRA C4SLs for a 'residential with produce' end use, the following soil exceedances were recorded:

Metals: including arsenic, cadmium, copper, lead and zinc.

PAH: benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(a,h)anthracene.

No samples tested positive for asbestos and no samples were found to contain concentrations of TPH above the generic assessment criteria.

The GAC exceedance for arsenic was the greatest, with a peak of 8,200mg/kg in TP03 at 0.2mBGL, against the GAC of 37mg/kg. Exceedances for the other toxic metals, along with the PAHs, are up to one order of magnitude higher than the GAC.

Leachate analysis was undertaken on a number of soil samples and screened against the Freshwater EQS. The only exceedance was for copper, with a peak concentration of 0.01mg/l against the EQS of 0.003mg/l. The elevated concentrations of copper fell well within the known background concentrations of copper within stream sediment in the local area, due to the geology and long history on mining on Cornwall. The exceedances were therefore not considered significant.

A revised Site Conceptual Model was produced, identifying risks to human receptors from physical contact with toxic metals and PAH as 'moderate' (natural soils) and 'high' (made ground). The risk to groundwater from the leaching of contaminants was considered to be 'low'. The risk of human contact with TPH was considered to be 'low' and the risk of ground gas was considered to be 'low'.

A remediation strategy report was proposed, along with a mine search and radon protective measures.

3 Enabling Works Plan Objectives

3.1 Introduction

The enabling works plan details the works to be carried out by the enabling works contractor in preparation for the proposed residential development.

Hydrogeo or a suitably qualified consultant hereafter referred to as '**the consultant**' shall be present on site on an as-required basis during the site based enabling works phase to collect representative samples and document the works in order to formulate a remediation verification report. The report shall provide supporting information to demonstrate that risks to human health and controlled water receptors are mitigated.

During the enabling works, the contractor will be supervising all works conducted within the Site. The enabling works contractor shall advise the Consultant where any unforeseen contaminated soils, liquid contamination or materials suspected to contain asbestos or similar are encountered and will instruct the Consultant to attend site if required.

The verification report shall cover the enabling works phase of the project. In addition in-situ verification of the placement of soft landscaping areas (topsoil and sub soil) is to be undertaken during the construction phase and managed by the construction contractor advising the Consultant in order that we may attend and independently verify plots.

3.2 Enabling Works

The main works to be progressed across the Site during the enabling works phase are outlined below:

- Clear vegetation;

- Install any tree protection as per planning requirements;

- Where required for construction purposes the enabling works contractor shall ensure made ground from the soft landscaped areas is at a level -600mm below final finished ground level;

- Where possible, during the enabling works surplus material deemed unsuitable for (upper 600mm) of soft-landscaped areas will be retained and reused below sealed hardstanding areas of the Site or at depths where fill is required -600mm;

- A high visibility geo-membrane should be placed over the residual soils and overlain with clean soils.

Where required, the enabling works contractor shall be responsible for the removal from site of any excess materials which are generated from the works to an appropriately licensed facility.

3.3 Remedial Strategy

The remedial strategy outlined below is based on the proposed site development layout plan provided by the client. Should the proposed layout change or the Site end use be altered, the proposed remedial options may require reassessment.

Following phased site investigation works progressed by Wheal Jane Consultancy across the Site it has been determined that remediation works will be required. Remediation is a form of risk management, which aims to demonstrably disrupt the pollutant linkage between the source, pathway and receptor. Breaking the pollutant linkage can be done in a variety of ways. For example, reducing, destroying or otherwise modifying the source of the contamination; managing pathways through barriers or modification boundaries; and receptor protection by restricting or changing the land-use.

The proposals for site redevelopment include retention and re-use of materials within the development and minimizing the removal of materials to offsite disposal.

The following remedial strategy is recommended for the Site, subject to final approval from the regulatory authorities such as the Contaminated Land Officer (CLO) or Environmental Health Officer (EHO) and Environment Agency Waste Team Officer:

Existing topsoil across the Site shall be carefully stripped under supervision of the enabling works contractor and stockpiled in quantities not exceeding 250m³. It is proposed that the topsoil is subject to testing to confirm its suitability for retention and re-use on the Site at a level of -600mm beneath the development;

Where Made ground is present in areas of soft landscaping it is to be removed down to a level -600mm below the finished development level (FFL). The excavated made ground will be retained where required below soft landscaped plots (> 600mm) and hardstanding areas at a level -600mm or -400mm respectively;

Sub soil and topsoil for use in the upper 600mm of all soft landscaped areas would be imported verified clean topsoil and subsoil material with certificates reviewed prior to importation;

A geotextile marker layer will be placed within all areas above the made ground in both soft landscaped areas and also hardstanding areas. The location of the imported soil is to be surveyed and recorded for future reference;

The excavation, movement and placement of all in-situ soils at the Site will be documented by a suitably qualified Consultant.

4 Remediation and Construction Considerations

4.1 Introduction

The enabling works contractor will be responsible for the final preparation of the Site Works which will be supervised by the Consultant on an as-required basis. The timing of site inspections shall be advised by the enabling works contractor.

The enabling works contractor shall agree hours of working, access points and routes for all site vehicles with the client and the Local Authority as required and shall be responsible for the works.

Suitable precautions will be employed to prevent noise, dust and odour emissions during all enabling works activities.

Welfare facilities shall be provided where drinking and eating are permitted. These activities shall not be permitted within the works areas of the Site.

Washing facilities shall be present on site, located between the clean and dirty area. The washing facility will include a shower plus wash basins and an area for changing out of PPE.

4.2 Health and Safety

Enabling works shall be undertaken in accordance with all relevant legislation including, but not limited to:

- The Health and Safety at Work etc. Act 1974;
- The Construction (Design and Management) Regulations 2015;
- Construction Health Safety and Welfare Regulations 1996;
- The Control of Substances Hazardous to Health Regulations 2002;
- The Control of Asbestos Regulations, 2012; and
- The Asbestos Licensing Regulations (amended) 1998.

Contaminated materials are known to be present on site, and for this reason it will be necessary during the enabling works and construction phases of the site development to protect the health and safety of site personnel.

General guidance on these matters is given in the Health and Safety Executive (HSE) document 'Protection of Workers and the General Public during the Redevelopment of Contaminated Land (HS (G) 66)'. In summary, the following measures are recommended to provide a minimum level of protection to workers:

Ground workers should be issued with protective glasses, clothing, hard hats, footwear and gloves;

Personnel shall wear hard hats, high visibility clothing and protective footwear at all times;

Hand washing and cleaning facilities shall be provided;

No smoking in any location on site; and

Good practices relating to personal hygiene shall be adopted.

Before site operations are commenced, the necessary COSHH Assessments, Method Statements and Health and Safety Plans should be completed and issued by the contractor in accordance with the CDM Regulations.

The contractor shall ensure that site visitors enter and register at the site office. All site personnel shall undergo a site and works specific health and safety induction prior to commencement of any work on site.

4.3 Plant

All site plant should be operated by suitably qualified personal, experienced for each item of plant. All traffic entering or working on site shall obey a maximum 5 mph speed limit. When not in use all plant and fuel storage facilities shall be locked to prevent unauthorised operation and vandalism.

Fuelling of any plant shall be undertaken in a designated area and all above ground fuel storage tanks shall comply with oil storage regulations for businesses in its entirety.

Plant fuel storage tanks held on site should be:

Situated within an oil-tight secondary containment system such as an impermeable bund. The secondary containment must provide storage of at least 110% of the tanks maximum capacity;

Located within a secure area; and,

Fitted with lockable taps and valves and kept locked shut when not in use.

Waste oil, hydraulic fluid etc. should not be tipped directly or discharged on to the Site. Such materials shall be stored separately in a secure bunded area for off-site disposal at an appropriately licensed facility.

Waste and disposal shall be undertaken by a registered carrier in accordance with the Waste Duty of Care: Code of Practice 2016 and the Hazardous Waste Regulations (HWR) 2005. Spill kits shall be kept on site in an accessible place adjacent to the designated refuelling area.

4.4 Services

Live services including electricity cables may be present beneath the Site. The location of all live services present beneath the Site should be confirmed from the relevant service providers prior to commencement of works.

All services that are located should be marked out, highlighted on a drawing and avoided during the works, thus minimising any disturbance to site operations for the period of site works.

4.5 Surface Water Drainage System

It is not expected that any significant surface water drainage systems are present on site, based on the site history. However, should any drainage systems be identified then the enabling works contractor shall ensure the extent of the identified existing site drainage systems is known and removed as part of these works.

Any water present in such structures shall be pumped, contained, tested and disposed offsite to a suitably licenced facility. Following the removal and chasing out of any former drainage features, including any interceptors and soakaway structures, verification samples and photographs shall be collected.

Any resulting excavations shall be verified clean and backfilled with suitable clean fill material.

4.6 Dust and Noise

The enabling works contractor shall ensure that measures are implemented to monitor and control potential impacts on on-site and off-site receptors. These are to include:

Use of vehicle wheel cleaning facilities to mitigate risk of soil on the highway;

Sheeting of vehicles to mitigate risks from contaminated waste transportation;

Damping down of formation and stockpiles during dry weather to suppress dust generation;

Limitations on appropriate working hours and noise levels, to be agreed with the Planning Authority;

Use of noise and dust monitoring during the site works if required.

4.7 Contaminated Soils

The made ground across the site area has been proven to contain elevated concentrations of toxic metals, in particular arsenic, and may also contain anthropogenic waste such as glass, plastic, brick, timber, ceramic, charcoal, metal and concrete.

Made ground has been identified across the Site area and there is not considered to be any specific 'hotspots'. All of the made ground is to be treated as contaminated for the purposes of this report.

The enabling works contractor shall ensure that adequate welfare facilities are provided in a designated clean area where drinking and eating is permitted. These activities shall not be permitted within the dirty areas of the Site.

No asbestos has been detected in soil samples submitted for laboratory analysis by Wheal Jane Consultancy as part of the Phase II Site Investigation works in 2018 however there remains the possibility that Asbestos Containing Materials (ACM) may be identified within the made ground during site development works. Unforeseen contamination is discussed in further detail in Section 5 of this report.

Any areas observed during development works to contain asbestos will be marked out by the enabling works contractor to ensure that all personnel on site are aware of the area. The enabling works contractor shall ensure that only competent individuals with the correct PPE and RPE enter the area.

Workers must be trained and competent, and appropriate measures implemented to eliminate asbestos exposure or reduce it to as low as is reasonably practicable. All other personnel working on site must have undergone appropriate asbestos awareness training.

Personal Protective Equipment (PPE) and Respiratory Protection Equipment (RPE)

The enabling works contractor shall ensure that staff working within any ACM impacted areas wear appropriate PPE, to include Tyvek suits and nitrile gloves. It is also recommended that, as a precaution, all ACM suspected materials are sprayed with water and that RPE with P3 filters are used for all ground personnel within the working area.

All those entering the working area must wear appropriate PPE and RPE or be within vehicles with positive air pressure cabins. Disposable type 5/6 coveralls will be worn.

The requirement for PPE and RPE must be made clear in the contractor's method statements.

Vehicle Movements

Vehicles in the 'dirty' area will pass through appropriate cleaning facilities, to ensure that the lorries do not transmit contaminated materials off site. All lorries will be appropriately sealed and sheeted prior to leaving the Site.

Sampling of Soils

If required, soil samples for offsite disposal shall be taken for conformance laboratory testing.

Soils stockpiled with a view to retention and re-use shall, where additional testing over and above that already collected is required, be tested and the results compared against the relevant screening criteria as attached in Appendix B. Reuse must be authorised by the Consultant or the client team following collection and review of laboratory data.

A record of the location of all stockpiles will be kept by the contractor together with, a schedule of the stockpiles, test results and disposal or reuse of the materials.

4.8 Asbestos

Any works involving the excavation and handling of ACM shall be carried out by the enabling works contractor in accordance with 'The Control of Asbestos Regulations, 2012'.

All site operatives should be aware that there is the potential for the made ground materials to contain asbestos fragments or fibres.

Materials suspected or proven to contain asbestos shall be stockpiled separately and any loose ACM sheeting or fragments identified carefully removed by the contractor in accordance with appropriate RAMS, as provided by the contractor. Materials that are visible and easily handpicked shall be removed from site to a suitably licensed facility.

The enabling works contractor shall ensure that asbestos waste is double-bagged in red and clear bags, labelled appropriately and stored in a skip, prior to removal from the Site. The skip should be lockable and kept locked except when in use, and should also be marked with asbestos warning signs. All asbestos waste must be disposed of in accordance with the Hazardous Waste Regulations.

Asbestos Re-use Criteria

If asbestos is detected and the results of sample quantification testing prove results >0.001% but <0.1% by mass, the soils could be re-used on the Site subject to certain criteria to mitigate possible future risks to ground workers and site end users. This material will not be placed beneath highways or areas where service / drainage runs will be excavated. Materials may, subject to approval, be placed 1000mm below the final development levels within Public Open Space area at the north of the site area. Cover materials shall incorporate a highly visible geotextile separator within public open space areas.

If the results of analysis confirm that asbestos is detected and the results of the quantification testing return results >0.1% by mass, then these materials should be removed from the Site as a hazardous waste.

The approach outlined shall be agreed with the relevant regulatory authorities prior to works commencing at the Site.

Any works involving the excavation and handling of ACMs shall be carried out in accordance with 'The Control of Asbestos Regulations, 2012'.

4.9 Offsite Disposal

Where removal of material offsite is absolutely necessary, the materials shall be sampled and analysed at rates sufficient to allow the material to be adequately categorised to the satisfaction of the receiving landfill operator.

Material exported from the Site to landfill shall be hauled by a registered waste carrier in accordance with Duty of Care (DOC) and where appropriate Hazardous Waste regulations (HWR) regulations.

A log of all waste consignment notes shall be completed; notes shall be signed and retained by all parties involved for inspection by the client, the Consultant or regulators, as required. The consignment note and log shall state the volume of waste, a physical description of the material and statement of its chemical composition. The waste consignment notes shall be kept by the contractor for a period of at least two years. Upon completion of the works a summary log and representative copies of consignment notes shall be provided to the Consultant for inclusion within the Remediation Verification Report.

4.10 Potable Services

It is recommended that protected potable water supply pipes are installed owing to the presence of Made Ground across the site area. The installation of pipes should be verified by a suitably qualified consultant and documented in a works verification report.

4.11 Radon Protection Measures

The site is located in an area where greater than 30% of properties are above the action level. Full radon protection measures are required within the proposed development plots. The installation of Radon Protection Measures should be verified by a suitably qualified consultant. This should include records of materials and installation in accordance with current best practice with all works presented in a verification report.

5 Unforeseen Contamination

The granular made ground at the Site has already been characterised following previous reporting as containing anthropogenic waste and elevated concentrations of contaminants, including arsenic. This section of the report refers to the identification of previously unforeseen contamination identified during enabling and/or development works.

The enabling works contractor shall ensure that any visual or olfactory evidence of contaminated materials across the Site is identified to the Consultant during the site development. A watching brief should be carried out with particular attention to the following:

- Visually identifiable asbestos such as sheeting, lagging, tiles etc.;
- Visual or olfactory evidence of deleterious materials, in particular ground impacted by hydrocarbons or solvents;
- Made ground which is significantly differing to the materials encountered during the initial site investigation.

If previously unidentified contamination is encountered by any site personnel, the enabling works contractor shall notify the Consultant and the developer. Works in the vicinity of the suspected contamination should be temporarily suspended and suitably fenced off.

Any area of contaminated arisings shall be surveyed for reference purposes and all sample locations shall be surveyed for future reference. It is proposed that representative samples of the encountered contaminated materials are collected at a rate of 1 sample per 100m³ or minimum of 2 samples per material type, whichever is greater. Samples should be tested for, but not limited to the following suite of determinants:

- Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc);
- pH and Soil Organic Matter (SOM);
- BTEX compounds;
- Total Petroleum Hydrocarbons (TPH) split into aliphatic and aromatic carbon bands;
- PAH split into the EPA Priority 16 substances; and
- Asbestos screen.

Soils sampled with a view to retention and re-use shall be compared against the relevant screening criteria as attached in Appendix B. Reuse must be authorised by the Consultant or the client team following collection and review of laboratory data.

6 Groundworks

6.1 Control of Groundwater

Any groundwater seepages into excavations during the progression of site based works should be controlled with sump pumping, which is considered a suitable technique to control groundwater seepages at the Site.

If, however, significant site dewatering is needed, the collected water will require disposal to surface water drains or foul sewer, with appropriate discharge consents which must be obtained by the enabling works contractor from the Environment Agency / appropriate water authority.

Contaminated water, where encountered during digging should be stored in a holding tank; the enabling works contractor shall ensure appropriate sampling and testing of water is progressed prior to offsite disposal at a licenced disposal facility.

6.2 Backfilling

Any voids created deeper than 600mm below the Finished Floor Level (FFL) created in the progression of site based works will be backfilled with made ground sourced from the excavation to 600mm below FFL in soft landscaped areas. The made ground placed into any voids will be compacted in line with the clients specifications required for the proposed development.

Backfilling of the soft landscaped areas which have been excavated (where required) to 600mm below FFL will be undertaken to the final ground level with verified clean imported sub soil and topsoil. It should be recognised that the depths of clean cover soils should be increased if required by planting in areas of borders, shrubs or trees.

Validation certificates for imported materials will be reviewed prior to importation to site. Results shall also be documented and presented within the remediation verification report. Limited validation sampling of any imported materials will also be undertaken by the Consultant for conformance testing.

6.3 Development Area Formation Levels - Verification

It is proposed that no made ground is present within the upper 600mm of the soft landscaped areas. Site formation levels for all garden areas will allow for a clean cover layer to comprise imported, verified clean sub soil and top soil.

The enabling works contractor shall confirm that no made ground is left remaining in-situ within 600mm of the FFL beneath the soft landscaped areas. A photographic record of the formation level shall be maintained by the contractor and all plots verified to demonstrate 600mm of clean cover is imported.

The contractor shall survey the site levels providing the reduced level survey and detailed photographic records on completion of the works.

We refer to guidance produced by the *Yorkshire and Lincolnshire Pollution Advisory Group* attached at APPENDIX C. This guidance “**Verification Requirements for Cover systems Technical guidance for Developers, Landowners and Consultants**” was developed to help developers ensure that they can demonstrate that material brought onto a development site for gardens or areas of soft landscaping is suitable for use and does not present harm to people, the environment and/or property. The consultant and developer team should refer to the guidance in order to check key information site photographs records required for the site verification report.

Final Site Levels – Verification of Garden Areas

The final make-up of the Site within the upper 600mm of the FFL, will comprise verified clean imported materials, shall be progressed during the construction phase. It should be recognised that the depths of clean cover soils (600mm) should be increased if required by planting in areas of borders, shrubs or trees. Where trees are planned a minimum area of 2.0 x the maximum mature root spread and at least 1.5 x the maximum mature depth of the roots (minimum 1000 mm) of the stock to be planted should be excavated.

The construction works contractor shall ensure topsoil samples are provided prior to importation at a rate of taken at a frequency of 1 sample per 100m³ or minimum 3no. samples.

Imported top soils should be as specified in BS 3882 as ‘suitable for their intended purpose’. BS3882 relates to nutrient content of topsoil and phytotoxic contamination and does not consider contaminants that pose a risk specifically to human health. Soils should be tested as below for contaminants that are considered to pose a risk to human health:

- Toxic metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc);
- pH and Soil Organic Matter (SOM);
- BTEX compounds;

Total Petroleum Hydrocarbons (TPH) split into aliphatic and aromatic carbon bands;
PAH split into the EPA Priority 16 substances; and
Asbestos screen.

Prior to importation sample data shall be presented to the Consultant for review and comparison to site specific end use targets as attached at Appendix B. The construction works contractor should ensure that where imported materials are utilised documentation to include the name and origin of the supplier of imported materials is retained.

Non Continuous hardstanding

Where non-continuous hardstanding is proposed within the development plots it will be necessary to cover the exposed soils with a high-visibility geo-membrane (alternatively, a suitable geo-textile can be used with a high visibility barrier mesh above). The areas of non-continuous hardstanding will be advised by the developer team. The construction shall comprise a minimum of 400mm compacted, clean sub-base or sub base with lean-mix concrete added above a reference layer.

Where the ground level requires modification, it may be necessary to remove some of the existing soil. In which case the material excavated from the site should be treated as waste and disposed of to a suitably licensed waste management facility. Waste transfer notes should be retained for records.

The geo-membrane (a permeable synthetic textile sheet), should be of a suitable colour such as orange or white. The purpose of the geo-membrane will be to act as a warning reference layer should future site users carry out any excavation works at the site. A layer of sand beneath the geo-membrane may also be required to ensure that the barrier is not pierced on stones when it is installed.

The remedial works are to be inspected and documented by a suitably qualified person consultant as part of a Verification Report.

7 Programme Documentation and Validation

7.1 Introduction

During the phase of works progressed by the enabling works contractor all works undertaken will be carefully documented. The routine documentation, where applicable, to be carried out by the enabling works contractor will include, but will not be limited to:

- Daily record sheets detailing activities on site;
- Excavation records detailing the material in each excavation;
- Excavation plans showing the dimensions and nature of each excavation together with sampling locations;
- Details of any material changes to the enabling works due to findings on site;
- Stockpile plans showing the dimensions and nature of stockpiled material where appropriate;
- Sample records detailing the location and composition of every sample collected with the results of any onsite screening;
- Sample location and results of laboratory chemical analysis;
- Records and final plans including topographic survey to verify placement of any material deeper than 600mm below the finished floor level;
- Duty of care register of contaminated waste removal, including a list of consignment notes against weighbridge tickets and chemical test results for the material;
- Details of any site testing / monitoring undertaken;
- Where encountered, a record of groundwater pumping and disposal, including volumes of water pumped, water quality analysis groundwater pumping rate and documentation to demonstrate duty of care; and
- Fully detailed photographic records of site works.

7.2 Verification

A copy of this Remediation Strategy shall be forward to the Contaminated Land Officer (CLO) for review and approval prior to the commencement site works.

Following approval the project team shall ensure the progression of works in accordance with this document. On completion of all of works, a Remediation Verification report shall be prepared by the Consultant and issued to the CLO for approval.

Appendices

Proposed Site Layout Plan

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All dimensions are to be checked on site. Only figured dimensions are to be used. Any discrepancies to be reported to SPS (Architectural Services) Ltd. before work proceeds. This drawing shall be used only for the purpose intended.

Contractors must include for all works described or being apparent on the drawings or can be reasonably inferred for the proper execution of the works.

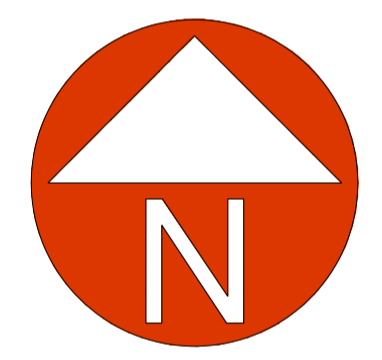
Depth, size and design of foundations shown are preliminary only, actual foundation depth size and design may differ depending on site conditions.

Where a specialist consultant has been appointed their specific works and details take precedent over this drawing



FINISHES KEY

- TARMAC FINISH
- KERB EDGING
- BRICK PAVING
- TURF OVER 600mm CLEAN TOP SOIL
- 600 x 600mm PAVING SLABS
- DRY-LAID FEATURE RETAINING WALL
- 2mtr CLOSED BOARDED FENCE



Amendments

date:	amendment notes	Rev
13.05.22	S73 planning issue	-
19.10.22	Finishes added to reflect Remediation Strategy Report	A

SPS | designers
Architectural | thinkers
innovators

Telephone: 01209 310562
 Email: enquires@spsarchitectural.co.uk
 Website: www.spsarchitectural.co.uk

client: PRACTICAL DEVELOPMENTS (SW) LTD

project: Construction of five dwelling houses at land to Trearath View, Lanner Moor, Lanner Cornwall, TR16 6HZ

drawing: Proposed Site Plan
 drawn by: SG drawn by: JS

scale: 1:200 date: APR 2022 paper size: A1

project no: 0248 drawing no: S73-100 rev: A

DO NOT SCALE FROM THESE DRAWINGS FOR CONSTRUCTION PURPOSES

Proposed Site Plan
 Scale: 1:200

for planning use only

Soil Screening Criteria

GENERIC ASSESSMENT CRITERIA FOR HUMAN HEALTH -
RESIDENTIAL WITH HOME-GROWN PRODUCE



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BY DEFRA 2013.

Compound	SGV mg/kg (EA)	S4UL mg/kg (LQM/ClEH 2014)			C4SL mg/kg (DEFRA)
		1% SOM	2.5% SOM	6% SOM	
Metals					
Inorganic Arsenic	32	37	37	37	37
Beryllium	-	1.7	1.7	1.7	-
Boron	-	290	290	290	-
Cadmium	10	11	11	11	22
Chromium III	-	910	910	910	-
Chromium VI	-	6	6	6	21
Copper	-	2400	2400	2400	-
Elemental Mercury - Hg ⁰	1	1.2	1.2	1.2	-
Inorganic Mercury - Hg ²⁺	170	40	40	40	-
Methyl Mercury - Hg ⁺	11	11	11	11	-
Nickel	130	180	180	180	-
Selenium	350	250	250	250	-
Vanadium	-	410	410	410	-
Zinc	-	3700	3700	3700	-
Lead	-	-	-	-	200
Total Petroleum Hydrocarbons (TPH)					
BTEX					
Benzene	0.33	0.087	0.17	0.37	0.87
Toluene	610	130	290	660	-
Ethylbenzene	350	47	110	260	-
O-Xylene	250	60	140	330	-
M-Xylene	240	59	140	320	-
P-Xylene	230	56	130	310	-
Aliphatics					
Aliphatics >C5-C6	-	42	78	160	-
Aliphatics >C6-C8	-	100	230	530	-
Aliphatics >C8-C10	-	27	65	150	-
Aliphatics >C10-C12	-	130	330	760	-
Aliphatics >C12-C16	-	1100	2400	4300	-
Aliphatics >C16-C35	-	65000	92000	110000	-
Aliphatics >C35-C44	-	65000	92000	110000	-
Aromatics					
Aromatics >EC5-EC7	-	70	140	300	-
Aromatics >EC7-EC8	-	130	290	660	-
Aromatics >EC8-EC10	-	34	83	190	-
Aromatics >EC10-EC12	-	74	180	380	-
Aromatics >EC12-EC16	-	140	330	660	-
Aromatics >EC16-EC21	-	260	540	1100	-
Aromatics >EC21-EC35	-	1100	1500	1700	-
Aromatics >EC35-EC44	-	1100	1500	1700	-
Aliphatics + Aromatics EC >44-70	-	1600	1800	1900	-
Poly Aromatic Hydrocarbons (PAH)					
Acenaphthene	-	210	510	1100	-
Acenaphthylene	-	170	420	920	-
Anthracene	-	2400	5400	11000	-
Benzo(a)anthracene	-	7.2	11	13	-
Benzo(a)pyrene	-	2.2	2.7	3.0	5
Benzo(b)fluoranthene	-	2.6	3.3	3.7	-
Benzo(ghi)perylene	-	320	340	350	-
Benzo(k)fluoranthene	-	77	93	100	-
Chrysene	-	15	22	27	-
Dibenz(a,h)anthracene	-	0.24	0.28	0.3	-
Fluoranthene	-	280	560	890	-
Fluorene	-	170	400	860	-
Indeno(1,2,3-cd)pyrene	-	27	36	41	-
Naphthalene	-	2.3	5.6	13	-
Phenanthrene	-	95	220	440	-
Pyrene	-	620	1200	2000	-
Coal Tar (Bap as surrogate marker)	-	0.79	0.98	1.1	-
Chloroalkanes and Alkenes					
1,2-Dichloroethane	-	0.0071	0.011	0.019	-
1,1,1-Trichloroethane	-	8.8	18	39	-
1,1,1,2-Tetrachloroethane	-	1.6	3.4	7.5	-
1,1,1,2-Tetrachloroethane	-	1.2	2.8	6.4	-
Tetrachloroethene	-	0.18	0.39	0.9	-
Tetrachloromethane	-	0.026	0.056	0.13	-
Trichloroethane	-	0.016	0.034	0.075	-
Trichloromethane (Chloroform)	-	0.91	1.7	3.4	-
Chloroethane (vinyl Chloride)	-	0.00064	0.00087	0.0014	-
Explosives					
2,4,6-Trinitrotoluene	-	1.6	3.7	8.1	-
HMX	-	5.7	13	26	-
RDX	-	120	250	540	-
Pesticides					
Aldrin	-	5.7	6.6	7.1	-
Dieldrin	-	0.97	2	3.5	-
Atrazine	-	3.3	7.6	17.4	-
Dichlorvos	-	0.032	0.066	0.14	-
Alpha-Endosulfan	-	7.4	18	41	-
Alpha-Hexachlorocyclohexanes	-	0.23	0.55	1.2	-
Beta-Hexachlorocyclohexanes	-	0.085	0.2	0.46	-
Gamma-Hexachlorocyclohexanes	-	0.06	0.14	0.33	-
Chlorobenzenes					
Chlorobenzene	-	0.46	1.0	2.4	-
1,2-Dichlorobenzene	-	23	55	130	-
1,3-Dichlorobenzene	-	0.4	1.0	2.3	-
1,4-Dichlorobenzene	-	61	150	350	-
1,2,3-Trichlorobenzene	-	1.5	3.6	8.6	-
1,2,4-Trichlorobenzene	-	2.6	6.4	15	-
1,3,5-Trichlorobenzene	-	0.33	0.81	1.9	-
1,2,3,4-Tetrachlorobenzene	-	15	36	78	-
1,2,3,5-Tetrachlorobenzene	-	0.66	1.6	3.7	-
1,2,4,5-Tetrachlorobenzene	-	0.33	0.77	1.6	-
Pentachlorobenzene	-	5.8	12	22	-
Hexachlorobenzene	-	1.8	3.3	4.9	-
Phenol And Chlorophenols					
Phenol	420	280	550	1100	-
Chlorophenols	-	0.87	2.0	4.5	-
Pentachlorophenol	-	0.22	0.52	1.2	-
Other					
Carbon Disulfide	-	0.14	0.29	0.62	-
Hexachloro-1,3-butadiene	-	0.29	0.7	1.6	-