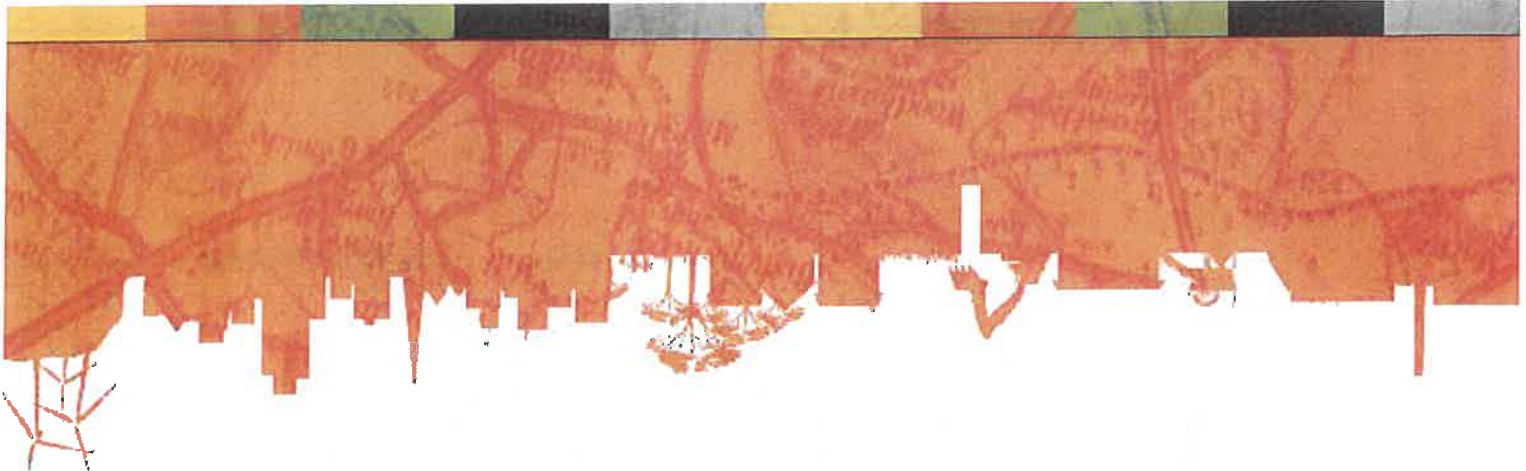




Report Ref: 10-610-r1  
Date Issued: July 2015

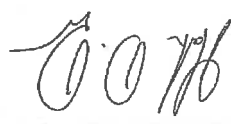


Prepared for:

Elm Point, Wrexham Industrial Estate,  
Elm Road,  
Wrexham,  
LL13 9UE

## GEO-ENVIRONMENTAL SITE ASSESSMENT



|                |                                                                                      |
|----------------|--------------------------------------------------------------------------------------|
| REMARKS        | Final                                                                                |
| DATE           | June 2015                                                                            |
| PREPARED BY    | R Walker                                                                             |
| QUALIFICATIONS | Bsc (Hons), FGS                                                                      |
| SIGNATURE      |  |
| CHECKED BY     | S. Towers                                                                            |
| QUALIFICATIONS | Bsc, FGS, AIMEA, AMIEnvSci                                                           |
| SIGNATURE      |     |
| AUTHORISED BY  | M Dyer                                                                               |
| QUALIFICATIONS | Bsc, FGS, AIMEA, MIEnvSci, CEnv                                                      |
| SIGNATURE      |    |
| PROJECT NUMBER | 10-610                                                                               |

## QUALITY ASSURANCE

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**E3P**

| Executive Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                     |                                                |                  |                                                                                                                                                 |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Site Address                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Elm Point Industrial park, Elm Road, Wrexham, LL13 9UE                                                                                                                                                                              | Grid Reference                                 | 338550E, 350380N |                                                                                                                                                 |  |
| Site Area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3.87ha                                                                                                                                                                                                                              |                                                |                  |                                                                                                                                                 |  |
| <p>The site is an irregular shaped parcel of land to the south east of Wrexham.</p> <p>The west boundary adjacent to Abbey Road has been bounded and planted with local species with secure barrier to site. The North and east borders are lined by mature trees and woodland. The southern border neighbours with light industry and is divided by mesh fence.</p> <p>The site is generally level in topography due to previous use as industrial estate, where it's likely a phase of groundworks took place to construct current levels (ranging between 28.30 and 28.90). The former buildings on site have been demolished with crushed aggregate from the buildings spread across the former building footprint. A small quantity also stock piled along the eastern border to the south.</p> <p>Areas of the site including the north west, north and eastern borders are currently undergoing ecological monitoring and so are separated from the site with fencing.</p> <p>E3P understands that Russells Construction will be acting as Main Contractor for the ultimate client CLWLD Compounders Ltd as part of the development of a large industrial facility with associated car parking, distribution service yards and infrastructure.</p> |                                                                                                                                                                                                                                     |                                                |                  |                                                                                                                                                 |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     |                                                |                  | <b>Proposed Development</b>                                                                                                                     |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     |                                                |                  | <b>Environmental Setting</b>                                                                                                                    |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     |                                                |                  | <i>Drift Geology</i><br>Till, Devensian – Diamicton                                                                                             |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     |                                                |                  | <i>Bedrock Geology</i><br>Salop Formation - Mudstone, Sandstone And Conglomerate.                                                               |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     |                                                |                  | <i>Hydrogeology</i><br>Secondary A Aquifer in solid geology. Two groundwater abstractions have been identified within a 1km radius of the site. |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     |                                                |                  | <i>Hydrology</i><br>Secondary and Tertiary Drainage ditches within 250m.                                                                        |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     |                                                |                  | <i>Flood Risk</i><br>Unaffected by flooding from rivers (Flood Zone 1).                                                                         |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                     | <i>Sensitive Land Uses</i><br>None identified. |                  |                                                                                                                                                 |  |
| <i>Industrial Land Use</i><br>No industrial land uses of Hazardous Substances have been identified which would potentially prejudice the future redevelopment of the site for a low rise residential end use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                     |                                                |                  |                                                                                                                                                 |  |
| <i>Ground Instability / Subidence Hazards</i><br>No hazard identified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                     |                                                |                  |                                                                                                                                                 |  |
| Site History                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Historical maps indicate that the site was largely undeveloped up until the construction of the Industrial Estate across the whole site pre1961 which remained with minimal change until late 2013 when the site was demolished.    |                                                |                  |                                                                                                                                                 |  |
| Hazardous Installations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | The Kellogg's company 224m NE of the site has a number of licenses to dispose of waste product material (mostly vegetation) directly adjacent to the site. However, this is unlikely to negatively impact the proposed development. |                                                |                  |                                                                                                                                                 |  |

**Executive Summary (Cont...)**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| <p>No recorded landfill sites are noted within influencing distance of the proposed development.</p> <p>The only notable sources of potentially hazardous ground gases are attributed to the varying depths of made ground and natural organic material within the superficial drift. However when considering the date of infilling, this source is unlikely to generate a significant gas risk.</p> <p>Unaffected – No special precautions required.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <p><b>Landfill Sites &amp; Ground Gases</b></p> |
| <p>The site is located within a Coal mining reporting area. However, it is not within an area of coal outcrops, past shallow coal mine workings, fissures, breaklines, mine gas or development high risk. Furthermore coal reserves do not exist within the underlying geological sequences. No special precautions required.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p><b>Coal Mining</b></p>                       |
| <p>E3P has completed an intrusive Ground Investigation comprising cable percussive boreholes, window sample boreholes with environmental monitoring installations, trial pits and geotechnical strength testing.</p> <p><b>Made Ground</b></p> <p>Made Ground was identified in all probeholes to a maximum proven depth of 1.5m bgl, but generally observed to be between 0.2 and 0.8m bgl. Made Ground comprised a surface covering of recycled demolition aggregate consisting of brick and concrete which was immediately underlain by a clayey gravel of concrete, slate, brick.</p> <p>Due to the concurrence of Made Ground components across the site it is likely that this was recently placed following the demolition of the former buildings.</p> <p><b>Drift</b></p> <p>The drift deposits were encountered in all exploratory holes and were viewed to be relatively consistent across the site. Drift deposits generally comprised firm low strength becoming very stiff very high strength with depth grey brown silty CLAY.</p> <p>A band of very soft extremely low strength highly organic silt was encountered at depths of circa 2.0m bgl predominantly beneath the southern area of the site and in localised areas to the north. This horizon was generally observed to be between 0.30m and 1.0m in thickness.</p> <p>Deep boreholes have been drilled to depths in excess of 25.0m which confirmed a sequence of stiff clay with intermittent sand horizons.</p> <p><b>Solid</b></p> <p>The solid bedrock geology has not been encountered during this phase of investigation, furthermore BGS boreholes in the area are limited. It is anticipated that the Salop formation mudstones are at depths in excess of 55m bgl.</p> <p><b>Groundwater</b></p> <p>Discontinuous perched groundwater inflows were recorded in a number of locations however did not create instability within the probeholes. The water ingress was not considered to be representative of saturated stratum.</p> | <p><b>Ground Conditions</b></p>                 |

| Executive Summary (Cont..)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------|
| Contaminated Land Risk Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |                                                                                     |
| Human Health                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Chemical analysis identified no contaminant exceedances with respect to human health when considering a commercial end use. It is therefore considered that the site is unlikely to pose any unacceptable degree of potential risk to human health.<br><br>The risk to the underlying Secondary A Aquifer in the bedrock geology is reduced due to the absence of any notable source of soluble phase contamination and the presence of >10m of low permeability cohesive drift deposits.<br><br>Chemical analysis of the groundwater has identified no elevated contaminant concentrations and subsequent groundwater risk assessment confirmed there was no unacceptable risk to the controlled water receptors and the wider environment.<br><br>Characteristic Situation 1 - No special protection measures required. | Ground Gas                  | Potable Water                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Poly-Ethylene Pipe          |                                                                                     |
| Geotechnical Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |                                                                                     |
| Underground Obstructions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | During the trial pitting phase of works, E3P identified a grey brick sub-structure within TP101 located within the southern sector of the site. A partially broken concrete slab was positioned on top of the sub-structure identified at circa 0.20m bgl.<br><br>However, it is anticipated that during the build phase works only minor obstructions will be present in localised areas, due to the previous phase of remediation the majority of larger obstructions (Eg. Tanks) appear to have been successfully removed.                                                                                                                                                                                                                                                                                             | Allowable Bearing Potential | The very low strength highly organic silt horizon will provide a safe ABP <20kN/m2. |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |                                                                                     |
| The presence of soft to firm low to moderate strength clays and very soft extremely low strength organic silts with relatively low safe ABP's will necessitate detailed consideration of the most economic foundation solution.<br><br>It is considered that the most likely foundation solution would be a specialist wide pad type system that will spread structural loadings and thus ensure acceptable degrees of uniform total and differential settlement. As and when the detailed foundation size and loadings are known, a full settlement analysis should be completed to confirm the findings documented herein.<br><br>Alternatively consideration could be given to the transfer of structural loads to a greater depth utilising a piled foundation combining of friction and end bearing design ratio.<br><br>There are trees within influencing distance of the proposed units, therefore all foundations will need to be assessed to determine the presence of clay soils and potential for volumetric instability. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                             |                                                                                     |

**Executive Summary (Cont...)**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                           |                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
| <p><b>Building Floor Slabs</b></p> <p>The presence of a very soft, variable thickness highly organic silt horizon with a reduced safe ABP at circa 2.0m will be stressed by building floor slab loading and as such the potential for a variable degree of differential settlement could be possible.</p> <p>As and when a ground bearing floor slab has been designed, further settlement analysis will be required to inform the design of a suitably stiffened horizon to ensure loadings do not induce an unacceptable degree of differential settlement within the soft silt horizon.</p> <p>At this time, it is considered that a stiffened soil platform using specialist geo-grids and engineered soils / aggregates will facilitate the construction of a suitable sub-grade for a ground bearing floor slab.</p> | <p><b>Soakaway Drainage</b></p> <p>Due to the nature of the underlying clays, soakaway drainage is not likely to be a viable option to utilise within the infrastructure design.</p> <p>If soak-away drainage is to be considered, full BRE Soak-Away Testing be completed to assess the effective permeability of the natural soils.</p> | <p><b>Sulphate Assessment</b></p> <p>Concrete classification will be DS1 AC1s.</p> | <p><b>Cut / Fill Earthworks</b></p> <p>It is likely that some cut fill works will be required to achieve the optimal development platform.</p> <p>A cut fill model with Isopachyte Banding is recommended to demonstrate areas of cut / fill in relation to the wider platform. Once this model is complete it will be possible to assess the soil mechanics from any areas of proposed cut and the potential to re-compact the material to achieve the required engineering performance specification.</p> <p>It is considered that the natural soils can be engineered in accordance with a Class 1 (a-c) material under favourable climatic conditions to achieve a CBR of 5%.</p> | <p><b>Waste Classification</b></p> <p>Stable Non-Reactive (Inert).</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|

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## APPENDICES

**Appendix I** Limitations  
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**Appendix III** Drawings

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Drawing No 10-610-007 – Thickness of Organic Silt Plan  
**Appendix IV** Photographs  
**Appendix V** E3P Exploratory Hole Logs  
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## 1. INTRODUCTION

### 1.1 Background

E3P Ltd have been commissioned by Russells Construction to undertake a Phase I Geo-Environmental Site Assessment with detailed Ground Investigation at the Land at Elm Point, Wrexham industrial estate on Elm Road in Wrexham.

The scope of work consisted of a review of historical, environmental and geological information in addition to an intrusive Ground Investigation, laboratory testing and interpretive geotechnical and contamination risk which comprised the following key elements:

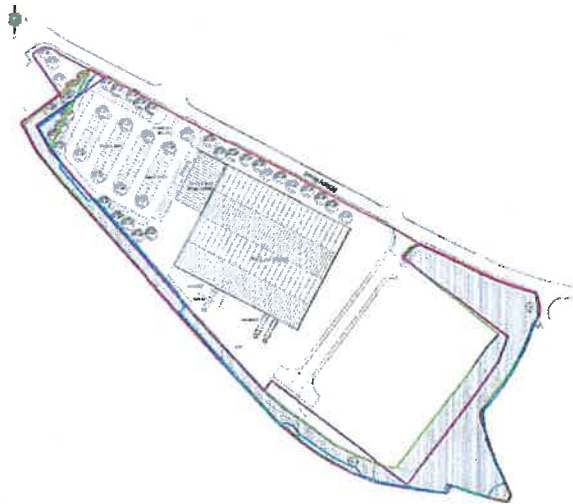
- 2 No. shell and auger boreholes;
- 12 No. Window sample probeholes with 7 No. completed as environmental monitoring installations;
- 12 No. Mechanically excavated trial pits;
- Extensive In-situ Geotechnical Testing;
- Laboratory analysis;
- Groundwater monitoring and sampling;
- Ground gas monitoring;
- Contamination Risk Assessment & Conceptual Site Model;
- Geotechnical Assessment & Interpretation; and,
- Factual and interpretive reporting.

### 1.2 Proposed Development

E3P understands that Russells Construction intend to construct one main industrial unit with the option of either a secondary large unit or two smaller units within the northern section of the site. All units have associated car parking, distribution service yards and infrastructure.

Two proposed development layouts have been suggested and are included in Appendix III as Drawing 10-610-002 and an excerpt is shown overleaf in Figure 1.1.

Figure 1.1 Proposed Layout



E3P has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed.

## 1.7 Risk Classification

E3P has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.

## 1.6 Confidentiality

The Phase I and II Assessments have not been made available to E3P or review however the pertinent points are detailed in the Remediation Report, which is summarised in Section 3.0 of this report.

 **Smith Grant – Remediation Report.** Report Ref: R1989-R02-v1, dated August 2015.

 **Smith Grant – Phase II Site Investigation Report.** Report Ref: R1662-R01-v2, dated 24<sup>th</sup> December 2011; and,

 **Smith Grant – Phase I Preliminary Environmental Risk Assessment.** Report Ref: R1570-R01-v2, dated 28<sup>th</sup> February 2011;

E3P have been made aware of the following reports being previously completed for the site:

## 1.5 Previous Reports

The limitations of this report are presented in Appendix I.

## 1.4 Limitations

-  Provide recommendations regarding future works required.
-  Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,
-  Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
-  Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified;
-  Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (CLR11);

The objectives of the Geo-Environmental Investigation are to:

## 1.3 Objectives

Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.

E3P has utilised the available data to classify the site on the basis of its likely contaminated land liability and potential for geotechnical constraints in relation to the site development. The risk classification definitions are summarised below:

| RISK          | DEFINITION                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Low           | There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property.                                                                                                                                                                                                                                                                                                                     |
| Low-Moderate  | There are unlikely to be significant contaminated land liabilities/geotechnical constraints associated with the property with regard to the proposed use. However, minor issues may require further consideration in the event of a future redevelopment of the site etc.                                                                                                                                                                     |
| Moderate      | Some potential contaminated land liabilities/geotechnical constraints are likely to affect the property as a result of historical and/or current activities. The risks identified are unlikely to pose an immediate significant issue but the purchaser/developer may wish to make further enquiries of the vendor or undertake further environmental improvements. Redevelopment of the site will likely require further site investigation. |
| Moderate-High | Some potentially significant contaminated land liabilities/geotechnical constraints have been identified at the property that requires further assessment including intrusive ground investigations.                                                                                                                                                                                                                                          |
| High          | Significant potential contaminated land liabilities/geotechnical constraints have been identified at the property. Further assessment including intrusive ground investigation will be required to determine to level of risk and associated liability.                                                                                                                                                                                       |

## 2. SITE SETTING

### 2.1 Site Details

|                         |                                                                   |
|-------------------------|-------------------------------------------------------------------|
| Site Address            | Elm Point, Wrexham Industrial Estate, Elm Road, Wrexham, LL13 9UE |
| National Grid Reference | E338550, N350380                                                  |
| Site Area               | 3.87Ha                                                            |

All acronyms used within this report are defined in the Glossary presented in Appendix II.  
A site location map is presented in Appendix III as Drawing 10-610-001.

### SITE DESCRIPTION

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |  |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--|
| Occupancy/use        | The site is an irregular shaped parcel of land to the south east of Wrexham.                                                                                                                                                                                                                                                                                                                                                                  |      |  |
|                      | The western boundary adjacent to Abbey Road has been bounded and planted with local species as a barrier to secure the site. The north and east borders are lined by mature trees and woodland. The southern border neighbours with light industry and is divided by mesh fence.                                                                                                                                                              |      |  |
|                      | The site is generally level in topography due to previous use as an industrial estate, where it's likely a phase of groundworks took place to construct current levels (ranging between 28.30 and 28.90). The former buildings on site have been demolished to ground-level with crushed aggregate from the buildings spread across the former building footprint. A small quantity is also stockpiled along the eastern border to the south. |      |  |
|                      | Areas of the site including the north west, north and eastern borders are currently undergoing ecological monitoring and so are separated from the site with fencing.                                                                                                                                                                                                                                                                         |      |  |
| Structures           | No structures are apparent                                                                                                                                                                                                                                                                                                                                                                                                                    |      |  |
| Access               | Access can be gained from two points along the western side of the site via Abbey Road.                                                                                                                                                                                                                                                                                                                                                       |      |  |
| Slope                | Site is generally flat due to levelling with crush material following demolition. Some areas have been bounded along the borders and northern areas that are environmentally protected and raised from general ground level.                                                                                                                                                                                                                  |      |  |
| Retaining structures | No retaining structures are present on site.                                                                                                                                                                                                                                                                                                                                                                                                  |      |  |
| Surface Cover (%)    | Buildings:                                                                                                                                                                                                                                                                                                                                                                                                                                    | None |  |
|                      | Hardstand:                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5    |  |
|                      | Soft cover (Gravel):                                                                                                                                                                                                                                                                                                                                                                                                                          | 95   |  |
|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |  |

**Site Description (Cont...)**

|                                           |                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Trees</b>                              | One mature tree is present along the eastern border but is currently protected due to badger warrens at its base. Otherwise the site is lined by mature trees to the north and east, with replanted site native shrub species lining the western border.                                                                             |
| <b>Hazardous Material Storage</b>         | All Underground Storage Tanks (USTs) have been successfully removed from site during a phase of remediation works prior to investigation. The Validation Report related to these works outlines that surrounding material was validated and contaminants removed, however, locations of USTs were targeted during the investigation. |
| <b>Asbestos Containing Material (ACM)</b> | ACM was observed during the site walkover, within the surface layer of crush material. This is likely to have originated from the building fabric of the recently demolished buildings. It is therefore highly likely that the Made Ground will contain ACM.                                                                         |
| <b>PCBs</b>                               | No equipment that may potentially contain PCBs was observed at the site; however, given the previous land uses it may be possible that PCBs are detected.                                                                                                                                                                            |
| <b>Waste Storage</b>                      | No potentially hazardous waste streams are generated at the site.                                                                                                                                                                                                                                                                    |
| <b>Drainage</b>                           | A utilities plan has been obtained from United Utilities that has identified the closest sewer is present within Abbey Road to the west.                                                                                                                                                                                             |

**2.2 Surrounding Area**

The surrounding area land uses are summarised below:

|                  |                              |
|------------------|------------------------------|
| <b>DIRECTION</b> | <b>LAND USE</b>              |
| <b>North</b>     | Woodland & Industrial beyond |
| <b>East</b>      | Woodland & Industrial beyond |
| <b>South</b>     | Industrial                   |
| <b>West</b>      | Industrial                   |

### 3. PREVIOUS REPORTS

E3P have been made aware of a previous Phase 1 Preliminary Environmental Risk Assessment conducted by SGP report ref: R1570-R01-v2, dated 28th February 2011 and Phase 2 Site Investigation report ref: R1662-R01-v2, dated 24th December 2011 the SGP reports have not been made available to E3P but the pertinent points are detailed in a further remediation report completed by Smith Grant Environmental Consultancy - R1989-R02-v1, dated August 2015.

From this the SGP pertinent points are as below:

- Stockpiles of Ash provide potential contaminative sources and must be removed from site;
- All structures (now demolished) must have a thorough Type 3 Asbestos survey prior to demolition and removed in the appropriate manner (in accordance with current legislation, HSE code of practise and waste disposal legislation);
- Removal of USTs and validation of potentially impacted material surrounding the tank;
- Material from demolition will be suitable for crushing and stockpiling for use within the development platform; and,
- Advised further Ground Investigation in the south eastern corner to determine extent of asbestos contamination.

The report also provided insight to possible further build phase works on site:

- 300mm clean cover soil layer in areas of soft landscaping;
  - Concrete to a classification to resist increased sulphate levels;
  - Analysis of the ground to provide appropriate water pipe materials.
- Following on from this Smith Grant validated the remediation aspects of the above mentioned works, with the pertinent points from their post-completion report as below:

- A total of 5 No. contamination hotspots needed targeting during the remediation, with an ash hotspot delayed to the second phase of works due to ecological factors on site at the time;

- Hotspot 1 comprising USTs had all tank liquids and gases vacuum removed into a mobile unit and disposed off-site. 4 No. tanks in total were removed that contained a mixture of lubricating oils, weathered fuels and polluted water to capacities totalling 22,700L. Tanks were removed to a scrap yard for metal reclamation and all surrounding soils, including overburden were assessed and validated for contaminants by soil sampling and PID testing. Resulting voids were backfilled using crush material from stockpiles on site;

- Hotspot 2 comprised an oil spill with all visually stained material removed to a level of 0.20m bgl across 15m<sup>2</sup>. This material was taken off site and the surrounding edges validated using chemical sampling and analysis and PID testing. These materials just breached the remediation target levels for heavy end TPH but were low enough to be considered acceptable for a commercial end use;

Hotspot 3 was postponed to a later date and has since been removed from site, however, no comments have been released to confirm whether the ground beneath the stockpile have been impacted due to the overburden;

Hotspot 4 comprised an oil spill. As with Hotspot 2, visually impacted material was removed to 0.10m bgl, at which point the remaining material in this area was confirmed as clean again using chemical sampling and PID testing; and,

Hotspot 5 comprised an area impacted by asbestos. An excavation approximately 9m x 4m was extended to a maximum depth of approximately 0.30m bgl where natural strata of soft to firm brown clay was encountered. Made Ground was removed in full from the area. Soils were damp at the time of excavation and no visible dust was released.

#### 4. E3P GROUND INVESTIGATION

##### 4.1 General

A Ground Investigation has been designed based on the findings of the desk study with exploratory holes advanced to target specific potential contaminant sources summarised in Table 4.1. In addition, exploratory holes have been advanced to provide information on baseline conditions across the site. The investigation has also been used to collect preliminary geotechnical information to assist in the design and construction of the development.

Exploratory fieldwork was completed on the between 5<sup>th</sup> June and 10<sup>th</sup> June 2015. The works are summarised in Table 4.1 below:

**Table 4.1 Summary of Fieldwork**

| POTENTIAL SOURCE / RATIONALE                                                                                                                                                                                | LOCATION                                                                                                 | TYPE                             | MAX DEPTH<br>(M BGL)                                                                         | WELL<br>RESPONSE<br>ZONE                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Investigation of general ground conditions, depth of Made Ground, presence / nature of any below ground obstructions associated with former buildings / basements, ASTs, chemical store and concrete slabs. | TP101 – TP112                                                                                            | Mechanically Excavated Trial Pit | 3.70                                                                                         | N/A                                                                                                                              |
| Investigation of deep ground conditions and obtaining deep in-situ geotechnical testing to aid in the design and construction of foundations.                                                               | BH101                                                                                                    | Cable Percussive Borehole        | 30.00                                                                                        | N/A                                                                                                                              |
|                                                                                                                                                                                                             | BH102                                                                                                    | Cable Percussive Borehole        | 35.00                                                                                        | N/A                                                                                                                              |
| Investigation of general ground conditions, obtain geotechnical data and to establish a regime of ground gas and water monitoring.                                                                          | WS101<br>WS102<br>WS103<br>WS104<br>WS105<br>WS106<br>WS107<br>WS108<br>WS109<br>WS110<br>WS111<br>WS112 | Window Sample Probehole          | 3.05<br>5.45<br>5.45<br>5.45<br>5.45<br>5.45<br>5.45<br>1.45<br>5.45<br>2.45<br>5.45<br>3.45 | 0.50-2.50<br>3.00-4.00<br>1.00-4.00<br>1.00-4.00<br>1.00-4.00<br>N/A<br>N/A<br>1.00-3.50<br>0.50-4.50<br>N/A<br>N/A<br>1.00-3.00 |

The sampling locations are illustrated in Drawing 10-610-005 (Appendix III). The ground conditions encountered and the depths of response zones are indicated on the exploratory hole logs which are provided in Appendix V.

## 4.2 In-Situ Standard Penetration Testing (SPT)

In-situ geotechnical testing was conducted using the Standard Penetration Test (SPT) and where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix V, presented in Table 5.3 and discussed in Section 7.0

## 4.3 Laboratory Analysis

Selected soil and groundwater samples were submitted to IZ Analytical for a range of chemical analysis comprising:

☛ Metals, cyanide, pH, total sulphate, water soluble sulphate (2:1 extract), sulphide;

☛ Asbestos;

☛ Phenols;

☛ Total and speciated poly-aromatic hydrocarbons (PAHs);

☛ Total and speciated petroleum hydrocarbon (TPH); and

☛ Total Organic Carbon (TOC); and,

☛ Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs).

Chemical laboratory analysis test certificates are included within Appendix VI and discussed in Section 6.0.

Selected samples were submitted to Professional Soils Laboratory (PSL) where the following geotechnical tests were undertaken:

☛ Atterburg Limits Determinations; and,

☛ Moisture Content.

Laboratory analysis sheets are included in Appendix VII and are summarised in Section 4.0:

## 5. GROUND AND GROUNDWATER CONDITIONS

### 5.1 Summary of Ground Conditions

The Ground Investigation generally confirms the published geology and identifies the strata set out in Table 5.1 below:

Table 5.1 Summary of Strata

| STRATA:      | GENERAL DESCRIPTION:                                                                                                        | TYPICAL DEPTH (MBGL): |      |       | LOCATION                                                                 |
|--------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------|------|-------|--------------------------------------------------------------------------|
|              |                                                                                                                             | TOP:                  |      | BASE: |                                                                          |
|              |                                                                                                                             | MIN:                  | MAX: |       |                                                                          |
| MADE GROUND: | Red brown sandy/clayey gravel. Gravel is fine to coarse sub-angular to sub-rounded of brick, limestone, glass and concrete. | 0.00                  | 0.00 | 0.20  | BH101, TP102-TP112, WS101-WS112.                                         |
| MADE GROUND: | Cream slightly sandy gravel. Gravel is fine to medium sub-angular to sub-rounded of limestone, brick and plastic.           | 0.00                  | 0.00 | 0.5   | TP101, WS103                                                             |
| CLAY         | Firm to stiff brown CLAY. (occasionally sandy)                                                                              | 0.4                   | 5.20 | 2.5   | TP104-TP107, TP109, WS102, WS109-WS111.                                  |
| CLAY         | Firm to stiff medium strength grey silty CLAY.                                                                              | 0.2                   | 6.70 | 2.20  | BH101, BH102, TP101-TP106, TP109-TP111, WS101-WS106, WS108, WS111, WS112 |
| SAND         | Brown slightly clayey fine SAND.                                                                                            | 1.1                   | 4.00 | 2.3   | BH102, TP104, TP106, TP108, TP111, WS103, WS108, WS109                   |
| PEAT         | Black PEAT.                                                                                                                 | 2.70                  |      | 3.70  | BH101                                                                    |

### 5.2 Made Ground

Made Ground was identified in all probenholes to a maximum proven depth of 1.5m bgl, but generally observed to between 0.2 and 0.8m bgl. Made Ground comprised a surface covering of crush material mainly consisting of brick and concrete which was immediately underlain by a clayey gravel of concrete, slate, brick.

Due to the concurrence of Made Ground components across the site it is likely that this was recently placed following the demolition of the former buildings.

### 5.3 Drift

The drift deposits were encountered in all exploratory holes and were viewed to be relatively consistent across the site. Drift deposits generally comprised firm low strength becoming very stiff very high strength with depth grey brown silty CLAY.

A band of very soft extremely low strength highly organic silt was encountered at depths of circa 2.0m bgl predominantly beneath the southern area of the site and in localised areas to the north. This horizon was generally observed to be between 0.30m and 1.0m in thickness.

Deep boreholes have been drilled to depths in excess of 25.0m which confirmed a sequence of stiff clay with intermittent sand horizons.

### 5.4 Bedrock

The solid bedrock geology has not been encountered during this phase of investigation, furthermore BGS boreholes in the area are limited. It is anticipated that the Salop formation mudstones are at depths in excess of 55m bgl.

### 5.5 Soil Consistency

Undrained shear strength values were measured using field hand shear vane tests. Results of the tests are presented in Table 5.2 below which indicate the clay soils to vary between stiff and very stiff. Strength test data is generally consistent with the field descriptions of the soils given above.

Table 5.2 Summary of Hand Shear Vane Tests

| LOCATION | DEPTH (M BGL) | SHEAR STRENGTH KPA | CALCULATED ALLOWABLE BEARING PRESSURE KN/M <sup>2</sup> |
|----------|---------------|--------------------|---------------------------------------------------------|
| TP101    | 2.00          | 157                | 368.95                                                  |
| TP101    | 3.40          | 25                 | 58.75                                                   |
| TP103    | 2.00          | 53                 | 124.55                                                  |
| TP104    | 1.20          | 99                 | 232.65                                                  |
| TP105    | 2.00          | 196                | 460.60                                                  |
| TP106    | 2.00          | 43                 | 101.05                                                  |
| TP109    | 1.60          | 67                 | 157.45                                                  |
| TP110    | 1.00          | 147                | 345.45                                                  |
| TP111    | 1.00          | 74                 | 173.90                                                  |
| TP111    | 3.00          | 147                | 345.45                                                  |
| TP112    | 1.00          | 109                | 156.15                                                  |

### 5.6 Side Stability and Ease of Excavation

The sides of the exploratory trial pit excavations appeared to be stable during excavation.



The presence of occasional brick footings on and within the near surface soils in the south of the site meant that in certain places excavation was slow through the Made Ground however, the natural strata was excavated with ease.

**Table 5.3 Standard/Cone Penetration Test Results**

| Boreholes | Depth<br>(m bgl) | Material Field<br>Description | CPT/SPT<br>"N" Value | Corrected<br>"N" Value<br>(N) <sub>60</sub> | Terzaghi &<br>Peck Relative<br>Density (Sands) | Eurocode Soil<br>Strength | Consistency<br>(BS5930) | Terzaghi & Peck<br>Approximate Undrained<br>Shear Strength (kN/m <sup>2</sup> ) |
|-----------|------------------|-------------------------------|----------------------|---------------------------------------------|------------------------------------------------|---------------------------|-------------------------|---------------------------------------------------------------------------------|
| WS101     | 1.00             | Silty CLAY                    | 12                   | 12.10                                       | N/A                                            | Medium strength           | Stiff                   | 60.49                                                                           |
|           | 2.00             | Silty CLAY                    | 27                   | 24.67                                       | N/A                                            | High strength             | Very Stiff              | 123.33                                                                          |
|           | 3.00             | Silty CLAY                    | 50                   | 43.48                                       | N/A                                            | Very high strength        | Very Stiff              | 217.41                                                                          |
|           | 1.00             | Silty CLAY                    | 10                   | 10.08                                       | N/A                                            | Medium strength           | Stiff                   | 50.41                                                                           |
| WS102     | 2.00             | Silty CLAY                    | 9                    | 8.22                                        | N/A                                            | Medium strength           | Stiff                   | 41.11                                                                           |
|           | 3.00             | Silty CLAY                    | 8                    | 6.96                                        | N/A                                            | Low strength              | Firm                    | 34.79                                                                           |
|           | 4.00             | Silty CLAY                    | 9                    | 7.60                                        | N/A                                            | Low strength              | Firm                    | 38.02                                                                           |
|           | 5.00             | Silty CLAY                    | 18                   | 14.93                                       | N/A                                            | Medium strength           | Stiff                   | 74.67                                                                           |
| WS103     | 1.00             | Silty CLAY                    | 15                   | 15.12                                       | N/A                                            | High strength             | Very Stiff              | 75.61                                                                           |
|           | 2.00             | Silty CLAY                    | 13                   | 11.88                                       | N/A                                            | Medium strength           | Stiff                   | 59.38                                                                           |
|           | 3.00             | SAND                          | 4                    | 3.48                                        | Very Loose                                     | N/A                       | N/A                     | N/A                                                                             |
|           | 4.00             | Silty CLAY                    | 27                   | 22.81                                       | N/A                                            | High strength             | Very Stiff              | 114.05                                                                          |
| WS104     | 5.00             | Silty CLAY                    | 10                   | 8.30                                        | N/A                                            | Medium strength           | Stiff                   | 41.48                                                                           |
|           | 1.00             | Silty CLAY                    | 11                   | 11.09                                       | N/A                                            | Medium strength           | Stiff                   | 55.45                                                                           |
|           | 2.00             | Silty CLAY                    | 11                   | 9.57                                        | N/A                                            | Medium strength           | Stiff                   | 47.83                                                                           |
|           | 3.00             | Silty CLAY                    | 23                   | 20.00                                       | N/A                                            | High strength             | Very Stiff              | 100.01                                                                          |
| WS105     | 4.00             | Silty CLAY                    | 12                   | 10.14                                       | N/A                                            | Medium strength           | Stiff                   | 50.69                                                                           |
|           | 5.00             | Silty CLAY                    | 10                   | 8.30                                        | N/A                                            | Medium strength           | Stiff                   | 41.48                                                                           |
|           | 1.00             | Silty CLAY                    | 11                   | 11.09                                       | N/A                                            | Medium strength           | Stiff                   | 55.45                                                                           |
|           | 2.00             | Silty CLAY                    | 11                   | 10.05                                       | N/A                                            | Medium strength           | Stiff                   | 50.24                                                                           |
| WS105     | 3.00             | Silty CLAY                    | 7                    | 6.09                                        | N/A                                            | Low strength              | Firm                    | 30.44                                                                           |
|           | 4.00             | Silty CLAY                    | 16                   | 13.52                                       | N/A                                            | Medium strength           | Stiff                   | 67.59                                                                           |
|           | 5.00             | Silty CLAY                    | 12                   | 9.96                                        | N/A                                            | Medium strength           | Stiff                   | 49.78                                                                           |

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| Boreholes | Depth<br>(m bgl) | Material Field<br>Description | CPT/SPT<br>"N" Value | Corrected<br>"N" Value<br>(N <sub>60</sub> ) | Terzaghi &<br>Peck Relative<br>Density (Sands) | Eurocode Soil<br>Strength | Consistency<br>(BS5930) | Terzaghi & Peck<br>Approximate Undrained<br>Shear Strength (kN/m <sup>2</sup> ) |
|-----------|------------------|-------------------------------|----------------------|----------------------------------------------|------------------------------------------------|---------------------------|-------------------------|---------------------------------------------------------------------------------|
| WS106     | 1.00             | Silty CLAY                    | 12                   | 12.10                                        | N/A                                            | Medium strength           | Stiff                   | 60.49                                                                           |
|           | 2.00             | Silty CLAY                    | 10                   | 9.14                                         | N/A                                            | Medium strength           | Stiff                   | 45.68                                                                           |
|           | 3.00             | Silty CLAY                    | 14                   | 12.18                                        | N/A                                            | Medium strength           | Stiff                   | 60.88                                                                           |
|           | 4.00             | Silty CLAY                    | 24                   | 20.28                                        | N/A                                            | High strength             | Very Stiff              | 101.38                                                                          |
| WS107     | 5.00             | Silty CLAY                    | 50                   | 50.41                                        | N/A                                            | Very high strength        | Very Stiff              | 252.04                                                                          |
|           | 1.00             | MG: Gravel                    | 50                   | 50.41                                        | N/A                                            | Very high strength        | Very Stiff              | 252.04                                                                          |
|           | 1.00             | Silty CLAY                    | 14                   | 14.11                                        | N/A                                            | Medium strength           | Stiff                   | 70.57                                                                           |
| WS108     | 2.00             | Silty CLAY                    | 12                   | 10.96                                        | N/A                                            | Medium strength           | Stiff                   | 54.81                                                                           |
|           | 3.00             | Clayey SAND                   | 6                    | 5.07                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
|           | 4.00             | Silty CLAY                    | 8                    | 6.96                                         | N/A                                            | Low strength              | Firm                    | 34.79                                                                           |
|           | 5.00             | Silty CLAY                    | 8                    | 6.64                                         | N/A                                            | Low strength              | Firm                    | 33.18                                                                           |
| WS109     | 1.00             | MG: Clay                      | 11                   | 11.09                                        | N/A                                            | Medium strength           | Stiff                   | 55.45                                                                           |
|           | 2.00             | Clayey SAND                   | 9                    | 8.22                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
|           | 3.00             | Clayey SAND                   | 8                    | 6.96                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
|           | 4.00             | Clayey SAND                   | 14                   | 11.83                                        | Medium Dense                                   | N/A                       | N/A                     | N/A                                                                             |
| WS110     | 5.00             | Clayey SAND                   | 22                   | 18.25                                        | Medium Dense                                   | N/A                       | N/A                     | N/A                                                                             |
|           | 1.00             | CLAY                          | 10                   | 10.08                                        | N/A                                            | Medium strength           | Stiff                   | 50.41                                                                           |
|           | 2.00             | CLAY                          | 50                   | 45.68                                        | N/A                                            | Very high strength        | Very Stiff              | 228.38                                                                          |
|           | 1.00             | CLAY                          | 10                   | 10.08                                        | N/A                                            | Medium strength           | Stiff                   | 50.41                                                                           |
| WS111     | 2.00             | CLAY                          | 8                    | 7.31                                         | N/A                                            | Low strength              | Firm                    | 36.54                                                                           |
|           | 3.00             | CLAY                          | 6                    | 5.22                                         | N/A                                            | Low strength              | Firm                    | 26.09                                                                           |
|           | 4.00             | CLAY                          | 14                   | 11.83                                        | N/A                                            | Medium strength           | Stiff                   | 59.14                                                                           |
|           | 5.00             | CLAY                          | 12                   | 9.96                                         | N/A                                            | Medium strength           | Stiff                   | 49.78                                                                           |
| WS112     | 1.00             | Silty CLAY                    | 10                   | 10.08                                        | N/A                                            | Medium strength           | Stiff                   | 50.41                                                                           |
|           | 2.00             | Silty CLAY                    | 12                   | 10.96                                        | N/A                                            | Medium strength           | Stiff                   | 54.81                                                                           |
|           | 3.00             | Silty CLAY                    | 50                   | 43.48                                        | N/A                                            | Very high strength        | Very Stiff              | 217.41                                                                          |

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| Boreholes | Depth<br>(m bgl) | Material Field<br>Description | CPT/SPT<br>"N" Value | Corrected<br>"N" Value<br>(N <sub>60</sub> ) | Terzaghi &<br>Peck Relative<br>Density (Sands) | Eurocode Soil<br>strength | Consistency<br>(BS5930) | Terzaghi & Peck<br>Approximate Undrained<br>Shear Strength (kN/m <sup>2</sup> ) |
|-----------|------------------|-------------------------------|----------------------|----------------------------------------------|------------------------------------------------|---------------------------|-------------------------|---------------------------------------------------------------------------------|
| BH101     | 1.20             | MG: Gravel                    | 6                    | 5.89                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
|           | 2.00             | CLAY                          | 9                    | 8.22                                         | N/A                                            | Medium strength           | Stiff                   | 41.11                                                                           |
|           | 4.00             | CLAY                          | 9                    | 7.60                                         | N/A                                            | Low strength              | Firm                    | 38.02                                                                           |
|           | 6.00             | Sandy CLAY                    | 10                   | 8.20                                         | N/A                                            | Medium strength           | Stiff                   | 40.99                                                                           |
|           | 9.00             | Sandy CLAY                    | 7                    | 5.65                                         | N/A                                            | Low strength              | Firm                    | 28.24                                                                           |
|           | 12.00            | Silty CLAY                    | 11                   | 8.19                                         | N/A                                            | Medium strength           | Stiff                   | 40.93                                                                           |
|           | 15.00            | Silty CLAY                    | 19                   | 12.72                                        | N/A                                            | Medium strength           | Stiff                   | 63.62                                                                           |
|           | 16.50            | Silty CLAY                    | 19                   | 12.12                                        | N/A                                            | Medium strength           | Stiff                   | 60.59                                                                           |
|           | 18.00            | Silty CLAY                    | 22                   | 13.39                                        | N/A                                            | Medium strength           | Stiff                   | 66.95                                                                           |
|           | 19.50            | Silty CLAY                    | 24                   | 13.97                                        | N/A                                            | Medium strength           | Stiff                   | 69.83                                                                           |
|           | 22.50            | Silty CLAY                    | 17                   | 9.08                                         | N/A                                            | Medium strength           | Stiff                   | 45.39                                                                           |
|           | 25.50            | Silty CLAY                    | 24                   | 11.81                                        | N/A                                            | Medium strength           | Stiff                   | 59.06                                                                           |
|           | 28.50            | Silty CLAY                    | 25                   | 11.38                                        | N/A                                            | Medium strength           | Stiff                   | 56.88                                                                           |
|           | 30.50            | Silty CLAY                    | 26                   | 11.24                                        | N/A                                            | Medium strength           | Stiff                   | 56.20                                                                           |
|           | 1.20             | MG: Gravel                    | 8                    | 7.85                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
| BH102     | 2.00             | MG: Gravel                    | 10                   | 9.14                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
|           | 4.00             | SAND                          | 9                    | 7.60                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
|           | 6.00             | Silty SAND                    | 10                   | 8.20                                         | Loose                                          | N/A                       | N/A                     | N/A                                                                             |
|           | 9.00             | Silty CLAY                    | 11                   | 8.88                                         | N/A                                            | Medium strength           | Stiff                   | 44.38                                                                           |
|           | 12.00            | Silty CLAY                    | 12                   | 8.93                                         | N/A                                            | Medium strength           | Stiff                   | 44.66                                                                           |
|           | 15.00            | Silty CLAY                    | 13                   | 8.71                                         | N/A                                            | Medium strength           | Stiff                   | 43.53                                                                           |
|           | 18.00            | Silty CLAY                    | 17                   | 10.35                                        | N/A                                            | Medium strength           | Stiff                   | 51.74                                                                           |
|           | 21.00            | Silty CLAY                    | 23                   | 12.81                                        | N/A                                            | Medium strength           | Stiff                   | 64.07                                                                           |
|           | 24.00            | Silty CLAY                    | 26                   | 13.32                                        | N/A                                            | Medium strength           | Stiff                   | 66.62                                                                           |
|           | 27.00            | Silty CLAY                    | 27                   | 12.77                                        | N/A                                            | Medium strength           | Stiff                   | 63.87                                                                           |
|           | 30.00            | Silty CLAY                    | 30                   | 13.14                                        | N/A                                            | Medium strength           | Stiff                   | 65.68                                                                           |
|           | 33.00            | Silty CLAY                    | 24                   | 9.74                                         | N/A                                            | Medium strength           | Stiff                   | 48.72                                                                           |

## 5.7 pH and Sulphate

Chemical analyses for pH and soluble sulphate content contained in Appendix VI (summarised below in (Table 7.4), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 in accordance with BRE Special Digest 1 (2005).

Elevated sulphate concentrations meeting Class DS-2 were noted in the samples taken from the crush piles on site. These are intended for use as developable platform material when processed to a 6F2 composition. This material also shows elevated pH levels that would meet AC2 class. This material is still considered usable however, must be in conjunction with the correct concrete type to withstand chemical reaction.

**Table 5.4 Summary of pH and Sulphate Data**

| LOCATION     | DEPTH<br>(m) | SO <sub>4</sub> IN 2:1<br>WATER / SOIL (G/L) | pH<br>VALUE |
|--------------|--------------|----------------------------------------------|-------------|
| TP109        | 2.30         | 0.12                                         | 7.5         |
| WS101        | 0.60         | 0.10                                         | 6.5         |
| WS102        | 0.80         | 0.027                                        | 7.3         |
| WS104        | 2.30         | 0.051                                        | 7.5         |
| WS109        | 1.90         | 0.027                                        | 7.5         |
| WS112        | 0.40         | 0.052                                        | 7.3         |
| Crush Pile 1 | N/A          | 0.86                                         | 9.9         |
| Crush Pile 2 | N/A          | 0.93                                         | 10.1        |

## 5.8 Groundwater Conditions

Groundwater strikes were encountered as seepages and perched at WS103, WS106, WS108, WS109 and WS111. The depth of the strikes and the depth to which groundwater rose are shown on the exploratory hole records and summarised in Table 5.5 below:

**Table 5.5 Summary of Groundwater Strikes**

| LOCATION | DEPTH TO STRIKE<br>(m) | NOTES   |
|----------|------------------------|---------|
| WS103    | 3.00                   | Perched |
| WS106    | 4.60                   | Perched |
| WS108    | 3.50                   | Seepage |
|          | 4.00                   | Seepage |
|          | 4.90                   | Perched |
| WS109    | 2.40                   | Seepage |
|          | 3.20                   | Seepage |
| WS111    | 4.10                   | Perched |

## 5.9 Soil Plasticity

The Liquid and Plastic Limits of samples of natural in-situ clay are determined using the cone penetrometer method and the rolling thread test. These tests enable determination of an average Plasticity Index (PI) for each "type" of clay, although judgement is applied where variable results are reported.

PI can be related to shrinkability (low, medium or high) and then to minimum founding depth. E3P typically only consider a soil to be shrinkable if the proportion finer than 63µm is >35%.

PI results are compared against guidance given in the NHBG Standards, Chapter 4.2 (revised January 2014), which advocates the use of modified Plasticity Index (I<sub>p</sub>), defined as:

$$I_p = I_p * (\% < 425\mu\text{m}/100)$$

ie if PI is 30%, but the soil contains 80% < 425µm, then:  $I_p = 30 * 80/100 = 24\%$ . It should be noted that in accordance with the requirements of BS 1377, the % passing the 425µm sieve is routinely reported by testing labs.

E3P apply engineering judgment where PI results are spread over a range of classifications. Consideration is given to the average values for each particular soil type (ie differentiate between residual soil and alluvium), the number of results in each class and the actual values.

**Table 5.6 Summary of Plasticity Index Test Results**

| LOCATION | DEPTH (m) | NATURAL MOISTURE CONTENT (%) | PLASTIC LIMIT (%) | LIQUID LIMIT (%) | PLASTICITY INDEX (%) | % PASSING 425µm SIEVE | MODIFIED PLASTICITY INDEX |
|----------|-----------|------------------------------|-------------------|------------------|----------------------|-----------------------|---------------------------|
| WS103    | 1.00      | 23                           | 26                | 63               | 37                   | 100                   | 37                        |
| WS106    | 1.00      | 23                           | 25                | 63               | 38                   | 100                   | 38                        |
| WS108    | 1.00      | 24                           | 26                | 64               | 38                   | 100                   | 38                        |
| WS110    | 1.00      | 15                           | 24                | 53               | 29                   | 100                   | 29                        |

Geotechnical testing results show the clay soils to be of moderate plasticity. The test certificates are included as Appendix VII.

## 5.10 Ground Gas

Concentrations of methane (CH<sub>4</sub>), carbon dioxide (CO<sub>2</sub>) and Oxygen (O<sub>2</sub>) were measured using a calibrated infra-red gas analyser with gas flow rates measured using an integrated flow meter.

Gas measurements were recorded for a minimum of sixty seconds at each location, at which point the maximum concentration of CH<sub>4</sub> and CO<sub>2</sub> together with the lowest concentration of O<sub>2</sub> were recorded. The results of the ground gas monitoring are presented in Table 5.7 overleaf.

**Table 5.7 Summary of Ground Gas and Groundwater Monitoring**

| Well  | Date       | CH <sub>4</sub><br>Initial<br>%v/v | CH <sub>4</sub><br>Steady<br>%v/v | CH <sub>4</sub><br>GSV<br>l/hr | CO <sub>2</sub><br>Initial<br>%v/v | CO <sub>2</sub><br>Steady<br>%v/v | CO <sub>2</sub><br>GSV<br>l/hr | O <sub>2</sub><br>%v/v | Atmos<br>(mb) | Atmos.<br>Dynamic | Flow<br>(l/hr) | Depth<br>to Base<br>(mbgl) | Depth to<br>Water<br>(mbgl) |
|-------|------------|------------------------------------|-----------------------------------|--------------------------------|------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------|-------------------|----------------|----------------------------|-----------------------------|
| WS101 | 11/06/2015 | 0.10                               | 0.10                              | 0.00013                        | 1.30                               | 1.30                              | 0.00169                        | 20.30                  | 1022          | Falling           | 0.13           | 2.67                       | 1.10                        |
|       | 25/06/2015 | 0.10                               | 0.10                              | 0.0001                         | 1.60                               | 1.60                              | 0.0016                         | 20.00                  | 1013          | Steady            | 0.10           | 2.67                       | 1.23                        |
|       | 06/07/2015 | 0.10                               | 0.10                              | 0.0001                         | 1.30                               | 1.30                              | 0.0013                         | 19.70                  | 1006          | Falling           | 0.10           | 2.69                       | 1.27                        |
|       | 20/07/2015 | 0.10                               | 0.10                              | 0.00159                        | 3.20                               | 3.20                              | 0.05088                        | 18.10                  | 1006          | Falling           | 1.59           | 2.63                       | 1.35                        |
| WS102 | 11/06/2015 | 0.10                               | 0.10                              | 0.0001                         | 0.80                               | 0.80                              | 0.0008                         | 20.00                  | 1022          | Falling           | 0.10           | 3.54                       | 3.07                        |
|       | 25/06/2015 | 0.10                               | 0.10                              | 0.0001                         | 0.30                               | 0.20                              | 0.0003                         | 20.80                  | 1013          | Steady            | 0.10           | 3.55                       | 2.40                        |
|       | 06/07/2015 | 0.10                               | 0.10                              | 0.0001                         | 0.20                               | 0.10                              | 0.0002                         | 20.60                  | 1006          | Falling           | 0.10           | 3.56                       | 2.42                        |
|       | 20/07/2015 | 0.10                               | 0.10                              | 0.00013                        | 0.10                               | 0.10                              | 0.00013                        | 20.90                  | 1006          | Falling           | 0.13           | 3.53                       | 1.71                        |
| WS103 | 11/06/2015 | 0.10                               | 0.10                              | 0.00013                        | 1.00                               | 1.00                              | 0.0013                         | 20.30                  | 1022          | Falling           | 0.13           | 3.60                       | 2.40                        |
|       | 25/06/2015 | 0.10                               | 0.10                              | 0.0001                         | 2.00                               | 2.00                              | 0.002                          | 19.30                  | 1013          | Steady            | 0.10           | 3.48                       | 2.56                        |
|       | 06/07/2015 | 0.10                               | 0.10                              | 0.0001                         | 1.90                               | 1.90                              | 0.0019                         | 19.50                  | 1006          | Falling           | 0.10           | 3.49                       | 2.59                        |
|       | 20/07/2015 | 0.10                               | 0.10                              | 0.00039                        | 1.30                               | 1.30                              | 0.00507                        | 19.90                  | 1006          | Falling           | 0.39           | 3.44                       | 2.51                        |
| WS104 | 11/06/2015 | 0.10                               | 0.10                              | 0.00013                        | 2.20                               | 2.20                              | 0.00286                        | 19.50                  | 1022          | Falling           | 0.13           | 4.07                       | 4.01                        |
|       | 25/06/2015 | 0.10                               | 0.10                              | 0.00079                        | 2.90                               | 2.90                              | 0.02291                        | 19.10                  | 1013          | Steady            | 0.79           | 4.06                       | 3.27                        |
|       | 06/07/2015 | 0.10                               | 0.10                              | 0.00039                        | 3.00                               | 3.00                              | 0.0117                         | 19.00                  | 1006          | Falling           | 0.39           | 4.07                       | 3.30                        |
|       | 20/07/2015 | 0.10                               | 0.10                              | 0.0001                         | 4.70                               | 4.70                              | 0.0047                         | 16.50                  | 1006          | Falling           | 0.10           | 4.05                       | 2.23                        |
| WS108 | 11/06/2015 | 0.10                               | 0.10                              | 0.0001                         | 0.60                               | 0.60                              | 0.0006                         | 20.40                  | 1022          | Falling           | 0.10           | 3.43                       | 2.32                        |
|       | 25/06/2015 | 0.10                               | 0.10                              | 0.0001                         | 0.80                               | 0.80                              | 0.0008                         | 20.10                  | 1013          | Steady            | 0.10           | 3.40                       | 2.49                        |
|       | 06/07/2015 | 0.10                               | 0.10                              | 0.0001                         | 0.90                               | 0.90                              | 0.0009                         | 19.90                  | 1006          | Falling           | 0.10           | 3.41                       | 2.54                        |
|       | 20/07/2015 | 0.10                               | 0.10                              | 0.00191                        | 0.90                               | 0.90                              | 0.01719                        | 20.00                  | 1006          | Falling           | 1.91           | 3.40                       | 2.59                        |

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| Well   | Date       | CH <sub>4</sub><br>Initial<br>%v/v | CH <sub>4</sub><br>Steady<br>%v/v | CH <sub>4</sub><br>GSV<br>l/hr | CO <sub>2</sub><br>Initial<br>%v/v | CO <sub>2</sub><br>Steady<br>%v/v | CO <sub>2</sub><br>GSV<br>l/hr | O <sub>2</sub><br>%v/v | Atmos<br>(mb) | Atmos.<br>Dynamic | Flow<br>(l/hr) | Depth<br>to Base<br>(mbgl) | Depth to<br>Water<br>(mbgl) |
|--------|------------|------------------------------------|-----------------------------------|--------------------------------|------------------------------------|-----------------------------------|--------------------------------|------------------------|---------------|-------------------|----------------|----------------------------|-----------------------------|
| WWS109 | 11/06/2015 | 0.10                               | 0.10                              | 0.0001                         | 0.10                               | 0.10                              | 0.0001                         | 15.20                  | 1022          | Falling           | 0.10           | 3.73                       | 2.05                        |
|        | 25/06/2015 | 0.10                               | 0.10                              | -0.00257                       | 0.10                               | 0.10                              | -0.00257                       | 17.90                  | 1013          | Steady            | -2.57          | 3.60                       | 2.23                        |
|        | 06/07/2015 | 0.10                               | 0.10                              | -0.0017                        | 0.10                               | 0.10                              | -0.0017                        | 18.00                  | 1006          | Falling           | -1.70          | 3.60                       | 2.25                        |
|        | 20/07/2015 | 0.10                               | 0.10                              | -0.0016                        | 0.10                               | 0.10                              | -0.0016                        | 19.00                  | 1006          | Falling           | -1.60          | 3.52                       | 2.37                        |
| WWS112 | 11/06/2015 | 0.10                               | 0.10                              | 0.00013                        | 0.40                               | 0.40                              | 0.00052                        | 20.60                  | 1022          | Falling           | 0.13           | 2.82                       | 0.80                        |
|        | 25/06/2015 | 0.10                               | 0.10                              | 0.00013                        | 2.60                               | 2.60                              | 0.00338                        | 17.70                  | 1013          | Steady            | 0.13           | 2.80                       | 1.04                        |
|        | 06/07/2015 | 0.10                               | 0.10                              | 0.00013                        | 2.20                               | 2.20                              | 0.00286                        | 18.10                  | 1006          | Falling           | 0.13           | 2.81                       | 1.06                        |
|        | 20/07/2015 | 0.10                               | 0.10                              | 0.00039                        | 3.20                               | 3.20                              | 0.01248                        | 17.20                  | 1008          | Falling           | 0.39           | 2.80                       | 1.30                        |



At a Tier 1 stage the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference to Generic Assessment Criteria (GACs) values published by LQM / CIEH 2<sup>nd</sup> edition - Suitable for Use Levels (S4UL), DEFRA - Category 4 Screening Levels (C4SL), and EA - Contaminated Land Exposure Assessment (CLEA), Soil Guideline Values (SGV)

The results of this comparison have been summarised within Table 6.1 (overleaf).

## 6. CONTAMINATED LAND RISK ASSESSMENT

### 6.1 Human Health Risk Assessment

**Table 6.1 Summary of Inorganic and Hydrocarbon Toxicity Assessment for a Residential End Use**

| DETERMINANT             | UNIT   | GAC     | N  | MC   | LOC. OF EX(m) | STRATA | PATH WAY | ASSESSMENT        |
|-------------------------|--------|---------|----|------|---------------|--------|----------|-------------------|
| Arsenic**               | mg/kg  | 640     | 8  | 11   | N/A           | N/A    | 1        | No Further Action |
| Cadmium**               | mg/kg  | 190     | 8  | <0.2 | N/A           | N/A    | 1        | No Further Action |
| Chromium (VI)**         | mg/kg  | 33      | 8  | <4.0 | N/A           | N/A    | 1        | No Further Action |
| Lead**                  | mg/kg  | 200     | 8  | 140  | N/A           | N/A    | 1        | No Further Action |
| Mercury <sup>(II)</sup> | mg/kg  | 58      | 8  | 0.4  | N/A           | N/A    | 2        | No Further Action |
| Nickel                  | mg/kg  | 980     | 8  | 38   | N/A           | N/A    | 1        | No Further Action |
| Selenium                | mg/kg  | 12000   | 8  | <1.0 | N/A           | N/A    | 1        | No Further Action |
| Copper <sup>(II)</sup>  | mg/kg  | 68000   | 8  | 35   | N/A           | N/A    | 1        | No Further Action |
| Zinc <sup>(II)</sup>    | mg/kg  | 730000  | 8  | 100  | N/A           | N/A    | 1        | No Further Action |
| Cyanide - Total         | mg/kg  | 791     | 8  | <1   | N/A           | N/A    | 1        | No Further Action |
| Phenols - Total         | mg/kg  | 210     | 8  | <1   | N/A           | N/A    | 1        | No Further Action |
| Asbestos                | Fibres | NFD     | 10 | NFD  | N/A           | N/A    | 4        | No Further Action |
| Naphthalene             | mg/kg  | 190     | 12 | 0.5  | N/A           | N/A    | 2        | No Further Action |
| Acenaphthylene          | mg/kg  | 83000   | 12 | 0.32 | N/A           | N/A    | 3        | No Further Action |
| Acenaphthene            | mg/kg  | 84000   | 12 | 2.9  | N/A           | N/A    | 1        | No Further Action |
| Fluorene                | mg/kg  | 63000   | 12 | 2.5  | N/A           | N/A    | 1        | No Further Action |
| Phenanthrene            | mg/kg  | 22000   | 12 | 11   | N/A           | N/A    | 3        | No Further Action |
| Anthracene              | mg/kg  | 520000  | 12 | 10   | N/A           | N/A    | 3        | No Further Action |
| Fluoranthene            | mg/kg  | 23000   | 12 | 32   | N/A           | N/A    | 3        | No Further Action |
| Pyrene                  | mg/kg  | 54000   | 12 | 28   | N/A           | N/A    | 3        | No Further Action |
| Benzo(a)Anthracene      | mg/kg  | 170     | 12 | 24   | N/A           | N/A    | 3        | No Further Action |
| Chrysene                | mg/kg  | 350     | 12 | 23   | N/A           | N/A    | 3        | No Further Action |
| Benzo(b)Fluoranthene    | mg/kg  | 44      | 12 | 27   | N/A           | N/A    | 3        | No Further Action |
| Benzo(k)Fluoranthene    | mg/kg  | 35      | 12 | 13   | N/A           | N/A    | 3        | No Further Action |
| Benzo(a)Pyrene          | mg/kg  | 500     | 12 | 23   | N/A           | N/A    | 3        | No Further Action |
| Indeno(1,2,3-cd)Pyrene  | mg/kg  | 3.5     | 12 | 10   | N/A           | N/A    | 3        | No Further Action |
| Dibenzo(a,h)Anthracene  | mg/kg  | 3900    | 12 | 1.9  | N/A           | N/A    | 3        | No Further Action |
| Benzo(g,h,i)Perylene    | mg/kg  | 3200    | 12 | 11   | N/A           | N/A    | 3        | No Further Action |
| TPH C5-C6 (aliphatic)*  | mg/kg  | 7800    | 10 | <1.0 | N/A           | N/A    | 2        | No Further Action |
| TPH C6-C8 (aliphatic)*  | mg/kg  | 2000    | 10 | <0.1 | N/A           | N/A    | 2        | No Further Action |
| TPH C8-C10 (aliphatic)* | mg/kg  | 9700    | 10 | <0.1 | N/A           | N/A    | 2        | No Further Action |
| TPH C10-C12 (aromatic)* | mg/kg  | 59000   | 10 | <2.0 | N/A           | N/A    | 2        | No Further Action |
| TPH C12-C16 (aromatic)* | mg/kg  | 1600000 | 10 | 49   | N/A           | N/A    | 2        | No Further Action |
| TPH C16-C21 (aromatic)* | mg/kg  | 26000   | 10 | 380  | N/A           | N/A    | 1        | No Further Action |
| TPH C21-C35 (aromatic)* | mg/kg  | 56000   | 10 | 570  | N/A           | N/A    | 1        | No Further Action |

**Notes**  
Main Exposure Pathways: 1 = Soil Ingestion, 2 = Vapour Inhalation (indoor), 3 = Dermal Contact & Ingestion, 4 = Dust Inhalation.  
Abbreviations: GAC = General Assessment Criteria, n = number of samples, MC = Maximum Concentration; Loc of Ex/m = Location of Exceedance and depth in metres; NFD = No Fibres Detected, S4UL = LQM/CIEH Suitable For Use Levels  
\* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 values for aromatic compounds for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.  
(i) GAC based on human health criteria. Ecotoxicological assessment will be made using EA guidance (EPR 8.01) on soil spreading (Cu 135mg/kg, Zinc 200mg/kg)  
(ii) S4UL based on methylmercury.  
\*\* PC4SL

Referring to Table 6.1 overleaf, the direct comparison identifies no contaminant exceedances within the soil samples analysed. It is therefore concluded that the site is chemically suitable for an intended commercial development.

Furthermore, chemical analysis of the stockpiled crush on site (assumed to be generated from the prior remediation and enabling works) is chemically suitable for re-use within the context of a commercial development.

Any proposed areas of landscaping will require the installation of 150mm topsoil as a growing medium. No suitable topsoil deposits exist on site, therefore this upper layer will require importation and appropriate validation testing.

## 6.2 Controlled Waters

| Risk Profile                                                                        | Discussion   | Risk Rating & Rationale                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Source Protection Zone (SPZ)                                                        | No           | Low                                                                                                                                                                                                                         |
| Distance to the closest groundwater abstraction point.                              | <100m        | Moderate                                                                                                                                                                                                                    |
| Aquifer classification in Superficial Drift Deposits                                | Unproductive | Very Low – Shallow low permeability natural clay soils will provide a degree of protection to the underlying bedrock aquifer from the vertical migration of any mobile contaminants.                                        |
| Aquifer classification in Bedrock.                                                  | Secondary A  | Very Low – Overlain by circa 50m of low permeability clay.                                                                                                                                                                  |
| Surface water or Groundwater protection Zones.                                      | No           | Very Low                                                                                                                                                                                                                    |
| Viability for Anthropogenic soil in direct contact with aquifer (drift or bedrock). | Yes          | Very Low – No aquifer in the superficial drift.                                                                                                                                                                             |
| Is the site underlain by low permeability Drift to depths in excess of 10.0m        | Yes          | Yes – The overall risk classification is significantly reduced due to the known presence of in excess of 10.0m of low permeability clay soil extending to depths in excess of 10.0m bgl beneath the shallow granular soils. |
| Is the site located within 50m of a surface water course                            | No           | Very Low – The risk to a surface water is negligible given the absence of a viable receptor within influencing distance of the site.                                                                                        |
| Summary                                                                             |              |                                                                                                                                                                                                                             |
| No potentially complete pollutant linkage identified.                               |              |                                                                                                                                                                                                                             |

To further refine the ICSM, E3P has undertaken an initial assessment of the soil data analysis to assess the potential for a source of separate phase or dissolved phase contamination originating from either a defined on-site source or from impacted soils. This assessment has been qualitative analysis of the soil data set to inform the development of the ICSM.

#### Preliminary Risk Assessment – Soil Data Analysis Risk to Controlled Waters

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>The soil data analysis has not identified any detectable concentrations of VOC's which could be deemed to represent either evidence of impact within the sub-surface soils or a potential source impacting the underlying stratum;</p> <p>The most soluble SVOC (Naphthalene) was only detected at marginal concentrations above the detection limit for the analytical technique and thus a very low level and unlikely source within the soil has been identified.</p> <p>Marginal concentrations of largely insoluble PAH compounds have been detected in the soil analysis, however given the relatively low concentrations, the ability for these to enter the dissolved phase or migrate off site is considered remote; and,</p> <p>Heavy metals have not been detected at concentrations that would be likely to generate a dissolved phase contamination plume.</p> | <p>The soil data obtained from the SI has been assessed within the context of a preliminary assessment to determine the potential presence of a contamination source.</p> <p><b>Total VOC &lt; 1ppm</b><br/> <b>Total SVOC &gt; 1ppm</b><br/> <b>C5-C10 &lt; 5ppm</b><br/> <b>C10-C12 &lt; 10ppm</b><br/> <b>C12-C16 &gt; 50ppm</b><br/> <b>Phenols – &lt; 2ppm</b><br/> <b>Naphthalene &gt; 2ppm</b><br/> <b>Total PAH &gt; 10ppm</b><br/> <b>PCB &lt; 1ppm</b><br/> <b>Heavy metals &gt; 500ppm</b></p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

In due consideration of the ICSM which has identified a potential pollutant linkage associated with the migration towards the aquifer within the underlying bedrock (albeit the sensitivity is significantly reduced) E3P has undertaken a Tier 1 controlled waters risk assessment.

This assessment comprises the analysis of dissolved phase compounds within the groundwater samples (where present).

The results of this assessment are presented in Table 6.2 overleaf.

**Table 6.3 Comparison of Groundwater Analysis with Tier 1 Screening Levels**

| DETERMINAND                                   | UNITS | EQS  | DWS  | N | MC      | STRATA | LOC OF EX | ASSESSMENT            |
|-----------------------------------------------|-------|------|------|---|---------|--------|-----------|-----------------------|
| Arsenic                                       | µg/l  | 50   | 10   | 3 | 6.36    | N/A    | N/A       | No Further Assessment |
| Cadmium                                       | µg/l  | 5    | 5    | 3 | 0.03    | N/A    | N/A       | No Further Assessment |
| Chromium                                      | µg/l  | 2    | 50   | 3 | <5.0    | N/A    | N/A       | No Further Assessment |
| Copper                                        | µg/l  | 5    | 2000 | 3 | 8.2     | N/A    | N/A       | No Further Assessment |
| Total Cyanide                                 | µg/l  | -    | 50   | 3 | <10     | N/A    | N/A       | No Further Assessment |
| Lead                                          | µg/l  | 4    | 10   | 3 | 2.8     | N/A    | N/A       | No Further Assessment |
| Mercury                                       | µg/l  | 1    | 1    | 3 | <0.05   | N/A    | N/A       | No Further Assessment |
| Nickel                                        | µg/l  | 8    | 20   | 3 | 1.9     | N/A    | N/A       | No Further Assessment |
| Selenium                                      | µg/l  | -    | 10   | 3 | 1.6     | N/A    | N/A       | No Further Assessment |
| Zinc                                          | µg/l  | 30   | 5000 | 3 | 7.9     | N/A    | N/A       | No Further Assessment |
| pH                                            | -     | 6-9  | -    | 3 | 7.6-7.7 | N/A    | N/A       | No Further Assessment |
| Naphthalene                                   | µg/l  | 10   | -    | 3 | <0.01   | N/A    | N/A       | No Further Assessment |
| Benzo(a)pyrene                                | µg/l  | 0.05 | 0.01 | 3 | <0.01   | N/A    | N/A       | No Further Assessment |
| benzo[b]k[fluoranthene]                       | µg/l  | 0.03 | -    | 3 | <0.01   | N/A    | N/A       | No Further Assessment |
| benzo[g,h,i]perylene & indeno[1,2,3-cd]pyrene | µg/l  | 0.02 | -    | 3 | <0.01   | N/A    | N/A       | No Further Assessment |
| TPH Aliphatic C5-C6                           | µg/l  | -    | 10   | 3 | <10     | N/A    | N/A       | No Further Assessment |
| TPH Aliphatic C6-C8                           | µg/l  | -    | 10   | 3 | <10     | N/A    | N/A       | No Further Assessment |
| TPH Aliphatic C8-C10                          | µg/l  | -    | 10   | 3 | <10     | N/A    | N/A       | No Further Assessment |
| TPH Aliphatic C10-C12                         | µg/l  | -    | 10   | 3 | <10     | N/A    | N/A       | No Further Assessment |
| TPH Aliphatic C12-C16                         | µg/l  | -    | 10   | 3 | <10     | N/A    | N/A       | No Further Assessment |
| TPH Aliphatic C16-C35                         | µg/l  | -    | 10   | 3 | <10     | N/A    | N/A       | No Further Assessment |

| #   | Notes                                                                                                                                                                                                                                                                                                                   |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Council Directive of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (76/464/EEC). Official Journal of the European Communities 18.5.76 L129/23                                                                                                 |
| 2.  | The Surface Waters (Dangerous Substances) (Classification) Regulations 1989, SI 2286/89                                                                                                                                                                                                                                 |
| 3.  | The Surface Waters (Dangerous Substances) (Classification) Regulations 1992, SI 337/92                                                                                                                                                                                                                                  |
| 4.  | These represent non-statutory changes made in the 1990's which may be used by regulatory authorities. They are more conservative than the original 1985 values.                                                                                                                                                         |
| 5.  | EC Dangerous Substances - List 1 parameters                                                                                                                                                                                                                                                                             |
| 6.  | EC Dangerous Substances - List 2 parameters as listed in Dangerous Substances Regulations of 1997 and 1998, and the DOE Circular 7/89                                                                                                                                                                                   |
| 7.  | Circular from the Department of the Environment (7/89) and the Welsh Office (SI 16/89). 30 March 1989. Water and the Environment: The implementation of European Community Directives on pollution caused by certain dangerous substances discharged into the aquatic environment                                       |
| 8.  | The Surface Waters (Dangerous Substances) (Classification) Regulations 1997, SI 2560/97                                                                                                                                                                                                                                 |
| 9.  | The Surface Waters (Dangerous Substances) (Classification) Regulations 1998, SI 389/98                                                                                                                                                                                                                                  |
| 10. | WHO DWS for Toluene and Ethylbenzene - odour/taste/colour (Human Health Risk)                                                                                                                                                                                                                                           |
| 11. | Specified compounds are benzo[b]fluoranthene (CAS 205-99-2), benzo[k]fluoranthene (CAS 207-08-9), benzo[a]pyrene (CAS 191-24-2) and indeno[1,2,3-cd]pyrene (CAS 193-39-5). The parametric value applies to the sum of the concentrations of the individual compounds detected and quantified in the monitoring process. |

In accordance with the methodology outlined with the CIRIA publication C665, E3P have utilised the results of the ground gas monitoring surveys to calculate a tentative Gas Screening

The monitoring has been undertaken during periods of both high / low and falling / rising atmospheric pressure; demonstrating worst case scenario.

During the monitoring visit completed to date, no significantly elevated concentrations of methane and carbon dioxide have been recorded within any of the probeholes with a maximum of 0.10% v/v methane and 4.70% v/v carbon dioxide (VVS104) detected during the monitoring to date.

- ☛ Made Ground located across the site from historical development and demolition activities;
- ☛ UST's in northern sector of site; and,
- ☛ Substantial ash deposits previously in place across site.

The Phase I Desk Study and subsequent Ground Investigation has identified the following potential sources of ground gas:

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 (*Assessing risks posed by hazardous ground gases to buildings*, 2007). However, it is recommended that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on-site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

### 6.3 Ground Gas

| Summary Assessment |                                                                                                                                                                                                                                                  | Conclusion & Recommendation                                                                                                                                                                                               |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yes                | Is the site deemed to be located within an area that would be classified as Moderate or High Risk in terms of a Controlled Waters Receptor                                                                                                       | The groundwater risk assessment has identified there is no unacceptable risk to the identified controlled water receptors. It is therefore considered that no further work with respect to controlled waters is required. |
| Yes                | Has the <b>SITE INVESTIGATION</b> accurately investigated all potential exposure pathways / potential pollutant linkages as defined within the ICSM to ensure the soil and groundwater analysis has targeted all potential contamination source. |                                                                                                                                                                                                                           |
| No                 | Has the <b>SOIL</b> data analysis identified any source of potentially soluble phase compounds that could be indicative of a risk to controlled waters                                                                                           |                                                                                                                                                                                                                           |
| No                 | Has the <b>GROUNDWATER / LEACHATE</b> analysis identified any elevated concentrations of potential contaminants of concern.                                                                                                                      |                                                                                                                                                                                                                           |

### Further Assessment and Risk Mitigation

The Tier I risk assessment indicates there are no contaminant exceedances within the groundwater samples analysed. All samples were obtained from monitoring wells where the response zones were located within the cohesive or granular natural drift strata.

Value (GSV). The maximum GSV calculated for methane was 0.001 l/hr and for carbon dioxide was 0.05 l/hr (WS101)

In accordance with the methodology outlined with the CIRIA publication C665 and BS8485, E3P has utilised the results of the ground gas monitoring surveys to calculate a tentative Gas Screening Value (GSV). The calculated GSVs reflect the absence of any significant flow with CIRIA C665 stating that in instances where the maximum GSV for carbon dioxide and methane is <0.07 l/hr and typical methane and carbon dioxide are less than 1% v/v and 5% v/v respectively, then this is equivalent to Characteristic Situation 1.

#### 6.4 Potable Water Infrastructure

Chemical analysis would suggest that Polyethylene (PE) pipeline will be suitable for the proposed residential development.

#### 6.5 Developed Conceptual Model

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the developed conceptual model does not identify any potential contaminant sources for human health, controlled waters or the wider environ and therefore no potential pathways or receptors. It is therefore concluded that the proposed development site is suitable for its intended end use as a commercial development.

## 7. GEOTECHNICAL ASSESSMENT

### 7.1 Proposed Development

E3P understands that Russells Construction intend to construct one main industrial unit with the option of either a secondary large unit or two smaller units within the northern section of the site. All units have associated car parking, distribution service yards and infrastructure. Given the nature of the proposed development it is considered that the structure meets the criteria of Geotechnical Category 1 of Euro Code 7.

In consideration of the nature of the development it is considered that acceptable risk from settlement is a total settlement value of 25mm for a masonry structure.

### 7.2 Summary of Ground Conditions

#### Made Ground

Made Ground was identified in all probeholes to a maximum proven depth of 1.5m bgl, but generally observed to be between 0.2 and 0.8m bgl. Made Ground comprised a surface covering of crush material mainly consisting of brick and concrete which was immediately underlain by a clayey gravel of concrete, slate, brick.

Due to the concurrence of Made Ground components across the site it is likely that this was recently placed following the demolition of the former buildings.

#### Drift

The drift deposits were encountered in all exploratory holes and were viewed to be relatively consistent across the site. Drift deposits generally comprised firm low strength becoming very stiff very high strength with depth grey brown silty CLAY.

A band of very soft extremely low strength highly organic silt was encountered at depths of circa 2.0m bgl predominantly beneath the southern area of the site and in localised areas to the north. This horizon was generally observed to be between 0.30m and 1.0m in thickness. Deep boreholes have been drilled to depths in excess of 25.0m which confirmed a sequence of stiff clay with intermittent sand horizons.

#### Bedrock

The bedrock geology was not encountered as part of the intrusive Ground Investigation.

### 7.3 Site Preparation

The site should be cleared and any vegetation below areas of proposed development and stripped in accordance with Series 200 of the Specification for Highway Works. This should include:  
• Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill;

• No invasive plant species have been identified on site. If identified during future works this material and the infested soils will require treatment / removal by a suitably qualified contractor;

- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill;
- Buried structures and old foundations have been encountered on site. These should be excavated from below the proposed development foot print with the resulting void backfilled; and,
- Consideration should be given to any retaining structures on the site and should be assessed by a structural engineer prior to development.

## 7.4 Foundation Conditions, Bearing Potential & Assessment of Potential Bearing Capacities

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the net safe Allowable Bearing Pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum.

| NATURAL COHESIVE SOILS              |                     |                                                              |                                                  |
|-------------------------------------|---------------------|--------------------------------------------------------------|--------------------------------------------------|
| DESCRIPTION                         | DEPTH RANGE (m BGL) | UNDRAINED SHEAR STRENGTH (C <sub>u</sub> ) kN/m <sup>2</sup> | ALLOWABLE BEARING POTENTIAL (kN/m <sup>2</sup> ) |
| Sandy Silty CLAY                    | 0.20-35.00          | 50-120                                                       | 103-250                                          |
| Silty CLAY                          | 2.50-5.45           | 26-36                                                        | 53-75                                            |
| Organic very silty CLAY (localised) | 2.60-4.00           | 35                                                           | 72                                               |
| NATURAL GRANULAR SOILS              |                     |                                                              |                                                  |
| DESCRIPTION                         | DEPTH RANGE (m BGL) | RELATIVE DENSITY                                             | ALLOWABLE BEARING POTENTIAL (kN/m <sup>2</sup> ) |
| Clayey SAND                         | 1.80-5.45           | Loose to Medium Dense                                        | 50-180                                           |

The presence of soft to firm low to moderate strength clays and very soft extremely low strength organic silts with relatively low safe ABP's will necessitate detailed consideration of the most economic foundation solution.

It is considered that the most likely foundation solution would be a specialist wide pad type foundation that will spread structural loadings and thus ensure acceptable degree of uniform total and differential settlement. As and when the detailed foundation size and loadings are known, a full settlement analysis should be completed to confirm the findings documented herein.

Alternatively consideration could be given to the transfer of structural loads to a greater depth utilising a piled foundation combining of friction and end bearing design ratio. There are trees within influencing distance of the proposed units, therefore all foundations will need to be assessed to determine the presence of clay soils and potential for volumetric instability.

However, due to the depth and variability of the Made Ground and potential for trench collapse it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations. Consideration should be given for the potential for dewatering gravels in the surrounding areas to the subject site that may cause structural damage to buildings sub-structures in close proximity to the site.

Site observations indicated that excavations should be feasible in the near surface with normal plant, however obstructions were identified in the near surface including former foundations and possible basement floor slabs associated with historic sub-structures. It is anticipated that any obstructions will be grubbed out during the reduced level dig for the sub structure works.

## 7.9 Excavations

Based upon the results of the chemical analyses it is considered that subsurface concrete should generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE Special Digest 1 (2005).

## 7.8 Concrete Durability

If soak-away drainage is to be considered, full BRE Soak-Away Testing be completed to assess the effective permeability of the natural soils.

Due to the nature of the underlying clays, soakaway drainage is not likely to be a viable option to utilise within the infrastructure design.

## 7.7 Drainage

It is considered that the material can be re-engineered to a method to achieve a CBR in excess of 5% if works are completed in favourable climatic conditions.

A programme of remediation and enabling works will be required to remediate the proposed road sub-grade in accordance with the requirements of the highways design manual (series 600) for a Method Compaction.

## 7.6 Pavement Construction

At this time, it is considered that a stiffened soil platform using specialist geo-grids and engineered soils / aggregates will facilitate the construction of a suitable sub-grade for a ground bearing floor slab.

As and when a ground bearing floor slab has been designed, further settlement analysis will be required to inform the design of a suitably stiffened horizon to ensure loadings do not induce an unacceptable degree of differential settlement within the soft silt horizon.

The presence of a very soft, variable thickness highly organic silt horizon with a reduced safe ABP at circa 2.0m will be stressed by building floor slab loading and as such the potential for a variable degree of differential settlement could be possible.

Careful consideration should be given to the construction of a ground bearing floor slab.

## 7.5 Ground Floor Slabs

## 7.10 Minerals

There are no minerals of economic value underlying the Sites at shallow depth and mining is considered to be very unlikely. The site is considered to be minerally stable.

## 7.11 Further Works

 Detailed design by a piling specialist to design a driven pile foundation to transfer structural loading to competent stratum at depth via a combination of friction and end bearing pile.

## 7.12 Construction Activity and Inspection

The following activities and inspections should be incorporated in to the site works:

 Due to the variability of the soils at the site it is recommended that sufficient allowance is made for the inspection of formation and sub formations to foundations and pavement construction;

 Excavations where access is required should be subject to a risk assessment from a competent person and where appropriate mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 utilised;

 It is considered that de-watering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond;

 Where access to confined spaces is required appropriate mitigation measures should be addressed within the Construction Stage Health and Safety Plan. Particular account should be taken of the gas results;

 The presence of potential contamination and mitigation measures should be addressed as part of the Construction Stage Health and Safety Plan and should include measures to design out the risks, reduce their impact and finally the use of Personnel Protective Equipment (PPE).

## 8. CONCLUSIONS AND RECOMMENDATIONS

### Contaminated Land Assessment

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Human Health      | The Tier I Human Health risk assessment has identified no contaminant exceedances, therefore the site is considered suitable for proposed commercial development.                                                                                                                                                                                                                                                                                                                      |
| Controlled Waters | The risk to the underlying Secondary A Aquifer in the bedrock geology is reduced due to the absence of any notable source of soluble phase contamination and the presence of >10m of low permeability cohesive drift deposits.<br><br>Chemical analysis of the groundwater has identified no elevated contaminant concentrations and subsequent detailed groundwater risk assessment confirmed there was no unacceptable risk to the controlled water receptors and the wider environ. |
| Ground Gas        | Characteristic Situation 1 - No special protection measures required.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Potable Water     | Poly-Ethylene Pipe (Upon completion of remediation and enabling works).                                                                                                                                                                                                                                                                                                                                                                                                                |

### Geotechnical Issues

During the trial pitting phase of works, E3P identified a grey brick sub-structure within TP101 located within the southern sector of the site. A partially broken concrete slab was positioned on top of the sub-structure identified at circa 0.20m bgl.

It is anticipated that during the build phase works only minor obstructions will be present in localised areas, due to the previous phase of remediation the majority of larger obstructions (Eg. Tanks) have been successfully removed in full.

The presence of soft to firm low to moderate strength clays and very soft extremely low strength organic silts with relatively low safe ABP's will necessitate detailed consideration of the most economic foundation solution and floor slab solution. It is considered that shallow spread foundations will be viable, albeit detailed settlement analysis will be required to prove the final design.

There are trees within influencing distance of the proposed units, therefore all foundations will need to be assessed to determine the presence of clay soils and potential for volumetric instability.

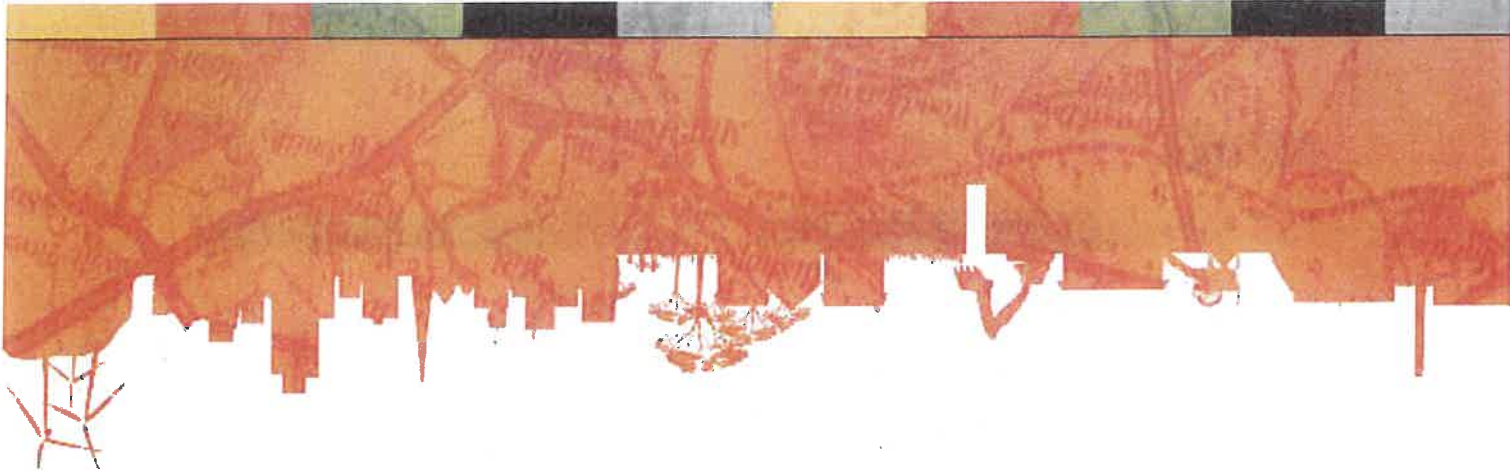
A programme of enabling works will be required to ensure suitable compaction of the Made Ground beneath ground bearing floor slabs and external yard areas to ensure compliance with the geotechnical performance specification.

## END OF REPORT



## APPENDIX I LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



## APPENDIX II GLOSSARY

## TERMS

|              |                                                            |
|--------------|------------------------------------------------------------|
| AST          | Above Ground Storage Tank                                  |
| BGS          | British Geological Survey                                  |
| BSI          | British Standards Institute                                |
| BTEX         | Benzene, Toluene, Ethylbenzene, Xylenes                    |
| CIEH         | Chartered Institute of Environmental Health                |
| CIRIA        | Construction Industry Research Association                 |
| CLEA         | Contaminated Land Exposure Assessment                      |
| CSM          | Conceptual Site Model                                      |
| DNAPL        | Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB) |
| DWS          | Drinking Water Standard                                    |
| EA           | Environment Agency                                         |
| EQS          | Environmental Quality Standard                             |
| GAC          | General Assessment Criteria                                |
| GL           | Ground Level                                               |
| GSV          | Gas Screening Value                                        |
| HCV          | Health Criteria Value                                      |
| ICSM         | Initial Conceptual Site Model                              |
| LNAPL        | Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)  |
| ND           | Not Detected                                               |
| LMRL         | Lower Method Reporting Limit                               |
| NR           | Not Recorded                                               |
| PAH          | Poly Aromatic Hydrocarbon                                  |
| PCB          | Poly-Chlorinated Biphenyl                                  |
| PID          | Photo Ionisation Detector                                  |
| QA           | Quality Assurance                                          |
| SGV          | Soil Guideline Value                                       |
| SPH          | Separate Phase Hydrocarbon                                 |
| Sp.TPH (CWG) | Total Petroleum Hydrocarbon (Criteria Working Group)       |
| SPT          | Standard Penetration Test                                  |
| SVOC         | Semi Volatile Organic Compound                             |
| UST          | Underground Storage Tank                                   |
| VCCs         | Vibro Concrete Columns                                     |
| VOC          | Volatile Organic Compound                                  |
| WTE          | Water Table Elevation                                      |

## UNITS

|      |                                          |
|------|------------------------------------------|
| m    | Metres                                   |
| km   | Kilometres                               |
| %    | Percent                                  |
| %v/v | Percent volume in air                    |
| mb   | Milli Bars (atmospheric pressure)        |
| l/hr | Litres per hour                          |
| µg/l | Micrograms per Litre (parts per billion) |
| ppb  | Parts Per Billion                        |

|                   |                                             |
|-------------------|---------------------------------------------|
| mg/kg             | Milligrams per kilogram (parts per million) |
| ppm               | Parts Per Million                           |
| mg/m <sup>3</sup> | Milligram per metre cubed                   |
| m bgl             | Metres Below Ground Level                   |
| m bcl             | Metre Below Cover Level                     |
| mAOD              | Metres Above Ordnance Datum (sea level)     |
| kN/m <sup>2</sup> | Kilo Newtons per metre squared              |
| µm                | Micro metre                                 |





**APPENDIX III  
DRAWINGS**





## APPENDIX IV PHOTOGRAPHS



## APPENDIX V E3P EXPLORATORY HOLE LOGS



| Borehole No. BH101<br>Sheet 2 of 4                                                                                                                       |               | Project Name: Elm Point<br>Project No. 10610 |      | Location: Wrexham           |  | Client: Russells Construction |        | Dates: 10/06/2015 - 10/06/2015<br>Logged By: R. Walker/F. Newman |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------------------|------|-----------------------------|--|-------------------------------|--------|------------------------------------------------------------------|--|
| Hole Type: BH                                                                                                                                            |               | Co-ords: -                                   |      | Level: 1:50                 |  | Scale: 1:50                   |        |                                                                  |  |
| Well                                                                                                                                                     | Water Strikes | Depth (m)                                    | Type | Samples and In Situ Testing |  | Level (m)                     | Legend | Stratum Description                                              |  |
|                                                                                                                                                          |               |                                              |      | Results                     |  |                               |        |                                                                  |  |
|                                                                                                                                                          |               | 11.00                                        | D    |                             |  | 11.00                         |        | Soft to firm grey silty CLAY.                                    |  |
|                                                                                                                                                          |               | 12.00                                        |      | N=11 (2,2/2,3,3)            |  |                               |        |                                                                  |  |
|                                                                                                                                                          |               | 13.00                                        | D    |                             |  |                               |        |                                                                  |  |
| <div> <div>20</div> <div>19</div> <div>18</div> <div>17</div> <div>16</div> <div>15</div> <div>14</div> <div>13</div> <div>12</div> <div>11</div> </div> |               |                                              |      |                             |  |                               |        |                                                                  |  |
| <div> <div>20.00</div> <div>11.00</div> </div>                                                                                                           |               |                                              |      |                             |  |                               |        |                                                                  |  |
| <div> <div>Continued on next sheet</div> </div>                                                                                                          |               |                                              |      |                             |  |                               |        |                                                                  |  |
| <div> <div>Complete at 30.0m bgl</div> <div>Remarks</div> </div>                                                                                         |               |                                              |      |                             |  |                               |        |                                                                  |  |

# Borehole Log



| Borehole Log |              | Project Name: Elm Point       |       | Location: Wrexham |           | Client: Russells Construction |  | Dates: 10/06/2015 - 10/06/2015 |  | R. Walker/F. Newman |  |
|--------------|--------------|-------------------------------|-------|-------------------|-----------|-------------------------------|--|--------------------------------|--|---------------------|--|
| Borehole No. | Sheet 3 of 4 | Hole Type                     | Scale | 1:50              | Logged By |                               |  |                                |  |                     |  |
|              |              | BH                            |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Co-ords:                      |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Level:                        |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Legend                        |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Depth (m)                     |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Depth (m)                     |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Level                         |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Legend                        |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Stratum Description           |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Soft to firm grey silty CLAY. |       |                   |           |                               |  |                                |  |                     |  |
|              |              | Continued on next sheet       |       |                   |           |                               |  |                                |  |                     |  |

|                               |           |                                |           |                               |         |
|-------------------------------|-----------|--------------------------------|-----------|-------------------------------|---------|
| Borehole No.                  |           | BH101                          |           | Sheet 4 of 4                  |         |
| Project Name: Elm Point       |           | Project No. 10610              |           | Co-ords: -                    |         |
| Location: Wrexham             |           | Level:                         |           | Scale 1:50                    |         |
| Client: Russells Construction |           | Dates: 10/06/2015 - 10/06/2015 |           | Logged By R. Walker/F. Newman |         |
| Well                          | Water     | Strikes                        | Depth (m) | Type                          | Results |
|                               |           |                                | 30.50     | D                             |         |
| End of borehole at 30.00 m    |           |                                |           |                               |         |
| Stratum Description           |           |                                |           |                               |         |
| Legend                        | Level (m) | Depth (m)                      |           |                               |         |
| Remarks                       |           |                                |           |                               |         |
| Complete at 30.0m bgl         |           |                                |           |                               |         |

# Borehole Log





# Borehole Log

Borehole No.

BH102

Sheet 1 of 4

Project Name: Elm Point

Project No.

10610

Co-ords: -

Location: Wrexham

Level:

Scale  
1:50

Logged By

R. Walker/F. Newman

Client:

Russells Construction

Dates:

10/06/2015 - 10/06/2015

Stratum Description

Legend

Well

Water

Strikes

Samples and In Situ Testing

Depth (m)

Depth (m)

Level (m)

Type

Results

Depth (m)

10.00

9.00

8.00

6.50

6.00

5.50

5.00

4.50

4.00

3.50

3.00

2.60

2.00

1.20

1.00

0.50

0.60

0.70

5.00

5.50

6.00

6.50

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| Borehole No. BH102<br>Sheet 2 of 4 |  | Project Name: Elm Point<br>Project No. 10610 |  | Location: Wrexham  |  | Client: Russells Construction |  | Dates: 10/06/2015 - 10/06/2015<br>Logged By: R. Walker/F. Newman                                                   |  |
| Hole Type: BH                      |  | Co-ords: -                                   |  | Level: 1:50        |  | Scale                         |  | Stratum Description                                                                                                |  |
| Legend                             |  | Level (m)                                    |  | Depth (m)          |  | Samples and In Situ Testing   |  | Well                                                                                                               |  |
|                                    |  | Depth (m)<br>Level (m)                       |  | Results            |  | Type                          |  | Strikes                                                                                                            |  |
|                                    |  |                                              |  | Depth (m)          |  | Type                          |  | Strikes                                                                                                            |  |
| 20.00                              |  | N=17 (3.3/4.4,4.5)                           |  | N=13 (3.3/3.3,4.3) |  | N=12 (2.2/3.3,3.3)            |  | 11.00<br>12.00<br>12.50<br>16.00<br>17.00<br>18.00<br>19.00<br>20.00                                               |  |
| D                                  |  | D                                            |  | D                  |  | D                             |  | D                                                                                                                  |  |
| Remarks                            |  | Complete at 35.0m bgl.                       |  | e3p                |  | Borehole Log                  |  | Borehole No. BH102<br>Sheet 2 of 4<br>Hole Type: BH<br>Scale 1:50<br>Level: 1:50<br>Logged By: R. Walker/F. Newman |  |

## Borehole Log

|                                                                                       |           |                                |           |                                    |        |                     |
|---------------------------------------------------------------------------------------|-----------|--------------------------------|-----------|------------------------------------|--------|---------------------|
|  |           | <b>Borehole Log</b>            |           | Borehole No. BH102<br>Sheet 4 of 4 |        |                     |
| Project Name: Elm Point<br>Project No. 10610                                          |           | Co-ords: -                     |           | Hole Type BH                       |        |                     |
| Location: Wrexham                                                                     |           | Level:                         |           | Scale 1:50                         |        |                     |
| Client: Russells Construction                                                         |           | Dates: 10/06/2015 - 10/06/2015 |           | Logged By R. Walker/F. Newman      |        |                     |
| Well                                                                                  | Water     | Samples and In Situ Testing    | Depth (m) | Level (m)                          | Legend | Stratum Description |
| Strikes                                                                               | Depth (m) |                                |           |                                    |        |                     |
| Remarks<br>Complete at 35.0m bgl.                                                     |           |                                |           |                                    |        |                     |
|      |           |                                |           |                                    |        |                     |

| Trial Pit Log           |             | Project No.  |                                                                                                                                | Project Name: Elm Point |       | Location: Wrexham |        | Client: Russells Construction |                             | Stratum Description |        |
|-------------------------|-------------|--------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------|-------------------|--------|-------------------------------|-----------------------------|---------------------|--------|
| Trial Pit No            | TP101       | Sheet 1 of 1 | Date                                                                                                                           | 05/06/2015              | Scale | 1:25              | Logged | R. Walker/F. Newman           |                             | Dimensions          |        |
| Co-ords: -              |             | Level:       | 2.30                                                                                                                           | Depth (m):              | 3.60  | 0.45              |        |                               |                             |                     |        |
| Project Name: Elm Point | Project No. | 10610        | Co-ords: -                                                                                                                     | Level:                  | 2.30  | 0.45              | Logged | R. Walker/F. Newman           | Samples and In Situ Testing |                     |        |
|                         |             |              |                                                                                                                                |                         |       |                   |        |                               | Depth (m)                   | Results             | Legend |
| Depth                   | Level (m)   | Legend       | Stratum Description                                                                                                            |                         |       |                   |        |                               |                             |                     |        |
| 0.30                    |             |              | MADE GROUND: Cream slightly sandy gravel. Gravel is fine to medium sub-angular to sub-rounded of limestone, brick and plastic. |                         |       |                   |        |                               |                             |                     |        |
| ES                      |             |              | MADE GROUND: Concrete.                                                                                                         |                         |       |                   |        |                               |                             |                     |        |
|                         |             |              | Very stiff grey brown slightly silty CLAY.                                                                                     |                         |       |                   |        |                               |                             |                     |        |
|                         |             |              | Soft grey very silty CLAY with organic odour.                                                                                  |                         |       |                   |        |                               |                             |                     |        |
|                         |             |              | Dark brown very silty CLAY with organic odour.                                                                                 |                         |       |                   |        |                               |                             |                     |        |
|                         |             |              | Soft grey silty CLAY.                                                                                                          |                         |       |                   |        |                               |                             |                     |        |
|                         |             |              | End of pit at 3.60 m                                                                                                           |                         |       |                   |        |                               |                             |                     |        |

Stability: Stable.

Remarks: Complete at 3.60m bgl. Brick wall foundations along north east trial pit wall.



|                                                                                                    |  |                                               |  |                                                                                                                                                                                                                  |  |
|----------------------------------------------------------------------------------------------------|--|-----------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|               |  | <b>Trial Pit Log</b>                          |  | Trialpit No<br><b>TP102</b><br>Sheet 1 of 1                                                                                                                                                                      |  |
| Project Name: <b>Elm Point</b><br>Location: <b>Wrexham</b><br>Client: <b>Russells Construction</b> |  | Co-ords: -<br>Level:                          |  | Date: <b>05/06/2015</b><br>Scale: <b>1:25</b><br>Logged: <b>R. Walker/F. Newman</b>                                                                                                                              |  |
| Project No. <b>10610</b><br>Dimensions (m): <b>2.30</b><br>Depth (m): <b>0.45</b>                  |  | Legend                                        |  |                                                                                                                                                                                                                  |  |
| Samples and In Situ Testing                                                                        |  | Depth (m)                                     |  | Stratum Description                                                                                                                                                                                              |  |
| Depth                                                                                              |  | Level (m)                                     |  | Type                                                                                                                                                                                                             |  |
| Results                                                                                            |  | Legend                                        |  | Type                                                                                                                                                                                                             |  |
| 0.20                                                                                               |  | ES                                            |  | MADE GROUND: Brown red slightly clayey gravel with frequent cobbles. Gravel is fine to coarse sub-angular to sub-rounded of brick, concrete, slate and limestone. Cobbles are sub-angular of brick and concrete. |  |
| 0.40                                                                                               |  | Firm to stiff grey brown silty CLAY.          |  | Soft grey very silty CLAY with organic odour.                                                                                                                                                                    |  |
| 2.00                                                                                               |  | Soft grey very silty CLAY with organic odour. |  | Dark brown very silty CLAY with organic odour.                                                                                                                                                                   |  |
| 2.30                                                                                               |  | Soft grey very silty CLAY with organic odour. |  | End of pit at 3.00 m                                                                                                                                                                                             |  |
| 2.50                                                                                               |  | Soft grey very silty CLAY with organic odour. |  | 3                                                                                                                                                                                                                |  |
| 3.00                                                                                               |  | 4                                             |  | 5                                                                                                                                                                                                                |  |
| Complete at 3.00m bgl.                                                                             |  | Stability: Stable.                            |  | Remarks:                                                                                                                                                                                                         |  |

|                                                                                       |  |                      |  |                                                                                   |  |                                                                                                                                                                                                                                                                                                                                       |  |
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|  |  | <b>Trial Pit Log</b> |  | Trialpit No<br><b>TP103</b>                                                       |  | Sheet 1 of 1                                                                                                                                                                                                                                                                                                                          |  |
| Project Name: Elm Point                                                               |  | Project No. 10610    |  | Co-ords: -                                                                        |  | Date<br>05/06/2015                                                                                                                                                                                                                                                                                                                    |  |
| Location: Wrexham                                                                     |  |                      |  | Dimensions<br>2.30                                                                |  | Scale<br>1:25                                                                                                                                                                                                                                                                                                                         |  |
| Client: Russells Construction                                                         |  |                      |  | Depth<br>3.70                                                                     |  | Logged<br>R. Walker/F. Newman                                                                                                                                                                                                                                                                                                         |  |
| Samples and In Situ Testing                                                           |  | Depth (m)<br>0.25    |  | Level (m)<br>0.85                                                                 |  | Legend                                                                                                                                                                                                                                                                                                                                |  |
| Results                                                                               |  | Type                 |  | Stratum Description                                                               |  |                                                                                                                                                                                                                                                                                                                                       |  |
| HVP=53                                                                                |  | 0.25                 |  | 0.85                                                                              |  | MADE GROUND: Red brown slightly sandy gravel. Gravel is fine to coarse sub-angular to sub-rounded of brick, limestone, glass and concrete.<br>MADE GROUND: Red brown very clayey gravel with frequent cobbles. Gravel is fine to coarse sub-angular to sub-rounded of brick and slate. Cobbles are sub-angular of brick and concrete. |  |
| 2.30                                                                                  |  | 2.50                 |  | 3.70                                                                              |  | Firm to stiff grey silty CLAY.<br>Dark brown very silty CLAY with organic odour.<br>Firm to stiff grey brown silty CLAY.                                                                                                                                                                                                              |  |
| End of pit at 3.70 m                                                                  |  |                      |  |                                                                                   |  |                                                                                                                                                                                                                                                                                                                                       |  |
| 3                                                                                     |  | 4                    |  | 5                                                                                 |  |                                                                                                                                                                                                                                                                                                                                       |  |
| Remarks: Complete at 3.70m bgl.                                                       |  | Stability: Stable.   |  |  |  |                                                                                                                                                                                                                                                                                                                                       |  |

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| Legend | Level (m) | 4 |
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The diagram shows a 2D hexagonal lattice. A central hexagonal cell is highlighted with a thick black border. This central cell is surrounded by six other hexagonal cells, which are arranged in a regular hexagonal pattern. The entire structure is composed of these hexagonal cells. At the bottom of the diagram, there are labels 'a' and 'b' indicating the lattice parameters.

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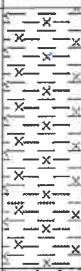
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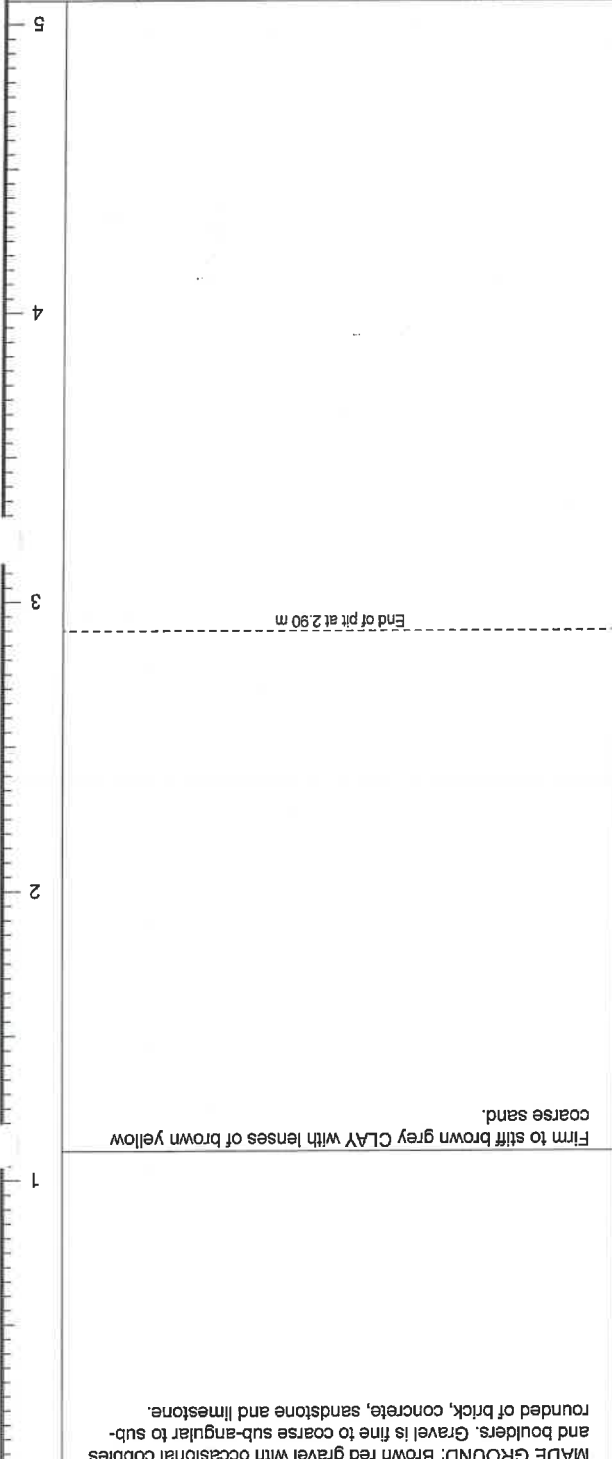
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|  |      | <b>Trial Pit Log</b>                      |                                                                                                                                                          | Trialpit No<br><b>TP106</b><br>Sheet 1 of 1                                         |                                      |
| Project Name: Elm Point<br>Location: Wrexham<br>Client: Russells Construction         |      | Project No. 10610<br>Co-ords: -<br>Level: |                                                                                                                                                          | Dimensions (m):<br>2.30<br>0.45<br>Depth 3.50                                       |                                      |
| Date 05/06/2015<br>Scale 1:25<br>Logged R. Walker/F. Newman                           |      | Stratum Description                       |                                                                                                                                                          |                                                                                     |                                      |
| Samples and In Situ Testing                                                           |      | Depth (m)                                 | Level (m)                                                                                                                                                | Legend                                                                              | Stratum Description                  |
| Depth                                                                                 | Type | Results                                   | MADE GROUND: Red brown sandy gravel with frequent cobbles. Gravel is fine to coarse sub-angular to sub-rounded of brick, porcelain, coal, ash and slate. |                                                                                     |                                      |
| 0.40                                                                                  | ES   |                                           |                                                                                                                                                          |                                                                                     |                                      |
| HVP=43                                                                                |      | 1.00                                      |                                                                                                                                                          |  | Firm grey brown slightly silty CLAY. |
| 2.40                                                                                  |      |                                           |                                                                                                                                                          |   | Brown fine SAND.                     |
| 2.60                                                                                  |      |                                           |                                                                                                                                                          |    | Soft grey brown CLAY.                |
| 3.50                                                                                  |      |                                           |                                                                                                                                                          |                                                                                     | End of pit at 3.50 m                 |
| Remarks: Complete at 3.50m bgl.                                                       |      | Stability: Stable.                        |                                                                                                                                                          |                                                                                     |                                      |



|                                                                                                                                                                                                                                                                                                                                                           |  |                                 |  |                                                                                   |  |
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|                                                                                                                                                                                                                                                                      |  | <b>Trial Pit Log</b>            |  | Trialpit No<br><b>TP107</b><br>Sheet 1 of 1                                       |  |
| Project Name: Elm Point<br>Project No. 10610<br>Co-ords: -<br>Level:                                                                                                                                                                                                                                                                                      |  | Date<br>05/06/2015              |  | Scale<br>1:25<br>Logged<br>R. Walker/F. Newman                                    |  |
| Location: Wrexham<br>Client: Russells Construction                                                                                                                                                                                                                                                                                                        |  | Dimensions<br>2.30<br>0.45      |  | Legend                                                                            |  |
| Stratum Description                                                                                                                                                                                                                                                                                                                                       |  | Samples and In Situ Testing     |  | Depth (m)                                                                         |  |
| MADE GROUND: Brown red gravel with occasional cobbles. Gravel is fine to coarse sub-angular to sub-rounded of brick, sandstone, limestone, mudstone and concrete. Cobbles are of brick.<br>MADE GROUND: Red slightly clayey gravel with frequent cobbles. Gravel is fine to coarse of brick and limestone. Cobbles are of brick.<br>Firm grey brown CLAY. |  | Type<br>ES<br>ES                |  | Results<br>0.40<br>0.60<br>3.10                                                   |  |
| End of pit at 3.10 m                                                                                                                                                                                                                                                                                                                                      |  | Depth (m)                       |  | Level (m)                                                                         |  |
| 5<br>4<br>3<br>2<br>1                                                                                                                                                                                                                                                                                                                                     |  | 3.10<br>0.60<br>0.40            |  | 3.10<br>0.60<br>0.40                                                              |  |
| Stability: Stable.                                                                                                                                                                                                                                                                                                                                        |  | Remarks: Complete at 3.10m bgl. |  |  |  |

|                                                                                       |                            |                                                                                    |                                                                                                                                                                      |                                                                        |
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|  | <b>Trial Pit Log</b>       |                                                                                    | Trialpit No<br><b>TP108</b>                                                                                                                                          | Sheet 1 of 1                                                           |
|                                                                                       | Project Name:<br>Elm Point | Project No.<br>10610                                                               | Co-ords: -<br>Level:                                                                                                                                                 | Date<br>05/06/2015                                                     |
| Location:<br>Wrexham                                                                  | Dimensions<br>2.30         |                                                                                    | Scale<br>1:25                                                                                                                                                        | Logged<br>R. Walker/F. Newman                                          |
| Client:<br>Russells Construction                                                      |                            | Depth<br>2.90                                                                      | 0.45                                                                                                                                                                 |                                                                        |
| <b>Samples and In Situ Testing</b>                                                    |                            | Legend                                                                             | Stratum Description                                                                                                                                                  |                                                                        |
| Depth<br>(m)                                                                          | Level<br>(m)               | Type                                                                               | Results                                                                                                                                                              | Depth<br>(m)                                                           |
| 1.10                                                                                  | 2.90                       | ES                                                                                 | MADE GROUND: Brown red gravel with occasional cobbles and boulders. Gravel is fine to coarse sub-angular to sub-rounded of brick, concrete, sandstone and limestone. | Firm to stiff brown grey CLAY with lenses of brown yellow coarse sand. |
| End of pit at 2.90 m                                                                  |                            |  |                                                                                                                                                                      |                                                                        |
| Remarks: Complete at 2.90m bgl.                                                       |                            | Stability: Stable.                                                                 |                                                                                                                                                                      |                                                                        |



|                                                                                       |                                                    |                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                  |
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|  |                                                    | <b>Trial Pit Log</b><br>TP110<br>Sheet 1 of 1                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                  |
| Project Name: Elm Point<br>Project No. 10610<br>Co-ords: -<br>Level:                  | Location: Wrexham<br>Client: Russells Construction | Dimensions (m):<br>2.30<br>0.45<br>Depth 3.30<br>Logged R. Walker/F. Newman                                                                                                                                                                                                                                                                               | Date 05/06/2015<br>Scale 1:25<br>Sheet 1 of 1                                                                                                                                                                                                                                                                                                    |
| <b>Samples and In Situ Testing</b>                                                    |                                                    | <b>Stratum Description</b>                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                  |
| Depth (m)<br>0.10<br>0.25<br>0.45                                                     | Type<br>ES                                         | Legend<br>    | Stratum Description<br>MADE GROUND: Grey white gravel. Gravel is fine to medium sub-angular to sub-rounded of limestone.<br>MADE GROUND: Black red gravel. Gravel is fine sub-angular to sub-rounded of brick and ash.<br>MADE GROUND: Red gravel. Gravel is fine to medium sub-angular to sub-rounded of brick.<br>Stiff grey brown silty CLAY. |
| Depth (m)<br>2.50<br>2.80<br>3.30                                                     |                                                    | Stratum Description<br>Dark brown very silty CLAY with organic odour.<br>Soft grey brown very silty CLAY.                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                  |
| Depth (m)<br>3.30                                                                     |                                                    | Stratum Description<br>End of pit at 3.30 m                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                  |
| Remarks: Complete at 3.30m bgl.                                                       |                                                    | Stability: Stable.                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                  |

| Depth (m) | Samples and In Situ Testing |      | Depth (m) | Level (m) | Legend | Stratum Description |
|-----------|-----------------------------|------|-----------|-----------|--------|---------------------|
|           | Results                     | Type |           |           |        |                     |
|           |                             |      |           |           |        |                     |

|      |    |                                                                                                                                                                                     |
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| 0.40 | ES | <br>MADE GROUND: Red brown gravel. Gravel is fine to coarse sub-angular to sub-rounded of brick. |
| 0.30 |    | <br>MADE GROUND: White gravel. Gravel is fine to coarse sub-angular to sub-rounded of limestone. |

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Thin grey brown slightly shiny crust.

HP=74

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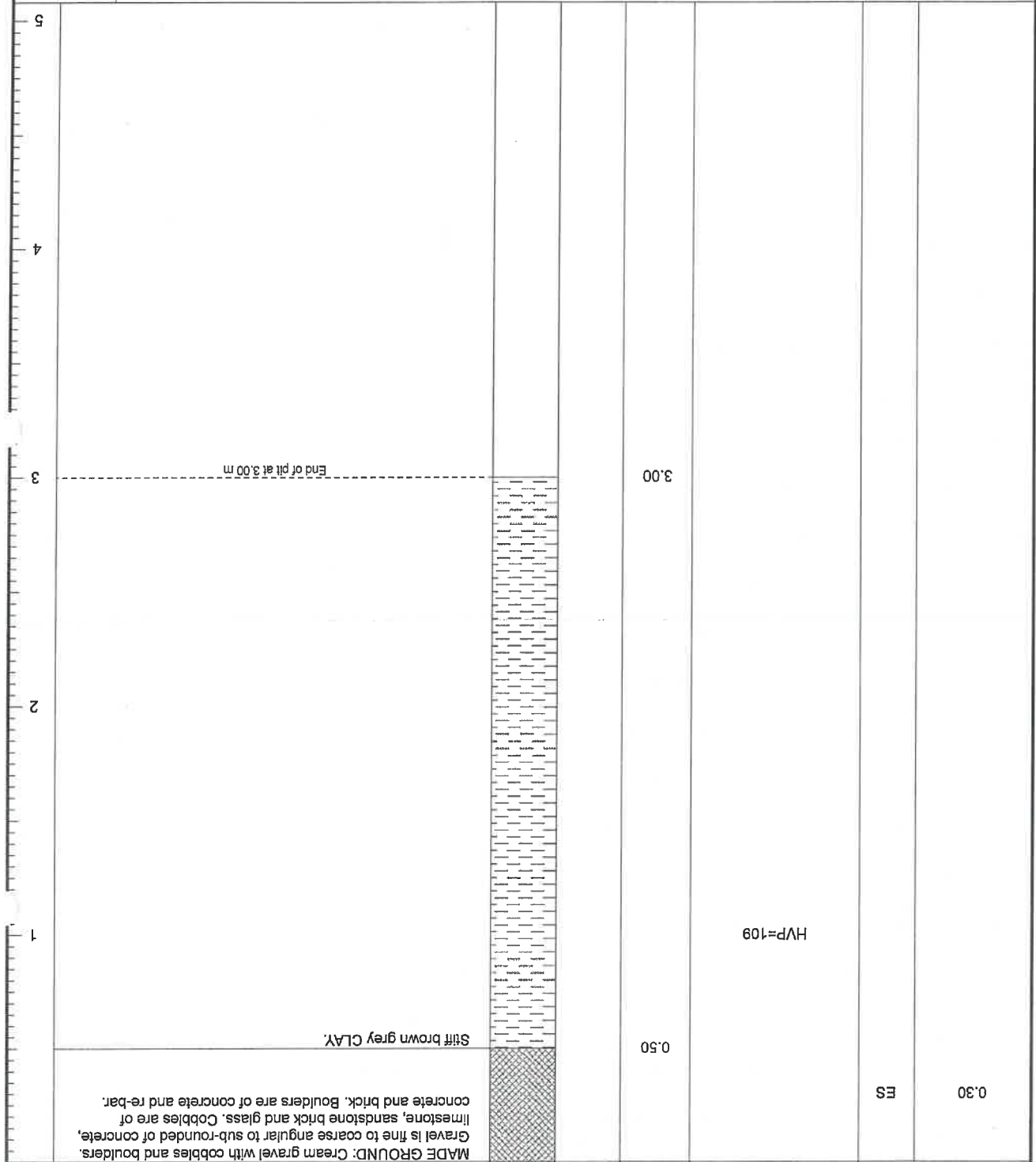
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| 1.30 | Brown clayey fine SAND. |
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|  |            | <b>Trial Pit Log</b>                      |           | Trialpit No<br><b>TP112</b><br>Sheet 1 of 1   |                                                                                                                                                                                                                                                        |
| Project Name: Elm Point<br>Location: Wrexham<br>Client: Russells Construction         |            | Project No. 10610<br>Co-ords: -<br>Level: |           | Dimensions (m):<br>2.30<br>0.45<br>Depth 3.00 |                                                                                                                                                                                                                                                        |
| Date 05/06/2015<br>Scale 1:25<br>Logged R. Walker/F. Newman                           |            | Stratum Description                       |           |                                               |                                                                                                                                                                                                                                                        |
| <b>Samples and In Situ Testing</b>                                                    |            | Depth (m)<br>0.50                         | Level (m) | Legend                                        | Stratum Description<br>MADE GROUND: Cream gravel with cobbles and boulders. Gravel is fine to coarse angular to sub-rounded of concrete, limestone, sandstone brick and glass. Cobbles are of concrete and brick. Boulders are of concrete and re-bar. |
| Depth<br>0.30                                                                         | Type<br>ES | Results<br>HVP=109                        |           |                                               |                                                                                                                                                                                                                                                        |
| Remarks: Complete at 3.00m bgl.                                                       |            | Stability: Stable.                        |           |                                               |                                                                                                                                                                                                                                                        |





| Borehole Log                                                                                                |  | Project Name                                                                                                                                                                      |  | Location:                                                                      |  | Client:                                          |  | Dates:                             |  | Logged By                                      |  | Scale                              |  | Hole Type                          |  | Sheet 1 of 1                      |  |      |  |      |  |      |  |      |  |      |  |                           |  |
|-------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------|--|--------------------------------------------------|--|------------------------------------|--|------------------------------------------------|--|------------------------------------|--|------------------------------------|--|-----------------------------------|--|------|--|------|--|------|--|------|--|------|--|---------------------------|--|
| Borehole No. WS102                                                                                          |  | 10610                                                                                                                                                                             |  | Wrexham                                                                        |  | Russells Construction                            |  | 05/06/2015 - 06/06/2015            |  | R. Walker/F. Newman                            |  | 1:50                               |  | WS                                 |  |                                   |  |      |  |      |  |      |  |      |  |      |  |                           |  |
| Project No.                                                                                                 |  | Co-ords:                                                                                                                                                                          |  | Level:                                                                         |  | Level (m)                                        |  | Legend                             |  | Stratum Description                            |  | Depth (m)                          |  | Type                               |  | Results                           |  |      |  |      |  |      |  |      |  |      |  |                           |  |
| 0.20                                                                                                        |  | ES                                                                                                                                                                                |  | 0.80                                                                           |  | ES                                               |  | N=10 (1,1/2,2,3)                   |  | 1.00                                           |  | 1.40                               |  | 1.50                               |  | 2.50                              |  | 3.20 |  | 3.70 |  | 4.00 |  | 5.20 |  | 5.45 |  | End of borehole at 5.45 m |  |
| MADE GROUND: Light grey gravel. Gravel is fine to coarse sub-angular to sub-rounded of slate and sandstone. |  | MADE GROUND: Reddish brown gravel with frequent cobbles. Gravel is fine to medium sub-angular to sub-rounded of brick, sandstone and slate. Cobbles are sub-rounded of sandstone. |  | Stiff medium strength blueish grey silty CLAY with rootlets and organic odour. |  | Stiff medium strength brown slightly silty CLAY. |  | Firm low strength grey silty CLAY. |  | Dark brown very silty CLAY with organic odour. |  | Firm low strength grey silty CLAY. |  | Firm low strength grey silty CLAY. |  | Stiff medium strength brown CLAY. |  |      |  |      |  |      |  |      |  |      |  |                           |  |
| N=18 (2,2/3,3,6,6)                                                                                          |  | N=9 (2,2/2,2,2,3)                                                                                                                                                                 |  | N=8 (0,1/2,2,2,2)                                                              |  | N=9 (2,2/2,2,2,3)                                |  | N=10 (1,1/2,2,3)                   |  | 1.00                                           |  | 1.40                               |  | 1.50                               |  | 2.50                              |  | 3.20 |  | 3.70 |  | 4.00 |  | 5.20 |  | 5.45 |  | End of borehole at 5.45 m |  |

Remarks  
Complete at 5.45m bgl.



# Borehole Log

WS103

Borehole No.

Sheet 1 of 1

Hole Type  
WS

Scale  
1:50

Logged By  
R. Walker/F.  
Newman

Dates:  
05/06/2015 - 06/06/2015

Level:  
-

Co-ords:  
-

Project No.  
10610

Location:  
Wrexham

Client:  
Russells Construction

Well  
Strikes

Water

Depth (m)

Type

Results

Depth (m)

Level (m)

Legend

Stratum Description

Remarks

Complete at 5.45m bgl.

e3p

|                                                                                                                                                                                                                                                                                                                    |       |                                   |           |                                           |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------|-----------|-------------------------------------------|---------|
|                                                                                                                                                                                                                               |       | <b>Borehole Log</b>               |           | Borehole No. <b>WS104</b><br>Sheet 1 of 1 |         |
| Project Name<br>Elm Point                                                                                                                                                                                                                                                                                          |       | Project No.<br>10610              |           | Co-ords: -                                |         |
| Location:<br>Wrexham                                                                                                                                                                                                                                                                                               |       | Level:<br>1:50                    |           | Scale<br>WS                               |         |
| Client:<br>Russells Construction                                                                                                                                                                                                                                                                                   |       | Dates:<br>05/06/2015 - 06/06/2015 |           | Logged By<br>R. Walker/F. Newman          |         |
| Well                                                                                                                                                                                                                                                                                                               | Water | Strikes                           | Depth (m) | Type                                      | Results |
| 0.40                                                                                                                                                                                                                                                                                                               | 0.90  | 2.30                              | 2.30      | ES                                        | PP      |
| Samples and In Situ Testing                                                                                                                                                                                                                                                                                        |       |                                   |           |                                           |         |
| Depth (m)                                                                                                                                                                                                                                                                                                          |       |                                   |           |                                           |         |
| Results                                                                                                                                                                                                                                                                                                            |       |                                   |           |                                           |         |
| Level (m)                                                                                                                                                                                                                                                                                                          |       |                                   |           |                                           |         |
| Legend                                                                                                                                                                                                                                                                                                             |       |                                   |           |                                           |         |
| Stratum Description                                                                                                                                                                                                                                                                                                |       |                                   |           |                                           |         |
| MADE GROUND: Grey black gravel, sub-rounded of ash, sandstone, slate, coal and brick. Stiff medium strength brown grey silty silty CLAY. Stiff medium strength silty sandy gravelly CLAY. Gravel is fine to medium sub-angular of mudstone. Stiff to very stiff medium to high strength brown slightly silty CLAY. |       |                                   |           |                                           |         |
| End of borehole at 5.45 m                                                                                                                                                                                                                                                                                          |       |                                   |           |                                           |         |
| Complete at 5.45m bgl.                                                                                                                                                                                                                                                                                             |       |                                   |           |                                           |         |
| Remarks                                                                                                                                                                                                                                                                                                            |       |                                   |           |                                           |         |

# Borehole Log

Borehole No. **WS105**

Sheet 1 of 1

Hole Type  
WS

Scale  
1:50

Logged By  
R. Walker/F.

Newman

Project Name

Project No. 10610

Co-ords: -

Location: Wrexham

Level:

Dates: 05/06/2015 - 06/06/2015

Client: Russells Construction

## Samples and In Situ Testing

Results

Depth (m)

Type

ES

PP

ES

PP

ES

PP

ES

PP

ES

PP

ES

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|----------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------|
| Borehole No.<br><b>WS106</b><br>Sheet 1 of 1 | <b>Borehole Log</b>              |  |
| Project Name<br>Elm Point                    | Project No.<br>10610             | Location:<br>Wrexham                                                                  |
| Hole Type<br>WS                              | Co-ords:<br>-                    | Client:<br>Russells Construction                                                      |
| Scale<br>1:50                                | Logged By<br>R. Walker/F. Newman | Dates:<br>05/06/2015 - 06/06/2015                                                     |
| Water<br>Strikes                             | Level<br>(m)                     | Stratum Description                                                                   |
| Depth (m)                                    | Legend                           | Samples and In Situ Testing                                                           |
| Type                                         | Results                          | Depth (m)                                                                             |
| PP                                           | 157                              | N=12 (2.2/3.3,3.3)                                                                    |
| PP                                           | 88                               | N=10 (2.2/2.2,3.3)                                                                    |
| PP                                           | 123                              | N=14 (3.3/3.3,4.4)                                                                    |
| PP                                           | N=24 (3.4/4.6,7.7)               | N=18 (3.3/3.5,5.5)                                                                    |
| 0.50                                         | 0.30                             | 2.60                                                                                  |
| 2.90                                         | 2.65                             | 5.45                                                                                  |
| 3.40                                         | 5.45                             | End of borehole at 5.45 m                                                             |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |
| 5.45                                         | 5.45                             | 5.45                                                                                  |

Complete at 5.45m bgl.





Refused at 1.45m bgl in Made Ground.

Remarks

0.70

ES

27 (11,12/27 for 150mm)

0.30 0.50 1.45

10 9 8 7 6 5 4 3 2 1

Well

Water

Depth (m)

Type

Results

Depth (m)

Level (m)

Legend

Stratum Description

Client:

Russells Construction

Project Name  
Elim Point

Project No.  
10610

Co-ords: -

Location:

Wrexham

Dates:

05/06/2015 - 06/06/2015

Logged By

R. Walker/F. Newman

Scale

1:50

Hole Type

WS

Sheet 1 of 1

WS107

Borehole No.

Borehole Log



| Borehole Log                                                                                                                             |  | Project Name                                                                                   |  | Location:                                             |  | Client:                                                          |  | Project No.                                    |  | Co-ords:                                |  | Level:                    |  | Dates:                  |  | Logged By           |  | WS108               |  |
|------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------|--|-------------------------------------------------------|--|------------------------------------------------------------------|--|------------------------------------------------|--|-----------------------------------------|--|---------------------------|--|-------------------------|--|---------------------|--|---------------------|--|
| Borehole No.                                                                                                                             |  | Sheet 1 of 1                                                                                   |  | Hole Type                                             |  | Scale                                                            |  | 1:50                                           |  | Level:                                  |  | WS                        |  | Hole Type               |  | WS                  |  | WS108               |  |
| Russells Construction                                                                                                                    |  | Wrexham                                                                                        |  | Elm Point                                             |  | 10610                                                            |  | -                                              |  | -                                       |  | -                         |  | 05/06/2015 - 06/06/2015 |  | R. Walker/F. Newman |  | WS108               |  |
| Well                                                                                                                                     |  | Water                                                                                          |  | Strikes                                               |  | Depth (m)                                                        |  | Type                                           |  | Results                                 |  | Depth (m)                 |  | Level (m)               |  | Legend              |  | Stratum Description |  |
| N=14 (2,2/3,3,4,4)                                                                                                                       |  | N=12 (2,2/3,3,3,3)                                                                             |  | N=8 (1,2/1,2,1,4)                                     |  | N=6 (2,1/1,1,2,2)                                                |  | N=8 (2,2/2,2,2,2)                              |  | 5.45                                    |  | 5.00                      |  | 5.00                    |  | 5.00                |  | 5.00                |  |
| 0.40                                                                                                                                     |  | 1.00                                                                                           |  | 2.80                                                  |  | 3.40                                                             |  | 5.00                                           |  | 5.45                                    |  | 5.00                      |  | 5.00                    |  | 5.00                |  | 5.00                |  |
| MADE GROUND: Dark brown red gravel, sub-angular to medium sub-angular to sub-rounded of slate, brick, concrete, sandstone and limestone. |  | Red GRAVEL. Gravel is fine to coarse sub-angular to sub-rounded of brick, slate and limestone. |  | Stiff medium strength grey brown slightly silty CLAY. |  | Firm low strength dark brown very silty CLAY with organic odour. |  | Loose dark brown clayey medium to coarse SAND. |  | Firm low strength grey very sandy CLAY. |  | End of borehole at 5.45 m |  |                         |  |                     |  |                     |  |

Complete at 5.45m bgl.

Remarks



Borehole Log

WS108

Borehole No.

Sheet 1 of 1

Hole Type

WS

Scale

1:50

Logged By

R. Walker/F. Newman

Stratum Description

Legend

Level (m)

Depth (m)

Results

Type

Depth (m)

Strikes

Water

Well



# Borehole Log

WS109

Borehole No.

Sheet 1 of 1

Hole Type  
WS

Scale  
1:50

Logged By  
R. Walker/F.  
Newman

Project Name  
Elm Point

Project No.  
10610

Co-ords: -

Location:  
Wrexham

Client:  
Russells Construction

Dates:  
05/06/2015 - 06/06/2015

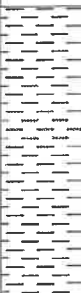
## Samples and In Situ Testing

| Well | Water | Strikes | Depth (m) | Type | Results | Depth (m) | Level (m) | Legend | Stratum Description |
|------|-------|---------|-----------|------|---------|-----------|-----------|--------|---------------------|
|------|-------|---------|-----------|------|---------|-----------|-----------|--------|---------------------|

|  |  |  |      |    |                          |      |  |                                                                                                       |                              |
|--|--|--|------|----|--------------------------|------|--|-------------------------------------------------------------------------------------------------------|------------------------------|
|  |  |  | 0.90 | PP | N=11 (2.2/3.2,3.9)<br>88 | 0.90 |  | MADE GROUND: Dark brown red clayey gravel. Gravel is fine to coarse of brick, concrete and limestone. | MADE GROUND: Firm grey clay. |
|  |  |  | 1.70 | PP | 221                      | 1.80 |  | MADE GROUND: Stiff medium strength fine to coarse sub-angular to sub-rounded of slate and brick.      |                              |
|  |  |  | 1.90 | ES | N=9 (2.2/2.2,3.2)        | 2.00 |  | Orange brown red slightly clayey fine SAND.                                                           |                              |
|  |  |  |      |    |                          | 2.50 |  | Loose brown orange clayey fine SAND.                                                                  |                              |
|  |  |  |      |    |                          | 3.60 |  | Loose brown orange slightly clayey fine SAND.                                                         |                              |
|  |  |  |      |    |                          | 4.00 |  | Soft brown orange slightly sandy CLAY.                                                                |                              |
|  |  |  |      |    |                          | 5.45 |  | Medium dense brown slightly clayey fine SAND.                                                         |                              |
|  |  |  |      |    |                          |      |  |                                                                                                       | End of borehole at 5.45 m    |
|  |  |  |      |    |                          |      |  |                                                                                                       |                              |
|  |  |  |      |    |                          |      |  |                                                                                                       |                              |

Remarks  
Complete at 5.45m bgl.



|                           |  |         |  |              |  |                 |  |                                                     |  |                      |  |                           |  |                                                                                                                                                                         |  |                                                                                                                                                                                                               |  |                |  |                                  |  |                                  |  |                                   |  |
|---------------------------|--|---------|--|--------------|--|-----------------|--|-----------------------------------------------------|--|----------------------|--|---------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------|--|----------------------------------|--|----------------------------------|--|-----------------------------------|--|
| Borehole No.              |  | WS110   |  | Sheet 1 of 1 |  | Hole Type<br>WS |  | Scale<br>1:50                                       |  | Location:<br>Wrexham |  | Project Name<br>Elm Point |  | Project No.<br>10610                                                                                                                                                    |  | Co-ords:<br>-                                                                                                                                                                                                 |  | Level:<br>1:50 |  | Logged By<br>R. Walker/F. Newman |  | Client:<br>Russells Construction |  | Dates:<br>05/06/2015 - 06/06/2015 |  |
| Borehole Log              |  |         |  |              |  |                 |  |                                                     |  |                      |  |                           |  |                                                                                                                                                                         |  |                                                                                                                                                                                                               |  |                |  |                                  |  |                                  |  |                                   |  |
| Well                      |  | Strikes |  | Depth (m)    |  | Type            |  | Results                                             |  | Depth (m)            |  | Level (m)                 |  | Legend                                                                                                                                                                  |  | Stratum Description                                                                                                                                                                                           |  |                |  |                                  |  |                                  |  |                                   |  |
| 0.20                      |  | 0.80    |  | PP           |  | ES              |  | N=10 (2,2/2,2,3,3)<br>221<br>N=50 (8,8/10,12,14,14) |  | 0.40                 |  | 2.45                      |  |   |  | MADE GROUND: Red brown slightly sandy gravel. Gravel is fine to medium sub-angular to sub-rounded of concrete, limestone, ash and brick.<br>Stiff to very stiff medium to very high strength brown grey CLAY. |  |                |  |                                  |  |                                  |  |                                   |  |
| End of borehole at 2.45 m |  |         |  |              |  |                 |  |                                                     |  |                      |  |                           |  |                                                                                                                                                                         |  |                                                                                                                                                                                                               |  |                |  |                                  |  |                                  |  |                                   |  |



Complete at 2.45m bgl.

10

9

8

7

6

5

4

3

2

1



# Borehole Log

WS111

Borehole No.

Sheet 1 of 1

Hole Type

WS

Scale

1:50

Location:

Wrexham

Client:

Russells Construction

Dates:

05/06/2015 - 06/06/2015

Logged By

R. Walker/F.

Newman

Project Name

Project No.

10610

Co-ords:

-

Level:

Level (m)

Legend

Stratum Description

Well

Water

Strikes

Depth (m)

Depth (m)

Results

Depth (m)

Depth (m)

Depth (m)

Depth (m)

Depth (m)

Depth (m)

Depth (m)

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Remarks

Complete at 5.45m bgl.

Complete at 5.45m bgl.

Complete at 5.45m bgl.

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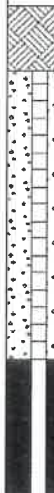
Complete at 5.45m bgl.

Complete at 5.45m bgl.

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Complete at 5.45m bgl.

| Well                                                                                  | Water | Strikes | Depth (m) | Type | Samples and In Situ Testing                                        |      | Depth (m) | Level (m)                                                                           | Legend                                                                              | Stratum Description                                                                                               |
|---------------------------------------------------------------------------------------|-------|---------|-----------|------|--------------------------------------------------------------------|------|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
|                                                                                       |       |         |           |      | Results                                                            |      |           |                                                                                     |                                                                                     |                                                                                                                   |
|  |       |         | 0.40      | ES   |                                                                    |      | 0.60      |                                                                                     |  | MADE GROUND: Grey gravel. Gravel is fine to coarse sub-angular to sub-rounded of sandstone, limestone and cement. |
|                                                                                       |       |         | 1.30      | ES   | N=10 (2,2/2,2,3,3)<br>N=12 (3,3/3,3,3,3)<br>N=50 (5,7/10,11,13,16) | 3.45 |           |  | Firm grey brown slightly silty CLAY.                                                |                                                                                                                   |
|                                                                                       |       |         |           |      |                                                                    |      |           |                                                                                     |                                                                                     | End of borehole at 3.45 m                                                                                         |



## APPENDIX VI CHEMICAL TESTING RESULTS



Environmental Science

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## Analytical Report Number : 15-73271

|                             |                   |                               |            |
|-----------------------------|-------------------|-------------------------------|------------|
| <b>Project / Site name:</b> | Elm Road, Wrexham | <b>Samples received on:</b>   | 09/06/2015 |
| <b>Your job number:</b>     | 10-610            | <b>Samples instructed on:</b> | 10/06/2015 |
| <b>Your order number:</b>   | 10610-1887-RJW    | <b>Analysis completed by:</b> | 16/06/2015 |
| <b>Report Issue Number:</b> | 1                 | <b>Report issued on:</b>      | 16/06/2015 |
| <b>Samples Analysed:</b>    | 14 soil samples   |                               |            |

Signed: 

Rexona Rahman  
Reporting Manager  
For & on behalf of i2 Analytical Ltd.

Signed: 

Emma Winter  
Assistant Reporting Manager  
For & on behalf of i2 Analytical Ltd.

Other office located at: ul. Poniewoź 39, 41 - 711 Ruda Śląska, Poland  
Standard sample disposal times, unless otherwise agreed with the laboratory, are :  
Excel copies of reports are only valid when accompanied by this PDF certificate.

- soils - 4 weeks from reporting
- leachates - 2 weeks from reporting
- waters - 2 weeks from reporting
- asbestos - 6 months from reporting

This certificate should not be reproduced, except in full, without the express permission of the laboratory. The results included within the report are representative of the samples submitted for analysis.

ISS No 15-73271-1

Page 2 of 16



Analytical Report Number: 15-73271  
Project / Site name: Elm Road, Wrexham  
Your Order No: 10610-1887-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m)     | Date Sampled | Time Taken    | Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |
|-------------------|------------------|---------------|---------------|--------------|---------------|-----------------------------------------|-------|-----------------------|-------------------------|
| 453014            | TP107            | None Supplied | 0.50          | 05/06/2015   | None Supplied |                                         |       |                       |                         |
| 453013            | TP104            | None Supplied | 0.30          | 05/06/2015   | None Supplied |                                         |       |                       |                         |
| 453012            | TP102            | None Supplied | 0.20          | 05/06/2015   | None Supplied |                                         |       |                       |                         |
| 453011            | Crush 2          | None Supplied | None Supplied | 05/06/2015   | None Supplied |                                         |       |                       |                         |
| 453010            | Crush 1          | None Supplied | None Supplied | 05/06/2015   | None Supplied |                                         |       |                       |                         |

| Heavy Metals / Metalloids          |     |        |       |       |   |   |   |   |   |
|------------------------------------|-----|--------|-------|-------|---|---|---|---|---|
| mg/kg                              | 1   | MCERTS | 7.5   | 9.1   | - | - | - | - | - |
| Cadmium (aquea regia extractable)  | 0.2 | MCERTS | < 0.2 | < 0.2 | - | - | - | - | - |
| Chromium (hexavalent)              | 4   | MCERTS | < 4.0 | 26    | - | - | - | - | - |
| Chromium (aquea regia extractable) | 1   | MCERTS | 21    | 26    | - | - | - | - | - |
| Copper (aquea regia extractable)   | 1   | MCERTS | 20    | 26    | - | - | - | - | - |
| Lead (aquea regia extractable)     | 1   | MCERTS | 15    | 30    | - | - | - | - | - |
| Mercury (aquea regia extractable)  | 0.3 | MCERTS | < 0.3 | < 0.3 | - | - | - | - | - |
| Nickel (aquea regia extractable)   | 1   | MCERTS | 18    | 21    | - | - | - | - | - |
| Selenium (aquea regia extractable) | 1   | MCERTS | < 1.0 | < 1.0 | - | - | - | - | - |
| Zinc (aquea regia extractable)     | 1   | MCERTS | 97    | 81    | - | - | - | - | - |

#### Petroleum Hydrocarbons

|                 |       |     |      |   |   |       |       |       |       |
|-----------------|-------|-----|------|---|---|-------|-------|-------|-------|
| TPH (C5 - C6)   | mg/kg | 1   | NONE | - | - | < 1.0 | < 0.1 | < 0.1 | < 1.0 |
| TPH (C6 - C8)   | mg/kg | 0.1 | NONE | - | - | < 0.1 | < 0.1 | < 0.1 | < 1.0 |
| TPH (C8 - C10)  | mg/kg | 0.1 | NONE | - | - | < 0.1 | < 0.1 | < 0.1 | < 1.0 |
| TPH (C10 - C12) | mg/kg | 2   | NONE | - | - | < 2.0 | < 2.0 | < 2.0 | < 4.0 |
| TPH (C12 - C16) | mg/kg | 4   | NONE | - | - | < 2.0 | < 2.0 | < 2.0 | < 4.0 |
| TPH (C16 - C21) | mg/kg | 1   | NONE | - | - | < 2.0 | < 2.0 | < 2.0 | < 4.0 |
| TPH (C21 - C35) | mg/kg | 1   | NONE | - | - | < 2.0 | < 2.0 | < 2.0 | < 4.0 |



Analytical Report Number: 15-73271  
Project / Site name: Elm Road, Wrexham  
Your Order No: 10610-1887-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Date Sampled | Time Taken    | (Soil Analysis) Analytical Parameter |                    |                      |  |
|-------------------|------------------|---------------|-----------|--------------|---------------|--------------------------------------|--------------------|----------------------|--|
|                   |                  |               |           |              |               | Units                                | Limit of detection | Accreditation Status |  |
| 453014            | TP107            | None Supplied | 0.50      | 05/06/2015   | None Supplied |                                      |                    | None Supplied        |  |
| 453013            | TP104            | None Supplied | 0.30      | 05/06/2015   | None Supplied |                                      |                    | None Supplied        |  |
| 453012            | TP102            | None Supplied | 0.20      | 05/06/2015   | None Supplied |                                      |                    | None Supplied        |  |
| 453011            | Crush 2          | None Supplied |           | 05/06/2015   | None Supplied |                                      |                    | None Supplied        |  |
| 453010            | Crush 1          | None Supplied |           | 05/06/2015   | None Supplied |                                      |                    | None Supplied        |  |

|                                       |       |   |           |   |   |   |   |   |   |   |       |
|---------------------------------------|-------|---|-----------|---|---|---|---|---|---|---|-------|
| Chloromethane                         | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Chloroethane                          | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Bromomethane                          | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Vinyl Chloride                        | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Trichlorofluoromethane                | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| 1,1-Dichloroethene                    | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Cis-1,2-dichloroethene                | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| MTBE (Methyl Tertiary Butyl Ether)    | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,1-Dichloroethane                    | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 2,2-Dichloropropane                   | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,1-Dichloroethane                    | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Trans-1,2-dichloroethene              | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Benzene                               | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Tetradichloromethane                  | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,2-Dichloropropane                   | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Trichloroethene                       | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Dibromomethane                        | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Cis-1,3-dichloropropene               | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Trans-1,3-dichloropropene             | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Toluene                               | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,1,2-Trichloroethane                 | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,3-Dichloropropane                   | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Dibromochloromethane                  | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Tetradichloroethene                   | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,2-Dibromochloroethane               | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| Chlorobenzene                         | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,1,1,2-Tetrachloroethane             | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Ethylbenzene                          | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| p & m-Xylene                          | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Styrene                               | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Tribromomethane                       | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| o-Xylene                              | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,1,2,2-Tetrachloroethane             | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Isopropylbenzene                      | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Bromobenzene                          | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| n-Propylbenzene                       | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| 2-Chlorotoluene                       | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 4-Chlorotoluene                       | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,3,5-Trimethylbenzene                | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| tert-Butylbenzene                     | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,2,4-Trimethylbenzene                | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| sec-Butylbenzene                      | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,3-Dichlorobenzene                   | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| p-Isopropyltoluene                    | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| 1,2-Dichlorobenzene                   | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,4-Dichlorobenzene                   | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Bulkybenzene                          | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,2-Dibromo-3-chloropropane           | µg/kg | 1 | ISO 17025 | - | - | - | - | - | - | - | < 1.0 |
| 1,2,4-Trichlorobenzene                | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| Hexachlorobutadiene                   | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |
| 1,2,3-Trichlorobenzene                | µg/kg | 1 | MCERTS    | - | - | - | - | - | - | - | < 1.0 |

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| Chemical Name               | Concentration (mg/kg) | MCERTS    | ISO 17025 | Concentration (mg/kg) | MCERTS | ISO 17025 |
|-----------------------------|-----------------------|-----------|-----------|-----------------------|--------|-----------|
| Aniline                     | 0.1                   | NONE      | -         | -                     | -      | -         |
| Phenol                      | 0.2                   | ISO 17025 | -         | -                     | -      | -         |
| 2-Chlorophenol              | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Bis(2-chloroethyl)ether     | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| 1,3-Dichlorobenzene         | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| 1,2-Dichlorobenzene         | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| 1,4-Dichlorobenzene         | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| Bis(2-chloroisopropyl)ether | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| 2-Methylphenol              | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| Hexachloroethane            | 0.05                  | MCERTS    | -         | -                     | -      | -         |
| Nitrobenzene                | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| 4-Methylphenol              | 0.2                   | NONE      | -         | -                     | -      | -         |
| Isophorone                  | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| 2-Nitrophenol               | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| 2,4-Dimethylphenol          | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| Bis(2-chloroethoxy)methane  | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| 1,2,4-Trichlorobenzene      | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| Naphthalene                 | 0.05                  | MCERTS    | -         | -                     | -      | -         |
| 2,4-Dichlorophenol          | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| 4-Chloroaniline             | 0.1                   | NONE      | -         | -                     | -      | -         |
| Hexachlorobutadiene         | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| 4-Chloro-3-methylphenol     | 0.1                   | NONE      | -         | -                     | -      | -         |
| 2,4,6-Trichlorophenol       | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| 2,4,5-Trichlorophenol       | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| 2-Methylnaphthalene         | 0.1                   | NONE      | -         | -                     | -      | -         |
| 2-Chloronaphthalene         | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Dimethylphtthalate          | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| 2,6-Dinitrotoluene          | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Acenaphthylene              | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Acenaphthene                | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| 2,4-Dinitrotoluene          | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| Dibenzofuran                | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| 4-Chlorophenyl phenyl ether | 0.3                   | ISO 17025 | -         | -                     | -      | -         |
| Diethyl phtthalate          | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| 4-Nitroaniline              | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| Fluorene                    | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Azobenzene                  | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| Bromophenyl phenyl ether    | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| Hexachlorobenzene           | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| Phenanthrene                | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Anthracene                  | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Carbazole                   | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| Dibutyl phtthalate          | 0.2                   | MCERTS    | -         | -                     | -      | -         |
| Anthraquinone               | 0.3                   | MCERTS    | -         | -                     | -      | -         |
| Fluoranthene                | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Pyrene                      | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Butyl Benzyl phtthalate     | 0.3                   | ISO 17025 | -         | -                     | -      | -         |
| Benz(a)anthracene           | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Chrysene                    | 0.05                  | MCERTS    | -         | -                     | -      | -         |
| Benz(b)fluoranthene         | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Benz(k)fluoranthene         | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Benz(a)pyrene               | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Indeno(1,2,3-cd)pyrene      | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Dibenzo(a,h)anthracene      | 0.1                   | MCERTS    | -         | -                     | -      | -         |
| Benz(ghi)perylene           | 0.05                  | MCERTS    | -         | -                     | -      | -         |

ISS No 15-73271-1



Analytical Report Number: 15-73271  
Project / Site name: Elm Road, Wrexham  
Your Order No: 10610-1887-RJW

| Lab Sample Number                                           | Sample Reference | Depth (m)     | Date Sampled | Time Taken    | (Soil Analysis) |                    |                      |              |
|-------------------------------------------------------------|------------------|---------------|--------------|---------------|-----------------|--------------------|----------------------|--------------|
|                                                             |                  |               |              |               | Units           | Limit of detection | Accreditation Status |              |
| 453019                                                      | WS102            | None Supplied | 04/05/2015   | None Supplied |                 |                    |                      |              |
| 453018                                                      | WS102            | None Supplied | 04/05/2015   | None Supplied |                 |                    |                      |              |
| 453017                                                      | WS101            | None Supplied | 04/05/2015   | None Supplied |                 |                    |                      |              |
| 453016                                                      | WS101            | None Supplied | 04/05/2015   | None Supplied |                 |                    |                      |              |
| 453015                                                      | TP109            | None Supplied | 05/06/2015   | None Supplied |                 |                    |                      |              |
| Whole Sample Crushed                                        |                  |               |              |               |                 |                    |                      |              |
|                                                             |                  |               |              |               | N/A             | NONE               |                      |              |
| Asbestos in Soil                                            |                  |               |              |               | Type            | ISO 17025          | Not-detected         | Not-detected |
|                                                             |                  |               |              |               |                 |                    |                      |              |
| General Inorganics                                          |                  |               |              |               |                 |                    |                      |              |
| pH                                                          |                  |               |              |               |                 |                    |                      |              |
| Total Crandle                                               |                  |               |              |               |                 |                    |                      |              |
| Total Sulphate as SO <sub>4</sub>                           |                  |               |              |               |                 |                    |                      |              |
| Water Soluble Sulphate (Soil Equivalent)                    |                  |               |              |               |                 |                    |                      |              |
| Water Soluble Sulphate as SO <sub>4</sub> (2:1)             |                  |               |              |               |                 |                    |                      |              |
| Water Soluble SO <sub>4</sub> (BRE SD 2:1 Leach Equivalent) |                  |               |              |               |                 |                    |                      |              |
| Sulphide                                                    |                  |               |              |               |                 |                    |                      |              |
| Total Sulphur                                               |                  |               |              |               |                 |                    |                      |              |
| Total Organic Carbon (TOC)                                  |                  |               |              |               |                 |                    |                      |              |
| Total Phenols                                               |                  |               |              |               |                 |                    |                      |              |
| Total Phenols (monohydric)                                  |                  |               |              |               |                 |                    |                      |              |
| Speciated PAHs                                              |                  |               |              |               |                 |                    |                      |              |
| Benzo(a)anthracene                                          |                  |               |              |               |                 |                    |                      |              |
| Benzo(b)fluoranthene                                        |                  |               |              |               |                 |                    |                      |              |
| Benzo(k)fluoranthene                                        |                  |               |              |               |                 |                    |                      |              |
| Benzo(a)pyrene                                              |                  |               |              |               |                 |                    |                      |              |
| Indeno(1,2,3-cd)pyrene                                      |                  |               |              |               |                 |                    |                      |              |
| Dibenz(a,h)anthracene                                       |                  |               |              |               |                 |                    |                      |              |
| Benzo(ghi)perylene                                          |                  |               |              |               |                 |                    |                      |              |
| Speciated Total EPA-16 PAHs                                 |                  |               |              |               |                 |                    |                      |              |
|                                                             |                  |               |              |               |                 |                    |                      |              |

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Analytical Report Number: 15-73271  
Project / Site name: Elm Road, Wrexham  
Your Order No: 10610-1887-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Date Sampled | Time Taken    | Analytical Parameter (Soil Analysis) |                    |                      |  |
|-------------------|------------------|---------------|-----------|--------------|---------------|--------------------------------------|--------------------|----------------------|--|
|                   |                  |               |           |              |               | Units                                | Limit of detection | Accreditation Status |  |
| 453019            | WS102            | None Supplied | 1.20      | 04/05/2015   | None Supplied |                                      |                    |                      |  |
| 453018            | WS102            | None Supplied | 0.80      | 04/05/2015   | None Supplied |                                      |                    |                      |  |
| 453017            | WS101            | None Supplied | 1.30      | 04/05/2015   | None Supplied |                                      |                    |                      |  |
| 453016            | WS101            | None Supplied | 0.60      | 04/05/2015   | None Supplied |                                      |                    |                      |  |
| 453015            | TP109            | None Supplied | 2.30      | 05/06/2015   | None Supplied |                                      |                    |                      |  |

| Heavy Metals / Metalloids         |       |     |        |       |       |   |   |       |   |
|-----------------------------------|-------|-----|--------|-------|-------|---|---|-------|---|
| Arsenic (agua regia extractable)  | mg/kg | 1   | MCERTS | 8.9   | 11    | - | - | 7.8   | - |
| Cadmium (agua regia extractable)  | mg/kg | 0.2 | MCERTS | < 0.2 | < 4.0 | - | - | < 0.2 | - |
| Chromium (hexavalent)             | mg/kg | 4   | MCERTS | < 4.0 | < 4.0 | - | - | < 4.0 | - |
| Chromium (agua regia extractable) | mg/kg | 1   | MCERTS | 20    | 46    | - | - | 21    | - |
| Copper (agua regia extractable)   | mg/kg | 1   | MCERTS | 16    | 28    | - | - | 35    | - |
| Lead (agua regia extractable)     | mg/kg | 1   | MCERTS | 14    | 43    | - | - | 22    | - |
| Mercury (agua regia extractable)  | mg/kg | 0.3 | MCERTS | < 0.3 | 0.4   | - | - | 0.3   | - |
| Nickel (agua regia extractable)   | mg/kg | 1   | MCERTS | 22    | 38    | - | - | 26    | - |
| Selenium (agua regia extractable) | mg/kg | 1   | MCERTS | < 1.0 | < 1.0 | - | - | < 1.0 | - |
| Zinc (agua regia extractable)     | mg/kg | 1   | MCERTS | 47    | 100   | - | - | 45    | - |

#### Petroleum Hydrocarbons

|                 |       |     |      |       |       |       |   |       |   |
|-----------------|-------|-----|------|-------|-------|-------|---|-------|---|
| TPH (C5 - C6)   | mg/kg | 1   | NONE | < 1.0 | < 1.0 | < 1.0 | - | < 1.0 | - |
| TPH (C6 - C8)   | mg/kg | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 | - | < 0.1 | - |
| TPH (C8 - C10)  | mg/kg | 0.1 | NONE | < 0.1 | < 0.1 | < 0.1 | - | < 0.1 | - |
| TPH (C10 - C12) | mg/kg | 2   | NONE | < 2.0 | < 2.0 | < 2.0 | - | < 2.0 | - |
| TPH (C12 - C16) | mg/kg | 4   | NONE | < 4.0 | < 4.0 | 11    | - | < 4.0 | - |
| TPH (C16 - C21) | mg/kg | 1   | NONE | < 1.0 | < 1.0 | 190   | - | < 1.0 | - |
| TPH (C21 - C35) | mg/kg | 1   | NONE | < 1.0 | 19    | 170   | - | < 1.0 | - |

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| VOCs |  | Analytical Parameter<br>(Soil Analysis) | Units | Limit of<br>detection | Accreditation<br>Status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------|--|-----------------------------------------|-------|-----------------------|-------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|------|--|-----------------------------------------|-------|-----------------------|-------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

[illegible]

Analytical Report Number: 15-73271  
Project / Site name: Elm Road, Wrexham  
Your Order No: 10610-1887-RJW

[illegible]

The results included within the report are representative of the sample submitted for analysis.



Analytical Report Number: 15-73271  
Project / Site name: Elm Road, Wrexham  
Your Order No: 10610-1887-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Date Sampled | Time Taken    | (Soil Analysis) |                    |                      |  |
|-------------------|------------------|---------------|-----------|--------------|---------------|-----------------|--------------------|----------------------|--|
|                   |                  |               |           |              |               | Units           | Limit of detection | Accreditation Status |  |
| 453020            | WS102            | None Supplied | 3.70      | 04/05/2015   | None Supplied |                 |                    |                      |  |
| 453021            | WS104            | None Supplied | 2.30      | 04/05/2015   | None Supplied |                 |                    |                      |  |
| 453022            | WS109            | None Supplied | 1.90      | 05/06/2015   | None Supplied |                 |                    |                      |  |
| 453023            | WS112            | None Supplied | 0.40      | 05/06/2015   | None Supplied |                 |                    |                      |  |

#### Petroleum Hydrocarbons

|                 |       |     |      |   |       |       |       |       |       |
|-----------------|-------|-----|------|---|-------|-------|-------|-------|-------|
| TPH (C5 - C6)   | mg/kg | 1   | NONE | - | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| TPH (C6 - C8)   | mg/kg | 0.1 | NONE | - | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C8 - C10)  | mg/kg | 0.1 | NONE | - | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| TPH (C10 - C12) | mg/kg | 2   | NONE | - | < 2.0 | < 2.0 | < 2.0 | < 2.0 | < 2.0 |
| TPH (C12 - C16) | mg/kg | 4   | NONE | - | < 4.0 | < 4.0 | < 4.0 | < 4.0 | 12    |
| TPH (C16 - C21) | mg/kg | 1   | NONE | - | < 1.0 | < 1.0 | < 1.0 | < 1.0 | 110   |
| TPH (C21 - C35) | mg/kg | 1   | NONE | - | < 1.0 | < 1.0 | < 1.0 | < 1.0 | 230   |

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Your Order No: 10610-1887-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Date Sampled | Time Taken    |
|-------------------|------------------|---------------|-----------|--------------|---------------|
| 453020            | WS102            | None Supplied | 3.70      | 04/05/2015   | None Supplied |
| 453021            | WS104            | None Supplied | 2.30      | 04/05/2015   | None Supplied |
| 453022            | WS109            | None Supplied | 1.90      | 05/06/2015   | None Supplied |
| 453023            | WS112            | None Supplied | 0.40      | 05/06/2015   | None Supplied |

| VOCs                                  |       |                    |                      |       |   |
|---------------------------------------|-------|--------------------|----------------------|-------|---|
| Analytical Parameter (Soil Analysis)  | Units | Limit of detection | Accreditation Status |       |   |
| Chloromethane                         | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Chloroethane                          | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Bromomethane                          | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Vinyl Chloride                        | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Trichlorofluoromethane                | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| 1,1-Dichloroethene                    | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,1,2-Trichloro 1,2,2-trifluoroethane | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Cis-1,2-dichloroethene                | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| MCERTS                                | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| MTBE (Methyl Tertiary Butyl Ether)    | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,1-Dichloroethane                    | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,2-Dichloropropane                   | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,1,1-Trichloroethane                 | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,1,2-Trichloroethane                 | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,2-Dichloroethane                    | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Trans-1,2-dichloroethene              | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Benzene                               | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Tetrachloromethane                    | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,2-Dichloropropane                   | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Trichloroethene                       | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Dibromomethane                        | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Bromodichloromethane                  | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Cis-1,3-dichloropropene               | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Trans-1,3-dichloropropene             | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Toluene                               | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,1,2-Trichloroethane                 | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,3-Dichloropropane                   | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Dibromochloromethane                  | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Tetrachloroethene                     | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,2-Dibromomethane                    | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| Chlorobenzene                         | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,1,1,2-Tetrachloroethane             | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Ethylbenzene                          | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| p & m-Xylene                          | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Styrene                               | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Trihomomethane                        | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| o-Xylene                              | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,1,2,2-Tetrachloroethane             | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Isopropylbenzene                      | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Bromobenzene                          | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| n-Propylbenzene                       | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| 2-Chlorotoluene                       | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 4-Chlorotoluene                       | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,3,5-Trimethylbenzene                | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| tert-Butylbenzene                     | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,2,4-Trimethylbenzene                | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| sec-Butylbenzene                      | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,3-Dichlorobenzene                   | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| p-Isopropyltoluene                    | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| 1,2-Dichlorobenzene                   | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,4-Dichlorobenzene                   | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Butylbenzene                          | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,2-Dibromo-3-chloropropane           | µg/kg | 1                  | ISO 17025            | < 1.0 | - |
| 1,2,4-Trichlorobenzene                | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| Hexachlorobutadiene                   | µg/kg | 1                  | MCERTS               | < 1.0 | - |
| 1,2,3-Trichlorobenzene                | µg/kg | 1                  | NONE                 | < 1.0 | - |

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Analytical Report Number: 15-73271  
Project / Site name: Elm Road, Wrexham  
Your Order No: 10610-1887-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Date Sampled | Time Taken    |
|-------------------|------------------|---------------|-----------|--------------|---------------|
| 453020            | WS102            | None Supplied | 3.70      | 04/05/2015   | None Supplied |
| 453021            | WS104            | None Supplied | 2.30      | 04/05/2015   | None Supplied |
| 453022            | WS109            | None Supplied | 1.90      | 05/06/2015   | None Supplied |
| 453023            | WS112            | None Supplied | 0.40      | 05/06/2015   | None Supplied |

| Analytical Parameter (Soil Analysis) |       |      |           |   |   | Units | Limit of detection | Accreditation Status |
|--------------------------------------|-------|------|-----------|---|---|-------|--------------------|----------------------|
| Aniline                              | mg/kg | 0.1  | NONE      | - | - | -     | -                  | -                    |
| Phenol                               | mg/kg | 0.2  | ISO 17025 | - | - | -     | -                  | -                    |
| 2-Chlorophenol                       | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Bis(2-chloroethyl) ether             | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| 1,3-Dichlorobenzene                  | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| 1,2-Dichlorobenzene                  | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Bis(2-chloroisopropyl) ether         | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| 2-Methylphenol                       | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| Hexachloroethane                     | mg/kg | 0.05 | MCERTS    | - | - | -     | -                  | -                    |
| Nitrobenzene                         | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| 4-Methylphenol                       | mg/kg | 0.2  | NONE      | - | - | -     | -                  | -                    |
| Isophorone                           | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| 2-Nitrophenol                        | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| 2,4-Dimethylphenol                   | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| Bis(2-chloroethoxy) methane          | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| 1,2,4-Trichlorobenzene               | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| Naphthalene                          | mg/kg | 0.05 | MCERTS    | - | - | -     | -                  | -                    |
| 2,4-Dichlorophenol                   | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| 4-Chloroaniline                      | mg/kg | 0.1  | NONE      | - | - | -     | -                  | -                    |
| Hexachlorobutadiene                  | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| + Chloro-3-methylphenol              | mg/kg | 0.1  | NONE      | - | - | -     | -                  | -                    |
| 2,4,6-Trichlorophenol                | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| 2,4,5-Trichlorophenol                | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| 2-Methylnaphthalene                  | mg/kg | 0.1  | NONE      | - | - | -     | -                  | -                    |
| 2-Chloronaphthalene                  | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Dimethylphthalate                    | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| 2,6-Dinitrotoluene                   | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Acenaphthylene                       | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Acenaphthene                         | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| 2,4-Dinitrotoluene                   | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| Dibenzofuran                         | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| 4-Chlorophenyl phenyl ether          | mg/kg | 0.3  | ISO 17025 | - | - | -     | -                  | -                    |
| Diethyl phthalate                    | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| 4-Nitroaniline                       | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| Fluorene                             | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Azobenzene                           | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| Bromophenyl phenyl ether             | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| Hexachlorobenzene                    | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| Phenanthrene                         | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Anthracene                           | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Carbazole                            | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| Dibutyl phthalate                    | mg/kg | 0.2  | MCERTS    | - | - | -     | -                  | -                    |
| Anthraquinone                        | mg/kg | 0.3  | MCERTS    | - | - | -     | -                  | -                    |
| Fluoranthene                         | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Pyrene                               | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Butyl benzyl phthalate               | mg/kg | 0.3  | ISO 17025 | - | - | -     | -                  | -                    |
| Benzo(a)anthracene                   | mg/kg | 0.05 | MCERTS    | - | - | -     | -                  | -                    |
| Chrysene                             | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Benzo(b)fluoranthene                 | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Benzo(k)fluoranthene                 | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Benzo(a)pyrene                       | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Indeno(1,2,3-cd)pyrene               | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Dibenz(a,h)anthracene                | mg/kg | 0.1  | MCERTS    | - | - | -     | -                  | -                    |
| Benzo(ghi)perylene                   | mg/kg | 0.05 | MCERTS    | - | - | -     | -                  | -                    |

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The results included within the report are representative of the samples submitted for analysis.

**Analytical Report Number : 15-73271**  
**Project / Site name: Elm Road, Wrexham**

\* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

| Lab Sample Number | Sample Reference | Sample Number | Depth (m)     | Sample Description *                             |
|-------------------|------------------|---------------|---------------|--------------------------------------------------|
| 453010            | Crush 1          | None Supplied | None Supplied | Light brown loam and sand with rubble and brick. |
| 453011            | Crush 2          | None Supplied | None Supplied | Light brown loam and sand with rubble and brick. |
| 453012            | TP102            | None Supplied | 0.20          | Brown loam and sand with rubble and brick.       |
| 453013            | TP104            | None Supplied | 0.30          | Brown loam and sand with rubble and brick.       |
| 453014            | TP107            | None Supplied | 0.50          | Red loam and sand with rubble and brick.         |
| 453015            | TP109            | None Supplied | 2.30          | Light brown clay and sand.                       |
| 453016            | WS101            | None Supplied | 0.60          | Brown clay and loam.                             |
| 453017            | WS101            | None Supplied | 1.30          | Light brown clay.                                |
| 453018            | WS102            | None Supplied | 0.80          | Red loam and sand with rubble and brick.         |
| 453019            | WS102            | None Supplied | 1.20          | Grey clay.                                       |
| 453020            | WS102            | None Supplied | 3.70          | Black clay and loam with gravel.                 |
| 453021            | WS104            | None Supplied | 2.30          | Brown clay and sand with gravel.                 |
| 453022            | WS109            | None Supplied | 1.90          | Light brown sand.                                |
| 453023            | WS112            | None Supplied | 0.40          | Light grey loam and sand with rubble and stones. |

# Analytical Report Number : 15-73271

Project / Site name: Elm Road, Wrexham

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

| Analytical Test Name                    | Analytical Method Description                                                                                                                                                              | Analytical Method Reference                                                                                                       | Method number | Wet / Dry Analysis | Accreditation Status |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Asbestos Identification in soil         | Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.                                                                     | In house method based on HSG 248                                                                                                  | A001-PL       | D                  | ISO 17025            |
| Crush Whole Sample                      | Either: Client specific preparation instructions - sample(s) crushed whole prior to analysis, OR sample unsuitable for standard preparation and therefore crushed whole prior to analysis. | In house method, applicable to dry samples only.                                                                                  | L019-UK       | D                  | NONE                 |
| Hexavalent chromium in soil             | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.                                      | In-house method                                                                                                                   | L080-PL       | W                  | MCCERTS              |
| Metals in soil by ICP-OES               | Determination of metals in soil by aqua-regia digestion followed by ICP-OES.                                                                                                               | In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.                                              | L038-PL       | D                  | MCCERTS              |
| Moisture Content                        | Moisture content, determined gravimetrically.                                                                                                                                              | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L019-UK/PL    | W                  | NONE                 |
| Monohydric phenols in soil              | Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.                                                                     | In-house method based on Examination of Water and Wastewater 20th Edition: (Clesceri, Greenberg & Eaton (skalar)                  | L080-PL       | W                  | MCCERTS              |
| pH in soil (automated)                  | Determination of pH in soil by addition of water followed by electrometric measurement.                                                                                                    | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L099-PL       | D                  | MCCERTS              |
| Semi-volatile organic compounds in soil | Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.                                                                    | In-house method based on USEPA 8270                                                                                               | L064-PL       | D                  | MCCERTS              |
| Speciated EPA-16 PAHs in soil           | Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.                                     | In-house method based on USEPA 8270                                                                                               | L064-PL       | D                  | MCCERTS              |
| Stones content of soil                  | Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.                                                                | In-house method based on British Standard Methods and MCCERTS requirements.                                                       | L019-UK/PL    | D                  | NONE                 |
| Sulphate, water soluble, in soil        | Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).                                  | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES. | L038-PL       | D                  | MCCERTS              |
| Sulphide in soil                        | Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.                     | In-house method                                                                                                                   | L010-PL       | D                  | MCCERTS              |
| Total cyanide in soil                   | Determination of total cyanide by distillation followed by colorimetry.                                                                                                                    | In-house method based on Examination of Water and Wastewater 20th Edition: (Clesceri, Greenberg & Eaton (Skalar)                  | L080-PL       | W                  | MCCERTS              |
| Total organic carbon in soil            | Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.                                                              | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L023-PL       | D                  | MCCERTS              |
| Total sulphate (as SO4 in soil)         | Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.                                                                                                    | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                                  | L038-PL       | D                  | ISO 17025            |
| Total Sulphur in soil                   | Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.                                                                       | In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil                      | L038-PL       | D                  | NONE                 |
| TPH in (Soil)                           | Determination of TPH bands by GC-MS/GC-FID                                                                                                                                                 | In-house method, TPH with carbon banding.                                                                                         | L064/076-PL   | D                  | NONE                 |



Analytical Report Number : 15-73271

Project / Site name: Elm Road, Wrexham

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

| Analytical Test Name               | Analytical Method Description                                           | Analytical Method Reference        | Method number | Wet / Dry Analysis | Accreditation Status |
|------------------------------------|-------------------------------------------------------------------------|------------------------------------|---------------|--------------------|----------------------|
| Volatile organic compounds in soil | Determination of volatile organic compounds in soil by headspace GC-MS. | In-house method based on USEPA8260 | L0735-PL      | W                  | MCERTS               |

For method numbers ending in 'UK' analysts have been carried out in our laboratory in the United Kingdom.

Soil analytical results are expressed on a dry weight basis. Where analysts have been carried out in our laboratory in Poland.

correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30°C.

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## Analytical Report Number : 15-73601

|                             |                   |                               |            |
|-----------------------------|-------------------|-------------------------------|------------|
| <b>Project / Site name:</b> | Elm Road, Wrexham | <b>Samples received on:</b>   | 16/06/2015 |
| <b>Your job number:</b>     | 10-610            | <b>Samples instructed on:</b> | 16/06/2015 |
| <b>Your order number:</b>   | 10610-1911-RJW    | <b>Analysis completed by:</b> | 22/06/2015 |
| <b>Report Issue Number:</b> | 1                 | <b>Report issued on:</b>      | 22/06/2015 |
| <b>Samples Analysed:</b>    | 3 water samples   |                               |            |

Signed:

Dr Claire Stone  
Quality Manager  
For & on behalf of 12 Analytical Ltd.

Signed:

Rexona Rahman  
Reporting Manager  
For & on behalf of 12 Analytical Ltd.

Other office located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

- soils - 4 weeks from reporting
- leachates - 2 weeks from reporting
- waters - 2 weeks from reporting
- asbestos - 6 months from reporting

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**Your Order No: 10610-1911-RJW**

| General Inorganics |     |           |     |      |
|--------------------|-----|-----------|-----|------|
| pH Units           | N/A | ISO 17025 | 7.7 | > 10 |
| mg/l               | 10  | ISO 17025 | 7.6 | > 10 |
| Total Cyanide      |     |           | 7.7 | > 10 |

|    |      |           |    |        |        |        |
|----|------|-----------|----|--------|--------|--------|
| 17 | 0.5  | ISO 17025 | 17 | 7.9    | 1.4    | 1.4    |
| 16 | 0.5  | ISO 17025 | 16 | 1.6    | 1.6    | > 0.6  |
| 15 | 0.5  | ISO 17025 | 15 | 1.6    | 1.9    | 1.0    |
| 14 | 0.05 | ISO 17025 | 14 | > 0.05 | > 0.05 | > 0.05 |
| 13 | 0.2  | ISO 17025 | 13 | 2.8    | 2.8    | 0.3    |
| 12 | 0.5  | ISO 17025 | 12 | 8.2    | 4.5    | 3.2    |
| 11 | 0.2  | ISO 17025 | 11 | 0.5    | 0.9    | > 0.2  |
| 10 | 5    | ISO 17025 | 10 | < 5.0  | < 5.0  | > 5.0  |
| 9  | 0.02 | ISO 17025 | 9  | 0.03   | < 0.02 | > 0.02 |
| 8  | 0.15 | ISO 17025 | 8  | 6.36   | 2.54   | 0.50   |
| 7  | 0.15 | ISO 17025 | 7  | 2.54   | 2.54   | 0.50   |
| 6  | 0.15 | ISO 17025 | 6  | 2.54   | 2.54   | 0.50   |
| 5  | 0.15 | ISO 17025 | 5  | 2.54   | 2.54   | 0.50   |
| 4  | 0.15 | ISO 17025 | 4  | 2.54   | 2.54   | 0.50   |
| 3  | 0.15 | ISO 17025 | 3  | 2.54   | 2.54   | 0.50   |
| 2  | 0.15 | ISO 17025 | 2  | 2.54   | 2.54   | 0.50   |
| 1  | 0.15 | ISO 17025 | 1  | 2.54   | 2.54   | 0.50   |

|                                |      |    |      |      |      |      |      |
|--------------------------------|------|----|------|------|------|------|------|
| PH-CWG - Aromatic > C5 - C7    | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aromatic > C7 - C8    | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aromatic > C8 - C10   | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aromatic > C10 - C12  | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aromatic > C12 - C16  | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aromatic > C16 - C21  | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aromatic > C21 - C35  | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aliphatic > C5 - C8   | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aliphatic > C8 - C10  | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aliphatic > C10 - C12 | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aliphatic > C12 - C16 | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aliphatic > C16 - C21 | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |
| PH-CWG - Aliphatic > C21 - C35 | µg/l | 10 | NONE | < 10 | < 10 | < 10 | < 10 |

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Analytical Report Number: 15-73601  
Project / Site name: Elm Road, Wrexham

Your Order No: 10610-1911-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m) | Date Sampled | Time Taken    |
|-------------------|------------------|---------------|-----------|--------------|---------------|
| 454917            | WS102            | None Supplied |           | 12/06/2015   | None Supplied |
| 454918            | WS108            | None Supplied |           | 12/06/2015   | None Supplied |
| 454919            | WS109            | None Supplied |           | 12/06/2015   | None Supplied |

| Analytical Parameter (Water Analysis) |  | Units | Limit of detection | Accreditation Status |
|---------------------------------------|--|-------|--------------------|----------------------|
|                                       |  | µg/l  |                    | ISO 17025            |

|                                       |      |   |           |       |
|---------------------------------------|------|---|-----------|-------|
| Chloromethane                         | µg/l | 1 | ISO 17025 | < 1.0 |
| Chloroethane                          | µg/l | 1 | ISO 17025 | < 1.0 |
| Bromomethane                          | µg/l | 1 | ISO 17025 | < 1.0 |
| Vinyl Chloride                        | µg/l | 1 | NONE      | < 1.0 |
| Trichlorofluoromethane                | µg/l | 1 | NONE      | < 1.0 |
| 1,1-Dichloroethene                    | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,2-Trichloro-1,2,2-trifluoroethane | µg/l | 1 | ISO 17025 | < 1.0 |
| Cis-1,2-dichloroethene                | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,2-Trichloroethane                 | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,1-Trichloroethane                 | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dichloroethane                    | µg/l | 1 | ISO 17025 | < 1.0 |
| Trans-1,2-dichloroethene              | µg/l | 1 | ISO 17025 | < 1.0 |
| Benzene                               | µg/l | 1 | ISO 17025 | < 1.0 |
| Tetrachloromethane                    | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dichloropropane                   | µg/l | 1 | ISO 17025 | < 1.0 |
| Trichloroethene                       | µg/l | 1 | ISO 17025 | < 1.0 |
| Dibromomethane                        | µg/l | 1 | ISO 17025 | < 1.0 |
| Bromodichloromethane                  | µg/l | 1 | ISO 17025 | < 1.0 |
| Cis-1,3-dichloropropene               | µg/l | 1 | ISO 17025 | < 1.0 |
| Trans-1,3-dichloropropene             | µg/l | 1 | ISO 17025 | < 1.0 |
| Toluene                               | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,2-Trichloroethane                 | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dibromomethane                    | µg/l | 1 | ISO 17025 | < 1.0 |
| Tetrachloroethane                     | µg/l | 1 | ISO 17025 | < 1.0 |
| Dibromochloromethane                  | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,3-Dichloropropane                   | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,2-Trichloroethane                 | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dichloroethane                    | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,2-Trichloroethane                 | µg/l | 1 | ISO 17025 | < 1.0 |
| o-Xylene                              | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,2,2-Tetrachloroethane             | µg/l | 1 | ISO 17025 | < 1.0 |
| Ethylbenzene                          | µg/l | 1 | ISO 17025 | < 1.0 |
| p & m-Xylene                          | µg/l | 1 | ISO 17025 | < 1.0 |
| Styrene                               | µg/l | 1 | ISO 17025 | < 1.0 |
| Triisobutylbenzene                    | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,1,2,2-Tetrachloroethane             | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dibromomethane                    | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dichloroethane                    | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,3-Dichlorobenzene                   | µg/l | 1 | ISO 17025 | < 1.0 |
| p-Isopropyltoluene                    | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dichlorobenzene                   | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,4-Dichlorobenzene                   | µg/l | 1 | ISO 17025 | < 1.0 |
| Bulkybenzene                          | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2-Dibromo-3-chloropropane           | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2,3-Trichlorobenzene                | µg/l | 1 | ISO 17025 | < 1.0 |
| Hexachlorobutadiene                   | µg/l | 1 | ISO 17025 | < 1.0 |
| 1,2,3-Trichlorobenzene                | µg/l | 1 | ISO 17025 | < 1.0 |

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Analytical Report Number: 15-73601  
Project / Site name: Elm Road, Wrexham

Your Order No: 10610-1911-RJW

| Lab Sample Number | Sample Reference | Sample Number | Depth (m)     | Date Sampled | Time Taken    |
|-------------------|------------------|---------------|---------------|--------------|---------------|
| 454917            | WS102            | None Supplied | None Supplied | 12/06/2015   | None Supplied |
| 454918            | WS108            | None Supplied | None Supplied | 12/06/2015   | None Supplied |
| 454919            | WS109            | None Supplied | None Supplied | 12/06/2015   | None Supplied |

| Analytical Parameter (Water Analysis) | Units | Limit of detection | Accreditation Status |
|---------------------------------------|-------|--------------------|----------------------|
|---------------------------------------|-------|--------------------|----------------------|

|                             |      |      |           |        |        |        |        |
|-----------------------------|------|------|-----------|--------|--------|--------|--------|
| Aniline                     | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Phenol                      | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 2-Chlorophenol              | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Bis(2-chloroethyl) ether    | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 2-Methylphenol              | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Hexachlorocyclopentadiene   | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 4-Chlorophenol              | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 2,4-Dichlorophenol          | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 2,4,6-Trichlorophenol       | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 2-Methylthiophene           | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 2-Chlorothiophene           | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Dimethylphthalate           | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 2,6-Dinitrotoluene          | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Acenaphthylene              | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Acenaphthene                | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 2,4-Dinitrotoluene          | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Dibenzofuran                | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 4-Chlorophenyl phenyl ether | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Dichlorophthalate           | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| 4-Nitroaniline              | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Fluorene                    | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Azobenzene                  | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Bromophenyl phenyl ether    | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Hexachlorobenzene           | µg/l | 0.02 | NONE      | < 0.02 | < 0.02 | < 0.02 | < 0.02 |
| Phenanthrene                | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Anthracene                  | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Carbazole                   | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Dibutyl phthalate           | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Anthraquinone               | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Pyrene                      | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Butyl benzyl phthalate      | µg/l | 0.05 | NONE      | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Benz(a)anthracene           | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Chrysene                    | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Benz(b)fluoranthene         | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Benz(k)fluoranthene         | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Benz(a)pyrene               | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Indeno(1,2,3-cd)pyrene      | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Dibenz(a,h)anthracene       | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Benzo(ghi)perylene          | µg/l | 0.01 | ISO 17025 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report are representative of the samples submitted for analysis.



**Analytical Report Number : 15-73601**

**Project / Site name: Elm Road, Wrexham**

**Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)**

| Analytical Test Name                     | Analytical Method Description                                                                                                             | Analytical Method Reference                                                                                     | Method number | Wet / Dry Analysis | Accreditation Status |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------|--------------------|----------------------|
| Hexavalent chromium in water             | Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.                | In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.                                    | L080-PL       | W                  | ISO 17025            |
| Metals in water by ICP-MS (dissolved)    | Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW. | In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS. | L012-PL       | W                  | ISO 17025            |
| Monohydric phenols in water              | Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW                                              | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar) | L080-PL       | W                  | ISO 17025            |
| pH in water                              | Determination of pH in water by electronic measurement. Accredited matrices: SW PW GW                                                     | In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests                                | L005-PL       | W                  | ISO 17025            |
| Semi-volatile organic compounds in water | Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.                          | In-house method based on USEPA 8270                                                                             | L070-UK       | W                  | NONE                 |
| Total cyanide in water                   | Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW                                     | In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar) | L080-PL       | W                  | ISO 17025            |
| TPH in (Water)                           | Determination of TPH bands by GC-MS/GC-FID                                                                                                | In-house method, TPH with carbon banding.                                                                       | L070-PL       | W                  | NONE                 |
| TPHCWG (Waters)                          | Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.                                | In-house method                                                                                                 | L070-UK       | W                  | NONE                 |
| Volatile organic compounds in water      | Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW                                    | In-house method based on USEPA8260                                                                              | L073W-PL      | W                  | ISO 17025            |

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom. For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland. Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 300C.

This certificate should not be reproduced, except in full, without the express permission of the laboratory. The results included within the report are representative of the samples submitted for analysis.



## APPENDIX VII GEO-TECHNICAL TESTING RESULTS

Professional Soils Laboratory

**PSL**

# LABORATORY REPORT



4043

Contract Number: PSL15/2846

Client's Reference:

Report Date: 16 June 2015

Client Name:

E3P

Helipoint Business Park

Liverpool Road

Eccles

Manchester

M30 7RU

For the attention of: R Walker

Contract Title: Elm Point, Wrexham

Date Received:

11/6/2015

Date Commenced:

11/6/2015

Date Completed:

16/6/2015

Notes:

Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson  
(Director)

A Watkins  
(Director)

M Beasall  
(Laboratory Manager)

D Lambe  
(Senior Technician)

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[illegible]

THE

Professional Soils Laboratory

|                                                                                     |          |                                                                                     |            |                                                                                     |          |
|-------------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|----------|
| Compiled by                                                                         | Date     | Checked by                                                                          | Date       | Approved by                                                                         | Date     |
|  | 16/06/15 |  | 16/06/15   |  | 16/06/15 |
| ELM POINT, WREXHAM.                                                                 |          |                                                                                     |            |                                                                                     |          |
| Contract No:                                                                        |          |                                                                                     | PSL15/2846 |                                                                                     |          |
| Client Ref:                                                                         |          |                                                                                     |            |                                                                                     |          |

(B.S. 1377 : PART 2 : 1990)

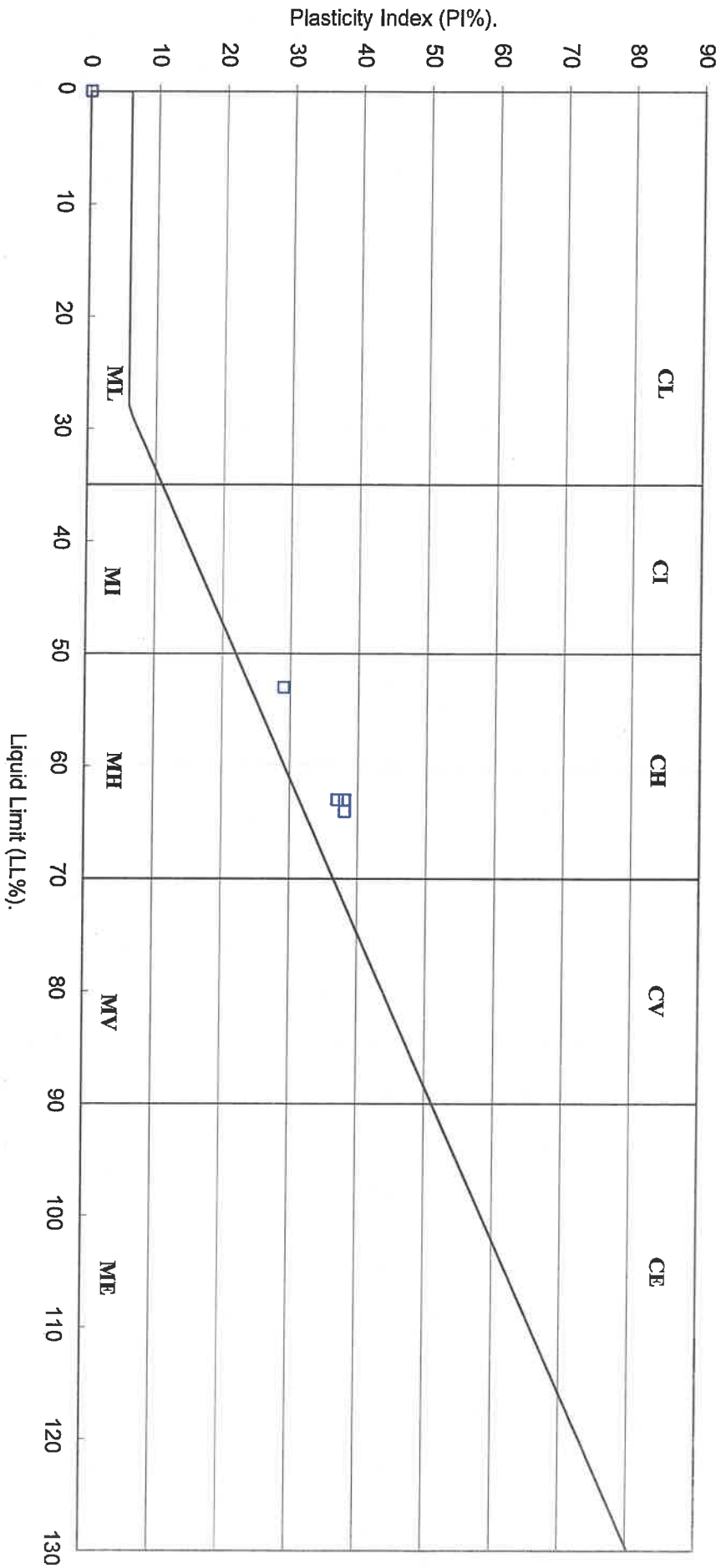
\*: Liquid Limit and Plastic Limit Wet Sieved.

## Professional Soils Laboratory

**ELM POINT, WREXHAM.**

# PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



**PSL**

**Professional Soils Laboratory**

Compiled by

*ML*

Date

16/06/15

Checked by

*M. S. ...*

Date

16/06/15

Approved by

*M. S. ...*

Date

16/06/15

ELM POINT, WREXHAM.

Contract No: PSL15/2846

Client Ref:



## APPENDIX VIII ORIGIN OF TIER I GENERIC ASSESSMENT CRITERIA

| CONSTITUENT                                      | ORIGIN OF RISK ASSESSMENT VALUE                |
|--------------------------------------------------|------------------------------------------------|
| Arsenic                                          | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Cadmium                                          | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Chromium                                         | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Lead                                             | PC4SL                                          |
| Mercury                                          | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Nickel                                           | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Selenium                                         | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Copper                                           | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Zinc                                             | S4UL's - LQM CIEH 2 <sup>nd</sup> Edition 2009 |
| Cyanide - Total                                  | CLEA 1.06 Derived Value                        |
| Phenols - Total                                  | LQM CIEH 2 <sup>nd</sup> Edition 2009 - 1% SOM |
| Naphthalene                                      |                                                |
| Acenaphthylene                                   |                                                |
| Acenaphthene                                     |                                                |
| Fluorene                                         |                                                |
| Phenanthrene                                     |                                                |
| Anthracene                                       |                                                |
| Fluoranthene                                     | S4UL's                                         |
| Pyrene                                           |                                                |
| Benzo(a)Anthracene                               |                                                |
| Chrysene                                         |                                                |
| Benzo(b/k)Fluoranthene (m)                       |                                                |
| Benzo(a)Pyrene                                   | PC4SL                                          |
| Indeno(123-cd)Pyrene                             |                                                |
| Dibenzo(a,h)Anthracene                           |                                                |
| Benzo(ghi)Perylene                               |                                                |
| TPH C <sub>5</sub> -C <sub>6</sub> (aliphatic)   |                                                |
| TPH C <sub>6</sub> -C <sub>8</sub> (aliphatic)   |                                                |
| TPH C <sub>9</sub> -C <sub>10</sub> (aliphatic)  |                                                |
| TPH C <sub>10</sub> -C <sub>12</sub> (aliphatic) |                                                |
| TPH C <sub>12</sub> -C <sub>16</sub> (aromatic)  |                                                |
| TPH C <sub>16</sub> -C <sub>21</sub> (aromatic)  |                                                |
| TPH C <sub>21</sub> -C <sub>35</sub> (aromatic)  |                                                |

S4UL's - 2015- General Assessment Criteria (GAC) developed by CIEH / LQM the using CLEA 1-06 with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM

General Assessment Criteria (GAC) developed by CIEH / LQM the using CLEA 1-06 with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM

